U. S. DEPARTMENT OF COMMERCE
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KEY TO METEOROLOGICAL RECORDS DOCUMENTATION NO. 2.11

HISTORY OF CLIMATOLOGICAL RECORD FORMS 1009 AND 612-14

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FOREWORD

The Key to Meteorological Records Documentation series has been established to provide guidance information to research personnel and others making use of climatological data.

Frequently users of such data have found it necessary to spend a great deal of time establishing whether the criteria for observing or computing various elements have changed over the period of record.

It is therefore hoped that the presentation of this series may not only conserve time but may have a direct influence in improving the accuracy of research results.

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PREFACE

This issue of the documentation series traces the history of Form 1009 (re-numbered Form 612-14, October 1952) from the establishment of the Weather Bureau as a civilian agency in 1891, through the succeeding years to date.

Discussion of Form 1009 and its widespread use must understandably take into account the original intent of the United States Congress. By Act of October 1, 1890, the Weather Bureau was set up as a civilian agency under the Department of Agriculture. The import of this Act, effective July 1, 1891, specified in addition to other precepts, "...the taking of such meteorological observations as may be necessary to establish and record climatic conditions in the United States". Since the funds appropriated were too meager to finance adequately the scope of the Act, the Weather Bureau was obligated from its inception to promulgate and enlarge the former system of cooperative observing stations. Such a network of stations was instituted by the Smithsonian Institution about the middle of the 19th Century and transferred to the Signal Corps of the Army in the early part of the year 1874.

The daily observations made by cooperative observers - first called voluntary observers, now climatological observers - were recorded principally on Form 1009. The growth of the cooperative-observing station system has more than tripled in the last 66 years. In 1891, the number of stations was about 1,800, while today the group exceeds 12,000. Instrumental equipment furnished by the Weather Bureau generally included a rain gage and for temperature stations an instrument shelter and maximum and minimum thermometers. In addition to instrumental observations of temperature and precipitation, observers recorded other weather features such as time of beginning and ending of precipitation, occurrences of destructive storms, hail, sleet, and other weather features of note.

While not universally realized by the general public, the collective action of cooperative observers in taking daily observations over many years has shaped the main structures and the present adequacy of the Climatology of the United States and its possessions. To substantiate this point we need cite only a few of the major climatological publications of the Weather Bureau: Bulletin Q, "Climatology of the United States", published in 1906; Bulletin W, 1st, 2d and 3d editions, and supplements to the 3d edition which have now been published. Also if we were to eliminate the cooperative stations from the meteorological sections of the "Atlas of America" published in 1920, and the 1941 Agriculture Yearbook, "Climate and Man", and the National Atlas Charts of the late 1950's and early 1960's these publications would be sadly lacking in climatological coverage.

Precluding the innovation of wholesale automation of weather gathering instruments, it appears that the cooperative observing system remains as the only means which the Weather Bureau can pursue to formulate an ideal census of the climatology of the United States and its possessions. This seems to be quite true, when we take into account the geographical extent of this country with its varied climate. This bulletin attempts to list changes in Form 1009 and instructions for its preparation. Observers did not always follow instructions or use the revised forms at the times specified.

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HISTORY OF CLIMATOLOGICAL RECORD FORMS 1009 AND 612-14

HISTORICAL DISCUSSION OF FORM 1009, 1891-1962

Descriptive Titles and Essential Station Data

The over-all departmental titles conformed to acts of Congress, in respect to time. "Department of Agriculture", from 1891 to 1941 and "Department of Commerce" 1942 to date.

The primary descriptive title of Form 1009, similarly was subject to only a few changes. "Voluntary Observer's Meteorological Record" from 1891 to 1905; "Cooperative Observer's Meteorological Record", 1906 to 1946; "Climatological Observer's Meteorological Record", 1947-48; and "Monthly Record of Climatological Observations", 1949 to date.

The specific subtitles, generally increased with years. The designations, such as "station_____", "county_____", "state_____", "month_____and year_____", have by necessity remained uniform, 1891 to the present time. "Time used" or "Meridian of Time" first appeared in the 1897 "Instructions to Voluntary Observers"; however, examination of early records show this important item to have been allowed for, at the bottom of the summary section as early as February 1893 - most probably an afterthought to the 1892 instructions, and it was finally incorporated officially in the 1897 instructions. The "Hour of observation_____" was not specifically provided for until 1911, and in 1941 this item was broken down to provide for situations when times of temperature and precipitation observations were not identical.

The precise location of each station in terms of latitude and longitude was first illustrated in the 1897 instructions, but its wide-scale use did not take place until about three years later. In 1947 space was provided to record the station location to degrees and minutes of latitude and longitude; two years later (1949) these specifications were eliminated from the form.

"Elevation_____" was first provided for in 1942, and in 1947 was eliminated from the body of the form.

Daily Observation Portion of Form 1009

From 1891 through 1948 the general character of the form allotted to daily record of observations remained fairly stable. In 1949 a number of changes were made which greatly reduced specific recordings on the observer's part. A short detailed description follows on the major divisions of the observational body of Form 1009, and changes introduced, and eliminations made.

Temperature

Daily Extremes. - The recording of daily maximum and minimum temperatures has remained constant through the prolonged use of this form.

For a period of three years 1891-93 and in some cases as late as 1895, certain printed editions of Form 1009 contained provisions for daily readings of current temperature at 7 A. M., 2 P. M., and 9 P. M.

Range. - Difference between the daily maximum and minimum readings first appeared in the 1897 instructions, eliminated in the 1901 instructions, reinstated in the 1915 instructions, and again dropped in the 1941 instructions. Actual examination of observational forms shows this item appears as early as February 1893, continued through December 1900, resumed again in June 1917, and terminated again after December 1941.

Mean. - Value midway between the daily maximum and minimum readings was first provided for in the instruction of 1899 and continued until the issuance of 1915 instructions after which it was never again provided for in the body of the table. Examination of actual observational records shows this item was in a part of the form after February 1893 and was eliminated with February 1917 records.

Set Maximum. - The reading of the maximum thermometer representing the current temperature first appears in the 1901 instructions and continues to the present time; and in this instance, actual observational practice conformed to instructions.

Precipitation

In general, that portion of Form 1009, set aside for recording daily amounts and description of precipitation remained remarkably constant from 1891 up to the middle of 1947. In June of 1947, certain changes were introduced to minimize writing on the part of the observers.

Occurrence of Precipitation. - The space allotted to daily entries of beginnings and endings of precipitation remained unchanged from 1891 to June 1947; then through December 1948 rearrangement permitted more space for this item to eliminate congestion. Effective with January 1949 a 24-hour space arrangement was introduced to record the times of occurrence of precipitation.

Daily Amounts. - This item has remained practically unchanged since 1891; however, units of measurement (inches and hundreds) was not printed on the forms until 1940.

Snowfall. - Amounts of snowfall, in unmelted state, appeared as early as February 1893, and continued up to the present time. In January 1949, the form and instructions were modified to include hail and sleet, as well as snow.

Depth of Snow. - Depth of snow on the ground, first appeared in the 1897 instruction, and in practice appears to have been generally recorded on the forms beginning about February 1897. Beginning with January 1949, the amount of hail and sleet on the ground was grouped and recorded in the Snowfall Depth Column.

Summary Data

During the period 1891-1948 Form 1009 contained, on the right-hand side, a summary of derived values, certain extremes and dates, and selected group data by fixed class intervals. Beginning with 1949, this feature of the form was eliminated. A brief breakdown of the summary section of Form 1009 prior to 1949 follows:

Temperature. - The monthly mean temperature was derived by averaging the monthly mean maximum and minimum temperatures. Also from 1892 to some time after 1897 one printing of Form 1009 contained the mean temperature as the average of observation 7 A. M., 2 P. M., and twice the 9 P. M. observations. Other summary data, computed over the 1891-1948 period, were the monthly mean maximum and minimum temperatures; maximum and date, and minimum and date.

The greatest daily range, difference between highest daily maximum and lowest minimum temperatures was recorded for the period 1901-1940.

The number of days with maximum temperatures 90° or above, and 32° or below; and with minimum temperatures 32° or below and 0° or below, were recorded from 1941 to 1948 inclusive.

Precipitation. - Monthly precipitation totals, greatest amount in 24-hours and date; and monthly snowfall totals were regularly recorded during the 58-year period 1891-1948.

Number of days with 0.01 inch or more were recorded through 1948, and the number with 0.25 and 1.00 inch or more for the period 1941-48.

The depth of snow on the ground on the 15th and the last day of the month were recorded from 1891 through 1940. The greatest depth on the ground was recorded for only a two-year period 1947-48.

Killing Frost. - The dates of light and killing frost were recorded in the early years, 1891-1898. From 1899 through 1948 only killing frost data were recorded. In 1949 this item was eliminated from Form 1009.

Thunderstorms. - Dates of thunderstorms were recorded from 1891 through 1948, and eliminated thereafter.

Hail. - Occurrences of hail, by dates, were recorded 1891-1948; for the period 1926-34, this was broken down into three classes - light, moderate, and heavy.

Sleet. - Dates of occurrences were noted from 1891 through 1948.

Auroras. - This phenomenon was noted by dates beginning in 1891 and eliminated from the body of Form 1009 with the year 1941.

Fog. - Provisions for recording instances of fog were not incorporated into the body of the form until June 1932. From this date through 1940, fog was recorded only as "Light" or "Dense". During the period 1941-1946 the term "Light" was used for visibilities 5/8 mile or more, and "Dense", visibility, 1/5 mile or less. For 1947-48 fog was recorded to 3 intensities - "Light" (visibility 3300 feet or more); "Moderate" (visibility 1650 to 3299 feet) and "Heavy" (visibility less than 1650 feet). Effective January 1949, observers were required only to indicate the occurrence of fog, with no limits indicated on the form.

High Winds. - Space for recording of high winds was first incorporated in the 1941 instructions, and has continued to date.

Glaze. - Date of the occurrences of glaze (freezing rain) first appeared in the 1941 instructions and has continued to be a recorded item down to the present time.

Prevailing Wind Direction. - While this item never appears in illustrations contained in the several issues of instructions, early editions of forms in use in most cases recorded the monthly prevailing wind direction for the period 1892-1899.

Depth of Frozen Ground at End of Month. - This item first appeared in the 1941 instructions, and continued through 1946.

Greatest Depth of Frozen Ground This Month and Date. - This particular information was only carried for two years, 1947 and 1948.

Number of Days Clear, Partly Cloudy, and Cloudy. - These were recorded from 1892 through 1948. Beginning with 1949, these classifications were eliminated from the form.

U. S. WEATHER BUREAU PUBLICATIONS RELATING TO THE PREPARATION OF FORM 1009

1892 Instructions for Volunteer Observers, Circular B-C 1st Edition, Revised.

1892 Directions for Use of Maximum and Minimum Thermometers, Circular B, 1st Edition.

1892 Instructions for Use of Rain Gauges, Circular C, 1st Edition.

1895 Instructions for Use of Maximum and Minimum Thermometers, Circular B, 1st Edition, Revised.

1895 Instructions for the Use of the Rain Gauge, Circular C, 1st Edition, Revised.

1897 Instructions for Volunteer Observers, Circular B-C, 1st Edition, Revised.

1899 Instructions for Volunteer Observers, Circular B-C, 1st Edition, Revised.

1901 Instructions for Volunteer Observers, Circular B-C, 2d Edition.

1906 Instructions for Cooperative Observers, Circular B-C, 3d Edition.

1911 Instructions for Cooperative Observers, Circular B-C, 4th Edition.

1913 Instructions for the Use of Thermographs, Supplement to Circular B-C, 4th Edition.

1915 Instructions for Cooperative Observers, Circular B-C, 5th Edition.

1915 Instructions for the Installation and Operation of Class "A" Evaporation Stations, Circular L, 1st Edition.

Date Unknown Additional Instructions for the Conduct of Evaporation Stations, Appendix 1 to Circular L, 1st Edition.

1919 Instructions for Cooperative Observers, Circular B-C, 6th Edition.

1919 Instructions for the Installation and Operation of Class "A" Evaporation Stations, Circular L, 2d Edition.

1924 Instructions for Cooperative Observers, Circular B-C, 7th Edition.

1935 Instructions for Cooperative Observers, Circular B-C, 8th Edition. (Not printed until 1938)

1941 Instructions for Cooperative Observers, Circular B-C, 9th Edition.

Date Unknown Instructions for the Installation and Operation of Weather Bureau Class "A" Evaporation Stations (Mimeographed) a partial revision of Instructions for the Installation and Operation of Class "A" Evaporation Stations, Circular L, 2d Edition.

1948 Instructions for the Installation and Operation of Weather Bureau Class "A" Evaporation Stations, Circular L, Revised (Mimeographed).

1950 Instructions for the Installation and Operation of Weather Bureau Class "A" Evaporation Stations, Circular L, Revised (Mimeographed).

