ANALYSIS OF RAINS AND SNOWS AT MOUNT VERNON, IOWA, 1935–36

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[Cornell College, Mount Vernon, Iowa, June 1936]

During the year 1935–36, 51 samples of precipitation were analyzed in the Cornell College chemical laboratories. There were 29 samples of rain and 22 samples of snow.

The rains of October 13 and 31, 1935, were accompanied by thunder and lightning. In the 0.10 of an inch rainfall on November 10, the chlorine, nitrates, and nitrites were unusually high. These results show what one would naturally expect, that most of these substances are dissolved in the first part of an ordinary precipitation. The same is true of the sulphate. Our experiments tend to show that the sulphates in the Mount Vernon precipitations come from the sulphur in the coal that is burned.

On January 4, 1936, the precipitation was both rain and snow equivalent to 0.2 of an inch rain. In Chicago the storm was accompanied by thunder and lightning.

TABLE 1.—*Parts per million*

Date	Rain or snow	Chlorine	Free NH_3	Alb. NH_3	N in nitrite	N in nitrite	Sulphate SO_3
1935							
June 6	Rain in 0 to 0.3	3.55	0.056	0.04	0.3	0.00	0.08
16	0.6 inch	2.13	.04	.05	.55	.00	.00
18	1.2 inches	3.00	.20	.02	.25	.00	.00
Oct. 10	0.5 inch	3.55	.40	.72	.15	.05	.05
13	0.35 inch	2.13	.22	.16	.09	.05	.00
17	⅓ inch rain	1.42	.24	.24	.20	.25	.01
21	¼ inch rain	3.55	.40	.32	.04	.10	.003
31	½ inch rain	2.00	.20	.04	.035	.09	.00
Nov. 4	2.6 inches rain	3.55	.08	.24	.06	.16	.00
10	1/10 inch rain	7.10	X	X	.25	.47	.025
19	3/10 inch rain	2.13	.32	.30	.30	.35	.005
27	1¼ inch rain	2.00	.056	.40	.11	.46	.00
28	2 inches rain	.71	.050	.24	.15	.09	.008
Dec. 7	½ inch rain	2.50	.025	.65	.20	.40	.007
15	4 inches snow	3.55	.112	.80	.20	.10	.005
23	do	2.13	.08	.36	.25	.08	.003
25	4 inches snow	3.55	.24	.03	.25	.15	.003
28	2 inches snow	3.75	.20	.32	.15	.25	.005
1936							
Jan. 2	6 inches snow	2.15	.02	.40	.08	.30	.005
4	0.4 inch rain	1.42	.40	.40	.35	.20	.005
6	2 inches snow	3.55	.28	.40	.15	.25	.005
7	¼ inch snow	1.42	X	X	.19	.60	X
8	3 inches snow	2.13	.08	.40	.075	.30	.00
16	2 inches snow	1.40	.136	.24	.10	.35	.002
18	9 inches snow	.71	.056	.22	.05	.25	.002
22	2 inches snow	7.10	.45	.20	.15	.45	.005
29	2 inches snow	3.40	.24	.112	.15	.20	.00
Feb. 4	4 inches snow	2.13	.45	.36	.20	.12	.006
9	3 inches snow	2.80	.45	.32	.10	.25	.003
12	do	1.42	.32	.45	.20	.25	.005
14	2 inches snow	2.10	.40	.32	.17	.25	.0014
17	do	2.13	.24	.32	.12	.35	.00
26	0.2 inch rain	3.55	.50	.80	.15	.40	.010
Mar. 11	½ inch rain	2.10	.28	.45	.13	.33	.009
14	3 inches snow	3.55	.24	.44	.175	.30	.002
19	0.02 inch snow	3.55	.24	.48	.23	.50	.016
Apr. 1	2 inches snow	.9	.40	.20	.10	.20	.004
2	3 inches snow	3.55	.16	.38	.10	.50	.00
5	do	3.55	.45	.28	.10	.35	.006
14	0.12 inch rain	2.84	.80	.50	.17	.50	.007
20	¼ inch rain	3.55	.42	.44	.20	.30	.00
24	1/10 inch rain	2.13	X	X	.25	1.00	.025
27	7/10 inch rain	1.42	.42	.40	.30	.5	.004
1936							
May 1	½ inch rain	3.55	.40	.20	.20	.05	.007
4	1/10 inch rain	7.10	X	X	.10	.12	.004
10	do	3.55	X	X	.20	.03	.002
12	⅛ inch rain	2.00	.24	.16	.15	.02	004
23	⅜ inch rain	2.13	.45	.40	.10	.15	.04
June 12	2.9 inches rain	.6	.24	.16	.10	.02	.004
6	0.3 inch rain	1.42	.40	.42	.16	.02	.009
9	1.2 inches rain	2.00	.38	.50	.10	.015	.004

