FRANKENFIELD ON THE SPRING FLOODS OF 1922.[1]

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In accordance with custom, a rather full abstract of the material contained in MONTHLY WEATHER REVIEW SUPPLEMENT No. 22 is herein presented. Those who may find a special interest in the subject and desire to obtain the full report can do so by applying to the Chief of Weather Bureau while the bureau's supply lasts. Afterwards application should be made to the Superintendent of Documents, Washington, D. C.—EDITOR.

The flood of 1922 in the Mississippi was unique in at least two respects, first, in the fact that with the exception of the Tennessee and Cumberland Rivers, the main stream and its principal tributaries were in flood at the same time. The excepted streams, however, contributed a very considerable volume of water during the early days of the flood; they can not, therefore, be entirely eliminated from consideration. The second striking feature of the flood was the high stages in the Mississippi from the mouth of the Arkansas to the Passes due to the great volume of water discharged by the Arkansas and White Rivers. It may be added in this connection that the United States engineers hold that a large part of the excess in the flood stage, especially at Arkansas City, Ark., was due to the closure of Cypress Creek, a small stream that empties into the Mississippi just above Arkansas City. Levees were constructed along that creek in 1921.

The crest stages reached at important points along both the main stream and its principal tributaries are shown in Table 1 below. For comparative purposes the crest stages of ten great previous floods in the Mississippi have been added.

[1] MO. WEATHER REV. SUPPLEMENT No. 22, Washington, D. C., 1923.

TABLE 1.—*Crest stages and dates during lower Mississippi River floods from 1882 to 1922, inclusive.*

[Highest stages of record in bold-face type.]

Station.	River.	Flood stage.	1882		1883		1893		1897		1903		1907	
			Stage.	Date.	Stage.	Date.	Stage.	Date.	Stage.	Date.	Stage.	Date.	Stage.	Date.
Cincinnati, Ohio	Ohio	52	58.6	Feb. 21	66.3	Feb. 15	50.6	May 2	50.1	Mar. 12	53.2	Mar. 5	65.2	Jan. 21
Mount Carmel, Ill	Wabash	15					24.5	May 8[1]	26.4	Mar. 13	22.3	Mar. 12	24.5	Jan. 28
Nashville, Tenn	Cumberland	40	38.3	Feb. 22	41.6	Feb. 14	19.9	May 9	48.7	Mar. 21	40.7	Mar. 9	28.2	Jan. 24
Johnsonville, Tenn	Tennessee	31	43.8	Jan. 31	29.0	Feb. 2[1]	27.0	May 13	48.0	Mar. 24	33.7	Mar. 11	14.5	Jan. 27
				Feb. 2										
St. Louis, Mo	Mississippi	30	28.2	Feb. 22	26.2	Feb. 26	31.5	May 3	23.2	Mar. 28[1]	25.8	Mar. 11	26.3	Jan. 23
Cairo, Ill	Ohio	45	51.9	Feb. 26	52.2	Feb. 27	49.3	May 9[1]	51.6	Mar. 25[1]	50.6	Mar. 15[1]	50.4	Jan. 27
New Madrid, Mo	Mississippi	34					38.1	May 9[1]	40.2	Mar. 26[1]	39.5	Mar. 16[1]	39.3	Jan. 28[1]
Cottonwood Point, Mo	do	35	37.5	Feb. 28	37.8	Feb. 28	36.6	May 12[1]	39.4	Mar. 22[1]	40.0	Mar. 20	38.4	Jan. 30[1]
Memphis, Tenn	do	35	35.2	Mar. 6[1]	34.8	Mar. 5[1]	35.2	May 15[1]	37.1	Mar. 19[1]	40.1	Mar. 20	40.3	Feb. 3
Helena, Ark	do	44	47.2	Mar. 9	46.9	Mar. 8[1]	48.0	May 25	51.8	Apr. 4	51.0	Mar. 25[1]	50.4	Feb. 5[1]
Pine Bluff, Ark	Arkansas	25	26.6	Feb. 25	25.4	Feb. 20	28.5	May 5	[2] 21.4	Mar. 21	[2] 23.3	Mar. 13	21.0	Jan. 26
Clarendon, Ark	White	30					33.9	May 11	31.9	Mar. 30	32.6	Mar. 20	32.5	Jan. 9[1]
Arkansas City, Ark	Mississippi	48	47.0	Feb. 28	46.3	Mar. 11[1]	50.3	May 29	51.9	Mar. 29	53.0	Mar. 27[1]	52.1	Feb. 8
Greenville, Miss	do	42	41.7	Feb. 27[1]	40.4	Mar. 10[1]	44.3	May 29	46.8	Mar. 29	49.1	Mar. 27	47.3	Feb. 8[1]
Lake Providence, La	do		38.2	Feb. 28[1]	36.5	Mar. 11[1]	41.8	May 15[1]	44.5	Mar. 30	46.5	Mar. 27	46.3	Feb. 9[1]
			38.3	Mar. 20										
Vicksburg, Miss	do	45	44.8	Mar. 1[1]	43.1	Mar. 14[1]	48.3	May 22[1]	52.5	Apr. 16	51.8	Mar. 27[1]	49.7	Feb. 11
			48.8	Mar. 20[1]										
Natchez, Miss	do	46	47.8	Mar. 28[1]	44.0	Apr. 7[1]	46.8	May 22[1]	49.8	Apr. 29[1]	50.4	Mar. 28[1]	48.9	Feb. 13[1]
Alexandria, La	Red	36					25.6	June 8	26.3	Apr. 15[1]	36.2	Mar. 27[1]	22.8	Jan. 13[1]
Baton Rouge, La	Mississippi	35	36.0	Mar. 26	35.1	Apr. 9	38.4	June 23	40.6	May 12[1]	40.0	Apr. 7[1]	37.3	Feb. 14[1]
Donaldsonville, La	do	28					30.6	June 23	32.8	May 13	32.2	Apr. 4[1]	30.1	Feb. 16[1]
New Orleans, La	do	18	16.2	Mar. 27	16.6	Apr. 7[1]	17.9	June 24	19.6	May 8[1]	20.3	Mar. 27[1]	19.8	Feb. 13[1]
Melville, La	Atchafalaya	37					34.5	June 25[1]	36.1	May 15	38.7	Apr. 4[1]	37.7	Feb. 19[1]
Monroe, La	Ouachita	40	49.7				38.6	June 21[1]	37.9	Apr. 9[1]	44.5	Mar. 26[1]	38.5	Jan. 23[1]

