MARYLAND DEPARTMENT OF THE ENVIRONMENT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMITS

MS4 MONITORING DATA-ENTRY USER GUIDE:
BMP EFFECTIVENESS,
WATERSHED ASSESSMENTS AND
PCB SOURCE TRACKING

Version 1.0

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1. Introduction

The Maryland Department of the Environment (the Department, or MDE) has updated the monitoring requirements outlined in the *Assessment of Controls* section (PART IV.G) of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permits issued to Phase I jurisdictions across the State. The goals under the updated requirements are to assess the effectiveness of BMP implementation (*BMP Effectiveness*), assess water quality at the watershed level and detect trends (*Watershed Assessment and Trends*), as well as track sources of polychlorinated biphenyl (PCB) contamination (*PCB Source Tracking*). MS4 Monitoring Guidelines published in 2021 provide technical guidelines and criteria for performing the required monitoring in accordance with the NPDES MS4 permit (MDE 2021). In addition to the data collected during the monitoring period, it is requested that each jurisdiction provide the Department with a Quality Assurance Project Plan (QAPP) for all MS4 monitoring requirements with detailed information on sample collection and analysis.

Under the updated monitoring requirements, new parameters were included and previously required monitoring parameters, deemed no longer essential, are now optional. MS4 monitoring under PART IV.G now has three different goals with associated parameters to monitor: BMP effectiveness, watershed assessment and trends, and PCB source tracking. To assess BMP effectiveness, jurisdictions shall continue to monitor stormflow and baseflow samples and begin continuous monitoring of temperature, pH, discharge, and conductivity upon the Department's approval of the respective monitoring plans. Watershed assessment and trends monitoring includes monthly sampling for bacteria and continuous sampling of chloride. Details on sampling design and methods are available in the MS4 Monitoring Guidelines (MDE 2021). To satisfy the PCB source tracking permit requirement, jurisdictions shall conduct PCB source trackdown monitoring in-stream and within storm sewer networks using a combination of passive, sediment grab, and automated sampling. Details on sampling design and methods are available in MDE's PCB TMDL Guidance (MDE 2022).

The Department has developed template spreadsheets that jurisdictions should utilize to report all respective monitoring data. The table in Appendix A highlights the files that are required from each jurisdiction in their annual reporting, based on the selected areas for participating in the Chesapeake Bay Trust (CBT) Pooled Monitoring. The templates developed are intended to facilitate quality assurance and quality control (QA/QC) and analysis of MS4 generated data by standardizing how they are presented. The MS4 Monitoring Data-Entry User Guide presents detailed information on the tables and fields, and guidance on proper monitoring reporting.

Some of the tables have been modified from the MDE MS4 Geodatabase, where monitoring data has been reported previously. Whenever possible, the Department has maintained consistency with the format in the MS4 Geodatabase, by modifying field nomenclatures only when necessary. Biological monitoring and its associated fields shall be reported separately, following the templates developed by the Maryland Department of Natural Resources (MDDNR) available on the Department's website (MDE 2024). The files submitted by MS4 jurisdictions will be imported into an internal MDE database and made available to the public when finalized.

The templates are <u>not intended</u> to be cumulative and therefore, do not need to include monitoring data collected during prior permit terms or under previous monitoring requirements. Data collected to meet new permit requirements should be reported annually with the Annual Report as individual spreadsheets (.csv, .xls, .xlsx, or .xlsm formats) containing the data collected during the fiscal year (FY) being reported. The only exception is for the first monitoring data submission under the <u>new monitoring requirements</u>. The first data submission should include any data collected up to the fiscal year being reported. For example, if a jurisdiction has been monitoring since January 2023 and

monitoring data is being reported for the first time with the FY24 Annual Report (December 2024), the results submitted must include any data collected from January 2023 through the end of June 2024. Biological data, given the lengthy process of benthic macroinvertebrate identification and the eventual need to consult with MDDNR, can be submitted in the following fiscal year's annual reporting if necessary. In circumstances where a data set will not be delivered within the foreseen timeline, jurisdictions should justify the absence of the data in the annual submission with the expected date for when it will be provided.

Quality Assurance Project Plans (QAPPs) and Standard Operating Procedures (SOPs) are important materials for the Department to understand the data and corresponding collection methods, analysis procedures in the laboratory, and unique site conditions. QAPPs and SOPs should reflect the methodologies employed in data collection and QA/QC processes. The Department requests that MS4 jurisdictions develop and submit QAPPs on all the permit monitoring being conducted under the 5th generation NPDES MS4 permits, as well as any relevant existing SOPs. If sampling and laboratory analysis methodologies are revised, the Department recommends submitting updated documentation with a cover page listing the changes.

2. General Considerations

This data-entry user guide supplements the information provided in the individual Excel Macro-Enabled Workbook (.xlsm) templates developed to support MS4 monitoring data. Each template file has a main tab where the monitoring data would be added, a tab with table fields descriptions and validation checks, and a tab with the domain tables relevant to that template. The domain tables are used to create the drop-down lists when the field is domain restricted. Each template's fields can fall into three categories: mandatory (M), conditional (C), or optional (O). This information is provided in the third column ('Field') of each table template's description.

The naming conventions for the tables follow the structure below (Figure 1), except the Monitoring Site table, which will remain the same as used for the MS4 geodatabase (i.e., *MonitoringSite*).

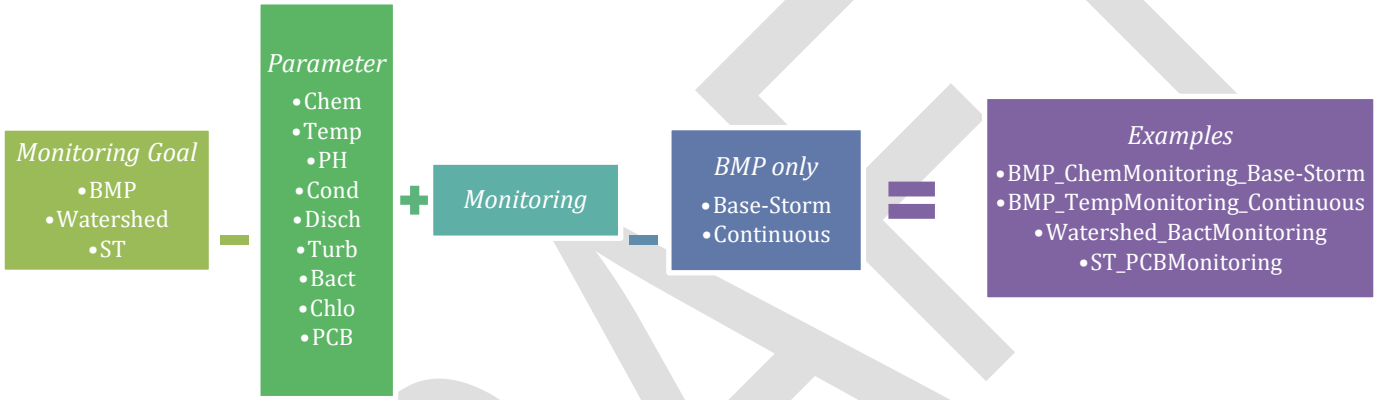

Figure 1. Schematic of monitoring data tables naming convention.

Tables *MonitoringSite* and *BMP_ChemMonitoring_Base-Storm* (formerly *ChemicalMonitoring*) already existed in the MS4 geodatabase, and have been updated to remove _dt fields, include new fields, and make optional some initially required fields, such as heavy metals. Domain tables *dMD8Digit*, *dMD12Digit* (formerly *dHUC12digit*), *dStationLoc*, *dStationType*, and *dStormBaseflow* also were domains in the geodatabase. Considering the additional monitoring required under the new permit, *dStationType* was updated to include bacteria and PCB monitoring and exclude biological monitoring, and *dStationLoc* to include other potential locations. The following new domains have been included: *dAnalyticalMethodBact*, *dAnalyticalMethodChem, dAnalyticalMethodPCB, dChemParameters, dCollectionEquip, dContinuousParameters*, *dFecalBacteria, dFlowRegime, dMDCounties, dMonitoringGoal*, *dPCBParameters*, *dQualifierCodes, dSampleFraction, dSampleMedia, dSampleType, and dWeightBasis.*

New tables were created to report continuous, bacteria, chloride, and PCB monitoring data. BMP effectiveness monitoring data should be populated in the *BMP_ChemMonitoring_Base-Storm* table in the case of samples collected during storm or baseflow, while continuous monitoring data shall be populated in their respective parameter *Monitoring_Continuous* tables (e.g., continuous temperature in *BMP_TempMonitoring_Continuous*). Watershed assessment and trends monitoring data should be populated in the *Watershed_BactMonitoring* and *Watershed_ChloMonitoring* tables. Lastly, PCB source tracking monitoring data should be populated in the *ST_PCBMonitoring* table. More details on each table's fields and descriptions are provided in further sections of this user guide.

Some of the fields in the database are domain restricted and that is specified in the reporting schema described in the following chapters. All domain tables are provided in Chapter 6 (Domain Tables). Domain restricted fields appear in the tables as drop-down lists where, in general, entries are limited to the options available. In some instances, the drop-down lists are provided as recommended options to select from, but any values can be entered (e.g., ANALYTICAL_METHOD). Also, for certain fields, multiple entries are allowed (e.g., STATION_TYPE and QUALIFIER). These nuances are provided in field descriptions where relevant.

Table 1. List of all templates and domain tables and their short description.

TAMPLATE NAME	CATEGORY	DESCRIPTION
MonitoringSite	Site Information	Information pertaining to monitoring sites
BMP_ChemMonitoring_BaseStorm	Primary Table	Data from samples collected for BMP effectiveness monitoring.
BMP_TempMonitoring_Continuous	Primary Table	Continuous temperature data for BMP effectiveness monitoring
BMP_PHMonitoring_Continuous	Primary Table	Continuous pH data for BMP effectiveness monitoring
BMP_DischMonitoring_Continuous	Primary Table	Continuous discharge data for BMP effectiveness monitoring
BMP_CondMonitoring_Continuous	Primary Table	Continuous specific conductance data for BMP effectiveness monitoring
BMP_TurbMonitoring_Continuous	Primary Table	Continuous turbidity data for BMP effectiveness monitoring
Watershed_BactMonitoring	Primary Table	Bacteria monitoring data for watershed assessment and trends
Watershed_ChloMonitoring	Primary Table	Chloride monitoring data for watershed assessment and trends
ST_PCBMonitoring	Primary Table	PCB source tracking monitoring data
dAnalyticalMethodBact	Domain Table	List of recommended analytical methods for bacteria quantitation
dAnalyticalMethodChem	Domain Table	List of recommended analytical methods for BMP effectiveness parameters
dAnalyticalMethodPCB	Domain Table	List of recommended analytical methods for PCB analysis
dChemParameters	Domain Table	List of parameters to analyze as part of BMP effectiveness monitoring. Details on reporting requirements are included in the table description
dCollectionEquip	Domain Table	Equipment used to collect the sample
dContinuousParameters	Domain Table	Parameters recorded by logger
dFecalBacteria	Domain Table	Name of bacteria group being sampled
dFlowRegime	Domain Table	Type of flow regime during which sample was collected
dMD12Digit	Domain Table	Maryland 12-digit watersheds
dMD8Digit	Domain Table	Maryland's 8-digit watersheds
dMDCounties	Domain Table	Two-letter abbreviation of Maryland counties
dMonitoringGoal	Domain Table	The goal of monitoring station's sampling: for BMP effectiveness, watershed assessment and trends, or PCB source tracking
dPCBParameters	Domain Table	PCB and congeners
dQualifierCodes	Domain Table	Codes specifying issues with sampling, transportation, analysis, etc. Retrieved from the Water Quality Exchange (WQX) (USEPA 2024) on 07/23/2024
dSampleFraction	Domain Table	Sample fraction
dSampleMedia	Domain Table	Identifies the environmental medium sample was taken
dSampleType	Domain Table	The type of sample collected: composite, discrete or passive
dStationLoc	Domain Table	Station location: estuary, impoundment, instream, outfall or other
dStationType	Domain Table	Station type: set up for chemical (BMP storm-baseflow samples and continuous sampling), bacteria, chloride, or PCB monitoring
dStormBaseflow	Domain Table	Storm or baseflow sampling
dWeightBasis	Domain Table	Sample weight bases: dry or wet. Applicable to sediment samples
Logger_Maintenance	Supporting Table	Information on logger maintenance and calibration events

Although optional, jurisdictions can assign a unique ID to each sample record, using the following naming convention: 2-digit jurisdiction code + 2-digit year + parameter abbreviation + 6-digit sequential number (Figure 2). This will promote easier access to each record. The abbreviated parameter, which should be written in all capital letters, is the same list as the parameters used in the tables naming convention: CHEM, TEMP, PH, COND, DISCH, TURB, BACT, CHLO, and PCB. The two-letter jurisdiction codes are: AL = Allegany; AA = Anne Arundel; BA = Baltimore; BC = Baltimore City; CV = Calvert; CA = Caroline; CR = Carroll; CE = Cecil; CH = Charles; DO = Dorchester; FR = Frederick; GA = Garrett; HA = Harford; HO = Howard; KE = Kent; MO = Montgomery; PG = Prince George's; QA = Queen Anne's; SO = Somerset; SM = St. Mary's; TA = Talbot; WA = Washington; WI = Wicomico; WO = Worcester; SH = State Highway Administration.

