The Weather Eye

A Southern New England
Cooperative Weather Observer Newsletter

August 2019 ***Editor: Kimberly Buttrick***

EQUIPMENT STANDARDS AND PROPER SITING

The Coop network has provided climate and weather data for over 100 years. Consistency of the measurements is an attribute of the network, and it has been maintained by rare and/or gradual change, and established standards for exposure of instruments over the life of the network. In order to preserve the integrity of the network, NWS has established standards for equipment, siting, and exposure.

Temperature sensor siting: The sensor should be mounted **5 feet +/- 1 foot above the ground**. The ground over which the shelter is located should be typical of the surrounding area. A level, open clearing is desirable so the thermometer(s) are freely ventilated by air flow. Do not install the sensor on a steep slope or in a sheltered hollow unless it is typical of the area or unless data from that type of site are desired. When possible, the shelter should be no closer than **four times the height of any obstruction** (tree, fence, building, etc.). The sensor should be at least **100 feet from any paved or concrete surface.**

Precipitation gauge siting: The exposure of a rain gauge is very important for obtaining accurate measurements. Gauges should not be located close to isolated obstructions such as trees and buildings, which may deflect precipitation due to erratic turbulence. **To avoid wind and resulting turbulence problems, do not locate gauges in wide-open spaces or on elevated sites, such as the tops of buildings.** The best site for a gauge is one in which it is protected in all directions, such as in an opening in a grove of trees. The height of the protection should not exceed twice its distance from the gauge. As a general rule, the windier the gauge location is, the greater the precipitation error will be.

NWS MOBILE WEATHER FOR THE I-PHONE and ANDROID PHONES TOO

It's not an App but it looks and acts like one! You can check it out at: https://mobile.weather.gov

GOT SLEET or HAIL?

If you observe winter time sleet, also known as ice pellets (IP), please report this in the Snow, Ice Pellets, and/or Hail column on your B91 form. And check off the IP (for ice pellets) box in the Observed Weather

part of the B91. If your observation of IP doesn't measure 0.1" or more, then report a T (for trace) in the column for Snow, Ice Pellets, and/or Hail.

Also, if you observe summertime hail, please report this in the Snow, Ice Pellets, and/or Hail column of your B91. And check off the H (for hail) box in the Observed Weather part of the B91. If your observation of hail doesn't measure 0.1" or more, then report a T (for trace) in the column for Snow, Ice Pellets, and/or Hail.

OBSERVATIONS TAKEN LATER/EARLIER THAN SCHEDULED

If you happen to take your observation later than, or perhaps earlier than, your scheduled time, please note this in remarks. We understand that life and your primary work take priority, but noting in remarks when your observation is taken at a different time would help greatly with our daily and monthly quality control of your data. Case in point: It's raining at the time of your 7am observation and you prefer to wait it out before going outside to measure the rainfall. The rain stops at 10am after which you go outside to measure. You indicate this amount on the day you took the observation. But on the following day at 7am you report 0.00 inches of 24-hour rainfall while other neighboring Coop observers report measurable rainfall. It appears from our end that your report of 0.00 inches of rainfall is erroneous. But if you had noted in remarks that you took the previous day's observation at 10am, we would understand that your 0.00 report the following day was correct.

DERIVATION OF THE TERM POSH

The definition of the word "posh" means elegant, fashionable, or typical of or intended for the upper classes. But its derivation comes from the acronym P.O.S.H. which stands for: Port Out, Starboard Home. Facing the front (bow) of a boat, the port side is on the left while the starboard side is on the right. In the early days of boat travel from Europe to the United States, the upper class passengers preferred to book roundtrip passage with a state room on the Port side from Europe to the United States (facing south toward the warmth of the sun), and Starboard heading home (facing south). Thus their travel documents would be stamped "P.O.S.H." Today you can be and dress posh without ever having to book passage on a boat!

COOP OBSERVING SOP

Before Art Reynolds, Public Works Supervisor at the Foxborough Water and Sewer Department, retired he asked for an observing handbook for his operators. Art thought it would be good to have a standard operating procedure (SOP) in place for new recruits as well as seasoned operators. Thanks to Art we developed a Coop Weather Observing SOP. See the end of this newsletter after the recognition of awards section. Hopefully you'll find it useful!

CONFIRMED TORNADOES NEAR  ***SOME OF OUR COOP SITES:***

EF Scale:
The Enhanced Fujita Scale classifies tornadoes into the following categories:

EF0...Weak.....65 to 85 mph
EF1...Weak.....86 to 110 mph
EF2...Strong....111 to 135 mph
EF3...Strong....136 to 165 mph
EF4...Violent...166 to 200 mph
EF5...Violent...>200 mph

Confirmed Tornadoes near Northbridge, MA Coop Site

Public Information Statement
National Weather Service Boston/Norton MA
515 PM EDT Thu Jul 26 2018

...NWS DAMAGE SURVEY FOR JULY 26 2018 TORNADO EVENT...

The National Weather Service confirmed two tornadoes in Worcester County which touched down early this morning. Both tornadoes occurred from the same parent thunderstorm cell.

.Tornado from Douglas, MA to Northbridge, MA...

Start Location...eastern Douglas in Worcester County, MA
End Location...southern Northbridge in Worcester County, MA
Date...July 26, 2018
Estimated Time...232 AM
Maximum EF-Scale Rating...EF-1
Estimated Maximum Wind Speed...100 mph
Maximum Path Width...200 yards
Path Length...4.4 miles
Beginning Lat/Lon...42.053 North, 71.698 West
Ending Lat/Lon...42.109 North, 71.656 West
* Fatalities...None
* Injuries...None

...Summary...
The first tornado touched down just south of Maple Street in East Douglas, where it produced most of its damage. The tornado tracked northeastward across Route 146 in the north westernmost portion of Uxbridge, then crossed Sutton Street and headed into the southern part of Northbridge, where it lifted up near the Northbridge Middle School. The tornado was on the ground for 4.4 miles. The path width was maximized at 200 yards in East Douglas and became narrower in Uxbridge and Northbridge.

On Maple Street, just west of Monroe Street in East Douglas, numerous large maple and oak trees were downed. Many were uprooted or snapped mid-way up. Some trees landed on homes. There was well-defined evidence of convergence in the way that the trees fell. Eyewitnesses heard a loud roar for about 30 seconds. Thankfully no injuries occurred.