Station.	River.	Flood stage.	1912		1913		1916		1920		1922	
			Stage.	Date.	Stage.	Date.	Stage.	Date.	Stage.	Date.	Stage.	Date.
Cincinnati, Ohio	Ohio	52	51.7	Apr. 5[1]	69.9	Apr. 1	43.9	Feb. 4	54.6	Mar. 22	52.2	Mar. 18
									52.6	Apr. 23	48.2	Apr. 19
Mount Carmel, Ill	Wabash	15	23.2	Apr. 7[1]	**31.0**	Mar. 30	26.7	Feb. 6	20.0	Mar. 22	24.1	Mar. 23
									23.6	Apr. 28[1]	26.0	Apr. 23
Nashville, Tenn	Cumberland	40	46.6	Apr. 7[1]	44.9	Apr. 2	20.9	Feb. 3	35.8	Mar. 16	45.1	Mar. 16
									24.0	Apr. 27	21.7	Apr. 21
Johnsonville, Tenn	Tennessee	31	35.4	Apr. 6	33.3	Mar. 29	25.0	Jan. 27	29.1	Mar. 17	36.4	Mar. 15
									24.9	Apr. 28	20.7	Apr. 23
St. Louis, Mo	Mississippi	30	30.8	Apr. 5	25.8	Mar. 27	31.5	Jan 31	27.8	Mar. 30	23.9	Mar. 17[1]
									28.0	Apr. 24	34.0	Apr. 19
Cairo, Ill	Ohio	45	54.0	Apr. 6[1]	**54.8**	Apr. 4[3]	53.4	Feb. 4	51.4	Mar. 31	53.6	Mar. 25[1]
									49.5	May 1[1]	53.5	Apr. 25
New Madrid, Mo	Mississippi	34	44.0	Apr. 5[1]	**44.5**	Apr. 9[1]	41.9	Feb. 5[1]	40.2	Apr. 1	41.6	Mar. 27[1]
									38.6	May 3	41.7	Apr. 26[1]
Cottonwood Point, Mo	do	35	42.0	Apr. 11[1]	**42.8**	Apr. 11[1]	39.5	Feb. 7	37.6	Apr. 3[1]	38.5	Mar. 28[1]
									36.5	May 4[1]	38.4	Apr. 28
Memphis, Tenn	do	35	45.3	Apr. 6	**46.5**	Apr. 10	43.5	Feb. 9	40.3	Apr. 5	42.6	Mar. 31[1]
									38.7	May 7	42.3	Apr. 29[1]
Helena, Ark	do	44	54.4	Apr. 21	**55.2**	Apr. 22	53.4	Feb. 11	50.1	Apr. 8[1]	52.3	Apr. 3[1]
									48.8	May 9[1]	53.1	May 3
Pine Bluff, Ark	Arkansas	25	26.2	Apr. 4	20.4	Apr. 14	**29.6**	Feb. 3	23.5	Mar. 31	17.7	Mar. 22
									19.1	May 21	26.0	Apr. 16
Clarendon, Ark	White	30	32.6	Apr. 14	30.4	Apr. 15[1]	**38.5**	Feb. 8	29.6	Apr. 8[1]	27.8	Mar. 23[1]
									29.2	May 19[1]	30.7	Apr. 11[1]
Arkansas City, Ark	Mississippi	48	55.4	Apr. 12	55.1	Apr. 21[1]	56.4	Feb. 10[1]	54.0	Apr. 11[1]	**58.0**	Apr. 22[1]
									52.4	May 13[1]	57.7	May 3[1]
Greenville, Miss	do	42	50.6	Apr. 12	50.4	Apr. 21	50.8	Feb. 11[1]	47.0	Apr. 16	**52.1**	Apr. 25[1]
									45.4	May 13	52.0	May 3[1]
Lake Providence, La	do		48.2	Apr. 12	48.0	Apr. 21	48.8	Feb. 15	45.4	Apr. 15[1]	**49.5**	Apr. 27[1]
									44.3	May 13[1]	49.3	May 6[1]
Vicksburg, Miss	do	45	52.1	Apr. 12	52.3	Apr. 27[1]	53.9	Feb. 15	50.8	Apr. 19[1]	**55.0**	Apr. 28[1]
									50.4	May 14[1]	54.7	May 7[1]
Natchez, Miss	do	46	51.4	Apr. 14[1]	52.4	Apr. 26[1]	53.6	Feb. 15	51.5	Apr. 28	[4] **55.2**	Apr. 26
									51.2	May 18[1]	[4] **52.8**	May 9[1]
Alexandria, La	Red	36	33.6	Apr. 22	24.2	Apr. 6	36.8	Feb. 16[1]	27.6	Apr. 5	37.1	Apr. 18[1]
									37.1	June 2[1]	37.4	May 10
Baton Rouge, La	Mississippi	35	43.8	May 11[1]	41.3	May 9	42.6	Mar. 1[1]	40.2	Apr. 30	[4] **44.6**	Apr. 27
									41.5	May 22[1]	**45.7**	May 16
Donaldsonville, La	do	28	34.8	May 11	32.7	May 8[1]	34.0	Mar. 1	31.6	May 1[1]	[4] **35.8**	Apr. 27[1]
									32.6	May 18[1]	**35.9**	May 16
New Orleans, La	do	18	22.0	May 11	20.5	May 8	21.0	Feb. 28[1]	19.5	Apr. 28[1]	[4] **22.8**	Apr. 24
									20.3	May 17[1]		
Melville, La	Atchafalaya	37	41.7	May 6[1]	41.5	Apr. 24	43.0	Feb. 14	42.5	May 20[1]	**45.9**	May 14[1]
Monroe, La	Ouachita	40	46.2	Apr. 22	36.9	Apr. 29[1]	40.6	Feb. 19[1]	41.0	June 5	42.3	May 9[1]