1952 Instructions for Climatological Observers, Circular B, 10th Edition.

1955 Instructions for Climatological Observers, Circular B, 10th Edition, Revised.

1962 Instructions for Climatological Observers, Circular B, 11th Edition.

REVIEW OF INSTRUCTIONS ISSUED TO COOPERATIVE OBSERVER

Atmospheric Phenomena

In addition to instrumental weather measurements - temperature and rainfall - observers were requested to observe and report on other atmospheric phenomena such as tornadoes, waterspouts, strong winds, various forms of precipitation, fog, haze, frost, etc. Observations of these phenomena constitute an important part of the record from a climatological station, since they are systematically observed, recorded according to prescribed criteria, and quite frequently are the only written account of meteorological phenomena in a large area. Standards set forth in the various circulars of instructions to observers varied over the years, consequently, a resumé of changes by categories is given below.

State of the Weather - The 1892 instructions on this subject, quoted,

> The weather is recorded clear when the sky is 3/10 or less obscured; fair, when the sky is from 4/10 to 7/10 obscured; cloudy, when the sky is more than 7/10 obscured; light rain (lt. r.), when there is light rain; heavy rain (hy. r.), when there is heavy rain; in like manner with light and heavy snow, substituting s for r; fog, haze, smoke, according as these are predominant.

Instructions (1892 edition) were quite extensive, and evidently were intended to guide observers using Form 1008 as well as Form 1009.

Character of Day - "State of the Weather" was changed to "Character of Day" beginning with 1897 instructions and this subtitle continued through the 1941 Circular of instructions to cooperative observers. Also, during the same period instructions under the above-mentioned subtitle consisted of two paragraphs. For the purpose of noting changes in instruction during the period 1897-1941, the paragraphs will be designated A and B and discussed in the same sequence.

Paragraph A, 1897 Circular B-C 1st Edition

> The general character of the day should be recorded as "clear" when 3/10 or less obscured; "partly cloudy" when 4/10 to 7/10 obscured; and "cloudy" when more than 7/10 obscured.

No change was made in instruction issued in the years 1899, 1901, 1906, and 1911.

Paragraph A, 1915 Circular B-C, 5th Edition

> The general character of the day from sunrise to sunset should be recorded as "clear" when the sky averages 3/10 or less obscured; "partly cloudy" when from 4/10 to 7/10 obscured; and "cloudy" when more than 7/10 obscured. The average cloudiness from sunrise to

sunset may be estimated with considerable accuracy by noting the degree of cloudiness on the scale given, as near sunrise as possible, between noon and 1 p.m., and near sunset; add these and divide the sum by 3; the quotient will be considered the average cloudiness.

No change was made in paragraph A, in instructions issued in 1919, 1924, 1935, and 1941.

Paragraph B, 1897 Circular B-C 1st Edition

When light fog, light haze, or light smoke has prevailed during the greater part of the day, its character should be recorded as "clear", but when dense fog, dense haze, or dense smoke has prevailed, the character of the day should be recorded as "foggy", "hazy", or "smoky", as the case may be. When these latter conditions prevail, it is recommended that observers note in the column headed "miscellaneous phenomena", the duration of the same, i.e., "dense fog from early morning till 3 p.m.", etc.

No change was made in paragraph B in 1899, 1901, and 1906.

Paragraph B, 1911 Circular B-C, 4th Edition

When light fog, light haze, or light smoke has prevailed during the greater part of the day, with three-tenths or less of clouds, its character should be recorded as "clear", but when dense fog, dense haze, or dense smoke has prevailed, the day should be recorded as "foggy", "hazy", or "smoky", as the case may be. When the last-named conditions prevail, it is recommended that observers note in the column headed "miscellaneous phenomena" the duration of same, e.g., "dense fog from early morning till 3 p.m." etc.

No change was made in paragraph B in the following years, namely, 1915, 1919, 1924, 1935, and 1941.

Circular B, 1952 and 1955 issues, omitted instructions on the "Character of Day", since this item was deleted from Form 1009 effective with the 1948 edition.

Frost - The 1892 instructions consisted of a single paragraph, as follows:

The occurrence of first and last frost of any growing season should be specially noted, as well as all killing frosts during the same.

The 1897 instructions consisted of two paragraphs, the first identical to 1892, and the second as cited below set forth definite comparative classifications.

The terms descriptive of frost will be as follows:

Light, to indicate a frost that has no destructive effect, although tender plants and vines in exposed places may be injured. Heavy, to indicate a frost that in itself is more severe than a light frost; that is, the deposit of frost is heavier and the temperature falls to a lower point, although the staple products of the locality may not have been generally destroyed. Killing, to indicate a frost that is generally destructive of vegetation and the staple products

of the locality. The distinction between the terms "Heavy" and "Killing" is one that has reference more to the effect of the frost than to its severity. Two frosts may be equally severe so far as the fall of temperature is concerned, yet no damage may be done by one while the other may be very destructive. The one that is not generally destructive will be called "Heavy"; the destructive frost, "Killing".

Instructions issued in 1899, 1901, and 1906 were the same as 1897. In 1911 a slight change was made in the opening paragraph of frost instructions to eliminate redundance.

> Occurrence of first and last frost of any growing season should be specially noted. [Reference to killing frosts was deleted,]

The 1915 frost instructions were as follows:

> Occurrence of first and last frost of the growing season should be noted. The terms descriptive of frost will be as follows:
> Light, to indicate a frost that has no destructive effect, although tender plants and vines in exposed places may be injured. Heavy, to indicate a frost that in itself is severer than light frost - that is, the deposit of frost is heavier and the temperature falls to a lower point, although the staple products of the locality may not have been generally destroyed. Killing, to indicate a frost that is generally destructive of vegetation and the staple products of the locality.

Instructions issued in 1919, 1924, 1935, and 1941 were identical to the above.

In 1952, 1955, and 1962 issues of Circular B, the criteria were radically different from previous instructions. The extent of departure is evident from the definitions cited below.

> Frost (Hoarfrost) - A deposit of thin ice crystal in the form of scales, needles, feathers, or fans in crystalline form on objects whose temperature is 32° or lower. Frost can occur at the ground when the air temperature is several degrees above freezing at the level of the instrument shelter.
>
> Light Frost - Surface objects, vegetation, etc., covered with a thin deposit of frost, which may be more or less patchy.
>
> Heavy Frost - Surface objects, vegetation, etc., covered with a copious deposit of frost.

About 1949 the Bureau began internally to de-emphasize frost and introduce a related concept, namely "Freeze". It was first introduced to cooperative observers in the 1952 Circular B, and repeated in the 1955 and 1962 editions, as follows:

> Freeze - The condition of the lower atmosphere when the temperature of surface objects is 32° or lower. A freeze may or may not be accompanied by an actual deposit of frost. When vegetation is injured by a relatively low temperature (with or without frost) the condition is termed a freeze. During a freeze, the air at the level of the instruments in the shelter may be above 32°, although the temperature at the ground is 32° or lower. This condition most frequently occurs during calm, clear nights, with the greatest temperature difference occurring near, or soon after, sunrise.

Light Freeze - Little destructive effect on vegetation, except on tender plants and vines; often accompanied by temperatures 32° or higher at the thermometer level in the instrument shelter.

Killing Freeze - Widely destructive effects on staple vegetation, with temperatures usually below 32° at the thermometer level in the instrument shelter.

Hard Freeze - Staple vegetation destroyed; the ground surface frozen solid underfoot; heavy ice on puddles and on other exposed water surfaces.

Thunderstorms - The 1892 instruction on this subject is as follows:

Thunderstorms six hours apart may be considered as separate storms.

Upon the occurrence of thunder, give as nearly as possible the times of first and loudest thunder and duration of thunder (being careful to note a.m. or p.m. if the hours 0 to 24 are not used).

Give the direction from which the storm appears to be coming, as shown by threatening sky, lightning flashes, or thunder peals. Also, the direction toward which it goes.

Instructions to cooperative observers in succeeding years through 1941 conformed exactly with the 1892 criteria, except two minor changes were made in the second paragraph effective with the 1915 Circular B-C, 5th edition. The 0 to 24-hour clock method of recording times was deleted and a minor change was made in the second paragraph. Rewritten as follows:

Upon the occurrence of thunder, give as nearly as possible the times of first and loudest thunder and its duration, being careful to note if a.m. or p.m.

Instructions issued in 1952 and 1955 Circulars were identical, but sufficiently different from previous instructions to require citation.

Definition - For record purposes a thunderstorm is regarded as in progress at the station when thunder is heard irrespective of whether lightning is seen. The intensity of a thunderstorm may vary from occasional peals of thunder, with or without rain, to very frequent, even almost continuous, sharp and pronounced thunder and lightning, with strong winds and heavy rain; sometimes accompanied by hail.

Observing and Recording - Record the time of occurrence, the direction and distance from the station, and the direction toward which the storm moved. Any damage from hail, flooding, and lightning should also be recorded. For example, "Thunderstorm with heavy rain and frequent lightning, scattered damage to buildings and livestock from lightning, and to crops from flooding of lowlands".

Tornadoes and Sand Spouts - Instructions in Circular B-C, 1892 edition were as follows:

> All meteorological circumstances attending these should be minutely noted, viz: the course of the barometer, which almost always sinks much and rapidly; that of the thermometer, which usually indicates an elevation of temperature; the region of the heavens in which the thunderstorm frequently accompanying them is formed; the form and color of the clouds; the direction and intensity of the wind; the frequency, intensity, and form of the lightning; finally, the apparent shape of the sand spout, its variations, and its effect upon the trees and upon the ground, the occurrence of hail, etc.

Tornadoes - In the 1897 edition, the term "Sand Spouts" was dropped and instructions changed and reduced to the following:

> All the meteorological circumstances attending these should be minutely noted, viz., the form and color of the clouds; the direction and intensity of the wind; the frequency, intensity, and form of the lightning; the occurrence of hail, destructive effects, etc.

The above instructions were repeated in subsequent issues of Circular B-C through 1941, except in the latter year the following was inserted, "direction of movement and width of path".

Discussion and instructions issued in 1952 were as follows:

> Description - These local storms (Tornadoes and Waterspouts) occur when meteorological conditions are favorable for intense thunderstorm activity. The distinguishing feature is the dark, whirling, funnel-shaped cloud (illustrated in Circular) with its violent and destructive winds. The storm is called a tornado when it occurs over land and a waterspout when it occurs over water.
>
> Reporting by telephone - When a tornado is observed in progress, the section center or a designated Weather Bureau Office should be advised immediately by telephone collect, giving the following information:
>
> (1) Distance and direction from your station.
> (2) Direction toward which it is traveling.
> (3) Time observed.
>
> Observing and Recording - Record the time of occurrence, the direction and length of path, width of path, destruction from wind and hail, injuries, deaths, and other relevant circumstances.

Instructions issued in 1955 were a reprint of the 1952 instruction, except in telephone reporting, the "Section Center" was omitted as a contact, necessarily so, since this designation was dropped in July 1954.

Auroras - Instructions on this subject in the 1892 edition of Circular B-C were very extensive, very demanding upon the observers, and in general beyond cooperative observers' capabilities. Perhaps a few observers, possessing professional attainments and probably using Form 1008, followed instructions and made out meticulous reports. Most likely, this over-emphasis was later realized since in the 1897 edition of

Circular B-C, aurora observing instructions had been reduced approximately 85 percent and are cited below.

> The date, hour, and minute of the beginning and ending of auroras should be carefully noted, as well as the azimuth and altitude of each extremity and of the crown of any arch of light, and the same data for any corona or glory that may be formed.
>
> When the observer is familiar with the names of the principal fixed stars, he may locate the arch or crown by reference to them, but it is preferable that he should observe directly the altitude and azimuth.
>
> Observers should be particular as to the date of the aurora; and when it begins in the evening of one day and continues into the early morning of the next day, it will be entered as occurring on the first day, but its details will be given in the record as occurring between the hours of its actual beginning and ending. Thus, an aurora that began on the evening of the 12th of January and continued until the early morning of the 13th would be entered as the aurora of the 12th, but its detail would be recorded as occurring, for instance, between the hours of 10 p.m. of January 12 and 2 a.m. of January 13.

The several subsequent editions of Circular B-C through 1941 were identical to the 1897 version except in 1911 instruction, the first paragraph was modified as follows:

> The date, hour and minute of the beginning and ending of auroras should be carefully noted, as well as the azimuth of the base and the altitude of the extremity, and the crown of any arch of light.

Discussion relative to auroras in the 1952 and 1955 Circular B, were identical and confined to the following one paragraph.

> A luminous glow frequently called northern lights or aurora borealis in the Northern Hemisphere. It is usually seen in the northern portion of the sky, but in high latitudes it may also be seen overhead, or even to the southward of the zenith. It may appear in such forms as arcs, bands, rays, curtains, and coronas. It is usually of whitish color, but may have various other colors. The lower edges of the arcs and curtains of the aurora are usually fairly well defined, while the upper edges are ill-defined.

Halo, Solar or Lunar - Instructions in Circular B-C, 1892 edition consisted of the following paragraph.

