State Climate Extremes Committee Memorandum

FOR: Derek S. Arndt
Chief, Climate Monitoring Section, Center for Weather and Climate
National Centers for Environmental Information (NCEI) Asheville, NC

FROM: Chris Stachelski
Observing and Climate Services Program Leader
National Weather Service, Eastern Region Headquarters, Bohemia, NY

DATE: 26 March 2020

SUBJECT: New Value for Delaware State 24-Hour Precipitation Record at Harbeson

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Summary

In 2019, the Office of the Delaware State Climatologist (ODSC) through oral conversation and e-mail correspondence with Chris Stachelski brought forth that it was aware of a potential new state record for 24-Hour Precipitation for the state of Delaware. Due to the large number of State Climate Extremes Committees (SCECs) convened in 2019 to discuss annual precipitation records set in 2018 in the eastern United States which needed to involve a number of the members who would serve on this SCEC, Chris and the ODSC opted to delay convening a SCEC for Delaware until 2020 due to workload balances.

On 11 March 2020, a SCEC convened by teleconference to discuss this proposed new record for Delaware for 24-Hour Precipitation which was recorded at Harbeson. Prior to the call, it was discovered that there were indeed several candidates that had surpassed the accepted state record holder for this value. On the call, a decision was made to discuss and vote on the highest value of all these new potential 24-Hour Precipitation records and in the event

the SCEC opted not to accept this value, then consideration would be given to the next highest value and so forth.

After considering the evidence at hand and surrounding observations, the meteorology of the event and remotely sensed imagery largely from WSR-88D radar, the members of the SCEC voted 5-0 to accept the Harbeson measurement value as the new official 24-Hour Precipitation record for the State of Delaware. **Thus the new 24-Hour Precipitation record for the State of Delaware that is true and valid is:**

- **Location:** Harbeson, DE
- **Site Type:** Delaware Environmental Observing System (DEOS) Mesonet Station
- **NWSLI Station ID:** WARD1
- **DEOS Station ID:** DWAR
- **24-Hour Precipitation Value:** 12.48 inches
- **Date:** 28 September 2016 - 29 September 2016

About the State Climate Extremes Committee (SCEC)

This SCEC was composed of members representing the National Weather Service (NWS) Forecast Office in Mount Holly, New Jersey, NWS's Eastern Region Headquarters System Operations Division (SOD) in Bohemia, New York, the Northeast Regional Climate Center in Ithaca, New York, the Office of the Delaware State Climatologist and the National Centers for Environmental Information in Asheville, North Carolina. It is convened to adjudicate potential records for validity. If validated, the observation is considered the state record for that record type. More details about the SCEC are available online at https://www.ncdc.noaa.gov/extremes/scec/details.

About the 24-Hour Precipitation Observation and Station

The Delaware Environmental Observing System (DEOS) is a mesonet of over 80 stations that collect meteorological and environmental data automatically throughout Delaware as well as in Chester County, Pennsylvania and Cecil County, Maryland. It is operated and maintained by the staff at the Center for Environmental Monitoring & Analysis (CEMA) which operates out of the University of Delaware in Newark in the Department of Geography. The Delaware State Climatologist serves as the Director of CEMA and the Associate Delaware State Climatologist serves as the Director of the DEOS network.

The Harbeson station was first established on 9 March 2005. It consists of sensors and equipment to collect meteorological and environmental data, most of which are located on a 3 meter tower. The only precipitation equipment is a 10 year old tipping bucket rain gauge (Texas Electronics TE-525MM) located about 8 feet east to slightly southeast of the main tower, mounted on a standalone pole. The gauge has an annual inspection in the spring to make sure the gauge tips properly and is within the manufacturer's specifications. This gauge was checked both prior to and following this event and appeared to be working properly. The manufacturer lists errors of 1% for rainfall rates over 2 inches per hour. Ongoing heavy precipitation may have up to a 5% undercatch.

The station is located 3.84 miles southeast of the geographic center of Harbeson, at the University of Delaware's Warrington Irrigation Research Farm near the intersection of

Harbeson Road (Route 5) and Road 290 off a maintained dirt road (see Figs. 1 and 2). The latitude and longitude of the station (decimal) are 38.67916, -75.24722. The farm fields next to the weather station are irrigated using sub-surface drip irrigation, thus there would be no chance of influence from irrigation on the rain gauge's measurements. Additionally, the crops grown in these fields in 2016 were soybeans, which were low to the ground in height and therefore would have limited, if any impact on the rain gauge's measurement.

In February 2005, the National Weather Service office in Mount Holly, NJ which has responsibility for Delaware, assigned the site a NWSLI of WARD1. In addition 14 other DEOS stations were assigned NWSLIs at this time with more sites since 2005 as the DEOS network was expanded. This allowed the data to be utilized by the operations staff at the National Weather Service in Mount Holly. Additionally DEOS operates a website (www.deos.udel.edu) that displays the data by station including daily and hourly data. The Mount Holly office uses this data as well when composing storm event totals they issue on Public Information Statements which are used by other National Weather Service offices, the media and other meteorological data users. This DEOS website displays the real-time and historical data for free.