Wind speeds were estimated at 100 mph, which is an EF-1 ranking on the Enhanced Fujita Scale, in East Douglas. Winds were estimated at 80 mph in Uxbridge and Northbridge, which is an EF-0 ranking on the Enhanced Fujita Scale.

.Tornado in Upton, MA...

Start Location...western Upton in Worcester County, MA
End Location...western Upton in Worcester County, MA
Date...July 26, 2018
Estimated Time...241 AM
Maximum EF-Scale Rating...EF-1
Estimated Maximum Wind Speed...100 mph
Maximum Path Width...100 yards
Path Length...1.0 mile
Beginning Lat/Lon...42.167 North, 71.627 West
Ending Lat/Lon...42.181 North, 71.620 West
* Fatalities...None
* Injuries...None

...Summary...
The same parent storm dropped a second tornado in the town of Upton, MA. It touched down on Hartford Avenue South, just south of the railroad tracks in West Upton. The tornado crossed Route 140 and produced most of its damage in the neighborhood of Ephram's Way, between Jonathan’s Way and Warren Street. The tornado tracked a little farther to the northeast into the southwest portion of the Upton State Forest before it lifted.

Winds were estimated at 70 to 80 mph near the railroad tracks where it began, or EF-0 on the Enhanced Fujita Scale. However, it intensified to approximately 100 mph when it approached Ephram's Way, which is EF-1 on the Enhanced Fujita Scale. Large oak and maple trees were uprooted and some were snapped. Some trees fell onto houses, causing some roof damage. One roof on Route 140 was damaged when the strong winds got underneath it and flipped a portion of it over. No injuries were reported.

The National Weather Service in Norton, MA would like to express its sincere appreciation to all of the towns' Fire and Police Departments for their help with this survey and to the Massachusetts Emergency Management Agency for all of their assistance with this survey, including personally escorting us to the most severely damaged areas. We thank the residents who allowed us to view the damage in their backyards and listen to their accounts of the event. And, we would like to thank our Skywarn amateur radio coordinators for their detailed information in helping to pinpoint the damage locations.

* The information in this statement is preliminary and subject to change pending final review of the events and publication in NWS Storm Data.

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Field/Notchey

Confirmed Tornadoes near West Thompson Lake, CT Coop Site

Public Information Statement
National Weather Service Boston/Norton MA
1208 PM EDT Mon Aug 6 2018

...NWS DAMAGE SURVEY FOR THE AUGUST 4TH 2018 TORNADO EVENT...

The National Weather Service confirmed two tornadoes in Windham County Connecticut and southern Worcester County Massachusetts which touched down Saturday morning August 4, 2018. Both tornadoes occurred from the same parent thunderstorm cell.

.Tornado from Woodstock to Quinebaug / Thompson, CT...

Start Location...Northern Woodstock in Windham County, CT
End Location...Quinebaug area of Thompson in Windham County, CT

Date...August 4, 2018
Estimated Time...936 AM to 940 AM EDT
Maximum EF-Scale Rating...EF-0
Maximum Wind Speed...80 mph
Maximum Path Width...8 yards
Path Length...5 miles but discontinuous
Beginning Lat/Lon...42.0000 N / 72.0334 W
Ending Lat/Lon...42.0192 N / 71.9397 W
* Fatalities...0
* Injuries...0

...Summary...
A National Weather Service survey team concluded that a weak, narrow tornado touched down in the northern portion of Woodstock, CT. It continued east-northeastward on a discontinuous path for approximately five miles into a portion of Quinebaug in Thompson, CT. It then lifted. The tornado was only 8 yards wide. It was on the ground, in a discontinuous path, from 936 AM to 940 AM EDT. There were no injuries reported.

The tornado was ranked EF-0 on the Enhanced Fujita Scale, with maximum winds estimated at 80 mph. It touched down on Redhead Hill Road where it sliced a single, healthy oak tree in half and flattened small portions of two separate corn fields. The corn was laid down in different directions. A woman saw swirling of trees and other debris as it occurred, despite it being enshrouded in rain. She had heard the Tornado Warning on her cell phone just before the damage occurred. Additional isolated tree damage was spotted on Watson Road, near Green Acres Lane in Quinebaug, in the northwest portion of Thompson, CT.

.Tornado from Dudley to Webster, MA...

Start Location...Dudley in Worcester County, MA
End Location...Webster in Worcester County, MA
Date...August 4, 2018
Estimated Time...948 AM to 949 AM EDT
Maximum EF-Scale Rating...EF-1
Estimated Maximum Wind Speed...110 mph
Maximum Path Width...300 yards
Path Length...0.5 miles
Beginning Lat/Lon...42.0454 N / 71.8912 W
Ending Lat/Lon...42.0511 N / 71.8849 W
* Fatalities...0
* Injuries...1

...Summary...
The National Weather Service (NWS) surveyed damage in the Massachusetts towns of Dudley, Webster, Sutton, and Grafton. We concluded that a high-end EF-1 tornado on the Enhanced Fujita Scale struck Dudley and Webster, with the most significant damage in Webster. Maximum wind speeds there were estimated at 110 mph. The tornado was 300 yards wide and traveled 0.5 miles in length from 948 AM to 949 AM. Tree damage in Sutton and Grafton was not indicative of a tornado. All of the damage was the result of the same storm that produced the EF-0 tornado in northeast Connecticut.

In just a couple of minutes, it wreaked havoc in the easternmost part of Dudley from roughly Route 12 (Schofield Avenue) to west of Laprise Court northeastward onto Main Street in Webster, and lifted near the French River by Oxford Avenue. Many trees were snapped and debarked. In Webster, a gas station overhang was twisted. An old brick rooftop was damaged, with bricks having fallen onto Main Street. The rubber roof covering of another building was peeled completely off. Windows were blown out at a business on Main Street and the street was littered with broken glass. The side walls of an apartment complex were bent slightly outward toward the tornado. Window screens were sucked outward. A car windshield and side mirror was damaged. There were other reports of trees fallen onto cars. Utility poles were snapped and numerous wires were downed.

Initially, a Severe Thunderstorm Warning was issued 17 minutes before the damage occurred. It was upgraded to a Tornado Warning 13 minutes prior to the tornado touchdown in Dudley.

