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No. 204

UNITED STATES
DEPARTMENT OF AGRICULTURE
Miscellaneous Publication No. 204

Washington, D. C. Issued August 1935

RAINFALL INTENSITY-FREQUENCY DATA

By

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Division of Drainage, Bureau of Agricultural Engineering

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By DAVID L. YARNELL, *senior drainage engineer, Division of Drainage, Bureau of Agricultural Engineering* [2]

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INTRODUCTION

The purpose of this investigation was to determine the frequency at which excessive rates of precipitation occur in different sections of the United States, and the intensity and duration of those rates. Such data are fundamental for the adequate and economical design of farm-terrace systems, farm-drainage systems, highway and railway culverts, municipal storm-sewer systems, and other engineering works that must care for storm run-off. It is believed that this study has developed data sufficient for predicting with reasonable accuracy the period of recurrence of intense precipitations in any part of the United States. The methods followed and the results obtained differ considerably from those of the Miami Conservancy District.[3]

From a detailed study of the records of excessive short-time precipitations at the Weather Bureau stations in continental United States having recording rain gages (see fig. 1), tables have been prepared showing for each station the short-interval record of the most intense storm and the maximum short-period precipitations that have occurred, and charts have been prepared showing the maximum precipitations in periods of 5 minutes to 2 hours that may be expected to occur with average frequencies of 2 to 100 years. From the same records and those of 24-hour precipitations at all Weather Bureau stations in continental United States, similar charts have been prepared showing the maximum 4-hour to 24-hour precipitations of

[1] The compilation, analysis, and publication of the data presented comprise a research project financed by funds provided by the Civil Works Administration, and carried out by temporary employees of the Bureau of Agricultural Engineering under the direction of the author.

[2] To Adolph F. Meyer, professor of hydraulic engineering, University of Iowa, the author is deeply grateful for extended advice and assistance in preparation of the rainfall charts. The suggestions also of Frederick Theodore Mavis, associate director in charge of the Laboratory of Hydraulic Research, University of Iowa, are acknowledged with thanks. Aid in the computations was given by engineers J. Alston Fisher, Walter Valentine, Edward Soucek, L. W. Garrett, Charles W. Kinney, Carlos Kampmeier, G. A. Kellow, F. W. Kunkel, R. B. Miller, J. W. Blessing, R. B. Day, and J. B. Saylor.

[3] MIAMI CONSERVANCY DISTRICT, ENGINEERING STAFF. STORM RAINFALL OF EASTERN UNITED STATES. Miami Conserv. Dist. Tech. Rept. pt. 5, 310 pp., illus. 1917.

FIGURE 1.—Weather Bureau stations furnishing data for determining high short-time rates of rainfall.

5-year to 100-year frequencies. Other charts show the number of excessive rainstorms per 30 years that occur in each of the months. The data studied comprise all recorded by the stations indicated, through 1933. The short-period records cover a total of 28,077 rainstorms. (Snowfall was not considered in this study.)

Many recent researches have demonstrated that, as a basis for the design of improvement works, conclusions respecting the probable intensity and frequency of rainfall in a given area are far safer and more economical if drawn from a study of the occurrence at many stations than if drawn from 25- or 50-year records from only one station. Single-station records seldom, if ever, give a correct picture of the normal rainfall experience in any particular area. The charts presented herein are based upon the weighted rainfall experience of all Weather Bureau stations, and therefore are more dependable for design than the records of any individual station. However, since heavy rains are local phenomena and subject to local influences, especially in mountainous regions, the intensity-frequency charts shown are recognized to be, as predictions of future occurrence, probabilities rather than absolute certainties.

METHOD OF INVESTIGATION

Excessive storms may be divided into two classes, (1) rains of great intensity and short duration, and (2) rains of moderate intensity and long duration. Those of the first class, which are usually the more destructive, are the storms that are treated in this publication. In cities where nearly the entire watershed areas may be impervious, practically all of the storm water may find its way quickly into the sewers. On agricultural lands a large portion of the precipitation of quick, heavy storms may need to be carried off by the drains if flood damage is to be prevented, or by the terraces in order to avoid soil erosion.

To obtain accurate records of intensive precipitation for short periods requires automatic recording rain gages. The first automatic rain gage was used in 1888, by the Signal Service. (See report of the Chief of Weather Bureau for 1896–97, p. 362.) Since 1893 the Weather Bureau has installed many more self-registering gages, until by 1933 there were records made by such instruments at 211 stations (including a few stations at which records had been discontinued). The records of the intense precipitations at those stations have been published in the annual reports of the Chief of the Weather Bureau for 1895–96 and subsequently. Those records show—

> the accumulated amounts of precipitation for each 5 minutes during all storms in which the rate of fall equaled or exceeded 0.25 inch in any 5-minute period, or 0.30 inch in any 10-minute period, or 0.35 inch in any 15-minute period, etc. If the period be 1 hour the minimum fall would need to be 0.80 inch; if 2 hours, 1.40 inches. (See report of the Chief of the Weather Bureau for 1929–30, p. 58.)

In the South Atlantic and the Gulf States, including Arkansas, Kentucky, and Tennessee, but not including the western portion of Texas, very heavy falls are so frequent that the published records show generally for those regions only the storms in which 1 inch or more fell in an hour.

The published Weather Bureau reports show the accumulated amounts of precipitation at 5-minute intervals during the storms.

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Station	Duration of Storm		Total precipitation	Time excess prec. began	Prec. prior excess rate	Time in minutes														Hours					
	From	To				5	10	15	20	25	30	35	40	45	50	60	80	100	120	3	6	12	24	48	72
Date 1912 July 14																									
Obs. Precip.	P 5.40	P 10.20	2.93	P 6.01	.02	.05	.25	.59	.93	1.38	1.78	2.14	2.38	2.50	2.54										
Increment						.05	.20	.34	.34	.45	.40	.36	.24	.12	.04						4 3/4 H				
Max. Precip.						.45	.85	1.21	1.55	1.89	2.13	2.33	2.45	2.50	2.54						2.93				
Date 1922 Sept. 2																									
Obs. Precip.	a 1.55	a 10.25	5.16	a 5.32	.66	.21	.41	.67	.93	1.10	1.25	1.37	1.51	1.65	1.81	2.35	2.96	3.45							
Increment						.21	.20	.26	.26	.17	.15	.12	.14	.14	.16	.54	.61	.49				8 1/2 H			
Max. Precip.						.27	.54	.72	.93	1.10	1.25	1.37	1.51	1.71	1.94	2.35	2.96	3.45				5.16			
Date																									
Obs. Precip.																									
Increment																									
Max. Precip.																									
Date																									
Obs. Precip.																									
Increment																									
Max. Precip.																									

FIGURE 2.—Sample form of computation of maximum short-time rates of rainfall.

Comparison of the published data with the original records for a number of storms indicates that the actual maximum 5-minute precipitation during any storm commonly exceeds the published figure by 8 to 10 percent, when determined from the particular interval of greatest downfall rather than from the series of regular intervals. Similar comparisons for the 1-hour and 2-hour precipitations indicate that the actual 1-hour maximum is 4 to 5 percent greater than the published record, and the 2-hour maximum 9 to 12 percent greater, because the published records do not include rainfall at low rates near the beginning and the end of the storm. The method of arranging these data to determine maximum rates of rainfall for short periods is illustrated in figure 2. On this form are shown the storms of July 14, 1912, and September 2, 1922, at Washington, D. C. If a storm lasted only 40 or 50 minutes, for example, in preparing the charts the observed precipitation in that length of time was considered also as having fallen in periods of 1 hour and 2 hours. It should be noted that in parts of the United States, especially in mountainous areas of the West, intense storms of small extent such as local cloudbursts have occurred without being recorded by the Weather Bureau because the stations there were not equipped with self-registering rain gages.

On such forms the times of beginning and ending of the storm and other data are entered on the line showing the observed precipitation by 5-minute intervals, up to 50 minutes from the beginning of the period of excessive precipitation, as copied from Weather Bureau records. Unusually prolonged precipitations of great intensity have been summarized to show accumulations at less-frequent intervals. The stated increments of precipitation were computed from the figures of observed precipitations on the line above. Each maximum precipitation shown for any storm is the maximum for the period of length stated by the figure in the heading of the column, and was determined by selection from the 5-minute increments. For example, in the 1912 storm (fig. 2) the maximum precipitation for 5 minutes is the fifth increment, that for 10 minutes combines the fifth and sixth increments, and that for 20 minutes combines the fifth, sixth, seventh, and fourth increments. In the 1922 storm the stated maximum for 5 minutes is half the eleventh increment, which is for 10 minutes, the 10-minute maximum is the eleventh increment, but the 15-minute maximum is the second, third, and fourth together. Comparison of the observed precipitations and the maximum short-period precipitations plotted in order is shown in figure 3.

Intensity-frequency diagrams were prepared for all stations (like figures 63, *B* and 64, *B*), from all records through 1933. From these were determined the maximum precipitations in periods of 5 minutes to 2 hours that have occurred with different average frequencies. In determining the 24-hour precipitations, all storms were considered that exceeded certain arbitrary limits set low enough to get reliable determinations for 5-year frequencies. For a few States, 33-year records were used; for some, 24½-year records; and for the others, the 20-year records covering 1914–33. The 4-hour, 8-hour, and 16-hour precipitations were obtained by graphic interpolation. The determined values for the 10-minute to 2-hour durations and for the 24-hour duration were plotted on logarithmic paper with the

coordinates intensity and duration, for each of a large number of stations, and smooth curves were drawn locating points of equal frequency. These curves showed the intensities of the precipitations of 4, 8, and 16 hours duration.

On outline maps of the United States the amounts of precipitation in different periods for different recurrence frequencies, determined as just described, were marked in the proper locations. Then isohyetals—lines of equal precipitation—were drawn, the plotted values being weighted according to best judgment, considering the length and character of the records from the different stations.

PRECIPITATION RATES AND FREQUENCIES

A summary record of the most intense storm at each station, selected from consideration of the maximum short-time rate of precipitation, is given in table 1. The maximum short-period precipitations recorded at each station are given in table 2, which shows the records for periods up to 12 hours duration. The precipitation shown for any period, in table 2, may have occurred in a different

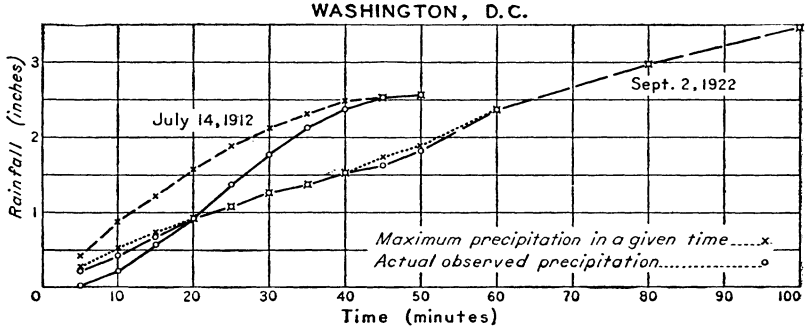

FIGURE 3.—Maximum short-period precipitations plotted in order of intensity compared with act ua storm record, for two heavy storms at Washington, D.C.

storm from that in which the precipitations shown for any or all other periods occurred.

The maximum precipitations for periods of 5, 10, 15, and 30 minutes and 1 and 2 hours that may be expected to occur on an average of once in 2, 5, 10, 25, 50, and 100 years in continental United States are shown in figures 4 to 39, and the maximum precipitations for 4, 8, 16, and 24 hours expected to occur once in 5, 10, 25, 50, and 100 years are shown in figures 40 to 59. The isohyetal interval is not the same on all these charts; even on some individual charts there is variation.

For California, Oregon, and Washington the locations of the 5-minute to 2-hour isohyetals could be determined only approximately, because of the small number of rainfall stations having automatic recording gages. No attempt has been made to show the precipitations for 4-, 8-, and 16-hour durations in California and the western part of Oregon and Washington, and in this area the 24-hour precipitations are shown by figures for 28 districts instead of by isohyetals. (See figs. 60 to 62.)

Graphs of the high-intensity precipitations at Honolulu, T. H., and San Juan, P. R., and the corresponding curves of average frequency are shown in figures 63 and 64.

The amount of surface run-off from a heavy rainfall, and the damage caused through floods or soil erosion in any locality, often depends in considerable measure upon the time of year when the storm occurs. The number of excessive short storms (2 hours or less duration) classed as excessive by the Weather Bureau that have occurred in each month, adjusted to a period of 30 years, are shown in figures 65 to 76, one figure for each month. The average period of record at the 206 stations is 29.5 years. The average number of storms in 30 years, as shown on the charts, was computed for each station as $n \times 30/y$, in which n is the number of excessive storms recorded and y is the length of the record in years. Comparison of figures 65 to 76 will show in what months heavy rainstorms are most frequent, for any part of the United States.

USE OF THE DATA

The rational method of estimating run-off is by substitution of known or assumed values for symbols in the formula

$$Q=CIA$$

in which Q=the rate of run-off, in cubic feet per second;
I=the rate of rainfall, in inches per hour;
C=the run-off coefficient, a decimal stating the portion of rainfall I that appears as run-off and depending upon the character of the drainage area;
and A=the drainage area in acres.

(The error of this formula is only 0.83 percent; exactly, with C=1.0000, a rainfall of 1.0000 inch per hour would give a run-off of 1.0083 cubic feet per second per acre.)

In applying this formula to any particular case, the area A is known, the rainfall rate I may be taken from the intensity-frequency charts (figs. 4 to 64) having regard for the economic aspect of the problem; and the coefficient C is a matter of judgment in comparing the case in question with others where run-off measurements have been made. Values of C for small agricultural lands have been given by Ramser [4] and values for impervious areas are stated in many textbooks on design of sewers.

Examples will illustrate use of the graphs and tables herein. It may be required to estimate the rate of run-off from a watershed of 40 acres in the vicinity of Washington, D.C., in order to design a ditch to drain that area. The distance from the most remote point of the area to the outlet ditch, along the course of flow, will be 2,000 feet. The ground slopes and character of surface indicate a velocity of flow of about 180 feet per minute. The period of concentration of flow from all parts of the area is thus computed as $2000 \div 180 = 11$ minutes. The degree of protection deemed economical will permit overflow of the ditch not oftener than once in 5 years. By interpolation between figures 11 and 17 for Washington, D. C., the maximum precipitation in 11 minutes and of 5-year recurrence interval is about 0.86 inch or 4.7 inches per hour. Estimating the coefficient C as 0.40, and substituting in the formula stated, the run-off is calculated as $Q=0.40 \times 4.7 \times 40=75$ cubic feet per second.

[4] RAMSER, C. E. RUN-OFF FROM SMALL AGRICULTURAL AREAS. Jour. Agr. Research 34:797-823 Illus. 1927.

Suppose it is desired to estimate the size of ditch necessary to carry away the drainage from a swampy area of 4,000 acres situated in the vicinity of Vicksburg, Miss., for a storm to be expected once in 5 years. The distance of the most remote point might be 32,500 feet from the outlet, and the ground slope and cover be such as to give a velocity of 90 feet per minute for the flow between those points. The period of concentration for the area then would be 6 hours. By interpolation between figures 40 and 45, the maximum precipitation at Vicksburg in 6 hours, to be expected with 5-year frequency, is 4.2 inches or 0.7 inch per hour. Assuming 0.4 for the coefficient C, the run-off then is computed as $Q=0.4\times0.7\times4{,}000=1{,}120$ cubic feet per second.

TABLE 1.—*Most intense rainstorm recorded at each station through 1933*

[For some prolonged storms prior to 1929, the records used in preparing this table show the precipitation by 5-minute intervals for more than 50 minutes. For some prolonged storms in 1929 and subsequent years, the maximum short-time precipitations given in this table were determined directly from graphic records by the registering rain gages instead of from the increments shown herein]

Station and date	Item	Entire storm: Duration: From—	Entire storm: Duration: To—	Entire storm: Rainfall	Time excessive rate began	Fall prior to excessive rate [1]	Precipitation for various periods, in inches: Minutes: 5	10	15	20	25	30	35	40	45	50	60	80	100	120	Hours: 3	6	12
				In.		*In.*																	
Abilene, Tex. Sept. 5, 1920.	Observed precipitation	4:10 p.m.	5:15 p.m.	2.43	4:19 p.m.	0.01	0.40	1.06	1.48	1.77	2.03	2.24	2.37	2.41									
	Increment						.40	.66	.42	.29	.26	.21	.13	.04									
	Maximum for period						.66	1.08	1.48	1.77	2.03	2.24	2.37	2.41									
Albany, N.Y. Aug. 11, 1914.	Observed precipitation	1:42 p.m.	3:02 p.m.	1.85	1:54 p.m.	.02	.05	.31	.68	1.05	1.40	1.58	1.60	1.66	1.67	1.67	1.82						
	Increment						.05	.26	.37	.37	.35	.18	.02	.06	.01	.0	.15						
	Maximum for period						.37	.74	1.09	1.35	1.53	1.58	1.60	1.66	1.67	1.70	1.82						
Alpena, Mich. May 29, 1914.	Observed precipitation	3:20 p.m.	5:45 p.m.	1.18	3:20 p.m.	.0	.41	.94	1.04														
	Increment						.41	.53	.10														
	Maximum for period						.53	.94	1.04														
Amarillo, Tex. May 26, 1905.	Observed precipitation	9:45 a.m.	7:15 p.m.	3.86	1:28 p.m.	.11	.09	.24	.49	.97	1.37	1.68	1.80	1.87									
	Increment						.09	.15	.25	.48	.40	.31	.12	.07									
	Maximum for period						.48	.88	1.19	1.44	1.59	1.71	1.80	1.87									
Anniston, Ala. Sept. 5, 1906.	Observed precipitation	3:45 p.m.	11:45 p.m.	4.35	3:45 p.m.	.0	.29	.86	1.45	2.10	2.65	2.97	3.25	3.43	3.50	3.60							
	Increment						.29	.57	.59	.65	.55	.32	.28	.18	.07	.10							
	Maximum for period						.65	1.24	1.81	2.36	2.68	2.97	3.25	3.43	3.50	3.60							
Apalachicola, Fla. May 2, 1923.	Observed precipitation	7:40 a.m.	6:30 p.m.	3.69	11:18 a.m.	.28	.06	.15	.22	.26	.34	.48	.76	1.39	2.02	2.32	2.71						
	Increment						.06	.09	.07	.04	.08	.14	.28	.63	.63	.30	.39						
	Maximum for period						.63	1.26	1.56	1.84	2.04	2.23	2.37	2.45	2.49	2.56	2.71						
Asheville, N.C. Aug. 18, 1918.	Observed precipitation	2:10 p.m.	7:10 p.m.	2.27	2:16 p.m.	.01	.48	1.31	1.71	1.80													
	Increment						.48	.83	.40	.09													
	Maximum for period						.83	1.31	1.71	1.80													
Atlanta, Ga. Aug. 11, 1926.	Observed precipitation	10:50 a.m.	11:42 a.m.	2.93	10:53 a.m.	.01	.30	.95	1.44	1.90	2.10	2.34	2.69	2.81	2.91								
	Increment						.30	.65	.49	.46	.20	.24	.35	.12	.10								
	Maximum for period						.65	1.14	1.60	1.90	2.10	2.34	2.69	2.81	2.91								
Atlantic City, N.J. July 22, 1903.	Observed precipitation	5:45 p.m.	11:55 p.m.	5.40	5:47 p.m.	T	.14	.35	.49	.60	.73	.83	.92	1.14	1.36	1.50	1.75	2.89	3.83	4.07	4.72		
	Increment						.14	.21	.14	.11	.13	.10	.09	.22	.22	.14	.25	1.14	.94	.24	.65		
	Maximum for period						.34	.67	.95	1.17	1.50	1.69	1.89	2.08	2.22	2.33	2.69	3.23	3.83	4.07	4.72		
Augusta, Ga. June 18, 1911.	Observed precipitation	5:35 p.m.	8:30 p.m.	2.91	5:42 p.m.	.02	.56	1.80	2.11	2.26	2.46	2.65	2.77	2.88									
	Increment						.56	1.24	.31	.15	.20	.19	.12	.11									
	Maximum for period						1.24	1.80	2.11	2.26	2.46	2.65	2.77	2.88									
Austin, Tex. May 6, 1930.	Observed precipitation	5:15 a.m.	10:45 a.m.	1.94	10:01 a.m.	.23	.11	.38	.88	1.36	1.57	1.69	1.70	1.71									
	Increment						.11	.27	.50	.48	.21	.12	.01	.01									
	Maximum for period						.50	.98	1.25	1.46	1.58	1.69	1.70	1.71									

[1] T.=trace.

TABLE 1.—*Most intense rainstorm recorded at each station through 1933*—Continued

Station and date	Item	Entire storm: Duration From—	Entire storm: Duration To—	Entire storm: Rainfall	Time excessive rate began	Fall prior to excessive rate [1]	Precipitation for various periods, in inches: Minutes 5	10	15	20	25	30	35	40	45	50	60	80	100	120	Hours 3	6	12
				In.		*In.*																	
Baker, Oreg. July 13, 1908.	Observed precipitation	2:40 p.m.	4:20 p.m.	0.95	3:05 p.m.	0.06	0.08	0.20	0.36	0.50	0.66	0.78											
	Increment						.08	.12	.16	.14	.16	.12											
	Maximum for period						.16	.30	.46	.58	.70	.78											
Baltimore, Md. July 12, 1903.	Observed precipitation	12:01 p.m.	1:10 p.m.	2.87	12:04 p.m.	.0	.33	.98	1.72	2.23	2.52	2.69	2.87										
	Increment						.33	.65	.74	.51	.29	.17	.18										
	Maximum for period						.74	1.39	1.90	2.23	2.52	2.69	2.87										
Bentonville, Ark. Apr. 23, 1908.	Observed precipitation	8:45 a.m.	4:55 p.m.	2.38	1:11 p.m.	.21	.08	.14	.40	1.04	1.59	1.76	1.81	1.88									
	Increment						.08	.06	.26	.64	.55	.17	.05	.07									
	Maximum for period						.64	1.19	1.45	1.62	1.68	1.76	1.81	1.88									
Binghamton, N.Y. June 24, 1924.	Observed precipitation	8:40 p.m.	(2)	2.36	8:46 p.m.	.02	.16	.34	.58	.64	.77	1.03	1.39	1.77	2.10	2.18	2.22	2.24					
	Increment						.16	.18	.24	.06	.13	.26	.36	.38	.33	.08	.04	.02					
	Maximum for period						.38	.74	1.07	1.33	1.46	1.54	1.76	1.94	2.10	2.18	2.22	2.24					
Birmingham, Ala. Sept. 3 1918.	Observed precipitation	1:54 p.m.	6:06 p.m.	2.19	2:15 p.m.	.01	.40	1.04	1.53	1.83	1.97												
	Increment						.40	.64	.49	.30	.14												
	Maximum for period						.64	1.13	1.53	1.83	1.97												
Bismarck, N.Dak. Aug. 9–10, 1909.	Observed precipitation	8:15 p.m.	(2)	3.60	10:53 p.m.	.04	.14	.47	.92	1.20	1.47	1.89	2.40	2.73	2.94	2.99							
	Increment						.14	.33	.45	.28	.27	.42	.51	.33	.21	.05							
	Maximum for period						.51	.93	1.26	1.53	1.93	2.26	2.59	2.80	2.94	2.99							
Block Island, R.I. Sept. 3, 1928.	Observed precipitation	1:45 a.m.	8:40 a.m.	3.32	5:32 a.m.	.36	.09	.20	.36	.45	.47	.50	.51	.54	.57	.64	.74	1.30	2.36	2.67			
	Increment						.09	.11	.16	.09	.02	.03	.01	.03	.03	.07	.10	.56	1.06	.31			
	Maximum for period						.33	.64	.87	1.06	1.28	1.44	1.52	1.59	1.71	1.82	1.92	2.06	2.36	2.67			
Boise, Idaho. July 30–31, 1912.	Observed precipitation	8:52 p.m.	1:20 a.m.	1.27	9:31 p.m.	.01	.05	.14	.17	.26	.33	.41	.51	.58	.60	.62	.95						
	Increment						.05	.09	.03	.09	.07	.08	.10	.07	.02	.02	.33						
	Maximum for period						.17	.33	.35	.37	.44	.54	.62	.69	.78	.81	.95						
Boston, Mass. Aug. 7, 1908.	Observed precipitation	1:38 p.m.	4:45 p.m.	1.73	1:48 p.m.	T	.07	.11	.23	.57	1.13	1.30	1.52	1.54	1.62								
	Increment						.07	.04	.12	.34	.56	.17	.22	.02	.08								
	Maximum for period						.56	.90	1.07	1.29	1.41	1.45	1.52	1.54	1.62								
Broken Arrow, Okla. Aug. 4, 1928.	Observed precipitation	10:30 p.m.	1:20 p.m.	6.99	2:59 a.m.	2.65	.20	.34	.50	.63	.82	.96	1.08	1.17	1.38	1.66	2.18	2.86	3.10				
	Increment						.20	.14	.16	.13	.19	.14	.12	.09	.21	.28	.52	.68	.24				
	Maximum for period						.28	.54	.80	1.01	1.18	1.35	1.52	1.69	1.78	1.90	2.23	2.86	3.10				
Brownsville, Tex. Apr. 27, 1932.	Observed precipitation	3:00 a.m.	7:05 a.m.	5.92	3:43 a.m.	.06	.29	.56	.92	1.18	1.49	1.81	2.29	2.67	3.06	3.47	4.75	5.63	5.76	5.81	5.86		
	Increment						.29	.27	.36	.26	.31	.32	.48	.38	.39	.41	1.28	.88	.13	.05	.05		
	Maximum for period						.64	1.28	1.69	2.08	2.46	2.94	3.26	3.57	3.83	4.19	4.75	5.63	5.76	5.81	5.86	[3] 5.92	
Buffalo, N.Y. July 19–20, 1911.	Observed precipitation	11:45 p.m.	4:00 a.m.	2.51	2:44 a.m.	.19	.11	.42	.81	.95	1.11	1.26	1.39	1.68	1.79	1.90	2.22						
	Increment						.11	.31	.39	.14	.16	.15	.13	.29	.11	.11	.32						
	Maximum for period						.39	.70	.84	1.00	1.15	1.28	1.57	1.68	1.79	1.95	2.22						
Burlington, Vt. June 21, 1933.	Observed precipitation	8:05 p.m.	10:00 p.m.	1.15	8:34 p.m.	.06	.46	.85	.87	.89	.89	.90	.92	.95	.97	.99	1.03						
	Increment						.46	.39	.02	.02	.00	.01	.02	.03	.02	.02	.04						
	Maximum for period						.46	.85	.87	.89	.89	.90	.92	.95	.97	.99	1.03	1.08	1.09				

Cairo, Ill. July 30, 1913.	Observed precipitation	3:05 p.m.	6:05 p.m.	2.56	3:11 p.m.	.01	.46	.91	1.32	1.54	1.66	1.76	1.85	(Record incomplete.)													
	Increment						.46	.45	.41	.22	.12	.10	.09														
	Maximum for period						.46	.91	1.32	1.54	1.66	1.76	1.85														
Canton, N.Y. July 16, 1925.	Observed precipitation	10:58 a.m.	12:44 p.m.	2.08	11:07 a.m.	.02	.24	.47	.67	1.08	1.45	1.73	1.85	1.91													
	Increment						.24	.23	.20	.41	.37	.28	.12	.06													
	Maximum for period						.41	.78	1.06	1.26	1.49	1.73	1.85	1.91													
Cape Henry, Va. July 30, 1921.	Observed precipitation	3:35 p.m.	6:30 p.m.	4.37	3:49 p.m.	.01	.21	.36	.46	.59	.67	.76	.78	.84	1.15	1.85	2.95	4.26									
	Increment						.21	.15	.10	.13	.08	.09	.02	.06	.31	.70	1.10	1.31									
	Maximum for period						.70	1.25	1.80	2.13	2.46	2.79	3.11	3.42	3.48	3.50	3.67	4.26									
Charles City, Iowa. June 21–22, 1930.	Observed precipitation	11:05 p.m.	12:50 a.m.	2.71	11:36 p.m.	.01	.11	.17	.30	.51	.81	1.14	1.51	1.97	2.20	2.33	2.48	2.70									
	Increment						.11	.06	.13	.21	.30	.33	.37	.46	.23	.13	.15	.22									
	Maximum for period						.46	.83	1.16	1.46	1.69	1.90	2.03	2.16	2.24	2.33	2.48	2.70									
Charleston, S.C. Sept. 5–6, 1933.	Observed precipitation	1:53 p.m.	7:56 a.m.	10.05	4:39 a.m.	2.60	.09	.14	.22	.34	.44	.57	.72	.80	.97	1.50	2.45	3.54	4.76	5.74	7.42						
	Increment						.09	.05	.08	.12	.10	.13	.15	.08	.17	.53	.95	1.09	1.22	.98	1.68						
	Maximum for period						.53	1.02	1.48	1.87	2.16	2.36	2.57	2.77	3.04	3.51	4.08	5.28	6.12	6.62	7.42	8.62	9.03				
Charlotte, N.C. Aug. 17, 1923.	Observed precipitation	5:10 p.m.	6:35 p.m.	2.00	5:33 p.m.	.01	.08	.27	.78	1.27	1.57	1.78	1.94	1.97													
	Increment						.08	.19	.51	.49	.30	.21	.16	.03													
	Maximum for period						.51	1.00	1.30	1.51	1.70	1.86	1.94	1.97													
Chattanooga, Tenn. June 15, 1924.	Observed precipitation	8:57 p.m.	10:02 p.m.	1.89	9:09 p.m.	.03	.26	.87	1.49	1.77																	
	Increment						.26	.61	.62	.28																	
	Maximum for period						.62	1.23	1.51	1.77																	
Cheyenne, Wyo. June 14, 1926.	Observed precipitation	9:15 p.m.	(2)	2.56	10:35 p.m.	.05	.10	.53	1.00	1.42	1.73	2.02	2.14	2.32													
	Increment						.10	.43	.47	.42	.31	.29	.12	.18													
	Maximum for period						.47	.90	1.32	1.63	1.92	2.04	2.22	2.32													
Chicago University, Ill. July 7, 1921.	Observed precipitation	5:27 p.m.	7:40 p.m.	2.43	5:27 p.m.	0	.46	.85	1.10	1.51	1.72	2.03	2.20														
	Increment						.46	.39	.25	.41	.21	.31	.17														
	Maximum for period						.46	.85	1.10	1.51	1.72	2.03	2.20														
Cincinnati, Ohio. Aug. 7, 1920.	Observed precipitation	3:16 p.m.	6:05 p.m.	2.70	3:16 p.m.	.01	.38	1.16	1.78	2.13	2.47	2.57	2.60														
	Increment						.38	.78	.62	.35	.34	.10	.03														
	Maximum for period						.78	1.40	1.78	2.13	2.47	2.57	2.60														
Cleveland, Ohio. Aug. 20, 1901.	Observed precipitation	4:11 p.m.	5:10 p.m.	1.78	4:30 p.m.	T	.37	1.04	1.46	1.77	1.78																
	Increment						.37	.67	.42	.31	.01																
	Maximum for period						.67	1.09	1.46	1.77	1.78																
Columbia, Mo. July 24, 1908.	Observed precipitation	12:42 p.m.	2:28 p.m.	1.55	1:12 p.m.	.09	.63	.99	1.22	1.31	1.37																
	Increment						.63	.36	.23	.09	.06																
	Maximum for period						.63	.99	1.22	1.31	1.37																
Columbia, S.C. July 26, 1922.	Observed precipitation	2:55 p.m.	6:00 p.m.	1.75	3:01 p.m.	.01	.55	1.05	1.39	1.60	1.64																
	Increment						.55	.50	.34	.21	.04																
	Maximum for period						.55	1.05	1.39	1.60	1.64																
Columbus, Ohio. June 23, 1901.	Observed precipitation	(2)	(2)	2.30	1:55 a.m.	.01	.09	.18	.61	1.07	1.49	1.74	1.94	2.06	2.10	2.15											
	Increment						.09	.09	.43	.46	.42	.25	.20	.12	.04	.05											
	Maximum for period						.46	.89	1.31	1.56	1.76	1.88	1.97	2.06	2.10	2.15											
Concord, N.H. July 7, 1907.	Observed precipitation	4:15 p.m.	5:35 p.m.	2.73	4:17 p.m.	.01	.09	.30	.60	1.09	1.60	2.15	2.48	2.69													
	Increment						.09	.21	.30	.49	.51	.55	.33	.21													
	Maximum for period						.55	1.06	1.55	1.88	2.18	2.39	2.60	2.69													
Concordia, Kans. Aug. 26, 1908.	Observed precipitation	3:32 p.m.	5:30 p.m.	2.54	3:38 p.m.	.01	.10	.41	.83	1.36	1.78	2.09	2.23	2.35	2.43												
	Increment						.10	.31	.42	.53	.42	.31	.14	.12	.08												
	Maximum for period						.53	.95	1.37	1.68	1.99	2.13	2.25	2.35	2.43												
Corpus Christi, Tex. Oct. 16, 1938.	Observed precipitation	5:15 p.m.	7:15 p.m.	3.68	5:47 p.m.	.01	.20	.67	1.15	1.57	1.98	2.38	2.48	2.75	3.08	3.21	3.63	3.66									
	Increment						.20	.47	.48	.42	.41	.40	.10	.27	.33	.13	.42	.03									
	Maximum for period						.48	.95	1.37	1.78	2.18	2.38	2.55	2.88	3.08	3.22	3.63	3.66									

[1] T. = trace.