A total of 12.48 inches of precipitation, all in the form of rain, fell from 2340 LST on 28 September 2016 to 2340 LST on 29 September 2016 at the Harbeson site. This total represents the maximum 24 hour precipitation at this site as additional precipitation fell past a 24 hour window, and was not based on a traditional observation window since the equipment has the ability to record measurements in 5-minute increments. If anything, given the heavy rainfall that occurred and the design and known limitations of the gauge type, the total amount of precipitation may well be an undercatch.

Fig. 1. Harbeson DEOS station as photographed on 29 April 2016. Photo credit DEOS staff.

Fig. 2. Harbeson DEOS station as photographed on 24 June 2016. Photo credit DEOS staff.

Meteorological Plausibility of the 24-Hour Precipitation Observation

Convectively induced precipitation is known to produce widely varying amounts in a small spatial area due to the localized nature of it. In this event, the amount of precipitation that fell was supported by a combination of estimates of precipitation from the WSR-88D radar at Dover, DE and the Advanced Hydrologic Prediction Service (AHPS) estimates. Additionally multiple other stations in the Delmarva region recorded heavy amounts of rainfall during this event. In convective events a gauge recording the heaviest precipitation is often the result of the rain gauge just happening to be in the right place relative to the location of a storm.

From 28 September through 29 September 2016, a slow moving frontal boundary was located near the Delmarva Peninsula. An easterly flow off the Atlantic Ocean combined with Precipitable Water values near 2 inches resulted in tropical-like moisture in nature being lifted by the front to generate effective rain producing showers and thunderstorms over the central Delmarva Peninsula. The heaviest rain during this event in the Harbeson area largely fell in the morning hours of 29 September 2016 as shown in the 24 hour AHPS Precipitation estimates ending at 12:00 UTC on that date (Figures 3 and 4). Between 6 and 8 inches was estimated to have fallen then.

When the event ended on 30 September 2016, the Harbeson DEOS station measured 13.89 inches. The next highest event total was from a spotter of the Mount Holly office 4 miles southeast of Milton, DE, who measured 13.88 inches with an unknown type of rain gauge. Another DEOS station at Stockley, DE recorded 11.05 inches during this event.

Sussex County, Delaware where Harbeson is located is generally flat with sandy loam soil typical of the coastal plain of the Mid-Atlantic from eastern North Carolina to southeast New Jersey. These soils typically drain well and typically take longer to experience saturation and thus for the area to see flooding. During this event several roads in the Harbeson area including Route 5 were reported flooded and closed. Flooding was evident in photos by local media (https://www.capegazette.com/article/flooding-rampant-sussex-county/117049).

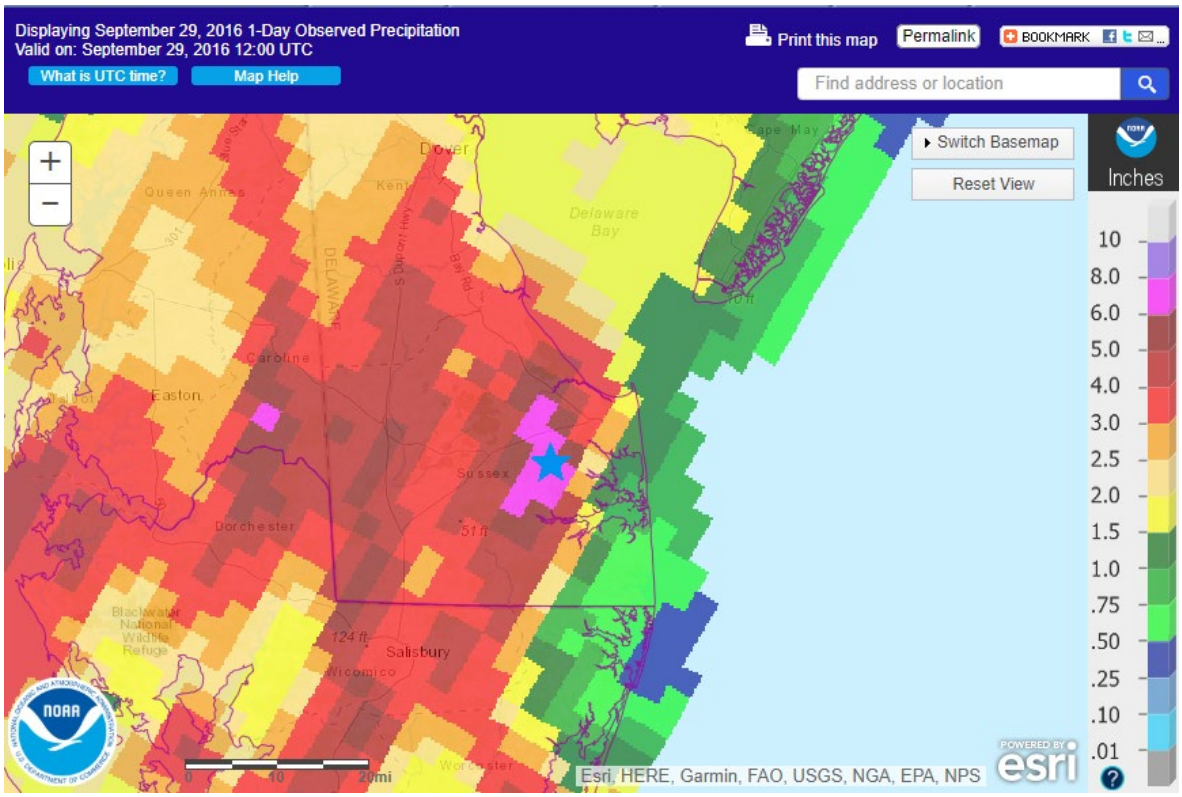

Fig. 3. Larger view of AHPS Precipitation estimates ending at 1200 UTC on 29 September 2016. Note the pink area near the Harbeson DEOS station (blue star).