Tornado Warnings trigger Wireless Emergency Alerts and nearly everyone we spoke to had heard the warning via their cell phones well in advance. This undoubtedly played a big role in the fact that there were no fatalities. According to media reports there was one minor injury when an automobile was struck by falling debris.

The NWS would like to thank many people for their assistance with conducting this survey. In particular, special thanks to the Amateur Radio Skywarn Operators, who accurately and quickly found the damaged areas and helped link up the NWS with on-scene State Emergency Management officials. We would like to thank the Massachusetts Emergency Management Agency for patiently driving the survey team from Woodstock, CT through Sutton, MA. The Connecticut Department of Homeland Security and Emergency Management also helped us by having their Region IV Director travel with the team. The Emergency Management Directors and fire and police officials in the aforementioned towns were very helpful as well. We would especially like to thank the people who took time out to speak with us and allow us to photograph their damaged property.

* The information in this statement is preliminary and subject to change pending final review of the events and publication in NWS Storm Data.

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Field/Cadima

Confirmed Tornado near Woods Hole Golf Club, MA Coop Site

Public Information Statement
National Weather Service Boston/Norton MA
454 PM EDT Mon Oct 29 2018

...NWS DAMAGE SURVEY FOR 10/29/18 TORNADO EVENT...

.EF-0 Tornado Confirmed in Woods Hole MA...

Start Location...Woods Hole in Barnstable County MA
End Location...Woods Hole in Barnstable County MA
Date...10/29/18
Estimated Time...958 AM EDT
Maximum EF-Scale Rating...EF0
Estimated Maximum Wind Speed...60-65 mph
Maximum Path Width...10 yards
Path Length...0.1 miles
Beginning Lat/Lon...41.5303N / 70.6680W
Ending Lat/Lon...41.5303N / 70.6680W
* Fatalities...0
* Injuries...0

...Summary...
A National Weather Service Storm Survey concluded that a waterspout in Vineyard Sound came ashore in Woods Hole MA and then quickly dissipated. Eyewitness reports at The Woods Hole Golf Club indicated four large wooden chairs were lofted into the air, swirled around and were thrown 500 feet away onto a tennis court. There was no other damage. At the same time, two nearby weather stations reported wind gusts of 56 mph and 65 mph.

The National Weather Service would like to thank The Massachusetts Emergency Management Agency, Falmouth Fire Department, and Skywarn Amateur radio operators for their assistance.

* The information in this statement is preliminary and subject to change pending final review of the event and publication in NWS Storm Data.

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GAF/HMF/JWD

Confirmed Tornadoes near West Harwich, MA Coop Site

Public Information Statement
National Weather Service Boston/Norton MA
359 PM EDT Wed Jul 24 2019

...NWS DAMAGE SURVEY FOR 07/23/19 TORNADO EVENTS...

...Overview...

A National Weather Service damage survey concluded that two tornadoes touched down on Cape Cod on Tuesday, July 23.

A long-lived supercell thunderstorm produced waterspouts on both Vineyard Sound and Nantucket Sound. One of these moved onshore as a tornado just west of Kalmus in Barnstable, MA. It had a discontinuous path and lifted in South Yarmouth, MA. The same storm produced a second tornado in Harwich, MA a few minutes later. Straight-line wind damage was observed in Dennis, MA and in Chatham, MA.

.Barnstable and Yarmouth Tornado

Start Location...Just west of Kalmus in Barnstable County MA
End Location...South Yarmouth in Barnstable County MA
Date...07/23/2019
Estimated Time...11:57 AM EDT to 12:07 PM EDT
Maximum EF-Scale Rating...EF1
Estimated Maximum Wind Speed...110 mph
Maximum Path Width...250.0 yards
Path Length...5.52 miles discontinuous
Beginning Lat/Lon...41.6354 / -70.2841
Ending Lat/Lon...41.6769 / -70.1961
* Fatalities...0
* Injuries...0

...Summary...
A waterspout moved onshore just west of Kalmus, MA at 1157 AM. Winds gusted to 91 mph at a mesonet observation site. They had shifted from southeast to west-northwest with the passage of the tornado. The tornado continued moving northeastward at about 35 mph. The damage was discontinuous but where the tornado touched down, the damage was quite significant, with winds estimated as high as 110 mph, which is on the high end of the Enhanced Fujita Scale EF-1 ranking.

The roof of a motel on the south side of Main Street in West Yarmouth was completely peeled off. Additional significant tornado damage occurred just southwest of the Dennis-Yarmouth Regional High School, particularly along Hazelmoor Road from Violet Glen Road to Vine Brook Road. Dozens of large trees were uprooted and a few were snapped off. A house had shingles blown off. Another house had a hole in the roof from a fallen tree.

The tornado then lifted, however severe straight-line wind damage was observed from West Dennis eastward to West Harwich. Numerous large trees were uprooted, consistent with 90 mph gusts or greater.

No injuries were reported with this storm.

.Harwich Tornado...

Start Location...1 SSW Harwich in Barnstable County MA
End Location...2 ENE Harwich in Barnstable County MA
Date...07/23/2019
Estimated Time...12:10 PM EDT to 12:15 PM EDT
Maximum EF-Scale Rating...EF1
Estimated Maximum Wind Speed...110 mph
Maximum Path Width...250.0 yards
Path Length...2.77 miles
Beginning Lat/Lon...41.6851 / -70.0789
Ending Lat/Lon...41.7005 / -70.0299
* Fatalities...0
* Injuries...0

...Summary...
The same supercell storm that produced the Barnstable-Yarmouth tornado went on to touch down again near the center of Harwich, MA at 1210 PM. The initial touchdown was just east of Harwich Elementary School, just south of Parallel Street. It moved northeast through Harwich Center, passing just south of a golf course, and lifted in East Harwich in the vicinity of Queen Anne Road. At least 150 hardwood trees were either uprooted or snapped. A few homes also had shingles that were ripped off. Wind gusts were estimated as high as 110 mph, which is on the high end of the Enhanced Fujita Scale EF-1 ranking. The tornado then lifted, however severe straight-line wind damage was observed in Chatham. Numerous large trees were uprooted, consistent with 90 mph gusts or greater.

No injuries were reported with this storm.