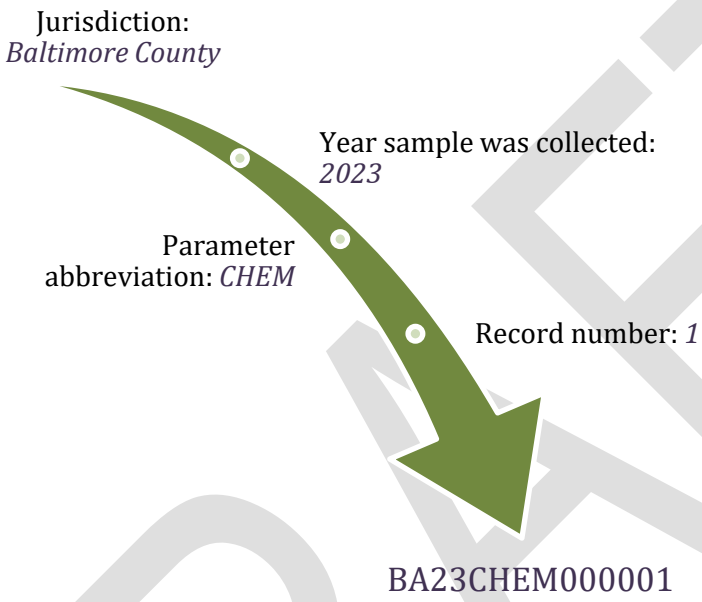

Figure 2. Example of data record unique ID naming convention.

The monitoring site ID is a **mandatory field** in all tables and shall adhere to the following naming convention: 2-digit jurisdiction code + 2-digit year + MSI (for Monitoring Site ID) + 6-digit sequential number (Figure 2). Note that this is the same naming convention as the data record unique ID, but instead of the parameter abbreviation, MSI (Monitoring Site ID) should be used (e.g., AA22MSI000001). Additionally, the 2-digit year of the monitoring site ID should correspond to the year the monitoring station was first established and should not change unless the site location changes. In many cases, the monitoring station where data is being collected has been reported in previous geodatabase submissions, for example, BMP effectiveness monitoring sites. In those cases, the jurisdiction should provide the very first ID reported in the geodatabase, so that historical data can be reconciled with new data. For assistance in determining the preferred monitoring site ID to use, please consult with MDE's Watershed Protection, Restoration and Planning Program (WPRPP).

Any high-frequency data (continuous data) should be accompanied by calibration data or field notes to help QA/QC the data. The Department developed a logger maintenance template (*Logger_Maintenance*) that jurisdictions can use. However, software-generated calibration information or scanned field notes about when cleaning, calibration, and data download occurred and information on issues with the site or logger could be provided alternatively. This will help data users understand when data gaps are due to logger maintenance and calibration.

3. Site Information

This section includes the table where all information pertaining to the monitoring site should be provided.

3.1. MonitoringSite

Information regarding each monitoring station should be provided on the *MonitoringSite* table. Table 2 offers a summary of each field: type, reporting requirement, if values must be selected from a domain table, and description. The *MonitoringSite* table is required whenever the jurisdiction is conducting at least one of the three elements of the assessment of controls: BMP effectiveness, watershed assessment and trends, and PCB source tracking.

Table 2. Fields characterizing monitoring stations.

Name	Type	Field	Domain	Description
MON_STATION_ID	Text	M		MDE primary ID – Jurisdiction Code + 2-digit Year + 'MSI' + 6-digit number (e.g., AA22MSI000001)
LOCAL_STATION_ID	Text	O		Jurisdiction's station ID
MDE_OUTFALL_ID	Text	C		MDE outfall ID; applies only if STATION_LOC is Outfall
LOCAL_OUTFALL_ID	Text	O		Alias if jurisdiction has outfall ID
LATITUDE	Double	M		8-digit WGS84 Auxiliary Sphere (Decimal Degrees)
LONGITUDE	Double	M		8-digit WGS84 Auxiliary Sphere (Decimal Degrees)
STREAM_ORDER	Double	M		Stream order based on the NHD 1:24,000 stream layer
MON_GOAL	Text	M	dMonitoringGoal	Indicate if station is linked to BMP effectiveness, watershed assessment and trends, or PCB source tracking monitoring
STATION_TYPE	Text	M	dStationType	Station type (BACT, CHEM, CHLO, PCB): If MON_GOAL is BMP, STATION_TYPE is CHEM; if MON_GOAL is WAT, then STATION_TYPE is either BACT or CHLO; if MON_GOAL is PST, then STATION_TYPE is PCB. Multiple entries are allowed if different types of data are being collected at the same site.
STATION_LOC	Text	M	dStationLoc	If STATION_TYPE is CHEM, STATION_LOC is either outfall or instream; if STATION_TYPE is BACT or CHLO, then STATION_LOC is instream; if STATION_TYPE is PCB, then STATION_LOC is likely instream but could also be estuary or impoundment. If other is selected, specify it in GEN_COMMENTS.
DRAIN_AREA	Double	M		Drainage area (acres) to monitoring station. MDE recommends delineating drainage area using USGS StreamStats.
STATE	Text	O		State where monitoring occurred
COUNTY_CODE	Text	O	dMDCounties	Two letter code of the county where monitoring occurred
COUNTY_NAME	Text	O	dMDCounties	Name of the county where monitoring occurred
MS4_NPDES	Text	M		Jurisdiction's NPDES permit ID
WATERSHED8DGT	Text	M	dMD8Digit	Maryland 8-digit watershed
WATERSHED12DGT	Text	O	dMD12Digit	Maryland 12-digit watershed
ST_NAME	Text	O		Name of the stream or estuary where station is located
GEN_COMMENTS	Text	O		General comments

See additional details on some of the fields below:

MON_STATION_ID: the codes for monitoring station IDs will continue to follow the naming convention previously used in the geodatabase: the two-letter jurisdiction code, two-digit year when the station was originally established, MSI as a shorthand for monitoring station ID, and a 6-digit number (e.g., AA22MSI000001). This field is mandatory, and is necessary for the information provided in this table to be linked to the tables containing monitoring data. If the monitoring station was established under previous generation permits and monitoring data has been previously reported in the geodatabase, keep the same ID as the first year it was reported (e.g., if Anne Arundel County started to monitor BMP effectiveness at a site in 2018 and it was the fifth station that year, the ID should be AA18MSI000005 and match the first time it appeared in the MS4 geodatabase). The year in the monitoring station ID should not change over time, unless the site's physical location changes, in which case a new station ID should be used.

LOCAL_STATION_ID: this field is optional for jurisdictions to fill out if they use another ID or name for the monitoring station, different from MDE_STATION_ID. If this is an outfall, it should match the LOCAL_OUTFALL_ID.

MDE_OUTFALL_ID: this field is conditional on the station location and only mandatory if it is in the outfall (STATION_LOC = OUT). The value provided must match the outfall ID (MDE_STATION_ID) in the Outfall feature class of the MS4 geodatabase.

MON_GOAL: this field is mandatory and refers to the station's designated monitoring goal. This field indicates if a site is monitored as part of BMP effectiveness (BMP), watershed assessment and trend analysis (WAT), or PCB source tracking (PST). This field is domain restricted, and options are provided in a drop-down list in the template.

STATION_TYPE: this field is mandatory and dependent on the MON_GOAL selection. If the monitoring station is linked to BMP effectiveness, the station type will always be chemical monitoring (CHEM). If the station is instead linked to watershed assessment and trends (WAT), the station type can be either bacteria (BACT) or chloride (CHLO) monitoring. If the station is linked to PCB source tracking (PST), the station type is PCB. Although domain restricted, this field allows multiple entries in case the same station is used for multiple monitoring goals and parameter types. For example, if the same station is used for Chemical monitoring during baseflow and storm events, and for chloride monitoring for watershed assessment; both CHEM and CHLO should be entered.

STATION_LOC: the station location is a mandatory field and dependent on the selection in MON_GOAL. If the station is linked to BMP effectiveness, the location can be either outfall (OUT) or instream (IN). If the monitoring goal is WAT, the location of the station should be instream (IN). There are additional station location options for PCB source tracking. See domain *dStationLoc* for the full list of locations. Note that for BMP stations, paired outfall and instream stations are required. Continuous monitoring will always occur at the instream location and storm-baseflow monitoring is required at both outfall and instream on every sampling event, unless the outfall is dry during baseflow. This field is domain restricted, and options are provided in a drop-down list in the template.

4. Primary Tables

4.1. BMP_ChemMonitoring_Base-Storm

The *BMP_ChemMonitoring_Base-Storm* table is where data from samples collected for the BMP effectiveness monitoring during baseflow and stormflow should be stored and reported. For each event, there should be sampling at both outfall and instream stations, unless the outfall is dry during baseflow conditions. Table 3 provides a summary of each field: type, reporting requirement, if values must be selected from a domain table, and description. The *BMP_ChemMonitoring_Base-Storm* table is not required to be submitted in annual reporting if the jurisdiction has opted into CBT's Pooled Monitoring for the BMP effectiveness monitoring.

This table was already part of the MS4 geodatabase. However, the fields have been updated to reflect new requirements and the format changed from wide to long. In the long format, each data record should represent a single parameter result. For example, one row for total nitrogen, one for total phosphorus, etc., for every monitoring event. Each monitoring event can have up to 15 rows of data (9 mandatory and 6 optional parameters). This change allows the inclusion of additional information related to the analysis of individual parameters, such as the analytical method, analysis date and time, result unit, and qualifier codes indicating issues during laboratory analysis.

Table 3. *BMP_ChemMonitoring_Base-Storm* fields and their descriptions.