[1] And subsequently. [2] Little Rock stage. [3] Absolute crest probably on 7th; nearly stationary from 4th. [4] Crevasse prevented further rise.

In general the above table is self-explanatory, the maximum flood stage for any gauging station may be seen by the full-face figures given in the table; it will be noted, of course, that the maximum stages of record in the lower river occurred in the 1922 flood.

Hydrographs of the 1922 flood for selected stations on the main streams and for a single station on four of its most important tributaries are shown in Figure 1. The time interval in this figure is 5 days. The duration above the flood stage is shown for each station by a dash line.

The order of magnitude of the several floods which have occurred in the Mississippi is placed as follows: The 1922 flood was the greatest below and that of 1913 the greatest above the mouth of the Arkansas, while the 1912 flood might possibly be considered the greatest flood for the entire stream, Cairo, Ill., to the mouth. The author remarks that owing to progressive changes in the levee system comparison with floods previous to 1912 does not lead to any significant conclusion.

CONTRIBUTING CAUSES OF THE FLOOD.

Precipitation as snow was not influential in producing the flood; precipitation as rain, however, was the dominating cause.

Rainfall, amount, character, and distribution.—The rainfall preceding the flood had been quite generous over the Ohio Basin during November and December, 1921, and over the lower Mississippi and upper Tennessee Basins during January, 1922. The rainfall of the last-named month over the Ohio and upper Mississippi Basins was, however, slightly deficient, so that on the whole the excess of November and December, 1921, was probably without influence upon the floods that developed later.

The rains beginning with the last week in February, 1922, were quite general over practically the entire basin and although not heavy enough to produce immediate floods, brought the stages of the streams up to within striking distance of flood stages should heavy rains fall at a later period. The amount of precipitation at representative stations in each of the six subdivisions of the entire Mississippi Basin for each week from February 22 to May 2, 1922, is given in Table 2 below.

TABLE 2.—*Precipitation, inches and hundredths, by weeks, from February 22 to May 2, 1922 (measured at 8 a. m., 75th meridian time).*

Ohio Drainage Basin.