[2] During the night.

[3] 4 hours.

TABLE 1.—*Most intense rainstorm recorded at each station through 1933*—Continued

Station and date	Item	Entire storm: Duration From—	Entire storm: Duration To—	Entire storm: Rainfall	Time excessive rate began	Fall prior to excessive rate [1]	Precipitation for various periods, in inches: Minutes 5	10	15	20	25	30	35	40	45	50	60	80	100	120	Hours 3	6	12
				In.		*In.*																	
Dallas, Tex. May 4, 1920	Observed precipitation	10:30 p.m.	1:25 a.m.	2.00	10:43 p.m.	0.02	0.25	0.97	1.54	1.78	1.88												
	Increment						.25	.72	.57	.24	.10												
	Maximum for period						.72	1.29	1.54	1.78	1.88												
Davenport, Iowa July 14, 1910	Observed precipitation	11:13 a.m.	12:55 p.m.	2.01	11:37 a.m.	.01	.38	.92	1.38	1.59	1.61	1.62	1.73	1.82									
	Increment						.38	.54	.46	.21	.02	.01	.11	.09									
	Maximum for period						.54	1.00	1.38	1.59	1.61	1.62	1.73	1.82									
Dayton, Ohio Sept. 5, 1916	Observed precipitation	3:03 p.m.	4:41 p.m.	1.85	3:44 p.m.	.04	.21	.59	.87	1.21	1.54	1.75	1.79										
	Increment						.21	.38	.28	.34	.33	.21	.04										
	Maximum for period						.38	.67	1.00	1.33	1.54	1.75	1.79										
Del Rio, Tex. Feb. 27, 1921	Observed precipitation	6:13 p.m.	9:30 p.m.	5.28	6:32 p.m.	.03	.09	.28	.53	.96	1.44	1.93	2.26	2.59	3.15	3.67	4.67	5.07					
	Increment						.09	.19	.25	.43	.48	.49	.33	.33	.56	.52	1.00	.40					
	Maximum for period						.56	1.08	1.58	2.08	2.41	2.74	3.23	3.71	4.14	4.39	4.67	5.07					
Denver, Colo. July 14, 1912	Observed precipitation	3:25 p.m.	6:30 p.m.	2.00	3:34 p.m.	.01	.32	1.19	1.52	1.62	1.67	1.72											
	Increment						.32	.87	.33	.10	.05	.05											
	Maximum for period						.87	1.20	1.52	1.62	1.67	1.72											
Des Moines, Iowa July 18–19, 1904	Observed precipitation	10:50 p.m.	7:55 a.m.	4.32	1:45 a.m.	1.77	.14	.23	.29	.35	.40	.53	.76	1.24	1.86	1.99	2.08						
	Increment						.14	.09	.06	.06	.05	.13	.23	.48	.62	.13	.09						
	Maximum for period						.62	1.10	1.33	1.46	1.59	1.64	1.70	1.76	1.86	1.99	2.08						
Detroit, Mich. Aug. 17, 1926.	Observed precipitation	1:14 p.m.	6:50 p.m.	4.51	1:14 p.m.	0	.08	.13	.23	.67	1.45	2.04	2.29	2.44	2.59	2.60	2.61	3.41	3.78	3.86			
	Increment						.08	.05	.10	.44	.78	.59	.25	.15	.15	.01	.01	.80	.37	.08			
	Maximum for period						.78	1.37	1.81	2.06	2.21	2.36	2.46	2.51	2.59	2.60	2.98	3.47	3.78	3.86			
Devils Lake, N.Dak. June 8, 1929.	Observed precipitation	8:20 p.m.	10:35 p.m.	2.96	10:03 p.m.	.72	.34	1.24	1.79	2.18	2.24												
	Increment						.34	.90	.55	.39	.06												
	Maximum for period						.90	1.45	1.84	2.18	2.24												
Dodge City, Kans. Sept. 16–17, 1906.	Observed precipitation	4:35 p.m.	12:12 p.m.	5.89	6:28 p.m.	.10	.35	.71	.96	1.30	1.77	2.21	2.50	2.81	2.95	3.11	3.47	4.27	4.85				
	Increment						.35	.36	.25	.34	.47	.44	.29	.31	.14	.16	.36	.80	.58				
	Maximum for period						.47	.91	1.25	1.50	1.86	2.21	2.50	2.81	2.95	3.11	3.47	4.27	4.85				
Drexel, Nebr. June 28, 1919.	Observed precipitation	10:20 a.m.	11:45 a.m.	2.15	10:49 a.m.	.08	.14	.47	.83	1.24	1.47	1.60	1.66	1.94	2.06								
	Increment						.14	.33	.36	.41	.23	.13	.06	.28	.12								
	Maximum for period						.41	.77	1.10	1.33	1.47	1.60	1.80	1.94	2.06								
Dubuque, Iowa July 9, 1919.	Observed precipitation	11:15 a.m.	3:40 p.m.	3.82	1:51 p.m.	1.13	.17	.51	1.17	1.71	1.91	2.16	2.40	2.51	2.64								
	Increment						.17	.34	.66	.54	.20	.25	.24	.11	13								
	Maximum for period						.66	1.20	1.54	1.74	1.99	2.23	2.40	2.51	2.64								
Due West, S.C. July 27, 1926	Observed precipitation	3:47 p.m.	8:15 p.m.	4.95	4:54 p.m.	.08	.09	.18	.27	.51	.63	.67	.68	.77	.81	1.25	2.34	3.55	4.19	4.62	4.82		
	Increment						.09	.09	.09	.24	.12	.04	.01	.09	.04	.44	1.09	1.21	.64	.43	.20		
	Maximum for period						.56	1.09	1.53	1.84	2.25	2.53	2.74	2.95	3.15	3.30	3.45	3.91	4.23	4.64	4.82		
Duluth, Minn. Aug. 12, 1910	Observed precipitation	5:30 p.m.	6:15 p.m.	1.42	5:41 p.m.	.01	.16	.62	1.14	1.38	1.40												
	Increment						.16	.46	.52	.24	.02												
	Maximum for period						.52	.98	1.22	1.38	1.40												

Eastport, Maine Aug. 4, 1928	Observed precipitation	6:24 p.m.	(2)	1.32	7:31 p.m.	.11	.21	.66	.96	1.03	1.10														
	Increment						.21	.45	.30	.07	.07														
	Maximum for period						.45	.75	.96	1.03	1.10														
Elkins, W.Va Aug. 4, 1911.	Observed precipitation	4:30 p.m.	7:25 p.m.	2.44	4:51 p.m.	.05	.34	.70	.94	1.36	1.72	1.95	2.11	2.22	2.28	2.32									
	Increment						.34	.36	.24	.42	.36	.23	.16	.11	.06	.04									
	Maximum for period						.42	.78	1.02	1.38	1.72	1.95	2.11	2.22	2.28	2.32									
Ellendale, N.Dak July 2, 1921.	Observed precipitation	9:06 p.m.	5:10 a.m.	2.32	9:18 p.m.	.05	.14	.40	.88	1.51	1.73	1.82	1.89	1.93											
	Increment						.14	.26	.48	.63	.22	.09	.07	.04											
	Maximum for period						.63	1.11	1.37	1.59	1.73	1.82	1.89	1.93											
El Paso, Tex June 13, 1911.	Observed precipitation	6:18 p.m.	7:10 p.m.	1.29	6:24 p.m.	.01	.18	.50	.83	1.05	1.24	1.26													
	Increment						.18	.32	.33	.22	.19	.02													
	Maximum for period						.33	.65	.87	1.06	1.24	1.26													
Erie, Pa May 26-27, 1903.	Observed precipitation	8:30 p.m.	(2)	2.07	8:32 p.m.	T	.30	.63	1.28	1.38	1.45	1.51	1.61	1.64											
	Increment						.30	.33	.65	.10	.07	.06	.10	.03											
	Maximum for period						.65	.98	1.28	1.38	1.45	1.51	1.61	1.64											
Escanaba, Mich July 12, 1903.	Observed precipitation	12:35 p.m.	1:30 p.m.	1.91	12:35 p.m.	0	.10	.79	1.42	1.62	1.65	1.77	1.87												
	Increment						.10	.69	.63	.20	.03	.12	.10												
	Maximum for period						.69	1.32	1.52	1.62	1.67	1.77	1.87												
Eureka, Calif Nov. 11, 1926.	Observed precipitation	(2)	7:40 a.m.	.86	1:52 a.m.	.15	.21	.33	.51																
	Increment						.21	.12	.18																
	Maximum for period						.21	.33	.51																
Evansville, Ind Aug. 10, 1908.	Observed precipitation	4:10 p.m.	11:00 p.m.	3.76	5:33 p.m.	.58	.12	.30	.50	.71	1.05	1.53	1.86	2.01	2.25	2.45	2.50								
	Increment						.12	.18	.20	.21	.34	.48	.33	.15	.24	.20	.05								
	Maximum for period						.48	.82	1.15	1.36	1.56	1.74	1.89	2.13	2.33	2.45	2.50								
Flagstaff, Ariz Aug. 2, 1908.	Observed precipitation	12:20 p.m.	4:50 p.m.	1.44	3:01 p.m.	.14	.11	.41	.75	.96	1.06	1.15													
	Increment						.11	.30	.34	.21	.10	.09													
	Maximum for period						.34	.64	.85	.96	1.06	1.15													
Fort Smith, Ark July 23, 1908.	Observed precipitation	1:46 p.m.	4:51 p.m.	1.76	1:58 p.m.	.01	.23	.73	1.13	1.26	1.36	1.45	1.52												
	Increment						.23	.50	.40	.13	.10	.09	.07												
	Maximum for period						.50	.90	1.13	1.26	1.36	1.45	1.52												
Fort Wayne, Ind July 14, 1916.	Observed precipitation	2:00 p.m.	5:15 p.m.	2.28	2:21 p.m.	.01	.35	.60	.85	1.04	1.83	2.01	2.21												
	Increment						.35	.25	.25	.19	.79	.18	.20												
	Maximum for period						.79	.98	1.23	1.48	1.83	2.01	2.21												
Fort Worth, Tex Aug. 22, 1916.	Observed precipitation	4:01 p.m.	7:25 p.m.	2.47	4:07 p.m.	.03	.49	.97	1.40	1.71	1.90	1.95	2.07	2.16	2.21										
	Increment						.49	.48	.43	.31	.19	.05	.12	.09	.05										
	Maximum for period						.49	.97	1.40	1.71	1.90	1.95	2.07	2.16	2.21										
Fresno, Calif Oct. 5, 1925.	Observed precipitation	4:05 p.m.	5:05 p.m.	1.18	4:08 p.m.	.01	.24	.48	.72	1.06	1.12	1.16													
	Increment						.24	.24	.24	.34	.06	.04													
	Maximum for period						.34	.58	.82	1.06	1.12	1.16													
Galveston, Tex Oct. 5-6, 1910.	Observed precipitation	11:35 p.m.	5:40 p.m.	6.62	12:42 a.m.	.07	.17	.36	.58	.94	1.22	1.47	1.74	1.83	1.89	2.09	2.27	4.07	5.99	6.28					
	Increment						.17	.19	.22	.36	.28	.25	.27	.09	.06	.20	.18	1.80	1.92	.29					
	Maximum for period						.48	.96	1.44	1.92	2.37	2.82	3.27	3.72	3.81	3.90	4.16	5.05	5.99	6.28					
Grand Haven, Mich Aug. 9, 1906.	Observed precipitation	5:40 a.m.	6:45 a.m.	1.34	5:55 a.m.	.02	.12	.19	.34	.64	1.06	1.23	1.31												
	Increment						.12	.07	.15	.30	.42	.17	.08												
	Maximum for period						.42	.72	.89	1.04	1.12	1.23	1.31												
Grand Junction, Colo Aug. 22, 1914.	Observed precipitation	5:20 p.m.	6:05 p.m.	.59	5:23 p.m.	.01	.24	.54	.58																
	Increment						.24	.30	.04																
	Maximum for period						.30	.54	.58																
Grand Rapids, Mich June 26, 1909.	Observed precipitation	7:35 p.m.	9:50 p.m.	2.78	8:37 p.m.	.57	.36	.84	1.10	1.31	1.51	1.71	1.86	2.01	2.11	2.19									
	Increment						.36	.48	.26	.21	.20	.20	.15	.15	.10	.08									
	Maximum for period						.48	.84	1.10	1.31	1.51	1.71	1.86	2.01	2.11	2.19									

[1] T. = trace.

[2] During the night.

TABLE 1.—*Most intense rainstorm recorded at each station through 1933*—Continued

Station and date	Item	Entire storm: Duration: From—	Entire storm: Duration: To—	Entire storm: Rainfall	Time excessive rate began	Fall prior to excessive rate [1]	Precipitation for various periods, in inches: Minutes: 5	10	15	20	25	30	35	40	45	50	60	80	100	120	Hours: 3	6	12
				In.		*In.*																	
Green Bay, Wis. Aug. 9, 1906.	Observed precipitation	10:45 a.m.	11:45 a.m.	2.11	10:45 a.m.	0	0.23	0.60	0.92	1.29	1.59	1.81	2.03	2.08									
	Increment						.23	.37	.32	.37	.30	.22	.22	.05									
	Maximum for period						.37	.69	1.06	1.36	1.59	1.81	2.03	2.08									
Greensboro, N.C. July 7, 1931.	Observed precipitation	6:35 p.m.	7:30 p.m.	.96	6:45 p.m.	.01	.26	.80	.90	.93	.94	.95											
	Increment						.26	.54	.10	.03	.01	.01											
	Maximum for period						.54	.80	.90	.93	.94	.95											
Greenville, S.C. Aug. 6, 1931.	Observed precipitation	1:50 p.m	4:00 p.m.	2.06	1:59 p.m.	.01	.87	1.31	1.68	1.87	1.98												
	Increment						.87	.44	.37	.19	.11												
	Maximum for period						.87	1.31	1.68	1.87	1.98												
Groesbeck, Tex. Oct. 1-2, 1927.	Observed precipitation	6:20 p.m.	7:10 a.m.	8.55	11:38 p.m.	2.37	.10	.19	.30	.34	.49	.65	.77	.95	1.16	1.22	1.63	2.50	3.50	4.98			
	Increment						.10	.09	.11	.04	.15	.16	.12	.18	.21	.06	.41	.87	1.00	1.48			
	Maximum for period						.53	.92	1.22	1.48	1.74	1.96	2.18	2.48	2.75	2.99	3.35	4.03	4.64	5.02			
Hannibal, Mo. Aug. 17-18, 1906.	Observed precipitation	9:00 p.m.	6:50 a.m.	2.43	1:57 a.m.	.04	.35	.80	1.33	1.63	1.81	1.90											
	Increment						.35	.45	.53	.30	.18	.09											
	Maximum for period						.53	.98	1.33	1.63	1.81	1.90											
Harrisburg, Pa. Aug. 8, 1925.	Observed precipitation	6:00 p.m.	(2)	2.87	7:35 p.m.	.43	.14	.45	.64	.65	.79	1.05	2.09	2.21	2.31								
	Increment						.14	.31	.19	.01	.14	.26	1.04	.12	.10								
	Maximum for period						1.04	1.30	1.44	1.56	1.64	1.95	2.09	2.21	2.31								
Hartford, Conn. Aug. 1, 1929.	Observed precipitation	3:30 p.m.	4:35 p.m.	2.93	3:40 p.m.	.03	.08	.33	.45	.72	1.11	1.34	1.67	2.32	2.77	2.89							
	Increment						.08	.25	.12	.27	.39	.23	.33	.65	.45	.12							
	Maximum for period						.65	1.10	1.43	1.66	2.05	2.32	2.44	2.69	2.81	2.89							
Hatteras, N.C. Sept. 5, 1928.	Observed precipitation	9:55 a.m.	7:15 p.m.	7.90	10:22 a.m.	.14	.06	.30	.65	1.19	1.75	2.22	2.65	3.06	3.54	4.05	5.26	5.52					
	Increment						.06	.24	.35	.54	.56	.47	.43	.41	.48	.51	1.21	.26					
	Maximum for period						.61	1.21	1.72	2.20	2.61	3.04	3.51	4.07	4.61	4.96	5.26	5.52					
Havre, Mont. July 9, 1909.	Observed precipitation	8:31 p.m.	9:20 p.m.	.81	8:56 p.m.	.02	.10	.40	.77														
	Increment						.10	.30	.37														
	Maximum for period						.37	.67	.77														
Helena, Mont. June 29, 1909.	Observed precipitation	4:06 p.m.	7:45 p.m.	.94	4:50 p.m.	.08	.08	.18	.65	.76	.81												
	Increment						.08	.10	.47	.11	.05												
	Maximum for period						.47	.58	.68	.76	.81												
Honolulu, Hawaii Dec. 30, 1923.	Observed precipitation	4:15 p.m.	8:15 p.m.	2.94	5:21 p.m.	.34	.13	.30	.43	.79	1.22	1.52	1.76	2.01	2.22	2.38	2.45						
	Increment						.13	.17	.13	.36	.43	.30	.24	.25	.21	.16	.07						
	Maximum for period						.43	.79	1.09	1.33	1.58	1.79	1.95	2.08	2.25	2.38	2.45						
Houghton, Mich. July 3, 1929.	Observed precipitation	10:58 p.m.	12:58 a.m.	1.81	11:00 p.m.	.01	.31	.79	.99	1.14	1.35	1.44	1.48	1.50	1.52	1.55	1.62	1.70	1.78	1.81			
	Increment						.31	.48	.20	.15	.21	.09	.04	.02	.02	.03	.07	.08	.08	.03			
	Maximum for period						.48	.79	.99	1.14	1.35	1.44	1.48	1.50	1.52	1.55	1.62	1.70	1.78	1.81			
Houston, Tex. Aug. 11, 1926.	Observed precipitation	1:15 p.m.	2:20 p.m.	2.72	1:15 p.m.	0	.09	.15	.19	.22	.48	1.07	1.91	2.48	2.62	2.66							
	Increment						.09	.06	.04	.03	.26	.59	.84	.57	.14	.04							
	Maximum for period						.84	1.43	2.00	2.26	2.40	2.44	2.47	2.53	2.62	2.66							

Huron, S.Dak. June 14, 1924.	Observed precipitation	6:25 p.m.	9:10 p.m.	2.28	7:07 p.m.	.02	.33	1.03	1.47	1.74	1.89	1.98	2.04													
	Increment						.33	.70	.44	.27	.15	.09	.06													
	Maximum for period						.70	1.14	1.47	1.74	1.89	1.98	2.04													
Indianapolis, Ind. Aug. 13, 1913.	Observed precipitation	10:45 a.m.	3:32 p.m.	2.86	11:55 a.m.	.01	.24	.50	.95	1.46	1.78	1.98	2.05	2.18	2.41	2.56	2.66	2.80								
	Increment						.24	.26	.45	.51	.32	.20	.07	.13	.23	.15	.10	.14								
	Maximum for period						.51	.96	1.28	1.54	1.78	1.98	2.05	2.18	2.41	2.56	2.66	2.80								
Iola, Kans. Oct. 1, 1923.	Observed precipitation	7:45 a.m.	11:35 a.m.	2.05	7:52 a.m.	.02	.09	1.06	1.46	1.69	1.79	1.83														
	Increment						.09	.97	.40	.23	.10	.04														
	Maximum for period						.97	1.37	1.60	1.70	1.79	1.83														
Jacksonville, Fla. July 27, 1917.	Observed precipitation	4:03 p.m.	6:10 p.m.	3.01	4:17 p.m.	.10	.11	.31	.63	1.10	1.77	2.26	2.57	2.71	2.80											
	Increment						.11	.20	.32	.47	.67	.49	.31	.14	.09											
	Maximum for period						.67	1.16	1.63	1.95	2.26	2.46	2.60	2.71	2.80											
Jupiter, Fla. Oct. 27-28, 1908.	Observed precipitation	9:30 p.m.	8:00 a.m.	5.59	12:05 a.m.	.32	.31	.62	.88	1.35	1.63	2.10	2.64	3.17	3.40	3.66	3.83	4.15	4.41	4.59						
	Increment						.31	.31	.26	.47	.28	.47	.54	.53	.23	.26	.17	.32	.26	.18						
	Maximum for period						.54	1.07	1.54	1.82	2.29	2.55	2.86	3.17	3.40	3.66	3.83	4.15	4.41	4.59						
Kalispell, Mont. Aug. 10, 1920	Observed precipitation	5:40 p.m.	9:30 p.m.	1.06	5:50 p.m.	.01	.18	.62	.88	.95																
	Increment						.18	.44	.26	.07																
	Maximum for period						.44	.70	.88	.95																
Kansas City, Mo. Aug. 23, 1906	Observed precipitation	4:10 a.m.	7:25 a.m.	5.93	4:21 a.m.	.03	.22	.60	1.02	1.52	2.02	2.57	3.14	3.67	4.01	4.32	4.74	5.45	5.74							
	Increment						.22	.38	.42	.50	.50	.55	.57	.53	.34	.31	.42	.71	.29							
	Maximum for period						.57	1.12	1.65	2.15	2.65	3.07	3.45	3.79	4.10	4.32	4.74	5.45	5.74							
Keokuk, Iowa July 31-Aug. 1, 1932.	Observed precipitation	5:55 p.m.	7:25 a.m.	3.95	12:21 a.m.	.19	.11	.22	.34	.48	.69	1.31	1.74	1.99	2.26	2.37	2.56	2.67	2.96	3.11	3.21	3.62				
	Increment						.11	.11	.12	.14	.21	.62	.43	.25	.27	.11	.19	.11	.29	.15	.10	.41				
	Maximum for period						.62	1.05	1.30	1.57	1.78	1.92	2.04	2.15	2.26	2.37	2.56	2.67	2.96	3.11	3.21	3.62				
Key West, Fla. Aug. 18, 1926.	Observed precipitation	3:02 p.m.	7:50 p.m.	7.65	3:18 p.m.	.01	.10	.18	.20	.24	.28	.31	.68	1.12	1.48	1.85	2.83	4.34	5.00	5.91	7.48						
	Increment						.10	.08	.02	.04	.04	.03	.37	.44	.36	.37	.98	1.51	.66	.91	1.57					
	Maximum for period						.51	.99	1.49	1.93	2.30	2.66	3.10	3.47	3.77	4.03	4.30	5.12	6.25	7.09	[4] 7.48					
Knoxville, Tenn. July 16, 1931.	Observed precipitation	4:45 p.m.	6:25 p.m.	2.67	5:02 p.m.	.01	.17	.71	1.14	1.48	1.81	2.18	2.36	2.47	2.54	2.57	2.63	2.66								
	Increment						.17	.54	.43	.34	.33	.37	.18	.11	.07	.03	.06	.03								
	Maximum for period						.54	.97	1.31	1.64	2.01	2.19	2.36	2.47	2.54	2.57	2.63	2.66								
LaCrosse, Wis. June 11, 1929.	Observed precipitation	9:37 a.m.	12:05 p.m.	1.76	10:15 a.m.	.01	.20	.62	1.12	1.41	1.51	1.53	1.53	1.54	1.55	1.57	1.63	1.71	1.75							
	Increment						.20	.42	.50	.29	.10	.02	.00	.01	.01	.02	.06	.08	.04							
	Maximum for period						.50	.92	1.21	1.41	1.51	1.53	1.53	1.54	1.55	1.57	1.63	1.71	1.75							
Lander, Wyo. July 31, 1931.	Observed precipitation	8:03 p.m.	10:03 p.m.	1.46	8:03 p.m.	0	.13	.15	.29	.59	1.04	1.31	1.39	1.40	1.41	1.42	1.43	1.45	1.45	1.46						
	Increment						.13	.02	.14	.30	.45	.27	.08	.01	.01	.01	.01	.02	.00	.01						
	Maximum for period						.45	.75	1.02	1.16	1.24	1.31	1.39	1.40	1.41	1.42	1.43	1.45	1.45	1.46						
Lansing, Mich. July 7, 1923.	Observed precipitation	9:00 a.m.	2:30 p.m.	2.33	9:12 a.m.	.01	.05	.16	.36	.41	.45	.63	.96	1.33	1.65	1.92	2.06									
	Increment						.05	.11	.20	.05	.04	.18	.33	.37	.32	.27	.14									
	Maximum for period						.37	.70	1.02	1.29	1.47	1.54	1.61	1.76	1.87	1.94	2.06									
LaSalle, Ill. May 10-11, 1905.	Observed precipitation	8:30 p.m.	6:50 a.m.	2.09	8:47 p.m.	T	.27	.90	1.17																	
	Increment						.27	.63	.27																	
	Maximum for period						.63	.90	1.17																	
Lewiston, Idaho Aug. 24, 1907.	Observed precipitation	4:30 p.m.	5:55 p.m.	1.11	4:30 p.m.	0	.15	.45	.65	.80	.95	1.05														
	Increment						.15	.30	.20	.15	.15	.10														
	Maximum for period						.30	.50	.65	.80	.95	1.05														
Lexington, Ky. July 3, 1931.	Observed precipitation	5:39 p.m.	9:10 p.m.	3.40	5:39 p.m.	0	.06	.35	.82	1.48	1.89	2.16	2.40	2.69	2.91	3.02	3.15	3.26								
	Increment						.06	.29	.47	.66	.41	.27	.24	.29	.22	.11	.13	.11								
	Maximum for period						.66	1.13	1.54	1.83	2.10	2.34	2.63	2.85	2.96	3.03	3.15	3.26								
Lincoln, Nebr. July 25, 1914.	Observed precipitation	5:20 p.m.	6:37 p.m.	3.12	5:29 p.m.	.02	.29	.72	1.26	1.88	2.18	2.53	2.78	2.90	2.99	3.06	3.08	3.12								
	Increment						.29	.43	.54	.62	.30	.35	.25	.12	.09	.07	.02	.04								
	Maximum for period						.62	1.16	1.59	1.89	2.24	2.53	2.78	2.90	2.99	3.06	3.08	3.12								

[1] T. = trace.

[2] During the night.

[4] 2½ hours.