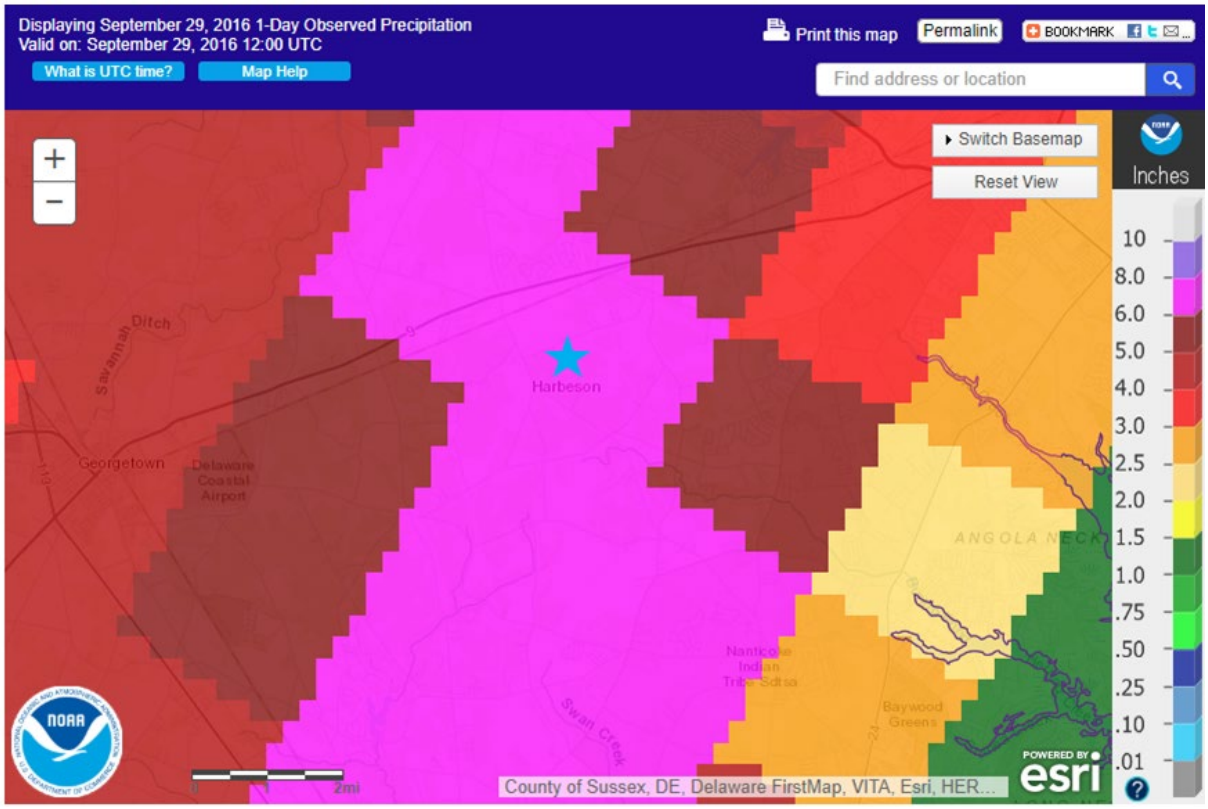

Fig. 4. AHPS Precipitation estimates ending at 1200 UTC on 29 September 2016. Note the pink area near Harbeson, DE. The center of the community of Harbeson is denoted by a blue star.

Previous 24-Hour Precipitation Record

The SCEC tables of state extremes show the current accepted state 24-Hour Precipitation record for Delaware as being 8.50 inches on 13 July 1975. According to the publication *Storm Data* for July 1975 between the 9th and 17th of July 1975, persistent southerly flow of moist, unstable air brought heavy rains and flooding of low-lying areas. Of the 8.50 inches of precipitation that fell at Dover for the period ending at 1545 LST on 13 July 1975, 7 inches of this fell between 0700 and 1100. The original observer form remarks for the 13th "severe thunderstorms, heavy at times" and shows the precipitation time that day marked with a line continuously from Midnight through 4 PM. Many Delaware rivers and creeks crested near the all-time records (at that time). Fifty-seven people were trapped in their cars and homes because of high water in Kent County alone where Dover is located. A remark at the end of that month's entry in *Storm Data* states "July 1975 was considered by many weather observers as one having the greatest number of severe thunderstorms in Delaware's history".