Station.	River.	Feb. 22 to 28.	Mar. 1 to 7.	Mar. 8 to 14.	Mar. 15 to 21.	Mar. 22 to 28.	Mar. 29 to Apr. 4.	Apr. 5 to 11.	Apr. 12 to 18.	Apr. 19 to 25.	Apr. 26 to May 2.	Total.
Warren, Pa.	Allegheny	0.16	1.00	0.68	0.12	0.68	1.19	1.32	1.38	0.21	0.00	6.74
Martin, Pa.	Monongahela	0.40	1.93	0.60	1.38	0.54	0.66	0.17	2.18	0.06	0.12	8.04
Pittsburgh, Pa.	Ohio	0.31	1.44	0.78	0.54	0.83	2.17	0.37	2.70	0.33	0.04	9.51
Parkersburg, W. Va.	do	0.18	1.06	0.84	2.42	0.87	0.87	0.14	3.27	0.18	0.22	10.05
Zanesville, Ohio	Muskingum	0.18	1.17	0.72	1.35	0.70	1.32	0.98	2.70	0.06	0.19	9.37
Hinton, W. Va.	Kanawha—New	0.58	1.76	1.64	1.28	0.68	0.56	Trace.	0.88	0.62	0.90	8.90
Charleston, W. Va.	do	0.40	1.75	0.73	0.82	0.56	1.72	Trace.	2.55	0.63	0.48	9.64
Point Pleasant, W. Va.	Ohio	0.28	2.07	1.06	2.18	1.34	0.90	0.10	1.96	0.00	0.26	10.15
Columbus, Ohio	Scioto	0.24	0.97	0.17	0.66	0.00	0.41	0.88	1.83	0.06	0.28	5.50
Chillicothe, Ohio	do	0.18	1.33	1.08	2.27	0.45	1.60	0.78	3.64	0.15	0.55	12.03
Portsmouth, Ohio	Ohio	0.34	1.50	0.89	2.15	1.35	1.34	1.01	1.91	0.05	0.44	10.98
Cincinnati, Ohio	do	0.31	0.70	0.89	0.68	0.70	1.59	1.02	2.66	0.07	0.57	9.19
Dayton, Ohio	Miami	0.31	0.73	1.42	1.59	0.63	1.44	1.53	3.49	0.02	0.34	11.50
Madison, Ind.	Ohio	0.63	0.91	0.98	2.68	1.42	1.28	1.78	2.16	0.17	0.78	12.79
Frankfort, Ky.	Kentucky	0.42	1.53	2.02	1.96	0.52	1.13	1.19	2.56	0.05	0.40	11.78
Louisville, Ky.	Ohio	0.34	0.74	1.13	2.10	1.55	0.94	1.82	3.46	0.01	0.77	12.86
Bowling Green, Ky.	Barren	1.00	2.68	2.03	2.75	1.55	1.72	1.73	0.60	0.00	2.22	16.28
Woodbury, Ky.	Green	0.71	1.40	1.34	2.28	1.93	1.03	1.47	0.40	Trace.	1.29	11.85
Evansville, Ind.	Ohio	0.47	0.44	1.28	2.57	1.56	2.42	0.92	1.70	0.29	1.16	12.81
Indianapolis, Ind.	White (W. Fork)	0.41	0.52	1.79	2.29	0.76	1.80	4.31	3.86	0.06	0.32	16.12
Elliston, Ind.	do	0.59	0.54	1.12	3.32	0.83	2.63	2.82	3.13	0.13	0.55	15.66
Terre Haute, Ind.	Wabash	0.41	0.56	2.22	2.41	0.81	2.45	3.78	6.25	0.35	0.19	19.43
Mount Carmel, Ill.	do	0.20	0.40	1.05	3.43	1.40	4.19	1.62	2.25	0.75	0.60	15.89
Burnside, Ky.	Cumberland	1.15	2.89	2.84	2.45	0.90	0.78	1.78	0.80	Trace.	2.05	15.64
Nashville, Tenn.	do	1.08	2.90	2.86	1.33	1.02	1.68	1.12	1.11	0.05	2.25	15.40
Chattanooga, Tenn.	Tennessee	1.25	5.06	3.10	0.75	0.70	0.48	1.47	2.05	4.18	0.65	19.69
Decatur, Ala.	do	1.20	3.80	2.90	1.15	0.38	2.63	1.66	2.23	0.12	0.61	16.68
Johnsonville, Tenn.	do	1.01	2.08	2.68	1.72	0.73	1.19	1.51	0.67	Trace.	3.75	15.34
Cairo, Ill.	Ohio	0.47	0.38	1.17	3.21	0.81	3.13	1.22	0.99	0.23	0.91	12.52

Upper Mississippi Drainage Basin.

