

Data Submittal to DEQ Guide

Best practices for submitting volunteer water quality monitoring parameter data to the Virginia Department of Environmental Quality

The purpose of this document is to provide a process for groups who collect volunteer water quality monitoring parameter data to submit their data to DEQ in a format that ensures accuracy and the fullest use of the data.

Why is this important? During the biennial water quality assessment process DEQ staff across the state review tens of thousands of data points to generate Virginia's 305(b)/303(d) Water Quality Assessment Integrated Report. To facilitate this process, DEQ converts as much of the water quality monitoring data as possible into a standardized format to allow its use in automated assessment tools which have been developed.

DEQ released the **Virginia Data Explorer (VDE)** in 2022, a collaboration between DEQ and the Chesapeake Monitoring Cooperative (CMC), as a platform for submitting water quality data collected by volunteers and other monitoring groups outside of DEQ. The VDE is the preferred method **for groups with a DEQ approved QAPP in place to submit their Level II or Level III** monitoring data to DEQ for use in the water quality assessment process. Groups without a DEQ approved QAPP in place or those generating Level I data should submit their data in the spreadsheet format below.

Data Submittal Through the Virginia Data Explorer: Level II and Level III data

The VDE is a data portal that mirrors the CMC data portal, which is limited to groups within the Chesapeake Bay Watershed. Groups outside of the Chesapeake Bay Watershed can now submit water quality data through the VDE. Groups who already submit data through the CMC portal can choose either portal for managing their Virginia data, your login information will work for either portal.

Benthic macroinvertebrate data are currently handled outside of the VDE. Groups submitting benthic macroinvertebrate data for the first time should contact DEQ (see contact information below).

DEQ accesses data annually from groups who use the VDE. DEQ and CMC provide technical, programmatic, and outreach support to integrate volunteer-based water quality and macroinvertebrate monitoring data into the VDE. The Virginia Data Explorer can be found at this link:

<https://cmc2.vims.edu/Home/Va/#/va>

Questions about submitting water quality monitoring data to the VDE may be sent to citizenwater@deq.virginia.gov, or by contacting Reid Downer (email: horace.downer@deq.virginia.gov; telephone: 804-217-4777).

Data Submittal Directly to DEQ: Level I data

This option is only for volunteer monitoring groups who have collected Level I data or data collected without a DEQ approved QAPP.

A complete example of how the data should be submitted directly to DEQ is shown at the end of this document. Detailed submittal information is presented in the following sections.

General Information

All data should be included in one spreadsheet (all stations and samples together for collections made in the calendar year. MS Excel, Apple Numbers, or CSV file formats are requested; if another format is needed to provide the data, please contact DEQ. Please do not divide the data into different tabs in the workbook by station or parameter. Any additional information (i.e. graphs, charts, etc.) can be provided on additional tabs within the workbook. Any formatting (highlighted cells, bolded text, etc.) will be ignored as the data will be pulled into a database.

Each monitoring event should be entered in a separate row in the spreadsheet with the data (station, sample, parameter, and other data) in the columns. Replicate samples, when collected, must be on separate rows. In these cases, the Sample Date/Time would be the same for each row and the replicate number would be indicated in the Sample Comment column (i.e. Replicate 1).

Below is a list of columns that should be included in the data reporting spreadsheet. They have been grouped together for ease of discussion in this document but in the spreadsheet the data should be a continuous set of columns (as shown on the last page).

Note that the examples below, while sometimes partially taken from previously submitted data, are not real data.

Station Data

The first set of columns are for data that identify the station where the monitoring takes place. These data will be duplicative when there are multiple sampling events, and for each individual station, the data will be exactly the same on each row.