> Halos are large circles of 45° or 90° in diameter. That is, the diameter is equal to one-eighth or one-fourth the circumference of the horizon. Both are seldom seen at the same time. The colors are very feeble, generally approaching whiteness. Halos arise from the presence in the atmosphere of minute prisms of ice, and are due to refraction of light. Sometimes the halo is intensified into two bright spots, one on each side of the luminary. These are called "parhelia" or "paraselenae" (mock suns or mock moons), sometimes sun-dogs. Still more complicated optical phenomena are sometimes seen, though rarely, except in high latitudes.

The 1897 instructions to observers were identical to 1892, however, two years later (1899) the first four sentences in the above paragraph were dropped and the following two sentences substituted:

> Halos are large circles of 45° and 90° in diameter; that is the diameter is equal to one-eighth or one-fourth the circumference of the horizon. The colors are very feeble; the red is the inside color.

Subsequent editions of Circular B-C through 1941, halo instructions were identical to the 1899 version.

Discussion of the above subject in Circular B, 1952 edition is given below and was substantially the same in the 1955 issue of Circular B.

> A colored or whitish ring or arc about sun or moon, commonly of 22° radius. When colored it is red on the inside. The sky is darker inside the ring than outside. Halos are formed by refraction of the light as it passes through ice crystals. Other halo phenomena include the 46° ring, parhelia, and tangent.

Corona, Solar or Lunar - The 1892 instructions on this subject were as follows:

> These must be distinguished from halos. Coronas are very common, especially around the moon, and are produced by the rays passing through a thin layer of cloud. Sometimes as many as three small concentric circles may be seen whose diameters are in the ratio of 1:2:3. They are frequently colored, red being the outside color. These colors are not the pure colors of the spectrum, but rather those of the opal, and are caused by interference and not refraction. A solar corona is not often visible on account of the dazzling brightness of the sun, but it may often be seen by viewing the sun through colored glass, or noticing its reflection in water.

The above paragraph was reproduced in succeeding issues of Circular B-C, except for two minor changes. In the 1915 edition the second sentence was changed to read, "Coronas are small circles, very commonly seen around the moon, due to rays of light passing through a thin layer of cloud." In the 1941 edition, the same sentence was changed to read, "Coronas are broad bands of light, very commonly seen around moon, due to rays of light passing through a thin layer of cloud."

The discussion of coronas contained in the 1952 Circular B, repeated in the 1955 edition is stated below.

> A rainbow-colored ring surrounding the sun or moon and formed by diffraction of light by water droplets. It may vary greatly in size, but it is usually smaller than a halo. All spectral colors may be visible, with red on the outside, but frequently the inner colors are not visible.

General Phenomena of Climate - On this subject the instructions in the 1892 edition of Circular B-C are reproduced in figure 1.

Instructions in the 1897 edition were identical to 1892, except the 8th through 13th and last items and the storm table were omitted. Instructions issued in 1899 and 1901 were a repetition of printed matter contained in the 1897 edition. Circular B-C 1906

Information of a general character relating to the growth of plants will be of value in compiling the climatology of a district.

It is suggested that where voluntary observers can do so the following be included in their records :

Time of plowing in the spring.

Time of planting various crops.

Time of appearance of same above ground.

Time of flowering of strawberries, currants, raspberries, apples, plums, and other fruit.

Time of commencement of haying.

Time of commencement of harvesting the various cereals.

Time of ripening of various fruits.

Time of first killing frost in fall.

Time of last killing frost in spring.

Time of sowing fall wheat.

Time of appearance of earliest shoots of same above ground.

Time of last snow on ground.

The depth of snow on ground on the last day of each winter month.

The time of migration of wild fowl and birds, the flights north and south.

The time of leafing and fall of leaves in deciduous forests.

The date of breaking up of ice in large rivers and bays.

The date of greatest rise and lowest water in important streams.

Voluntary observers are requested to include in their monthly reports all reliable information relative to the destruction of life and property coming to their knowledge, due to storms, classifying it, as far as possible, as indicated in the following table :

Date of storms.	Nature of storms (tornado, northeast gale, etc.).	Section of country traversed by storm.	Number and names of persons killed.	Number and names of persons injured.	Number and names of vessels lost or damaged, with estimated amount of loss.	Number of houses, barns, and other buildings destroyed or damaged, with estimated amount of loss.	Estimated amount of damage to property.	Number of animals killed, and estimated value.

66

FIGURE 1

General Phenomena of Climate
and
Early Monthly Storm Table
(From Instructions for
Voluntary Observers
Circular B-C, 1892)

edition also repeated instructions contained in the 1897 edition except the item "The date of greatest rise and lowest water in important streams", was omitted and a paragraph added, namely, "Suitable forms for recording the foregoing data may be had upon application."

Presumably, the previously issued extended instructions directed toward collecting phenological and sundry data met with little success. This is evident from the fact that instructions issued in 1911 consisted of one sentence, viz., "Information of a general character relating to the growth of plants will be of value in determining the climatology of a district."

The foregoing limited instructions continued through the 1941 edition of Circular B-C, and the 1952 and 1955 editions of Circular B make no reference to the collection of phenological data.

Instrument Shelter - In the early years instrument shelters varied somewhat in construction and size, however, they contained the essential characteristics such as louvered sides and double roofs, in both slant and hip types. About the turn of the century, the pattern of construction approached quite closely present-day standards and the small modifications introduced in the last fifty years or so presumably did not significantly influence temperature measurements.

Considerable latitude was permitted in locating shelters as late as 1905. The 1892 instructions requested the observers to mount the shelter on a firm post at least 10 feet above the ground; roof exposures were allowed, elevation of shelter at 8 feet with certain minimum roof-space requirements, and in cases where observers encountered difficulty conforming to the foregoing conditions a window or wall type of shelter exposure was permitted. By 1897 the window-type of exposure was rapidly declining since instructions of that year and following years never made mention of this type. In 1897 instructions reduced the elevation of the shelter above the ground to not less than 4 feet and as time passed elevation of the bottom of the shelter was firmly fixed at 4 feet above the ground. Instructions for Cooperative Observers for the years 1901, 1906, and 1911 made no specific recommendation in respect to elevation above ground of the instrument shelter; presumably detailed instructions were issued by the Section Director at the time of shipment of equipment to new observers. About 1920 the Bureau began supplying new observers with the necessary four shelter supports and cross-members, thereby relieving new observers of this obligation and surely this action brought about better uniformity in the height of the shelter above ground throughout the service.

While instructions to observers as late as 1935, mention the permissibility of attaching the instrument shelter to the north wall of some substantial building, it is believed that the number of such installations shortly after 1900 were comparatively infrequent. Roof installations are discussed in instructions as late as 1941, and constituted a very small portion of the total installations.

Thermometers - Observers were furnished with self-registering maximum and minimum thermometers, mounted on a pine board to be placed on a cross-member within the instrument shelter. Many observers between 1891 and 1900 were not equipped with self-registering instruments and instead used an exposed thermometer and accordingly modified the first three columns on Form 1009 (providing for maximum, minimum, and range of temperature) to indicate the hours at which observations were made. By 1906, the Townsend support was gradually being introduced into the cooperative observing system and following July 1913 contracts let for maximum thermometers were solely for the new pattern requiring the Townsend support and consequently the "old style" supports were rapidly replaced.

Rain Gage - From 1891 to sometime in the middle 90s, many cooperative observers were not using the standard precipitation-gage equipment. The receiver of this non-standard gage had an inside diameter of 8 inches, and the inside tube of 2.53 inches, identical with the standard equipment. However, the overflow can was less than 8 inches in diameter, (apparently 6 inches) thus requiring the use of the receiver throughout the year. This irregularity probably affected the reliability of snow measurements especially in regions of heavy snowfall. Beginning with 1895, Circular C, Instructions for Use of the Rain Gage, discussed only the standard 8-inch non-recording gage, and one must presume that non-standard receivers and overflow cans were replaced. A picture and description of this gage may be found in the first edition of Circular B-C, Revised 1892, Instructions for Voluntary Observers.

From 1891 to 1900 approximately, the ground placement of the box-like rain gage support was subject to considerable instability. Observers were directed to place the support on level ground and fill in the lower portion of the interior with ballast such as bricks or stones to fix its position and pile rocks around the outside to give additional security. The 1901 instructions requested observers to place the support on level ground and secure its position by driving down four stakes alongside. Since 1901 this practice continued in effect, except instructions issued in 1941 suggested that the bottom of the box should be separated from the ground sufficiently to prevent decaying of the wood. The 1952 and subsequent instructions fixed the distance between the ground and the bottom of the support at 4 to 6 inches.

In the case of roof rain-gage exposure, the Bureau about 1897-98 began supplying observers with three iron braces for anchoring the rain gage support and prior to this time the manner of securing the support was left to the discretion of each observer.

A few rain gages used by cooperative observers are shielded. The shields were developed following experiments between 1910 and 1912 by J. Cecil Alter then of the Salt Lake City Weather Bureau Office. Shields originally were made of cloth or wood and help to minimize precipitation loss by deflecting the wind downward. The currently accepted shield has 30 metal tapered stiffened leaves, 16 inches long and uniformly spaced around a rigid horizontal ring. The tops of the leaves are one-half inch higher than the level of the gage opening.

FORM 5201 - MACHINE-PREPARED VERSION OF FORM 1009

Form 5201, an IBM prepared version of Form 1009 was prepared from 1009 punch cards for all continental stations beginning with July or August 1948. These forms, quadruplet prepared, were distributed to the Central Office, Section Centers (the local Weather Bureau Office concerned with cooperative observers), Cooperative Observers, and one copy retained at the WRPCs. Forms 5201 fulfilled a very useful purpose during the period that the Weekly 1009s were in use by providing a collective monthly summary; also they made available to the Central Office and Section Centers 1009 data at an early date.

Increased processing efficiency at the WRPCs coupled with stepped up printing operations gradually reduced the active use of Forms 5201 to a relatively short period prior to the distribution of published climatic data. Consequently, preparation of the forms was terminated in the eastern States with the August 1951 data, and in the central and western States prior to January 1952.

Various memoranda issued relating to Forms 5201 are as follows:

Climatological Operations Memorandum
No. 24, April 22, 1949
No. 28, October 14, 1949
No. 40, December 27, 1950

Climatological Service Memorandum
No. 11, March 28, 1950
No. 19, March 7, 1951
No. 20, May 21, 1951
No. 22, August 6, 1951
No. 27, April 9, 1952

WEEKLY EDITION OF FORM 1009

A weekly edition of Form 1009, numbered 1009-48 was introduced on a pilot-project basis in three States during 1947. Considerable resistance to use of this form on the part of observers combined with certain processing problems prompted the Bureau in January 1950 to abandon the weekly 1009s, leaving the termination date up to each Section Director, with the reservation that the termination date be not later than January 1, 1951.

Listed below are the States, remarks relative to coverage, and period of time Form 1009-48 was in use by cooperative observers.

Louisiana: Most stations began use of the weekly form during the last half of August 1947. By July 1, 1949, the use of this form had decreased to about 30 percent of the reporting stations and most of these continued until the termination date, March 31, 1950.