While the 8.50 inches is officially the prior state record, it was exceeded on two instances but never formally recognized as having been broken. The first of these was in September 1999 during Tropical Storm Floyd. According to the publication *Storm Data and Unusual Weather Phenomena* for September 1999, a total of 10.58 inches of rain fell from Floyd at

Greenwood, which established a new 24 hour state record. However, this total represents the total of two daily values at the Greenwood cooperative observer station (co-op ID 07-3595) for 16 September 1999 and 17 September 1999 (6.41 inches and 4.17 inches respectively). A search of the highest totals by one daily value from Floyd shows the highest total as being 9.30 inches at the Wilmington Porter Reservoir cooperative observer station (co-op ID 07-9605) ending at 23:59 LST on 16 September 1999. Floyd produced a swath of heavy rain across the eastern Mid-Atlantic as a result of the storm's rich tropical moisture that was further enhanced from lift from a frontal boundary located over the region. It is unknown why any of these values were overlooked when the initial SCEC table was created in the mid 2000s.

In August 2011 Delaware, in addition to other states in the eastern United States, was impacted by Hurricane Irene. Irene moved north along the coast resulting in heavy rainfall from the tropical moisture associated with the hurricane. Two CoCoRaHS (Community Collaborative Rain, Hail and Snow) network stations exceeded the value recorded at the Wilmington Porter Reservoir cooperative station of 9.30 inches during Tropical Storm Floyd. These values capture a 24 hour period ending at a report time on 28 September 2011 and include 9.95 inches at Marydel 2.4 SE (CoCoRaHS station DE-KN-4) and 9.76 inches at Greenwood 2.9 SE (CoCoRaHS station DE-SS-7). It should be noted that at the time of Irene, totals from CoCoRaHS observers were not put into the GHCN database. These were added later to GHCN as a result of the state of New Jersey accepting an annual precipitation value from 2011 from a CoCoRaHS station. Thus at the time they would have not been searchable in the ACIS database for consideration for a state record.

It should be noted that prior to 1975, the long standing state 24-Hour Precipitation for Delaware was 7.83 inches at the Odessa cooperative observer weather station (co-op ID 07-6825) on 27 June 1938. This value appears on the station's original observing form and was published in *Climatological Data: Maryland and Delaware Section* but none of the station's data was ever put into the GHCN database and this is not searchable at the time of this report in ACIS. Additionally GHCN and ACIS databases show a value of 9.01 inches of precipitation at the Dover Air Force Base observing site on 4 August 1967 (WBAN 13707), however, the original SWO form does not show this value and or any value for the date, so the whereabouts of its origin are unknown. However, it does show heavy rain and thunderstorms in the observations taken that date. It is worth noting that even at the time this occurred, the United States Weather Bureau rarely considered observations from military installations in that era for climatological records. The Air Force Combat Climatology Center (AFCCC) was contacted by NCEI and they verify this precipitation value as valid and in their database as such.

Finding of Committee on 24-Hour Precipitation Record

The SCEC voted 5-0 to accept the value of 12.48 inches at Harbeson at the DEOS weather station. Despite being from a network not officially operated by the National Weather Service, the maintenance and upkeep of the network's equipment by the DEOS staff and the public availability of the data including real-time dissemination of it through the DEOS webpage and the Public Information Statement issued by the National Weather Service in Mount Holly at the end of the event with a storm total on it support that this station was in

good working order during the event and made all efforts to share the data from it. Several SCEC members commented on the documentation of the station's metadata and maintenance record as being key factors in their decision to accept this station for consideration for a state record. **The unanimous agreement of the SCEC, based on evidence as stated above, has determined the 12.48 inches precipitation value for the 24 hour period from 28 September 2016 through 29 September 2016 for Harbeson is indeed valid and is the new accepted 24 hour precipitation record for the State of Delaware.** The SCEC made their determination on the call held on 11 March 2020.

NCEI Climate Monitoring Chief Decision:

Approved as recommended in boldface above:	**Not approved** returned to SCEC with no action taken:
ARNDT.DEREK.SHANE.1384496519 Digitally signed by ARNDT.DEREK.SHANE.1384496519 Date: 2020.04.28 17:05:52 -04'00'	

About the SCEC

Committee Members (Voting):

- Valerie Meola, Meteorologist, NWS Mount Holly
- Chris Stachelski, Observing and Climate Program Leader, NWS Eastern Region
- Keith Eggleston, Regional Climatologist, Northeast Regional Climate Center
- Kevin Brinson, Associate Delaware State Climatologist
- Karin Gleason, National Centers for Environmental Information, Asheville, NC

Additional teleconference participants:

- Bryant Korzeniewski, National Centers for Environmental Information, Asheville, NC

Additional participants by electronic mail:

- Dan Leathers, Delaware State Climatologist

Appendix I: NWS Mount Holly Public Information Statement

This statement was issued by NWS Mount Holly in the immediate aftermath of the event. It includes storm precipitation totals from the event.