TABLE 1.—*Most intense rainstorm recorded at each station through 1933*—Continued

Station and date	Item	Entire storm: Duration: From—	Entire storm: Duration: To—	Entire storm: Rainfall	Time excessive rate began	Fall prior to excessive rate [1]	Precipitation for various periods, in inches: Minutes: 5	10	15	20	25	30	35	40	45	50	60	80	100	120	Hours: 3	6	12
				In.		*In.*																	
Little Rock, Ark. Nov. 28, 1905.	Observed precipitation	12:40 p.m.	6:40 p.m.	2.94	3:56 p.m.	0.31	0.15	0.33	0.56	0.91	1.12	1.52	1.85	1.97	2.04	2.29	2.55						
	Increment						.15	.18	.23	.35	.21	.40	.33	.12	.07	.25	.26						
	Maximum for period						.40	.73	.96	1.29	1.52	1.70	1.85	1.97	2.14	2.29	2.55						
Los Angeles, Calif. Feb. 18, 1914.	Observed precipitation	11:30 a.m.	7:45 p.m.	3.10	12:27 p.m.	.18	.06	.11	.21	.29	.32	.35	.41	.45	.55	.63	.86	1.73	1.90				
	Increment						.06	.05	.10	.08	.03	.03	.06	.04	.10	.08	.23	.87	.17				
	Maximum for period						.22	.44	.66	.87	.99	1.10	1.18	1.28	1.32	1.38	1.44	1.73	1.90				
Louisville, Ky. July 4, 1896.	Observed precipitation	5:52 p.m.	9:35 p.m.	4.60	6:08 p.m.	.15	.06	.15	.70	1.20	1.52	1.70	1.90	2.06	2.22	2.38	2.70	3.43	4.15	4.35			
	Increment						.06	.09	.55	.50	.32	.18	.20	.16	.16	.16	.32	.73	.72	.20			
	Maximum for period						.55	1.05	1.37	1.55	1.75	1.91	2.07	2.23	2.39	2.55	2.92	3.64	4.15	4.35			
Ludington, Mich. June 26, 1931.	Observed precipitation	5:38 a.m.	8:28 a.m.	1.87	5:43 a.m.	.01	.28	.80	1.10	1.24	1.32	1.38	1.42	1.44	1.48	1.48	1.55	1.75	1.82	1.86			
	Increment						.28	.52	.30	.14	.08	.06	.04	.02	.04	.00	.07	.20	.07	.04			
	Maximum for period						.52	.82	1.10	1.24	1.32	1.38	1.42	1.44	1.48	1.48	1.55	1.75	1.82	1.86			
Lynchburg, Va. Aug. 29-30, 1903.	Observed precipitation	8:30 p.m.	1:20 p.m.	2.78	9:10 p.m.	.04	.55	1.06	1.51	1.89	2.03	2.13											
	Increment						.55	.51	.45	.38	.14	.10											
	Maximum for period						.55	1.06	1.51	1.89	2.03	2.13											
Macon, Ga. July 18, 1916.	Observed precipitation	12:42 p.m.	3:20 p.m.	3.35	12:42 p.m.	0	.21	.35	.47	.60	.74	1.18	1.80	2.31	2.70	2.88	3.11	3.32					
	Increment						.21	.14	.12	.13	.14	.44	.62	.51	.39	.18	.23	.21					
	Maximum for period						.62	1.13	1.57	1.96	2.14	2.28	2.41	2.53	2.70	2.88	3.11	3.32					
Madison, Wis. Aug. 8, 1906.	Observed precipitation	5:00 p.m.	8:45 p.m.	4.96	5:24 p.m.	.01	.21	.74	1.29	1.58	1.82	2.09	2.29	2.50	2.85	3.19	3.61	4.54	4.84				
	Increment						.21	.53	.55	.29	.24	.27	.20	.21	.35	.34	.42	.93	.30				
	Maximum for period						.55	1.08	1.37	1.61	1.88	2.09	2.29	2.64	2.98	3.19	3.61	4.54	4.84				
Marquette, Mich. June 23, 1907.	Observed precipitation	4:25 p.m.	8:15 p.m.	3.95	4:32 p.m.	T	.29	.53	.59	.75	1.02	1.35	1.70	1.91	2.17	2.42	2.93	3.54					
	Increment						.29	.24	.06	.16	.27	.33	.35	.21	.26	.25	.51	.61					
	Maximum for period						.35	.68	.95	1.16	1.42	1.67	1.93	2.18	2.34	2.50	2.93	3.54					
Memphis, Tenn. July 16-17, 1929.	Observed precipitation	11:00 p.m.	2:00 a.m.	5.00	11:34 p.m.	.05	.14	.22	.43	.82	1.42	2.09	2.53	2.99	3.23	3.24	3.25	3.87	4.55	4.69			
	Increment						.14	.08	.21	.39	.60	.57	.44	.46	.24	.01	.01	.62	.68	.14			
	Maximum for period						.60	1.17	1.61	2.07	2.46	2.70	2.91	2.99	3.23	3.24	3.25	3.87	4.55	4.69			
Meridian, Miss. Aug. 13, 1906.	Observed precipitation	1:40 a.m.	6:25 p.m.	3.92	1:42 p.m.	.01	.17	.38	.76	1.25	1.81	2.28	2.53	2.73	2.89	3.06	3.63	3.74					
	Increment						.17	.21	.38	.49	.56	.47	.25	.20	.16	.17	.57	.11					
	Maximum for period						.56	1.05	1.52	1.90	2.15	2.36	2.56	2.73	2.96	3.25	3.63	3.74					
Miami, Fla. June 14, 1933.	Observed precipitation	3:12 p.m.	5:48 p.m.	5.17	3:20 p.m.	.02	.43	.87	1.57	1.79	2.34	2.89	3.24	3.53	3.79	4.00	4.53	5.09	5.12	5.13			
	Increment						.43	.44	.70	.22	.55	.55	.35	.29	.26	.21	.53	.56	.03	.01			
	Maximum for period						.70	1.14	1.57	2.02	2.46	2.89	3.24	3.53	3.79	4.00	4.53	5.09	5.12	5.13			
Miles City, Mont. July 21-22, 1923.	Observed precipitation	11:30 p.m.	2:15 a.m.	1.02	11:37 p.m.	.02	.17	.55	.79	.98													
	Increment						.17	.38	.24	.19													
	Maximum for period						.38	.62	.81	.98													
Milwaukee, Wis. June 24, 1904.	Observed precipitation	1:02 p.m.	3:25 p.m.	2.53	1:05 p.m.	T	.08	.14	.29	.71	1.23	1.64	1.79	2.00	2.11	2.20							
	Increment						.08	.06	.15	.42	.52	.41	.15	.21	.11	.09							
	Maximum for period						.52	.94	1.35	1.50	1.71	1.86	1.97	2.06	2.12	2.20							

Minneapolis, Minn. June 26, 1914.	Observed precipitation	7:30 p.m.	11:30 p.m.	1.60	9:04 p.m.	.21	.07	.15	.67	1.14	1.31	1.35													
	Increment						.07	.08	.52	.47	.17	.04													
	Maximum for period						.52	.99	1.16	1.24	1.31	1.35													
Mobile, Ala. July 19, 1917.	Observed precipitation	5:10 p.m.	6:56 p.m.	1.62	5:52 p.m.	.01	.60	1.33	1.48	1.56	1.59														
	Increment						.60	.73	.15	.08	.03														
	Maximum for period						.73	1.33	1.48	1.56	1.59														
Modena, Utah July 27, 1916.	Observed precipitation	3:34 p.m.	4:02 p.m.	1.06	3:38 p.m.	T	.27	.57	.95	1.06															
	Increment						.27	.30	.38	.11															
	Maximum for period						.38	.68	.95	1.06															
Montgomery, Ala. May 30, 1905.	Observed precipitation	10:05 a.m.	3:35 p.m.	3.65	10:38 a.m.	T	.08	.17	.36	.70	1.08	1.44	1.98	2.48	2.85	3.03	3.46								
	Increment						.08	.09	.19	.34	.38	.36	.54	.50	.37	.18	.43								
	Maximum for period						.54	1.04	1.41	1.78	2.15	2.49	2.68	2.86	3.08	3.29	3.46								
Moorhead, Minn. Aug. 29, 1908.	Observed precipitation	8:04 a.m.	9:40 a.m.	2.00	8:04 a.m.	0	.34	1.02	1.24	1.28	1.33	1.34	1.35	1.38	1.40	1.40	1.72	1.98							
	Increment						.34	.68	.22	.04	.05	.01	.01	.03	.02	.00	.32	.26							
	Maximum for period						.68	1.02	1.24	1.28	1.33	1.34	1.35	1.38	1.40	1.40	1.72	1.98							
Mount Tamalpais, Calif. Feb. 20, 1917.	Observed precipitation	(2)	12:35 p.m.	1.61	12:30 a.m.	.71	.05	.11	.30	.45	.49														
	Increment						.05	.06	.19	.15	.04														
	Maximum for period						.19	.34	.40	.45	.49														
Mount Weather, Va. May 14, 1905.	Observed precipitation	1:25 p.m.	5:35 p.m.	1.62	2:10 p.m.	.06	.30	.85	1.14																
	Increment						.30	.55	.29																
	Maximum for period						.55	.85	1.14																
Nantucket, Mass. Oct. 20, 1910.	Observed precipitation	8:20 a.m.	5:05 p.m.	3.86	10:50 a.m.	.06	.12	.16	.21	.34	.43	.54	.58	.67	.70	.74	.80	1.15	2.02	2.73	3.16				
	Increment						.12	.04	.05	.13	.09	.11	.04	.09	.03	.04	.06	.35	.87	.71	.43				
	Maximum for period						.36	.69	.86	.99	1.12	1.34	1.41	1.68	1.94	2.19	2.31	2.42	2.62	3.00	3.16				
Nashville, Tenn. July 19, 1921.	Observed precipitation	9:24 a.m.	2:55 p.m.	3.70	9:26 a.m.	.01	.59	1.19	1.33	1.49	1.65	1.67	1.67	1.67	1.67	1.80	1.89	2.68	3.30						
	Increment						.59	.60	.14	.16	.16	.02	.00	.00	.00	.13	.09	.79	.62						
	Maximum for period						.60	1.19	1.33	1.49	1.65	1.67	1.67	1.67	1.67	1.80	1.89	2.68	3.30						
New Haven, Conn. July 24, 1928.	Observed precipitation	11:45 p.m.	(2)	2.40	12:06 a.m.	.01	.52	.99	1.77	2.26	2.32														
	Increment						.52	.47	.78	.49	.06														
	Maximum for period						.78	1.27	1.77	2.26	2.32														
New Orleans, La. Apr. 15–16, 1927.	Observed precipitation	8:30 a.m.	(2)	14.01	10:28 p.m.	6.16	.24	.50	.67	.76	.84	.87	.89	.94	.95	.98	1.52	2.92	3.19	3.23	6.53				
	Increment						.24	.26	.17	.09	.08	.03	.02	.05	.01	.03	.54	1.40	.27	.04	3.30				
	Maximum for period						.58	1.06	1.44	1.77	1.97	2.36	2.58	2.69	2.80	2.98	3.36	3.76	4.66	5.28	6.54				
New York City, N.Y. Aug. 12, 1926.	Observed precipitation	2:55 p.m.	5:45 p.m.	3.23	3:48 p.m.	.75	.21	.67	1.26	1.75	2.14	2.31	2.41	2.46											
	Increment						.21	.46	.59	.49	.39	.17	.10	.05											
	Maximum for period						.59	1.08	1.54	1.93	2.14	2.31	2.41	2.46											
Norfolk, Va. Aug. 31, 1901.	Observed precipitation	12:40 p.m.	5:15 p.m.	1.96	2:10 p.m.	.07	.09	.45	1.00	1.44	1.66	1.72	1.76	1.80											
	Increment						.09	.36	.55	.44	.22	.06	.04	.04											
	Maximum for period						.55	.99	1.35	1.57	1.66	1.72	1.76	1.80											
Northfield, Vt. Aug. 14, 1918.	Observed precipitation	1:08 p.m.	2:05 p.m.	1.92	1:09 p.m.	T	.85	1.46	1.64	1.71	1.74	1.80	1.89	1.91											
	Increment						.85	.61	.18	.07	.03	.06	.09	.02											
	Maximum for period						.85	1.46	1.64	1.71	1.74	1.80	1.89	1.91											
Northhead, Wash. Dec. 10, 1920.	Observed precipitation	6:42 a.m.	(2)	1.38	3:49 p.m.	.42	.05	.10	.16	.26	.45	.53	.57	.60	.65	.74	.88								
	Increment						.05	.05	.06	.10	.19	.08	.04	.03	.05	.09	.14								
	Maximum for period						.19	.29	.37	.43	.48	.53	.57	.60	.69	.74	.88								
North Platte, Nebr. Aug. 28, 1929.	Observed precipitation	1:45 a.m.	5:10 a.m.	3.82	2:30 a.m.	.02	.05	.17	.41	.50	.70	1.05	1.30	1.50	1.76	2.08	2.69	3.25	3.50	3.77					
	Increment						.05	.12	.24	.09	.20	.35	.25	.20	.26	.32	.61	.56	.25	.27					
	Maximum for period						.35	.63	.93	1.19	1.39	1.69	1.99	2.19	2.33	2.52	2.80	3.26	3.52	3.77	3.80				
Oklahoma City, Okla. Sept. 18, 1923.	Observed precipitation	6:02 p.m.	8:12 p.m.	2.23	6:04 p.m.	.01	.52	.83	1.43	1.74	1.94	2.13	2.18												
	Increment						.52	.31	.60	.31	.20	.19	.05												
	Maximum for period						.60	.91	1.43	1.74	1.94	2.13	2.18												

[1] T. = trace.

[2] During the night.

TABLE 1.—*Most intense rainstorm recorded at each station through 1933*—Continued

Station and date	Item	Entire storm: Duration: From—	Entire storm: Duration: To—	Entire storm: Rainfall	Time excessive rate began	Fall prior to excessive rate [1]	Precipitation for various periods, in inches: Minutes: 5	10	15	20	25	30	35	40	45	50	60	80	100	120	Hours: 3	6	12
				In.		*In.*																	
Omaha, Nebr. July 6, 1898.	Observed precipitation	1:02 p.m.	6:24 p.m.	2.98	4:49 p.m.	0.33	0.67	0.97	1.27	1.47	1.63	1.71	1.91	2.05	2.21	2.33	2.53	2.61					
	Increment						.67	.30	.30	.20	.16	.08	.20	.14	.16	.12	.20	.08					
	Maximum for period						.67	.97	1.27	1.47	1.63	1.71	1.91	2.05	2.21	2.33	2.53	2.61					
Oswego, N.Y. July 3, 1915.	Observed precipitation	4:47 p.m.	9:40 p.m.	1.45	5:17 p.m.	T	.74	1.21	1.28														
	Increment						.74	.47	.07														
	Maximum for period						.74	1.21	1.28														
Palestine, Tex. May 9, 1921.	Observed precipitation	3:35 p.m.	7:00 p.m.	3.55	4:20 p.m.	.08	.09	.26	.55	.81	1.17	1.63	2.14	2.71	2.89	3.07	3.23						
	Increment						.09	.17	.29	.26	.36	.46	.51	.57	.18	.18	.16						
	Maximum for period						.57	1.08	1.54	1.90	2.16	2.45	2.63	2.81	2.98	3.07	3.23						
Parkersburg, W. Va. Aug. 19, 1903.	Observed precipitation	3:00 p.m.	4:45 p.m.	2.21	3:00 p.m.	0	.15	.23	.90	1.37	1.75	1.91	1.98										
	Increment						.15	.08	.67	.47	.38	.16	.07										
	Maximum for period						.67	1.14	1.52	1.68	1.76	1.91	1.98										
Pensacola, Fla. Oct. 20, 1909.	Observed precipitation	11:45 a.m.	9:50 p.m.	5.46	6:42 p.m.	.57	.05	.12	.26	.33	.92	1.72	2.45	3.21	3.70	3.98	4.27	4.49	4.73	4.82			
	Increment						.05	.07	.14	.07	.59	.80	.73	.76	.49	.28	.29	.22	.24	.09			
	Maximum for period						.80	1.53	2.29	2.88	3.37	3.65	3.80	3.94	4.01	4.15	4.27	4.49	4.73	4.82			
Peoria, Ill. July 2, 1931.	Observed precipitation	4:11 p.m.	5:17 p.m.	2.60	4:12 p.m.	T	.13	.50	.73	1.06	1.57	1.93	2.23	2.45	2.52	2.57	2.60						
	Increment						.13	.37	.23	.33	.51	.36	.30	.22	.07	.05	.03						
	Maximum for period						.51	.87	1.20	1.50	1.80	2.10	2.32	2.45	2.52	2.57	2.60						
Philadelphia, Pa. Aug. 3, 1898.	Observed precipitation	10:50 a.m.	1:20 p.m.	5.48	10:50 a.m.	0	.08	.28	.60	.90	1.24	1.84	2.14	2.52	2.75	2.95	3.58	4.69	5.22	5.43			
	Increment						.08	.20	.32	.30	.34	.60	.30	.38	.23	.20	.63	1.11	.53	.21			
	Maximum for period						.60	.94	1.28	1.62	1.92	2.24	2.47	2.67	2.99	3.30	3.79	4.82	5.25	5.43			
Phoenix, Ariz. July 17–18, 1908.	Observed precipitation	8:34 p.m.	2:25 a.m.	1.41	9:11 p.m.	.07	.18	.46	.78	.99	1.11	1.15											
	Increment						.18	.28	.32	.21	.12	.04											
	Maximum for period						.32	.60	.81	.99	1.11	1.15											
Pierre, S.Dak. Aug. 29, 1912.	Observed precipitation	6:08 p.m.	7:55 p.m.	1.75	7:12 p.m.	.22	.08	.14	.32	.86	1.38	1.52											
	Increment						.08	.06	.18	.54	.52	.14											
	Maximum for period						.54	1.06	1.24	1.38	1.44	1.52											
Pittsburgh, Pa. June 26, 1931.	Observed precipitation	2:55 a.m.	3:45 a.m.	1.45	2:59 a.m.	.01	.26	.96	1.23	1.35	1.41	1.43	1.43	1.44	1.44	1.45							
	Increment						.26	.70	.27	.12	.06	.02	.00	.01	.00	.01							
	Maximum for period						.70	.97	1.23	1.35	1.41	1.43	1.43	1.44	1.44	1.45							
Pocatello, Idaho Aug. 9, 1930.	Observed precipitation	12:34 p.m.	1:55 p.m.	1.08	12:34 p.m.	0	.05	.20	.26	.37	.69	.85	.94	1.01	1.05	1.08							
	Increment						.05	.15	.06	.11	.32	.16	.09	.07	.04	.03							
	Maximum for period						.32	.48	.59	.68	.80	.89	.96	1.01	1.05	1.08							
Point Reyes Light, Calif. Nov. 3, 1918.	Observed precipitation	6:10 a.m.	9:20 a.m.	.82	8:11 a.m.	.25	.12	.36	.47	.51													
	Increment						.12	.24	.11	.04													
	Maximum for period						.24	.36	.47	.51													
Port Angeles, Wash. Aug. 1, 1918.	Observed precipitation	4:00 p.m.	4:35 p.m.	.32	4:06 p.m.	T	.27	.30															
	Increment						.27	.03															
	Maximum for period						.27	.30															

Port Arthur, Tex. May 11, 1930.	Observed precipitation	2:30 a.m.	6:33 a.m.	3.24	3:19 a.m.	.33	.33	.80	1.21	1.93	2.16	2.17	2.18	2.20	2.23	2.24	2.26	2.42	2.68	2.81	2.91		
	Increment						.33	.47	.41	.72	.23	.01	.01	.02	.03	.01	.02	.16	.26	.13	.10		
	Maximum for period						.72	1.13	1.60	1.93	2.16	2.17	2.18	2.20	2.23	2.24	2.26	2.42	2.68	2.81	2.91	[5] 3.24	
Port Huron, Mich. July 20, 1916.	Observed precipitation	2:44 p.m.	7:10 p.m.	2.42	2:53 p.m.	.01	.26	.51	.84	1.25	1.56	1.86	2.10	2.28									
	Increment						.26	.25	.33	.41	.31	.30	.24	.18									
	Maximum for period						.41	.74	1.05	1.35	1.60	1.86	2.10	2.28									
Portland, Maine. Sept. 14–15, 1904.	Observed precipitation	1:40 p.m.	10:30 a.m.	2.39	12:45 a.m.	.13	.08	.12	.23	.58	1.64												
	Increment						.08	.04	.11	.35	1.06												
	Maximum for period						1.06	1.41	1.52	1.56	1.64												
Portland, Oreg. Aug. 8, 1900.	Observed precipitation	5:46 p.m.	6:50 p.m.	1.25	6:00 p.m.	.05	.30	.60	.93	1.00	1.05	1.10	1.16	1.16	1.20								
	Increment						.30	.30	.33	.07	.05	.05	.06	.00	.04								
	Maximum for period						.33	.63	.93	1.00	1.05	1.10	1.16	1.16	1.20								
Providence, R.I. June 20, 1919.	Observed precipitation	4:25 p.m.	7:35 p.m.	2.01	4:36 p.m.	.02	.07	.19	.39	.74	1.15	1.48	1.66	1.72									
	Increment						.07	.12	.20	.35	.41	.33	.18	.12									
	Maximum for period						.41	.76	1.09	1.29	1.47	1.59	1.71	1.78									
Pueblo, Colo. June 2, 1921.	Observed precipitation	2:50 p.m.	4:30 p.m.	1.81	3:41 p.m.	T	.38	.71	.93	1.20	1.42	1.59	1.72	1 79									
	Increment						.38	.33	.22	.27	.22	.17	.13	.07									
	Maximum for period						.38	.71	.93	1.20	1.42	1.59	1.72	1.79									
Raleigh, N.C. July 14, 1914.	Observed precipitation	3:45 p.m.	5:06 p.m.	3.03	3:51 p.m.	.01	.22	.56	.86	1.48	2.21	2.57	2.76	2.87	2.94	2.99							
	Increment						.22	.34	.30	.62	.73	.36	.19	.11	.07	.05							
	Maximum for period						.73	1.35	1.71	2.01	2.35	2.57	2.76	2.87	2.94	2.99							
Rapid City, S.Dak. July 18, 1924.	Observed precipitation	1:19 p.m.	2:05 p.m.	1.49	1:27 p.m.	.01	.19	.43	.72	1.12	1.35	1.45											
	Increment						.19	.24	.29	.40	.23	.10											
	Maximum for period						.40	.69	.93	1.16	1.35	1.45											
Reading, Pa. Aug. 7, 1932.	Observed precipitation	6:25 p.m.	7:20 p.m.	2.29	6:27 p.m.	.01	.35	.77	1.28	1.74	1.92	2.05	2.11	2.20	2.28								
	Increment						.35	.42	.51	.46	.18	.13	.06	.09	.08								
	Maximum for period						.51	.97	1.39	1.74	1.92	2.05	2.11	2.20	2.28								
Red Bluff, Calif. Sept. 13–14, 1918.	Observed precipitation	1:33 p.m.	([2])	6.00	9:46 p.m.	.50	.06	.10	.15	.20	.29	.40	.47	.52	.57	.63	.73	1.05	1.47	1.71	3.56		
	Increment						.06	.04	.05	.05	.09	.11	.07	.05	.05	.06	.10	.32	.42	.24	1.85		
	Maximum for period						.26	.51	.73	.89	1.05	1.21	1.35	1.52	1.66	1.82	2.07	2.80	3.31	3.72	4.70	[5] 5.43	
Reno, Nev. Aug. 2, 1912.	Observed precipitation	1:19 p.m.	2:30 p.m.	.93	1:25 p.m.	.01	.13	.43	.64	.76	.84												
	Increment						.13	.30	.21	.12	.08												
	Maximum for period						.30	.51	.64	.76	.84												
Richmond, Va. Aug. 20, 1931.	Observed precipitation	4:22 p.m.	8:30 p.m.	4.74	4:32 p.m.	.01	.15	.61	1.16	1.72	2.22	2.47	2.71	2.86	2.94	3.14	3.62	4.40	4.46	4.51	4.67		
	Increment						.15	.46	.55	.56	.50	.25	.24	.15	.08	.09	.52	.85	.06	.05	.16		
	Maximum for period						.56	1.11	1.61	2.07	2.32	2.56	2.71	2.86	2.94	3.14	3.62	4.40	4.46	4.51	4.67	[5] 4.74	
Rochester, N.Y. July 11, 1897.	Observed precipitation	3:30 p.m.	9:40 p.m.	3.37	4:05 p.m.	.03	.14	.44	.71	1.06	1.36	1.70	1.84	1.96	2.12	2.24	2.49	2.74					
	Increment						.14	.30	.27	.35	.30	.34	.14	.12	.16	.12	.25	.25					
	Maximum for period						.35	.65	.99	1.26	1.56	1.70	1.84	1.98	2.12	2.24	2.49	2.74					
Roseburg, Oreg. May 9, 1910.	Observed precipitation	5:20 p.m.	6:45 p.m.	1.17	6:24 p.m.	.04	.55	.80	1.10	1.14													
	Increment						.55	.25	.30	.04													
	Maximum for period						.55	.80	1.10	1.14													
Roswell, N.Mex. June 6, 1930.	Observed precipitation	3:17 a.m.	4.20 a.m.	1.39	3:29 a.m.	.01	.31	.86	1.17	1.33	1.37	1.38											
	Increment						.31	.55	.31	.16	.04	.01											
	Maximum for period						.55	.86	1.17	1.33	1.37	1.38											
Royal Center, Ind. July 9, 1925.	Observed precipitation	12:20 p.m.	2:12 p.m.	2.40	12:30 p.m.	.01	.14	.47	.59	.71	.74	.83	1.04	1.18	1.60	2.08	2.27						
	Increment						.14	.33	.12	.12	.03	.09	.21	.14	.42	.48	.19						
	Maximum for period						.48	.90	1.04	1.25	1.35	1.44	1.53	1.61	1.94	2.08	2.27						
Sacramento, Calif. Oct. 26, 1921.	Observed precipitation	2:30 p.m.	2:50 p.m.	.66	2:33 p.m.	.01	.18	.45	.63	.66													
	Increment						.18	.27	.18	.03													
	Maximum for period						.27	.45	.63	.66													

[1] T. = trace.

[2] During the night.

[5] 4 hours.

TABLE 1.—*Most intense rainstorm recorded at each station through 1933*—Continued

Station and date	Item	Entire storm: Duration: From—	Entire storm: Duration: To—	Entire storm: Rainfall	Time excessive rate began	Fall prior to excessive rate [1]	Precipitation for various periods, in inches: Minutes: 5	10	15	20	25	30	35	40	45	50	60	80	100	120	Hours: 3	6	12
				In.		*In.*																	
Saginaw, Mich. July 5, 1923.	Observed precipitation	2:25 p.m.	5:12 p.m.	1.30	4:41 p.m.	0.08	0.18	0.49	1.11	1.22													
	Increment						.18	.31	.62	.11													
	Maximum for period						.62	.93	1.11	1.22													
Saint Joseph, Mo. June 17, 1928.	Observed precipitation	9:27 a.m.	4:10 p.m.	3.62	2:28 p.m.	2.19	.07	.45	1.01	1.25	1.34	1.39											
	Increment						.07	.38	.56	.24	.09	.05											
	Maximum for period						.56	.94	1.18	1.27	1.34	1.39											
Saint Louis, Mo. July 8, 1898.	Observed precipitation	12:20 a.m.	3:00 a.m.	3.17	1:14 a.m.	.10	.09	.26	.41	.56	.82	1.11	1.24	1.34	1.79	2.34	2.82	2.95					
	Increment						.09	.17	.15	.15	.26	.29	.13	.10	.45	.55	.48	.13					
	Maximum for period						.55	1.00	1.24	1.48	1.58	1.71	2.00	2.26	2.41	2.56	2.82	2.95					
St. Paul, Minn. June 14, 1924.	Observed precipitation	7:02 p.m.	10:45 p.m.	3.15	7:38 p.m.	.23	.10	.19	.42	.74	1.09	1.53	2.07	2.31	2.32	2.37	2.60						
	Increment						.10	.09	.23	.32	.35	.44	.54	.24	.01	.05	.23						
	Maximum for period						.54	.98	1.33	1.65	1.89	2.12	2.21	2.31	2.32	2.41	2.60						
Salt Lake City, Utah. Aug. 13, 1931.	Observed precipitation	7:40 p.m.	9:30 p.m.	.86	7:49 p.m.	T	.30	.66	.77	.80	.83	.85	.86										
	Increment						.30	.36	.11	.03	.03	.02	.01										
	Maximum for period						.36	.66	.77	.80	.83	.85	.86										
San Antonio, Tex. Apr. 18, 1915.	Observed precipitation	12:50 p.m.	4:17 p.m.	5.59	1:39 p.m.	.13	.07	.34	.56	1.10	1.43	1.81	2.01	2.44	2.56	2.68	2.83	3.11	3.29	4.01			
	Increment						.07	.27	.22	.54	.33	.38	.20	.43	.12	.12	.15	.28	.18	.72			
	Maximum for period						.70	1.12	1.36	1.52	1.88	2.10	2.37	2.49	2.61	2.68	2.83	3.11	3.29	4.61			
San Diego, Calif. Mar. 15, 1905.	Observed precipitation	7:26 p.m.	9:00 p.m.	.95	7:34 p.m.	.02	.08	.25	.42	.55	.83	.93											
	Increment						.08	.17	.17	.13	.28	.10											
	Maximum for period						.28	.41	.58	.75	.85	.93											
Sand Key, Fla. Oct. 19, 1924.	Observed precipitation	2:00 a.m.	4:25 a.m.	2.98	3:30 a.m.	.24	.09	.57	.94	1.44	1.81	2.13	2.35	2.62	2.74								
	Increment						.09	.48	.37	.50	.37	.32	.22	.27	.12								
	Maximum for period						.50	.87	1.35	1.72	2.04	2.26	2.53	2.65	2.74								
Sandusky, Ohio. June 5, 1917.	Observed precipitation	8:30 p.m.	11:45 p.m.	2.10	10:12 p.m.	.13	.06	.32	.56	.89	1.30	1.63	1.88										
	Increment						.06	.26	.24	.33	.41	.33	.25										
	Maximum for period						.41	.74	1.07	1.32	1.57	1.82	1.88										
Sandy Hook, N.J. Aug. 10, 1931.	Observed precipitation	6:50 p.m.	8:50 p.m.	1.40	6:54 p.m.	.01	.24	.86	1.11	1.21	1.32	1.32	1.33	1.33	1.34	1.34	1.34	1.37	1.39	1.40			
	Increment						.24	.62	.25	.10	.11	.00	.01	.00	.01	.00	.00	.03	.02	.01			
	Maximum for period						.62	.87	1.11	1.21	1.32	1.32	1.33	1.33	1.34	1.34	1.34	1.37	1.39				
San Francisco, Calif. Nov. 4, 1918.	Observed precipitation	9:18 p.m.	10:35 p.m.	.95	9:37 p.m.	.05	.09	.35	.59	.70	.75	.81											
	Increment						.09	.26	.24	.11	.05	.06											
	Maximum for period						.26	.50	.61	.70	.75	.81											
San Juan, P.R. Nov. 11–12, 1931.	Observed precipitation	1:52 p.m.	(2)	8.06	2:35 p.m.	.39	.11	.19	.29	.37	.49	.81	1.27	1.51	1.86	2.25	3.06	3.69	4.51	4.67	5.04	6.24	
	Increment						.11	.08	.10	.08	.12	.32	.46	.24	.35	.39	.81	.63	.82	.16	.37	1.20	
	Maximum for period						.46	.81	1.20	1.55	1.85	2.25	2.57	2.73	2.89	3.05	3.41	4.14	4.51	4.67	5.04	6.24	
San Luis Obispo, Calif. Feb. 2, 1926.	Observed precipitation	11:38 a.m.	6:10 p.m.	1.63	5:26 p.m.	.95	.06	.16	.44	.59	.64												
	Increment						.06	.10	.28	.15	.05												
	Maximum for period						.28	.43	.53	.59	.64												