* The information in this statement is preliminary and subject to change pending final review of the events and publication in NWS Storm Data.

The National Weather Service would like to extend its appreciation to the Massachusetts Emergency Management Agency, local emergency management, police and fire departments, Skywarn amateur radio and trained spotters, and the general public for help in completing this survey.

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AED/BW/WS/GAF/JWD

Public Information Statement
National Weather Service Boston/Norton MA
505 PM EDT Mon Jul 29 2019

...NWS HAS DETERMINED THAT A THIRD TORNADO OCCURRED ON CAPE COD ON 7/23/19.

.WEST YARMOUTH, MA TORNADO...

Start Location...West Yarmouth in Barnstable County MA
End Location...West Yarmouth in Barnstable County MA
Date...July 23 2019
Estimated Time...1200 PM to 1201 PM
Maximum EF-Scale Rating...EF1
Estimated Maximum Wind Speed...90 mph
Maximum Path Width...50 yards
Path Length...0.25 miles
Beginning Lat/Lon...41.6453/-70.2490
Ending Lat/Lon...41.6758/-70.1992
* Fatalities...0
* Injuries...0

...Summary...
Based on additional information provided by TV meteorologists, residents, and Skywarn amateur radio, the National Weather Service has determined that there was an additional tornado in West Yarmouth on July 23. This brief and narrow tornado was on the ground at the same time as another tornado...previously documented...was moving toward South Yarmouth.

The tornado touched down on Yacht Avenue and Schooner Street in West Yarmouth and traveled east approximately one-quarter mile before lifting on Egg Harbor Road, just after Pine Cone Drive. The path width was approximately 50 yards. Numerous pine trees were snapped near their bases. Tree tops appeared twisted. Residents reported seeing swirling motion. NWS Doppler Radar showed a tornado debris signature with this storm, indicating that some trees and branches were lofted into the air. This tornado was only on the ground for one minute, between Noon and 1201 PM. It lifted as it approached the south end of the Bass River.

Although a brief and very shallow waterspout was observed over the southern part of the Bass River, the damage in West Dennis just to the east of Wrinkle Point was considered to be from strong straight line downburst winds.

It should be noted that prior to the three July 23rd tornadoes, there had been only three documented tornadoes on Cape Cod. These were on Oct. 29 2018 (EF0 in Woods Hole)... Aug. 22 1977 (F1 at Hyannis/Barnstable Airport)... and Aug. 9 1968 (F1 in vicinity of Sandwich).

* The information in this statement is preliminary and subject to change pending final review of the event and publication in NWS Storm Data.

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GAF/JWD/AJN/AED/WS

FROM THE DESK OF MATT SPIES
-Connecticut State Coordinator for CoCoRaHS

(CoCoRaHS is an acronym that stands for the Community Collaborative Rain, Hail and Snow Network)

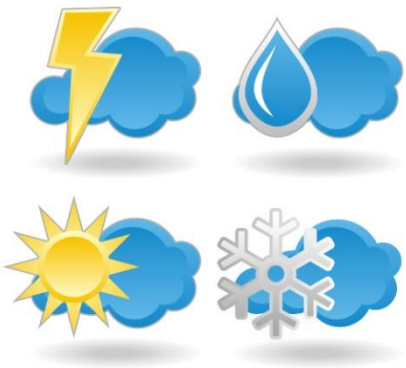
How Does Your 4-inch Rain Gauge Work?

When it rains, your gauge measures the amount of precipitation that falls through the area at the top of the gauge. When you read the gauge, you measure the depth of water that has fallen through the area and accumulated in the bottom, that is the depth of water.

How, you may ask, can this gauge work properly if the inner tube is 10 inches long but only records 1 inch depth of water? The reason has to do with accuracy. The National Weather Service (NWS) has adopted the criteria that the gauge should be able to measure to an accuracy of 0.01". The problem with a gauge that's 4" (CoCoRaHS) or 8" (NWS standard) in diameter, is that it's nearly impossible to read the depth to an accuracy of 0.01". That's where the funnel and inner tube come into play.

The funnel of the CoCoRaHS gauge squeezes the water into the area of the inner tube, which is 1/10th of the area of outer cylinder (The NWS 8-inch gauge has a similar funnel and inner tube). By reducing the area that the water falls into, the depth can be stretched by the same factor of 10. In this way, the total volume of water (area times depth) that fell through the top of the gauge and the total volume in the inner tube are the same. This stretching allows us to read the depth of water to an accuracy of 0.01".

Incidentally, the Fort Collins, Colorado weather station has a CoCoRaHS and NWS gauge, 4-inch and 8-inch respectively, side-by-side and has been keeping track of their measurements for a number of years. The results show that both gauges record very similar amounts of precipitation. You can view the abstract from the American Meteorology Society (AMS) 15th Conference on Applied Climatology/13th Symposium on Meteorological Observations and Instrumentation (2005): "GAUGE".



TIPS from NWS NORTON/BOSTON for CoCoRaHS OBSERVERS

If you are a Coop Observer ***and*** a CoCoRaHS Observer, it is important that your data entries for both mirror one another. For example, if you report a multi-day precipitation value in WxCoder, you must do the same in CoCoRaHS. When you don't, the National Centers for Environmental Information (where your data gets archived) flags your data and corrections must be made. Moral of the story, ensure your Coop data is "matchy matchy" with your CoCoRaHS data.

WE SAY GOODBYE

The following Coop Observers have retired after many years of recording climate at their stations. We truly appreciate their service and contributions to climate:

Robert Famiglietti
Arboretum Greenhouse Horticultural Technologist at The Arnold Arboretum of Harvard University, Dana Greenhouse
– Jamaica Plain, MA
-25 year Length of Service Award

Michael S. Jezak
– Tiverton, RI
-retired June 30, 2019

WE WELCOME

We welcome our newest Coop Observers who have stepped forward and are willing to be the daily eyes and ears for weather in their communities:

Mark Alan Lovewell
– Vineyard Haven, MA
-began August 1, 2018

Note about Mark: He is also the long standing Coop Observer from Edgartown, MA (also on Martha's Vineyard) where he has been observing since June 1, 1982.

