

Chesapeake Bay Virginia (CBV) NERR Meteorological Metadata
January - December 2002
Latest update: **January 30, 2023**

I. Data Set & Research Descriptors

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2) Entry verification

a) Data Input Procedures:

The 15-minute, 1-hour average, and 24-hour data were downloaded from each instrument on the weather station to a Campbell Scientific CR10X datalogger. The CDMO Data Logger Program (nerr.csi) was loaded into the CR10X and controls the sensors and data collection schedule (see 2b of the Entry Verification section for the data collection schedule). The CR10X then interfaced with the PC208W software supplied by Campbell Scientific. This software was located on a laptop computer to which the data was downloaded manually in the field. Data was downloaded monthly from a storage module located within the weather station. Once an entire month of data was available, the CDMO Weather Data Management Program (WDMP) was used to convert the files to an Access database. This program was developed in Visual Basic to interface with the NERRS data collection schedule (see 2b of the Entry Verification section for the data collection schedule). The WDMP will automatically input and convert the monthly raw data file into an Access Database. There are three main steps the WDMP performs. First, it converts the comma delimited monthly raw data file into an Access Database. Secondly, it checks the data against a predetermined set of error criteria (see Part C of this section). Finally, it produces error and summary reports. Any anomalous data were investigated and are noted below in Anomalous Data section. Any data corrections that were performed are noted in the Data Correction section below. Eric Wooden performed all data management.

Gemteck's EQwin version 5 and the CDMO developed Microsoft Excel EQWinFormat.xls macro now replaces the WDMP as the NERR MET database management program and primary QA/QC program.

The Centralized Data Management Office converted all SWMP weather data collected with CR10X program versions prior to version 4.0 which was distributed in October 2003. This was necessary in order to merge the old data format (12 array output) with the new data format found in version 4.0 (3 array output). The new format produces averages, maximums and minimums every fifteen minutes (array 15), every hour (array 60) and every day (array 144) for any sensors hooked up to the CR10X. Specifically, the 150 and 151 fifteen minute data were converted to the new 15 array; the hourly 101, 102, 105 and 106 data were converted to the new 60 array; and the daily 241, 242, 243, 244, 245 and 246 data were converted to the new 144 array. With the new format, the use of 55555's to code for deleted data and 11111's to code for missing data has been abandoned. Hence, all 55555's or 11111's contained in the SWMP weather data collected prior to Version 4.0 of the CR10X program were removed and left blank.

For data collection, the CR10X datalogger was programmed to collect data in the following formats:

- i) 15-minute data are collected instantaneously for Air Temperature (C), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). 15-minute Precipitation (mm) and PAR (mmol/m²) data are totaled from 5-second readings, prior to NERR_4.CSI
- ii) 15-minute average, maximum and minimum data are averages of 5-second readings for Air Temperature (oC), Relative Humidity (%), Barometric Pressure (mb) and Wind Speed (m/s) with NERR_4.CSI.
- iii) Hourly average, maximum, and minimum data are averages of 5-second readings for Air Temperature (oC), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). Hourly totals for PAR (mmol/m²) and Precipitation (mm) are totals of 15-minute readings.
- iv) Daily average, maximum and minimum data are averages of 5-second readings for Air Temperature (oC), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). Daily totals for PAR (mmol/m²) and Precipitation (mm) are totals of 15-minute readings.

Data were stored on a Campbell Scientific storage module (SM192 or SM4M), which was retrieved monthly. The data were downloaded and pre-processed as described in Section 2. QA/QC of the data was conducted using either the WDMP or EQWin. WDMP error reports and EQWin queries were based on the following anomalous data criteria:

Air Temp:

- 15 min sample not greater than max for the day
- 15 min sample not less than the min for the day
- 15 min sample not greater than 3.0 C from the previous 15 minutes (WDMP only)
- Max and min temp recorded for the day (WDMP only)
- 1-hour average not greater than 10% above the greatest 15 min sample recorded in the hour (WDMP only)
- Sample not greater than 50 C or less than -30 C (EQWin only)

Relative Humidity:

- Not changed by more than 25% from the previous 15 minutes (WDMP only)
- Max and min humidity recorded for the day (WDMP only)
- 1-hour average not greater than 10% above the greatest 15 min sample recorded in the hour (WDMP only)
- Sample not greater than 100% or less than 0% (EQWin only)

Pressure:

- Pressure not greater than 1040 mb or less than 980 mb (WDMP only)
- Pressure changes greater than 5 mb per hour (WDMP only)
- Maximum and minimum values recorded for the day (WDMP only)
- 1-hour average not greater than 10% above the greatest 15 min sample recorded in the hour (WDMP only)
- Sample not greater than 1060 mb or less than 900 mb (EQWin only)

Wind Speed:

- Wind speed not greater than 65 m/s or less than 0.5 m/s (WDMP only)
- Wind speed not greater than 30 m/s (EQWin only)
- Wind speed not less than 0.5 m/s for 12 consecutive hours (EQWin only)

Wind Direction:

- Wind direction not greater than 360 degrees or less than 0 degrees

Rainfall:

- Precipitation not greater than 5 mm in 15 min
- No precipitation for the month (WDMP only)

Photosynthetically Active Radiation (PAR):

- Sample not greater than 5000 mmol/m² or less than -0.5 mmol/m²

Time:

- 15-minute interval recorded

For all data:

- No duplicate data

3) Research objectives:

The principal objective is to record long-term meteorological data within the York River watershed in order to observe any environmental changes or trends over time. Samples were taken every 5 seconds and 15 minutes over roughly one-week collecting intervals.

4) Research methods:

The Campbell Scientific weather station samples every 5 seconds to produce both hourly and daily averages of those measurements of air temperature, relative humidity, barometric pressure, rainfall, wind speed and wind direction. An instantaneous sample is taken every 15 minutes and that data is stored in array 150. A one-month sampling interval was chosen so that the storage module would not run out of room and overwrite data. Periodically, sensors on the weather station are inspected for damage or debris. If any is found, it is repaired and/or cleaned. Sensors are removed and sent back to Campbell Scientific for calibration at minimum of every two years.

5) Site location and character:

Taskinas Creek (TC) Component:

The Chesapeake Bay NERRS of Virginia maintains a long-term water quality-monitoring program, and stream gauge station at Taskinas creek station. The Taskinas Creek station is located in the transitional zone of the York River tributary in the York River State Park.

The Chesapeake Bay National Estuarine Research Reserve in Virginia is located on the York River, a tributary of the Chesapeake Bay. The weather station is located at York River State Park that borders the York River and includes the Taskinas Creek tributary. The bordering river is 50 km long, 38 kilometers from the mouth of the river, and it 2.25 kilometer wide near the weather station, and. The weather station is located (37°24' 50.79850" N, 76°42' 44.51934" W) on a bluff (11m elevation) 60m from the York River in a manicured lawn area of the park. No trees or other major structures within a 35m radius of weather station. The stream gauge located 2km NW (288 degree of weather station) and the water quality station located 200m (298 degree) of weather station. The weather station has a landscape fence around it to keep visitors of the park away from the weather station. All the instruments, the Wind Sentry, Temperature and Humidity sensor, Barometric Sensor, and LiCor Sensor all located

on the approximately 3.5 m aluminum tower following the descriptions outlined in the Campbell Scientific CR10X Based Meteorological Monitoring Station Standard Operating Procedure. The Tipping Bucket Rain gauge is located within 2m of the tower. The sensors were wired to the CR10X following the protocol in the CDMO Manual.

6) Data collection period:

Weather data has been collected at the Taskinas Creek since 1996. The current weather station has been operational since 1996. Data was collected for the entire year in 2002.

7) Distribution

According to the Ocean and Coastal Resource Management Data Dissemination Policy for the NERRS System-wide Monitoring Program, NOAA/ERD retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The PI retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the PI and NERR site where the data were collected will be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. Manuscripts resulting from the NOAA/OCRM supported research that are produced for publication in open literature, including refereed scientific journals, will acknowledge that the research was conducted under an award from the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. The data set enclosed within this package/transmission is only as good as the quality assurance/quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

NERR weather data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see Section 1 Principal investigators and contact persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under the general information link on the CDMO home page) and online at the CDMO home page <http://cdmo.baruch.sc.edu>. Data are available in text format.

8) Associated researchers and projects:

Taskinas Creek watershed is a site of limited impact due to development or recreational use. There is a water quality station and a stream gauge station at this site. This site is being developed as a control site for watershed work in the area.