Santa Fe, N.Mex. Aug. 12, 1922.	Observed precipitation	1:10 p.m.	3:00 p.m.	1.15	1:26 p.m.	.06	.33	.55	.77	.90	.99														
	Increment						.33	.22	.22	.13	.09														
	Maximum for period						.33	.55	.77	.90	.99														
Sault Ste. Marie, Mich. Aug. 7, 1916.	Observed precipitation	6:35 a.m.	9:00 a.m.	1.07	6:42 a.m.	.01	.61	.85	.92																
	Increment						.61	.24	.07																
	Maximum for period						.61	.85	.92																
Savannah, Ga. July 10, 1921.	Observed precipitation	4:00 p.m.	8:30 p.m.	2.88	4:53 p.m.	.06	.14	.69	1.09	1.63	2.04	2.21	2.26												
	Increment						.14	.55	.40	.54	.41	.17	.05												
	Maximum for period						.55	.95	1.49	1.90	2.07	2.21	2.26												
Scranton, Pa. July 24, 1933.	Observed precipitation	3:05 p.m.	5:45 p.m.	2.71	3:19 p.m.	.01	.42	.76	1.12	1.43	1.75	1.83	1.87	1.99	2.04	2.04	2.16	2.54	2.64	2.70					
	Increment						.42	.34	.36	.31	.32	.08	.04	.12	.05	.00	.12	.38	.10	.06					
	Maximum for period						.42	.76	1.12	1.43	1.75	1.83	1.87	1.99	2.04	2.04	2.16	2.54	2.64	2.70	[6]2.71				
Seattle, Wash. Aug. 24, 1921.	Observed precipitation	2:48 p.m.	3:45 p.m.	.59	3:09 p.m.	.03	.29	.46	.51																
	Increment						.29	.17	.05																
	Maximum for period						.29	.46	.51																
Sheridan, Wyo. July 2, 1912.	Observed precipitation	7:52 p.m.	8:20 p.m.	.91	7:53 p.m.	.01	.16	.64	.85																
	Increment						.16	.48	.21																
	Maximum for period						.48	.69	.85																
Shreveport, La. June 25, 1932.	Observed precipitation	2:20 p.m.	6:15 p.m.	2.47	3:07 p.m.	.37	.06	.13	.62	1.31	1.86	1.93	1.96	1.98	1.99	2.00	2.01	2.04	2.07	2.09	2.10				
	Increment						.06	.07	.49	.69	.55	.07	.03	.02	.01	.01	.01	.03	.03	.02	.01				
	Maximum for period						.69	1.24	1.73	1.80	1.87	1.93	1.96	1.98	1.99	2.00	2.01	2.04	2.07	2.09	2.10				
Sioux City, Iowa June 13, 1930.	Observed precipitation	5:34 a.m.	6:54 a.m.	2.85	6:05 a.m.	.03	.10	.62	1.11	1.85	2.28	2.71	2.80	2.81	2.82										
	Increment						.10	.52	.49	.74	.43	.43	.09	.01	.01										
	Maximum for period						.74	1.23	1.75	2.18	2.61	2.71	2.80	2.81	2.82										
Spokane, Wash. July 21, 1910.	Observed precipitation	1:50 p.m.	2:15 p.m.	.39	1:51 p.m.	.01	.23	.36																	
	Increment						.23	.13																	
	Maximum for period						.23	.36																	
Springfield, Ill. July 23, 1917.	Observed precipitation	1:20 p.m.	4:15 p.m.	2.58	1:29 p.m.	.01	.43	1.02	1.41	1.67	1.92	2.08	2.30	2.41	2.52										
	Increment						.43	.59	.39	.26	.25	.16	.22	.11	.11										
	Maximum for period						.59	1.02	1.41	1.67	1.92	2.08	2.30	2.41	2.52										
Springfield, Mo. May 6, 1906.	Observed precipitation	7:20 a.m.	11:35 a.m.	1.86	9:45 p.m.	.34	.10	.53	1.12	1.40	1.45														
	Increment						.10	.43	.59	.28	.05														
	Maximum for period						.59	1.02	1.30	1.40	1.45														
Syracuse, N.Y. June 21, 1932.	Observed precipitation	4:22 p.m.	5:25 p.m.	1.88	4:31 p.m.	.05	.34	.66	.88	1.27	1.72	1.83													
	Increment						.34	.32	.22	.39	.45	.11													
	Maximum for period						.45	.84	1.06	1.38	1.72	1.83													
Tacoma, Wash. Nov. 1-2, 1909.	Observed precipitation	6:35 a.m.	4:10 a.m.	2.12	10:59 a.m.	1.01	.07	.14	.24	.33	.42	.49	.62	.70											
	Increment						.07	.07	.10	.09	.09	.07	.13	.08											
	Maximum for period						.13	.21	.29	.38	.48	.56	.63	.70											
Tampa, Fla. June 12, 1900.	Observed precipitation	2:57 p.m.	7:05 p.m.	2.53	3:00 p.m.	T	.50	1.50	1.90	2.15	2.35	2.40	2.45												
	Increment						.50	1.00	.40	.25	.20	.05	.05												
	Maximum for period						1.00	1.50	1.90	2.15	2.35	2.40	2.45												
Tatoosh Island, Wash. Oct. 18, 1914.	Observed precipitation	5:13 a.m.	12:50 p.m.	1.47	10:33 a.m.	.20	.19	.38	.61	.88	1.00														
	Increment						.19	.19	.23	.27	.12														
	Maximum for period						.27	.50	.69	.88	1.00														
Taylor, Tex. Apr. 29, 1905.	Observed precipitation	2:00 p.m.	6:10 p.m.	3.28	2:42 p.m.	.06	.45	1.35	2.25	2.75	2.83	2.89													
	Increment						.45	.90	.90	.50	.08	.06													
	Maximum for period						.90	1.80	2.30	2.75	2.83	2.89													
Terre Haute, Ind. July 7, 1915.	Observed precipitation	2:30 p.m.	8:30 p.m.	3.46	5:05 p.m.	.49	1.05	1.32	1.38	1.56	1.70	1.80	1.98	2.18	2.38	2.46	2.57	2.94							
	Increment						1.05	.27	.06	.18	.14	.10	.18	.20	.20	.08	.11	.37							
	Maximum for period						1.05	1.32	1.38	1.56	1.70	1.80	1.98	2.18	2.38	2.46	2.57	2.94							

[1] T.=trace. [2] During the night, [6] 2¾ hours.

TABLE 1.—*Most intense rainstorm recorded at each station through 1933*—Continued

Station and date	Item	Entire storm: Duration From—	Entire storm: Duration To—	Entire storm: Rainfall	Time excessive rate began	Fall prior to excessive rate[1]	Precipitation for various periods, in inches: Minutes 5	10	15	20	25	30	35	40	45	50	60	80	100	120	Hours 3	6	12
				In.		*In.*																	
Thomasville, Ga.	Observed precipitation	2:02 p.m.	5:18 p.m.	4.49	2:17 p.m.	0.01	0.21	0.52	0.64	0.78	1.11	1.68	2.23	2.94	3.38	3.77	4.14	4.26					
	Increment						.21	.31	.12	.14	.33	.57	.55	.71	.44	.39	.37	.12					
June 27, 1909.	Maximum for period						.71	1.26	1.83	2.27	2.66	2.99	3.17	3.36	3.56	3.77	4.14	4.26					
Toledo, Ohio	Observed precipitation	7:06 a.m.	8:35 a.m.	3.65	7:14 a.m.	.01	.09	.12	.32	.75	1.17	1.74	2.34	2.93	3.20	3.38	3.58						
	Increment						.09	.03	.20	.43	.42	.57	.60	.59	.27	.18	.20						
Aug. 16, 1920.	Maximum for period						.60	1.19	1.76	2.18	2.61	2.88	3.08	3.26	3.36	3.46	3.58						
Tonopah, Nev.	Observed precipitation	2:20 p.m.	3:45 p.m.	.52	2:48 p.m.	.03	.05	.20	.39														
	Increment						.05	.15	.19														
Sept. 12, 1923.	Maximum for period						.19	.34	.39														
Topeka, Kans.	Observed precipitation	4:45 a.m.	6:30 p.m.	4.59	5:28 a.m.	.06	.20	.25	.34	.58	1.24	1.65	1.96	2.32	2.47	2.79	3.27	3.56	3.70	3.82	3.99	4.33	
	Increment						.20	.05	.09	.24	.66	.41	.31	.36	.15	.32	.48	.29	.14	.12	.17	.34	
Sept. 14, 1930.	Maximum for period						.66	1.07	1.38	1.74	1.98	2.21	2.45	2.69	2.93	3.02	3.27	3.56	3.70	3.82	3.99	4.33	
Trenton, N.J.	Observed precipitation	6:35 p.m.	7:15 p.m.	1.70	6:38 p.m.	.01	.19	.50	.96	1.32	1.62	1.69											
	Increment						.19	.31	.46	.36	.30	.07											
June 30, 1920.	Maximum for period						.46	.82	1.13	1.43	1.62	1.69											
Valentine, Nebr.	Observed precipitation	5:12 p.m.	7:40 a.m.	4.02	5:44 p.m.	.02	.10	.30	.57	1.19	1.94	2.44	2.62	2.74	2.79								
	Increment						.10	.20	.27	.62	.75	.50	.18	.12	.05								
July 6, 1915.	Maximum for period						.75	1.37	1.87	2.14	2.34	2.52	2.64	2.74	2.79								
Vicksburg, Miss.	Observed precipitation	6:12 p.m.	(2)	2.19	10:58 p.m.	.57	.56	1.19	1.25	1.26	1.29	1.38	1.51	1.55									
	Increment						.56	.63	.06	.01	.03	.09	.13	.04									
May 12, 1923.	Maximum for period						.63	1.19	1.25	1.26	1.29	1.38	1.51	1.55									
Walla Walla, Wash.	Observed precipitation	5:48 p.m.	8:25 p.m.	.85	6:02 p.m.	.05	.07	.23	.36	.45	.53	.57	.61										
	Increment						.07	.16	.13	.09	.08	.04	.04										
May 25, 1911.	Maximum for period						.16	.29	.38	.46	.53	.57	.61										
Washington, D.C.	Observed precipitation	3:10 p.m.	5:40 p.m.	1.82	3:12 p.m.	.01	.45	1.14	1.48	1.59													
	Increment						.45	.69	.34	.11													
July 15, 1921.	Maximum for period						.69	1.14	1.48	1.59													
Wausau, Wis.	Observed precipitation	9:32 a.m.	4:56 p.m.	2.10	9:35 a.m.	.01	.24	.74	1.13	1.30	1.63	1.82											
	Increment						.24	.50	.39	.17	.33	.19											
July 29, 1924.	Maximum for period						.50	.89	1.13	1.39	1.63	1.82											
Wichita, Kans.	Observed precipitation	11:25 p.m.	8:25 a.m.	2.52	11:30 p.m.	.01	.26	.77	1.36	1.73	1.90	2.00	2.05	2.07	2.10	2.12	2.16	2.25	2.33	2.39	2.46		
	Increment						.26	.51	.59	.37	.17	.10	.05	.02	.03	.02	.04	.09	.08	.06	.07		
June 14–15, 1931.	Maximum for period						.59	1.10	1.47	1.73	1.90	2.00	2.05	2.07	2.10	2.12	2.16	2.25	2.33	2.39	2.46		
Williston, N.Dak.	Observed precipitation	3:10 p.m.	6:10 p.m.	3.05	4:18 p.m.	.11	.13	.34	.53	.85	1.12	1.50	1.88	2.25	2.61	2.80	2.91	2.92	2.94	2.97			
	Increment						.13	.21	.19	.32	.27	.38	.38	.37	.36	.19	.11	.01	.02	.03			
June 9, 1932.	Maximum for period						.38	.76	1.13	1.49	1.76	2.08	2.27	2.48	2.67	2.80	2.91	2.92	2.94	2.97			
Wilmington, N.C.	Observed precipitation	1:30 p.m.	4:30 p.m.	3.02	1:32 p.m.	.01	.45	.97	1.37	2.01	2.44	2.60	2.65	2.68									
	Increment						.45	.52	.40	.64	.43	.16	.05	.03									
Sept. 23, 1923.	Maximum for period						.64	1.07	1.56	2.01	2.44	2.60	2.65	2.68									

Winnemucca, Nev. June 29, 1925.	Observed precipitation	2:35 p.m.	3:50 p.m.	.91	2:43 p.m.	.02	.27	.53	.71	.79	.81														
	Increment						.27	.26	.18	.08	.03														
	Maximum for period						.27	.53	.71	.79	.81														
Wytheville, Va. Aug. 22, 1916	Observed precipitation	2:40 p.m.	5:00 p.m.	2.50	2:42 p.m.	.01	.21	.47	1.02	1.57	1.95	2.18	2.31	2.40											
	Increment						.21	.26	.55	.55	.38	.23	.13	.09											
	Maximum for period						.55	1.10	1.48	1.74	1.97	2.18	2.31	2.40											
Yankton, S. Dak. May 26, 1912.	Observed precipitation	(2)	6:30 a.m.	2.55	4:09 a.m.	.42	.22	.72	1.12	1.49	1.67	1.71	1.77												
	Increment						.22	.50	.40	.37	.18	.04	.06												
	Maximum for period						.50	.90	1.27	1.49	1.67	1.71	1.77												
Yellowstone Park, Wyo. July 13, 1929.	Observed precipitation	6:06 p.m.	7:06 p.m.	.37	6:19 p.m.	.03	.13	.30	.31	.32	.32	.32	.33	.33	.34	.34									
	Increment						.13	.17	.01	.01	.00	.00	.01	.00	.01	.00									
	Maximum for period						.17	.30	.31	.32	.32	.32	.33	.33	.34	.34									

[1] T. = trace.

[2] During the night.

TABLE 2.—*Maximum rates of precipitation at each station, through 1933*

Station	Precipitation in inches during number of minutes stated [1]														Hours		
	5	10	15	20	25	30	35	40	45	50	60	80	100	120	3	6	12
Abilene, Tex.	0.66	1.14	1.55	1.85	2.04	2.27	2.50	2.65	2.66	2.76		3.17	4.17	4.42			
Albany, N.Y.	.58	.87	1.17	1.35	1.53	1.58	1.61	1.66	1.67	1.70	1.82						
Alpena, Mich.	.59	.94	1.11	1.29	1.57		1.60	1.68	1.77		1.85						
Amarillo, Tex.	.63	.88	1.19	1.44	1.59	1.71	1.87	1.93	1.96	1.99		2.53	2.61	2.74			
Anniston, Ala.	.65	1.24	1.81	2.36	2.68	2.97	3.25	3.43	3.50	3.60							
Apalachicola, Fla.	.63	1.26	1.56	1.84	2.04	2.23	2.47	2.55	2.59	2.66	2.72	3.17	3.31	3.75	4.14		
Asheville, N.C.	.83	1.31	1.71	1.80		2.12	2.40	2.53	2.65	2.67				2.70			
Atlanta, Ga.	.84	1.27	1.65	1.90	2.10	2.39	2.69	2.89	3.03	3.19		3.38	4.03	4.29			
Atlantic City, N.J.	.83	1.19		1.32	1.53	1.74	1.89	2.08	2.22	2.33	2.69	3.23	3.83	4.07		5.40	
Augusta, Ga.	1.24	1.80	2.11	2.26	2.46	2.68	2.84	3.01				3.24					
Austin, Tex.	.53	.98	1.25	1.46	1.58	1.69	1.76	1.85	1.90	2.00	2.01	2.07	2.23	2.28	2.34	3.56	
Baker, Oreg.	.30	.44	.50	.58	.70	.78							.95				
Baltimore, Md.	.74	1.39	1.90	2.23	2.52	2.69	2.87					2.87	3.03	3.38	3.58	4.17	
Bentonville, Ark.	.64	1.19	1.45	1.62	1.72	1.84	1.89	2.13	2.18	2.21	2.31	2.32	2.44	2.95			
Binghamton, N.Y.	.50	.90	1.07	1.33	1.46	1.54	1.76	1.94	2.10	2.18	2.22	2.29					
Birmingham, Ala.	.64	1.13	1.53	1.83	1.97			1.99	2.10	2.27	2.37	2.86	3.04	3.07	3.22		
Bismarck, N.Dak.	.68	1.10	1.38	1.53	1.93	2.26	2.59	2.80	2.94	2.99	3.00	3.01	3.02				
Block Island, R.I.	.38	.64	.87	1.06	1.28	1.44	1.52	1.67	1.80	1.85	2.11		2.36	2.67		2.72	
Boise, Idaho	.17	.33	.42	.55	.64			.69	.78	.81	.95						
Boston, Mass.	.56	.90	1.07	1.29	1.41	1.45	1.52	1.54	1.62	1.63	1.76		2.00	2.41			

[1] For each period indicated, the precipitation shown may have occurred in either the same or a different storm from that in which any other of the precipitations occurred.

TABLE 2.—*Maximum rates of precipitation at each station, through 1933*—Continued

Station	Precipitation in inches during number of minutes stated														Hours		
	5	10	15	20	25	30	35	40	45	50	60	80	100	120	3	6	12
Broken Arrow, Okla	0.48	0.77	1.05	1.24	1.36	1.46	1.54	1.69	1.78	1.90	2.23	2.86	3.10				
Brownsville, Tex	.64	1.28	1.69	2.08	2.46	2.94	3.26	3.57	3.83	4.19	4.75	5.63	5.76	5.81	5.86		
Buffalo, N.Y	.42	.70	.92	1.00	1.18	1.34	1.57	1.68	1.79	1.95	2.22		2.33		3.08		
Burlington, Vt	.47	.85	.99	1.03	1.24	1.38	1.56	1.63	1.73	1.90	1.96						
Cairo, Ill	.63	.93	1.32	1.54	1.66	1.76	1.86	2.10	2.41	2.71	3.15	3.35	3.61				
Canton, N.Y	.45	.78	1.06	1.26	1.49	1.73	1.85	1.91									
Cape Henry, Va	.70	1.25	1.80	2.13	2.46	2.79	3.11	3.42	3.48	3.50	3.67	4.26					
Charles City, Iowa	.48	.87	1.16	1.46	1.69	1.90	2.03	2.16	2.24	2.33	2.48	2.70					
Charleston, S.C	.56	1.02	1.48	1.87	2.16	2.36	2.57	2.77	3.04	3.51	4.08	5.28	6.12	6.62	7.42	8.62	9.03
Charlotte, N.C	.63	1.00	1.30	1.51	1.70	1.86	1.94	2.04	2.13	2.20	2.35	2.59	2.92	3.12	3.98		
Chattanooga, Tenn	.80	1.23	1.51	1.77		1.85	2.10	2.30	2.46		2.52	2.83				3.54	
Cheyenne, Wyo	.48	.90	1.32	1.63	1.92	2.04	2.22	2.32	2.46								
Chicago University, Ill	.58	.96	1.22	1.51	1.72	2.03	2.20				2.30		2.39				
Cincinnati, Ohio	.78	1.40	1.78	2.13	2.47	2.57	2.60										
Cleveland, Ohio	.78	1.09	1.46	1.77	1.78	1.80				1.84		1.90				2.00	
Columbia, Mo	.63	.99	1.22	1.36	1.61	1.86	2.06	2.21	2.34	2.51	2.73	2.84	2.98	3.26	4.64		
Columbia, S.C	.55	1.05	1.39	1.60	1.67	1.86	1.99	2.12	2.19		2.32	2.85	3.35	3.84			
Columbus, Ohio	.53	.89	1.31	1.56	1.80	2.05	2.22	2.34	2.42	2.62	2.79	2.80	2.86	2.93			
Concord, N.H	.55	1.06	1.55	1.88	2.18	2.39	2.60	2.69				2.73					
Concordia, Kans	.58	.98	1.37	1.68	1.99	2.13	2.25	2.35	2.43		2.64						
Corpus Christi, Tex	.60	1.14	1.44	1.78	2.18	2.38	2.60	2.88	3.08	3.22	3.63	3.82			4.54	6.03	
Dallas, Tex	.72	1.29	1.54	1.78	2.07	2.40	2.71	2.88	3.08	3.17	3.25	3.35	3.38	3.65			
Davenport, Iowa	.54	1.00	1.38	1.59	1.61	1.88	2.13	2.42	2.63	2.69							
Dayton, Ohio	.44	.77	1.00	1.33	1.54	1.75	1.79	1.83	2.03	2.15	2.26	2.52	2.61	2.66	2.80		
Del Rio, Tex	.62	1.08	1.58	2.08	2.41	2.74	3.23	3.71	4.14	4.39	4.67	5.07					
Denver, Colo	.87	1.20	1.52	1.62	1.67	1.72			1.80	1.93	2.20	2.32					
Des Moines, Iowa	.62	1.10	1.33	1.53	1.67	1.74	1.99	2.22	2.29	2.32	2.62	3.05	3.29	3.32			
Detroit, Mich	.78	1.37	1.81	2.06	2.21	2.36	2.46	2.51	2.59	2.60	2.98	3.47	3.78	3.86			
Devils Lake, N.Dak	.90	1.45	1.84	2.18	2.24	2.40	2.54	2.64	2.66		2.70						
Dodge City, Kans	.55	1.02	1.34	1.55	1.86	2.21	2.50	2.81	2.95	3.11	3.47	4.27	4.85				
Drexel, Nebr	.50	.77	1.15	1.36	1.47	1.60	1.80	1.94	2.06				2.47	2.89			
Dubuque, Iowa	.66	1.20	1.54	1.74	1.99	2.23	2.40	2.51	2.64		2.66	2.97		3.21			
Due West, S.C	.56	1.09	1.53	1.84	2.25	2.53	2.74	2.95	3.15	3.30	3.45	3.91	4.15	4.64			
Duluth, Minn	.54	.98	1.22	1.38	1.48	1.60	1.71	1.80	1.96	2.12	2.26	2.51					
Eastport, Maine	.45	.75	.96	1.03	1.10		1.16	1.25	1.34			1.46	1.62		1.94	2.85	

Elkins, W.Va	.55	.81	1.05	1.38	1.72	1.95	2.11	2.22	2.28	2.32		2.47	3.07	3.14			
Ellendale, N.Dak	.63	1.11	1.37	1.59	1.73	1.82	1.96	2.16	2.45	2.50	2.62	2.78		3.27	4.69		
El Paso, Tex	.43	.65	.87	1.06	1.24	1.26			1.30	1.38	1.57	1.79	2.10	2.30			
Erie, Pa	.65	.98	1.28	1.38	1.45	1.55	1.72	1.78	1.83	1.97	2.07	2.25			2.89	3.18	
Escabana, Mich	.69	1.32	1.52	1.62	1.65	1.77	1.87						1.91				
Eureka, Calif	.21	.37	.51		.57	.63	.69	.75	.79								
Evansville, Ind	.48	.85	1.15	1.36	1.59	1.81	1.99	2.23	2.41	2.59	2.79			3.01			
Flagstaff, Ariz	.35	.64	.85	.96	1.06	1.15											
Fort Smith, Ark	.50	.90	1.13	1.29	1.52	1.73	1.79	1.92	2.01	2.03	2.06	2.31	2.70				
Fort Wayne, Ind	.79	.98	1.24	1.48	1.83	2.01	2.21						2.53	2.94			
Fort Worth, Tex	.56	.97	1.40	1.71	1.91	2.02	2.28	2.48	2.66	2.89	3.08	3.66	3.95	4.32			
Fresno, Calif	.34	.58	.82	1.06	1.12	1.16											
Galveston, Tex	.74	1.45	1.92	2.24	2.50	2.82	3.27	3.72	4.24	4.62	5.31	6.02	6.71	7.58		11.79	
Grand Haven, Mich	.42	.72	.89	1.04	1.28	1.43	1.54				1.67	2.02					
Grand Junction, Colo	.30	.54	.58	.61		.64											
Grand Rapids, Mich	.48	.89	1.10	1.31	1.51	1.71	1.80	2.01	2.11	2.19							
Green Bay, Wis	.51	.78	1.06	1.36	1.59	1.81	2.03	2.08	2.10	2.16		2.28	2.39				
Greensboro, N.C	.54	.80	.90	1.22	1.42	1.48	1.51	1.54	1.56	1.57	1.59	1.61		1.62	1.72		
Greensville, S.C	.87	1.31	1.68	1.87	1.98	2.30	2.60	2.91	3.16	3.34	3.42						3.45
Groesbeck, Tex	.58	1.01	1.34	1.53	1.74	1.96	2.18	2.48	2.75	2.99	3.35	4.03	4.64	4.98			
Hannibal, Mo	.54	.98	1.33	1.63	1.86	1.90	2.15	2.51	2.69	2.80	2.94	3.21	3.52	4.66			
Harrisburg, Pa	1.04	1.30	1.44	1.56	1.64	1.95	2.09	2.21	2.32	2.37		2.44	2.63	2.84			
Hartford, Conn	.65	1.10	1.43	1.66	2.05	2.32	2.44	2.69	2.81	2.89	2.92						
Hatteras, N.C	.61	1.21	1.72	2.20	2.61	3.04	3.51	4.07	4.61	4.96	5.26	5.52				6.59	
Havre, Mont	.37	.67	.77	.88						.93	1.19	1.30					
Helena, Mont	.47	.60	.76		.81		.83	.90	.96								
Honolulu, Hawaii	.47	.79	1.09	1.33	1.58	1.79	1.95	2.08	2.25	2.38	2.50	3.02			3.97		
Houghton, Mich	.48	.79	.99	1.16	1.35	1.44	1.68	1.87	2.10	2.26	2.61	3.29	3.80	4.28			
Houston, Tex	.84	1.43	2.00	2.26	2.51	2.92	3.10	3.33	3.47	3.54	3.59		3.80	4.28			
Huron, S.Dak	.76	1.14	1.47	1.74	1.89	1.98	2.04				2.12	2.52					
Indianapolis, Ind	.69	1.08	1.28	1.54	1.78	1.98	2.05	2.18	2.41	2.56	2.66	2.86	3.08	3.10			
Iola, Kans	.97	1.37	1.60	1.70	2.02	2.27	2.46	2.63		2.65	2.92	3.22			4.09		
Jacksonville, Fla	.72	1.16	1.63	1.95	2.26	2.46	2.60	2.73	2.85	3.00	3.21	3.41	3.63	4.16	4.58	5.78	
Jupiter, Fla	.65	1.10	1.55	1.87	2.29	2.55	2.86	3.17	3.40	3.66	3.83	4.15	4.41	4.59		5.20	
Kalispell, Mont	.44	.70	.88	.95													
Kansas City, Mo	.80	1.12	1.65	2.15	2.65	3.07	3.45	3.79	4.10	4.32	4.74	5.45	5.74				
Keokuk, Iowa	.62	1.05	1.30	1.57	1.78	1.92	2.04	2.15	2.26	2.37	2.56	2.79	2.96	3.11	3.21	3.62	
Key West, Fla	.65	.99	1.49	1.93	2.30	2.66	3.10	3.47	3.77	4.03	4.30	5.12	6.25	7.09			
Knoxville, Tenn	.54	.99	1.31	1.64	2.01	2.19	2.36	2.47	2.54	2.57	2.63	2.73	2.86	3.30	3.92		
LaCrosse, Wis	.66	.92	1.21	1.41	1.51	1.53		1.59	1.76	1.82	1.92	2.33	2.79				

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TABLE 2.—*Maximum rates of precipitation at each station, through 1933*—Continued

Station	Precipitation in inches during number of minutes stated														Hours		
	5	10	15	20	25	30	35	40	45	50	60	80	100	120	3	6	12
Lander, Wyo	0.45	0.75	1.02	1.16	1.24	1.31	1.39	1.40	1.41	1.42	1.43	1.45		1.46		1.51	
Lansing, Mich	.66	.90	1.02	1.29	1.47	1.54	1.61	1.65	1.70	1.94	2.06			2.22	2.29		
LaSalle, Ill	.63	.90	1.17		1.24	1.43	1.56					1.65	1.97				
Lewiston, Idaho	.30	.50	.65	.80	.95	1.05											
Lexington, Ky	.66	1.13	1.54	1.83	2.10	2.34	2.63	2.85	2.96	3.09	3.20	3.26	3.79	5.15	6.17		
Lincoln, Nebr	.67	1.24	1.70	1.98	2.26	2.53	2.78	2.90	2.99	3.06	3.08			3.57	3.88		
Little Rock, Ark	.58	1.00	1.28	1.53	1.68	1.91	2.12	2.23	2.29	2.29	2.55	2.61	2.93	3.23	4.43		
Los Angeles, Calif	.42	.53	.66	.87	.99	1.10	1.18	1.28	1.32	1.38	1.44	1.73	1.90				
Louisville, Ky	.79	1.11	1.44	1.55	1.75	1.91	2.07	2.23	2.39	2.55	2.92	3.64	4.15	4.35			
Ludington, Mich	.52	.82	1.10	1.24	1.38	1.51	1.71	1.96	2.14	2.28	2.50		2.84	3.22	3.75		
Lynchburg, Va	.56	1.06	1.51	1.89	2.03	2.13	2.19	2.55	2.93	3.15	3.49						
Macon, Ga	.62	1.13	1.57	1.96	2.14	2.36	2.58	2.95	3.31	3.67	4.29	5.25	6.05	6.54			
Madison, Wis	.55	1.08	1.37	1.61	1.88	2.09	2.29	2.64	2.98	3.19	3.64	4.54	4.84				
Marquette, Mich	.48	.74	.96	1.16	1.42	1.67	1.93	2.18	2.34	2.50	2.93	3.54					
Memphis, Tenn	.78	1.17	1.61	2.07	2.46	2.70	2.91	2.99	3.23	3.24	3.25	3.87	4.55	4.69	5.00		
Meridian, Miss	.67	1.05	1.52	1.90	2.15	2.36	2.56	2.73	2.89	3.06	3.63	3.74					
Miami, Fla	.70	1.14	1.57	2.02	2.46	2.89	3.24	3.53	3.79	4.00	4.53	5.09	5.12	5.68	8.44		
Miles City, Mont	.38	.62	.81	.98													
Milwaukee, Wis	.54	.94	1.35	1.50	1.71	1.86	1.97	2.06	2.12	2.20		2.67	3.07	3.24			
Minneapolis, Minn	.81	1.05	1.16	1.32	1.58	1.93	2.15	2.21				2.38	2.38	2.47			
Mobile, Ala	.73	1.33	1.54	1.89	2.22	2.31	2.36		2.50	2.62	3.02	3.90	4.32	4.47			
Modena, Utah	.38	.68	.95	1.06		1.12	1.17	1.22	1.24	1.27	1.41	1.68					
Montgomery, Ala	.61	1.04	1.47	1.80	2.15	2.49	2.68	2.86	3.08	3.29	3.46	3.55	4.00	4.39	5.40	5.81	
Moorhead, Minn	.68	1.02	1.37	1.65	1.90	1.56	1.82	1.98	2.13	2.26	2.55	2.60			2.77		
Mount Tamalpais, Calif	.19	.34	.40	.45	.50	.53	.59	.65	.71								
Mount Weather, Va	.55	.85	1.14		1.19	1.33	1.68		1.74	1.88	2.14	2.62	3.09	3.11			
Nantucket, Mass	.42	.69	.81	.99	1.18	1.34	1.41	1.68	1.94	2.19	2.31	2.42	2.62	3.00			
Nashville, Tenn	.60	1.19	1.33	1.49	1.65	1.72	1.79	1.86	1.93	2.00	2.09	2.68	3.30				
New Haven, Conn	.78	1.27	1.77	2.26	2.32					2.33	2.37						
New Orleans, La	.75	1.19	1.68	1.97	2.23	2.37	2.45	2.59	2.97	3.22	3.66	3.77	5.10	5.64	6.54		
New York City, N.Y	.68	1.20	1.63	1.93	2.14	2.31	2.41	2.46				2.75	3.20	3.50			
Norfolk, Va	.64	.99	1.35	1.57	1.66	1.75	1.96	2.13	2.22	2.31	2.69	3.59	4.44	4.73			
Northfield, Vt	.85	1.46	1.64	1.71	1.74	1.80	1.89	1.91					2.16	2.28			
North Head, Wash	.27	.32	.38	.43	.48	.53	.57	.63	.69	.74	.88		.90	.94	1.04	1.45	
North Platte, Nebr	.58	.81	1.02	1.21	1.39	1.69	1.99	2.19	2.33	2.52	2.80	3.26	3.52	3.77	3.80		