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053
NOUS41 KPHI 301706
PNSPHI
DEZ001>004-MDZ008-012-015-019-020-NJZ001-007>010-012>027-PAZ054-055-
060>062-067>071-010506-

PUBLIC INFORMATION STATEMENT
SPOTTER REPORTS
NATIONAL WEATHER SERVICE MOUNT HOLLY NJ
106 PM EDT FRI SEP 30 2016

THE FOLLOWING ARE UNOFFICIAL OBSERVATIONS TAKEN DURING THE SYSTEM
THAT HAS BEEN AFFECTING OUR REGION. APPRECIATION IS EXTENDED TO
HIGHWAY DEPARTMENTS...COOPERATIVE OBSERVERS...SKYWARN SPOTTERS AND
SOCIAL MEDIA FOR THESE REPORTS. THIS SUMMARY IS ALSO AVAILABLE ON OUR
HOME PAGE AT WEATHER.GOV/PHI

********************STORM TOTAL RAINFALL********************

LOCATION           STORM TOTAL     TIME/DATE   COMMENTS
                      RAINFALL          OF
                      /INCHES/   MEASUREMENT

DELAWARE

...KENT COUNTY...
   2 W MILFORD          10.75   800 AM  9/30  COCORAHS
   2 ENE HARRINGTON      9.06   915 AM  9/30  COCORAHS
   4 NE FELTON           8.96   800 AM  9/30  COCORAHS
   HARRINGTON            8.63  1100 AM  9/30  DEOS
   1 E WOODSIDE          8.46   800 AM  9/30  COCORAHS
   FREDERICA             8.44  1100 AM  9/30  DEOS
   4 ESE CAMDEN          8.11   800 AM  9/30  COCORAHS
   8 ESE HAZLETTVILLE    8.10   759 AM  9/30  CWOP
   3 SSW HARRINGTON      7.87   700 AM  9/30  COCORAHS
   ADAMSVILLE            7.69  1100 AM  9/30  DEOS
   DOVER                 7.31  1100 AM  9/30  DEOS
   E FELTON              7.29   700 AM  9/30  COCORAHS
   3 SSW WYOMING         7.04   700 AM  9/30  COCORAHS
   5 WSW DOVER           6.06   730 AM  9/30  COCORAHS
   3 WNW MAGNOLIA        6.00   715 AM  9/30  COCORAHS
   3 SSE SMYRNA          5.79   700 AM  9/30  COCORAHS
   4 NNW HARRINGTON      5.76   639 AM  9/30  TRAINED SPOTTER
   9 E HAZLETTVILLE      5.72  F5 758 AM  9/30  AWOS
   WOODSIDE              5.71  1100 AM  9/30  COUNTY OFFICIAL
   6 WNW DOVER           5.10   800 AM  9/30  COCORAHS
   SMYRNA                5.07  1100 AM  9/30  DEOS
   W DOVER               4.89  1100 AM  9/30  DEOS
   KENTON                4.53  1100 AM  9/30  DEOS
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...NEW CASTLE COUNTY...

BLACKBIRD	5.32	1100 AM	9/30	DEOS
1 SSE MIDDLETOWN	5.01	700 AM	9/30	COCORAHS
2 NNE DELANEY CORNER	4.61	709 AM	9/30	RAWS
5 ENE MIDDLETOWN	4.57	527 AM	9/30	COCORAHS
TOWNSEND	4.46	1100 AM	9/30	DEOS
GLASGOW	4.16	746 AM	9/30	CWOP

...SUSSEX COUNTY...

HARBESON	13.89	1100 AM	9/30	DEOS
4 SSE MILTON	13.88	720 AM	9/30	TRAINED SPOTTER
STOCKLEY	11.05	1100 AM	9/30	DEOS
1 W MILLSBORO	10.84	700 AM	9/30	COCORAHS
2 SSE SEAFORD	10.75	700 AM	9/30	COCORAHS
1 S SEAFORD	10.34	700 AM	9/30	COCORAHS
1 WSW SEAFORD	10.26	700 AM	9/30	COCORAHS
4 E DELMAR	9.87	700 AM	9/30	COCORAHS
4 SW LEWES	9.86	615 AM	9/30	COCORAHS
ELLENDALE	9.68	1100 AM	9/30	DEOS
1 WSW MILFORD	9.55	700 AM	9/30	COCORAHS
LAUREL	9.44	1100 AM	9/30	DEOS
10 NNE SYCAMORE	9.06	708 AM	9/30	RAWS
17 SE BIG STONE BEAC	8.90	755 AM	9/30	CWOP
SUSSEX COUNTY AIRPOR	8.69	448 AM	9/30	ASOS
3 ENE ELLENDALE	8.68	737 AM	9/30	COCORAHS
SELBYVILLE	8.62	1100 AM	9/30	DEOS
BRIDGEVILLE	8.42	1100 AM	9/30	DEOS
18 SSE BIG STONE BEA	8.41	746 AM	9/30	CWOP
GEORGETOWN	8.36	1100 AM	9/30	DEOS
3 SE MILFORD	8.11	700 AM	9/30	COCORAHS
SEAFORD	7.86	1100 AM	9/30	DEOS
7 NE GALESTOWN	7.85	800 AM	9/30	CWOP
LEWES	7.63	1100 AM	9/30	DEOS
6 SSE ANDREWSVILLE	7.48	748 AM	9/30	CWOP
GUMBORO	7.35	1100 AM	9/30	DEOS
JONES CROSSROADS	7.24	1100 AM	9/30	DEOS
2 SSW LEWES	6.96	700 AM	9/30	COCORAHS
3 SSE MILTON	6.77	1145 AM	9/29	COCORAHS
1 SE LEWES	6.74	745 AM	9/30	COCORAHS
6 W GEORGETOWN	6.54	800 AM	9/30	COCORAHS
7 ENE DAGSBORO	6.24	700 AM	9/30	COCORAHS
11 S BIG STONE BEACH	6.10	756 AM	9/30	CWOP
2 SSE LEWES	5.80	800 AM	9/30	COCORAHS
7 E SELBYVILLE	5.78	600 AM	9/30	COCORAHS
MILLSBORO	5.55	1100 AM	9/30	DEOS
6 NW SYCAMORE	5.50	755 AM	9/30	CWOP
BETHANY BEACH	5.38	1100 AM	9/30	DEOS
6 NNE MILLSBORO	5.12	600 AM	9/29	COCORAHS
1 NW OCEAN VIEW	4.80	1100 AM	9/30	COCORAHS
3 S MILFORD	4.70	700 AM	9/29	COCORAHS
INDIAN RIVER ACRES	4.10	1100 AM	9/30	DEOS