II. Physical Structure Descriptors

9) Sensor specifications, operating range, accuracy, date of last calibration

CSI LiCor Quantum Sensor

Model # LI190SB

Stability: $<\pm 2\%$ change over 1 yr

Operating Temperature: -40 to 65°C

Sensitivity: typically $5\ \mu\text{A}$ per $1000\ \mu\text{moles s}^{-1}\text{ m}^{-2}$

Light spectrum wavelength: 400 to 700 nm

Date of last calibration: 8/2000 installed 1/2001

CSI Wind Sentry

Model # 03001-5, #03301-5

Range: 0 - 50 m/s ; 360° mechanical

Date of last calibration: 12/2000 installed 1/2001

CSI Temperature and Relative Humidity

Model #: HM45C

Operating Temperature: -40 to $+60^{\circ}\text{C}$

Temperature Measurement Range: -40 to $+60^{\circ}\text{C}$

Temperature Accuracy: $\pm 0.2^{\circ}\text{C}$ @ 20°C

Relative Humidity Measurement Range: 0 - 100% non-condensing

RH Accuracy: $\pm 2\%$ RH (0 - 90%) and $\pm 3\%$ (90 - 100%)

Uncertainty of calibration: $\pm 1.2\%$ RH

Date of Last calibration: 10/2000 installed 1/2001

CSI Barometric Sensor

Model #PTB101B

Operating Range: Pressure: 600 to 1060 mb

Temperature: -40 to $+60^{\circ}\text{C}$

Humidity: non-condensing

Accuracy: ± 0.5 to 6.0 mb ($+20$ to 60°C)

Stability: $\pm 0.1\text{ mb}$ per year

Date of Last calibration: 7/2000 installed 1/2001

Fluid Isolation Technology Tipping Bucket Rain Gauge

Model #: RG-2000-C

Range: 0.1 mm

Accuracy: 1.0% at <14"/hr

Date of Last calibration: 1/2001

10) Coded variable indicator and variable code definitions:

Sampling station:	Sampling site code:	Station code:
Taskinas Creek	TC	cbvtcmet

11) Data anomalies/Data corrections:

Arrays:

During 2022 all pre-2007 weather data were revisited by the CDMO. Historically those datasets included 15 minute, hourly (60), and daily data arrays (144). As directed by the NERRS Data Management Committee, the CDMO removed the hourly and daily data arrays leaving only the 15 minute data to make the entire NERRS SWMP weather dataset consistent in its reporting. All references to the 60 and 144 arrays were left in the metadata document as they may still provide valuable information, but users should be aware that they are largely no longer relevant. The updated datasets were uploaded to the database and made available through the various data applications at www.nerrsdata.org/get/landing.cfm throughout the fall of 2022.

CalD=Calendar Day.

January 2002 TC

The following data appear to be correct:

Array	CalD	Time	Error Message
150	1	1115	Technician change <0 wind direction to 0
101	1	1100	Air temp avg (.06637) < 15 minute min (.1813) by at least 10%
150	5	845	Air temp diff >3C from 5 845 (-4.6644) to 5 900 (-1.4522)
150	11	1400	Humidity diff >25% from 11 1400 (72.788) to 11 1415 (42.337)
101	22	800	Air temp avg (.30376) < 15 minute min (.38781) by at least 10%
150	25	330	Air temp diff >3C from 25 330 (13.141) to 25 345 (9.7351)
150	30	2215	Air temp diff >3C from 30 2215 (19.393) to 30 2230 (16.056)
150	31	1100	Technician change <0 wind direction to 0

February 2002 TC

The following data appear to be correct:

Array	CalD	Time	Error Message
150	4	1345	Air temp diff >3C from 4 1345 (6.8936) to 4 1400 (3.4201)
150	4	1345	Humidity diff from >25% 4 1345 (43.153) to 4 1400 (77.622)
150	4	1600	Humidity diff from >25% 4 1600 (82.806) to 4 1615 (32.615)
102	6	1700	Wind speed is less than 0.5 m/s from 6 1700 to 7 500
102	9	1800	Wind speed is less than 0.5 m/s from 9 1800 to 10 700
150	17	1200	Air temp diff >3C from 17 1200 (9.9578) to 17 1215 (6.6816)
101	24	2300	Air temp avg (-.44018)< 15 minute min (-.5602) by at least 10%

March 2002 TC

The following data appear to be correct:

Array	CalD	Time	Error Message
151	2	2215	Precip diff >5mm from 2 2215 (5.842) to 2 2230 (.254)
102	12	1200	Wind speed is less than 0.5 m/s from 12 1200 to 13 300
101	22	900	Air temp avg (.38076) < 15 minute min (.50866) by at least 10%
150	24	730	Air temp diff >3C from 24 730 (3.4492) to 24 745 (6.4572)

April 2002 TC

The following data appear to be correct:

Array	CalD	Time	Error Message
150	3	1630	Air temp diff >3C from 3 1630 (27.138) to 3 1645 (16.741)
150	3	1630	Humidity diff >25% from 3 1630 (38.202) to 3 1645 (90.012)
150	10	1100	Technician change <0 wind direction to 0
150	15	1430	Air temp diff >3C from 15 1430 (28.265) to 15 1445 (24.199)
150	15	1445	Air temp diff >3C from 15 1445 (24.199) to 15 1500 (19.2)
151	15	1500	Precip diff >5mm from 15 1500 (5.842) to 15 1515 (.508)
150	17	1545	Air temp diff >3C from 17 1545 (33.23) to 17 1600 (29.106)
150	25	1545	Air temp diff >3C from 25 1545 (23.821) to 25 1600 (18.553)

May 2002 TC

The following data appear to be correct:

Array	CalD	Time	Error Message
150	2	1545	Air temp diff >3C from 2 1545 (27.734) to 2 1600 (20.204)
150	7	1730	Air temp diff >3C from 7 1730 (25.473) to 7 1745 (21.742)

150	7	1745	Air temp diff >3C from 7 1745 (21.742) to 7 1800 (18.414)
151	7	1745	Precip diff >5mm from 7 1745 (7.874) to 7 1800 (26.416)
151	7	1800	Precip diff >5mm from 7 1800 (26.416) to 7 1815 (.508)
151	9	1945	Precip diff >5mm from 9 1945 (13.716) to 9 2000 (3.556)
150	13	1900	Air temp diff >3C from 13 1900 (27.609) to 13 1915 (20.943)
150	18	815	Air temp diff >3C from 18 815 (24.827) to 18 830 (21.556)
150	18	830	Air temp diff >3C from 18 830 (21.556) to 18 845 (14.223)

June 2002 TC

The following data appear to be correct:

Array	CalD	Time	Error Message
150	6	1530	Air temp diff >3C from 6 1530 (32.638) to 6 1545 (28.44)
150	6	1630	Air temp diff >3C from 6 1630 (26.73) to 6 1645 (23.004)
151	6	1945	Precip diff >5mm from 6 1945 (1.27) to 6 2000 (7.112)
150	26	1700	Air temp diff >3C from 26 1700 (32.043) to 26 1715 (25.513)
150	26	1700	Humidity diff >25% from 26 1700 (54.316) to 26 1715 (87.106)
150	27	1915	Air temp diff >3C from 27 1915 (26.742) to 27 1930 (22.476)

July 2002 TC

The following data appear to be correct:

Array	CalD	Time	Error Message
102	7	1700	Wind speed is less than 0.5 m/s from 7 1700 to 8 700
102	14	100	Wind speed is less than 0.5 m/s from 14 100 to 14 1300
150	27	1600	Air temp diff >3C from 27 1600 (27.466) to 27 1615 (23.868)

August 2002 TC

The following data appear to be correct:

Array	CalD	Time	Error Message
150	16	1600	Air temp diff >3C from 16 1600 (30.849) to 16 1615 (26.918)
150	24	1400	Air temp diff >3C from 24 1400 (31.734) to 24 1415 (25.936)
102	26	1800	Wind speed is less than 0.5 m/s from 26 1800 to 27 1100
102	27	1300	Wind speed is less than 0.5 m/s from 27 1300 to 28 1400
102	29	1400	Wind speed is less than 0.5 m/s from 29 1400 to 30 900
102	30	1500	Wind speed is less than 0.5 m/s from 30 1500 to 31 1000

September 2002 TC

The following data appear to be correct:

Array	CalD	Time	Error Message
150	4	1445	Air temp diff >3C from 4 1445 (32.971) to 4 1500 (28.441)
102	8	1300	Wind speed is less than 0.5 m/s from 8 1300 to 9 700
150	14	1445	Air temp diff >3C from 14 1445 (25.887) to 14 1500 (22.354)
151	14	1500	Precip diff >5mm from 14 1500 (12.446) to 14 1515 (1.27)
102	25	600	Wind speed is less than 0.5 m/s from 25 600 to 25 2100
150	25	1030	Missing 150 Array (15 minute data)
101	25	1100	Technician changed 101 Array data from 25 1100 to 25 1100
102	25	1100	Technician changed 102 Array from 25 1100 to 25 1100
102	25	2300	Wind speed is less than 0.5 m/s from 25 2300 to 26 1900
241	25	2400	Technician changed 241 Array from 25 2400 to 25 2400
242	25	2400	Technician changed 242 Array from 25 2400 to 25 2400
243	25	2400	Technician changed 243 Array data from 25 2400 to 25 2400
244	25	2400	Technician changed 244 Array data from 25 2400 to 25 2400
151	27	1545	Precip diff >5mm from 27 1545 (7.366) to 27 1600 (.254)

