Wellsborough, Tioga county: the storm on the 28th was very severe at points twenty-five miles north of station, where trees and fences were blown down and buildings demolished.

Province of Quebec.—Quebec: a severe storm occurred during the night of the 17–18th; houses were blown down, trees uprooted, and other damage done.

Texas.—Fort Stockton: a thunder storm prevailed at this place from 11 a. m. to 4.20 p. m. on the 4th. Fifteen miles south, hail fell for forty-five minutes, the hailstones being as large as walnuts. The storm moved from southwest to northeast.

Rio Grande City: heavy rain began at 12.05 a. m, on the 10th and continued until noon, the total rainfall being 5.64 inches.

Indianola: a heavy rain and thunder storm occurred during the morning of the 28th. The rainfall for the thirteen hours ending at 10.40 a. m., was 5.08 inches. The lowlands in this vicinity were completely inundated.

Utah.—Nephi, Juab county: a destructive storm of rain and hail occurred at Circle Valley, Beaver county, on the 2d.

Virginia.—Lynchburg: a heavy rain storm occurred on the afternoon of the 11th; the rainfall was 1.22 inches, nearly all of which fell in forty minutes.

Wisconsin.—La Crosse: a very heavy rain storm occurred during the afternoon and evening of the 6th. From 5.07 to 11.35 p. m. 5.41 inches of rain fell, and 5.00 inches of this amount fell in less than three hours. The total rainfall for the day was 5.69 inches, which is the largest daily rainfall that has occurred since this station was established, in November, 1872. From 7.30 to 9.90 p. m. there was a continuous display of lightning and many buildings were struck. The heavy rainfall flooded the streets and cellars, causing a large amount of damage; several extensive washouts occurred on the railroads, resulting in delay of trains.

Clear Lake, Polk county: a tornado occurred at this place late in the afternoon of the 9th, leaving the greater part of the town in ruins and killing three persons. The damage caused by the storms is estimated at about $150,000, about forty buildings in Clear Lake and vicinity having been destroyed.

At Clayton, about eight miles northeast of Clear Lake, about one-half of the lighter buildings of the village were destroyed. The storm struck Clayton about 6 p. m.

Eau Claire, Eau Claire county: a severe wind and rain storm passed over this town, from the northwest at 4.35 p. m. on the 9th, causing great damage to the grain and hay stacks.

Chippewa Falls, Chippewa county: the severest storm of season occurred during the night of the 9–10th. The heavy rainfall caused the Chippewa river to rise rapidly.

NAVIGATION.

FLOODS.

Eau Claire, Eau Claire county, Wisconsin: both the Chippewa and Eau Claire rivers began falling at about noon on the 11th, after having reached the unprecedented height of twenty-six feet above low-water mark. All of the bridges over the Chippewa river, ten in number, were washed away. It is estimated that the damage in the vicinity of Chippewa Falls and Eau Claire will reach $1,500,000. Business houses on either side of both rivers were submerged. In Eau Claire nearly four hundred houses were either swept away or wrecked, and 2,000 persons were rendered dependent for shelter upon those living in the higher localities. At 9 p. m. of the 11th, the Chippewa river had fallen three feet below its maximum height, which was four feet and seven inches above the flood of 1880; and by the morning of the 12th it had fallen more than six feet.

Wausau, Marathon county, Wisconsin: the heavy rains preceding the 11th, caused a destructive flood in the Wisconsin river. On the above date the water reached a point within a few inches of the high water-mark of September 25, 1880. All of the lumber mills along the river were compelled to suspend work, and a large quantity of lumber was under water. At Wausau the water covered the Chicago, Milwaukee, and Saint Paul railway switch, and the bridges near the Michigan Lumber Company's mill were secured by cables to prevent them from being washed away. The bridges in the vicinity of Merrill, Lincoln county, were washed away and all the tributaries to the Wisconsin river in the county were much swollen. With the exception of the Comstock Mills, all of the mills at Merrill were compelled to shut down on account of high water.