MARYLAND

...CAROLINE COUNTY...

FEDERALSBURG	8.60	700 AM	9/30	CO-OP OBSERVER
1 ENE GREENSBORO	5.51	700 AM	9/30	COCORAHS

6 WSW DENTON	4.57	700 AM	9/30	COCORAHS

NEW JERSEY

...CAPE MAY COUNTY...

4 SW MIDDLE TWP	4.96	700 AM	9/30	COCORAHS
4 NNW MIDDLE TWP	4.60	700 AM	9/30	COCORAHS
20 SSE PORT NORRIS	4.52	732 AM	9/30	CWOP
WSW WILDWOOD CREST	4.49	738 AM	9/30	COCORAHS
2 NW CAPE MAY	4.44	1200 AM	9/30	CO-OP OBSERVER
18 SSE PORT NORRIS	4.19	758 AM	9/30	CWOP
3 S DENNIS TWP	4.07	655 AM	9/30	COCORAHS

&&

*****METADATA*****
:9/30/2016, 800 AM, DE, KENT, MILFORD, 2, W, 38.91097, -75.46055, RAIN, 10.75, INCH, COCORAHS,
:9/30/2016, 915 AM, DE, KENT, HARRINGTON, 2, ENE, 38.93014, -75.53429, RAIN, 9.06, INCH, COCORAHS,
:9/30/2016, 800 AM, DE, KENT, FELTON, 4, NE, 39.03257, -75.51693, RAIN, 8.96, INCH, COCORAHS,
:9/30/2016, 1100 AM, DE, KENT, HARRINGTON, , , 38.92270, -75.57230, RAIN, 8.63, INCH, DEOS,
:9/30/2016, 800 AM, DE, KENT, WOODSIDE, 1, E, 39.07250, -75.54780, RAIN, 8.46, INCH, COCORAHS,
:9/30/2016, 1100 AM, DE, KENT, FREDERICA, , , 39.00890, -75.46480, RAIN, 8.44, INCH, DEOS,
:9/30/2016, 800 AM, DE, KENT, CAMDEN, 4, ESE, 39.08411, -75.49217, RAIN, 8.11, INCH, COCORAHS,
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:9/30/2016, 700 AM, DE, KENT, HARRINGTON, 3, SSW, 38.88208, -75.60516, RAIN, 7.87, INCH, COCORAHS,
:9/30/2016, 1100 AM, DE, KENT, ADAMSVILLE, , , 38.83330, -75.68330, RAIN, 7.69, INCH, DEOS,
:9/30/2016, 1100 AM, DE, KENT, DOVER, , , 39.15900, -75.51700, RAIN, 7.31, INCH, DEOS,
:9/30/2016, 700 AM, DE, KENT, FELTON, , E, 39.00983, -75.57123, RAIN, 7.29, INCH, COCORAHS,
:9/30/2016, 700 AM, DE, KENT, WYOMING, 3, SSW, 39.07223, -75.57602, RAIN, 7.04, INCH, COCORAHS,
:9/30/2016, 730 AM, DE, KENT, DOVER, 5, WSW, 39.12967, -75.61250, RAIN, 6.06, INCH, COCORAHS,
:9/30/2016, 715 AM, DE, KENT, MAGNOLIA, 3, WNW, 39.07840, -75.52924, RAIN, 6.00, INCH, COCORAHS,
:9/30/2016, 700 AM, DE, KENT, SMYRNA, 3, SSE, 39.25827, -75.58968, RAIN, 5.79, INCH, COCORAHS,
:9/30/2016, 639 AM, DE, KENT, HARRINGTON, 4, NNW, 38.97621, -75.60081, RAIN, 5.76, INCH, TRAINED SPOTTER,
:9/30/2016, 758 AM, DE, KENT, HAZLETTVILLE, 9, E, 39.13000, -75.47000, RAIN, 5.72, INCH, AWOS,
:9/30/2016, 1100 AM, DE, KENT, WOODSIDE, , , 39.07030, -75.56850, RAIN, 5.71, INCH, COUNTY OFFICIAL,
:9/30/2016, 800 AM, DE, KENT, DOVER, 6, WNW, 39.19487, -75.61980, RAIN, 5.10, INCH, COCORAHS,
:9/30/2016, 1100 AM, DE, KENT, SMYRNA, , , 39.29540, -75.60770, RAIN, 5.07,