WE RECOGNIZE

Thanks to all of you for your dedication and interest in weather data collection. Your daily efforts are much appreciated. Look ahead to view a number of fellow Coop Observers that have received length of service awards. Those not pictured but who received awards are as follows:

Individual Awards:

Francis Simison
Chief Operator at the City of Brockton Advanced Water Reclamation Facility
– Brockton, MA
-35 year Length of Service Award

Robert Melancon
Treatment Plant Operator at New Bedford Water Department Quittacas Water Treatment Plant
– Rochester, MA
-30 year Length of Service Award

Emanuel Aurelio
Treatment Plant Operator at New Bedford Water Department Quittacas Water Treatment Plant
– Rochester, MA
-30 year Length of Service Award

Mike Ziegenhagen
Caretaker 2 at the City of New Britain Board of Water Commissioners
– New Britain, CT
-25 year Length of Service Award

Donald F. Ives
– Worthington, MA
-25 year Length of Service Award

Rich Lucia
Chief Observer at the Hartford-Bradley International Airport
– Bradley, CT
-20 year Length of Service Award

Rich Chase
Chief Water Operator at the Whitinsville Water Company
– Northbridge, MA
-20 year Length of Service Award

Steve Pingree
Electrician at the City of Haverhill Wastewater Division
– Haverhill, MA
-20 year Length of Service Award

Timothy Russell
Project Manager with the U.S. Army Corps of Engineers
– Buffumville Lake, MA
-20 year Length of Service Award

David Castenara
Treatment Plant Operator at the City of Westfield Water Treatment Facility
– Westfield, MA
-20 year Length of Service Award

Maureen Dowdey
Accounts Payable Clerk at the Whitinsville Water Company
– Northbridge, MA
-15 year Length of Service Award

Mike Bumpus
Superintendent at the Middleboro Water Department
– Middleboro, MA
-15 year Length of Service Award

Michael Bouchard
Operator at the Woonsocket Water Treatment Plant
– Woonsocket, RI
-15 year Length of Service Award

Cathy St. Andre
Park Ranger with the U.S. Army Corps of Engineers
– West Thompson Lake, CT
-15 year Length of Service Award

Eleanor Linkkila
– Hampton, CT
-15 year Length of Service Award

Jason Robinson
Park Ranger with the U.S. Army Corps of Engineers
– Buffumville Lake, MA
-15 year Length of Service Award

John Arthur Young
Weather Observer at T.F. Green Airport
– Providence, RI
-15 year Length of Service Award

Claudia Tabares
Weather Observer at T.F. Green Airport
– Providence, RI
-15 year Length of Service Award

James Chartier
Weather Observer at T.F. Green Airport
– Providence, RI
-15 year Length of Service Award

Frank Acropolis
Weather Observer at T.F. Green Airport
– Providence, RI
-10 year Length of Service Award

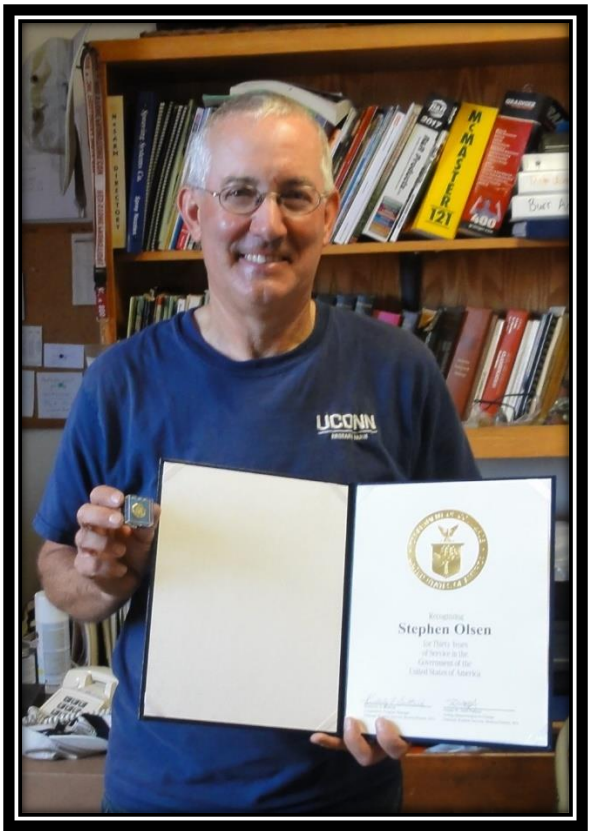
Augustin Busschaert
Weather Observer at T.F. Green Airport
– Providence, RI
-10 year Length of Service Award

John Flynn
Weather Observer at T.F. Green Airport
– Providence, RI
-10 year Length of Service Award

Kenneth Cavanaugh
Operator at the Danvers Water Treatment Plant
– Middleton, MA
-10 year Length of Service Award

Michael Ryder
Upper Air Weather Observer at the NWS Meteorological Observatory
– Chatham, MA
-10 year Length of Service Award

Mark Alan Lovewell (pictured right) of Martha's Vineyard, MA received a 35 year Length of Service Award for his years of observing from Edgartown, located on the southeast side of the island. Not only does Mark observe from the southeast side of Martha's Vineyard, but he also observes from a new site established in Vineyard Haven, located on the north side of the island. Thank you Mark!



On July 24, 2018, Stephen Olsen, pictured left, was presented with a 30 year Length of Service award. Steve is a Research Farm Manager with the University of Connecticut College of Agriculture & Natural Resources, Department of Plant Science located in Storrs, CT. The Storrs site has the distinction of being part of our Nation's Historical Climate Network, with weather records dating back to June 1, 1888!

On June 18, 2018 Bob Rochefort (pictured right), an operator at the Woonsocket Water Treatment Plant located Woonsocket, RI received a 30 year Length of Service Award from Kim Buttrick (pictured left) and Bill Simpson (who took the picture). One can always find common ground with people. Besides having an interest in weather and climate as common ground, Bob and Kim also share the same birthday – February 3!

On June 25, 2019, the Lead Operator at Milford Water, Jeff Papuga (pictured left), was presented with a 20 year Length of Service Award. Operator Eric Bassett (pictured right) joined in for the photo op! Milford Water has weather records dating back to 1884. That's 125 years of weather data from Milford, MA! Thanks to Jeff and crew for adding to the esteemed climate record.