La Crosse, Wisconsin: the very heavy rains about the 6th of the month caused great damage in this state. Large quantities of heavy drift-wood, lumber, and broken rafts passed this place from the 14th to 25th. The Mississippi river rose from three feet and three inches on the 3d to eleven feet and ten inches on the 16th. This is the most rapid rise shown by the river record of this station. On the 16th the water reached the tops of the levees.

Rio Grande City, Texas: the very heavy rainfall of the 10th caused the Rio Grande river to rise rapidly on that date; it reached its maximum height, eighteen feet above low-water mark, at 1 p. m. The banks of the river were washed away and the low lands south of this place were flooded.

STAGE OF WATER IN RIVERS.

In the following table are shown the danger points at the various river stations, the highest and lowest stages for September, 1884, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark. September, 1884.

Stations.	Danger-point on gauge.		Highest water.			Lowest water.			Monthly range.	
			Date.	Height.		Date.	Height.			
	Ft.	In.		Ft.	In.		Ft.	In.	Ft.	In.
Red River:										
Shreveport, Louisiana	29	9	1	1	5	24	*— 0	2	1	7
Arkansas:										
Little Rock, Arkansas	33	0	6	6	7	16, 17	3	6	3	1
Fort Smith, Arkansas	.....		2	*— 0	3	10	*— 4	4	4	1
Missouri:										
Yankton, Dakota	20	0	1	15	9	30	10	9	5	0
Omaha, Nebraska	16	0	10, 11, 14 15, 16	7	8	9	7	1	0	7
Leavenworth, Kansas	21	0	1	10	4	25	7	9	2	7
Mississippi:										
Saint Paul, Minnesota	14	6	12	4	10	4, 7	3	1	1	9
La Crosse, Wisconsin	18	0	16, 17	10	2	1	2	1	8	1
Dubuque, Iowa	21	10	24, 25	14	6	1, 2	3	10	10	8
Davenport, Iowa	15	0	28	11	4	2	2	6	8	10
Keokuk, Iowa	14	0	30	10	4	5, 6	2	9	7	7
Saint Louis, Missouri	30	0	30	20	6	15	9	2	11	4
Cairo, Illinois	40	0	30	14	3	23	7	1	7	2
Memphis, Tennessee	34	0	7	8	4	22, 26	3	4	5	0
Vicksburg, Mississippi	41	0	11, 12	9	9	30	5	1	4	8
New Orleans, Louisiana†	—2	6	5, 6, 7	—12	1	19	—12	11	0	10
Ohio:										
Pittsburg, Pennsylvania	20	0	19	4	1	11, 12	0	5	3	8
Cincinnati, Ohio	50	0	1	4	5	27	2	6	1	11
Louisville, Kentucky	24	0	1	3	5	24	2	7	0	10
Cumberland:										
Nashville, Tennessee	42	0	4	3	8	30	0	6	3	2
Tennessee:										
Chattanooga, Tennessee	33	0	1	3	2	28,29,30	0	7	2	7
Monongahela:										
Pittsburg, Pennsylvania	29	0	19	4	1	11, 12	0	5	3	8
Savannah:										
Augusta, Georgia	.....		12	6	7	25,26,29	4	6	2	1
Willamette:										
Portland, Oregon	.....		11	5	5	30	0	6	4	11
Sacramento:										
Red Bluff, California	.....		9, 10 14 to 24	0	11	1 to 8 11to13 25to30	0	10	0	1
Sacramento, California	.....		13, 14	8	9	30	7	9	1	0
Mobile:										
Mobile, Alabama	.....		6	18	1	12	15	10	2	3
Colorado:										
Yuma, Arizona	.....		.....	.....		.....	.....		.....	

* Below bench mark. † Below high-water mark of 1874 and 1883.

The Cumberland river at Nashville, Tennessee, was not navigable at any time during the month.

At Saint Paul, Minnesota, the Mississippi river reached a height sufficient to admit of the passage of large steamers on the 2d.

The Ohio river at Vevay, Indiana, was navigable for small steamers only on the 4th; on the 12th the river was lower than it has been at any time since 1881.

HIGH TIDES.