INCH, DEOS,
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INCH, DEOS,
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75.73083, RAIN, 4.61, INCH, RAWS,
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RAIN, 4.57, INCH, COCORAHS,
:9/30/2016, 1100 AM, DE, NEW CASTLE, TOWNSEND, , , 39.39410, -75.69300, RAIN,
4.46, INCH, DEOS,
:9/30/2016, 746 AM, DE, NEW CASTLE, GLASGOW, , , 39.60900, -75.75917, RAIN,
4.16, INCH, CWOP,
:9/30/2016, 1100 AM, DE, SUSSEX, HARBESON, , , 38.72483, -75.28491, RAIN,
13.89, INCH, DEOS,
:9/30/2016, 720 AM, DE, SUSSEX, MILTON, 4, SSE, 38.72538, -75.28479, RAIN,
13.88, INCH, TRAINED SPOTTER,
:9/30/2016, 1100 AM, DE, SUSSEX, STOCKLEY, , , 38.64095, -75.33992, RAIN,
11.05, INCH, DEOS,
:9/30/2016, 700 AM, DE, SUSSEX, MILLSBORO, 1, W, 38.58195, -75.31588, RAIN,
10.84, INCH, COCORAHS,
:9/30/2016, 700 AM, DE, SUSSEX, SEAFORD, 2, SSE, 38.61892, -75.59845, RAIN,
10.75, INCH, COCORAHS,
:9/30/2016, 700 AM, DE, SUSSEX, SEAFORD, 1, S, 38.64081, -75.61676, RAIN,
10.34, INCH, COCORAHS,
:9/30/2016, 700 AM, DE, SUSSEX, SEAFORD, 1, WSW, 38.64500, -75.62610, RAIN,
10.26, INCH, COCORAHS,
:9/30/2016, 700 AM, DE, SUSSEX, DELMAR, 4, E, 38.46909, -75.49233, RAIN,
9.87, INCH, COCORAHS,
:9/30/2016, 615 AM, DE, SUSSEX, LEWES, 4, SW, 38.74452, -75.20477, RAIN,
9.86, INCH, COCORAHS,
:9/30/2016, 1100 AM, DE, SUSSEX, ELLENDALE, , , 38.80710, -75.42430, RAIN,
9.68, INCH, DEOS,
:9/30/2016, 700 AM, DE, SUSSEX, MILFORD, 1, WSW, 38.90528, -75.45441, RAIN,
9.55, INCH, COCORAHS,
:9/30/2016, 1100 AM, DE, SUSSEX, LAUREL, , , 38.55500, -75.57310, RAIN, 9.44,
INCH, DEOS,
:9/30/2016, 708 AM, DE, SUSSEX, SYCAMORE, 10, NNE, 38.74167, -75.41528,
RAIN, 9.06, INCH, RAWS,
:9/30/2016, 755 AM, DE, SUSSEX, BIG STONE BEACH, 17, SE, 38.78713, -
75.15431, RAIN, 8.90, INCH, CWOP,
:9/30/2016, 448 AM, DE, SUSSEX, SUSSEX COUNTY AIRPORT, , , 38.68700, -
75.35900, RAIN, 8.69, INCH, ASOS,
:9/30/2016, 737 AM, DE, SUSSEX, ELLENDALE, 3, ENE, 38.83171, -75.36900,
RAIN, 8.68, INCH, COCORAHS,
:9/30/2016, 1100 AM, DE, SUSSEX, SELBYVILLE, , , 38.45810, -75.22400, RAIN,
8.62, INCH, DEOS,
:9/30/2016, 1100 AM, DE, SUSSEX, BRIDGEVILLE, , , 38.74330, -75.60240, RAIN,
8.42, INCH, DEOS,
:9/30/2016, 746 AM, DE, SUSSEX, BIG STONE BEACH, 18, SSE, 38.75633, -
75.20283, RAIN, 8.41, INCH, CWOP,
:9/30/2016, 1100 AM, DE, SUSSEX, GEORGETOWN, , , 38.69000, -75.39000, RAIN,
8.36, INCH, DEOS,