The required data elements are:

- **Station ID:** This value should be unique for each station monitored by a specific volunteer group. The station ID should not change from one sampling event or data submittal year to another if the sampling is done in the same location. If monitoring is done at multiple locations along the same waterbody, each location should have a unique Station ID. Maintaining the Station ID (for the same monitoring location) year to year greatly simplifies processing the data for DEQ.
- **Station Waterbody:** The name of the waterbody that the station is located on as identified from a USGS topographic map or other standard reference. If the site is on an unnamed tributary to a named waterbody, please state "Unnamed tributary to (insert name of waterbody)".
- **Station Description:** A detailed station location description so the station can be located on a map (i.e. Rt. 619 bridge or, 0.5 miles downstream of Rt. 619 bridge). If the monitoring station is co-located with a DEQ water quality monitoring station, and DEQ station ID is known, please include the DEQ station ID in this data column.
- **Latitude/Longitude:** The coordinate pair locating the station using **decimal degrees** (i.e. 38.4412, -78.0011). If the station coordinate pair is in another format (i.e. degrees/ minutes/seconds) please convert to decimal degrees. A Google search will return several free online tools to help make this conversion. Please also check the accuracy of the latitude/longitude (Google Maps is a simple way to do this) before the submission of the data. If assistance is needed with either of these items, please contact DEQ.

Below is an example of data in this format:

Station_ID	Station_Waterbody	Station_Description	Latitude	Longitude
ACB.BUFCRE10	Buffalo Creek	Buffalo Creek at intersection with Mateer Rd/670	37.7425	-79.5066
ACB.BUFCRE10	Buffalo Creek	Buffalo Creek at intersection with Mateer Rd/670	37.7425	-79.5066
ACB.BUFCRE12.5	Colliers Creek	Buffalo Creek at Colliers Creek	37.7568	-79.5431
ACB.BUFCRE12.5	Colliers Creek	Buffalo Creek at Colliers Creek	37.7568	-79.5431
ACB.BUSMILCRE	Great Wicomico River	Bush Mill Creek at the dock at the end of Heron Court.	37.8750	-76.4413
ACB.BUSMILCRE	Great Wicomico River	Bush Mill Creek at the dock at the end of Heron Court.	37.8750	-76.4413
ACB.CEDCRE2.4	Spring Gap Creek-Cedar Creek	Cedar Creek at low bridge above Monacan living exhibit off of the Cedar Creek Trail. Station co-located with DEQ station ID 2-CEC004.60.	37.6307	-79.5481
ACB.CEDCRE2.4	Spring Gap Creek-Cedar Creek	Cedar Creek at low bridge above Monacan living exhibit off of the Cedar Creek Trail. Station co-located with DEQ station ID 2-CEC004.60.	37.6307	-79.5481
ACB.CGC01	Alone Mill Creek-Maury River	Cedar Grove Creek at confluence with Maury River	37.8828	-79.3859

Sample Data

The second set of columns are for data that identifies the sampling event itself. When the sample was taken, at what depth and a comment field for any additional information about that sampling event. As noted above, if replicate samples are taken there will be two rows of data where the Sample Date/Time would be the same for each row and the replicate number would be indicated in the Sample Comment column (i.e. Replicate 1).

The required data elements that are:

- Sample Date/Time:** The date and time the sample was taken from the waterbody for analysis. Preferred format is yyyy-mm-dd hh:mm:ss (i.e. 2019-04-14 09:58:00) using a 24 hour clock. Measurement to the second a sample was taken is not necessary, just the hour and minute. Separate columns for the date and time are also acceptable.
- Sample Depth:** The depth the sample was taken in the water column in meters. DEQ surface water samples are typically taken at 0.3 meters (1 foot). Monitoring in lakes or estuarine waters are often sampled at various depths. 0.3 meters is an acceptable estimate for samples taken near the surface for which an exact depth is not known.
- Sample Comment:** This column is for comments about the entire sample, not just a single parameter (i.e. unusual water conditions under which a sample might have been taken). This column should also be used to indicate replicate samples. If replicate samples are collected there should be a row of data for each replicate. The values in the Station ID, Station Waterbody, Station Description, Latitude/Longitude, Sample Date/Time, and Sample Depth columns should be identical among replicates, and they should be differentiated with a replicate number in the Sample Comment Column (e.g. Replicate 1).