New River Inlet, North Carolina: high tides occurred on

the 12th, 14th, and 15th; that on the 14th being, with one exception, the highest observed since 1869.

High tides were also observed as follows:

Ocean City, Maryland, 8th.

Jacksonville, Florida, from 15th to 18th.

Indianola, Texas, 28th.

WATER TEMPERATURE.

The following table gives the highest and lowest temperatures of the water at the several stations; the range of water temperature; the mean temperature of the air at the station; and the depth of water at which the observations are taken:

Temperature of water for September, 1884.

Station.	Temperature at bottom.		Range.	Average depth, feet and inches.		Mean temperature of the air at station.
	Max.	Min.		ft.	in.	
	°	°	°			°
Atlantic City, New Jersey	75.0	69.5	5.5	2	8	69.7
Alpena, Michigan	72.3	55.8	10.5	12	0	60.5
Augusta, Georgia	84.8	78.0	6.8	5	0	76.4
Baltimore, Maryland	81.2	71.9	9.3	10	0	72.1
Block Island, Rhode Island	68.2	60.7	7.5	7	6	65.3
Boston, Massachusetts	65.5	57.1	8.4	21	2	65.8
Buffalo, New York	75.0	65.4	9.6	9	11	65.6
Canby, Fort, Washington Territory	62.5	50.7	11.8	16	10	55.3
Cedar Keys, Florida	86.2	79.9	6.3	10	10	80.3
Charleston, South Carolina	83.2	75.2	8.0	39	4	77.2
Chicago, Illinois	66.9	58.7	8.2	8	0	68.9
Chincoteague, Virginia	82.4	68.5	13.9	4	0	71.8
Cleveland, Ohio	75.1	64.3	10.8	14	0	67.3
Detroit, Michigan	75.6	62.9	12.7	23	10	68.4
Delaware Breakwater, Delaware	76.7	68.2	8.5	8	10	70.6
Duluth, Minnesota	65.1	52.4	12.7	10	2	57.5
Eastport, Maine	52.0	50.5	1.5	14	11	56.5
Escanaba, Michigan	66.0	59.1	6.9	18	3	60.1
Galveston, Texas	87.3	80.2	7.1	12	11	83.5
Grand Haven, Michigan	77.5	64.2	13.3	19	0	65.4
Indianola, Texas	86.2	77.5	8.7	9	3	81.0
Jacksonville, Florida	85.2	79.8	5.4	18	0	77.8
Key West, Florida	87.9	81.7	6.2	17	3	82.2
Mackinaw City, Michigan	65.1	56.2	8.9	10	0	60.6
Macon, Fort, North Carolina	84.0	70.6	13.4	8	10	75.5
Marquette, Michigan	60.5	55.6	4.9	10	0	59.9
Milwaukee, Wisconsin	57.8	43.1	14.7	8	0	64.0
Mobile, Alabama	85.6	80.0	5.6	17	2	78.3
New Haven, Connecticut	76.7	65.0	11.7	16	0	66.4
New London, Connecticut	69.6	64.2	5.4	12	6	66.9
New York City	74.4	67.4	7.0	16	2	69.6
Norfolk, Virginia	80.8	72.7	8.1	16	5	73.9
Pensacola, Florida	85.3	82.3	3.0	17	8	79.5
Portland, Maine	59.8	54.4	5.4	15	3	64.0
Portland, Oregon	71.0	56.5	14.5	53	6	55.7
Sandusky, Ohio	79.0	62.5	16.5	10	3	68.8
Sandy Hook, New Jersey	75.3	64.0	11.3	1	8	70.4
San Francisco, California	60.9	57.5	3.4	37	5	58.3
Savannah, Georgia	84.3	76.0	8.3	10	8	76.4
Smithville, North Carolina	82.5	73.0	9.5	10	9	75.9
Toledo, Ohio	77.6	65.7	11.9	11	2	69.3
Wilmington, North Carolina	82.0	72.0	10.0	20	1	75.2