St. Paul, Minn.	Mississippi	1.03	0.08	0.02	0.66	0.59	0.20	1.01	0.03	0.35	Trace.	3.97
Wisconsin Rapids, Wis.	Wisconsin	.....	0.00	0.09	1.71	0.30	0.28	4.13	0.73	0.13	0.00	7.37
Portage, Wis.	do	2.99	0.36	0.00	1.74	0.41	0.93	2.74	1.78	0.29	0.05	11.29
Davenport, Iowa	Mississippi	1.19	0.09	0.71	0.78	1.03	0.84	2.05	0.71	0.05	Trace.	7.45
Des Moines, Iowa	Des Moines	0.46	0.13	Trace.	1.69	0.26	0.26	2.01	0.40	0.34	0.28	5.83
Hannibal, Mo.	Mississippi	0.44	0.34	2.99	0.20	1.58	1.42	2.62	2.04	0.65	0.01	12.29
Peoria, Ill.	Illinois	0.68	0.11	1.60	0.77	1.04	1.81	1.49	1.09	0.75	0.05	9.39
Beardstown, Ill.	do	0.40	0.24	2.25	0.65	1.42	1.35	1.90	1.85	0.65	0.00	10.71
St. Louis, Mo.	Mississippi	0.63	0.56	2.09	0.86	0.59	1.24	2.57	3.93	0.66	0.24	13.37
Cape Girardeau, Mo.	do	0.46	0.27	1.57	2.01	1.01	3.07	1.91	0.63	0.20	1.00	12.13

Missouri Drainage Basin.

Station.	River.	Feb. 22 to 28.	Mar. 1 to 7.	Mar. 8 to 14.	Mar. 15 to 21.	Mar. 22 to 28.	Mar. 29 to Apr. 4.	Apr. 5 to 11.	Apr. 12 to 18.	Apr. 19 to 25.	Apr. 26 to May 2.	Total.
Topeka, Kans.	Kansas	2.41	0.10	2.92	0.81	0.46	0.78	2.94	0.04	0.56	1.35	12.37
Kansas City, Mo.	Missouri	1.32	0.20	3.28	0.98	1.11	1.60	1.55	0.75	0.28	0.35	11.42
Boonville, Mo.	do	0.98	0.10	3.68	0.39	1.89	2.19	3.67	1.79	0.81	0.37	15.87
Ottawa, Kans.	Osage	0.53	0.54	3.13	0.48	2.99	1.98	4.33	0.66	0.95	1.20	16.79
Osceola, Mo.	do	0.98	0.61	2.34	0.98	1.41	3.18	5.48	1.90	1.25	1.36	19.49
Warsaw Mo.	do	1.15	0.10	2.20	0.85	2.40	2.45	6.81	2.53	1.33	1.75	21.57
Hermann, Mo.	Missouri	0.63	0.32	2.46	0.79	1.24	2.65	6.89	2.92	0.91	0.56	19.37

Arkansas Drainage Basin.

Oswego, Kans	Neosho	0.88	0.30	4.10	1.25	1.31	2.39	5.37	3.00	2.34	0.37	21.31
Okay, Okla	Verdigris	1.21	0.33	1.28	0.78	1.21	3.59	1.73	0.00	0.95	1.95	13.03
Woodward, Okla	North Canadian	1.00	0.24	5.45	0.15	0.75	1.15	1.32	0.00	1.05	1.37	12.48
Oklahoma City, Okla	do	0.42	0.22	2.33	0.03	1.67	1.80	3.27	Trace.	1.76	1.22	12.72
Calvin, Okla	Canadian	1.74	0.50	1.43	0.08	1.20	3.85	1.95	0.02	1.02	1.39	13.18
Dodge City, Kans	Arkansas	1.56	0.01	3.64	0.08	0.03	0.39	0.09	0.19	2.56	1.02	9.57
Wichita, Kans	do	1.12	0.26	2.97	0.13	0.23	1.13	2.91	0.48	1.40	0.84	11.47
Fort Smith, Ark	do	1.37	0.62	0.63	0.36	1.85	1.42	1.51	0.82	0.81	1.16	10.55
Little Rock, Ark	do	1.45	1.45	2.49	0.75	2.76	2.82	0 62	0.19	0.47	1.75	14.75
Pine Bluff, Ark	do	1.30	2.27	3.34	3.11	2.17	2.64	1.87	0.19	0.06	2.95	19.90
Black Rock, Ark	Black	1.28	0.86	2.82	1.25	1.29	2.68	1.23	1.55	0.02	2.19	15.17
Batesville, Ark	White	1.56	0.25	2.76	0.74	1.56	1.93	2.13	0.75	0.00	1.87	13.55
Newport, Ark	do	1.45	0.47	2.66	1.27	2.20	2.65	1.66	0.36	0.02	2.82	15.56
Clarendon, Ark	do	1.69	1.65	3.77	2.83	1.73	3.02	1.79	0.10	Trace.	1.58	18.16

Red Drainage Basin.

