



National Weather Service
WFO Mount Holly, NJ
Cooperative Observation Program
Observer Manual

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1. Taking Observations

Measuring precipitation is one of the most basic and useful forms of weather observations. It is important to note that observations will vary based on the type of precipitation that is expected to occur. If any frozen precipitation is forecast, it is important to **remove the funnel top and inner tube** from your gauge *before* precipitation begins. This will prevent damage to the equipment and ensure the most accurate measurements possible.

Note that the inner tube of the rain gauge only holds a certain amount of precipitation until it begins to overflow into the outer can. If rain falls, but is not measurable inside of the gauge, this should be reported as a Trace (T) of rainfall. This includes sprinkles/drizzle and occurrences where there is some liquid in the inner tube, but it is not measurable on the measuring stick.

During the cold season (generally November through early April), we recommend that observers leave their snowboards outside at all times, if possible. If this is not feasible, make sure to deploy your snowboard before any frozen precipitation occurs.

Snowfall is a 24-hour accumulation of new snow and/or sleet since the last observation time. If possible, we recommend that new snow is measured every 6 hours then added up at the observation time for the most accurate measurement. For events where snow and/or sleet changes to rain, we recommend measuring the snow/sleet immediately before the rain begins melting it. However, we know this is not always possible. The new snowfall on the snowboard since the previous observation time is also sufficient. If snow falls, but does not stick or is not measurable on the snowboard, this should be reported as a Trace (T) of snowfall. This includes snow flurries and snow or sleet mixing with rain. If there is a Trace (T) of snowfall, there must also be at least a Trace (T) of liquid equivalent.

Snow depth is a measurement taken only at the standard observation time once per day. Snow depth is an average depth of snow and/or ice over a representative area. A best practice is to take 3 to 5 depth measurements in a representative area then calculate and record the average of them. Snow depth does not include drifts of snow, however snow drift depths may be noted in the remarks section. If snow is covering most of the ground at the observation time, but is less than a half inch on average, this should be reported as a Trace (T) of snow depth.

Rainfall and Liquid Equivalent of Frozen Precipitation

- Rainfall (measured in hundredths of an inch X.XX")
 - **Standard 8" Rain Gauge**

To measure the rainfall in your 8" standard rain gauge:

1. Remove the top funnel
2. Lower the measuring stick inside of the inner tube then pull out the measuring stick and read the level marked by the liquid in the tube

3. Remove the inner tube and dump out the liquid
 - a. If the inner tube has overflowed into the outer can, place the inner tube on a flat and stable surface then place the funnel on top of the tube (Note: a completely full inner tube will measure exactly 2.00")
 - b. Pour the remaining liquid in the can into the funnel then remove the funnel to measure the amount of liquid inside the tube with the measuring stick
 - c. Repeat this procedure and make note of each measurement until no liquid remains in the can
 - d. Add up all of the measurements to calculate the total rainfall amount
4. Replace the inner tube to the center of the can then replace the funnel
5. Place the gauge back into the stand

- Plastic 4" Rain Gauge

To measure the rainfall in your 4" plastic rain gauge:

1. Read the level marked by the liquid in the inner tube
2. Remove the funnel top and inner tube then dump out the liquid
 - a. If the inner tube has overflowed into the outer can, place the inner tube on a flat and stable surface then place the funnel on top of the tube (Note: a completely full inner tube will measure exactly 1.00")
 - b. Pour the remaining liquid in the can into the funnel then measure the amount of liquid inside the tube
 - c. Repeat this procedure and make note of each measurement until no liquid remains in the can
 - d. Add up all of the measurements to calculate the total rainfall amount
3. Replace the inner tube to the center of the can then replace the funnel
4. Place the gauge back into the mount

● **Liquid Equivalent of Frozen Precipitation (measured in hundredths of an inch X.XX")**

- Standard 8" Rain Gauge

To measure the liquid equivalent of frozen precipitation in your 8" standard rain gauge:

1. Remove the top funnel and inner tube before precipitation begins falling
2. Pour some warm (not hot) water into the inner tube then measure the amount of water that you poured in the tube with the measuring stick and make note of it
3. Pour the warm water from the inner tube into the can then place the inner tube on a flat and stable surface
4. Place the funnel on top of the tube then slowly pour the liquid in the can into the funnel once any frozen precipitation has fully melted
5. Remove the funnel from the tube and measure the amount of liquid inside the tube with the measuring stick
6. Subtract the value of warm water you poured into the tube from the value measured from the can. This will be your observed liquid equivalent

7. Pour out the liquid in the tube
8. If no more frozen precipitation is expected, replace the inner tube to the center of the can then replace the funnel. If more frozen precipitation is expected, skip to step 10
9. Place the gauge back into the stand

- Plastic 4" Rain Gauge

To measure the liquid equivalent of frozen precipitation in your 4" plastic rain gauge:

1. Remove the top funnel and inner tube before precipitation begins falling
2. Pour some warm (not hot) water into the inner tube then measure the amount of water that you poured in the tube and make note of it
3. Pour the warm water from the inner tube into the can then place the inner tube on a flat and stable surface
4. Place the funnel on top of the tube then slowly pour the liquid in the can into the funnel once any frozen precipitation has fully melted
5. Remove the funnel from the tube and measure the amount of liquid inside the tube
6. Subtract the value of warm water you poured into the tube from the value measured from the can. This will be your observed liquid equivalent
7. Pour out the liquid in the tube
8. If no more frozen precipitation is expected, replace the inner tube to the center of the can then replace the funnel. If more frozen precipitation is expected, skip to step 10
9. Place the gauge back into the stand