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for September, 1884, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 81.58 per cent. The percentages for the four elements are: Weather, 88.64; direction of the wind, 77.00; temperature, 77.89; barometer, 84.49 per cent. By geographical districts, they are: For New England, 78.28; middle Atlantic states, 83.87; south Atlantic states, 88.42; eastern Gulf states, 86.67; western Gulf states, 86.20; lower lake region, 77.39; upper lake region, 77.97; Ohio valley and Tennessee, 84.77; upper Mississippi valley, 78.52; Missouri valley, 72.64; north Pacific coast region, 83.33; middle Pacific coast region, 90.83; south Pacific coast region, 98.33. There were five omissions to predict out of 2,948, or 0.17 per cent. Of the 2,943 predictions that have been made, ninety-eight, or 3.33 per cent., are considered to have entirely failed; one hundred and sixty-seven, or 5.68 per cent., were one-fourth verified; three hundred and fifty-four, or 12.03 per cent., were one-half verified; five hundred and sixty-seven, or 19.26 per cent., were three-fourths verified; 1,757, or 59.70 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During September, 1884, one hundred and forty cautionary signals were ordered. Of these, ninety-one, or 65.0 per cent., were justified by winds of twenty-five miles or more per hour at or within one hundred miles of the station. Twenty-six offshore signals were ordered, of which number sixteen, or 61.54 per cent., were fully justified, both as to direction and velocity; twenty, or 76.92 per cent., were justified as to direction; and twenty-one, or 80.77 per cent., were justified as to velocity. One hundred and sixty-six signals of all kinds were ordered, one hundred and seven, or 64.46 per cent., being fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Three signals were ordered late. In sixty-four cases winds of twenty-five miles or more per hour were reported, for which no signals were ordered.

Concerning the system of indicating the weather changes by means of railway signals, Professor Mell, director of the "Alabama Weather Service," states that this system has been in successful operation over a large part of that state, and that the reports received by him indicate that much interest is manifested wherever the signals have been displayed. These signals were displayed from the 11th to the close of the month, and a high percentage of verification was attained. Out of the reports from nine stations, six reported that the indications referring to temperature were fully verified; five reported the indications referring to the character of the weather fully verified; and the remaining stations reported percentages of accuracy varying from 85 to 95 per cent.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Brilliant and extensively observed auroral displays occurred on the evenings of the 13th and 17th; that which occurred on the last-mentioned date being observed throughout the northern portions of the United States and in British America. It was seen at Sidney, Nova Scotia, on the east; at stations on the coasts of Oregon and Washington Territory on the west; and southward to stations in southern Illinois and Indiana, and the central portions of Ohio and Kansas.

The display on the 13th, was not observed to the west of Dakota but was reported by numerous stations from the upper Missouri valley eastward to the Atlantic coast. The following reports relate to the display:

Eastport, Maine, 13th: an auroral arch was visible from 7.50 p. m. until 2 a. m. of the 14th; it extended to an altitude of 25°; several streamers of whitish color were observed during the display.

Point Judith, Rhode Island, 13th: a faint auroral light appeared at 7.50 p. m.; at 8.10 p. m. an arch of pale straw color formed, and remained visible until after midnight; the arch extended from northwest to northeast, being about 5° in width and 12° altitude; a dark haze was observed beneath the arch; no streamers were seen.

Menand Station (near Albany), New York: at 10.15 p. m., on the 13th, auroral beams of from 5° to 10° altitude were observed.

Moorestown, New Jersey: from 10.45 to 11.15 p., m. on the 13th, a few auroral streamers were observed.

Oswego, New York: an auroral light of pale straw color appeared at 10.50 p. m.; only a few streamers were noticed; the light faded gradually and by 12.50 a. m. it had entirely disappeared.

Rochester, New York: from 9.30 to 10.10 p. m., on the 13th, an aurora was visible in the northern sky; beams of light suddenly shot upward to a height of 45° and were followed by a wave of light having a slow motion from west to east.

Thornville, Michigan: a faint auroral display was visible from 9 to 11 p. m., on the 13th.

Riley, Illinois: a poorly-defined auroral arch of unusual brilliancy was observed at 10 p. m., on the 13th.