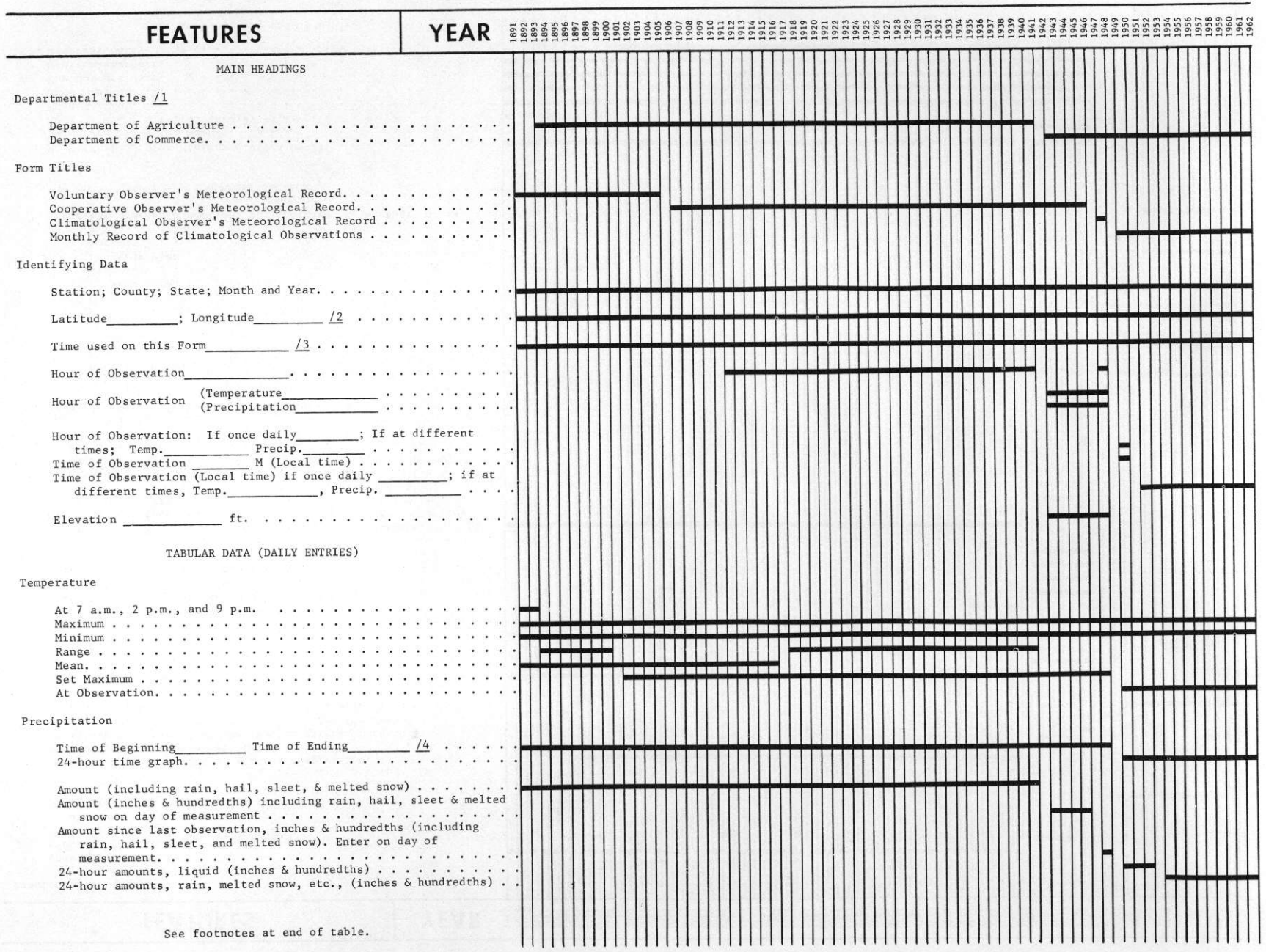
New Mexico: Approximately 300 stations cooperated in the weekly reporting Form 1009-48 program. About 60 percent of this number started in mid-July 1947 and others later. By July 1, 1949 the number of participating stations had dropped back to the 60 percent level, diminished to 40 percent on March 31, 1950 and about 20 percent were still using the weekly form on the termination date, namely October 31, 1950.

Oklahoma: Use of the weekly reporting forms began in July and early August of 1947 and were discontinued on March 31, 1950. During this period, the use of these forms over the State was approximately 100 percent.

FORM 1009 PUNCH CARDS

Standard 80-column punch cards have been used as analytical and statistical tools in connection with Forms 1009 since 1946. Although card forms have been altered during the years, two series of cards have been used principally: one for daily observed data, and the other for monthly summary data. A mere description of the card forms and dates of revisions, however, does not adequately describe the contents of the card decks. This information may be found in Punch Card Reference Manuals No. 483 and 486. Punch card techniques have been used for quality control of climatological data, for production of copy for publication, and for a wide variety of summaries.

HISTORICAL SUMMARY OF FEATURES OF FORM 1009



See footnotes at end of table.

Figure 2 - Graphical Illustration of Change in Form 1009 by Years 1891-1962

HISTORICAL SUMMARY OF FEATURES OF FORM 1009

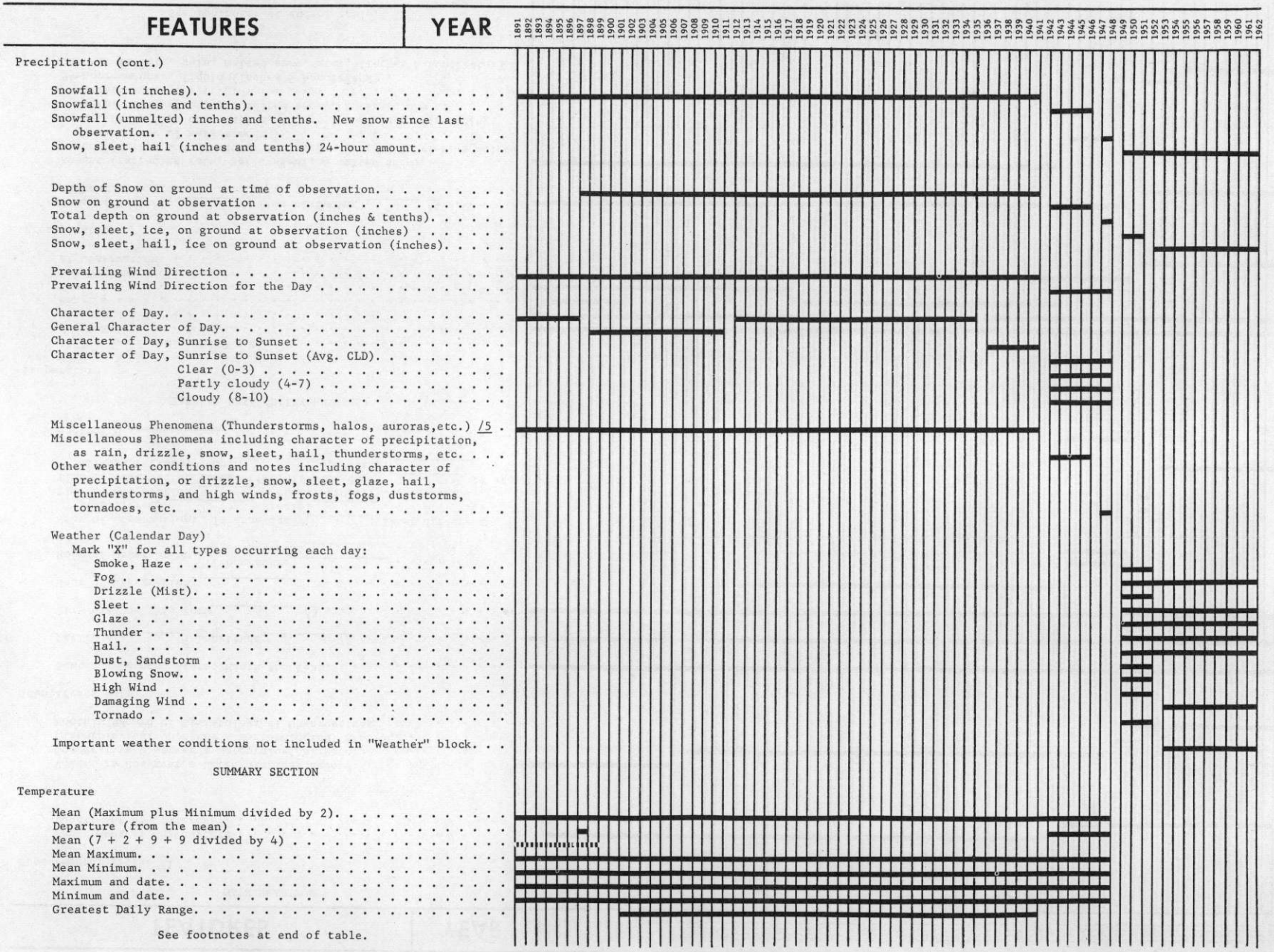
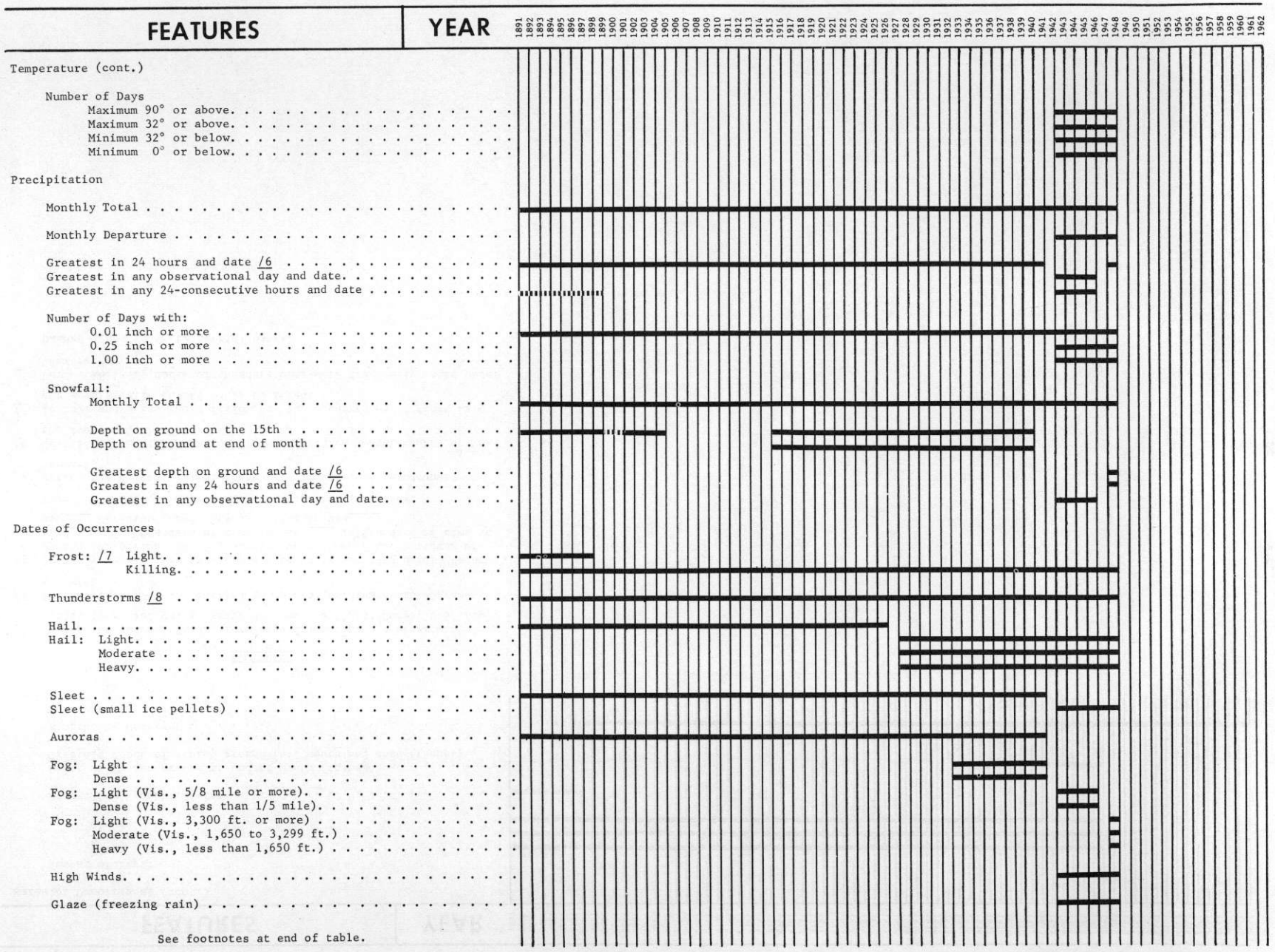


Figure 2 (cont.)

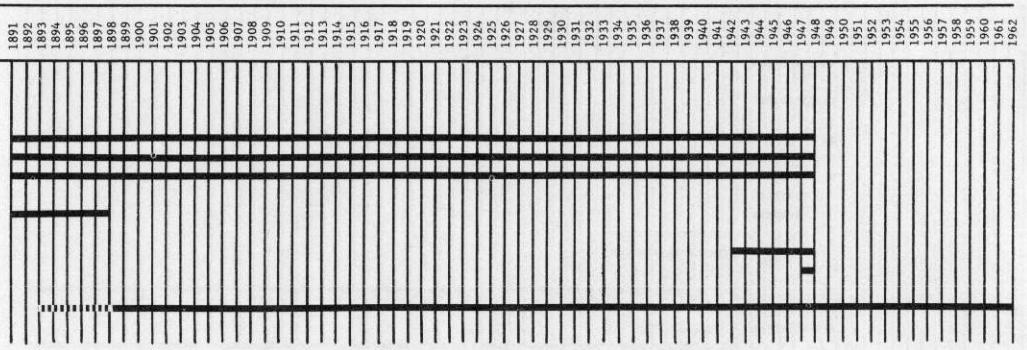
HISTORICAL SUMMARY OF FEATURES OF FORM 1009



See footnotes at end of table.

Figure 2 (cont.)

HISTORICAL SUMMARY OF FEATURES OF FORM 1009



FOOTNOTES

/1 During the years 1891-92, form used did not have a departmental title; form used was a carryover from the Signal Corps, U.S. Army.

/2 In the years 1947-48 modified to record coordinates to degrees and minutes.

/3 In early years, time in use was frequently recorded under "Remarks". During the period 1942-56, successively changed to "Meridian of time_____"; "Standard of time in use_____"; "Standard of time in use_____Meridian"; and "Standard time in use_____".

/4 Double heading was carried for the two years, 1947-48.

/5 During the period 1891-98 these data sometimes entered under "Remarks".

/6 Qualified, "Best available without splitting measurements" during the two years, 1947-48.