Oklahoma City, Okla	.60	.91	1.43	1.74	2.00	2.29	2.55	2.65	2.74	2.80	3.08	3.63	3.69			3.85	
Omaha, Nebr	.67	.97	1.27	1.47	1.63	1.71	1.91	2.05	2.21	2.33	2.53	2.61		3.00	4.12		
Oswego, N.Y	.74	1.21	1.28				1.44	1.52					1.87	1.95			
Palestine, Tex	.58	1.08	1.54	1.93	2.22	2.47	2.63	2.81	2.98	3.07	3.23		3.35	3.79			
Parkersburg, W.Va	.67	1.14	1.52	1.68	1.76	1.91	1.98					2.18	2.43				
Pensacola, Fla	.80	1.53	2.29	2.88	3.37	3.65	3.80	3.94	4.01	4.15	4.27	4.49	5.08	6.10	7.10		
Peoria, Ill	.73	.90	1.20	1.50	1.80	2.10	2.32	2.45	2.52	2.57	2.60	2.68	3.13				
Philadelphia, Pa	.64	.94	1.35	1.62	1.92	2.24	2.47	2.67	2.87	3.30	3.79	4.82	5.35	5.43			
Phoenix, Ariz	.36	.60	.81	.99	1.11	1.16	1.25	1.28			1.30	1.68		1.79			
Pierre, S.Dak	.55	1.06	1.24	1.38	1.44	1.52		1.57	1.72	1.81	1.93		2.25				
Pittsburgh, Pa	.70	.97	1.23	1.36	1.43	1.46	1.48	1.64	1.65	1.75		1.81	1.87	1.92	1.98		
Pocatello, Idaho	.35	.48	.61	.69	.84	.95	1.05	1.09	1.16	1.20							
Point Reyes Light, Calif	.24	.36	.47	.51		.53	.61	.71	.79	.86	.98	1.06					
Port Angeles, Wash	.27	.30					.32										
Port Arthur, Tex	.72	1.13	1.60	2.00	2.41	2.76	2.85	2.99	3.07		3.11	3.25	3.73	4.07	4.70	6.52	
Port Huron, Mich	.46	.74	1.05	1.35	1.60	1.86	2.10	2.28	2.32							2.58	
Portland, Maine	1.06	1.41	1.52	1.56	1.64							1.73	1.84	1.97			
Portland, Oreg	.33	.63	.93	1.00	1.05	1.10	1.16		1.20								
Providence, R.I	.41	.76	1.09	1.29	1.47	1.59	1.71	1.78	1.92	2.10	2.46	2.74	3.02		3.09	4.30	
Pueblo, Colo	.44	.80	.97	1.20	1.42	1.59	1.72	1.83	1.94	2.04							
Raleigh, N.C	.73	1.35	1.71	2.01	2.35	2.57	2.76	2.87	2.94	2.99		3.41	3.71	3.98	4.65		
Rapid City, S.Dak	.45	.73	.95	1.16	1.35	1.45	1.60	1.69	1.85	2.03	2.41						
Reading, Pa	.59	.98	1.39	1.74	1.92	2.05	2.11	2.20	2.28	2.42	2.68	3.58	4.35	4.89			
Red Bluff, Calif	.39	.51	.76	.89	1.05	1.21	1.35	1.52	1.66	1.82	2.07	2.80	3.31	3.72	4.70		
Reno, Nev	.30	.54	.69	.76	.84							.85	.86	.91	.95		
Richmond, Va	.70	1.28	1.63	2.07	2.32	2.60	2.71	2.90	3.12	3.34	4.02	5.07	5.61	6.32	7.01	7.10	
Rochester, N.Y	.56	.78	.99	1.26	1.56	1.70	1.84	1.98	2.12	2.24	2.49	2.74					
Roseburg, Oreg	.55	.80	1.10	1.14													
Roswell, N.Mex	.55	.86	1.17	1.33	1.37	1.46	1.62	1.70	1.79	1.92	2.21	2.64	2.69	2.78			
Royal Center, Ind	.65	.90	1.05	1.26	1.43	1.56	1.62		1.94	2.08	2.27						
Sacramento, Calif	.27	.45	.63	.66	.67	.79	.87										
Saginaw, Mich	.62	.93	1.11	1.22								1.26					
Saint Joseph, Mo	.56	.94	1.18	1.38	1.63	1.82	2.01	2.19	2.48	2.67	2.97	3.13	3.74	4.06	4.92	6.31	
Saint Louis, Mo	.88	1.00	1.36	1.70	2.07	2.50	2.80	3.07	3.25	3.31	3.47	3.65	3.68				
Saint Paul, Minn	.58	.98	1.33	1.69	1.90	2.12	2.21	2.31	2.33	2.41	2.60	2.69	2.93	3.04			
Salt Lake City, Utah	.36	.66	.77	.87	.97	1.05	1.09										
San Antonio, Tex	.70	1.12	1.46	1.70	1.91	2.10	2.37	2.49	2.61	2.68	2.83	3.18	3.29	4.61			
San Diego, Calif	.29	.47	.59	.75	.85	.93	.80	.88	.96	1.04	1.15	1.29	1.62	2.09			
Sand Key, Fla	.50	.87	1.35	1.72	2.04	2.26	2.53	2.65	2.74					2.82	3.74		
Sandusky, Ohio	.56	.85	1.10	1.34	1.59	1.82	1.98	2.11	2.16	2.22				2.39			
Sandy Hook, N.J	.62	.97	1.15	1.21	1.32	1.56	1.77	1.82	1.83	1.98	2.31	2.82	3.13				
San Francisco, Calif	.33	.50	.62	.72	.75	.81									.85		
San Juan, P.R	.71	1.02	1.29	1.61	1.89	2.25	2.59	2.73	2.89	3.05	3.44	4.14	4.51	4.67	5.04	6.24	
San Luis Obispo, Calif	.28	.43	.53	.59	.63	.71	.77	.86	.92	.97	1.07						
Santa Fe, N.Mex	.41	.55	.77	.90	.99		1.02	1.10			1.16	1.45	1.57	1.60	1.68		

TABLE 2.—*Maximum rates of precipitation at each station, through 1933*—Continued

Station	Precipitation in inches during number of minutes stated														Hours		
	5	10	15	20	25	30	35	40	45	50	60	80	100	120	3	6	12
Sault Ste Marie, Mich	0.61	0.85	0.92	0.94	1.01	1.10			1.12	1.15	1.17	1.35					
Savannah, Ga	.65	1.08	1.49	1.90	2.07	2.31	2.57	2.79	3.00	3.19	3.40	3.82	4.03	4.65			
Scranton, Pa	.51	.92	1.12	1.43	1.75	1.83	1.87	1.99	2.04		2.16	2.54	2.64	2.70			
Seattle, Wash	.29	.46	.51	.57		.58	.62									0.65	
Sheridan, Wyo	.48	.69	.85	.99	1.22	1.30	1.33	1.34	1.36	1.38	1.39	1.84	2.40	2.68			
Shreveport, La	.69	1.24	1.73	1.80	1.87	2.00	2.23	2.43	2.57	2.72	3.15	3.61	4.28	5.19	6.49		
Sioux City, Iowa	.75	1.31	1.75	2.18	2.61	2.71	2.80	2.81	2.82		2.94						
Spokane, Wash	.23	.36			.39												
Springfield, Ill	.59	1.02	1.41	1.67	1.92	2.10	2.31	2.42	2.56	2.70	2.75	2.77	2.92				
Springfield, Mo	.59	1.02	1.30	1.40	1.52	1.65	1.76	1.88	2.00	2.12	2.26	2.51	2.98	3.25	3.35		
Syracuse, N.Y	.57	.84	1.06	1.38	1.72	1.83		1.97	2.04	2.28	2.65	3.15	3.53	3.73			
Tacoma, Wash	.15	.29	.35	.38	.48	.56	.63	.70									
Tampa, Fla	1.05	1.66	2.03	2.17	2.35	2.72	2.95	3.11	3.31	3.49	3.76	4.41		4.42	4.58		
Tatoosh Island, Wash	.33	.50	.69	.88	1.00				1.07	1.22	1.42	1.66	1.79	1.89	2.16	2.28	
Taylor, Tex	1.90		2.30	2.75	2.83	2.89		2.97	3.21	3.58	4.22	4.88	6.27	7.51	10.34		
Terre Haute, Ind	1.05	1.32	1.38	1.56	1.70	1.80	1.98	2.18	2.38	2.46	2.57	2.94		3.13		3.46	
Thomasville, Ga	.71	1.26	1.83	2.27	2.66	2.99	3.13	3.36	3.56	3.77	4.14	4.26			5.16		
Toledo, Ohio	.60	1.19	1.76	2.18	2.61	2.88	3.08	3.26	3.36	3.46	3.58						
Tonopah, Nev	.21	.34	.39														
Topeka, Kans	.66	1.07	1.38	1.74	1.98	2.21	2.45	2.69	2.93	3.02	3.27	3.56	3.70	3.82	3.99	4.33	
Trenton, N.J	.56	.94	1.13	1.43	1.62	1.69					1.70	2.16	2.30				
Valentine, Nebr	.75	1.37	1.87	2.14	2.34	2.52	2.64	2.74	2.79		3.01	3.21	3.13				
Vicksburg, Miss	.74	1.19	1.39	1.73	2.02	2.30	2.56	2.69	2.82	2.94	3.11	3.27	4.05	4.12	5.76		
Walla Walla, Wash	.21	.29	.38	.46	.53	.57	.61										
Washington, D.C	.69	1.21	1.51	1.62	1.89	2.13	2.33	2.45	2.50	2.54	2.79	3.23	3.45			3.52	
Wausau, Wis	.51	.93	1.27	1.49	1.63	1.82					1.94	2.80	3.41	3.75	4.08		
Wichita, Kans	.60	1.10	1.47	1.73	1.90	2.00	2.18	2.23	2.36	2.59		2.89		3.49	4.93		
Williston, N.Dak	.61	.91	1.14	1.49	1.76	2.08	2.27	2.48	2.67	2.80	2.91	2.92	2.94	2.97	3.05		
Wilmington, N.C	.65	1.07	1.47	2.01	2.44	2.60	2.65	2.68	2.71	2.94	3.39	4.04	4.58	4.97			
Winnemucca, Nev	.27	.53	.71	.79													
Wytheville, Va	.55	1.10	1.48	1.74	1.97	2.18	2.31	2.40			2.43						
Yankton, S.Dak	.75	1.13	1.32	1.49	1.67	1.71	1.77	1.89	1.90	2.02	2.34	3.00					
Yellowstone Park, Wyo	.17	.30	.31	.39	.45	.50	.55										

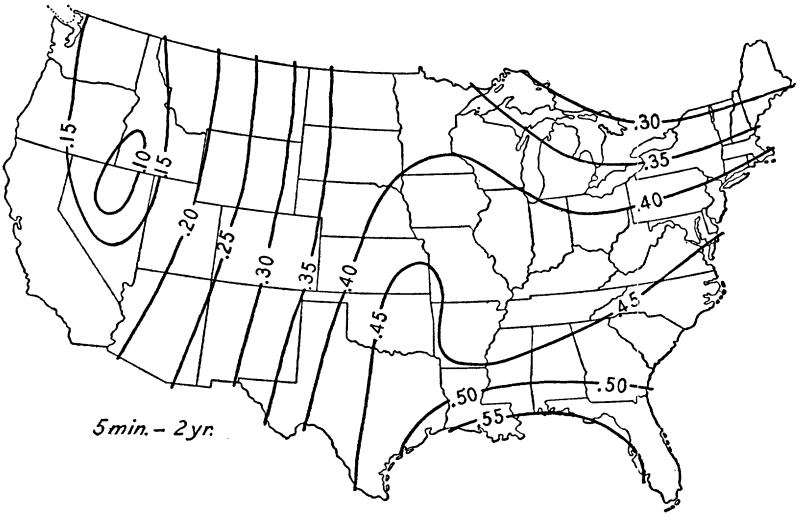


FIGURE 4.—Five-minute rainfall, in inches, to be expected once in 2 years.

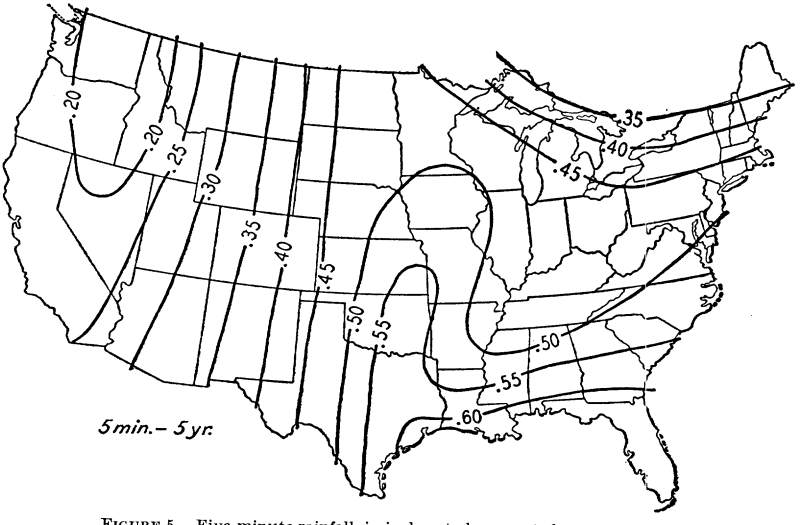


FIGURE 5.—Five-minute rainfall, in inches, to be expected once in 5 years.

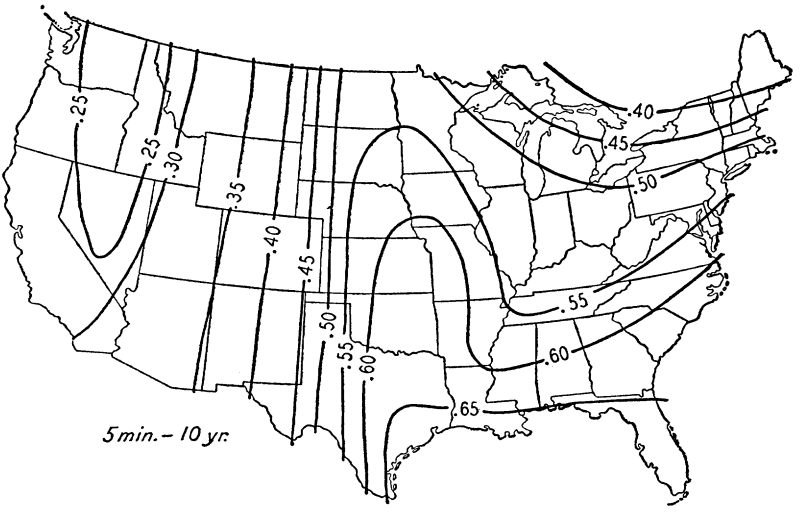


FIGURE 6.—Five-minute rainfall, in inches, to be expected once in 10 years.

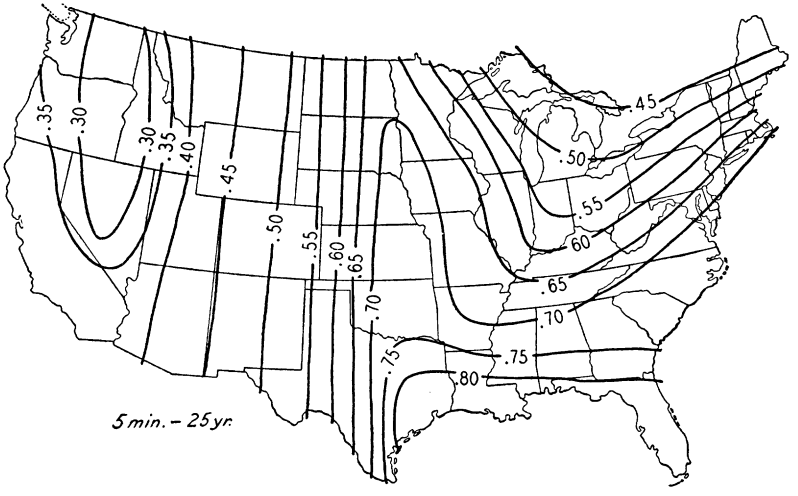


FIGURE 7.—Five-minute rainfall, in inches, to be expected once in 25 years.

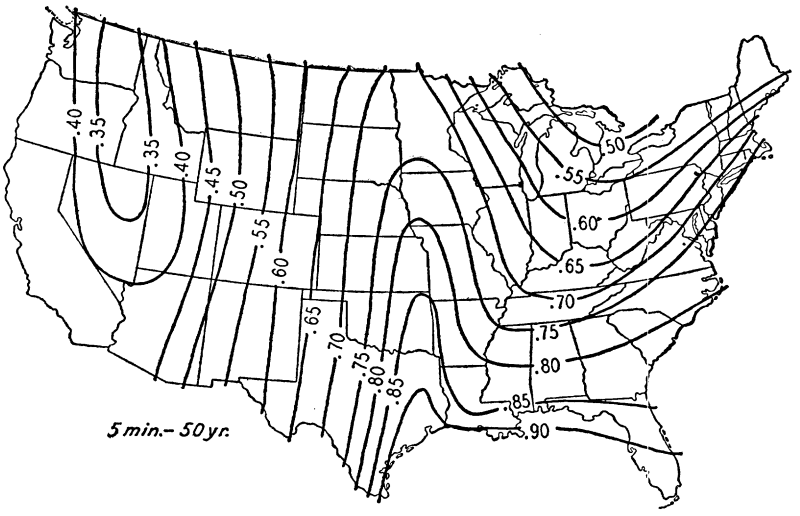


FIGURE 8.—Five-minute rainfall, in inches, to be expected once in 50 years.

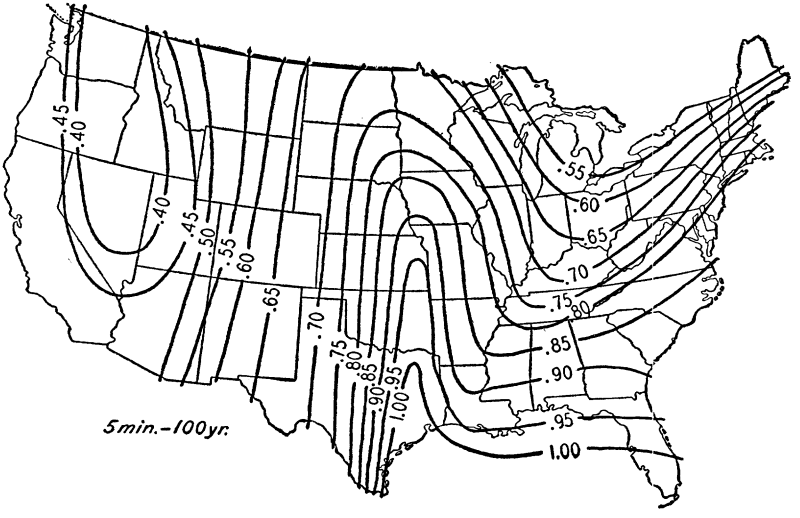


FIGURE 9.—Five-minute rainfall, in inches, to be expected once in 100 years.

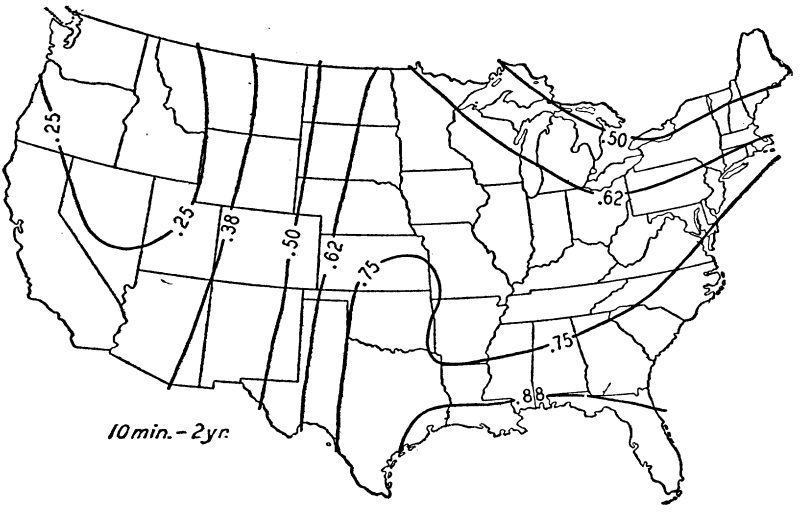


FIGURE 10.—Ten-minute rainfall, in inches, to be expected once in 2 years.

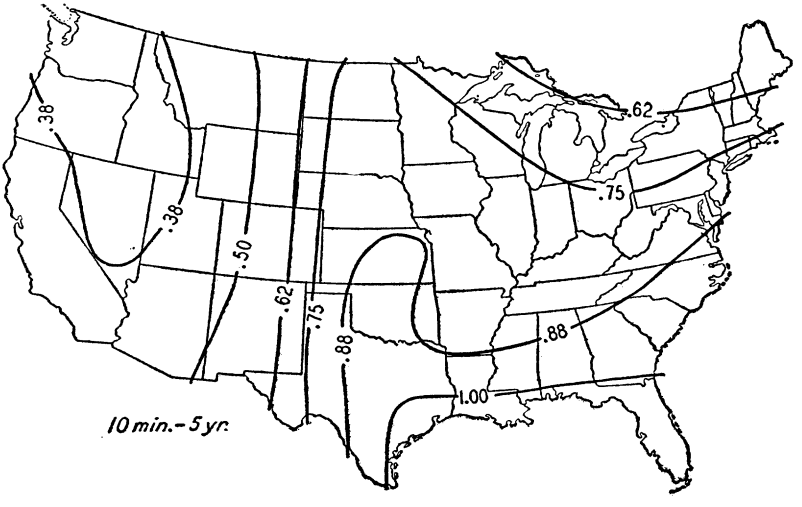


FIGURE 11.—Ten-minute rainfall, in inches, to be expected once in 5 years.

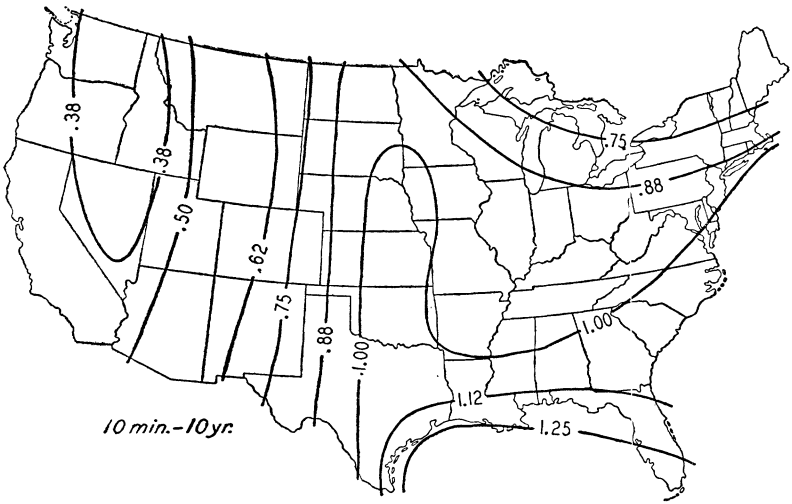


FIGURE 12.—Ten-minute rainfall, in inches, to be expected once in 10 years.

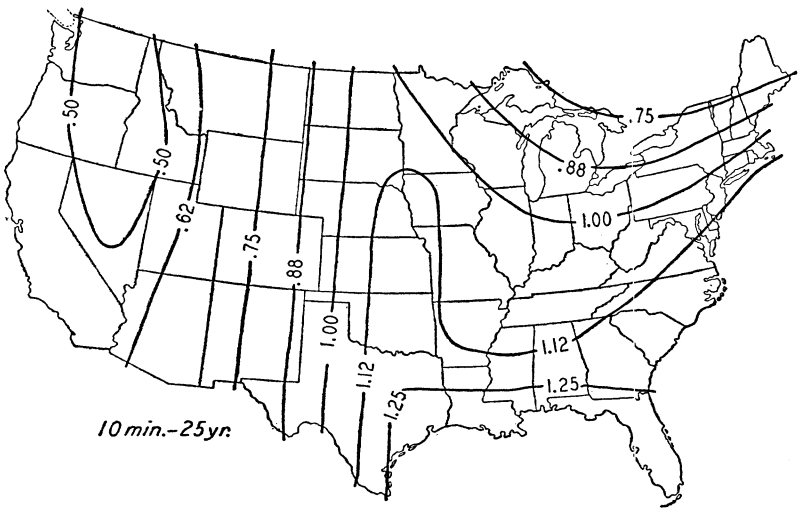


FIGURE 13.—Ten-minute rainfall, in inches, to be expected once in 25 years.

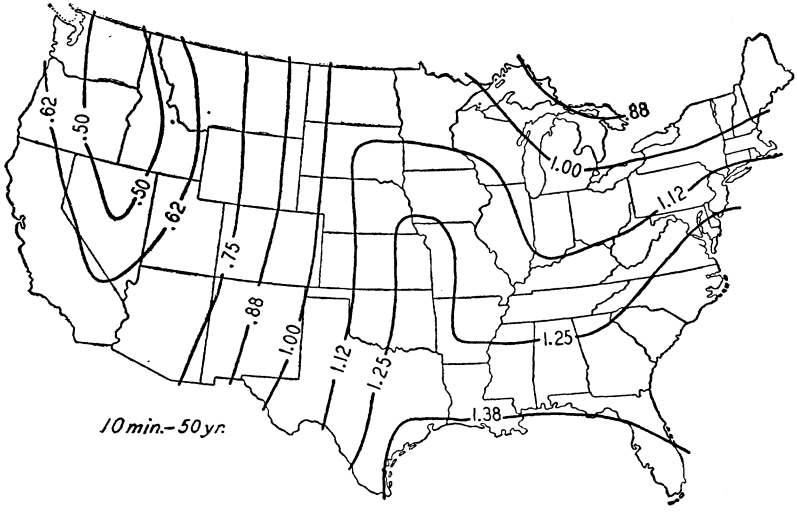


FIGURE 14.—Ten-minute rainfall, in inches, to be expected once in 50 years.

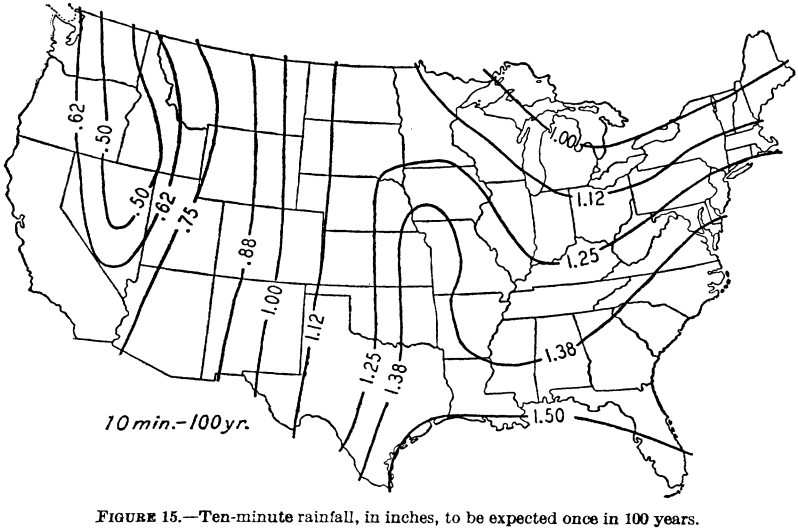


FIGURE 15.—Ten-minute rainfall, in inches, to be expected once in 100 years.

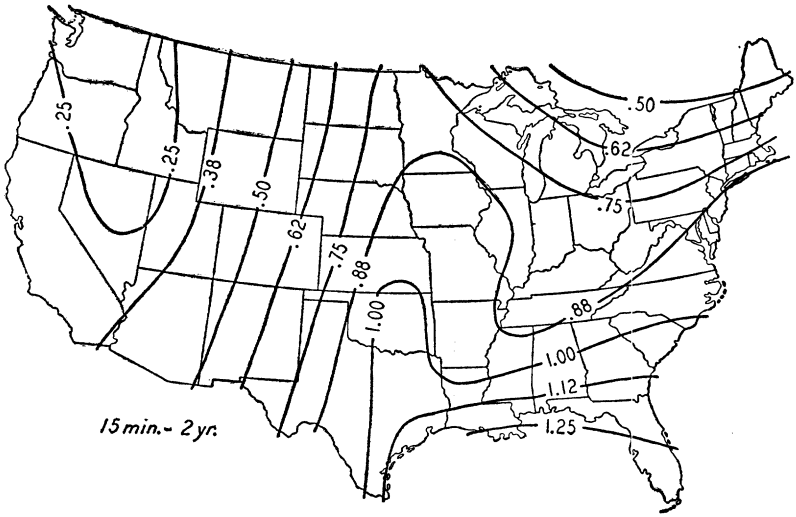


FIGURE 16.—Fifteen-minute rainfall, in inches, to be expected once in 2 years.