Name	Type	Field	Domain	Description
CHEM_MON_ID	Text	O		MDE primary ID (Unique table ID): Jurisdiction Code + Year 2-digits + 'CHEM' + 6-digit number (e.g., BA22CHEM000001)
MON_STATION_ID	Text	M		Monitoring site ID linking to MonitoringSite table
LOCAL_STATION_ID	Text	O		Local ID value (must match value in MonitoringSite table)
MON_DATE	Date	M		Date of monitoring (MM/DD/YYYY)
MON_TIME	Time	M		Time monitoring begins (HH:MM 24-hr system)
Sample_Collection_Equipment	Text	O	dCollectionEquip	Equipment used to collect sample for laboratory analysis: autosampler, water bottle
Sample_Type	Text	O	dSampleType	Discrete, Composite
STORM_BASEFLOW	Text	M	dStormBaseflow	Storm or baseflow sample
DEPTH	Double	C		Depth of rain (inches); applies only to storm sample
DURATION	Double	C		Duration of the storm event (HH:MM); applies only to storm sample
INTENSITY	Double	C		Calculated: Intensity (in/h) = depth/duration; applies only to storm sample
TOTAL_STORM_FLOW_VOL	Double	C		Total storm flow volume (ft^3); applies only to storm sample
DISCHARGE	Double	M		Discharge in cubic feet per second (ft^3). Instantaneous for baseflow samples and peak discharge for storm samples.
WATER_TEMP	Double	M		Flow weighted average of water temperature (°C) if storm sample, *in-situ* value for baseflow sample
pH	Double	M		Flow weighted average of pH if storm sample, *in-situ* value for baseflow sample
ANALYSIS_DATE	Date	M		Date sample was analyzed in the lab (MM/DD/YYYY)

Name	Type	Field	Domain	Description
ANALYSYS_TIME	Time	M		Time sample was analyzed in the lab (HH:MM 24-hr system)
ANALYTICAL_METHOD	Text	M	dAnalyticalMethod Chem	Analytical method used to quantify the parameter. Methods outside of the list are allowed.
LABORATORY_NAME	Text	M		Name of the laboratory or facility conducting the analysis
LAB_ACCREDITATION	Text	O		Information on laboratory accreditation if certified/accredited
CHEM_PARAMETER	Text	M	dChemParameters	Name of the chemical parameter analyzed
CHEM_PARAMETER_DT	Double	M		Analysis detection limit for the parameter
CHEM_PARAMETER_EMC	Double	M		Event mean concentration of the parameter
CHEM_PARAMETER_UNIT	Text	M		Parameter result unit
QUALIFIER	Text	O	dQualifierCodes	Code describing issues with site, sampling, laboratory analysis, results, etc.
GEN_COMMENTS	Text	O		General comments

See additional details on some of the fields below:

CHEM_MON_ID: each data record optionally should have a unique ID in the following format: two-digit jurisdiction code, two-digit year sample was collected, 'CHEM', and a six-digit number (e.g., BA22CHEM000001). Because the monitoring data is no longer stored in a geodatabase, the table does not need to have a unique ID and this field can be left blank by the jurisdiction if preferred.

MON_STATION_ID: monitoring station ID linking to *MonitoringSite* table. The ID provided in this table must match IDs from the *MonitoringSite* table.

MON_DATE: monitoring date refers to the date when the sample was collected. This field was formerly EVENT_DATE in the geodatabase and updated for consistency across all data tables. In the case of storm sampling, the date should correspond to when the first sample was collected.

MON_TIME: monitoring time refers to the time when the sample was collected, following 24-hour standard time format. This field was formerly EVENT_TIME in the geodatabase and updated for consistency across all data tables. In the case of storm sampling, the time should correspond to when the first sample was collected.

STORM_BASEFLOW: mandatory domain restricted field to indicate if the sample occurred during baseflow (BF) or storm flow (S).

DURATION: duration of the storm event, provided in hours and minutes. This field applies only to storm sampling and should be left blank for baseflow samples.

DISCHARGE: discharge in cubic feet per second: instantaneous for baseflow samples and the peak discharge in the case of storm samples.

CHEM_PARAMETER_EMC: result of laboratory analysis for a specific parameter. In the event results are below the method detection limit (MDL), provide the instrument-measured value and qualify the data record in the field

QUALIFIER using qualifier code DL (i.e., Not Detected: The analyte was not detected at a level >= to the Method Detection Limit for the analysis), which indicates the result is below CHEM_PARAMTER_DT. The same approach used for EMC calculations should be used when a parameter result is based on the sum of its constituent parameters, such as total nitrogen (TN). If TN is not directly analyzed in the laboratory, but estimated from other parameters, the Department recommends using the instrument-measured value of the constituent that was below method detection limit to calculate TN and adding the qualifier code DL in the QUALIFIER field indicating that is the case. In such circumstances, the qualifier code DL should be added to both constituent's record and resulting TN. If results below the MDL are provided differently from the recommendation above, please include details on the censored data in the GEN_COMMENTS field (e.g., value below detection limit replaced with half of the MDL, which is the censoring method the Department recommends).

QUALIFIER: code describing issues encountered with the monitoring site, sampling, laboratory analysis, results, etc. The codes provided in the drop-down menu come from domain table *dQualifierCodes*, and multiple entries are allowed in the cell. The list in the templates and this user guide was retrieved from the US Environmental Protection Agency's (EPA) Water Quality Exchange (WQX) allowable value list of ResultMeasureQualifier, which is frequently updated. The version in the present templates was obtained on July 23, 2024. See table *dQualifierCodes* in Chapter 6 for a short list of recommended qualifiers to use depending on the issue encountered.

GEN_COMMENTS: This optional field should include additional information that was not pertinent in any of the previous fields and is helpful for QA/QC purposes or to better understand the data.

4.2. BMP_TempMonitoring_Continuous

The *BMP_TempMonitoring_Continuous* table is where high-frequency temperature data recorded as part of the BMP effectiveness monitoring should be stored and reported. Table 4 provides a summary of each field: type, reporting requirement, if values must be selected from a domain table, and description. The *BMP_TempMonitoring_Continuous* table is not required to be submitted in annual reporting if the jurisdiction has opted into CBT's Pooled Monitoring for the BMP effectiveness monitoring.

Table 4. *BMP_TempMonitoring_Continuous* fields and their descriptions.

Name	Type	Field	Domain	Description
TEMP_MON_ID	Text	O		MDE primary ID (Unique table ID): Jurisdiction Code + Year 2-digits + 'TEMP' + 6-digit number (e.g., BC19TEMP000001)
MON_STATION_ID	Text	M		Monitoring site ID linking to MonitoringSite table
LOCAL_STATION_ID	Text	O		Local ID value (must match value in MonitoringSite table)
LOGGER_SN	Text	M		Logger factory serial number or associated ID
MON_DATE	Date	M		Date of measurement (MM/DD/YYYY)
MON_TIME	Time	M		Time of measurement (HH:MM 24-hour standard time)
WATER_TEMP	Double	M		Instantaneous water temperature in degrees Celsius (°C) based on a 20-minute recording frequency
AIR_TEMP	Double	O		Instantaneous air temperature in degree Celsius (°C) based on a 20-minute recording frequency
QUALIFIER	Text	O	dQualifier Codes	Code describing issues with site, sampling, laboratory analysis, results, etc.
GEN_COMMENTS	Text	O		General comments

See additional details on some of the fields below:

TEMP_MON_ID: each record optionally should have a unique ID in the following format: two-digit jurisdiction code, two-digit year data was recorded, 'TEMP', and a 6-digit number (e.g., BC19TEMP000001). Because the monitoring data is no longer stored in a geodatabase, the table does not need to have a unique ID and this field can be left blank by the jurisdiction if preferred.

MON_STATION_ID: monitoring station ID linking to the *MonitoringSite* table. The ID provided in this table must match an existing ID from the *MonitoringSite* table, specifically the instream site of the BMP effectiveness monitoring.

LOGGER_SN: logger factory serial number or associated ID. The serial number should be concatenated with the operating agency's acronym (agency acronym + - + serial number). For example, if a logger with serial number 20537987 is operated by USGS, LOGGER_SN should be USGS-20537987. If the jurisdiction is the one responsible for operating it, the jurisdiction two-letter code can be used as the agency acronym.

MON_DATE: monitoring date refers to the date data was recorded.

MON_TIME: monitoring time refers to the time data was recorded, following 24-hour standard time format. Please ensure the clock is set to standard time to avoid gaps and duplication of the data due to daylight savings time changes.

WATER_TEMP: water temperature is the main parameter of interest in the table, and it should be in degrees Celsius (°C), ranging from zero to 35. As per the Monitoring Guidelines (MDE 2021), there should be a record of water temperature every 20 minutes. However, jurisdictions have the flexibility to choose shorter recording frequences.

QUALIFIER: qualifier code representing issues encountered with the monitoring site, sampler, etc. The codes provided in the drop-down menu come from domain table *dQualifierCodes* and multiple entries are allowed in the cell. The list in the templates and this user guide was retrieved from the WQX on July 23, 2024.

GEN_COMMENTS: this optional field should include additional information that was not pertinent in any of the previous fields and is helpful for QA/QC purposes or to better understand the data.

4.3. BMP_PHMonitoring_Continuous

The *BMP_PHMonitoring_Continuous* table is where high-frequency pH recorded as part of the BMP effectiveness monitoring should be stored and reported. Table 5 provides a summary of each field: type, reporting requirement, if values must be selected from a domain table, and description. The *BMP_PHMonitoring_Continuous* table is not required to be submitted in annual reporting if the jurisdiction has opted into CBT's Pooled Monitoring for the BMP effectiveness monitoring.

Table 5. *BMP_PHMonitoring_Continuous* fields and their descriptions.

Name	Type	Field	Domain	Description
PH_MON_ID	Text	O		MDE primary ID (Unique table ID): Jurisdiction Code + Year 2-digits + 'PH' + 6-digit number (e.g., CH22PH000001)
MON_STATION_ID	Text	M		Monitoring site ID linking to MonitoringSite table
LOCAL_STATION_ID	Text	O		Local ID value (must match value in MonitoringSite table)
LOGGER_SN	Text	M		Logger factory serial number or associated ID
MON_DATE	Date	M		Date of measurement (MM/DD/YYYY)
MON_TIME	Time	M		Time of measurement (HH:MM 24-hour standard time)
PH	Double	M		Instantaneous pH based on a 60-minute recording frequency
WATER_TEMP	Double	O		Instantaneous water temperature in degrees Celsius (°C) paired with pH recording frequency of 60 minutes
QUALIFIER	Text	O	dQualifier Codes	Code describing issues with site, sampling, laboratory analysis, results, etc.
GEN_COMMENTS	Text	O		General comments

See additional details on some of the fields below:

PH_MON_ID: each record optionally should have a unique ID in the following format: two-digit jurisdiction code, two-digit year data was recorded, 'PH', and a six-digit number (e.g., CH22PH000001). Because the monitoring data is no longer stored in a geodatabase, the table does not need to have a unique ID and this field can be left blank by the jurisdiction if preferred.

MON_STATION_ID: monitoring station ID linking to the *MonitoringSite* table. The ID provided in this table must match an existing ID from the *MonitoringSite* table, specifically the instream site of the BMP effectiveness monitoring.

LOGGER_SN: logger factory serial number or associated ID. The serial number should be concatenated with the operating agency's acronym (agency acronym + - + serial number). For example, if a logger with serial number 20537987 is operated by USGS, LOGGER_SN should be USGS-20537987. If the jurisdiction is the one responsible for operating it, the jurisdiction two-letter code can be used as the agency acronym.

MON_DATE: monitoring date refers to the date data was recorded.

MON_TIME: monitoring time refers to the time data was recorded, following a 24-hour standard time format. Please ensure the clock is set to standard time to avoid gaps and duplication of the data due to daylight savings time changes.

PH: is the main parameter of interest in the table and it should be above zero and less than or equal to 14. As per the Monitoring Guidelines (MDE 2021), there should be a record of pH every 60 minutes, although jurisdictions can opt to use a shorter recording frequency.