/7 In 1891 and a few years following, the occurrences of frost were not specifically qualified as to intensity.

/8 Period 1891-98, dates of thunderstorms were frequently noted under "Remarks".

Dashed lines indicate partial usage.

Figure 2 (cont.)

[FORM 1009, METE.]

UNITED STATES SIGNAL SERVICE.

MONTHLY METEOROLOGICAL RECORD, VOLUNTARY OBSERVERS,

Station, Shell Beach *County,* Vermillion ; *State,* Louisiana

Month of February , 1891.

W. Direction			TEMPERATURE.			PRECIPITATION.			
7. A. M.	2 P. M.	9. P. M.	~~Mean.~~	Maximum.	Minimum.	Time of Beginning.	Time of Ending.	Total Amount of Rain and melted Snow.	Average Depth of Snow in inches.
1 N.E.			20	76	56				
2 N.E.			19	75	56			.30	
3 N.			20	56	36			.10	
4 N.			15	52	37				
5 S.E.			19	65	46				
6 S.E.			14	70	56			.10	
7 S.E.			13	75	62				
8 S.E.			20	76	56				
9 S.E.			14	70	56				
10 ✓ N.E.			24	56	32				
11 N.E.			9	65	56			.18	
12 N.E.			16	76	60			1.60	
13 N.E.			11	65	55			.85	
14 ✓ N.E.			13	65	52			3.10	
15 S.W.			10	63	53				
16 S.W.			15	70	55				
17 S.			9	74	65				
18 S.W.			9	75	66				
19 ✓ S.E.			11	77	66				
20 N.E.			16	76	66			2.50	
21 N.			20	66	48				
22 N.			21	66	45				
23 S.			20	71	51				
24 S.			12	75	63				
25 N.			25	75	40				
26 N.W.			16	51	35				
27 S.E.			20	55	35				
28 S.			20	71	51				
29 NE									
30									
31									
				1407	1447			873	

Examined

[illegible] Jr.
Voluntary Observer.

Form 1009 - 1891

Form 1009 - 1891
(Reverse Side)

REMARKS.

E of R

[FORM NO. 1009, METL.]

UNITED STATES SIGNAL SERVICE.

MONTHLY

Meteorological Record, Voluntary Observers,

Station: Haldeman

Month of Feb 91

NOTES.

This form provides for observations of Temperature and Precipitation only.

These data are exceedingly important and the record should be made with extreme care.

Observations should never be omitted, if possible to make them.

The daily mean temperature is found by the formula 1/4 (7 + 2 + 9 + 9).

When it is not practicable to make tri-daily observations, good results may be obtained by taking two observations daily, selecting hours of the same name, viz: 7 a. m. and 7 p. m., or 8 a. m. and 8 p. m., preferably the latter. The mean daily temperature in such case is obtained by taking one-half of the sum of the two observations.

When maximum and minimum thermometers, only, are used the mean will be obtained by taking one-half of the sum of the readings of the two instruments.

Fractions of degrees should be recorded in tenths, thus: 72.1, &c.

The monthly means are determined by dividing the sums of the daily means by the number of days.

Under the heading "Precipitation" should be noted the time of beginning and ending of the fall of rain or snow, and the true depth in inches and hundredths expressed decimally; also the depth of snow, in inches. Rain to be indicated by R. and snow by S., thus: 1.20 R., .60 S. Ten inches of snow are equivalent to one inch of rain. When the amount of precipitation is too small to measure the fact should be indicated by the word "Trace" written in the space for that day and amount. Under the heading "Average depth of snow" should be entered the record of the average of several measurements (not less than three) where the snow lies well on the level.

If any observation is not taken write in the space the word "blank." The blank spaces on the form for name of observer, place of observation, month during which the observations were made, etc., should always be carefully filled up.

In forwarding this form to the office of the Chief Signal Officer write on left-hand corner of envelope Records Division.

A. W. GREELY,
Chief Signal Officer.

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MONTHLY SUMMARY.

Mean temperature, 59.8 RM

Maximum temperature, 77 *Date,* 19

Minimum temperature, 32 *Date,* 10

Total precipitation, including melted snow, 2.73

Number of days upon which 0.01, or more, of rain, or melted snow, fell, 8

Depth of snow, in inches, on the ground on 15th ——; *at end of month,* ——

Total snowfall, in inches, during the month, ——

Frost, dates of, ——

Thunder-storms, dates and time, ——

Hail, dates and time, ——

Auroras, dates and time, ——

Miscellaneous phenomena, ——

[Form 1009—Met'l.]

UNITED STATES WEATHER BUREAU.

Voluntary Observers' Meteorological Record, *Month of* July, 1892

Station, Maurepas ; *County,* Livingston ; *State* La

[redacted]				TEMPERATURE. Maximum.	Minimum.	PRECIPITATION. Time of Beginning.	Time of Ending.	Total Amount of Rain and melted Snow.	Average Depth of Snow in inches.
1	NW	NW	NW	89	70	12 m.		0.01	Thunder
2	NW	SE	SE	91	71				"
3	SE	SE	SE	90	70				
4	NW	NW	NW	90	71			Trace	"
5	SE	" "	" "	84	71	12 m.			"
6	NW	NW	NE	78	71	~~2:30 P~~	2:30 Pm	0.95	"
7	N.E	SE	NW	81	68	9:30	10:15 am	1.61	"
8	" "	NE	NW	78	69	2 Pm	6 Pm	0.46	"
9	" "	SE	SE	82	69	6 am		020	"
10	SE	" "	" "	81	68	7:55 am		013	"
11	" "	SW	SW	83	70	11:55 am		020	"
12	" "	SE	NW	86	70			0.01	
13	" "	" "	SE	✓ 89	68				
14	" "	NW	NW	90	72				
15	NW	SW	SW	88	75	showers		025	"
16	" "	" "	" "	83	73	"		025	"
17	SE	SE	SE	85	70	"		0.07	
18	" "	" "	" "	85	70	"		025	
19	NW	NW	NW	89	69				
20	" "	" "	" "	88	70				
21	NE	EE	SE	88	71	2 Pm	2:45 pm	0.70	"
22	SE	" "	" "	87	72	12:30 m		1.45	"
23	" "	NE	NW	91	71				
24	NW	NW	NW	✓ 92	74				
25	W	NW	SE	87	73	1 Pm	6 Pm	1.80	"
26	SE	SE	SE	78	70	2 "		0.45	"
27	" "	" "	" "	84	70	3 " "	6 am 5 Pm	0.10	"
28	" "	" "	" "	85	70	10 am	4 " "	1.05	"
29	NW	S	" "	89	70			0.01	"
30	W	NW	NW	90	70			Trace	"
31	NE	NW	NW	90	71	4 Pm	6 Pm	1.74	"
Sum,				2671	2187		~~2187~~	~~11.66~~	20
Mean,	SE			86.2	70.5		~~70 1/2~~	~~11.58~~ 11.68	

* If no rain or snow falls write the words "no precipitation" in this column.

MAR = 15.7 Robert Bedfield Voluntary Observer.

3—200

Form 1009 - 1892

[Form No. 1009—Met'l.]

UNITED STATES WEATHER BUREAU.

MONTHLY

Voluntary Observers' Meteorological Record,

Station: Mariposa ; *State:* La

Month of July , 1892.

NOTES.

This form provides for observations of Temperature and Precipitation only.

~~The data are exceedingly important and the record~~ should be made with extreme care.

Observations should never be omitted, if possible to make them.

The daily mean temperature from two observations is found by taking one-half of their sum.

When three daily observations are made, the daily mean temperature is determined by dividing the sum of the 7 A. M., 2, and twice the 9 P. M. readings, by 4. Example:

7 A. M.	50	50
2 P. M.	65	65
9 P. M.	60	120
		4)235
Mean		58.7

When maximum and minimum thermometers only are used, the mean will be obtained by dividing the sum of the readings of the two instruments by two, thus:

Maximum	80
Minimum	60
	2)140
Mean	70

Fractions of degrees should be recorded in tenths, thus: 72.1, etc.

The monthly means are determined by dividing the sums of the daily means by the number of days.

Under the heading "Precipitation" should be noted the time of beginning and ending of the fall of rain or snow, and the true depth in inches and hundredths expressed decimally; also the depth of snow, in inches. Rain to be indicated by R. and snow by S., thus: 1.20 R., .60 S. Ten inches of snow are equivalent to one inch of rain. When the amount of precipitation is too small to measure, the fact should be indicated by the word "Trace" written in the space for that day and amount. Under the heading "Average depth of snow" should be entered the record of the average of several measurements (not less than three) where the snow lies well on the level.

If any observation is not taken write in the space the word "blank." The blank spaces on the form for name of observer, place of observation, month during which the observations were made, etc., should always be carefully filled up.

In forwarding this form to the office of the Chief Signal Officer write on left-hand corner of envelope Records Division.

3—290

A. W. GREELY,
Chief Signal Officer.

REMARKS.

MONTHLY SUMMARY.

Mean temperature, 78.~~8~~ No Range = 24

Maximum temperature, 92 *Date,* 24

Minimum temperature, 68 *Date,* 7 10 1

Total precipitation, including melted snow, 11.68

Number of days upon which 0.01, or more, of rain, or melted snow, fell, 20

Depth of snow, in inches, on the ground on 15th, — *; at end of month,* —

Total snowfall, in inches, during the month, —

Frost, dates of, —

Thunder-storms, dates and time, 1 2 4 5 6 7 8 9 10 11 14 15 21 22 25 26 27 28 29 30 31

Hail, dates and time, —

Sleet, dates and time, —

Auroras, dates and time, —

Miscellaneous phenomena, —

Time used on this form, (†) Local

† Write local, eastern, central, mountain, or Pacific, as the case may be.

Form 1009 - 1892
(Reverse Side)

Form No. 1009—Met'l.

U. S. Department of Agriculture, Weather Bureau.

Voluntary Observers' Meteorological Record: Month of February, 1893,

Station, Poughkeepsie; County, Dutchess; State, New York.

DATE.	TEMPERATURE. 7 A. M.	2 P. M.	9 P. M.	Maximum.	Minimum.	Mean. †	Range.	PRECIPITATION. Time of beginning.	Time of ending.	Amount. *	Snowfall, in inches.	Prevailing wind direction.	Character of day.
1				28.1	11.8	19.95	16.3	night	- - - -		3	N	cloudy
2				31.7	23.7	27.70	8.0	- - - -	night	.62		N	"
3				41.1	21.2	31.15	19.9	night	2 p.m.	.17		N.W	"
4				32.8	0.9	16.85	31.9					N	clear
5				23.6	-2.3	10.65	25.9					N.W	"
6				39.0	-0.1	19.45	39.1	night	- - - -	.78	2	S.W	cloudy
7				44.1	20.2	32.15	23.9	- - -	night	.73		N.W	"
8				26.4	5.9	16.15	20.5					W	clear
9				36.9	6.0	18.45	24.9					S.E.	cloudy
10				47.0	26.7	36.85	20.3	8 p.m.	11 a.m.	.79		S.W.	partly cloudy
11				42.2	30.8	36.50	11.4					N.W.	cloudy
12				41.3	17.2	29.25	24.1					N	partly cloudy
13				41.9	25.6	33.75	16.3	night	- - -	.95	7	N	cloudy
14				43.9	24.9	34.40	19.0	- - - -	night	.48	3		clear
15				56.6	31.5	44.05	25.1	night	night	.08		N	"
16				44.6	22.3	33.45	22.3					N.W	"
17				32.6	8.9	20.75	23.7	6 p.m	- - - -	.07	1	N	cloudy
18				26.0	9.8	17.90	16.2	- - -	4.30 p.m.	.68		W	"
19				32.3	14.6	23.45	17.7	5 p.m	- - - -	T	T	S.W.	"
20				32.4	7.6	20.00	25.0	- - - -	night	.02		N.W.	partly cloudy
21				26.7	-3.0	11.85	29.7					N.E.	clear
22				16.4	4.0	10.20	12.4	night	4 p.m.	1.00	10(?)	N	cloudy.
23				33.3	14.6	23.95	18.7	night	night	T	T	S	partly cloudy.
24				34.2	16.1	25.15	18.1					W	" "
25				34.5	15.7	24.10	18.8	1.15 p.m.	- - - -	.16	3	SE	cloudy
26				37.0	8.7	22.85	28.3	- - -	8 p.m.	.04	T	N	clear
27				34.6	-6.6	14.00	41.2					N	"
28				25.3	-5.9	9.70	31.2	1.30 p.m.	- - - -	.21	2	N	cloudy
29													
30													
31													
Sum.				980.6	340.7	665.65	629.9			6.78	31		
Mean.				35.02	12.52	23.77	22.50			6.78			

*Including rain, hail, sleet, and melted snow.
†From maximum and minimum readings.

(IN TRIPLICATE.)

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Vassar College.
Voluntary Observer.

Monthly Summary.

Mean temperature, † 23.77

Mean max. temperature, 35.02; mean min. temperature, 12.52

Maximum temperature, 56.6; date, 15

Minimum temperature, -6.6; date, 27

Total precipitation, 6.78 inches.

