

losses in other counties of east-central Iowa and the northern tier of counties in Illinois were added, the total losses would doubtless reach several hundred thousand dollars.

Second storm.—By the evening of the 14th the snow of the 11th–12th had settled to a depth of 4.3 inches, when a second storm set in, amounting to 6.6 inches by 7 p. m. of the 15th, at which time the average depth of both old and new snow was 9.4 inches. This snowfall, while slightly larger than the first one, was not sufficiently wet to stick to surfaces and consequently had no such disastrous results. However, the snow on tracks caused considerable delay to trains and street cars, although the wind was light and there was but little drifting. The general effects of the storm could not be considered serious, especially when compared with the preceding one.

Third storm.—Before the damage from the storms of the 11th–12th and 14th–15th had been repaired, and with 4.5 inches of snow remaining on the ground from the two previous storms, the third heavy storm within a week occurred on the 18th. This fall averaged 6.7 inches and brought the total depth on ground to 11.0 inches—the greatest depth on the ground at one time during the present winter. The total fall from the three snows was 19.5 inches, as compared with the total previous fall for the entire winter of 13.9 inches, or about 40 per cent more. This phenomenal snowfall in so short a period is without precedent in this locality. Moreover, not since March, 1891, has there been so large a fall in any one month as that which fell from the 11th to the 18th, inclusive.

The fall occurred practically during the daylight hours of Sunday, and was of the type popularly regarded as a “blizzard.” The snow was dry and was accompanied by moderately high wind and a cold wave which was severe for the season, the temperature falling from 39° at 9 p. m. of the 17th to 1° above zero at 3 p. m. of the 18th, and continuing to fall gradually thereafter to 7° below

zero at 6 a. m. of the 19th. The heavy drifting snow, high wind, and severe cold wave obviously added new difficulties to the work of clearing away the effects of the previous storms, especially that of repairing the wire systems.

The most far-reaching consequences of this storm, however, were to be found in the constantly drifting snow on the electric and steam railway tracks. Trains were delayed for hours due to blocked tracks. One train from Chicago on the Illinois Central due Sunday night at 11 p. m. arrived on Monday 11 hours late, and an east-bound train was stalled in the drifts east of Freeport, Illinois practically all of Sunday night. All railway lines suffered alike from snow-blocked tracks, and some lines were bothered greatly by derailments due to the hard-packed snow.

Country roads were quite generally blocked by the deep drifts for more than a week, during which the snow settled slowly to a depth of 3 inches at this writing.

LATER NOTE (MARCH 29, 1923.)

A final estimate has just been received from Jo Daviess County, Illinois, giving the losses from the storms as follows:

Number poles down (all wire services).....	677
Time required to make repairs (weeks).....	8
Money loss from above items.....	\$9,000
Damage to trees, money loss.....	\$1,000
Average delay to trains, for a period of 48 hours (hours).....	6

These losses are for the entire county but the figures in money losses are believed far too low, judging from estimates and advices received from representatives of the four railroads passing through Dubuque; that is, the loss of 677 poles would entail a much larger expense than \$9,000. The number of poles is probably correct.

The wind was doubtless a large factor in breaking down the wires and poles but it is impossible to separate the contributing causes (wind and weight of snow on wires).—H. M. W.

THE STORMS OF MARCH 11-12, 1923, IN ILLINOIS.

By CLARENCE J. ROOT, Meteorologist.

[Weather Bureau Office, Springfield, Ill., Apr. 12, 1923.]

A deep barometric disturbance crossed Illinois during the night of the 11th–12th. At 7 p. m. of the 11th its center was located in southern Missouri and by the following morning the center had advanced to Chicago. The sea-level barometer reading at Chicago (28.70 inches) and Peoria (28.89 inches) were the lowest of record, and at Springfield (28.82 inches) the lowest but one. Heavy precipitation and strong gales were general throughout Illinois. The maximum wind velocity at Springfield was from the southwest, but at Chicago, Peoria, and Davenport the maximum velocity came from the northeast. The strong, general winds caused damage to property in nearly all parts of the State. Poles and wires were blown down, buildings unroofed or otherwise injured, farm structures and outbuildings destroyed, trees torn or uprooted, windows broken, and fences demolished. In a few cases livestock were killed, but so far as is known no person was killed or even injured. The damage to property was not particularly severe in any one locality, but it was so widespread that in the aggregate the loss was considerable. One of the features of the storm was the interference with electric light, telephone, and interurban services.

In the extreme southeastern part of the State there seems to have been several local winds within the general storm. These winds occurred between 8:30 p. m. and 9 p. m. of the 11th. The storm in Gallatin County was probably a tornado. It entered at the southwest corner and crossed the county diagonally. The path of principal destruction was 300 yards in width, and the money loss in the direct path of the tornado about \$10,000. In Hamilton and Johnson counties there is not enough evidence to classify the winds as tornadoes. In the latter county hundreds of fruit trees were destroyed. There are important commercial apple orchards in Johnson County.