WATER_TEMP: water temperature is an optional parameter and, if included, should be in degrees Celsius (°C), ranging from zero to 35.

QUALIFIER: qualifier codes representing issues encountered with the monitoring site, sampler, etc. The codes provided in the drop-down menu come from domain table *dQualifierCodes* and multiple entries are allowed in the cell. The list in the templates and this user guide was retrieved from the WQX on July 23, 2024.

GEN_COMMENTS: this optional field should include additional information that was not pertinent in any of the previous fields and is helpful for QA/QC purposes or to better understand the data.

4.4. BMP_DischMonitoring_Continuous

The *BMP_DischMonitoring_Continuous* table is where high-frequency discharge recorded as part of the BMP effectiveness monitoring should be stored and reported. Table 6 provides a summary of each field: type, reporting requirement, if values must be selected from a domain table, and description. The *BMP_DischMonitoring_Continuous* table is not required to be submitted in annual reporting if the jurisdiction has opted into CBT's Pooled Monitoring for the BMP effectiveness monitoring.

Table 6. *BMP_DischMonitoring_Continuous* fields and their descriptions.

Name	Type	Field	Domain	Description
DISCH_MON_ID	Text	O		MDE primary ID (Unique table ID): Jurisdiction Code + Year 2-digits + 'DISCH' + 6-digit number (e.g., CR19DISCH000001)
MON_STATION_ID	Text	M		Monitoring site ID linking to MonitoringSite table
LOCAL_STATION_ID	Text	O		Local ID value (must match value in MonitoringSite table)
LOGGER_SN	Text	M		Logger factory serial number or associated ID
MON_DATE	Date	M		Date of measurement (MM/DD/YYYY)
MON_TIME	Time	M		Time of measurement (HH:MM 24-hour standard time)
DISCHARGE	Double	M		Instantaneous discharge in cubic feet per second (ft^3/s) based on 15-minute recording frequency
QUALIFIER	Text	O	dQualifier Codes	Code describing issues with site, sampling, laboratory analysis, results, etc.
GEN_COMMENTS	Text	O		General comments

See additional details on some of the fields below:

DISCH_MON_ID: each record optionally should have a unique ID in the following format: two-digit jurisdiction code, two-digit year data was recorded, 'DISCH', and a six-digit number (e.g., CR19DISCH000001). Because the monitoring data is no longer stored in a geodatabase, the table does not need to have a unique ID, and this field can be left blank by the jurisdiction if preferred.

MON_STATION_ID: monitoring station ID linking to the *MonitoringSite* table. The ID provided in this table must match an existing ID from the *MonitoringSite* table, specifically the instream site of the BMP effectiveness monitoring.

LOGGER_SN: logger factory serial number or associated ID. The serial number should be concatenated with the operating agency's acronym (agency acronym + - + serial number). For example, if a logger with serial number 20537987 is operated by USGS, LOGGER_SN should be USGS-20537987. If the jurisdiction is the one responsible for operating it, the jurisdiction two-letter code can be used as the agency acronym.

MON_DATE: monitoring date refers to the date data was recorded.

MON_TIME: monitoring time refers to the time data was recorded, following a 24-hour standard time format. Please ensure the clock is set to standard time to avoid gaps and duplication of the data due to daylight savings time changes.

DISCHARGE: is the main parameter of interest in the table and it should be above or equal to zero in cubic feet per second (ft^3/s). As per the Monitoring Guidelines (MDE 2021), there should be a record of discharge every 15 minutes, although jurisdictions have the flexibility to record their data at shorter intervals.

QUALIFIER: qualifier codes representing issues encountered with the monitoring site, sampler, etc. The codes provided in the drop-down menu come from domain table *dQualifierCodes* and multiple entries are allowed in the cell. The list in the templates and this user guide was retrieved from the WQX on July 23, 2024.

GEN_COMMENTS: this optional field should include additional information that was not pertinent in any of the previous fields and is helpful for QA/QC purposes or to better understand the data.

4.5. BMP_CondMonitoring_Continuous

The *BMP_CondMonitoring_Continuous* table is where high-frequency specific conductance recorded as part of the BMP effectiveness monitoring should be stored and reported. Table 7 provides a summary of each field: type, reporting requirement, if values must be selected from a domain table, and description. The *BMP_CondMonitoring_Continuous* table is not required to be submitted in annual reporting if the jurisdiction has opted into CBT's Pooled Monitoring for the BMP effectiveness monitoring. Additionally, if the jurisdiction is collecting specific conductance data at a monitoring site that fulfills both the BMP effectiveness and the watershed assessment and trends monitoring, the data can be reported using either *BMP_CondMonitoring_Continuous* or *Watershed_ChlorMonitoring*, provided that all collected data is included.

Table 7. *BMP_CondMonitoring_Continuous* fields and their descriptions.

Name	Type	Field	Domain	Description
COND_MON_ID	Text	O		MDE primary ID (Unique table ID): Jurisdiction Code + Year 2-digits + 'COND' + 6-digit number (e.g., FR19COND000001)
MON_STATION_ID	Text	M		Monitoring site ID linking to MonitoringSite table
LOCAL_STATION_ID	Text	O		Local ID value (must match value in MonitoringSite table)
LOGGER_SN	Text	M		Logger factory serial number or associated ID
MON_DATE	Date	M		Date of measurement (MM/DD/YYYY)
MON_TIME	Time	M		Time of measurement (HH:MM 24-hour standard time)
SPEC_COND	Double	M		Specific Conductance after conversion in microSiemens per cm (µS/cm) based on a 30-minute recording frequency
WATER_TEMP	Double	O		Instantaneous temperature in degrees Celsius (°C) paired with the conductivity recording frequency of 30 minutes
QUALIFIER	Text	O	dQualifier Codes	Code describing issues with site, sampling, laboratory analysis, results, etc.
GEN_COMMENTS	Text	O		General comments

See additional details on some of the fields below:

COND_MON_ID: each record optionally should have a unique ID in the following format: two-digit jurisdiction code, two-digit year data was recorded, 'COND', and a six-digit number (e.g., FR19COND000001). Because the monitoring data is no longer stored in a geodatabase, the table does not need to have a unique ID, and this field can be left blank by the jurisdiction if preferred.

MON_STATION_ID: monitoring station ID linking to the *MonitoringSite* table. The ID provided in this table must match an existing ID from the *MonitoringSite* table, specifically the instream site of the BMP effectiveness monitoring.

LOGGER_SN: logger factory serial number or associated ID. The serial number should be concatenated with the operating agency's acronym (agency acronym + - + serial number). For example, if a logger with serial number 20537987 is operated by USGS, LOGGER_SN should be USGS-20537987. If the jurisdiction is the one responsible for operating it, the jurisdiction two-letter code can be used as the agency acronym.

MON_DATE: monitoring date refers to the date data was recorded.

MON_TIME: monitoring time refers to the time data was recorded, following a 24-hour standard time format. Please ensure the clock is set to standard time to avoid gaps and duplication of the data due to daylight savings time changes.

SPEC_COND: specific conductance is the main parameter of interest in the table, and it should be above or equal to zero and in microSiemens per centimeter (µS/cm) at 25 degrees Celsius. As per the Monitoring Guidelines (MDE 2021), there should be a record of specific conductance every 30 minutes, although jurisdictions have the flexibility to record the data at shorter intervals.

WATER_TEMP: water temperature is an optional parameter and, if included, should be in degrees Celsius (°C), ranging from zero to 35.

QUALIFIER: qualifier codes representing issues encountered with the monitoring site, sampler, etc. The codes provided in the drop-down menu come from domain table *dQualifierCodes* and multiple entries are allowed in the cell. The list in the templates and this user guide was retrieved from the WQX on July 23, 2024.

GEN_COMMENTS: this optional field should include additional information that was not pertinent in any of the previous fields and is helpful for QA/QC purposes or to better understand the data.

4.6. BMP_TurbMonitoring_Continuous

The *BMP_TurbMonitoring_Continuous* table is where high-frequency turbidity recorded as part of the BMP effectiveness monitoring should be stored and reported. Table 8 provides a summary of each field: type, reporting requirement, if values must be selected from a domain table, and description. Please note that continuously monitoring turbidity is optional for every jurisdiction and, therefore, this table is not required. However, if jurisdictions opt to provide such data, certain fields are mandatory.

Table 8. *BMP_TurbMonitoring_Continuous* fields and their descriptions. Note that providing this table is optional.

Name	Type	Field	Domain	Description
TURB_MON_ID	Text	O		MDE primary ID (Unique table ID): Jurisdiction Code + Year 2-digits + 'TURB' + 6-digit number (e.g., HA19TURB000001)
MON_STATION_ID	Text	M		Monitoring site ID linking to MonitoringSite table
LOCAL_STATION_ID	Text	O		Local ID value (must match value in MonitoringSite table)
LOGGER_SN	Text	M		Logger factory serial number or associated ID
MON_DATE	Date	M		Date of measurement (MM/DD/YYYY)
MON_TIME	Time	M		Time of measurement (HH:MM 24-hour standard time)
TURBIDITY	Double	M		Turbidity in NTU based on one of the following recording frequencies: 2, 5 or 15 minutes
WATER_TEMP	Double	O		Instantaneous water temperature in degree Celsius based on a 2, 5 or 15-minute recording frequency
DISCHARGE	Double	O		Instantaneous discharge in cubic feet per second paired with turbidity recording frequency
QUALIFIER	Text	O	dQualifier Codes	Code describing issues with site, sampling, laboratory analysis, results, etc.
GEN_COMMENTS	Text	O		General comments

See additional details on some of the fields below:

TURB_MON_ID: each record optionally should have a unique ID in the following format: two-digit jurisdiction code, two-digit year data was recorded, 'TURB', and a six-digit number (e.g., HA19TURB000001). Because the monitoring data is no longer stored in a geodatabase, the table does not need to have a unique ID, and this field can be left blank by the jurisdiction if preferred.

MON_STATION_ID: monitoring station ID linking to the *MonitoringSite* table. The ID provided in this table must match an existing ID from the *MonitoringSite* table, specifically the instream site of the BMP effectiveness monitoring.

LOGGER_SN: logger factory serial number or associated ID. The serial number should be concatenated with the operating agency's acronym (agency acronym + - + serial number). For example, if a logger with serial number 20537987 is operated by USGS, LOGGER_SN should be USGS-20537987. If the jurisdiction is the one responsible for operating it, the jurisdiction two-letter code can be used as the agency acronym.

MON_DATE: monitoring date refers to the date data was recorded.

MON_TIME: monitoring time refers to the time data was recorded, following a 24-hour standard time format. Please ensure the clock is set to standard time to avoid gaps and duplication of the data due to daylight savings time changes.

TURB: turbidity is the main parameter of interest in the table, and it should be above or equal to zero in nephelometric turbidity units (NTU). As per the Monitoring Guidelines (MDE 2021), if the jurisdiction decides to monitor for this parameter, recording frequency can be in two-, five- or 15-minute intervals.

WATER_TEMP: water temperature is an optional parameter and, if included, should be in degrees Celsius (°C), ranging from zero to 35.

DISCHARGE: water temperature is optional and, if included, should be above or equal to zero in cubic feet per second (ft^3/s).

QUALIFIER: qualifier codes representing issues encountered with the monitoring site, sampler, etc. The codes provided in the drop-down menu come from domain table *dQualifierCodes* and multiple entries are allowed in the cell. The list in the templates and this user guide was retrieved from the WQX on July 23, 2024.

GEN_COMMENTS: this optional field should include additional information that was not pertinent in any of the previous fields and is helpful for QA/QC purposes or to better understand the data.