Greatest precipitation in any 24 consecutive hours, 1 in; date, 22nd

No. of clear days, 9; partly cloudy, 5; cloudy, 14; on which .01 or more precipitation fell 16

Prevailing wind direction, North.

Depth of snow on ground on 15th, 10 inches.

Depth of snow on ground at end of month, 22 inches.

Total snowfall during the month, 31 inches.

Dates of frost, Light,

Killing,

Dates of hail,

Dates of sleet,

Dates of auroras,

Time used on this form (a)

(a) Local, eastern, central, or Pacific.

Remarks.

(Thunderstorms and miscellaneous phenomena.)

O.K. W.H.

Heavy Storm on 22nd.

Form 1009 - 1893

Form No. 1009—Mo'l.

U. S. Department of Agriculture, Weather Bureau.

Voluntary Observers' Meteorological Record: Month of February, 1897

Station, Poughkeepsie; County, Dutchess; State, New York

Date.	TEMPERATURE. 7 A. M.	2 P. M.	9 P. M.	Maximum.	Minimum.	Mean. †	Range.	PRECIPITATION. Time of beginning.	Time of ending.	Amount. *	Snowfall, in inches.	Prevailing wind direction.	Character of day.	Depth of snow at sunset.
1				33	-10	11.5	43					N	clear	
2	~			32	9	20.5	23					N	cldy	
3				31	21	26	10					N	"	
4				30	4	17	26					NW	clear	
5				32	-6	13	38					S	"	
6				39	20	29.5	19	1PM	7PM	.24		S	cldy	
7				45	32	38.5	13	--	1PM	.28		N	"	
8				38	26	32	12	11AM	5PM	.03		W	"	
9				40	30	35	10					NW	PC	
10				38	24	31	14					N	"	
11				27	14	20.5	13					N	clear	
12				22	12	17	10	EM	10PM	1.03	10.5	N	cldy	
13				25	-3	11	28					N	clear	
14				38	-11	13.5	49					S	"	
15				32	12	22	20	8PM			T	N	cldy	
16				44	27	35.5	17					NW	clear	
17				44	9	26.5	35					S	cldy	
18				46	31	38.5	15					NW	PC	
19				36	19	27.5	17					N	clear	
20				34	11	22.5	23	7PM	D Y	.20	2	NW	PC	
21				49	29	39	20					S	clear	
22				37	30	33.5	7	9PM	--	.42		S	cldy	
23				46	27	36.5	19		EM	.46		W	PC	
24				34	21	27.5	13					W	clear	
25				41	17	29	24					N	cldy	
26				32	18	25	14					N	PC	
27				29	7	18	22					NW	clear	
28				34	15	24.5	19					N	"	
29														
30														
31														
Sum				1008	425					2.66	12.5			
Mean				36.0	15.2		20.8			✓				

*Including rain, hail, sleet, and melted snow.
†From maximum and minimum readings.

25.6

(IN TRIPLICATE.)

Vassar College Observatory
Voluntary Observer.

Monthly Summary.

Maximum temperature, ~~46~~ 45; date, ~~28~~ 21

Minimum temperature, -11; date, 14

Mean temperature † (mean max. + mean min. ÷ 2), 25.6

Mean temperature (7 + 2 + 9 + 9 ÷ 4), ...

Mean max. temperature, ...; mean min. temperature, ...

Total precipitation, 2.66 inches.

Greatest precipitation in any 24 consecutive hours, 1.03; date, 12

Total snowfall during the month, 12.5 inches.

Depth of snow on ground on 15th, 8 inches.

Depth of snow on ground at end of month, 1 inches.

No. of clear days, 12; partly cloudy, 6, cloudy, 10;

on which .01 or more precipitation fell, 7

Prevailing wind direction, North

Dates of frost, Light, ...
Killing, ...

Dates of hail, ...

Dates of sleet, ...

Dates of auroras, ...

Time used on this form (a) Eastern

(a) Local, eastern, central, or Pacific.

Remarks.

(Thunderstorms and miscellaneous phenomena.)

Lunar Halo
9, 10, 17

30

Form 1009 - 1897

Form No. 1009—Met'l: U. S. Department of Agriculture, Weather Bureau.

VOLUNTARY OBSERVERS' METEOROLOGICAL RECORD.

Month of January, 1901; Station, Elmira; County, Chemung

State, N. Y.; Latitude, 42°; Longitude, 76°47'; Time used on this form

DATE.	TEMPERATURE. Maximum.	Minimum.	*Mean.	§Set Max.	PRECIPITATION. Time of Beginning.	Time of Ending.	†Amount.	Snowfall in Inches.	Depth of Snow on Ground at Time of Observation.	Prevailing Wind Direction.	Character of Day.	‡Miscellaneous Phenomena.
1	30	25	5	25						N.W.	⊕	
2	41	18	23	20						"	○	
3	20 ~~16~~	9	11	10						"	⊕	
4	37	6	31	35						N.E	○	
5	35	15	20	16						N.W.	○	
6	33	6	27	30						"	○	
7	37	30	7	30	5 A.M.	7.30	.02	.5		"	⊕	
8	44	27	17	41						S	⊕	
9	43	32	11	34			T			N.W.	⊕	
10	43	31	12	41	5 A.M.		.26			"	⊕	
11	41	36	5	37	during the day		.04			"	⊕	
12	39	28	11	31	during night		.20			"	⊕	
13	35	28	7	30						"	○	
14	37	24	13	34	6 A.M.		*	.4	.4	S	⊕	
15	43	31	12	38			.05	1.	1.	S.E	⊕	
16	50	35	15	49			T			S	○	
17	49	25	24	27			T			N.W.	⊕	
18	27	9	18	13	8 P.M.		.06	.8	.8	"	⊕	
19	19	0	19	3						"	○	
20	36	-1	37	30						S	○	
21	46	30	16	42			.02			S.W.	⊕	
22	42	19	23	23						N.W.	○	
23	35	17	18	34						S	○	
24	37	32	5	34						S.E.	⊕	
25	~~34~~ ~~29~~	~~28~~ ~~24~~	6	28			.30	3.5	3.5	N.W.	⊕	
26	26	19	7	21			T		3.	"	⊕	
27	29	19	10	25			.06	.2	3.	"	⊕	
28	25	19	6	22			.02		3.	"	⊕	
29	24	17	7	24			T		3.	"	⊕	
30	25	20	5	25			.06	1.	4.	S.E	⊕	
31	26	16	10	17			T	T	3.	N.W	⊕	
Sum	1088 ~~1087~~	650	~~438~~ ~~437~~				1.09	7.4		N.W		
Mean	35.1	21.0										

* May be left blank.
† Including rain, hail, sleet, and melted snow.
‡ Thunderstorms, halos, auroras, etc.
§ Reading of maximum thermometer immediately after setting.

(IN TRIPLICATE.) 8—253

Gerity Brothers, Voluntary Observer.

Post-Office Address, Elmira N.Y.

MONTHLY SUMMARY.

TEMPERATURE.

Mean maximum, ~~35.0~~ 35.1

Mean minimum, 21.0

Mean, 28.0

Maximum, 50; date, 16

Minimum, -1; date, 20

Greatest daily range, 57

PRECIPITATION.

Total, 1.09 inches.

Greatest in 24 hours, .30; date, 25

SNOW.

Total fall, 7.4 inches; on ground 15th, 1.0 inches; at end of month, 3.0 inches.

NUMBER OF DAYS.

With .01 inch or more precipitation, 10

Clear, 10; partly cloudy, 5; cloudy, 16

DATES OF—

Killing frost, B

Thunderstorms,

Hail,

Sleet,

Auroras,

REMARKS.

Form 1009 - 1901

Form No. 1009—Met'l.

U. S. Department of Agriculture, Weather Bureau.

COOPERATIVE OBSERVERS' METEOROLOGICAL RECORD:

Month of June, 1917 *Station,* Elmira; *County,* Chemung

Hour of Observation, 9:30 A.M.

State, N.Y.; *Latitude,* —; *Longitude,* —; *Time used on this form,*

DATE.	Temperature: Maximum.	Minimum.	Range.	* Set Max.	Precipitation: Time of Beginning.	Time of Ending.	† Amount.	Snowfall, in Inches.	Depth of Snow on Ground at Time of Observation.	Prevailing Wind Direction.	Character of Day, Sunrise to Sunset.	‡ Miscellaneous Phenomena.
	1	2	3	4	5	6	7	8	9	10	11	
1	75	57	18	66	4 A.	6 A.	T.			S.W.	⦶	
2	76	52	24	56	4 P.	6 P.	0.01			N.E.	⊕	
3	69	56	12	57						S.W.	⦶	
4	82	45	37	64						S.W.	○	
5	75	56	19	71	12½ P. / 6 P.	4 P. / 7 P.	0.33			S.W.	⦶	
6	71	52	19	57	12 M. / 5 P.	3 P.	0.77			N.E.	⊕	
7	77	56	21	62	9 P.	9 A. / 11 P.	0.03			N.E.	⦶	
8	75	57	18	70	4 P.	8 P.	0.60			S.W.	⦶	
9	79	55	24	66	11 P.	11½ P.	T.			N.E.	○	
10	76	62	14	66	9 A.	11 A.	0.07			S.W.	⦶	
11	65	56	9	59						N.E.	⊕	
12	87	52	35	63						N.E.	⦶	
13	84	58	26	73						S.W.	⦶	
14	74	59	15	60	5 A.	9 A.	0.19			N.E.	⊕	
15	65	45	20	48	5 A.	10 P.	0.28			N.E.	⊕	Heavy 7 P. to 9 P.
16	59	48	11	54						N.E.	⊕	
17	70	40	30	58						N.E.	○	
18	79	46	33	65	7 P.	D.N.	0.39			S.W.	○	
19	86	57	29	65						S.W.	○	
20	77	61	16	74	12 M.	4 P.	1.13			S.W.	⦶	4 storms in succession
21	83	55	28	62						S.W.	○	
22	82	55	27	73						S.W.	○	
23	78	56	22	65	9 P.	11 P.	1.16			S.W.	○	5 min. Rain 4 P.M.
24	67	55	12	60						N.E.	⊕	
25	76	52	24	64						N.E.	○	
26	81	54	27	64	6 A. / 8 P.	8 A. / 10 P.	T. / 0.62			S.W.	⦶	
27	80	62	18	74						S.W.	○	
28	75	54	21	65	10 P.	D.N.	0.53			N.E.	○	
29	76	61	15	67	6 A.	12½ P.	0.14			S.W.	⊕	
30	79	54	25	68						V	○	
31	—	—	—	—	—	—	—			—	—	
Sum	2277	1628	649	1925			6.47			S.W.		
Mean	75.9	54.3										

* Reading of maximum thermometer immediately after setting.
† Including rain, hail, sleet, and melted snow.
‡ Thunderstorms, halos, auroras, etc.

Thurber A. Brown, Cooperative Observer.

(IN TRIPLICATE.) See cover for instructions. M.W.W. Post-Office Address, Elmira, N.Y.

MONTHLY SUMMARY. 1307

TEMPERATURE.

Mean maximum, 75.9

Mean minimum, 54.3

Mean, 65.1 -2.7

Maximum, 87; date, 12

Minimum, 40; date, 17

Greatest daily range, 37

PRECIPITATION.

Total, 6.47 inches. +2.70

Greatest in 24 hours, 1.16; date, 23

SNOW.

Total snowfall, 0 inches; on ground 15th, 0 inches;

at end of month, 0 inches.

NUMBER OF DAYS—

With .01 inch or more precipitation, 14

Clear, 13; partly cloudy, 10; cloudy, 7

DATES OF—

Killing frost,

Thunderstorms, 2-6-7-8-18-20-23-26

Hail, 20

Sleet,

Auroras,

REMARKS:

Precipitations and daily temperatures entered on dates of occurrence.

Maximum occurred on date recorded.

Rec'd JUL 11

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Form 1009 - 1917

Form No. 1009—Met'l.