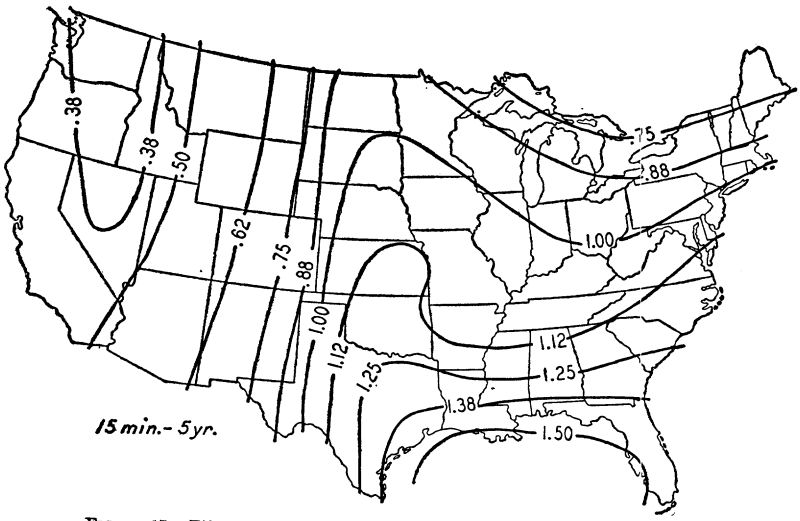


FIGURE 17.—Fifteen-minute rainfall, in inches, to be expected once in 5 years.

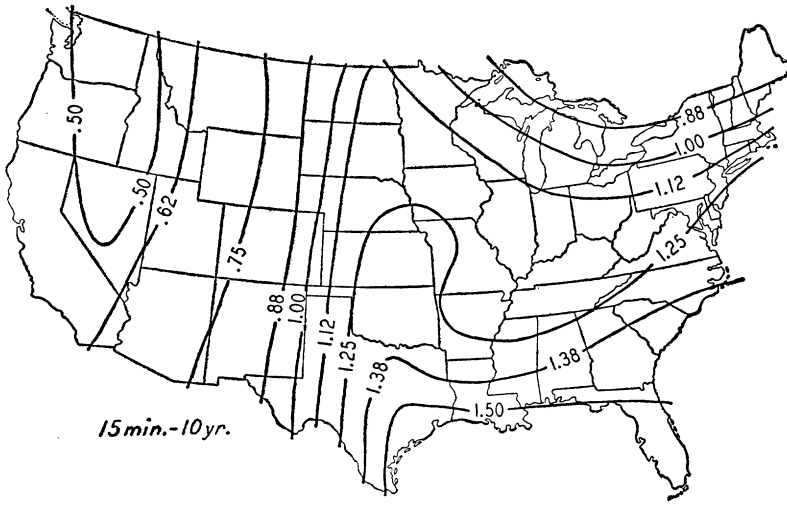


FIGURE 18.—Fifteen-minute rainfall, in inches, to be expected once in 10 years.

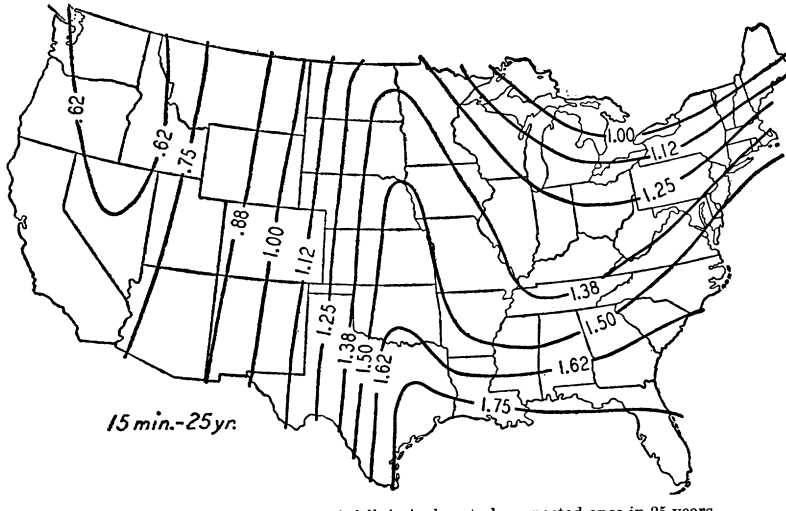


FIGURE 19.—Fifteen-minute rainfall, in inches, to be expected once in 25 years.

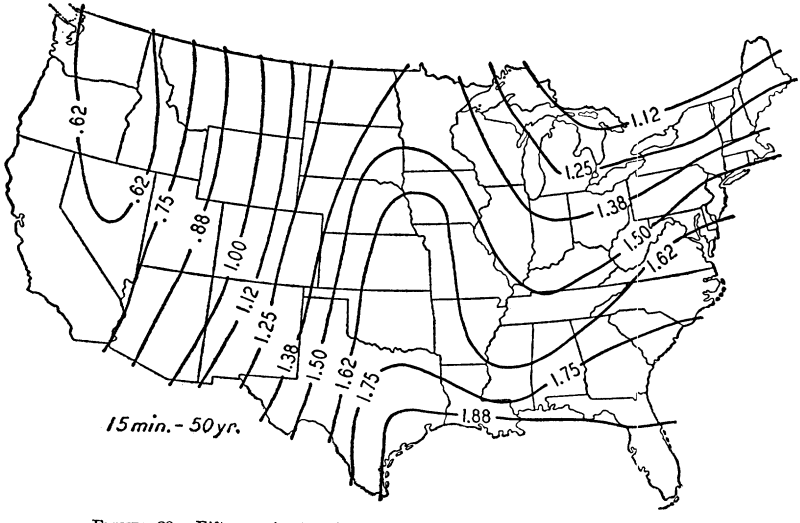


FIGURE 20.—Fifteen-minute rainfall, in inches, to be expected once in 50 years.

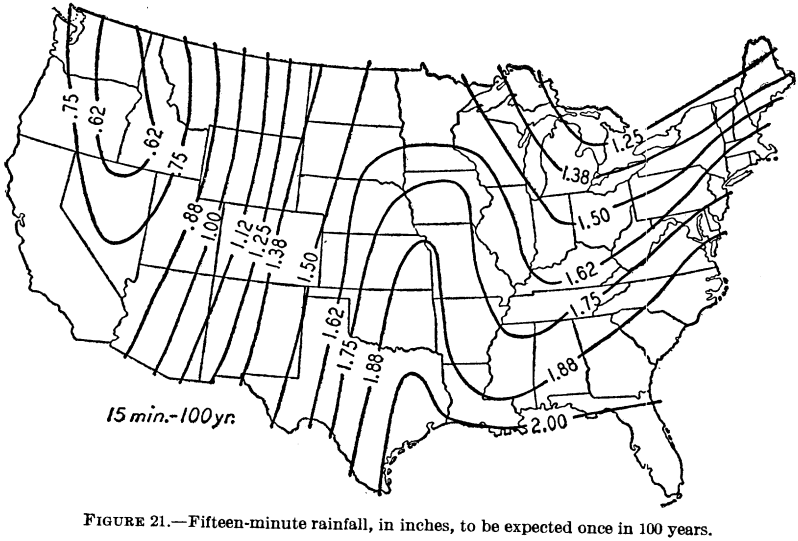


FIGURE 21.—Fifteen-minute rainfall, in inches, to be expected once in 100 years.

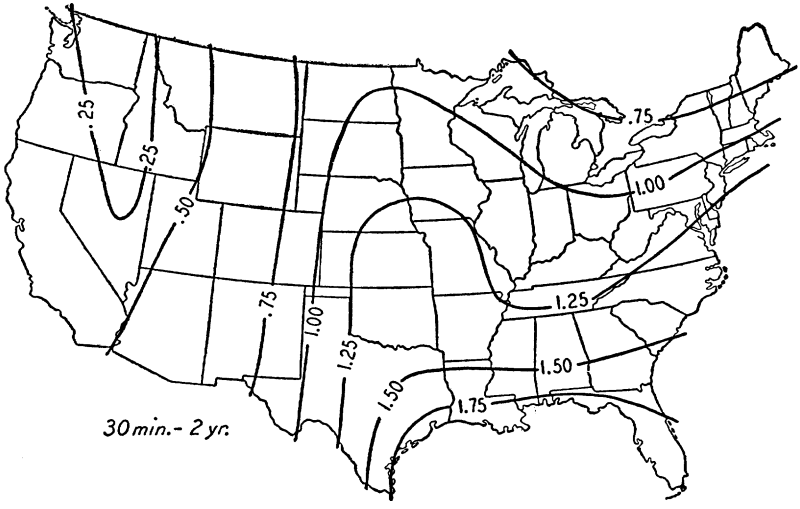


FIGURE 22.—Thirty-minute rainfall, in inches, to be expected once in 2 years.

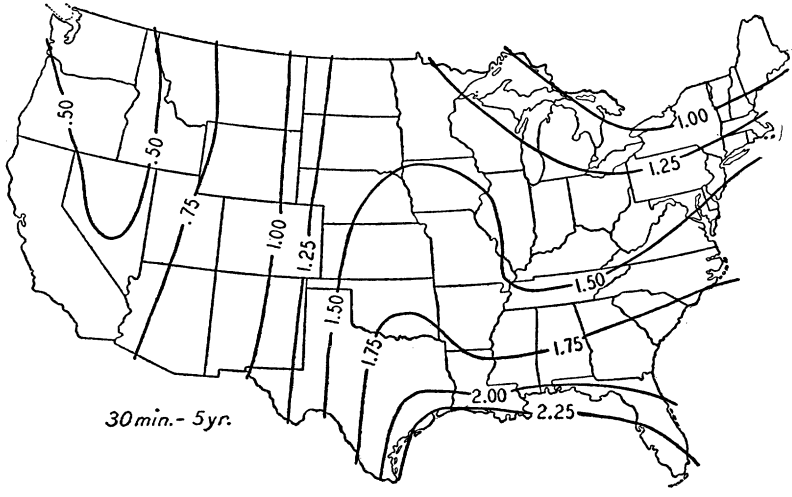


FIGURE 23.—Thirty-minute rainfall, in inches, to be expected once in 5 years.

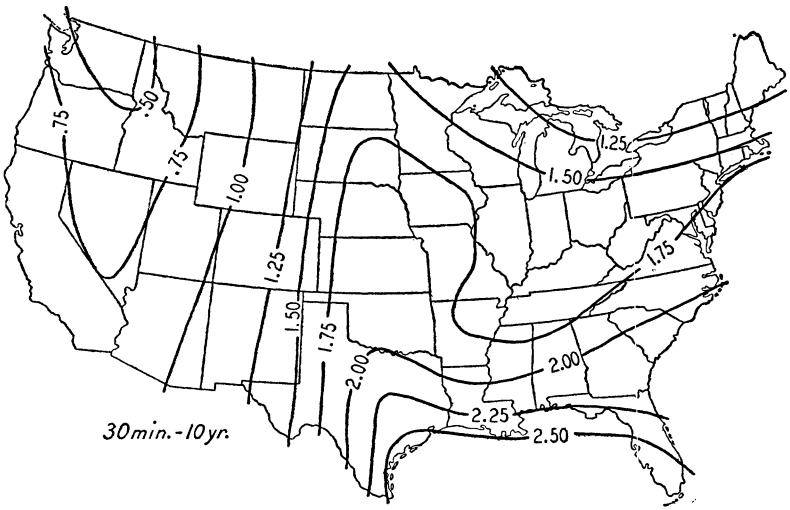


FIGURE 24.—Thirty-minute rainfall, in inches, to be expected once in 10 years.

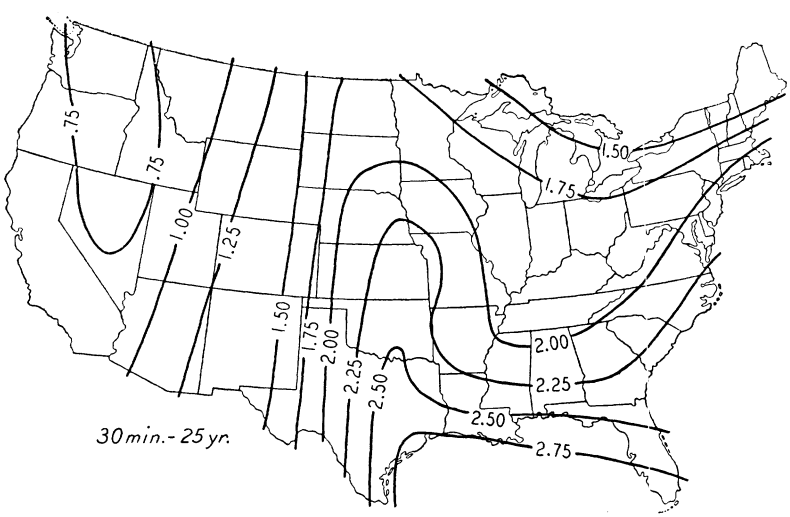


FIGURE 25.—Thirty-minute rainfall, in inches, to be expected once in 25 years.

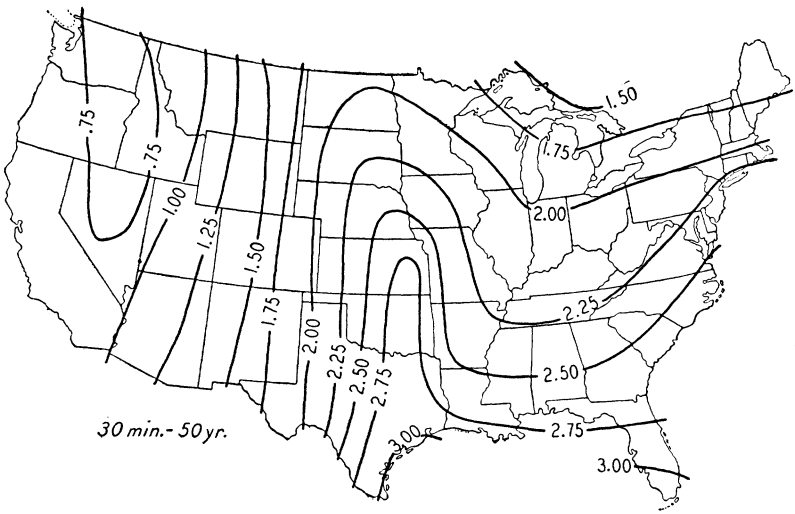


FIGURE 26.—Thirty-minute rainfall, in inches, to be expected once in 50 years.

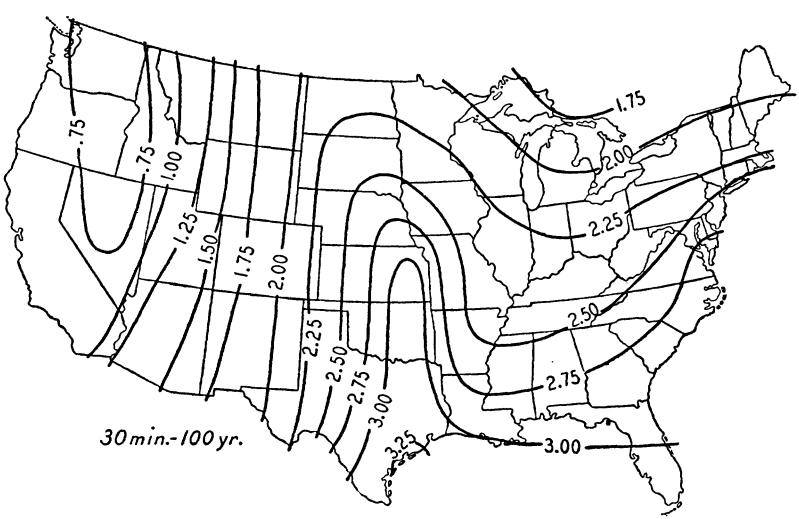


FIGURE 27.—Thirty-minute rainfall, in inches, to be expected once in 100 years.

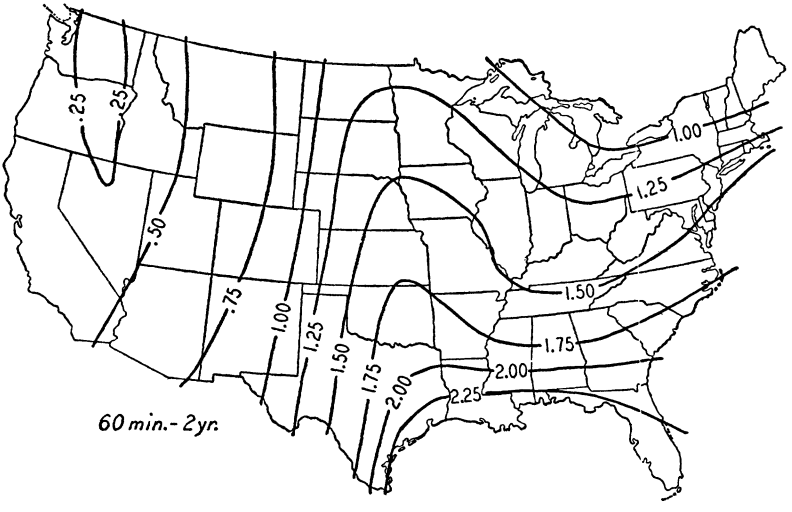


FIGURE 28.—One-hour rainfall, in inches, to be expected once in 2 years.

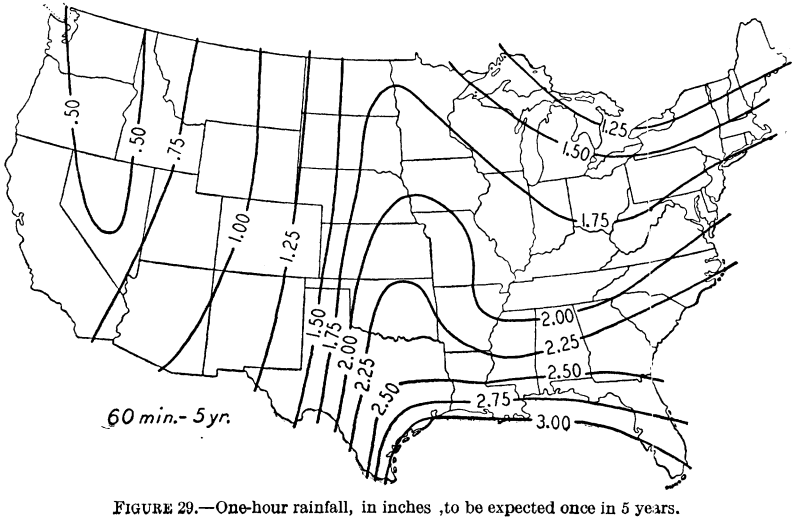


FIGURE 29.—One-hour rainfall, in inches ,to be expected once in 5 years.

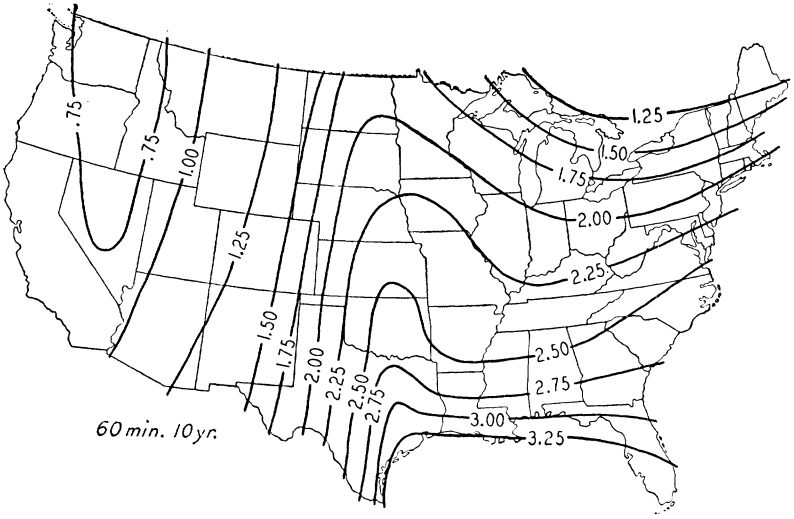


FIGURE 30.—One-hour rainfall, in inches, to be expected once in 10 years.

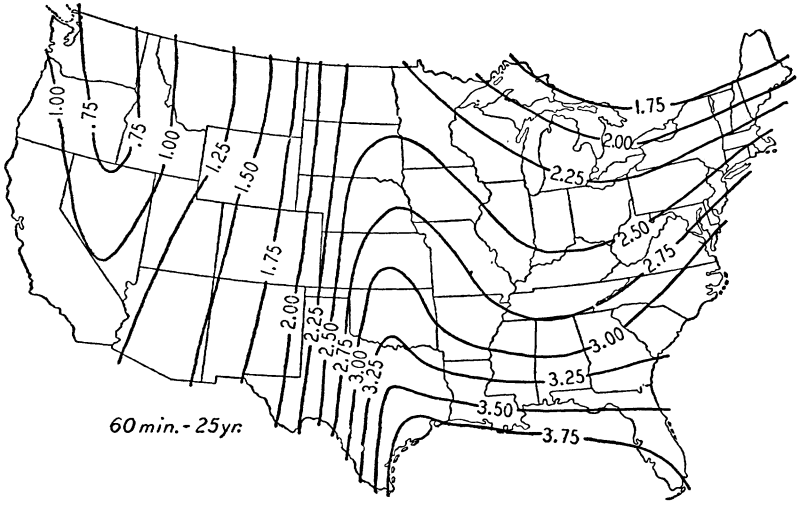


FIGURE 31.—One-hour rainfall, in inches, to be expected once in 25 years.

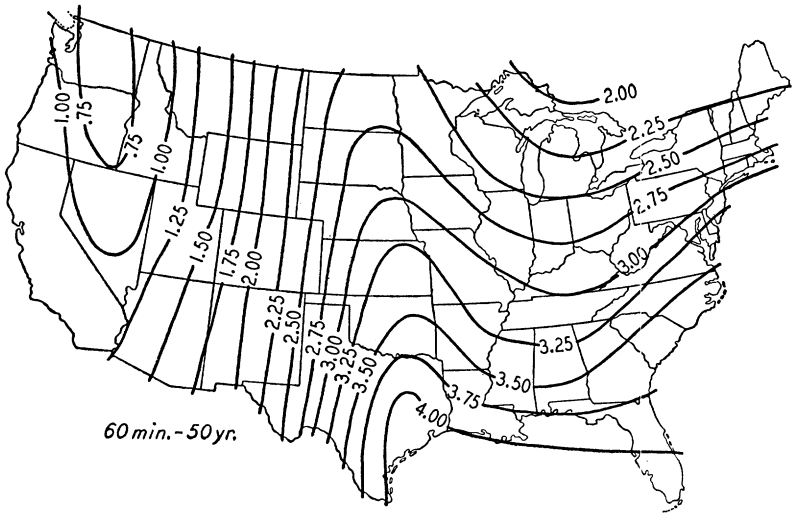


FIGURE 32.—One-hour rainfall, in inches, to be expected once in 50 years.

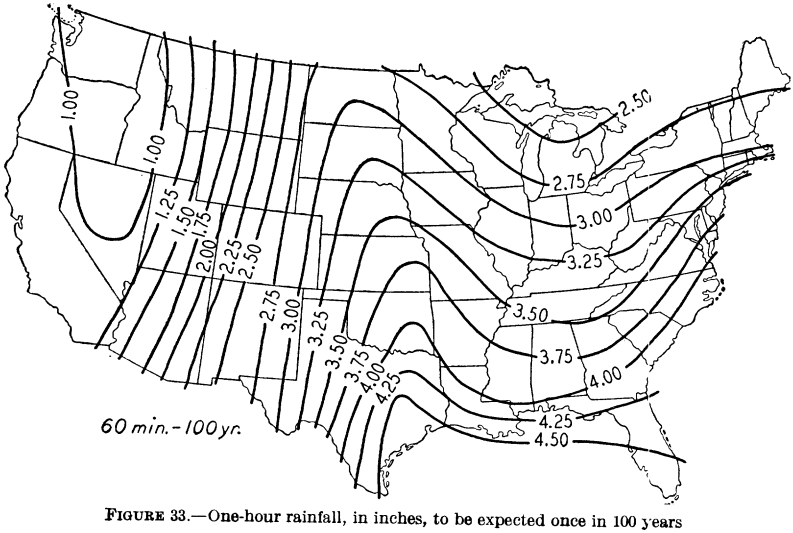


FIGURE 33.—One-hour rainfall, in inches, to be expected once in 100 years

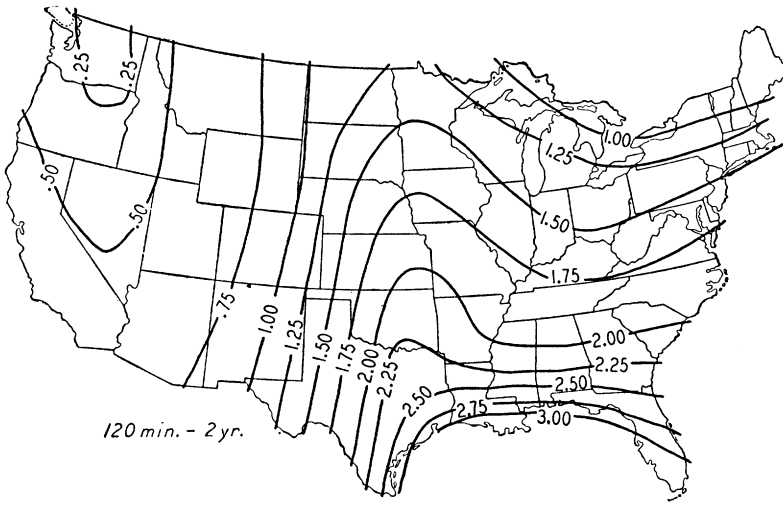


FIGURE 34.—Two-hour rainfall, in inches, to be expected once in 2 years.

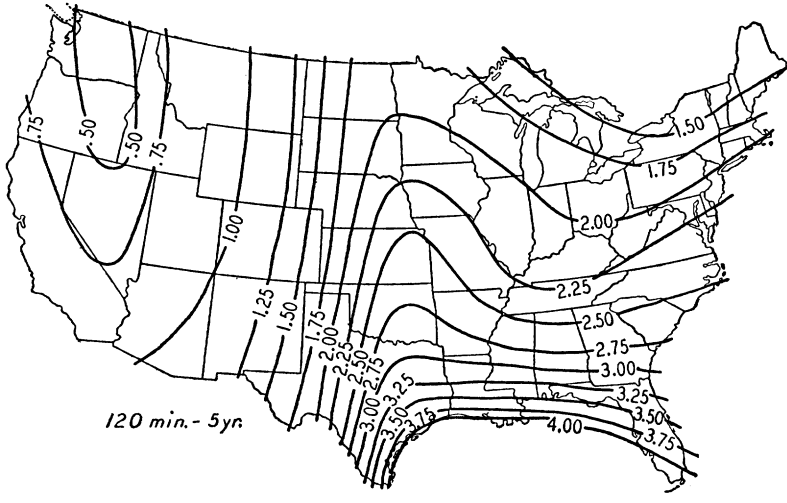


FIGURE 35.—Two-hour rainfall, in inches, to be expected once in 5 years.

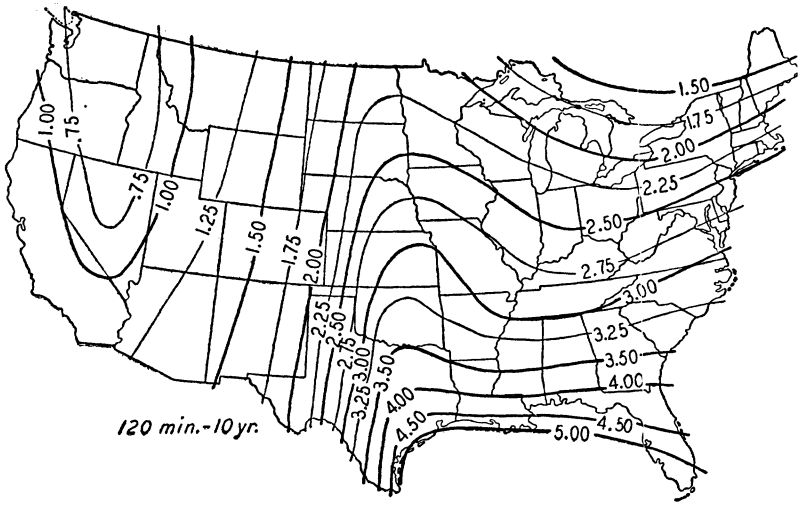


FIGURE 36.—Two-hour rainfall, in inches, to be expected once in 10 years.

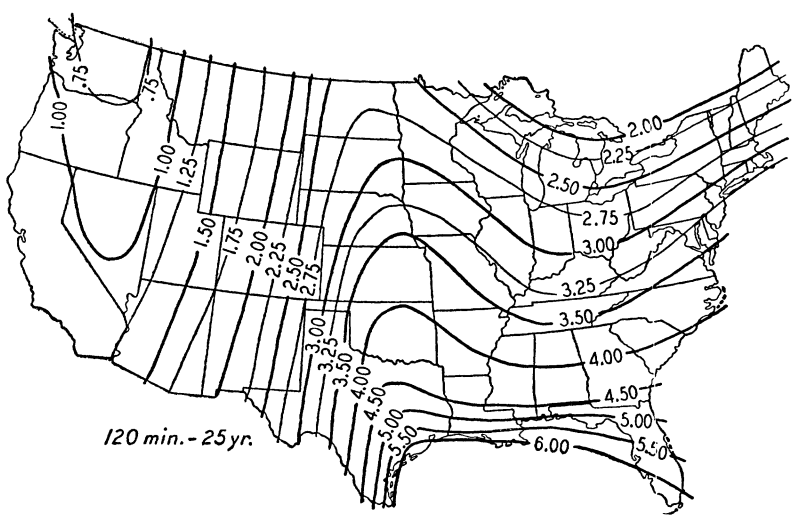


FIGURE 37.—Two-hour rainfall, in inches, to be expected once in 25 years.

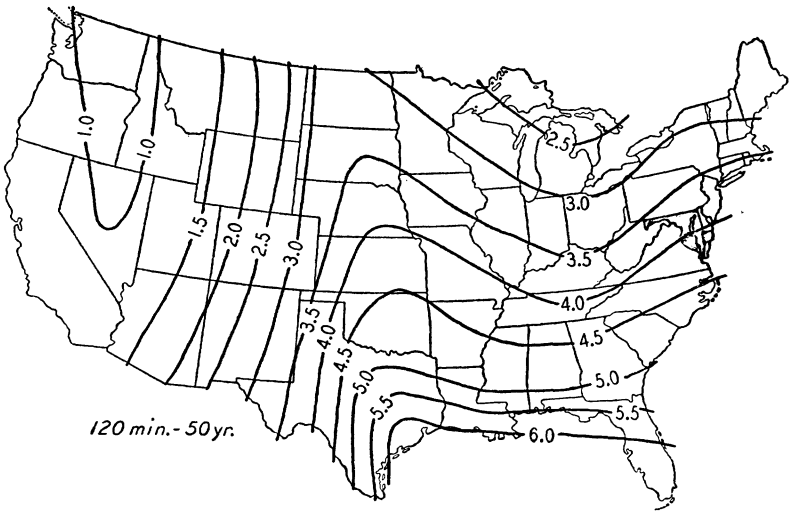


FIGURE 38.—Two-hour rainfall, in inches, to be expected once in 50 years.