4.7. Watershed_BactMonitoring

The *Watershed_BactMonitoring* table is where fecal indicator bacteria data collected as part of the watershed assessment and trends monitoring should be stored and reported. Table 9 provides a summary of each field: type, reporting requirement, if values must be selected from a domain table, and description. The *Watershed_BactMonitoring* table is not required to be submitted in annual reporting if the jurisdiction has opted into CBT's Pooled Monitoring for the bacteria portion of the watershed assessment and trends monitoring.

Table 9. *Watershed_BactMonitoring* fields and their descriptions.

Name	Type	Field	Domain	Description
BACT_MON_ID	Text	O		MDE primary ID (Unique table ID): Jurisdiction Code + Year 2-digits + 'BACT' + 6-digit number (e.g., HO19BACT000001)
MON_STATION_ID	Text	M		Monitoring site ID linking to MonitoringSite table
LOCAL_STATION_ID	Text	O		Local ID value (must match value in MonitoringSite table)
MON_DATE	Date	M		Date sample was collected in the field (MM/DD/YYYY)
MON_TIME	Time	M		Time sample was collected (HH:MM 24-hour system)
FLOW_REGIME	Text	M	dFlowRegime	Sample collected during high (H) or low (L) flow according to TMDL flow threshold percentile
FLOW	Double	M		Daily streamflow (ft^3/s) obtained from the nearest USGS gage normalized to the station's contributing area
WATER_DEPTH	Double	M		Depth in feet where the sample was collected. Recommendation is for samples not to be collected in shallow waters, but at knee depth
ANALYTICAL_METHOD	Text	M	dAnalytical MethodBact	Analytical method used to determine parameter results. Methods outside of the list are allowed.
LABORATORY_NAME	Text	M		Name of the laboratory or facility conducting the analysis.
LAB_ACCREDITATION	Text	O		Information on laboratory accreditation if certified/accredited
SAMPLE_PREP_DATE	Date	M		Date incubation process started in the lab (MM/DD/YYYY)
SAMPLE_PREP_TIME	Time	M		Time incubation process started in the lab (HH:MM 24-hour system)
ANALYSIS_DATE	Date	M		Date incubation process ended, and sample was analyzed/quantified in the lab (MM/DD/YYYY)
ANALYSIS_TIME	Time	M		Time incubation process ended, and sample was analyzed in the lab (HH:MM 24-hour system)
BACTERIA_PARAMETER	Text	M	dFecal Bacteria	Name of the fecal bacteria group/species being monitored
BACTERIA_RESULT	Double	M		Observed concentration of the bacteria being monitored (MPN/100 mL)
LOWER_DL	Double	M		Lower detection limit of method used for quantitation (MPN/100 mL)
UPPER_DL	Double	M		Upper detection limit of method used in quantitation (MPN/100 mL)
REACHED_DL	Text	C		If observed value recorded was above upper detection limit (>) or below lower detection limit (<)
SAMPLE_DILUTION	Text	C		If sample dilution was necessary to quantify bacteria, provide the dilution used
QUALIFIER	Text	O	dQualifier Codes	Code describing issues with site, sampling, laboratory analysis, results, etc.
GEN_COMMENTS	Text	O		General comments including the weather conditions the day of sampling

See additional details on some of the fields below:

BACT_MON_ID: each record optionally should have a unique ID in the following format: two-digit jurisdiction code, two-digit year sample was collected, 'BACT', and a six-digit number (e.g., HO19BACT000001). Because the monitoring data is no longer stored in a geodatabase, the table does not need to have a unique ID, and this field can be left blank by the jurisdiction if preferred.

MON_STATION_ID: monitoring station ID linking to the *MonitoringSite* table. The ID provided in this table must match an existing ID from the *MonitoringSite* table.

MON_DATE: monitoring date refers to the date when the sample was collected.

MON_TIME: monitoring time refers to the time when the sample was collected, following 24-hour standard time format.

FLOW_REGIME: refers to the flow regime during sample collection, either high flow or low flow. Determination of flow regime is in accordance with watershed's TMDL flow threshold percentile.

FLOW: refers to the streamflow on the day the sample was collected. Every record of bacteria quantification should be accompanied by streamflow. For this parameter, mean daily streamflow in cubic feet per second can be obtained from the nearest USGS gage in the same or adjacent watershed and normalized to the contributing area for an estimate of the flow at the monitoring site.

SAMPLE_PREP_DATE: refers to the date sample was received by the laboratory and prepared for incubation. According to the EPA analytical methods the Department recommends (COLILERT and ENTEROLERT), the holding time of water samples for bacterial analysis is 6 hours. Therefore, the sample preparation date should match the monitoring date.

SAMPLE_PREP_TIME: refers to the time of the day (in 24-hour format) the sample was prepared for incubation in the laboratory. As previously mentioned, the holding time for bacteria quantification is 6 hours. Therefore, sample preparation time should be within 6 hours of the monitoring time.

ANALYSIS_DATE: refers to the date the sample was analyzed in the laboratory. According to EPA analytical methods the Department recommends (COLILERT and ENTEROLERT), the incubation period should be at least 18 and up to 22 hours.

ANALYSIS_TIME: refers to the time of the day (in 24-hour format) the incubation period ended, and the sample was analyzed. As previously mentioned, the incubation period should be at least 18 and up to 22 hours. Therefore, analysis time should be within 18 to 22 hours of the sample preparation time.

BACTERIA_PARAMETER: select which group or species of bacteria is being monitored: *Escherichia coli* (ECOLI), Enterococci (ENTERO) or fecal coliform (FECAL). This field allows only the values shown in the drop-down list.

BACTERIA_RESULT: the bacteria result refers to the observed concentration of the bacteria being monitored in most probable number per 100 milliliters (MPN/100 mL). Value must be positive, larger than or equal to the lower detection limit, and smaller or equal to the upper detection limit. In cases where concentration is too low or too high to detect,

record the detection limit reached. The notation to indicate that the result was below or above detection limits is explained in the field REACHED_DL description.

LOWER_DL: lower detection limit of the analytical method used to quantify bacteria in the sample.

UPPER_DL: upper detection limit of the analytical method used to quantify bacteria in the sample. If water samples are diluted for quantification, record the upper detection limit post dilution.

REACHED_DL: this field is conditional on the bacteria concentration in the sample being below the lower detection limit (use symbol <) or above the upper detection limit (use symbol >).

SAMPLE_DILUTION: this field is conditional on the water sample going through dilution before bacteria quantification. If sample dilution is necessary (samples are taken during or after heavy rains, site has shown chronically high levels of bacteria, or sample reached upper DL at first quantification), provide the dilution used followed by X (e.g., 100X).

QUALIFIER: qualifier codes are optional and should be included to represent issues encountered with the monitoring site, sampling, laboratory analysis, results, etc. The codes provided in the drop-down menu come from domain table *dQualifierCodes* and multiple entries are allowed in the cell. The list in the templates and this user guide was retrieved from the WQX on July 23, 2024.

GEN_COMMENTS: this optional field should include additional information that was not pertinent in any of the previous fields and is helpful for QA/QC purposes or to better understand the data.

4.8. Watershed_ChloMonitoring

The *Watershed_ChloMonitoring* table is where high-frequency specific conductance data collected as part of the watershed assessment and trends monitoring should be stored and reported. Table 10 provides a summary of each field: type, reporting requirement, if values must be selected from a domain table, and description. The *Watershed_ChloMonitoring* table is not required to be submitted in annual reporting if the jurisdiction has opted into CBT's Pooled Monitoring for the chloride portion of the watershed assessment and trends monitoring. Additionally, if the jurisdiction is collecting specific conductance data at a monitoring site that fulfills both the BMP effectiveness and the watershed assessment and trends monitoring, the data can be reported using either *BMP_CondMonitoring_Continuous* or *Watershed_ChlorMonitoring*, provided that all collected data is included.

Table 10. *Watershed_ChloMonitoring* fields and their descriptions.

Name	Type	Field	Domain	Description
CHLO_MON_ID	Text	O		MDE primary ID (Unique table ID): Jurisdiction Code + Year 2-digits + 'CHLO' + 6-digit number (e.g., MO19CHLO000001)
MON_STATION_ID	Text	M		Monitoring site ID linking to MonitoringSite table
LOCAL_STATION_ID	Text	O		Local ID value (must match value in MonitoringSite table)
LOGGER_SN	Text	M		Logger factory serial number or associated ID
MON_DATE	Date	M		Date of measurement (MM/DD/YYYY)
MON_TIME	Time	M		Time of measurement (HH:MM 24-hour standard time)
SPEC_COND	Double	M		Specific Conductance after conversion in microsiemens per centimeter (µS/cm) based on 30-minute recording frequency
WATER_TEMP	Double	O		Instantaneous temperature in degrees Celsius (°C) paired with the conductivity recording frequency of 30 minutes
QUALIFIER	Text	O	dQualifier Codes	Code describing issues with site, sampling, laboratory analysis, results, etc.
GEN_COMMENTS	Text	O		General comments

CHLO_MON_ID: each record optionally should have a unique ID in the following format: two-digit jurisdiction code, two-digit year data was recorded, 'CHLO', and a six-digit number (e.g., MO19CHLO000001). Because the monitoring data is no longer stored in a geodatabase, the table does not need to have a unique ID, and this field can be left blank by the jurisdiction if preferred.

MON_STATION_ID: monitoring station ID linking to the *MonitoringSite* table. The ID provided in this table must match an existing ID from the *MonitoringSite* table, specifically the instream site of the BMP effectiveness monitoring.

LOGGER_SN: logger factory serial number or associated ID. The serial number should be concatenated with the operating agency's acronym (agency acronym + - + serial number). For example, if a logger with serial number 20537987 is operated by USGS, LOGGER_SN should be USGS-20537987. If the jurisdiction is the one responsible for operating it, the jurisdiction two letter code can be used as the agency acronym.

MON_DATE: monitoring date refers to the date data was recorded.

MON_TIME: monitoring time refers to the time data was recorded, following a 24-hour standard time format. Please ensure the clock is set to standard time to avoid gaps and duplication of the data due to daylight savings time changes.

SPEC_COND: specific conductance is the main parameter of interest in the table, and it should be above or equal to zero and in microSiemens per centimeter (µS/cm) at 25 degrees Celsius. As per the Monitoring Guidelines (MDE 2021), there should be a record of specific conductance every 30 minutes, although jurisdictions have the flexibility to record the data at shorter intervals.

WATER_TEMP: water temperature is an optional parameter and, if included, should be in degrees Celsius (°C), ranging from zero to 35.

QUALIFIER: qualifier codes representing issues encountered with the monitoring site, sampler, etc. The codes provided in the drop-down menu come from domain table *dQualifierCodes* and multiple entries are allowed in the cell. The list in the templates and this user guide was retrieved from the WQX on July 23, 2024.

GEN_COMMENTS: this optional field should include additional information that was not pertinent in any of the previous fields and is helpful for QA/QC purposes or to better understand the data.

4.9. ST_PCBMonitoring

The *ST_PCBMonitoring* table is where PCB source tracking data should be stored and reported. Table 11 offers a summary of each field: type, reporting requirement, if values must be selected from a domain table, and description.

Table 11. *ST_PCBMonitoring* fields and their descriptions.