On October 19, 2018 Treatment Plant Operators from the City of Westfield Water Treatment Facility received length of service awards from Bill Simpson. Pictured left is Kent Markel with a 15 year Length of Service Award and pictured right is Robert Hartman with a 20 year Length of Service Award. Many thanks to the treatment plant operators from Westfield, MA!

On June 25, 2019, Water Operator Roland Roy (pictured right) of the Whitinsville Water Company, received a 15 year Length of Service Award. Whitinsville, MA is also known as the Northbridge climate station. Pictured with Roland is Maureen Dowdy. Maureen works the front office as the Accounts Payable Clerk. She also ensures the weather data taken by the operators is correctly entered into WxCoder each month. Weather observing is a team effort at the Whitinsville Water Company!

Edward Harris IV ("Eddie"), pictured right, Chief Observer at T.F. Green Airport, RI (aka Providence Airport) received a 15 year Length of Service award on July 1, 2019. Eddie started his career in weather when he enlisted in the Navy from his hometown in Mount Laurel, NJ. After basic training, Eddie's first assignment was to Keesler Air Force Base (AFB), MS where he studied to become a weather observer. Keesler AFB has trained many enlisted weather observers whether Navy, Air Force or Marines. Thank you Eddie for your service to our Nation and for your service at Providence Airport!

In April 2019, Mike Coulombe (pictured left), Lead Plant Operator at the Greenfield Water Facilities Division in Greenfield, MA received a 10 year Length of Service award. Weather records date back to May 1, 1967 from the town of Greenfield. Many thanks to Mike and crew for continuing a long climate record spanning more than 50 years!

In March 2019, David Poulin (pictured left) received a 10 year Length of Service award. Dave is a Sewage Treatment Plant Operator at the Bridgewater Correctional Complex – Water Pollution Control Facility – in Bridgewater, MA. Frank Crofton (pictured right), the Plant Manager joined in on the celebration!

Thanks to all of You!

CONTACT INFORMATION

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COOP WEATHER OBSERVING

STANDARD OPERATING PROCEDURES

WHAT IS THE DAILY WEATHER OBSERVATION AT A COOP SITE?

The weather observation is conducted daily at a specified time – 7 days a week, 365 days a year. It is a snapshot of the weather over the past 24 hours at the Coop station. The weather elements observed are:

- Temperature (maximum, minimum, current) – measured in whole degrees Fahrenheit
- Rainfall (which includes melted winter time precipitation) – measured in hundredths of an inch
- Snowfall – measured in tenths of an inch
- Snow depth – measured to the nearest whole number

These elements are recorded on a National Weather Service Form B-91. Below is an example of a digitized Form B-91 from Foxboro, MA during the month of February 2015:

STATION (Climatological): Foxboro | (River Station, if different) | MONTH: Feb 2015

STATE: MA | COUNTY: Norfolk | RIVER

TIME (local) OF OBSERVATION RIVER | TEMPERATURE: 07:30 | PRECIPITATION: 07:30 | STANDARD TIME IN USE

TYPE OF RIVER GAGE | ELEVATION OF RIVER GAGE ZERO | FLOOD STAGE | NORMAL POOL STAGE

WS FORM B-91 (03-09) — U.S. DEPARTMENT OF COMMERCE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

DATE	TEMPERATURE: 24 HRS ENDING AT OBSERVATION MAX	TEMPERATURE: 24 HRS ENDING AT OBSERVATION MIN	TEMPERATURE: AT OBSN	PRECIPITATION: 24 HR AMOUNTS: Rain, melted snow, etc. (in and hundredths)	PRECIPITATION: 24 HR AMOUNTS: Snow, ice pellets, hail (ins and tenths)	PRECIPITATION: AT OB: Snow, ice pellets, hail ice on ground (in)	PRECIPITATION: Draw a straight line (-------) through hours precipitation was observed, and a wavy line (~~~~~~~) through hours precipitation 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.)	WEATHER (Observation Day) Mark 'X' for all types occurring each day: Fog	Ice pellets	Glaze	Thunder	Hail	Damaging winds	Time of occurrence if different from above	RIVER STAGE: Condition	Gage reading at ___ AM	Tendency	REMARKS (SPECIAL OBSERVATIONS, ETC.)
1	21	8	15	0.00	0.0	18											
2	31	14	15	0.42	5.0	21											
3	30	4	5	0.83	10.0	25											0.20 H2O but too low.
4	22	5	20	0.00	0.0	18											
5	38	M	33	T	T	18											
6	33	1	4	0.09	2.0	18											
7	21	4	21	0.00	0.0	18											
8	27	21	27	0.26	2.0	20											
9	30	12	15	0.33	4.0	22											
10	18	13	16	0.57	8.0	29											
11	29	13	18	T	T	28											
12	20	5	14	T	T	28											
13	29	5	5	T	T	28											
14	18	-7	0	0.00	0.0	23											
15	25	-1	18	0.52	11.0	30											
16	19	-2	5	0.15	3.5	29											
17	19	5	10	0.00	0.0	26											
18	21	8	9	0.04	1.5	26											
19	29	8	20	0.08	2.0	27											
20	26	1	3	0.00	0.0	26											
21	16	-5	9	0.00	0.0	25											
22	33	9	33	0.44	1.5	26											
23	40	10	24	0.00	0.0	25											
24	24	-6	-3	0.00	0.0	25											
25	18	-3	4	0.07	2.0	27											
26	34	4	17	0.00	0.0	26											
27	21	0	9	T	T	26											
28	27	0	3	0.00	0.0	25											
29																	
30																	
31																	
	25.7	4.7	SUM	3.80	52.5		CHECK BAR (for wire weight) NORMAL CHECK BAR										

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice
B. Frozen, but open at gage
C. Upper surface smooth ice
D. Ice gorge above gage
E. Ice gorge below gage
F. Shore ice
G. Floating ice
H. Pool stage

READING	DATE

Fog	Ice pel	Glaze	Thund	Hail	Dam winds

OBSERVER: Closed by WFO BOX (wfobox) on 25 Mar 2015 03:06PM

SUPERVISING OFFICE: BOX Taunton | STATION INDEX NO.: 19-2913-02

EQUIPMENT USED TO REPORT THE DAILY WEATHER
and
PROCEDURES ON HOW TO TAKE THESE MEASUREMENTS

Temperature:

1) An electronic Maximum/Minimum Temperature System (MMTS)

The MMTS consists of a sensor on a pole with a coaxial cable connected from the sensor to a Nimbus readout display. The Nimbus always displays the current temperature.