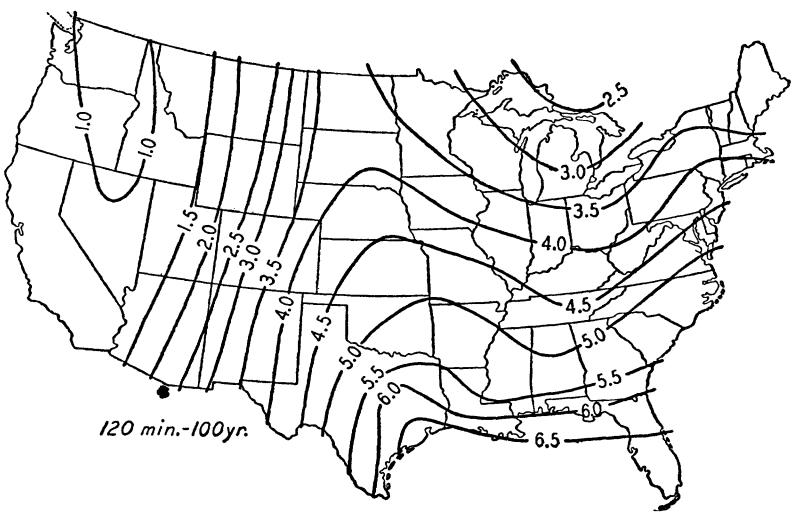


FIGURE 39.—Two-hour rainfall, in inches, to be expected once in 100 years.

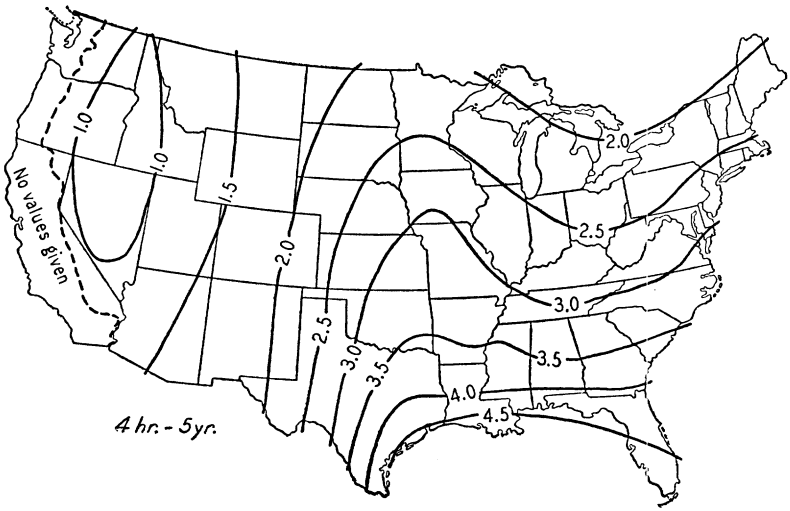


FIGURE 40.—Four-hour rainfall, in inches, to be expected once in 5 years.

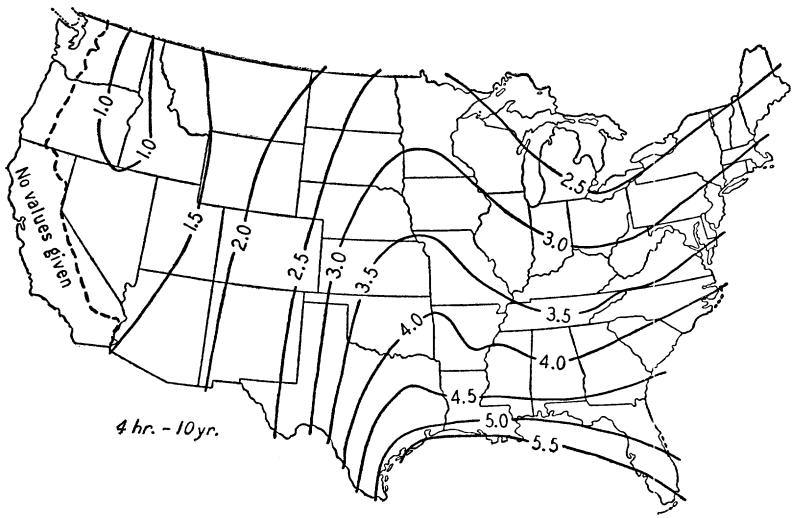


FIGURE 41.—Four-hour rainfall, in inches, to be expected once in 10 years.

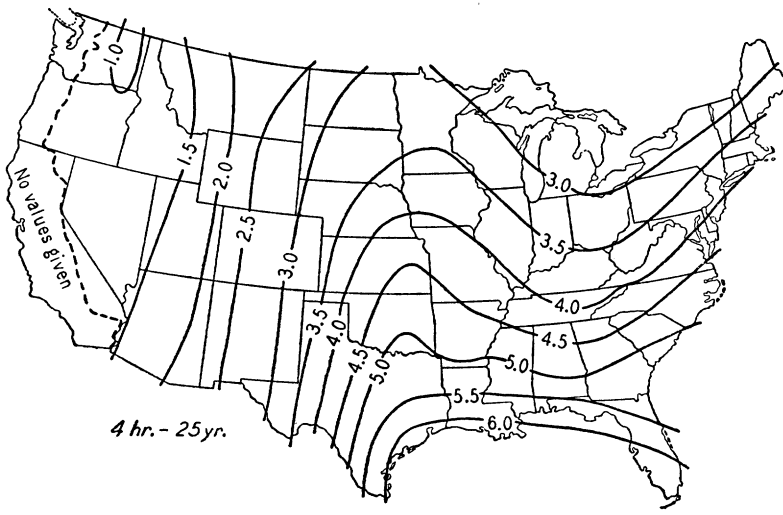


FIGURE 42.—Four-hour rainfall, in inches, to be expected once in 25 years.

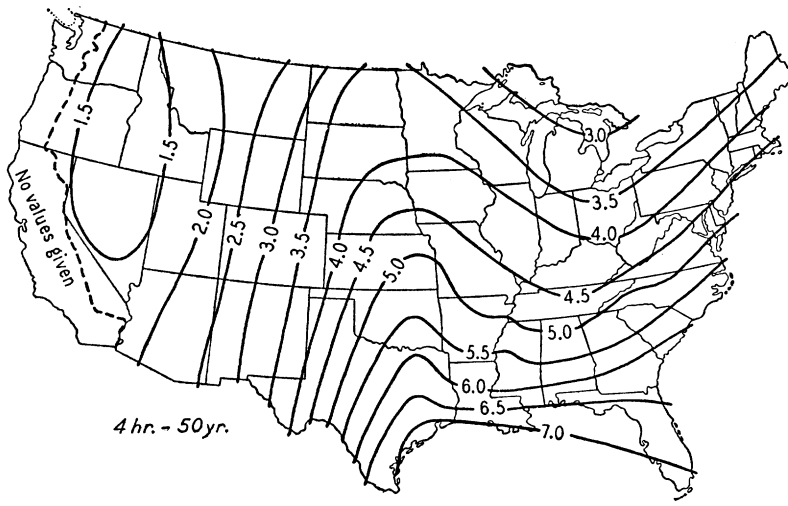


FIGURE 43.—Four-hour rainfall, in inches, to be expected once in 50 years.

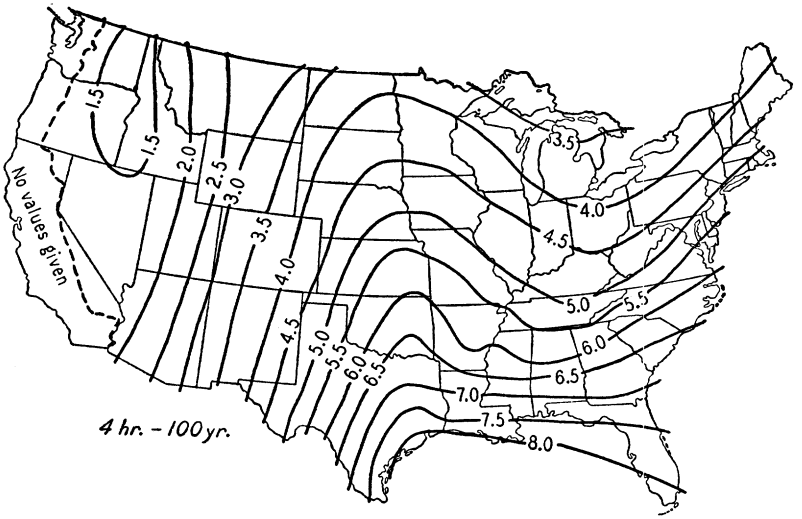


FIGURE 44.—Four-hour rainfall, in inches, to be expected once in 100 years.

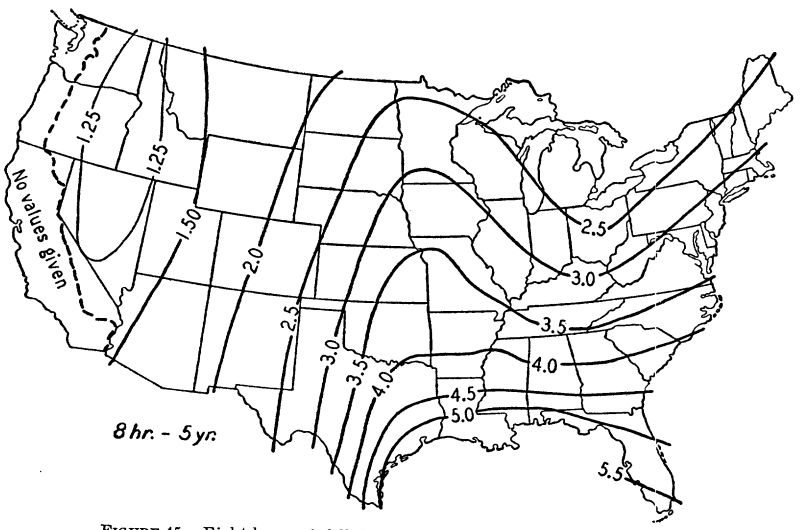


FIGURE 45.—Eight-hour rainfall, in inches, to be expected once in 5 years.

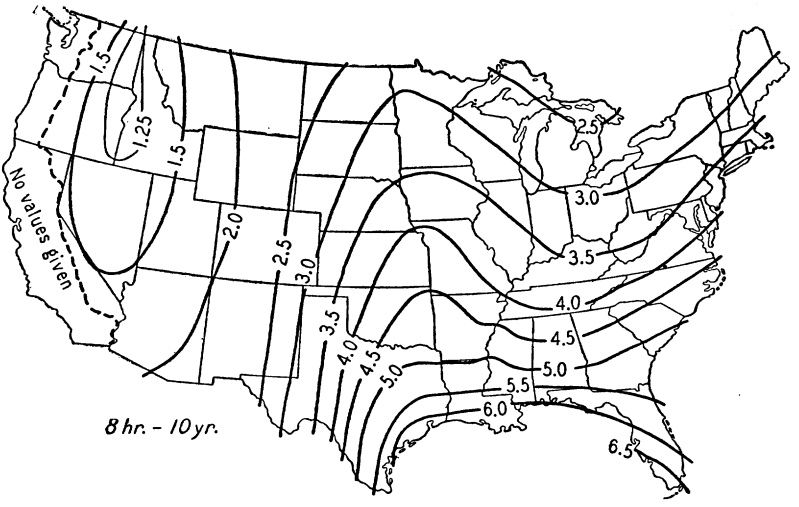


FIGURE 46.—Eight-hour rainfall, in inches, to be expected once in 10 years.

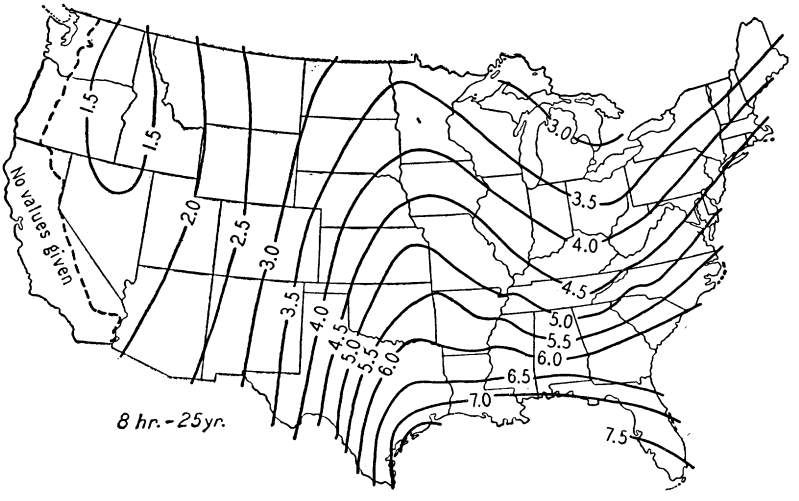


FIGURE 47.—Eight-hour rainfall, in inches, to be expected once in 25 years.

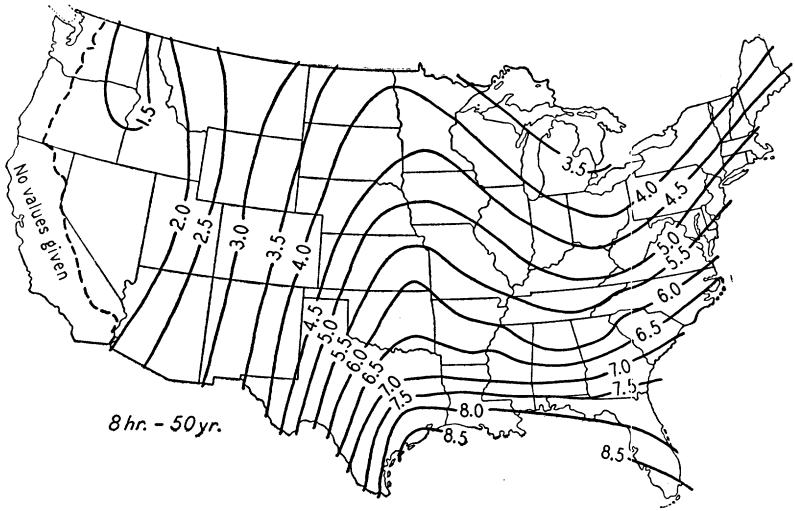


FIGURE 48.—Eight-hour rainfall, in inches, to be expected once in 50 years.

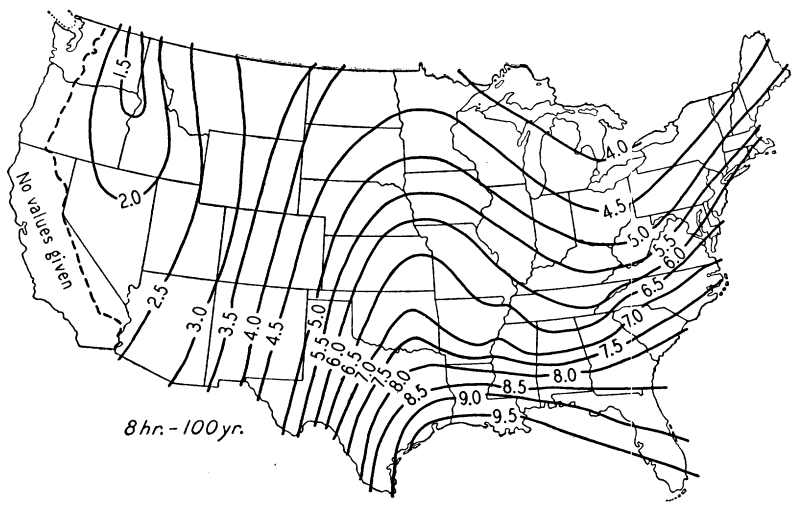


FIGURE 49.—Eight-hour rainfall, in inches, to be expected once in 100 years.

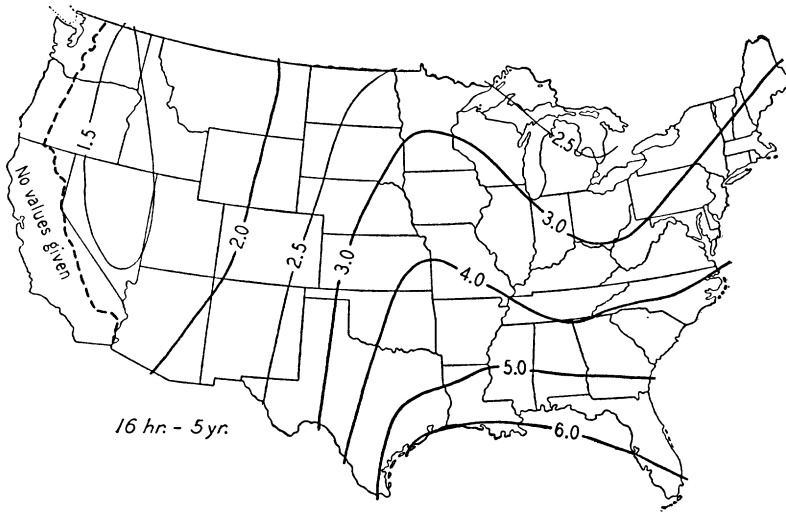


FIGURE 50.—Sixteen-hour rainfall, in inches, to be expected once in 5 years.

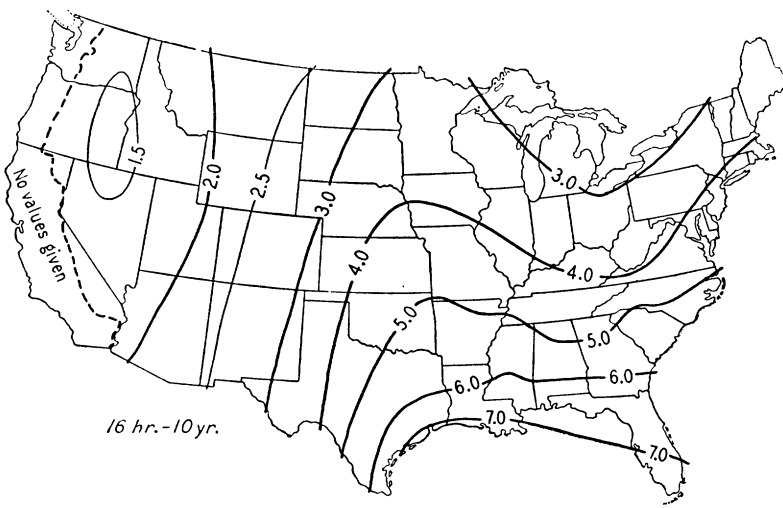


FIGURE 51.—Sixteen-hour rainfall, in inches, to be expected once in 10 years.

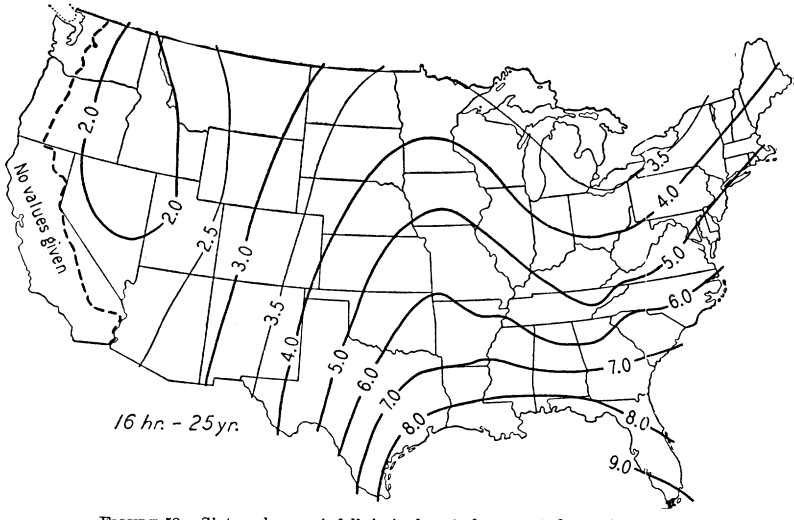


FIGURE 52.—Sixteen-hour rainfall, in inches, to be expected once in 25 years.

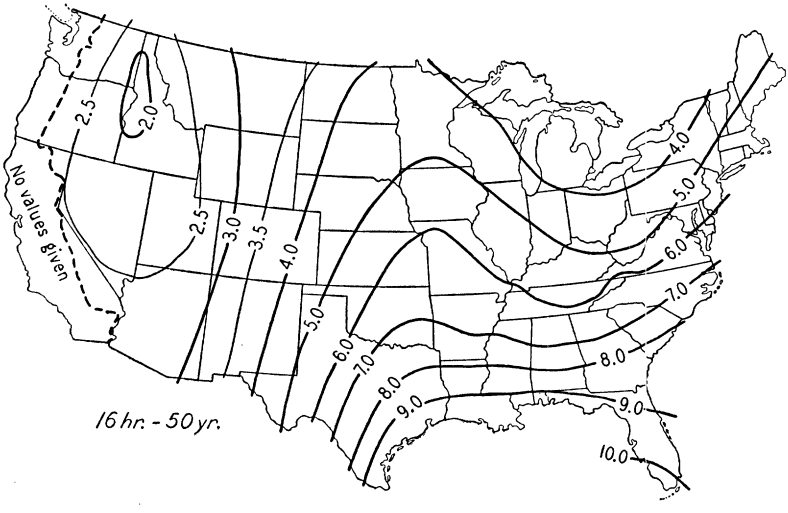


FIGURE 53.—Sixteen-hour rainfall, in inches, to be expected once in 50 years.

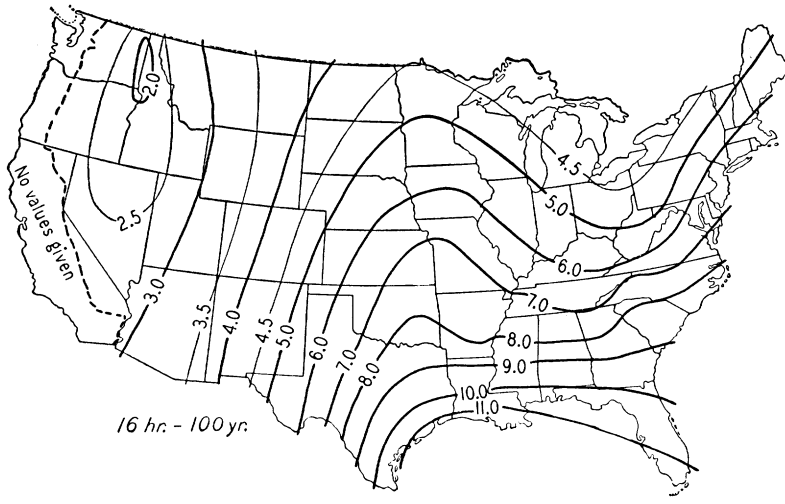


FIGURE 54.—Sixteen-hour rainfall, in inches, to be expected once in 100 years.

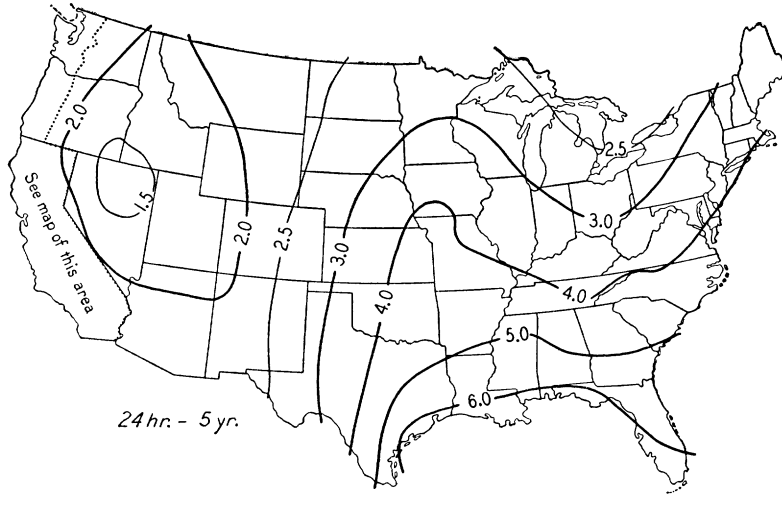


FIGURE 55.—Twenty-four-hour rainfall, in inches, to be expected once in 5 years. (Data for Pacific Coast area are given in fig. 60.)

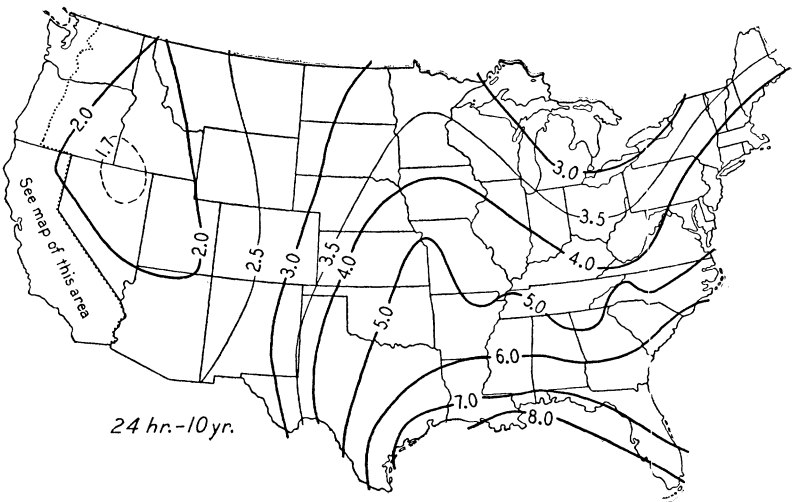


FIGURE 56.—Twenty-four-hour rainfall, in inches, to be expected once in 10 years. (Data for Pacific Coast area are given in fig. 60.)

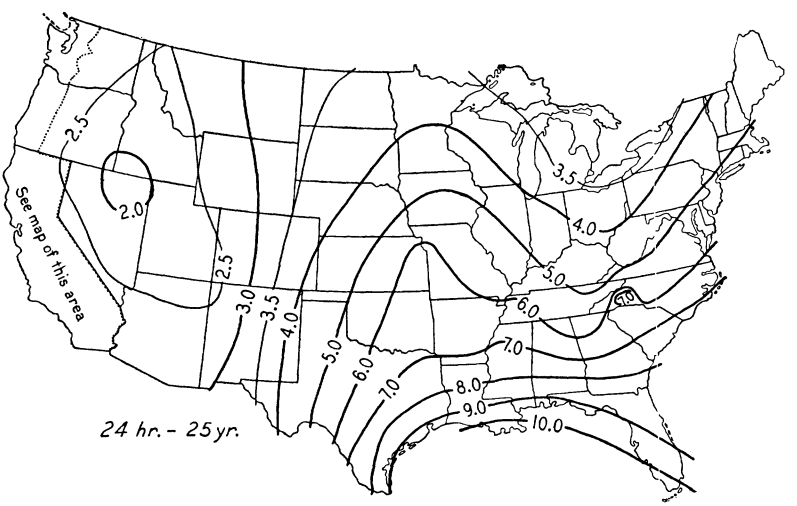


FIGURE 57.—Twenty-four-hour rainfall, in inches, to be expected once in 25 years. (Data for Pacific Coast area are given in fig. 61.)

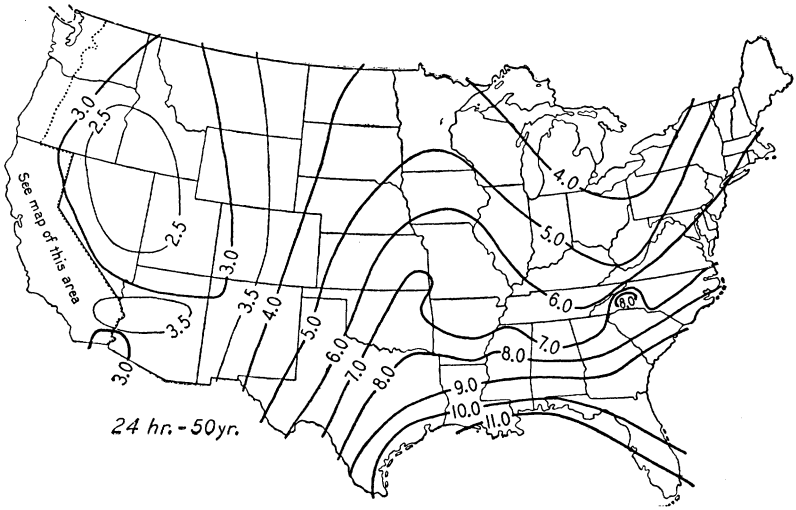


FIGURE 58.—Twenty-four-hour rainfall, in inches, to be expected once in 50 years. (Data for Pacific Coast area are given in fig. 61.)

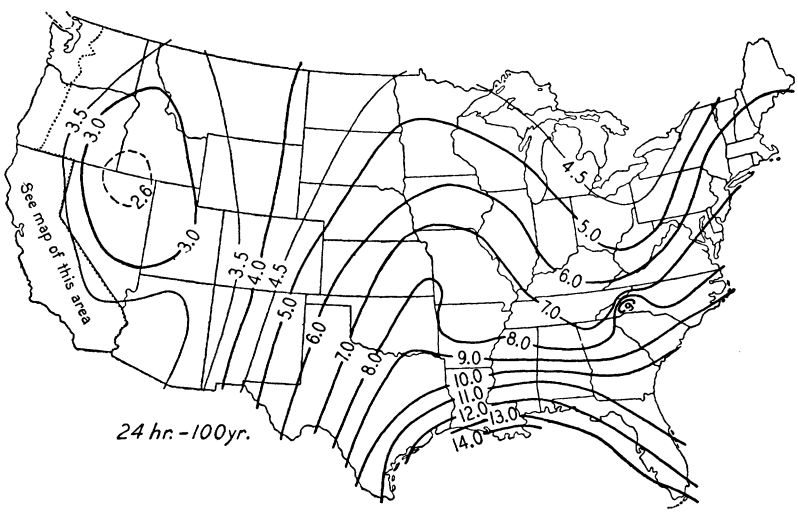


FIGURE 59.—Twenty-four-hour rainfall, in inches, to be expected once in 100 years. (Data for Pacific Coast area are given in fig. 62.)