The following hourly and daily data were deleted due to 5 second data loss resulting from data download on September 25 at 1030:

101	25	1100	Technician changed 101 Array data from 25 1100 to 25 1100
102	25	1100	Technician changed 102 Array from 25 1100 to 25 1100
241	25	2400	Technician changed 241 Array from 25 2400 to 25 2400
242	25	2400	Technician changed 242 Array from 25 2400 to 25 2400
243	25	2400	Technician changed 243 Array data from 25 2400 to 25 2400
244	25	2400	Technician changed 244 Array data from 25 2400 to 25 2400

October 2002 TC

The following data appear to be correct:

Array	CalD	Time	Error Message
102	2	1400	Wind speed is less than 0.5 m/s from 2 1400 to 3 500
102	10	1700	Wind speed is less than 0.5 m/s from 10 1700 to 11 1300
102	15	1000	Wind speed is less than 0.5 m/s from 15 1000 to 15 2300
102	24	1400	Wind speed is less than 0.5 m/s from 24 1400 to 25 500
102	26	1900	Wind speed is less than 0.5 m/s from 26 1900 to 27 1100
102	27	2200	Wind speed is less than 0.5 m/s from 27 2200 to 28 1400

November 2002 TC

The following data appear to be correct:

Array	CalD	Time	Error Message
151	14	1345	Precip diff >5mm from 14 1345 (.254) to 14 1400 (7.366)
102	15	1700	Wind speed is less than 0.5 m/s from 15 1700 to 16 1200
150	26	30	Air temp diff >3C from 26 30 (5.8326) to 26 45 (9.1064)
101	28	500	Air temp avg (.06331) > 15 minute max (.05347) by at least 10%

December 2002 TC

The following data appear to be correct:

Array	CalD	Time	Error Message
150	6	815	Pressure diff >5mb from 6 815 (1006) to 6 830 (1020.1)
101	19	1500	Technician changed 101 Array data from 19 1500 to 19 1500
102	19	1500	Technician changed 102 Array from 19 1500 to 19 1500
150	19	1430	Missing 150 Array (15 minute data)
241	19	2400	Technician changed 241 Array from 19 2400 to 19 2400
242	19	2400	Technician changed 242 Array from 19 2400 to 19 2400
243	19	2400	Technician changed 243 Array data from 19 2400 to 19 2400
244	19	2400	Technician changed 244 Array data from 19 2400 to 19 2400

The following hourly and daily data were deleted due to 5 second data loss resulting from data download on December 19 at 1430:

Array	CalD	Time	Error Message
101	19	1500	Technician changed 101 Array data from 19 1500 to 19 1500
102	19	1500	Technician changed 102 Array from 19 1500 to 19 1500
241	19	2400	Technician changed 241 Array from 19 2400 to 19 2400
242	19	2400	Technician changed 242 Array from 19 2400 to 19 2400
243	19	2400	Technician changed 243 Array data from 19 2400 to 19 2400
244	19	2400	Technician changed 244 Array data from 19 2400 to 19 2400

12) Missing data:

Arrays:

During 2022 all pre-2007 weather data were revisited by the CDMO. Historically those datasets included 15 minute, hourly (60), and daily data arrays (144). As directed by the NERRS Data Management Committee, the CDMO removed the hourly and daily data arrays leaving only the 15 minute data to make the entire NERRS SWMP weather dataset consistent in its reporting. All references to the 60 and

144 arrays were left in the metadata document as they may still provide valuable information, but users should be aware that they are largely no longer relevant. The updated datasets were uploaded to the database and made available through the various data applications at www.nerrsdata.org/get/landing.cfm throughout the fall of 2022.

January 2002 TC
None

February 2002 TC
None

March 2002 TC
None

April 2002 TC
None

May 2002 TC
None

June 2002 TC
None

July 2002 TC
None

August 2002 TC
None

September 2002 TC

The loss of this 150 array occurred during manual downloading of data. No loss of rainfall data occurred since it was not raining during download:

Array	CalD	Time	Error Message
150	25	1030	Missing 150 Array (15 minute data)

October 2002 TC

None

November 2002 TC

None

December 2002 TC

The loss of this 150 array occurred during manual downloading of data. No loss of rainfall data occurred since it was not raining during download.