Field Name	Type	Field	Domain	Description
PCB_MON_ID	Text	O		MDE primary ID (Unique table ID): Jurisdiction Code + Year 2-digits + 'PCB' + 6-digit number (e.g. PG19PCB000001)
MON_STATION_ID	Text	M		Monitoring site ID linking to MonitoringSite table
LOCAL_STATION_ID	Text	O		Local ID value (must match value in MonitoringSite table)
MON_START_DATE	Date	M		Date of monitoring or deployment of passive sampler (MM/DD/YYYY)
MON_START_TIME	Time	M		Time monitoring begins or that passive sampler was deployed (HH:mm 24-hr system)
MON_END_DATE	Date	C		Date passive sampler was retrieved (MM/DD/YYYY). Only applicable to passive sampling.
MON_END_TIME	Time	C		Time passive sampler was retrieved (HH:mm 24-hr system). Only applicable to passive sampling.
Sample_Collection_Equipment	Text	M	dCollectionEquip	Equipment used to collect sample: autosampler, passive strip, Ponar grab, water bottle
Sample_Fraction	Text	M	dSampleFraction	Bed Sediment (total, interstitial water), Water (dissolved, particulate, total)
Sample_Media	Text	M	dSampleMedia	Water, Sediment
Sample_Type	Text	M	dSampleType	Discrete, Composite, Passive
Weight_Basis	Text	C	dWeightBasis	Dry, Wet basis for sediment samples
ANALYSIS_DATE	Date	M		Date sample was analyzed in the lab (MM/DD/YYYY)
ANALYSIS_TIME	Time	M		Time sample was analyzed in the lab (HH:MM 24-hr system)
ANALYTICAL_METHOD	Text	M	dAnalyticalMethods	Analytical method used to determine parameter results
LABORATORY_NAME	Text	M		Name of the laboratory or facility conducting the analysis.
LAB_ACCREDITATION	Text	O		Information on laboratory accreditation if certified/accredited
PARAMETER	Text	M	dPCBParameters	Name of the parameter analyzed, including PCB congeners
PARAMETER_DT	Double	M		Analytical method detection limit for the parameter
PARAMETER_RESULT	Double	M		Instrument-measured result of the parameter analyzed
PARAMETER_UNIT	Text	M		Parameter result unit
QUALIFIER	Text	O	dQualifierCodes	Code describing issues with site, sampling, laboratory analysis, results, etc.
GEN_COMMENTS	Text	O		General comments

See additional details on some of the fields below:

PCB_MON_ID: each record optionally should have a unique ID in the following format: two-digit jurisdiction code, two-digit year, 'PCB', and a 6-digit number (e.g., PG19PCB000001). Because the monitoring data is no longer stored in a geodatabase, the table does not need to have a unique ID, and this field can be left blank by the jurisdiction if preferred.

MON_STATION_ID: monitoring station ID linking to the *MonitoringSite* table. The ID provided in this table must match an existing ID from the *MonitoringSite* table.
MON_START_DATE and MON_START_TIME: date and time when the grab sample was collected or that the passive sampler was deployed.

MON_END_DATE and MON_END_TIME: Date and time the passive sampler was retrieved, and only applicable to samples collected with passive samplers.

ANALYTICAL_METHOD: The analytical method used to quantify the parameter. The drop-down list provides recommended methods, but the field is unrestricted, and any value is allowed.

PARAMETER: Parameters that should be analyzed for PCB source tracking (total polychlorinated biphenyls, total organic carbon, and grain size) as well PCB congeners. The field is limited to domain *dPCBParameters*, with a drop-down list to select from, and multiple values allowed for when individual congeners cannot be determined in the lab (e.g., PCB-100/194).

QUALIFIER: qualifier codes representing issues encountered with the monitoring site, sampler, etc. The codes provided in the drop-down menu come from domain table *dQualifierCodes* and multiple entries are allowed in the cell. The list in the templates and this user guide was retrieved from the WQX on July 23, 2024.

GEN_COMMENTS: this optional field should include additional information that was not pertinent in any of the previous fields and is helpful for QA/QC purposes or to better understand the data.

5. Supporting Tables

5.1. Logger_Maintenance

The *Logger_Maintenance* table is optional, and it is where information on logger maintenance can be recorded and provided. If the jurisdiction is conducting BMP effectiveness monitoring and/or chloride as part of watershed assessment and trends and, therefore, submitting continuous data to the Department, calibration information should be provided as well. The *Logger_Maintenance* table is only a suggested format to accommodate that type of information, but any other formats are acceptable (e.g., field notes or a software generated file). This information aids the Department's QA/QC process and allows us to understand when data gaps are due to the sonde being out of water for maintenance and calibration. Additionally, notes regarding the site's conditions provide an important context for when the data was collected and the results observed.

Table 12. *Logger_Maintenance* fields and their descriptions.

Name	Type	Field	Domain	Description
LOGGER_MAIN_ID	Text	O		MDE primary ID (Unique table ID) – Jurisdiction Code + Year 2-digits + 'LMI' + 6-digit number (e.g., SH19LMI000001)
MON_STATION_ID	Text	M		Monitoring site ID linking to MonitoringSite table
MAINTENANCE_DATE	Date	M		Date of maintenance (MM/DD/YYYY)
MAINT_START_TIME	Time	M		Time logger was removed from water for maintenance (HH:MM 24-hour standard time)
MAINT_END_TIME	Time	M		Time logger was returned to water (HH:MM 24-hour standard time)
LOGGER_SN	Text	M		Logger factory serial number or associated ID
LOGGER_PARAMETER	Text	M	dContinuous Parameters	All parameters being recorded by the logger: temperature, pH, discharge, conductivity, and/or turbidity
ACTION	Text	M		Type of activity performed that day (e.g., calibration, precision check, cleaning, data download, etc.)
PRE_CAL_VALUE	Double	C		Value recorded before calibration is performed (required field if 'calibration' is entered in ACTION field)
POST_CAL_VALUE	Double	C		Value recorded after calibration is performed (required field if 'calibration' is entered in ACTION field)
ACCURACY_THRESHOLD	Text	C		Acceptable range for the accuracy value during calibration or accuracy checks, applicable to the logger used (e.g., Sensor Response Factor). Conditional on the type of activity being performed
ACCURACY_VALUE	Double	C		Value recorded during calibration process or another accuracy check (conditional on type of maintenance action performed)
GEN_COMMENTS	Text	O		General comments, including site conditions that could affect the data.

6. Domain Tables

6.1. dAnalyticalMethodBact

Domain Description	Code	Code Description	Analyte
Recommended analytical methods to quantify bacteria.	COLILERT	IDEXX ~ Coliform/E. coli Enzyme substrate test; ONPG-MUG test	ECOLI or FECALCOL
	ENTEROLERT	IDEXX ~ Enterolert Test Kit Procedure	ENTEROCOCCI

6.2. dAnalyticalMethodChem

Domain Description	Code	Code Description	Analyte
Recommended analytical methods for each required parameter.	2540-D	Standard Methods 2540 D ~Total Suspended Solids in Water	TSS
	353.2	EPA-NERL 353.2 ~ Nitrate-Nitrite Nitrogen by Colorimetry	NITRATE-NITRITE/TN
	365.1	EPA-NERL 365.1 ~ Phosphorus (all forms) by Semi-Automated Colorimetry	PO4/TOTAL_PHOSPHORUS
	4110-B	Standard Methods 4110 B ~ Anions in Water by Ion Chromatography	CL
	4500-NH3(G)	Standard Methods 4500 NH3 G ~ Ammonia in Water Using Automated Phenate Method	NH3_NH4
	5210-B	Standard Methods 5210 B ~ BOD: 5-Day Test	BOD
	5310-B	Standard Methods 5310 B ~ Total Organic Carbon by Combustion-Infrared Method/High-Temperature Combustion Method	TOC
	COLILERT	IDEXX ~ Coliform/E. coli Enzime substrate test; ONPG-MUG test	ECOLI
	ENTEROLERT	IDEXX ~ Enterolert Test Kit Procedure	ENTEROCOCCI

6.3. dAnalyticalMethodPCB

Domain Description	Code	Code Description	Analyte
Recommended analytical methods for the PCB source tracking.	8082	EPA Method 8082 - PCBs by GC/ECD	PCBs
	1668	EPA Method 1668 - PCBs by HR GC/MS	PCBs

6.4. dChemParameters

Domain Description	Code	Code Description	Requirement
Chemical parameters that should be analyzed for BMP effectiveness.	BOD	Biological Oxygen Demand (mg/L)	Conditional. If not measurable, TOC should be provided
	CL	Total Chloride (mg/L)	Mandatory
	ECOLI	E. Coli (MPN/100mL)	Conditional. Applies if ENTEROCOCCI result is not provided
	ENTEROCOCCI	Enterococci (MPN/100mL)	Conditional. Applies if ECOLI result is not provided
	HARDNESS	Hardness (mg/L)	Optional
	NH3_NH4	Total Ammonia (mg/L)	Mandatory
	NITRATE_NITRITE	Nitrate + Nitrite (mg/L)	Mandatory
	PO4	Total Orthophosphate (mg/L)	Mandatory
	TKN	Total Kjeldahl Nitrogen (mg/L)	Optional
	TN	Total Dissolved Nitrogen (mg/L)	Mandatory
	TOC	Total Organic Carbon (mg/L)	Conditional. Applies if information on BOD is not available
	TOTAL_COPPER	Total Copper (ug/L)	Optional
	TOTAL_LEAD	Total Lead (ug/L)	Optional
	TOTAL_PHOSPHORUS	Total Dissolved Phosphorus (mg/L)	Mandatory
	TOTAL_ZINC	Total Zinc (ug/L)	Optional
	TPH	Total Petroleum Hydrocarbons (mg/L)	Optional
	TSS	Total Suspended Solids (mg/L)	Mandatory

6.5. dCollectionEquip

Domain Description	Code	Code Description
Equipment used to collect the sample.	autosampler	Automated sampling device for water, type unspecified.
	passive strip	Passive sampling device using plastic strips made from polyethylene (PE) or polyoxymethylene (POM) to collect a time-integrated sample of hydrophobic organic contaminants.
	Ponar grab	Grab sampling device used in fresh and salt water for taking samples of hard bottoms such as sand, gravel, consolidated material, or clay.
	water bottle	Bottle used for sampling water.

6.6. dContinuousParameters

Domain Description	Code	Code Description
Parameters recorded by logger.	COND	Instantaneous conductivity
	DISCH	Instantaneous discharge
	PH	Instantaneous pH
	TEMP	Instantaneous temperature
	TURB	Instantaneous turbidity

6.7. dFecalBacteria

Domain Description	Code	Code Description
Group of fecal bacteria sampled.	ECOLI	*Escherichia coli*
	ENTERO	Enterococci
	FECAL	Fecal Coliform

6.8. FlowRegime

Domain Description	Code	Code Description
Type of flow regime during which sample was collected.	L	Low flow
	H	High flow

6.9. dMD12Digit

Domain Description	Code	Code Description
Maryland 12-digit watersheds.	Please see MonitoringSite table's 'Domains' tab for the full list of 12-digit watersheds	

6.10. dMD8Digit

Domain Description	Code	Code Description
Maryland 8-digit watersheds.	02130705	Aberdeen Proving Ground
	02140205	Anacostia River
	02140502	Antietam Creek
	02130102	Assawoman Bay
	02130703	Atkisson Reservoir
	02130101	Atlantic Ocean
	02130604	Back Creek
	02130901	Back River
	02130903	Baltimore Harbor
	02130207	Big Annemessex River
	02130606	Big Elk Creek
	02130803	Bird River
	02130902	Bodkin Creek
	02130602	Bohemia River
	02140104	Breton Bay
	02131108	Brighton Dam