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

COOPERATIVE OBSERVERS' METEROLOGICAL RECORD;

Month of *June*, 1932, Station, *Elmira, N.Y.* County, *Chemung*
Hour of Observation, *9th am.*
State, *New York*; Latitude, *42*; Longitude, *77*; Time used on this form, *Normal E*

DATE	Temperature: Maximum (1)	Minimum (2)	Range (3)	* Set max. (4)	Precipitation: Time of beginning (5)	Time of ending (6)	† Amount (7)	Snowfall, in inches (8)	Depth of snow on ground at time of observation (9)	Prevailing wind direction (10)	Character of day, sunrise to sunset (11)	‡ Miscellaneous phenomena
1	82	51	31	69	8¼P.	+	0.07			W.	Φ	
2	76	61	15	66	+	+	0.11			S.E.	⊕	
3	87	62	25	74	+	1-P.	0.01			S.W.	Φ	
4	83	61	22	73						N.W.	O	
5	83	62	21	76	8¼P.	10¾P.	0.21			S.E.	O	
6	81	63	18	72	9¼P	4¾P	0.05			S.W.	Φ	
7	58	53	5	54						N.W.	O	
8	64	39	25	51						N.W.	Φ	
9	70	49	21	60						N.W.	Φ	
10	65	52	13	60						N.W.	⊕	
11	80	42	38	62						S.W.	O	
12	71	49	22	70	1¾P.	11¾P.	0.19			S.E.	⊕	
13	66	55	11	59	3¼P	11 E P	0.15			S.W.	⊕	
14	81	58	23	66						S.W.	Φ	
15	88	57	29	68						N.W.	O	
16	76	64	12	69	4A	+	T			N.E.	⊕	
17	85	63	22	71	+	3A.	0.20			N.E.	Φ	
18	83	58	25	68						S.E.	O	
19	76	61	15	72						S.E.	Φ	
20	90	60	30	70						S.E.	Φ	
21	86	67	19	74	2 55 P	3½ A	0.17			S.W.	Φ	
22	84	64	20	74	9¼P.	9¾P.	0.07			N.W.	O	
23	69	54	15	63						N.W.	Φ	
24	72	47	25	56						N.W.	O	
25	74	53	21	59	8-A.	12¾ A	0.10			N.W.	⊕	
26	91	59	32	70	9¼P.	+	0.07			S.E.	O	
27	77	70	7	72	+	+	0.75			S.E.	⊕	
28	78	62	16	69	+	3A	0.02			N.W.	O	
29	84	53	31	68	11¼P.	D.N.	0.10			N.W.	O	
30	82	61	21	70						N.W.	O	
31												
Sum	2342	1712	630	2005			2.27			NW	13	
Mean												

* Reading of maximum thermometer immediately after setting.
† Including rain, hail, sleet, and melted snow.
‡ Thunderstorms, halos, auroras, etc.

M. W. Wipfler, Cooperative Observer.
McHall. 8—26
Post Office Address, *Elmira, N.Y.*

(IN TRIPLICATE) See cover for instructions.

U. S. GOVERNMENT PRINTING OFFICE 1900

MONTHLY SUMMARY 1352

TEMPERATURE

Mean maximum, 78.1
Mean minimum 57.1
Mean, 67.6
Maximum, 91; date, 26
Minimum, 39; date, 8
Greatest daily range, 38

PRECIPITATION

Total, 2.22; inches 0.75; greatest in 24 hours
Date, 27th

SNOW

Total snowfall, — inches
On ground 15th, — inches
At end of month, — inches

NUMBER OF DAYS—

With .01 inch or more precipitation, 15
Clear, 12; partly cloudy, 11
Cloudy, 7

DATES OF—

Fog: Light, —; Dense, —
Killing frost, —
Thunderstorms, 3rd - 5th
Hail: Light, —; Moderate, —; Heavy, —
Sleet, —
Auroras, —

REMARKS:

Precipitations and daily temperatures entered on dates of occurrence

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W. B. FORM 1009

U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU

COOPERATIVE OBSERVERS' METEOROLOGICAL RECORD:

STATION *Elmira, N.Y.*, COUNTY *Chemung*, STATE *New York* — TEMP. *9 30 am.*
LATITUDE *42° 5'*. LONGITUDE *76° 48'*. ELEVATION *858.62* HOUR OF OBSERVATION
MONTH *January*, 19*42*. MERIDIAN OF TIME *E. S.* — PRECIP. *7 Am*

DATE	TEMPERATURE: MAXIMUM (1)	MINIMUM (2)	[2] SET MAX. (3)	PRECIPITATION: TIME OF BEGINNING (4)	TIME OF ENDING (5)	[3] AMOUNT INCHES & HUNDREDTHS (6)	SNOWFALL INCHES & TENTHS (7)	SNOW ON GROUND AT OBSERVATION (8)	PREVAILING WIND DIRECTION FOR THE DAY (9)	CHARACTER OF DAY SUNRISE TO SUNSET (AVE. CLD.): CLEAR (0—3) (10)	P. CLDY. (4—7)	CLOUDY (8—10)	MISCELLANEOUS PHENOMENA INCLUDING CHARACTER OF PRECIPITATION, AS RAIN, DRIZZLE, SNOW, SLEET, HAIL, THUNDERSTORMS, ETC. (11)
1	38	32	35	12 30 Pm.	10 Pm			—	S.W.			V	Snow Squall 0.5" Rain
2	47	35	41	3 Am	5 Am.	0.09	0.5	—	S.W.			V	Rain
3	41	23	31	10 30 Pm.	+	T	T	—	W	V			Clear am. light snow 10 30
4	32	28	30	+	7 am	0.40	5.50	5.50	S.E			V	Overcast all day
5	33	13	20					4.00	S.W.	V			Partly cldy
6	30	-4	2					4.00	S.W.	V			Clear
7	16	-1	7	3 Am	4 Am	T	T	4.00	W.	V			Clear
8	11	-12	-3					4.00	S.E.	V			Frosty
9	12	-3	10					4.00	S.W.			V	Hazy
10	20	1	4					3.00	N.E.	V			Clear
11	16	0	16					3.00	S.W.		V		Cloudy
12	26	14	26					3.00	S.W.			V	partly cldy.
13	36	18	19					3.00	N.		V		Clearing
14	31	15	31					2.50	S.W.		V		Clear
15	43	23	24	10 30 A.	11 P.	T	T	1.00	N.W.			V	Cloudy
16	34	12	14			T		1.00	N.	V			Clear
17	18	5	19					1.00	S.E	V			Clear
18	45	13	45					T	W.			V	Cloudy
19	52	39	43	3 30 A.	11 30 Pm	0.15		—	S.W.			V	Cloudy
20	46	31	34			0.25		—	N.W.			V	Cloudy
21	36	26	28					—	N.E			V	Cloudy
22	32	25	31					—	S.E.			V	Cloudy
23	38	26	38					—	S.W.	V			Clear
24	52	33	39					—	S.W.	V			Clear
25	50	33	35					—	S.E			V	overcast
26	38	33	35	9 Am	11 Am	0.01	0.5	0.5	S.E.			V	Snowing to fine rain
27	38	32	37	9 Pm	+	0.03	T	T	S.W.			V	Cloudy
28	43	28	28	+	11 Pm	T	T	T	N.			V	Cloudy
29	29	11	13			T	T	T	N.		V		Cloudy
30	20	10	19					—	S.E		V		Cloudy
31	36	19	35	9 15 a.	10 15 Pm			—	S.			V	light rain
[1] 1 ST.	42					0.27							
SUM	1043	558				.93	6.5		SW				

SEE COVER FOR INSTRUCTIONS

1 ENTER TEMP. AND PRECIP. FOR 1 ST. DAY OF FOLLOWING MO. WHERE OBS. IN MORNING ONLY
2 READING OF MAX. THERMOMETER IMMEDIATELY AFTER SETTING.
3 INCLUDING RAIN, HAIL, SLEET AND MELTED SNOW ON DAY OF MEASUREMENT.

Wayland F. Hall.
(COOPERATIVE OBSERVER)
City Hall Elmira, N.Y.
(P.O. ADDRESS)

(IN TRIPLICATE)

MONTHLY SUMMARY

(TO BE FILLED IN BY OBSERVER)

DATES OF—
HIGH WINDS, ___
GLAZE, (FREEZING RAIN) *31*
SLEET, (SMALL ICE PELLETS) ___
HAIL, ___
KILLING FROST, ___
THUNDERSTORMS, ___
FOG, LIGHT (VIS. 5/8 MI. OR MORE) ___
DENSE (VIS. LESS THAN 1/8 MI.) ___
DEPTH OF FROZEN GROUND AT END OF MO. *12* INS.

(NOT TO BE FILLED IN BY OBSERVER)

51 6

TEMPERATURE

MEAN MAXIMUM, *33.6*
MEAN MINIMUM, *18.0*
MEAN MONTHLY, *25.8* DEPARTURE, ___
MAXIMUM, *52* ; DATE, *18, 23*
MINIMUM, *-12* ; DATE, *8*

PRECIPITATION

TOTAL, *.93* INS. DEPARTURE. ___

GREATEST AMOUNT

IN ANY OBSERVATIONAL DAY		COMPUTED FOR 24-HOUR PERIOD	
AMOUNT	DATE	AMOUNT	DATE
.40	4	—	—

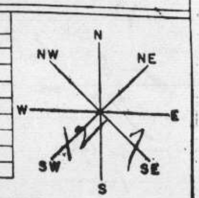
SNOW

TOTAL SNOWFALL, *6.5* INCHES
GREATEST IN ANY OBSERVATIONAL DAY *5.5*
DATE *4*

NUMBER OF DAYS

MAX. TEMP. 90° OR ABOVE, ___
MAX. TEMP. 32° OR BELOW, *13*
MIN. TEMP. 32° OR BELOW, *26*
MIN. TEMP. 0° OR BELOW, *5*
WITH 0.01 INCH OR MORE PRECIP., *6*
0.25 INCH OR MORE, *2*; 1.00 INCH OR MORE, *0*
CLEAR, *10* PARTLY CLOUDY, *5* CLOUDY, *16*

REMARKS BY OBSERVER:



STATION ___
MONTH ___, 19___

(17)

Form 1009 - 1942

WB Form 1009

Budget Bureau No. 41-R230.
Approval expires Sept. 30, 1947.

U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU
CLIMATOLOGICAL OBSERVERS' METEOROLOGICAL RECORD

Station Elmira, County Chemung, State New York, Month June, 1947

Standard of time in use E.D.S., Latitude 42 ° 05 ' N., Longitude 76 ° 48 ' W., Elevation 863 ft.

Hour of observation: If once daily Sun Set; if at different times, temperature ...., precipitation ....

Date	Temperature: Maximum (1)	Temperature: Minimum (2)	Temperature: Set max. [1] (3)	Precipitation (all types): Time of beginning (4)	Time of ending (5)	Time of beginning (6)	Time of ending (7)	Amount since last observation, inches and hundredths [2] (8)	Snowfall (unmelted) inches and tenths: New snow since last observation (9)	Total depth on ground at observation (10)	Prevailing wind direction for the day (11)	Character of day sunrise to sunset (Ave. cld.) (12): Clear (0-3)	Partly cloudy (4-7)	Cloudy (8-10)	Other weather conditions and notes including character of precipitation, as drizzle, snow, sleet, glaze, hail, thunderstorms, and high winds, frosts, fogs, duststorms, tornadoes, etc. (13)
1	74	41	66								S.W.			✓	overcast all day
2	76	58	67	12 10 Pm.	6 Am T	8 Pm	+	T			S.W.			✓	Thunder Storm 8 Pm River Crest 846.6 5-7 Pm.
3	68	45	54	+	7 20 Am.			2.00			N.		✓		
4	75	37	57								S.E	✓			
5	80	46	68	11 45 Pm.							S.W.	✓			light shower Pm.
6	89	57	74	+	12 Am.			0.07			S.W.	✓			
7	75	64	64	12 Am	10 Pm.			0.17			S.W			✓	
8	73	57	60					0.28			S.W.			✓	
9	80	52	70								N.E.	✓			
10	82	53	81								S.W.	✓			
11	86	65	81								S.W.	✓			
12	81	57	59								N.		✓		
13	78	46	68	9 Pm.	11 Pm.						S.E		✓		
14	76	55	67	7 Am.	~~[illegible]~~	~~[illegible]~~	9 15 Pm.	0.88			S.W.			✓	
15	69	50	60					0.09			N.			✓	
16	76	50	62								N.		✓		
17	79	41	66	10 Pm.	+						N.W.	✓			
18	76	53	63	+	7 30 Am.			0.10			S.W.		✓		
19	74	43	62								N.W.	✓			
20	80	42	63								N.E	✓			
21	79	45	68								S.W.	✓			
22	85	43	65								N.W.	✓			
23	89	48	72	11 30 Pm.	8 Am on 24						N.W.	✓			
24	85	55	70	6 Pm.	9 Pm.			0.36			S.E.	✓			
25	82	57	70	9 Pm	3 10 Pm.			0.12			W.		✓		
26	79	54	68	2 Pm.	2 40 Pm.			T			S.W.		✓		
27	88	52	77								N.	✓			
28	86	58	77								S.W.		✓		
29	93	58	79								S.W.	✓			
30	88	64	75								S.W.			✓	
31															
1st [3]															
Sum	2441	1541						4.07				15	8	7	

Wayland F. Hall (Observer)

Elmira, N.Y. (P. O. address)

[1] Reading of maximum thermometer immediately after whirling and while hanging vertically.
[2] Including rain, hail, sleet, and melted snow. Enter on day of measurement.
[3] Enter temperature and precipitation for 1st day of following month.