Arthur City, Tex	Red	2.60	0.00	0.40	0.00	1.30	3.60	0.50	1.20	2.80	0.80	13.20
Shreveport, La	do	2.36	1.24	1.37	0.24	3.23	4.38	2.66	0.83	0.32	3.80	20.43
Alexandria, La	do	1.66	3.31	4.06	3.35	3.08	1.72	1.70	1.64	0.15	3.33	24.00
Camden, Ark	Ouachita	2.68	1.11	2.48	1.09	2.09	3.42	2.26	0.36	0.40	4.87	20.76
Monroe, La	do	3.36	2.46	2.76	0.00	2.62	4.40	0.96	0.40	1.29	4.86	23.11
Melville, La	Atchafalaya	1.85	0.20	0.25	0.05	3.95	4.60	0.00	0.80	0.00	4.05	15.75

Lower Mississippi Drainage Basin.

New Madrid, Mo	Mississippi	0.90	0.90	1.60	2.92	1.54	4.70	1.80	0.73	0.19	1.60	16.88
Memphis, Tenn	do	1.25	1.36	3.52	2.30	0.60	0.51	2.43	0.06	Trace.	0.75	12.78
Marked Tree, Ark	St. Francis	0.82	1.74	3.95	2.48	1.07	5.35	1.64	0.40	Trace.	1.91	19.36
Helena, Ark	Mississippi	1.36	2.12	3.62	0.96	0.74	2.10	2.02	0.50	Trace.	2.58	16.00
Arkansas City, Ark	do	1.90	3.33	3.02	0.10	0.91	2.78	2.15	0.22	0.49	2.47	17.37
Greenville, Miss	do	2.66	4.61	2.30	0.40	1.03	4.65	1.65	0.33	0.76	2.96	21.35
Yazoo City, Miss	Yazoo	4.74	3.53	2.90	0.31	0.97	2.93	2.16	1.14	0.47	1.93	21.08
Vicksburg, Miss	Mississippi	6.14	3.45	2.24	0.40	1.62	2.19	1.08	1.20	0.60	2.14	21.06
Natchez, Miss	do	1.98	3.34	2.18	0.60	2.31	2.26	2.09	2.38	0.27	0.43	17.84
Baton Rouge, La	do	2.30	1.90	2.40	0.30	3.90	1.43	1.33	0.08	0.15	0.32	14.11
Donaldsonville, La	do	2.28	1.05	1.40	0.52	2.10	2.50	1.61	Trace.	0.25	2.56	14.27
New Orleans, La	do	1.10	2.07	0.78	0 95	2.47	2.18	0.67	0.00	0.57	2.62	13.41

An inspection of this table will show that heavy rains were rather general in most basins in the second and third week of March. The response of both the Ohio and Tennessee was almost immediate. See the hydrograph for Cincinnati, Figure 1. Heavy rains continued in the Ohio Basin during the first half of April causing two distinct crests in the Ohio in that month.

In general the discharge of the Mississippi at and below St. Louis, Mo., rose steadily during March and the great volume of water passed down stream as a long drawn-out wave as shown by the hydrographs in Figure 1.

Run-off.—Discharge measurements for the 1922 flood are not yet available to the Weather Bureau. The author has worked out, however, tentative discharge figures based upon the average ratio of discharge to precipitation as given by Morrill in *Weather Bureau Bulletin E*, Table XIV, page 27. The values in that table were those assumed by Humphreys and Abbott and by Greenleaf and are as follows:

TABLE 3.—*Ratio of discharge to precipitation.*

Basin.	Ratio.	Basin.	Ratio.
Ohio	0.30	Red	0.22
Upper Mississippi	0.28	Lower Mississippi	0.52
Missouri	0.15		
Arkansas	0.16	Total	0.25

Using the values given in the above table the rainfall and run-off for seven great floods has been computed. Only the figures for the 1922 flood are given in this abstract; they follow as Table 4 below.

TABLE 4.—*Precipitation in inches over drainage basins and discharge in millions of cubic yards for 1922 flood.*

Drainage basin.	1922							
	February.		March.		April.		Total.	
	Precipitation.	Discharge.	Precipitation.	Discharge.	Precipitation.	Discharge.	Precipitation.	Discharge.
Ohio	0.79	15,264	1.75	38,482	1.25	27,369	3.70	81,115
Upper Mississippi	0.27	5,711	0.51	10,708	0.72	14,991	1.50	31,410
Lower Mississippi	0.40	15,083	0.69	26,197	0.30	11,378	1,39	5[illegible],658
Missouri	0.34	5,156	1.25	13,809	1.34	20,624	2.93	39,589
Arkansas	0.34	4,837	1.02	14,513	0.92	13,062	2.28	32,412
Red	0.42	6,474	0.76	10,755	0.69	10,733	1.87	27,962
Total	2.47	52,525	5.98	114,464	5.22	98,157	13.67	256,14[illegible]
Ratio		0.27		0.25		0.23		0.25

The discharges are given in millions of cubic yards and were obtained from the ratios given in Table 4. The author concedes that his discharge values are based upon estimates of high authority rather than actual measurements, but nevertheless they serve as a basis of comparison with previous floods. The drainage areas used in the computations and the ratio of the different basins to the whole are shown in Table 5 below.