TABLE 2.—*Pounds per acre*

Date	Rain or snow	Chlorine	Free NH_3	Alb. NH_3	N in nitrate	N in nitrite	Sulphate SO_3
1935							
June 6	3 inches rain	0.24	0.04	0.003	0.02	0.00	0.005
16	0.6 inches rain	.29	.005	.007	.075	.00	.00
18	1.2 inches rain	.81	.05	.005	.068	.00	.00
Oct. 10	0.5 inch rain	.4	.045	.08	.017	.006	.0057
13	0.35 inch rain	.17	.018	.13	.007	.004	.00
17	⅓ inch rain	.114	.019	.019	.029	.016	.008
21	¼ inch rain	.2	.023	.018	.0023	.006	.0002
31	½ inch rain	.23	.023	.005	.004	.01	.00
Nov. 4	2.6 inches rain	2.09	.047	.014	.035	.095	.00
10	1/10 inch rain	.16	X	X	.0058	.011	.0006
19	3/10 inch rain	.1419	.022	.02	.02	.024	.0004
27	1¼ inches rain	.56	.016	.112	.031	.13	.0003
28	2 inches snow	.067	.002	.009	.006	.003	.0003
Dec. 7	½ inch rain	.28	.03	.07	.023	.046	.0008
15	4 inches snow	.16	.085	.09	.019	.0075	.0004
25	do	.27	.016	.0023	.019	.011	.0002
28	2 inches snow	.15	.008	.0012	.006	.01	.0002
1936							
Jan. 2	6 inches snow	.245	.0023	.046	.009	.034	.0006
4	0.2 inch snow	.54	.015	.015	.013	.008	.002
Dec. 23	4 inches snow	.162	.0061	.027	.019	.006	.0023
Jan. 6	2 inches snow	.16	.013	.018	.007	.011	.0002
7	¼ inch snow	.007	X	X	.001	.0030	X
8	3 inches snow	.12	.0046	.023	.0057	.017	.00
16	2 inches snow	.052	.005	.009	.0004	.013	.0007
18	9 inches snow	.12	.110	.037	.0085	.0425	.0003
22	2 inches snow	.263	.017	.007	.006	.017	.0002
29	do	.13	.009	.004	.0056	.007	.00
Feb. 4	4 inches snow	.162	.034	.027	.015	.009	.0005
9	3 inches snow	.16	.026	.018	.006	.014	.0002
12	do	.081	.018	.026	.0114	.014	.0003
14	2 inches snow	.08	.015	.0122	.0065	.009	.0002
17	do	.081	.009	.0122	.0046	.013	.0038
26	0.2 inch rain	.16	.0225	.036	.0068	.018	.0004
Mar. 11	0.5 inch rain	.24	.032	.051	.0147	.037	.001
14	3 inches snow	.20	.014	.0251	.010	.017	.0001
19	2 inches snow	.135	.009	.018	.19	.009	.0061
Apr. 1	do	.034	.015	.008	.004	.008	.002
2	3 inches snow	.20	.009	.022	.0057	.029	.00
5	do	.20	.016	.026	.0057	.0209	.0004
14	0.12 inch rain	.077	.022	.014	.0046	.013	.0002
20	0.25 inch rain	.20	X	X	.011	.017	.00
24	1/10 inch rain	.05	.024	.025	.006	.023	.0006
27	7/10 inch rain	.227	.067	.064	.048	.08	.0006
May 1	⅛ inch rain	.016	.018	.009	.009	.002	.0002
9	1/10 inch rain	.16	X	X	.002	.003	.0001
10	do	.08	X	X	.0046	.0009	.00005
12	⅛ inch rain	.096	.011	.007	.007	.0009	.0002
23	⅜ inch rain	.20	.041	.036	.009	.0014	.0036
6	0.3 inch rain	.10	.027	.029	.011	.0014	.0006
9	1.2 inches rain	.54	.103	.14	.01	.0041	.0011
June 12	2.9 inches rain	.40	.16	.11	.066	.013	.003

SEA SWELLS IN RELATION TO MOVEMENT AND INTENSITY OF TROPICAL STORMS

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[Marine Division, Weather Bureau, Washington, July 1936]

Tropical storms, like other phenomena that cause disturbances of the sea surface, result in the formation of waves which move outward in all directions from the region of origin. The precursory indications given by sea swells preceding the storm are generally appreciated, and have been discussed by a number of writers. Of these, mention may be made of Lt.-Col. William Reid [1] who prepared the diagram of swells and cross seas reproduced in figure 1. Other investigators have studied waves caused by storms at sea, notably Cornish,[2] Wheeler,[3] and Fleming.[4] The effects of a storm's progressive travel on the character and direction of movement of sea swells in the various parts of the storm area have been discussed by Cline [5] who originated the diagram reproduced in figure 2.

[1] Reid, Lt.-Col., William. The Progress of the Development of the Law of Storms and of the Variable Winds. London, 1849.

[2] Cornish, Vaughn. Ocean Waves. Cambridge, 1934.

[3] Wheeler, W. H. A Practical Manual of Tides and Waves: London, 1906.

[4] Fleming, J. A. Waves and Ripples. London, 1912.

[5] Cline, I. M. Relation of Changes in Storm Tides on the Coast of the Gulf of Mexico to the Center and Movement of Hurricanes. MONTHLY WEATHER REVIEW. 48: 127–146. March 1920.