(IN TRIPLICATE)

MONTHLY SUMMARY
(To be filled in by observer)

Dates of—
High winds ....
Glaze (freezing rain) ....
Sleet (small ice pellets) ....
Hail: light .... ; moderate .... ; heavy ....
Killing frost ....
Thunderstorms 2nd 7th
Fog: light (vis. 3,300 ft. or more) .... ; moderate (vis. 1,650 to 3,299 ft.) .... ; heavy (vis. less than 1,650 ft.) ....
Greatest depth of frozen ground this month .... in.; date ....

(Not to be filled in by observer)

TEMPERATURE
Mean maximum 81.4
Mean minimum 51.5
Mean 66.1 Departure ....
Maximum 93; Date 11
Minimum 37; Date 4

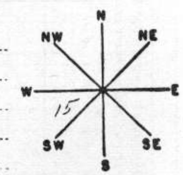
PRECIPITATION
Total .... in. departure ....
Greatest in any 24 hours 2.00 date; 2+3
(Best available without splitting measurements)

SNOW
Total snowfall .... in. ....
Greatest in any 24 hours .... date; ....
(Best available without splitting measurements)

Greatest depth on ground .... in.; date ....

NUMBER OF DAYS
Max. temp. 90° or above 2
Max. temp. 32° or below ....
Min. temp. 32° or below ....
Min. temp. 0° or below ....
With 0.01 inch or more precip. 9
0.25 inch or more 4; 1.00 inch or more 1
Clear 15 Partly cloudy 8 Cloudy 7

Remarks by observer:



Station Elmira, N.Y.

Month June, 1947

16—46080-2 U. S. GOVERNMENT PRINTING OFFICE

18

Form 1009 - 1947

WB Form 1009 Rev. 1948

U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU

MONTHLY RECORD OF CLIMATOLOGICAL OBSERVATIONS

Budget Bureau No 41-R 230.2
Approval Expires Dec. 31, 1950

Station _____
County _____ State _____

Standard of Time in use _____ Meridian

Month _____, Year 19____

Time of Observation _____ M(local time)

DATE	TEMPERATURE °F: 24 Hrs. ending at Observation — MAX.	MIN.	AT OBSN.	PRECIPITATION: Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precip. probably occurred unobserved. A.M. 1 2 3 4 5 6 7 8 9 10 11 NOON 1 2 3 4 5 6 7 8 9 10 11 Midnight	24-Hr. Amounts: LIQUID (a)	SNOW SLEET HAIL (b)	SNOW SLEET ICE on ground at Obsn. (c)	WEATHER (CALENDAR DAY) Mark 'X' for all types occurring each day: Smoke, Haze	Fog	Drizzle (Mist)	Sleet	Glaze	Thunder	Hail	Dust, Sandstorm	Blowing Snow	High Wind	Tornado
1																					
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
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28																					
29																					
30																					
31																					
Sum					Sum																
Mean																					
Extreme					Great-est																

REMARKS:

LIST FORM OR SUPPLIES NEEDED

Observer _____

Post Office _____

(a) Enter Inches and Hundredths, (b) Enter Inches and Tenths, (c) Enter Inches

Station _____

Month _____ Year _____

GPO 16-55902-1

Form 1009 - 1948

U. S. DEPARTMENT OF COMMERCE
WB Form 5201
(Revised 1-1-49)

WEATHER BUREAU

MONTHLY SUMMARY OF FORM 1009

1125 FT. ABOVE SEA LEVEL — LAWTON 2 N — OKLA A — LAT.: 34° 39′ — LONG.: 98° 24′

YR.	MO.	DATE	TEMPERATURES (°F.) MAX.	MIN.	AT TIME OF OBS.	PRECIPITATION (IN.) AMOUNT	SNOWFALL Sleet, Hail	SNOW SLEET ICE on ground at Obsn.	DAYS WITH RAIN	SNOW	SMOKE HAZE	FOG	DRIZZLE (MIST)	SLEET	GLAZE	THUNDER	HAIL	DUST SANDST'M	BLW'G SNOW	HIGH WIND	TORNADO	24 HR. WIND MOVEMENT (MILES)	EVAPORATION (INCHES AND THOUS.)	STATION NO.
49	10	01	76	47	54	0	0	0														109	230	34 5068 3
		02	78	44	56	0	0	0														89	210	
		03	84	56	71	0	0	0														76	120	
		04	85	68	68	01	0	0														72	80	
		05	75	62	65	12	0	0														46	50	
		06	80	59	63	0	0	0														21	80	
		07	90	63	70	0	0	0														155	170	
		08	93	70	73	0	0	0														190	180	
		09	87	73	77	T	0	0														136	90	
		10	84	54	60	17	0	0														187	220	
		11	79	56	58	0	0	0														77	270	
		12	75	39	47	0	0	0														93	180	
		13	75	39	47	0	0	0														40	180	
		14	77	40	51	0	0	0														29	150	
		15	76	43	49	0	0	0														60	170	
		16	77	40	53	0	0	0														30	130	
		17	80	53	58	0	0	0														65	150	
		18	80	59	64	0	0	0														124	130	
		19	84	64	69	03	0	0														139	80	
		20	83	69	72	0	0	0														160	80	
		21	83	57	57	108	0	0														175	120	
		22	75	39	46	0	0	0														55	200	
		23	67	46	51	31	0	0														39	100	
		24	53	48	50	203	0	0														107	M	
		25	50	41	41	06	0	0														115	60	
		26	65	38	44	0	0	0														23	80	
		27	68	39	47	0	0	0														27	70	
		28	64	38	45	0	0	0														38	80	
		29	70	42	48	0	0	0														23	60	
		30	74	44	50	0	0	0														102	70	
		31	51	32	37	15	0	0														158	150	

MEANS, TOTALS AND EXTREMES

MEAN MAX.	MEAN MIN.	MEAN TEMP.	TOTAL PRECIP.	TOTAL SNOW	GREATEST DEPTH ON GROUND	MAX. ≥ 90	MIN. ≤ 32	PREC ≥ .01	PRECIP. ≥ 1.00	TOTAL WIND MOVEMENT	MONTHLY EVAPORATION
75.4	50.4	62.9	3.96			2	1	9	2		

HIGHEST	LOWEST	DEPARTURE FROM NORMAL	DEPARTURE FROM NORMAL	DATE†	MAX. ≤ 32	MIN. ≤ 0	PRECIP. ≥ .25	GREATEST DAY	
93	32							2.03	
DATE†	DATE†							DATE†	
80	31 0						3	24 0	2760	4078 3940

"T" = AM'T TOO SMALL TO MEASURE †"I" = ALSO OTHER DAYS
"N" = MEASURED ON SUBSEQUENT DATE

Form 1009 - 1949

W. B. 1009-48

U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU

Budget Bureau No. 41-R991.1
Approval Expires Dec. 31, 1949

Weekly Record of Climatological Observations

Station ______ County ______ State ______

Month May 6/12, Year 1950

Standard of Time in use E Meridian

Time of Observation 9:00 A M (local time)

DAY OF WEEK	DATE (1-31)	TEMPERATURE °F 24 Hrs. ending at Observation MAX.	MIN.	AT OBSN.	PRECIPITATION 24-Hr. Amounts LIQUID (a)	SNOW SLEET HAIL (b)	SNOW SLEET ICE on ground at Obsn. (c)	Smoke, Haze	Fog	Drizzle (Mist)	Sleet	Glaze	Thunder	Hail	Dust, Sandstm	Blowing Snow	High Wind	Tornado
SAT	6	84	65	82	0.02					X								
SUN	7	96	68	74	0.28													
MON	8	84	49	~~54~~ 64														
TUE	9	69	61	64														
WED	10	76	59	71														
THU	11	85	61	76				X										
FRI	12	84	58	63				X		X								

PRECIPITATION: Draw a straight line (—) through hours precipitation was observed, and a waved line (∿∿) through hours precip. probably occurred unobserved. A. M. 1 2 3 4 5 6 7 8 9 10 11 NOON 1 2 3 4 5 6 7 8 9 10 11 Midnight

WEATHER (CALENDAR DAY) Mark 'X' for all types occurring each day

PLEASE MAIL THIS FORM PROMPTLY UPON COMPLETION

WEATHER AND CROP REPORT
EFFECT OF WEATHER ON CROPS; CONDITION AND PROGRESS OF CROPS; DESCRIPTION OF PRESENT FARM OPERATIONS; ETC.

Weekly Form 1009 - 1950

Remarks: Special Observations, Storms, Floods and Property Damage, Frosts.

List Forms or Supplies Needed

(a) Enter Inches and Hundredths, (b) Enter Inches and Tenths, (c) Enter Inches

Observer JOHN DOE

GPO 16-55905-1

WB FORM 1009

U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU

RECORD OF CLIMATOLOGICAL OBSERVATIONS

Station Your Station

County Your County

State Your State

Time of observation (local time) if once daily 6 P ; If at different times, temperature , precipitation

Month Sample, 19

Standard time in use E

Date	TEMPERATURE °F: 24 hrs. ending at observation Max.	Min.	At obsn.	PRECIPITATION: Draw a straight line (—) through hours precipitation was observed, and a waved line (~) through hours precip. probably occurred unobserved. A.M. 1 2 3 4 5 6 7 8 9 10 11 NOON 1 2 3 4 5 6 7 8 9 10 11 P.M.	24-hr. amounts: Rain, Melted snow, etc. (ins. & hund'ths)	Snow, Sleet, Hail (ins. & tenths)	At obsn. Snow, Sleet, Hail, Ice on gnd (inches)	WEATHER (CALENDAR DAY): Mark 'X' for all types occurring each day: Fog	Sleet	Glaze	Thunder	Hail	Strong wind	Important weather conditions not included in 'Weather' block
1	93	61	81		.01										
2	101	57	86		.24							X	X	X	Sky very black at 6AM
3	97	67	82		2.03	.5	0					X	X	X	
4	100	71	87		0										
5	88	63	79		.08										
6	84	59	75		0										
7	81	49	72		0										
8	79	53	71		.27										
9	74	47	64		0										
10	69	38	60		0										
11	63	34	55		0										
12	58	46	54		T										
13	63	50	57		.07										
14	59	45	53		.22										
15	54	43	45		.15									X	
16	49	26	32		0										
17	34	15	19		T	T	T								
18	23	0	5		T	T	0								
19	8	-9	-5		0										
20	-4	-18	-8		0										
21	0	-10	0		0										
22	19	0	11		0										
23	28	8	25		.66	7.5	7		X					X	Blowing snow
24	32	22	30		.45	4.8	10								
25	44	27	41		0		8								
26	47	26	43		.03	.3	6								
27	53	34	46		0		3								
28	58	38	49		0		T								
29	52	33	35		.02		0								
30	49	28	43		.12										
31	57	42	51		0										
Sum				A.M. NOON P.M.	Sum			Fog	Sleet	Glaze	Thunder	Hail	Strong wind		
Avg.				Observer Your name											
Extremes				Post Office	Greatest										

REMARKS

Strong winds and severe thunderstorm on 2nd & 3rd, with hail up to 1" in diameter. This storm caused about $1,000 damage to roofs, glass, etc.

Highways blocked by drifting snow on 23rd. Several minor traffic accidents resulted

Form 1009 - 1951

List forms or supplies needed Carbon paper

Station Your Station Month Sample, 19

16—30764-1

W. B. FORM 612–14 (FORMERLY 1009)

U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU

(REVISED 1956)

RECORD OF CLIMATOLOGICAL OBSERVATIONS

Station _____

County _____

State _____

Time of observation (local time) if once daily _____;

If at different times, temperature _____, precipitation _____

Month _____, 19____

Standard time in use _____

Date	TEMPERATURE °F: 24 hrs. ending at observation — Max.	TEMPERATURE °F: 24 hrs. ending at observation — Min.	TEMPERATURE °F: At obsn.	PRECIPITATION: Draw a straight line (—) through hours precipitation was observed, and a waved line (~~) through hours precip. probably occurred unobserved. A.M. NOON P.M. 1 2 3 4 5 6 7 8 9 10 11 1 2 3 4 5 6 7 8 9 10 11	PRECIPITATION: 24-hr. amounts — Rain, Melted snow, etc. (Ins. & hund'ths)	PRECIPITATION: 24-hr. amounts — Snow, Sleet, Hail (Ins. & tenths)	PRECIPITATION: At obsn. — Snow, Sleet, Hail, Ice on ground (Inches)	WEATHER (CALENDAR DAY): Mark 'X' for all types occurring each day — Fog	Sleet	Glaze	Thunder	Hail	Damaging Wind	Time of Obsn. If different from the above	Important weather conditions not included in 'Weather' block; remarks, etc.
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
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26															
27															
28															
29															
30															
31															
Sum				A.M. NOON P.M. 1 2 3 4 5 6 7 8 9 10 11 1 2 3 4 5 6 7 8 9 10 11	Sum			Fog	Sleet	Glaze	Thunder	Hail	Damaging Wind		
Avg.				Observer _____											
Extreme				Post Office _____	Greatest										

Check ☐ when additional sheet is used for remarks

List forms or supplies needed _____

Station _____ Month _____, 19____

Form 1009 - 1956

☆ U. S. GOVERNMENT PRINTING OFFICE : 1963 O - 687547