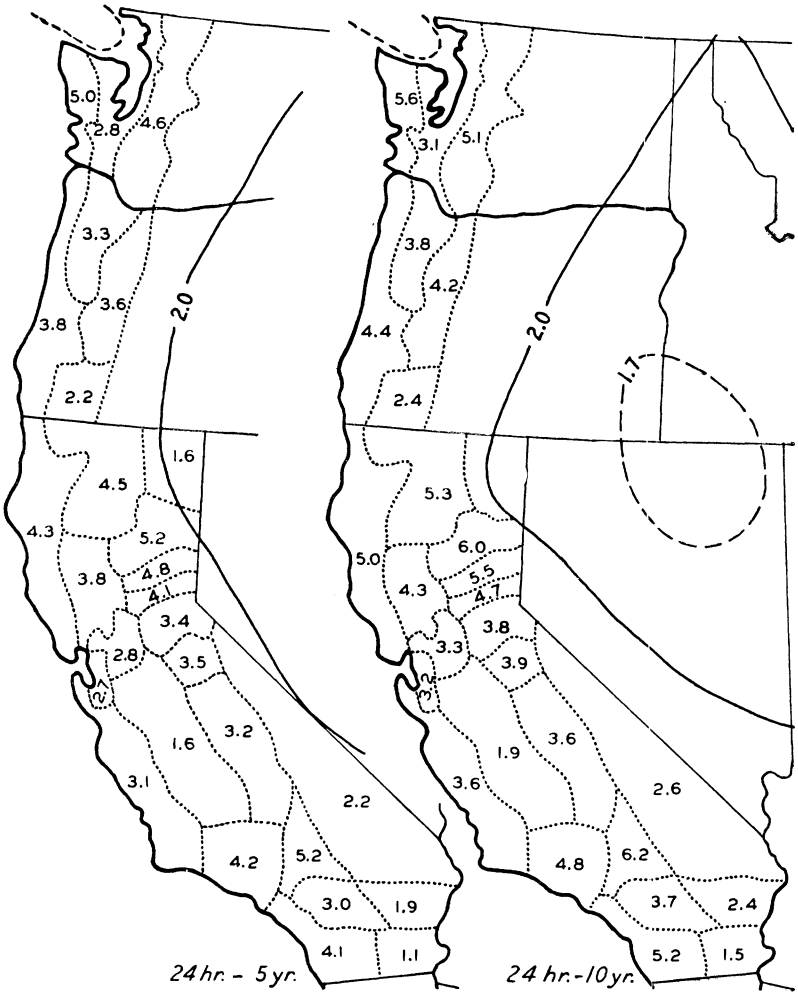


FIGURE 60.—Twenty-four-hour rainfalls in the Pacific Coast district, in inches, to be expected once in 5 years and once in 10 years.

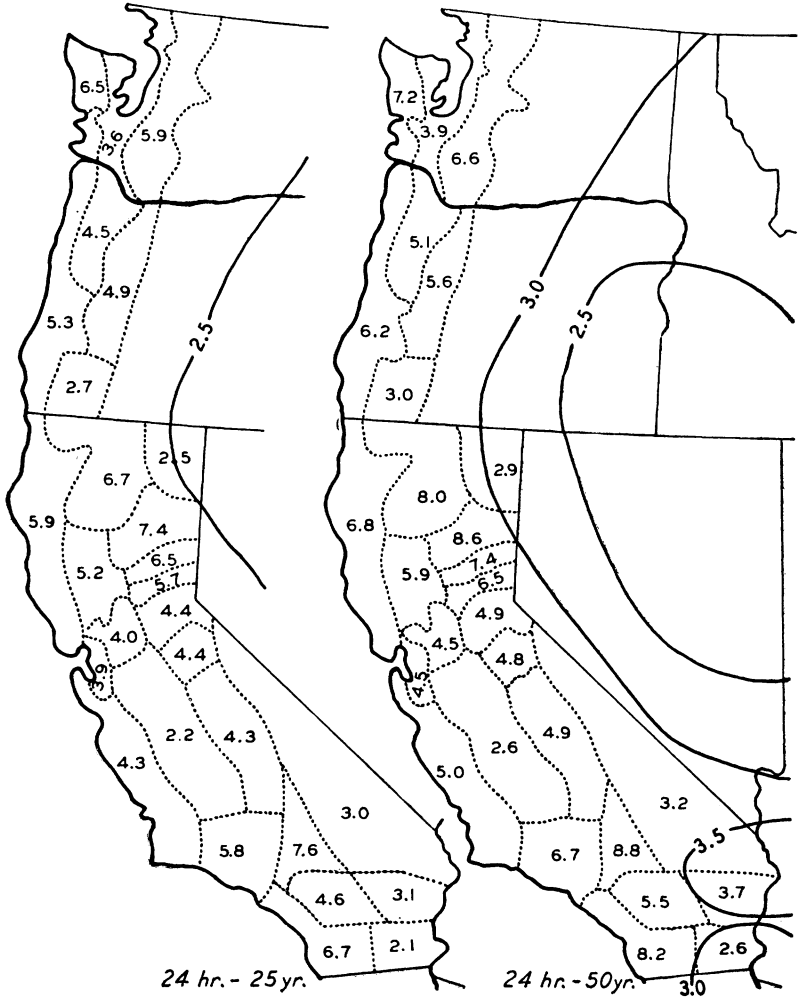


FIGURE 61.—Twenty-four-hour rainfalls in the Pacific Coast district, in inches, to be expected once in 25 years and once in 50 years.

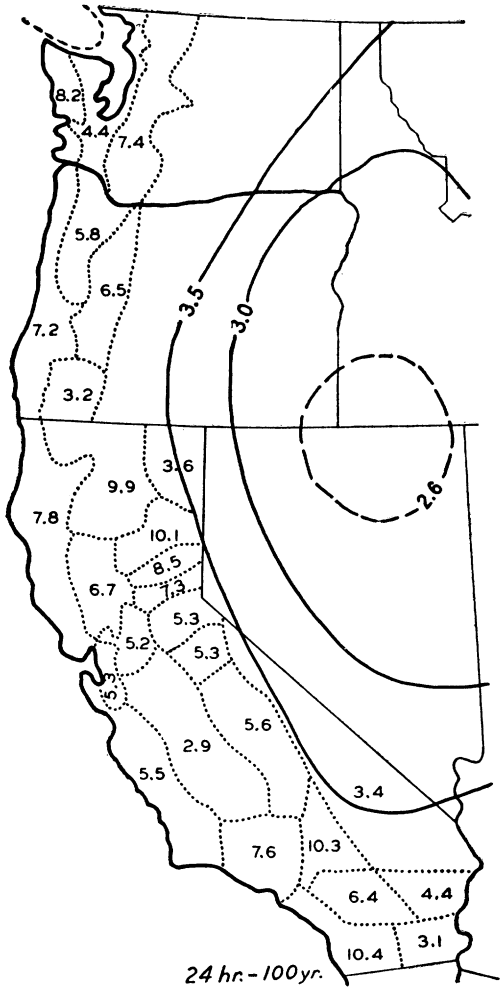


FIGURE 62.—Twenty-four-hour rainfall in the Pacific Coast district, in inches, to be expected once in 100 years.

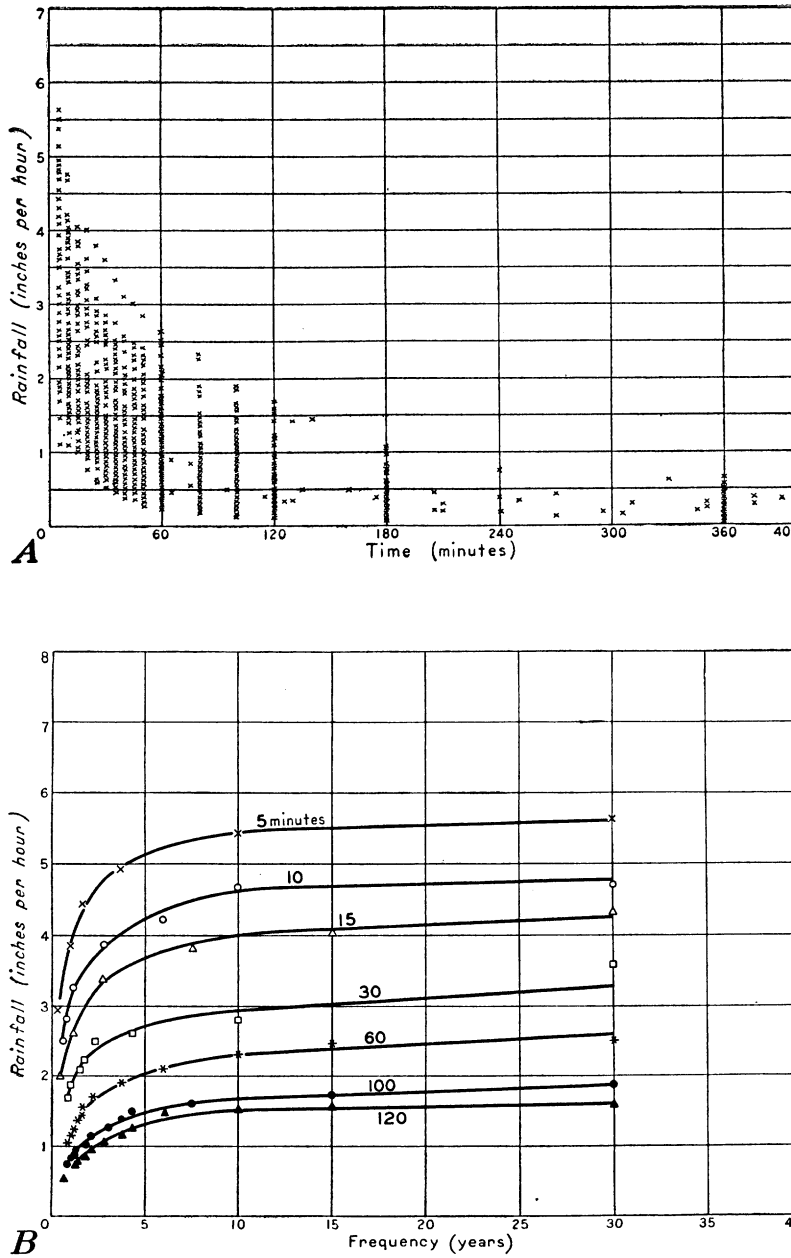
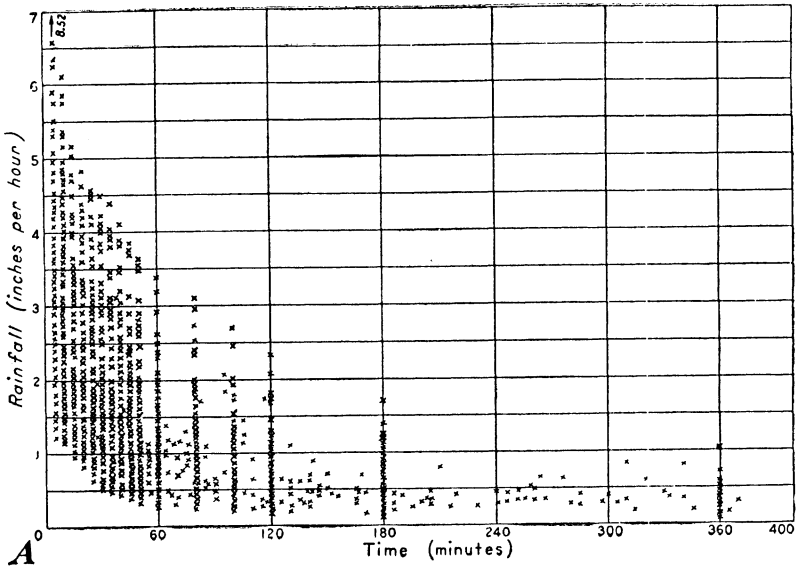


FIGURE 63.—Excessive precipitations at Honolulu, T. H., 1904–33. *A*, Record of rates and durations; *B* frequency of occurrences.



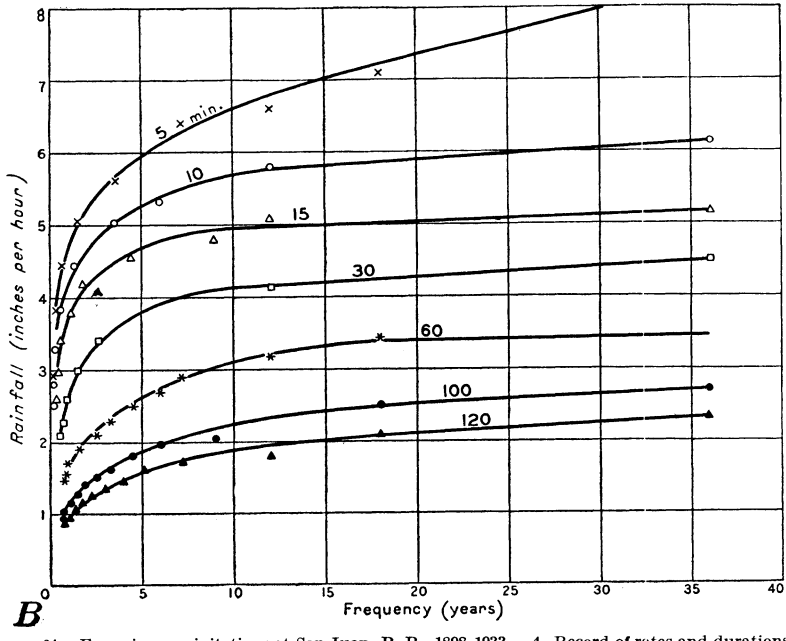


FIGURE 64.—Excessive precipitations at San Juan, P. R., 1898–1933. *A*, Record of rates and durations; *B* frequency of occurrences.

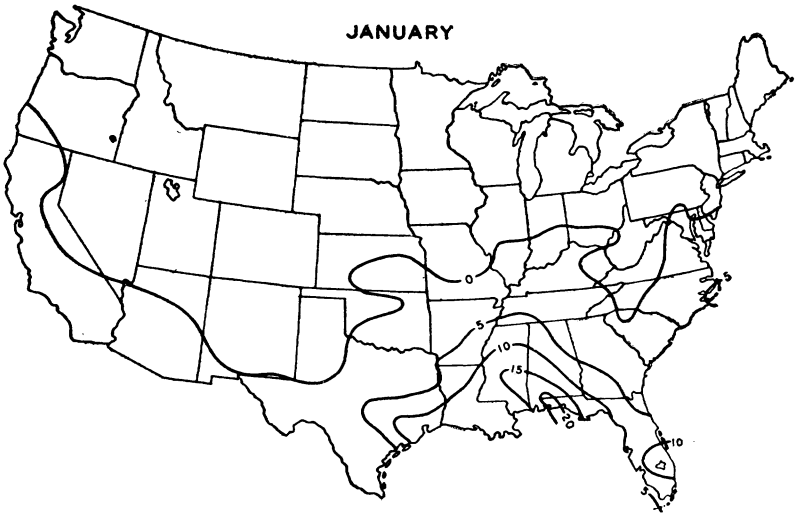


FIGURE 65.—Number of excessive rainstorms in January, per 30 years.

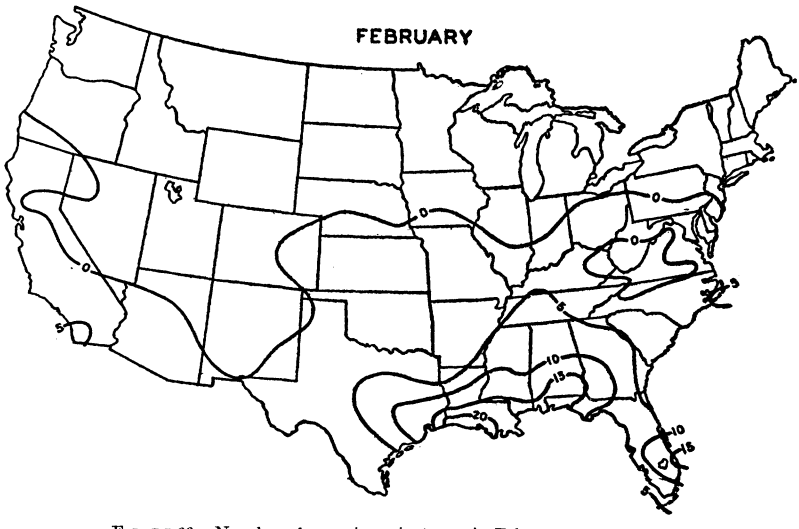


FIGURE 66.—Number of excessive rainstorms in February, per 30 years.

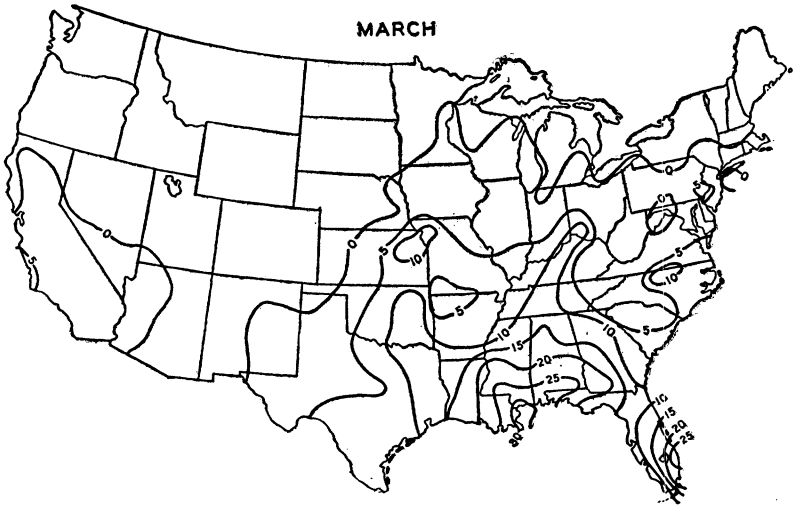


FIGURE 67.—Number of excessive rainstorms in March, per 30 years.

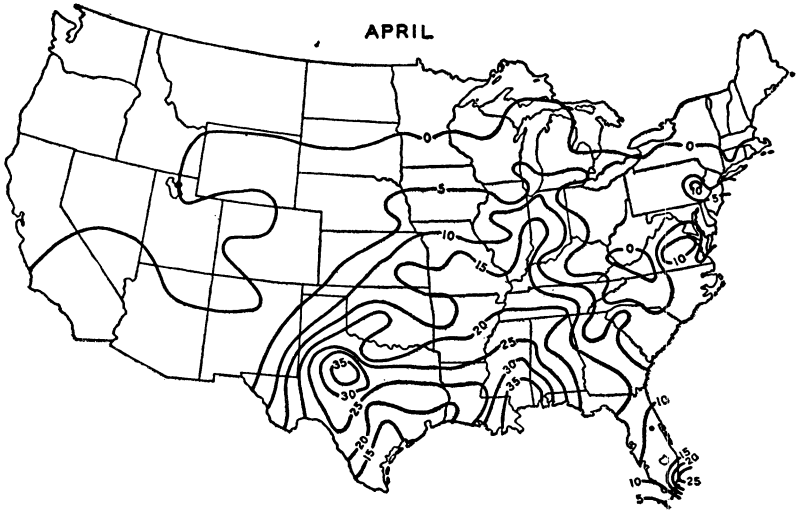


FIGURE 68.—Number of excessive rainstorms in April, per 30 years.

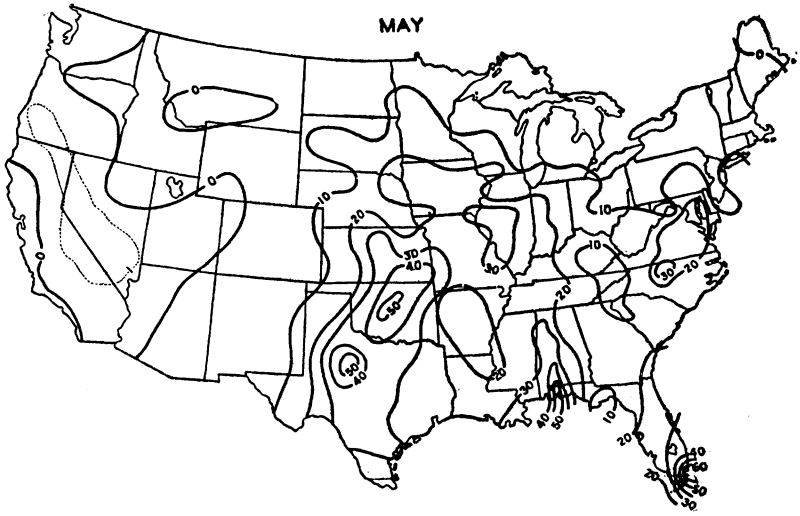


FIGURE 69.—Number of excessive rainstorms in May, per 30 years.

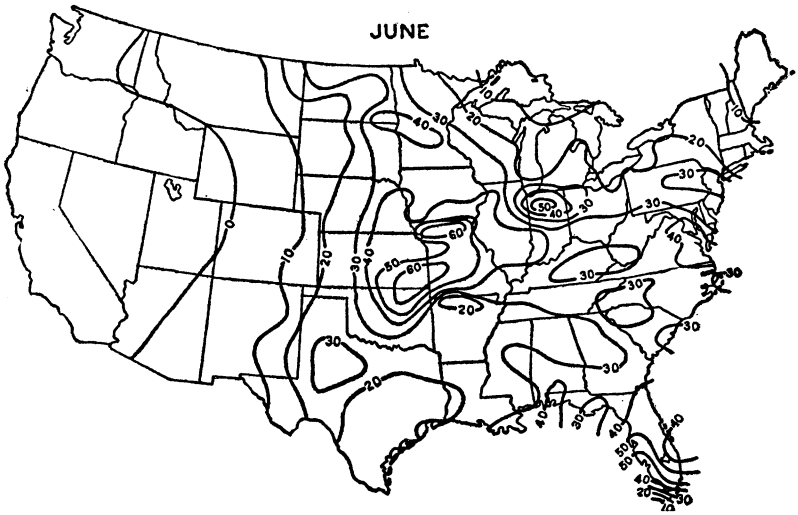


FIGURE 70.—Number of excessive rainstorms in June, per 30 years.

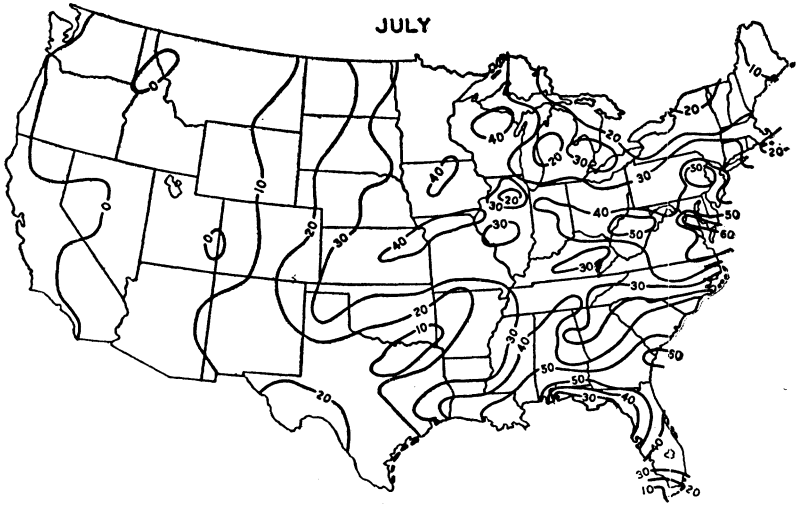


FIGURE 71.—Number of excessive rainstorms in July, per 30 years.

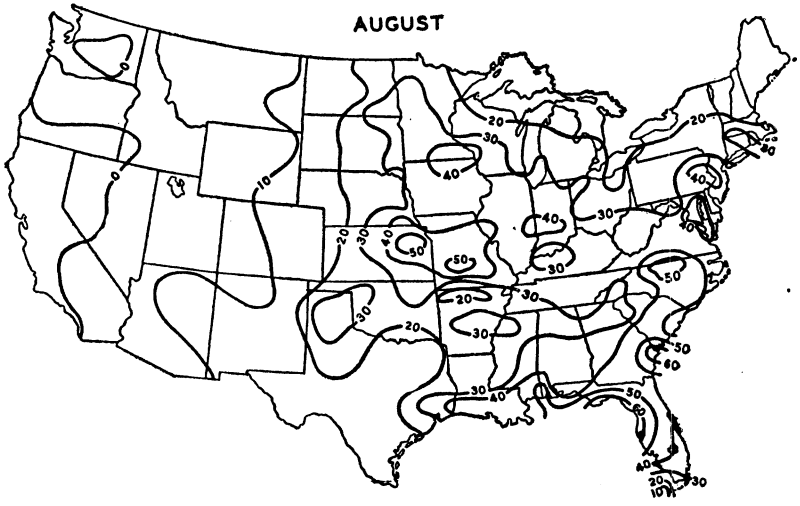


FIGURE 72.—Number of excessive rainstorms in August, per 30 years.

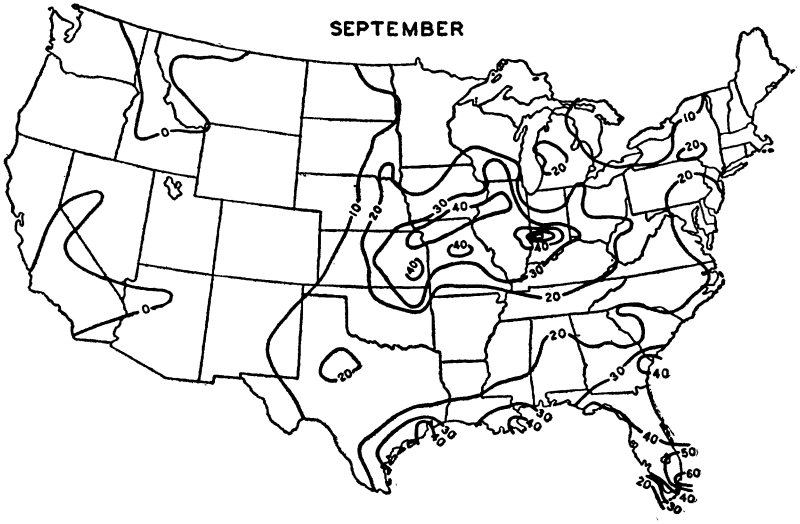


FIGURE 73.—Number of excessive rainstorms in September, per 30 years.

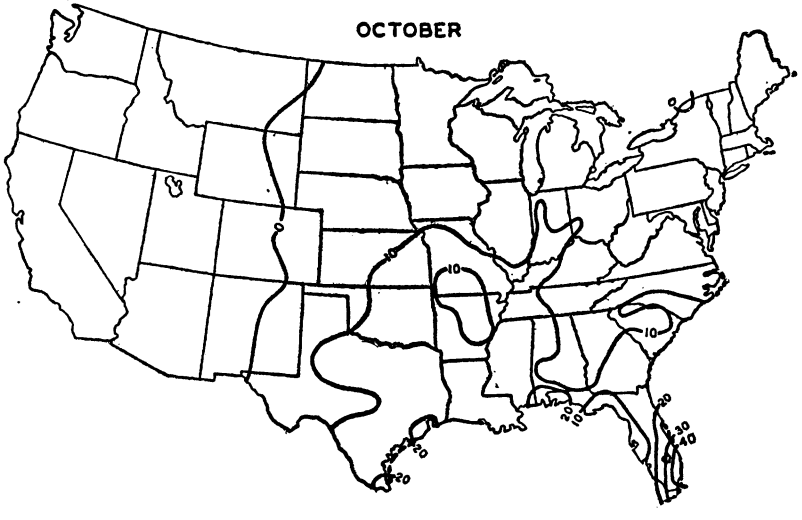


FIGURE 74.—Number of excessive rainstorms in October, per 30 years.

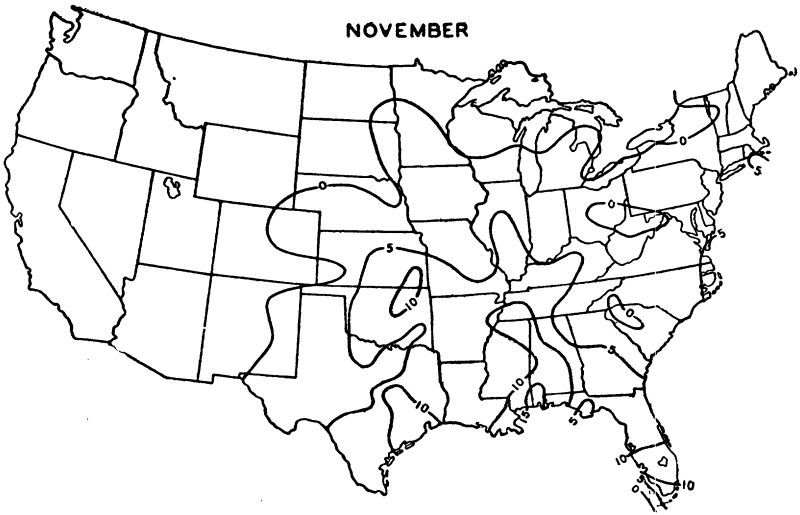


FIGURE 75.—Number of excessive rainstorms in November, per 30 years.

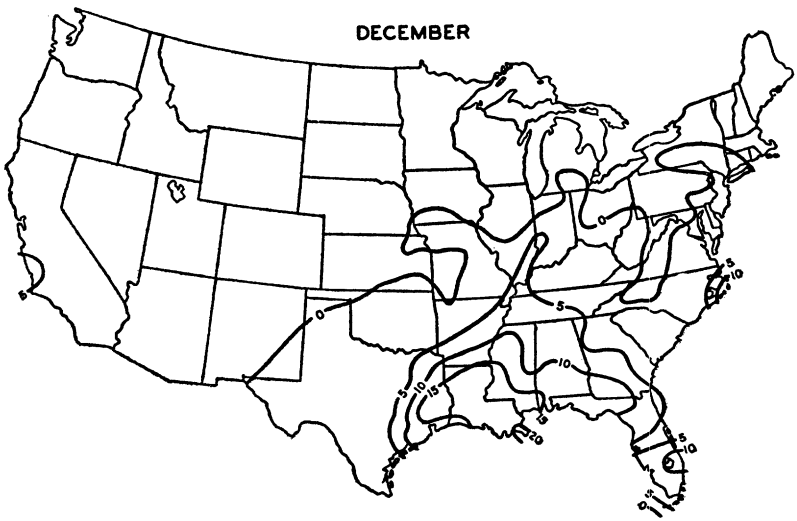


Figure 76.—Number of excessive rainstorms in December, per 30 years.

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