TABLE 5.—*Drainage areas used in computations and ratios to entire basin.*

Basin.	Area in square miles.	Ratio to whole.
Ohio	203,900	24
Upper Mississippi	148,150	17
Lower Mississippi	60,300	7
Missouri	205,750	24
Arkansas	145,000	17
Red	90,000	11
Total	853,100	100

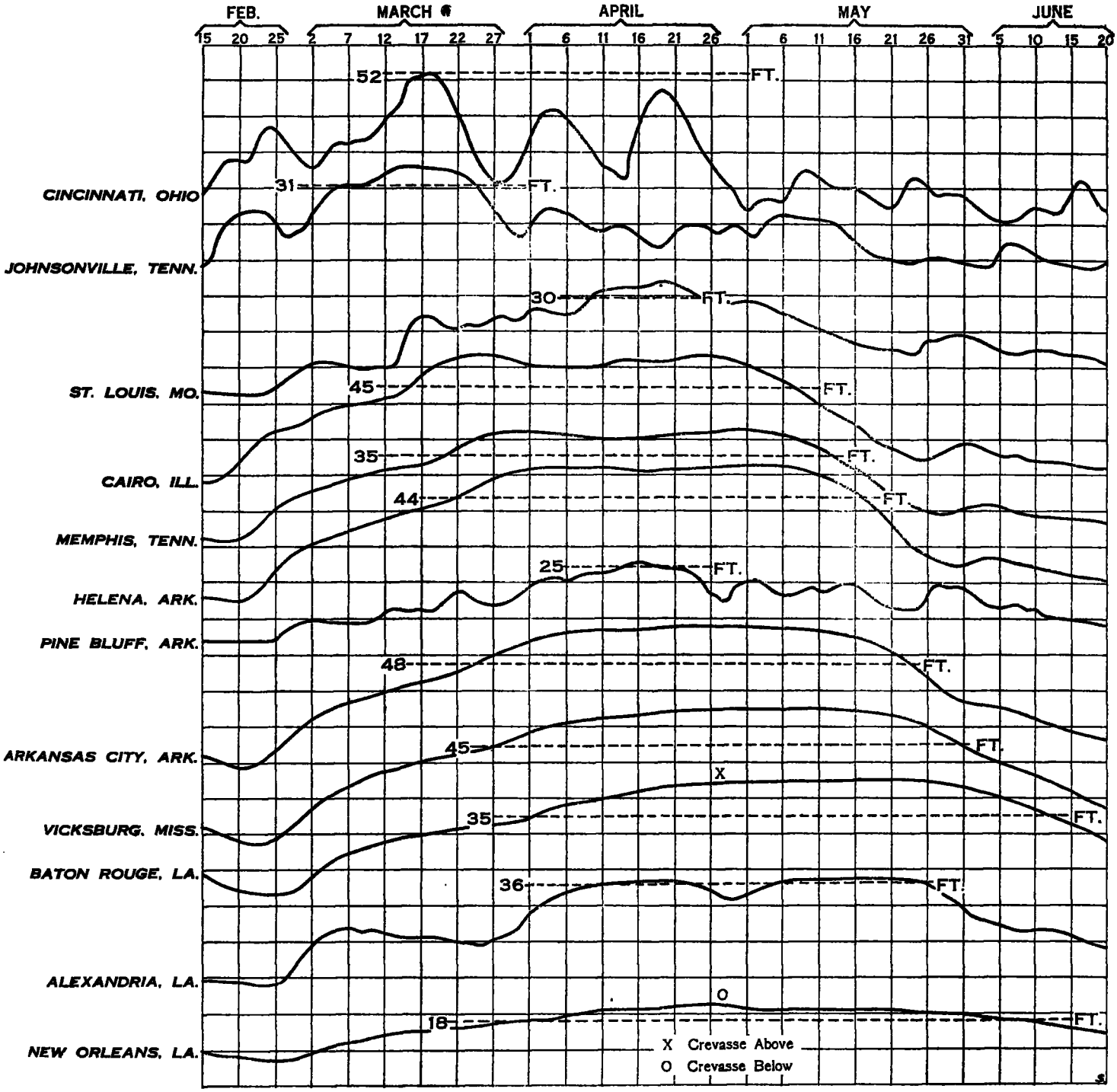

FIG. 1.—Hydrographs for selected stations, lower Mississippi River flood of 1922.

COMPUTATION OF RAINFALL FOR EACH BASIN.

Charts are given showing the distribution of precipitation for the months January to April, both inclusive, but in computing the total precipitation for the flood the months of February, March, and April only were used. The procedure followed in obtaining the totals for the several basins is given in the author's own words, as follows:

The rainfall for each drainage basin was computed according to a method suggested by Marvin and is as follows: Monthly data for a large number of stations were charted and isohyetal lines carefully drawn. These lines were then traced upon sheets of cross-section paper together with the outlines of the six drainage areas.