Pictured left is a sensor on a galvanized pole. Pictured below is a Nimbus readout display which always displays the current temperature.

Procedures for observing temperature using the MMTS:

The Nimbus unit remembers the highest and lowest temperature for the period since it was last reset. **To determine the maximum and minimum readings, push the Recall button to the right of the display and hold it.** The display will alternate between the highest temperature and the lowest temperature since last reset. Once the high and low are noted, as well as the current temperature, reset the display. **To reset the display, push the Clear button and wait for about 6 seconds until "E2E.2" is displayed.** "E2E.2" signals the unit has been reset. If you were to

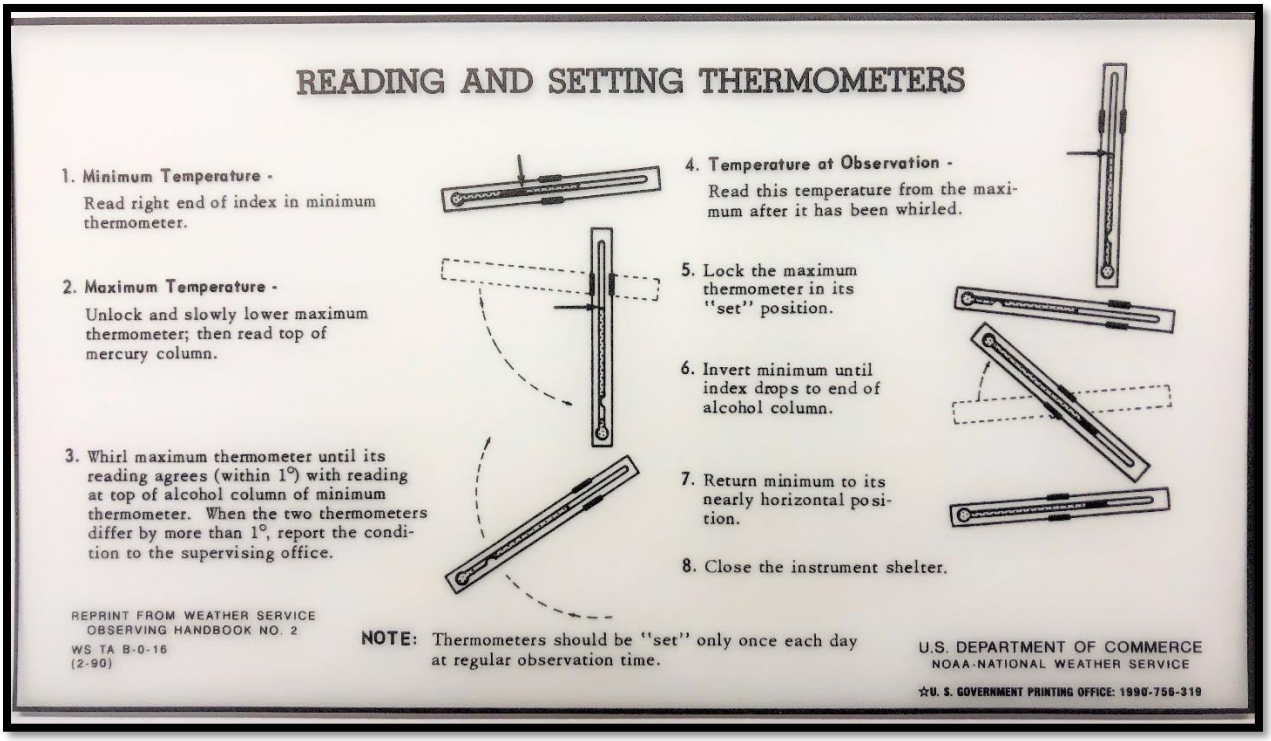
press the recall button right after you have reset the unit, both the maximum and minimum temperature readings should be the same.

2) Liquid in glass (LIG) thermometers

The LIG thermometers are housed in a Cotton Region Shelter (CRS), pictured below left, which provides a shaded, well-ventilated area for maximum and minimum thermometers used to acquire daily temperature extremes.

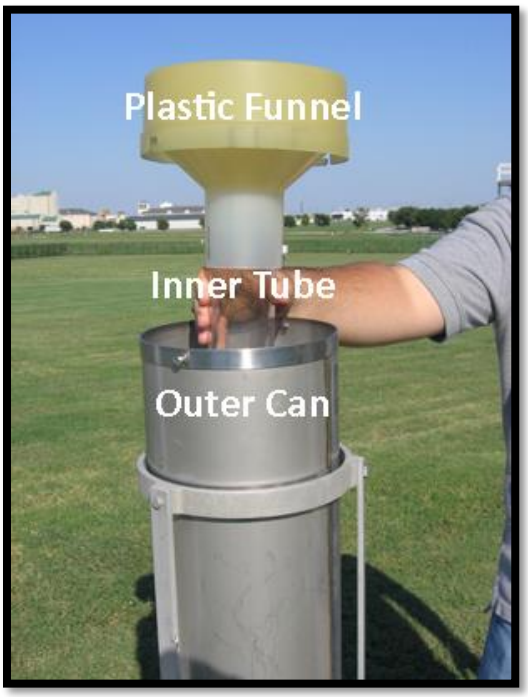
Pictured below right shows the thermometers inside the CRS which are attached to what is called a Townsend Support. The minimum thermometer is a long tubular glass filled with alcohol whereas the maximum thermometer is made of a long tubular glass filled with mercury. The minimum thermometer is mounted on the above bracket and is sloped slightly down to the left while the maximum thermometer is mounted on the lower bracket and is sloped slightly up to the left.

Procedures for observing temperature using LIG thermometers:



Rainfall: 8 inch Standard Rain Gauge (SRG)
(The diameter of the can is 8-inches - thus the name.)

The SRG consists of an overflow can (aka outer can), inner tube, funnel, precipitation stick and tripod.



Pictured left is the SRG seated in the tripod.

Pictured below is a precipitation stick with numbers hatched in hundredths of an inch.