This data should be provided in this format:

Sample_DateTime	Sample_Depth	Sample_Comment
12/12/2019 11:30:00	0.3	Water level still low, but flow seems normal. Water is murkier than it has been since I started this.
11/5/2019 11:05:00	0.3	The water level is lower than before. Water is clear, and I can see the bottom well.
12/12/2019 11:07:00	0.3	I could see fish near rocks on the river bottom. The fish were about 6" long and darker colored as seen from the top. Herring? This test was done in the afternoon of a hot day.
11/5/2019 12:10:00	0.3	Recent boat launches may account for high turbidity (decreased clarity) today. Canada goose and 4-5 goslings eating duck weed at the shoreline approx. 7-8 meters from dock. Floating feces observed after water for culture obtained.
12/19/2019 13:30:00	0.3	A large amount of small-leafed plants floating on the water. Plants accumulated at the dock, and large patches were observed out on the river.
11/21/2019 13:30:00	0.3	No submerged aquatic vegetation but last year at this time there was considerable underwater vegetation, so the absence this year is worth noting.
11/19/2019 13:30:00	0.3	Very dry conditions for last two months.
12/10/2019 14:59:00	0.3	Banks are all overgrown and full of sand deposits left after high river levels this year.
12/4/2019 15:00:00	0.3	Septics are backing up into homes in the area. This may be a part of the high E coli count in the water.

Parameter Data

The next set(s) of columns are for data about the individual parameters that are monitored. For each parameter monitored there will be set of four columns as detailed below. It is important to note that there is no expectation that data will be entered for every row for the _Qualifier, _Remark and _Level columns. Those columns should only be used when information is available, and otherwise left blank.

- Parameter Value:** The numeric result for the parameter. If the parameter was a 'non-detect' this column should be left blank. If the result was a less than or greater than value, enter the numeric value and note the less/greater than in the qualifier field. Please also provide the units for the parameter in the column header.
- Parameter Qualifier:** Information that qualifies the value entered into the Parameter Value column. For less than please use < and for greater than please use >. If the parameter was not detected in the analysis, please enter 'non-detect'.
- Parameter Remark:** Any comments specific to the parameter being monitored. The comments can include methods used, equipment issues, etc.
- Parameter Level:** The tier (Level I, II or III) at which the volunteer monitoring group believes the data should be used for assessment purposes. This will be confirmed by DEQ staff based on the Quality Assurance Project Plan for the volunteer monitoring group. If the volunteer monitoring group does not wish for the data to be used, please enter 'Not to be used for assessment purposes' in the column for the parameter.

Below is an example of what this data would look like in this format for two parameters, DO and Fecal Coliform:

DO_mg_l _Value	DO _Qualifier	DO_Remark	DO _Level	Fecal_Coliform count_Value	Fecal_Coliform _Qualifier	Fecal_Coliform _Remark	Fecal_Coliform _Level
9.8		Method DO.1, issue with probe during sampling	3	10	<	Method FC.1	2
6.8		Method DO.1, issue with probe during sampling	3	10	<	Method FC.1	2
5.6		Method DO.1	3	40		Method FC.1	2
4.2		Method DO.1	3	55		Method FC.1	2
5.4		Method DO.1	3	30		Method FC.1	2
6.6		Method DO.1	3	10	<	Method FC.1	2
6.8		Method DO.1	3	10		Method FC.1	2
5.4		Method DO.1	3	10		Method FC.1	2
4.5		Method DO.1	3	60		Method FC.1	2

When defining the column headers it is very important to indicate the exact parameter being reported. For instance, for a parameter such as nitrogen, please indicate if the parameter being monitored for is total nitrogen or dissolved nitrogen as that distinction may make a difference in the assessment of the data. Other field data parameters (pH, water temperature, specific conductance, secchi depth, etc.) should be reported in the same four-column format.

Other Data

Please feel free to include additional columns at the end of the spreadsheet which capture other information which could be helpful in the use of the data for assessment. Data such as air temperature, other weather conditions, stream flow gage data, qualitative assessments of stream flow, etc. can be very helpful to DEQ staff during the assessment process.