Domain Description	Code	Code Description
	02120205	Broad Creek
	02130701	Bush River
	02130704	Bynum Run
	02140207	Cabin John Creek
	05020204	Casselman River
	02140305	Catoctin Creek
	02130106	Chincoteague Bay
	02130607	Christina River
	02050301	Conewago Creek
	02140504	Conococheague Creek
	02120204	Conowingo Dam Susq R
	02130507	Corsica River
	05020203	Deep Creek Lake
	02120202	Deer Creek
	02130204	Dividing Creek
	02140304	Double Pipe Creek
	02130501	Eastern Bay
	02141002	Evitts Creek
	02140511	Fifteen Mile Creek
	02130307	Fishing Bay
	02130609	Furnace Bay
	02141004	Georges Creek
	02140107	Gilbert Swamp
	02130801	Gunpowder River
	02130905	Gwynns Falls
	02130401	Honga River
	02130103	Isle of Wight Bay
	02130904	Jones Falls
	02130511	Kent Island Bay
	02130504	Kent Narrows
	02120201	L Susquehanna River
	02130506	Langford Creek
	02130907	Liberty Reservoir
	02140506	Licking Creek
	02130402	Little Choptank
	02140505	Little Conococheague
	02130605	Little Elk Creek
	02130804	Little Gunpowder Falls
	02131105	Little Patuxent River
	02140509	Little Tonoloway Creek
	05020202	Little Youghiogheny R
	02130805	Loch Raven Reservoir
	02139998	Lower Chesapeake Bay
	02130505	Lower Chester River
	02130403	Lower Choptank
	02130601	Lower Elk River
	02130804	Little Gunpowder Falls
	02131105	Little Patuxent River
	02140509	Little Tonoloway Creek
	05020202	Little Youghiogheny R
	02130805	Loch Raven Reservoir

Domain Description	Code	Code Description
	02139998	Lower Chesapeake Bay
	02130505	Lower Chester River
	02130403	Lower Choptank
	02130601	Lower Elk River
	02130802	Lower Gunpowder Falls
	02140302	Lower Monocacy River
	02130202	Lower Pocomoke River
	02130301	Lower Wicomico River
	02130702	Lower Winters Run
	02131001	Magothy River
	02130208	Manokin River
	02140503	Marsh Run
	02130306	Marshyhope Creek
	02140111	Mattawoman Creek
	02139997	Middle Chesapeake Bay
	02130509	Middle Chester River
	02131106	Middle Patuxent River
	02130807	Middle River - Browns
	02130502	Miles River
	02130302	Monie Bay
	02140110	Nanjemoy Creek
	02130305	Nanticoke River
	02130205	Nassawango Creek
	02130105	Newport Bay
	02130608	Northeast River
	02120203	Octoraro Creek
	02140204	Oxon Creek
	02130906	Patapsco River L N Br
	02131101	Patuxent River lower
	02131102	Patuxent River middle
	02131104	Patuxent River upper
	02140203	Piscataway Creek
	02130201	Pocomoke Sound
	02140109	Port Tobacco River
	02140508	Potomac River AL Cnty
	02140301	Potomac River FR Cnty
	02141001	Potomac River L N Branch
	02140101	Potomac River L tidal
	02140102	Potomac River M tidal
	02140202	Potomac River MO Cnty
	02141005	Potomac River U N Branch
	02140201	Potomac River U tidal
	02140501	Potomac River WA Cnty
	02130806	Prettyboy Reservoir
	02140206	Rock Creek
	02131107	Rocky Gorge Dam
	02130908	S Branch Patapsco
	02130610	Sassafras River
	02141006	Savage River
	02140208	Seneca Creek
	02131002	Severn River

Domain Description	Code	Code Description
	02140510	Sideling Hill Creek
	02130104	Sinepuxent Bay
	02131003	South River
	02130508	Southeast Creek
	02140105	St. Clements Bay
	02140103	St. Mary's River
	02130611	Stillpond-Fairlee
	02130706	Swan Creek
	02130206	Tangier Sound
	02140507	Tonoloway Creek
	02140512	Town Creek
	02130308	Transquaking River
	02130405	Tuckahoe Creek
	02139996	Upper Chesapeake Bay
	02130510	Upper Chester River
	02130404	Upper Choptank
	02130603	Upper Elk River
	02140303	Upper Monocacy River
	02130203	Upper Pocomoke River
	02131005	West Chesapeake Bay
	02131004	West River
	02131103	Western Branch
	02130303	Wicomico Creek
	02140106	Wicomico River
	02130304	Wicomico River Head
	02141003	Wills Creek
	02130503	Wye River
	05020201	Youghiogheny River
	02140108	Zekiah Swamp

6.11. dMDCounties

Domain Description	Code	Code Description
Maryland Counties	AA	Anne Arundel County
	AL	Allegany County
	BA	Baltimore County
	BC	Baltimore City
	CA	Caroline County
	CE	Cecil County
	CH	Charles County
	CR	Carroll County
	CV	Calvert County
	DO	Dorchester County
	FR	Frederick County
	GA	Garrett County
	HA	Harford County
	HO	Howard County
	KE	Kent County

Domain Description	Code	Code Description
	MO	Montgomery County
	PG	Prince George's County
	QA	Queen Anne's County
	SM	St. Mary's County
	SO	Somerset County
	TA	Talbot County
	WA	Washington County
	WI	Wicomico County
	WO	Worcester County

6.12. dMonitoringGoal

Domain Description	Code	Code Description
Station's data monitoring goal.	BMP	BMP effectiveness assessment
	WAT	Watershed assessment and trends
	PST	PCB source tracking

6.13. dPCBParameters

Domain Description	Code	Code Description	Requirement
Parameters that should be analyzed for PCB source tracking, including PCB congeners. Field allows entering a combination of congeners from the domain table when individual congeners cannot be determined at the lab (e.g., PCB-100/194).	PCBs	Total Polychlorinated Biphenyls	Mandatory
	TOC	Total Organic Carbon	Mandatory
	GSA	Grain Size Analysis	Mandatory
	PCB-1	2-Chlorobiphenyl	
	PCB-2	3-Chlorobiphenyl	
	PCB-3	4-Chlorobiphenyl	
	PCB-4	2,2'-Dichlorobiphenyl	
	PCB-5	2,3-Dichlorobiphenyl	
	PCB-6	2,3'-Dichlorobiphenyl	
	PCB-7	2,4-Dichlorobiphenyl	
	PCB-8	2,4'-Dichlorobiphenyl	
	PCB-9	2,5-Dichlorobiphenyl	
	PCB-10	2,6-Dichlorobiphenyl	
	PCB-11	3,3'-Dichlorobiphenyl	
	PCB-12	3,4-Dichlorobiphenyl	
	PCB-13	3,4'-Dichlorobiphenyl	
	PCB-14	3,5-Dichlorobiphenyl	
	PCB-15	4,4'-Dichlorobiphenyl	
	PCB-16	2,2',3-Trichlorobiphenyl	
	PCB-17	2,2',4-Trichlorobiphenyl	
	PCB-18	2,2',5-Trichlorobiphenyl	
	PCB-19	2,2',6-Trichlorobiphenyl	
	PCB-20	2,3,3'-Trichlorobiphenyl	

Domain Description	Code	Code Description	Requirement
	PCB-21	2,3,4-Trichlorobiphenyl	
	PCB-22	2,3,4'-Trichlorobiphenyl	
	PCB-23	2,3,5-Trichlorobiphenyl	
	PCB-24	2,3,6-Trichlorobiphenyl	
	PCB-25	2,3',4-Trichlorobiphenyl	
	PCB-26	2,3',5-Trichlorobiphenyl	
	PCB-27	2,3',6-Trichlorobiphenyl	
	PCB-28	2,4,4'-Trichlorobiphenyl	
	PCB-29	2,4,5-Trichlorobiphenyl	
	PCB-30	2,4,6-Trichlorobiphenyl	
	PCB-31	2,4',5-Trichlorobiphenyl	
	PCB-32	2,4',6-Trichlorobiphenyl	
	PCB-33	2,3',4'-Trichlorobiphenyl	
	PCB-34	2,3',5'-Trichlorobiphenyl	
	PCB-35	3,3',4-Trichlorobiphenyl	
	PCB-36	3,3',5-Trichlorobiphenyl	
	PCB-37	3,4,4'-Trichlorobiphenyl	
	PCB-38	3,4,5-Trichlorobiphenyl	
	PCB-39	3,4',5-Trichlorobiphenyl	
	PCB-40	2,2',3,3'-Tetrachlorobiphenyl	
	PCB-41	2,2',3,4-Tetrachlorobiphenyl	
	PCB-42	2,2',3,4'-Tetrachlorobiphenyl	
	PCB-43	2,2',3,5-Tetrachlorobiphenyl	
	PCB-44	2,2',3,5'-Tetrachlorobiphenyl	
	PCB-45	2,2',3,6-Tetrachlorobiphenyl	
	PCB-46	2,2',3,6'-Tetrachlorobiphenyl	
	PCB-47	2,2',4,4'-Tetrachlorobiphenyl	
	PCB-48	2,2',4,5-Tetrachlorobiphenyl	
	PCB-49	2,2',4,5'-Tetrachlorobiphenyl	
	PCB-50	2,2',4,6-Tetrachlorobiphenyl	
	PCB-51	2,2',4,6'-Tetrachlorobiphenyl	
	PCB-52	2,2',5,5'-Tetrachlorobiphenyl	
	PCB-53	2,2',5,6'-Tetrachlorobiphenyl	
	PCB-54	2,2',6,6'-Tetrachlorobiphenyl	
	PCB-55	2,3,3',4-Tetrachlorobiphenyl	
	PCB-56	2,3,3',4'-Tetrachlorobiphenyl	
	PCB-57	2,3,3',5-Tetrachlorobiphenyl	
	PCB-58	2,3,3',5'-Tetrachlorobiphenyl	
	PCB-59	2,3,3',6-Tetrachlorobiphenyl	
	PCB-60	2,3,4,4'-Tetrachlorobiphenyl	
	PCB-61	2,3,4,5-Tetrachlorobiphenyl	
	PCB-62	2,3,4,6-Tetrachlorobiphenyl	
	PCB-63	2,3,4',5-Tetrachlorobiphenyl	
	PCB-64	2,3,4',6-Tetrachlorobiphenyl	
	PCB-65	2,3,5,6-Tetrachlorobiphenyl	

Domain Description	Code	Code Description	Requirement
	PCB-66	2,3',4,4'-Tetrachlorobiphenyl	
	PCB-67	2,3',4,5-Tetrachlorobiphenyl	
	PCB-68	2,3',4,5'-Tetrachlorobiphenyl	
	PCB-69	2,3',4,6-Tetrachlorobiphenyl	
	PCB-70	2,3',4',5-Tetrachlorobiphenyl	
	PCB-71	2,3',4',6-Tetrachlorobiphenyl	
	PCB-72	2,3',5,5'-Tetrachlorobiphenyl	
	PCB-73	2,3',5',6-Tetrachlorobiphenyl	
	PCB-74	2,4,4',5-Tetrachlorobiphenyl	
	PCB-75	2,4,4',6-Tetrachlorobiphenyl	
	PCB-76	2,3',4',5'-Tetrachlorobiphenyl	
	PCB-77	3,3',4,4'-Tetrachlorobiphenyl	
	PCB-78	3,3',4,5-Tetrachlorobiphenyl	
	PCB-79	3,3',4,5'-Tetrachlorobiphenyl	
	PCB-80	3,3',5,5'-Tetrachlorobiphenyl	
	PCB-81	3,4,4',5-Tetrachlorobiphenyl	
	PCB-82	2,2',3,3',4-Pentachlorobiphenyl	
	PCB-83	2,2',3,3',5-Pentachlorobiphenyl	
	PCB-84	2,2',3,3',6-Pentachlorobiphenyl	
	PCB-85	2,2',3,4,4'-Pentachlorobiphenyl	
	PCB-86	2,2',3,4,5-Pentachlorobiphenyl	
	PCB-87	2,2',3,4,5'-Pentachlorobiphenyl	
	PCB-88	2,2',3,4,6-Pentachlorobiphenyl	
	PCB-89	2,2',3,4,6'-Pentachlorobiphenyl	
	PCB-90	2,2',3,4',5-Pentachlorobiphenyl	
	PCB-91	2,2',3,4',6-Pentachlorobiphenyl	
	PCB-92	2,2',3,5,5'-Pentachlorobiphenyl	
	PCB-93	2,2',3,5,6-Pentachlorobiphenyl	
	PCB-94	2,2',3,5,6'-Pentachlorobiphenyl	
	PCB-95	2,2',3,5',6-Pentachlorobiphenyl	
	PCB-96	2,2',3,6,6'-Pentachlorobiphenyl	
	PCB-97	2,2',3,4',5'-Pentachlorobiphenyl	
	PCB-98	2,2',3,4',6'-Pentachlorobiphenyl	
	PCB-99	2,2',4,4',5-Pentachlorobiphenyl	
	PCB-100	2,2',4,4',6-Pentachlorobiphenyl	
	PCB-101	2,2',4,5,5'-Pentachlorobiphenyl	
	PCB-102	2,2',4,5,6'-Pentachlorobiphenyl	
	PCB-103	2,2',4,5',6-Pentachlorobiphenyl	
	PCB-104	2,2',4,6,6'-Pentachlorobiphenyl	
	PCB-105	2,3,3',4,4'-Pentachlorobiphenyl	
	PCB-106	2,3,3',4,5-Pentachlorobiphenyl	
	PCB-107	2,3,3',4',5-Pentachlorobiphenyl	
	PCB-108	2,3,3',4,5'-Pentachlorobiphenyl	
	PCB-109	2,3,3',4,6-Pentachlorobiphenyl	
	PCB-110	2,3,3',4',6-Pentachlorobiphenyl	