The isohyets divide the drainage basins into various irregular small subareas, over which the precipitation may be assumed to be uniform and of an amount represented by the mean between the two adjacent isohyetals. Therefore the number of squares in each subarea was counted. This number was then multiplied by the average precipitation for the subarea in question and the product divided by the sum of the counts for all the subareas, which latter, of course, is the number of squares in the whole drainage basin being studied. Finally, the sum of the quotients found in the above manner gives the depth of precipitation, which, spread uniformly over the whole basin, would represent the same amount of water as fell in the irregularly distributed precipitation. This procedure, while laborious, was well worth the time consumed, and it is thought to have accomplished a more accurate presentation of data than was possible otherwise.

The number of squares in the subarea was limited always by the boundary lines of the watershed, except in the extreme upper Arkansas, Missouri, and Mississippi valleys. In these territories the winter and spring precipitation is invariably small, mostly in the form of light snow, contributing practically nothing to flood conditions. The drainage basins were therefore cut off for these regions by an arbitrary straight line running through Omaha, as shown by the heavy dash line on the left side of Figure 2, which is reproduced.

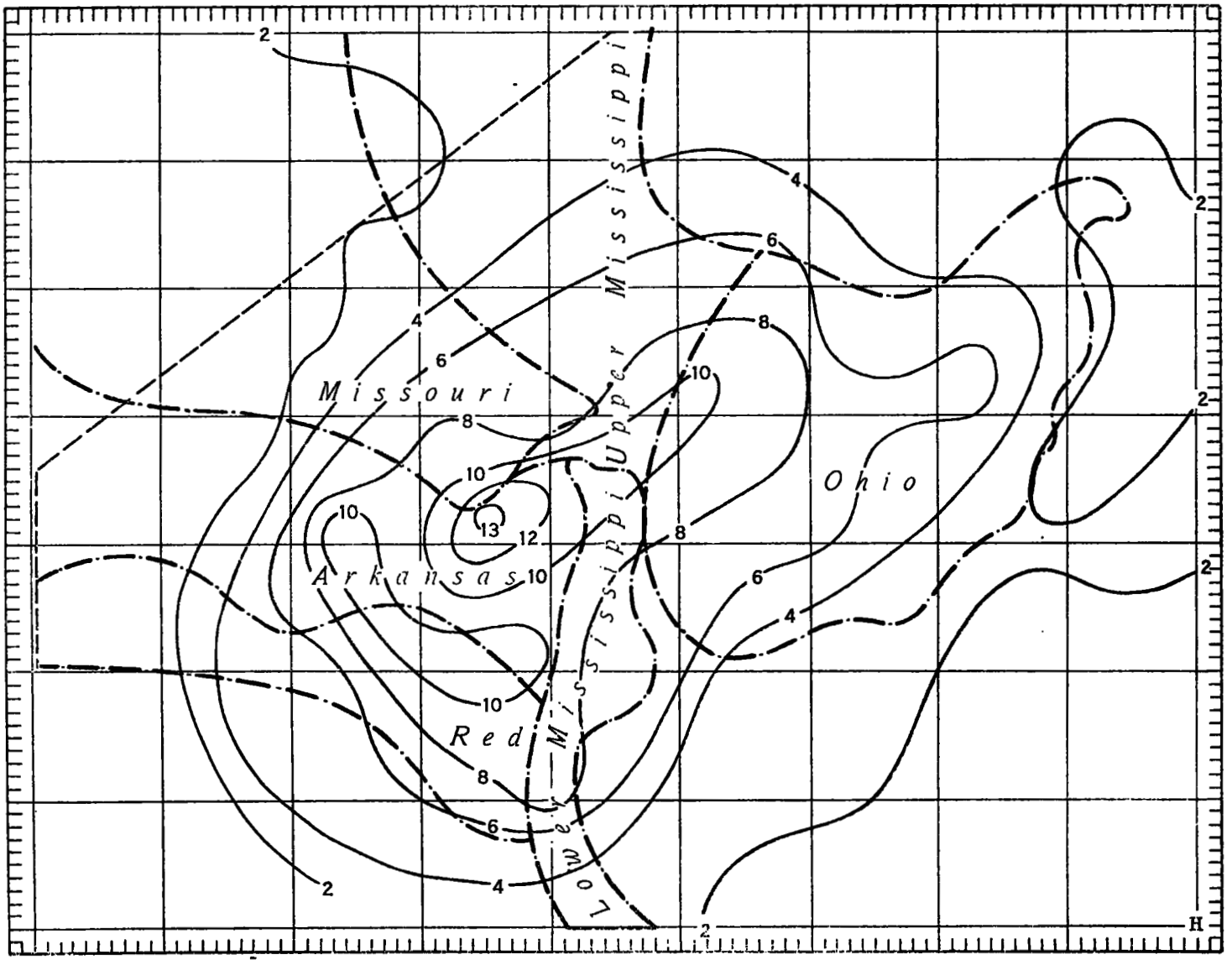

FIG. 2.—Illustration of method of determination of amounts of precipitation.