Array	CalD	Time	Error Message
150	19	1430	Missing 150 Array (15 minute data)

13) Other Remarks/notes

Arrays:

During 2022 all pre-2007 weather data were revisited by the CDMO. Historically those datasets included 15 minute, hourly (60), and daily data arrays (144). As directed by the NERRS Data Management Committee, the CDMO removed the hourly and daily data arrays leaving only the 15 minute data to make the entire NERRS SWMP weather dataset consistent in its reporting. All references to the 60 and 144 arrays were left in the metadata document as they may still provide valuable information, but users should be aware that they are largely no longer relevant. The updated datasets were uploaded to the database and made available through the various data applications at www.nerrsdata.org/get/landing.cfm throughout the fall of 2022.

Precipitation:

During the initial years of NERRS SWMP weather data collection the CR10X programming was inconsistent in how precipitation values were recorded. For most reserves, zeros were not recorded when rainfall had not occurred between 2001-2003, instead no rainfall was represented by a blank cell. The CDMO verified which datasets were impacted by this issue for the 2001-2006 datasets and inserted zeros when the metadata indicated that no precipitation occurred and data were not missing for other reasons. In some cases, zero values for precipitation data were evaluated and removed where the metadata confirmed that no rainfall should have been in the dataset. The pre-2007 data did not go through a thorough QAQC process again at that time (in addition to previous QAQC); however, if discrepancies were noticed between what was documented in the metadata and what was in the dataset, additional updates may have been made. The updated datasets were uploaded to the database and made available through the various data applications at www.nerrsdata.org/get/landing.cfm throughout early 2023.

Rain Events:

January 2002

Date	RainAmount (mm)
4	.508
6	28.448
7	1.016
12	3.556
13	5.080
19	27.940
20	1.270
21	4.826
22	.254
23	4.826
24	.254
25	7.366
Monthly Total	85.3

February 2002

Date	RainAmount (mm)
4	.508
7	23.368
8	.254
10	.254
27	.508
Monthly Total	24.9

March 2002

Date	RainAmount (mm)
2	16.764
3	4.064
12	1.270
13	2.794
17	22.098
18	9.652
19	.508
20	5.842
21	.254
26	12.700
27	2.540
31	28.956

Monthly Total 107.4

April 2002

Date	RainAmount (mm)
1	2.794
3	5.080
10	5.334
12	.508
15	7.620
18	3.048
19	.508
20	1.270
21	3.810
22	19.050
25	11.176
27	8.128
28	9.144
Monthly Total	77.5

May 2002

Date	RainAmount (mm)
2	19.050
4	3.810
5	1.270
6	.254
7	35.814
8	.254
9	32.004
10	.254
13	8.636
18	10.414
Monthly Total	111.8

June 2002

Date	RainAmount (mm)
6	26.670
14	10.414
15	.508
17	2.540
26	4.318
27	3.810

28 .254
Monthly Total 48.5

July 2002

Date	RainAmount (mm)
10	1.016
14	37.084
15	12.700
18	.254
20	1.016
23	2.286
24	14.478
25	1.524
26	5.080
27	.762
28	.254
30	.254
Monthly Total	76.7

August 2002

Date	RainAmount (mm)
15	1.270
16	1.778
17	4.064
18	.254
24	19.812
27	2.794
28	2.032
29	.762
30	.508
31	.762
Monthly Total	34.0

September 2002

Date	RainAmount (mm)
1	1.524
2	.508
3	.508
4	.508
5	.508
7	.254

8	.254
11	.254
14	14.478
15	3.048
16	10.922
17	.254
23	.254
26	20.066
27	11.684
28	.254
Monthly Total	65.3

October

Date	RainAmount (mm)
10	21.336
11	33.782
12	1.016
15	4.318
16	14.732
17	.254
21	8.636
22	.254
23	.254
25	.762
26	13.462
28	31.750
29	17.018
30	14.224
Monthly Total	161.8

November 2002

Date	RainAmount (mm)
1	.254
4	6.604
5	13.208
6	11.176
11	.254
12	9.144
13	2.794
14	8.382
16	26.670
17	15.240

19	.254
21	11.938
Monthly Total	105.9

December 2002

Date	RainAmount (mm)
5	18.542
6	11.176
7	1.016
11	7.620
13	17.526
14	.254
19	.762
20	4.318
24	19.050
25	7.620
28	.254
31	2.540
Monthly Total	90.7

2002 Year Total 989.8