Complete Dataset Format

All together the data will look something like the table below. Using the column header schema as shown below will help DEQ efficiently process the data. The column titles highlighted in red are required data elements. For the parameter data, value columns are only required when there is data available. In the example below there are DO data available for all nine samples, but fecal coliform data are only available for the first four samples so those columns are blank for the rest of the samples. Any additional parameters which were monitored for

during a sampling event will be appended onto the right end of the spreadsheet with the four columns per parameter as would any additional data collected that the monitoring group thinks should be considered during any use of the data from the sample.

Questions?

Please direct any questions about the submittal of water quality monitoring data to citizenwater@deq.virginia.gov.

Station_ID	Station_Waterbody	Station_Description	Latitude	Longitude	Sample_DateTime	Sample_Depth	Sample_Comment	DO_mg_l_Value	DO_Qualifier	DO_Remark	DO_Level	Fecal_Coliform_count_Value	Fecal_Coliform_Qualifier	Fecal_Coliform_Remark	Fecal_Coliform_Level
ACB.BUFCRE10	Buffalo Creek	Buffalo Creek at intersection with Mateer Rd/670	37.7425	-79.5066	12/12/2019 11:30:00	0.3	Water level still low, but flow seems normal. Water is murkier than it has been since I started this.	9.8		Method DO.1, issue with probe during sampling	3	10	<	Method FC.1	2
ACB.BUFCRE10	Buffalo Creek	Buffalo Creek at intersection with Mateer Rd/670	37.7425	-79.5066	11/5/2019 11:05:00	0.3	The water level is lower than before. Water is clear, and I can see the bottom well.	6.8		Method DO.1, issue with probe during sampling	3	10	<	Method FC.1	2
ACB.BUFCRE12.5	Colliers Creek	Buffalo Creek at Colliers Creek	37.7568	-79.5431	12/12/2019 11:07:00	0.3		5.6		Method DO.1	3	40		Method FC.1	2
ACB.BUFCRE12.5	Colliers Creek	Buffalo Creek at Colliers Creek	37.7568	-79.5431	11/5/2019 12:10:00	0.3	Recent boat launches may account for high turbidity (decreased clarity) today. Canada goose at the shoreline approx 7-8 meters from dock. Floating feces observed.	4.2		Method DO.1	3	55		Method FC.1	2
ACB.BUSMILCRE	Great Wicomico River	Bush Mill Creek at the dock at the end of Heron Court.	37.8750	-76.4413	12/19/2019 13:30:00	0.3	A large amount of small-leaved plants floating on the water. Plants accumulated at the dock, and large patches were observed on the river.	5.4		Method DO.1	3				
ACB.BUSMILCRE	Great Wicomico River	Bush Mill Creek at the dock at the end of Heron Court.	37.8750	-76.4413	11/21/2019 13:30:00	0.3		6.6		Method DO.1	3				
ACB.CEDCRE2.4	Spring Gap Creek-Cedar Creek	Cedar Creek at low bridge above Cedar Creek Trail. Station co-located with DEQ station ID 2-CEC004.60.	37.6307	-79.5481	11/19/2019 13:30:00	0.3	Very dry conditions for last two months.	6.8		Method DO.1	3				
ACB.CEDCRE2.4	Spring Gap Creek-Cedar Creek	Cedar Creek at low bridge above Cedar Creek Trail. Station co-located with DEQ station ID 2-CEC004.60.	37.6307	-79.5481	12/10/2019 14:59:00	0.3	Banks are all overgrown and full of sand deposits left after high river levels this year.	5.4		Method DO.1	3				
ACB.CGC01	Alone Mill Creek-Maury River	Cedar Grove Creek at confluence with Maury River	37.8828	-79.3859	12/4/2019 15:00:00	0.3	Septics are backing up into homes in the area. This may be a part of the high EColi count in the water.	4.5		Method DO.1	3				