In the northern part of the State rain and wet snow fell throughout the night. The rain froze as it fell and the snow adhered to all objects with which it came in contact. Trees, wires, and poles were covered with ice and snow. At Oregon the ice coating was 3 to 4 inches thick on the wires. Mr. N. V. Woleben, cooperative observer at Marengo, weighed the incrustation of snow and ice and found it to be twelve ounces to the foot of wire. This condition was general throughout that portion of Illinois lying within 50 or 60 miles of the Wisconsin border. With this accumulation of ice on the wires, the destructive

effect of the wind was much greater than in the parts of the State farther south. The snowfall ranged from 2 to 11 inches in this area. The combination of pole and wire destruction and heavy snow greatly disturbed transportation of all kinds. The snow drifted in places. Electric lines had the snow and broken poles and wires to contend with, and steam lines also impeded by the snow, were unable to dispatch trains on account of lack of communication facilities. Trains, in some cases, were dispatched by radio. Passengers were marooned over night in interurban cars, and in the cities street car service was suspended. Some trains on the steam roads were canceled, and at Marengo the interurban line did not resume operations until the 28th. In Chicago street-car and steam transportation were considerably hampered by the snow. In the western part of Carroll County telegraph poles were torn out and the tops stuck in the ground with the butts up.

The Chicago, Burlington and Quincy Railroad sent out about 150 miles of wire to repair damage. A good idea of the effect and extent of the storm is given in the following report furnished by the Illinois Bell Telephone Co., the leading telephone company in the State:

We had around 6,000 poles down and we expect the total cost of restoration will be something in the neighborhood of \$350,000. In addition to the pole damage there was, of course, much damage to wires due to their breaking on account of accumulated snow, and wind, and also on account of tree limbs falling on them. The principal damage occurred from the west limits of Chicago to the general neighborhood of Rockford and extended, with less severity, from there to Rock Island and Galena. In this area there was a great deal of wet snow which

froze on the wires, and very heavy wind. We also had considerable trouble due, however, entirely to the wind pressure in the area around Decatur and extending as far south as Nashville, but the damage was in no way as serious as that in the northern part of the State. We have no definite data as to the extent of the damage suffered by other wire using companies, but we know, in general, that the rural telephone lines of the companies connecting with us in the north end of the State suffered severely.

The storm was so widespread that it is next to impossible to secure an accurate estimate of the money loss, but considering the information at hand it is probable that the loss for the entire State was in the neighborhood of \$800,000.

With the greater part of the snow still present to hamper the work of restoration, an additional fall of 3 to 11 inches occurred from the 14th to 16th. There was little drifting, but the street cars at Rockford were again put out as the tracks were frozen solid with ice. With most of the accumulated depth of the 16th still on the ground, a third storm within a period of eight days occurred on the 18th. This storm produced an additional amount of 2 to 8 inches, the total depth on ground at Freeport being 25 inches. The storm of the 18th was of the blizzard type, with strong winds, much drifting, and rapidly falling temperature. By the following morning the temperature in northern Illinois was well below zero. Passenger trains were many hours late. Some freight trains were stalled and others were annulled. Highways were badly blocked for several days. The week of March 11 to 18, 1923, will remain fresh in the memories of the people of northern Illinois for a long time.

TORNADO IN TENNESSEE ON MARCH 11, 1923.

By R. M. WILLIAMSON, Meteorologist.

[Weather Bureau, Nashville, Tenn., Apr. 25, 1923.]

Destructive winds occurred over most of the State during the night of March 11-12, in connection with a storm of unusual intensity centered over Missouri at 7 p. m. of the 11th. The severest part of the storm in this State was felt in the western counties about 8 p. m., in the central portion about 10 p. m., and in the eastern portion after midnight. At Nashville, and probably at most other points also, most of the damage was done within a period of ten minutes, or less, when the wind attained its highest velocity. During this period there was heavy rainfall and a vivid lightning display. Instead of the usual series of local thunderstorms, or tornadoes, that strike here and there within the most active portion of a barometric depression, there was in this case what appeared to be a wave or crest of wind of almost hurricane force that advanced eastward across the State, including all portions in its sweep but wreaking its fury mostly in the western and central portions. At the time of this crest the wind shifted from southeast and south to southwest and continued from that direction during the following twelve hours or more.

In two of the western counties the wind assumed the form of a real tornado of serious character. Its path was rather more limited than usual, being from 200 to

400 yards wide and not over 15 miles long. The destruction of human life was unusually heavy, considering the small extent of the storm. This was due to the fact that two villages lay in its path, namely, Deanburg, Chester County, and Pinson, Madison County, about 10 miles apart. The latter, a village of about 500 inhabitants, was almost a total wreck. At Deanburg 2 persons were killed and about 20 injured; at Pinson 17 or 18 persons were killed and some 40 or 50 injured. The property loss included the school building, two churches, 60 or more dwellings, many barns, outhouses, fences, etc., and about 60 head of stock, a total damage of approximately \$100,000. The tornado originated at or near Deanburg, extreme western Chester County, at 8 p. m. and traveled rapidly northeastward to Pinson, in the adjoining county, passing there about 8:10 to 8:15 p. m. It was lost sight of three miles northeast of Pinson, having traveled a distance probably not exceeding 10 miles. Since it occurred at night and in the midst of a general windstorm of unusual severity, there was probably very little observation of the appearance of the storm clouds, and hence no accurate description of the approach of the storm is available.