Procedures for measuring rainfall:

Use the precipitation stick to measure rainfall collected in the SRG. You measure and report precipitation amounts in hundredths of an inch. Rainfall falls into the funnel and is funneled down into the inner tube. The precipitation stick is used like a dipstick and placed into the funnel, down into the inner tube. Any rainfall in the inner tube will darken the stick, which is hatched in hundredths of an inch, so that when you pull the stick out you'll be able to measure how much rain fell.

The inner tube is 20 inches high and can collect up to 2.00 inches of water. Any rainfall that occurs that is more than 2.00 inches will cause the inner tube to overflow into the outer can - thus the name "overflow can." If you ever measure exactly 2.00 inches of rain from the SRG at the time of your observation, check the overflow can to see if additional rainfall collected there. If there is additional rainfall in the overflow can, pour this into the inner tube then measure with the precipitation stick. This additional amount is added to your initial measurement of 2.00 inches.

While the inner tube can hold up to 2.00 inches of water, the overflow can has the capacity to hold 20.00 inches of water.

Pictured left is an observer measuring rainfall from the SRG.

Snowfall: *Snow Stick*

Snowfall is measured using a snow stick (pictured below left) with numbers hatched in tenths of an inch. An observer (pictured below right) is using a snow stick to measure new snowfall.

Procedures for measuring snowfall:

Use the snow stick to measure snowfall. The snow stick is hatched in tenths of an inch which is how you measure and report new snowfall. Before the onset of snow, ensure you have a cleared area where snowfall can accumulate and be measured, such as on a snow board. Measure new snow on your 16" by 24" snow board (pictured right).

To measure 24 hour snowfall:

Step 1: Place your snowboard in a large open area away from any obstructions. Be sure to mark its location, for example, with a flag.

Step 2: After a 24 hour period measure the frozen precipitation on top of the snowboard. Report an estimate if you believe some of the snow on your snowboard melted before observation time.

Step 3: Reset your snowboard on top of the freshly fallen frozen precipitation near your original snowboard placement location.

BEWARE: Of issues of melting and settling. Measure frozen precipitation immediately after the end of an event, if possible.

WHAT IF…

1. It only flurried and there was no accumulation?

   Place "T" for liquid and snowfall, zero for snow depth

2. Frozen precipitation fell but it was blown off the snowboard?

   Measure an average representative snow depth around your observation site and subtract the previous day snow depth. For example, you had 5.2 inches of snow on the ground yesterday, and now you have 7.4, your snowfall would be 2.2 and your snow depth at 7.

3. Frozen precipitation fell earlier but all of it melted by observation time?

   Do your best to measure frozen precipitation after it has stopped falling for snowfall. Snow depth at your time of observation will be zero.

Snow depth: *5 FT Snow Stake*

A 5 FT snow stake is helpful in winter to determine the amount of snow remaining on the ground – also known as "snow depth." The snow stake, pictured right, has numbers on it hatched in whole inches.

Procedures for measuring snow depth:

You report snow depth to the nearest whole inch. Snow depth is the accumulated snow from previous snow storms. You can use the 5 FT snow stake as a helpful tool but it is also good to sample the surrounding snow pack with your 40 inch snow stick and average the measurements to the nearest whole inch.

Liquid measure of the snowfall or wintry mix (rain, freezing rain, sleet and/or snow):

In the winter time the SRG becomes a snow gauge. The measuring tube and funnel are removed, allowing wintry precipitation to fall directly into the overflow can.

Procedures for measuring the liquid content of wintry precipitation:

Have a spare overflow can at the ready. At the time of observation, if there is snow in the overflow can, swap out the cans and bring the one containing snow indoors placing it near a radiator thus allowing the contents to melt. Once melted, pour into the inner tube. Using the precipitation stick, you can get the liquid measure of the wintry precipitation that fell. The liquid is measured like rainfall, in hundredths of an inch.

Pictured above left is the SRG ready for winter time precipitation as the inner tube and funnel have been removed and placed inside. Pictured above right are the tools needed for snow operations. There is the spare overflow can for swapping out. There is the inner tube, funnel and precipitation stick for measuring the melted wintry precipitation. And finally there is the snow stick for measuring snowfall and snow depth.

To melt and measure quickly:

Step 1: Using your inner tube, pour hot tap water into the tube and measure the amount.

Step 2: Add that measured hot water to the contents of your overflow can to melt the frozen precipitation. Slosh around and ensure all frozen precipitation is melted before measurement.

Step 3: Pour the entire liquid contents of the overflow can back into the inner tube. Use your funnel to aid in the pouring.

Step 4: Measure the new liquid amount in the inner tube and then subtract the pre-measured added hot water amount to get the true liquid amount for the past 24 hours.

WHAT IF…

Freshly fallen frozen precipitation was blown out of the overflow can, or wind was too strong for a sufficient catch?

Obtain a substitute sample of snow on the ground where the depth you feel is representative of the amount that fell in the past 24 hours up until observation. Be sure to melt the sample and obtain the liquid amount.

PROCEDURES ON WHAT TO DO WHEN YOU MISS OBSERVATIONS

If you miss a day, or a couple of days, of observing you can do a multi-day report. A multi-day report is specifically for precipitation but you can add value to your climate record by doing the same for temperature. A multi-day report is similar to a 24-hour observation, except that the measurements reflect what occurred over days.

For temperature in a multi-day report, you are measuring the maximum and minimum temperature since the last re-set. For precipitation in a multi-day report, you are measuring what all accumulated in the rain gauge – be it rainfall in the inner tube or wintry precipitation in the overflow can – since last measured.

Upon your return, report at your normal time and report the maximum temperature, minimum temperature, current temperature, amount of liquid rainfall or wintry melt (even if zero), and snow remaining on the ground if any. For snowfall, you'd report M for missing upon your return. For the missing days of observing, you would put M (for missing) in the temperature, precipitation, snowfall and snow depth fields.

The number of days in a multi-day report is the number of days you missed, plus the day you report. So for example, if you miss a weekend of observing, your Monday report would be a 3-day multi-day report. That's the 2 days you missed, counting Saturday plus Sunday, plus the day you report on Monday equals 3.

If you report through WxCoder, use the drop down menu after precipitation to note how many days of accumulation your precipitation report represents. Also, note this in remarks so anyone looking at your B91 form can clearly see an observation is a multi-day report.