Snowfall (measured in tenths of an inch X.X")

To measure the 24-hour snowfall:

1. Deploy the snowboard before frozen precipitation begins falling
 - a. Place the snowboard in an area that is not susceptible to drifting of snow and away from surfaces like roads, driveways, and sidewalks that may be plowed
 - b. Place a marking flag next to the snowboard so you can easily locate it if the snow becomes deep
 - c. **Note:** we recommend leaving the snowboard outside for the season if possible
2. Use the snow measuring stick to measure the depth of snow on the board to a tenth of an inch (X.X")
 - a. If the depth of the snow is uneven on the board, take 3 to 5 measurements and calculate an average for the measured snowfall
 - b. It is recommended that new snow is measured every 6 hours and/or if precipitation type changes (i.e. snow to rain, sleet to snow, snow to sleet, etc.)
3. Clear off the snowboard and place it back on the ground

Snow Depth (measured in whole inches X")

To measure the snow depth:

1. Use the snow measuring stick to take 3 to 5 measurements of the depth of snow lying on the ground across an area representative of the average snow depth for the area
2. Calculate an average of your measurements. This will be your at observation snow depth value

Maximum and Minimum Temperatures (if equipped)

- Digital Maximum/Minimum Sensor with Nimbus Display

Please refer to the [Nimbus display manual](#) for operating instructions. This is also linked on our website.

Quick operation and troubleshooting guide:

- Press and hold the “Recall” button to display the maximum and minimum temperature since the last reset
- Press and hold the “Clear” button (until “E2E.2” displays) to reset the maximum and minimum temperature from the “Recall” feature
- A blinking “L” on the screen indicates the backup 9v battery is low
- A constant reading of -99.9° indicates the sensor wire is unplugged or the wire has an open circuit
- A constant reading of 255.5° indicates there is a short in the sensor wire

- Cotton Region Shelter (CRS) with Liquid-in-Glass (LIG) Thermometers

To record the maximum and minimum temperature, follow the steps below:

1. Read the right end of the index in the minimum thermometer
2. Unlock and lower the maximum thermometer. Read the top of the mercury column
3. Whirl the maximum thermometer until its reading agrees within 1 degree of the reading of the minimum thermometer. A difference of more than 1 degree between the two thermometers may require replacing one of both thermometers with ones that agree more closely
4. Read this temperature from the maximum thermometer after it has been twirled
5. Raise and lock the maximum thermometer into its SET position
6. Invert the minimum thermometer until the index falls to the end of the alcohol column
7. Return the minimum thermometer to its SET position
8. Check to make sure all latches are secure and then close the shelter

2. Reporting Observations

The [WxCoder program](#) is the preferred method of submitting observations to us. This website has a few different methods for entering observations. If you do not have reliable internet access or are unable to access the site, you may call in your observation to our office using the 800 number provided to you. You may also email, fax, or mail your monthly data form to our office. Timely observations are important to us. Be sure and submit your observations to us at your earliest convenience.

WxCoder Reporting Instructions

The best way to enter observations normally on a day to day basis is by using the Daily Entry Form. If you've been away for several days, you may need to go back and fill in missed days of temperature measurements. This can be done a few different ways: the Super Form (recommended), the Monthly Form, or the Daily Entry Form (not recommended). These can all be accessed from the "My Observations" page.

- **Daily Entry Form**

1. Log into [WxCoder](#)
2. If the site does not automatically open to the Daily Entry Form, click to the "My Observations" tab then click the "Daily Entry Form" tab
3. Enter your observations for each element, including traces (T), remarks, and missing values (M), then click the "Submit" button at the bottom of the page
4. Review the data you've entered on the next page then scroll down to the bottom of the page and *click the "Confirm" button*. If you do not click the confirm button, your entry will not be saved or sent to us

- **Super Form (for entering multiple days at once)**

1. Log into [WxCoder](#)
2. Click to the "My Observations" tab then click the "Super Form" tab
3. Enter your observations for each element and day, including traces (T), remarks, and missing values (M), then click the "Save" button at the top of the page
4. Review the data you've entered once saved to make sure you've entered everything as desired

A Few Things to Remember when Reporting Observations

- A trace (T) of rain should be recorded if rain falls, but is not measurable in the gauge (i.e. sprinkles)
- A trace (T) of snow should be recorded if snow falls, but is not measurable on the snowboard (i.e. flurries or wet snow mixed with rain)
- Sleet should be measured and recorded as snow

- A trace (T) of snow should be recorded if sleet falls, but is not measurable on the snowboard (includes sleet mixed with rain). We encourage you to make a remark if this occurred
- Freezing rain and freezing drizzle should be recorded as rain (liquid only), but we encourage you to mention the accretion amount in the remarks
- *Continue recording and entering zero values for snowfall and snow depth*, even during the warm season. The zero values are still valuable data. The same is true for days without rainfall
- If values of a particular element or day were not recorded or are not available, we ask that a value(s) of missing (M) be recorded. This lets us know that the value is truly missing instead of inadvertently being left blank
- We encourage you to report any sort of significant or severe weather (i.e. high winds, wind damage, flooding, hail, blowing/drifting snow, etc.) that occurs in the remarks
- Review your monthly data at the end of each month and ensure you've reported all observations from the month. If there are any days or elements with legitimately missing data, mark these as missing (M)

As always, if you have any questions, concerns, or equipment issues, do not hesitate to contact us. The COOP team can be reached via email at phi.coop@noaa.gov. If you need immediate assistance or do not have email access, you may call our operations staff using the 800 number provided to you.