:9/30/2016, 700 AM, DE, SUSSEX, MILFORD, 3, SE, 38.89287, -75.39244, RAIN, 8.11, INCH, COCORAHS,
:9/30/2016, 1100 AM, DE, SUSSEX, SEAFORD, , , 38.64890, -75.61660, RAIN, 7.86, INCH, DEOS,
:9/30/2016, 800 AM, DE, SUSSEX, GALESTOWN, 7, NE, 38.64501, -75.62614, RAIN, 7.85, INCH, CWOP,
:9/30/2016, 1100 AM, DE, SUSSEX, LEWES, , , 38.78030, -75.14980, RAIN, 7.63, INCH, DEOS,
:9/30/2016, 748 AM, DE, SUSSEX, ANDREWSVILLE, 6, SSE, 38.77850, -75.58233, RAIN, 7.48, INCH, CWOP,
:9/30/2016, 1100 AM, DE, SUSSEX, GUMBORO, , , 38.47750, -75.36560, RAIN, 7.35, INCH, DEOS,
:9/30/2016, 1100 AM, DE, SUSSEX, JONES CROSSROADS, , , 38.60456, -75.44686, RAIN, 7.24, INCH, DEOS,
:9/30/2016, 700 AM, DE, SUSSEX, LEWES, 2, SSW, 38.75883, -75.15788, RAIN, 6.96, INCH, COCORAHS,
:9/29/2016, 1145 AM, DE, SUSSEX, MILTON, 3, SSE, 38.73876, -75.29189, RAIN, 6.77, INCH, COCORAHS,
:9/30/2016, 745 AM, DE, SUSSEX, LEWES, 1, SE, 38.77446, -75.14109, RAIN, 6.74, INCH, COCORAHS,
:9/30/2016, 800 AM, DE, SUSSEX, GEORGETOWN, 6, W, 38.69720, -75.49313, RAIN, 6.54, INCH, COCORAHS,
:9/30/2016, 700 AM, DE, SUSSEX, DAGSBORO, 7, ENE, 38.57681, -75.12191, RAIN, 6.24, INCH, COCORAHS,
:9/30/2016, 756 AM, DE, SUSSEX, BIG STONE BEACH, 11, S, 38.82917, -75.32500, RAIN, 6.10, INCH, CWOP,
:9/30/2016, 800 AM, DE, SUSSEX, LEWES, 2, SSE, 38.75160, -75.12630, RAIN, 5.80, INCH, COCORAHS,
:9/30/2016, 600 AM, DE, SUSSEX, SELBYVILLE, 7, E, 38.46115, -75.08933, RAIN, 5.78, INCH, COCORAHS,
:9/30/2016, 1100 AM, DE, SUSSEX, MILLSBORO, , , 38.58520, -75.29180, RAIN, 5.55, INCH, DEOS,
:9/30/2016, 755 AM, DE, SUSSEX, SYCAMORE, 6, NW, 38.66283, -75.56533, RAIN, 5.50, INCH, CWOP,
:9/30/2016, 1100 AM, DE, SUSSEX, BETHANY BEACH, , , 38.53800, -75.06540, RAIN, 5.38, INCH, DEOS,
:9/29/2016, 600 AM, DE, SUSSEX, MILLSBORO, 6, NNE, 38.66139, -75.22974, RAIN, 5.12, INCH, COCORAHS,
:9/30/2016, 1100 AM, DE, SUSSEX, OCEAN VIEW, 1, NW, 38.55294, -75.10059, RAIN, 4.80, INCH, COCORAHS,
:9/29/2016, 700 AM, DE, SUSSEX, MILFORD, 3, S, 38.87757, -75.43989, RAIN, 4.70, INCH, COCORAHS,
:9/30/2016, 1100 AM, DE, SUSSEX, INDIAN RIVER ACRES, , , 38.57428, -75.17046, RAIN, 4.10, INCH, DEOS,
:9/30/2016, 700 AM, MD, CAROLINE, FEDERALSBURG, , , 38.69100, -75.77360, RAIN, 8.60, INCH, CO-OP OBSERVER,
:9/30/2016, 700 AM, MD, CAROLINE, GREENSBORO, 1, ENE, 38.98634, -75.78463, RAIN, 5.51, INCH, COCORAHS,
:9/30/2016, 700 AM, MD, CAROLINE, DENTON, 6, WSW, 38.86230, -75.92670, RAIN, 4.57, INCH, COCORAHS,
:9/30/2016, 700 AM, NJ, CAPE MAY, MIDDLE TWP, 4, SW, 39.04251, -74.89400, RAIN, 4.96, INCH, COCORAHS,
:9/30/2016, 700 AM, NJ, CAPE MAY, MIDDLE TWP, 4, NNW, 39.14315, -74.85381, RAIN, 4.60, INCH, COCORAHS,
:9/30/2016, 732 AM, NJ, CAPE MAY, PORT NORRIS, 20, SSE, 38.96417, -74.92500, RAIN, 4.52, INCH, CWOP,
:9/30/2016, 738 AM, NJ, CAPE MAY, WILDWOOD CREST, , WSW, 38.97168, -

74.83976, RAIN, 4.49, INCH, COCORAHS,
:9/30/2016, 1200 AM, NJ, CAPE MAY, CAPE MAY, 2, NW, 38.96048, -74.92634,
RAIN, 4.44, INCH, CO-OP OBSERVER,
:9/30/2016, 758 AM, NJ, CAPE MAY, PORT NORRIS, 18, SSE, 38.98400, -74.94500,
RAIN, 4.19, INCH, CWOP,
:9/30/2016, 655 AM, NJ, CAPE MAY, DENNIS TWP, 3, S, 39.16609, -74.82630,
RAIN, 4.07, INCH, COCORAHS,

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MEOLA