Domain Description	Code	Code Description	Requirement
	PCB-111	2,3,3',5,5'-Pentachlorobiphenyl	
	PCB-112	2,3,3',5,6-Pentachlorobiphenyl	
	PCB-113	2,3,3',5',6-Pentachlorobiphenyl	
	PCB-114	2,3,4,4',5-Pentachlorobiphenyl	
	PCB-115	2,3,4,4',6-Pentachlorobiphenyl	
	PCB-116	2,3,4,5,6-Pentachlorobiphenyl	
	PCB-117	2,3,4',5,6-Pentachlorobiphenyl	
	PCB-118	2,3',4,4',5-Pentachlorobiphenyl	
	PCB-119	2,3',4,4',6-Pentachlorobiphenyl	
	PCB-120	2,3',4,5,5'-Pentachlorobiphenyl	
	PCB-121	2,3',4,5',6-Pentachlorobiphenyl	
	PCB-122	2,3,3',4',5'-Pentachlorobiphenyl	
	PCB-123	2,3',4,4',5'-Pentachlorobiphenyl	
	PCB-124	2,3',4',5,5'-Pentachlorobiphenyl	
	PCB-125	2,3',4',5',6-Pentachlorobiphenyl	
	PCB-126	3,3',4,4',5-Pentachlorobiphenyl	
	PCB-127	3,3',4,5,5'-Pentachlorobiphenyl	
	PCB-128	2,2',3,3',4,4'-Hexachlorobiphenyl	
	PCB-129	2,2',3,3',4,5-Hexachlorobiphenyl	
	PCB-130	2,2',3,3',4,5'-Hexachlorobiphenyl	
	PCB-131	2,2',3,3',4,6-Hexachlorobiphenyl	
	PCB-132	2,2',3,3',4,6'-Hexachlorobiphenyl	
	PCB-133	2,2',3,3',5,5'-Hexachlorobiphenyl	
	PCB-134	2,2',3,3',5,6-Hexachlorobiphenyl	
	PCB-135	2,2',3,3',5,6'-Hexachlorobiphenyl	
	PCB-136	2,2',3,3',6,6'-Hexachlorobiphenyl	
	PCB-137	2,2',3,4,4',5-Hexachlorobiphenyl	
	PCB-138	2,2',3,4,4',5'-Hexachlorobiphenyl	
	PCB-139	2,2',3,4,4',6-Hexachlorobiphenyl	
	PCB-140	2,2',3,4,4',6'-Hexachlorobiphenyl	
	PCB-141	2,2',3,4,5,5'-Hexachlorobiphenyl	
	PCB-142	2,2',3,4,5,6-Hexachlorobiphenyl	
	PCB-143	2,2',3,4,5,6'-Hexachlorobiphenyl	
	PCB-144	2,2',3,4,5',6-Hexachlorobiphenyl	
	PCB-145	2,2',3,4,6,6'-Hexachlorobiphenyl	
	PCB-146	2,2',3,4',5,5'-Hexachlorobiphenyl	
	PCB-147	2,2',3,4',5,6-Hexachlorobiphenyl	
	PCB-148	2,2',3,4',5,6'-Hexachlorobiphenyl	
	PCB-149	2,2',3,4',5',6-Hexachlorobiphenyl	
	PCB-150	2,2',3,4',6,6'-Hexachlorobiphenyl	
	PCB-151	2,2',3,5,5',6-Hexachlorobiphenyl	
	PCB-152	2,2',3,5,6,6'-Hexachlorobiphenyl	
	PCB-153	2,2',4,4',5,5'-Hexachlorobiphenyl	
	PCB-154	2,2',4,4',5,6'-Hexachlorobiphenyl	
	PCB-155	2,2',4,4',6,6'-Hexachlorobiphenyl	

Domain Description	Code	Code Description	Requirement
	PCB-156	2,3,3',4,4',5-Hexachlorobiphenyl	
	PCB-157	2,3,3',4,4',5'-Hexachlorobiphenyl	
	PCB-158	2,3,3',4,4',6-Hexachlorobiphenyl	
	PCB-159	2,3,3',4,5,5'-Hexachlorobiphenyl	
	PCB-160	2,3,3',4,5,6-Hexachlorobiphenyl	
	PCB-161	2,3,3',4,5',6-Hexachlorobiphenyl	
	PCB-162	2,3,3',4',5,5'-Hexachlorobiphenyl	
	PCB-163	2,3,3',4',5,6-Hexachlorobiphenyl	
	PCB-164	2,3,3',4',5',6-Hexachlorobiphenyl	
	PCB-165	2,3,3',5,5',6-Hexachlorobiphenyl	
	PCB-166	2,3,4,4',5,6-Hexachlorobiphenyl	
	PCB-167	2,3',4,4',5,5'-Hexachlorobiphenyl	
	PCB-168	2,3',4,4',5',6-Hexachlorobiphenyl	
	PCB-169	3,3',4,4',5,5'-Hexachlorobiphenyl	
	PCB-170	2,2',3,3',4,4',5-Heptachlorobiphenyl	
	PCB-171	2,2',3,3',4,4',6-Heptachlorobiphenyl	
	PCB-172	2,2',3,3',4,5,5'-Heptachlorobiphenyl	
	PCB-173	2,2',3,3',4,5,6-Heptachlorobiphenyl	
	PCB-174	2,2',3,3',4,5,6'-Heptachlorobiphenyl	
	PCB-175	2,2',3,3',4,5',6-Heptachlorobiphenyl	
	PCB-176	2,2',3,3',4,6,6'-Heptachlorobiphenyl	
	PCB-177	2,2',3,3',4,5',6'-Heptachlorobiphenyl	
	PCB-178	2,2',3,3',5,5',6-Heptachlorobiphenyl	
	PCB-179	2,2',3,3',5,6,6'-Heptachlorobiphenyl	
	PCB-180	2,2',3,4,4',5,5'-Heptachlorobiphenyl	
	PCB-181	2,2',3,4,4',5,6-Heptachlorobiphenyl	
	PCB-182	2,2',3,4,4',5,6'-Heptachlorobiphenyl	
	PCB-183	2,2',3,4,4',5',6-Heptachlorobiphenyl	
	PCB-184	2,2',3,4,4',6,6'-Heptachlorobiphenyl	
	PCB-185	2,2',3,4,5,5',6-Heptachlorobiphenyl	
	PCB-186	2,2',3,4,5,6,6'-Heptachlorobiphenyl	
	PCB-187	2,2',3,4',5,5',6-Heptachlorobiphenyl	
	PCB-188	2,2',3,4',5,6,6'-Heptachlorobiphenyl	
	PCB-189	2,3,3',4,4',5,5'-Heptachlorobiphenyl	
	PCB-190	2,3,3',4,4',5,6-Heptachlorobiphenyl	
	PCB-191	2,3,3',4,4',5',6-Heptachlorobiphenyl	
	PCB-192	2,3,3',4,5,5',6-Heptachlorobiphenyl	
	PCB-193	2,3,3',4',5,5',6-Heptachlorobiphenyl	
	PCB-194	2,2',3,3',4,4',5,5'-Octachlorobiphenyl	
	PCB-195	2,2',3,3',4,4',5,6-Octachlorobiphenyl	
	PCB-196	2,2',3,3',4,4',5,6'-Octachlorobiphenyl	
	PCB-197	2,2',3,3',4,4',6,6'-Octachlorobiphenyl	
	PCB-198	2,2',3,3',4,5,5',6-Octachlorobiphenyl	
	PCB-199	2,2',3,3',4,5,5',6'-Octachlorobiphenyl	
	PCB-200	2,2',3,3',4,5,6,6'-Octachlorobiphenyl	

Domain Description	Code	Code Description	Requirement
	PCB-201	2,2',3,3',4,5',6,6'-Octachlorobiphenyl	
	PCB-202	2,2',3,3',5,5',6,6'-Octachlorobiphenyl	
	PCB-203	2,2',3,4,4',5,5',6-Octachlorobiphenyl	
	PCB-204	2,2',3,4,4',5,6,6'-Octachlorobiphenyl	
	PCB-205	2,3,3',4,4',5,5',6-Octachlorobiphenyl	
	PCB-206	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	
	PCB-207	2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl	
	PCB-208	2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl	
	PCB-209	Decachlorobiphenyl	

6.14. dQualifierCodes

Domain Description	Code	Code Description
Short list of result measure qualifier codes obtained from the EPA's Water Quality Exchange (USEPA 2024). For a full list, consult the domain table in the monitoring data reporting templates.	DI	Dilution required
	DL	Not Detected: The analyte was not detected at a level >= to the Method Detection Limit for the analysis.
	DT	Date value on logger was incorrect; Changed to date of sampling event; Date and time considered suspect
	E	Concentration of analyte being analyzed exceeded calibration range of instrument
	EFAI	Equipment failure
	FEQ	Field equipment questionable
	FPC	Performance Check, failed
	FPP	Sample field preparation problem
	FPR	Ongoing Precision and Recovery, failed
	FQC	Quality Control, failed
	FSP	Failed. Surrogate spike recovery not acceptable.
	GT	The listed result is greater than the upper quantitation limit for either the analytical method or the meter used for the measurement.
	H	Holding time exceeded:
	I	Estimated value; compound failed initial calibration value
	ITNA	Incubation time not attained
	ITNM	Incubation temperature not maintained
	J	Estimated: The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
	J-R	Approximate value result is below the reporting level but greater than the method detection limit
	JCN	Sample Container Damaged, no sample lost
	JCW	Sample Container Damaged, sample lost
	KCF	Known Contamination, field
	KCX	Known Contamination, unknown
	KK	True bacterial concentration is assumed to be less than the reported value.
	LAC	No Result Reported, lab accident
	LBF	Lab Failed, sample not analyzed

Domain Description	Code	Code Description
	LL	True bacterial concentration is assumed to be greater than the reported value.
	LT	Less Than
	NFNS	Comparison of nutrient fractions (e.g. filtered > unfiltered) or nutrient species (e.g. PO4 > TP) are not consistent
	NPNF	Normal protocol not followed
	PB	Continuous probe biased
	PP	Sample preparation problem
	Q	The result did not pass the lab quality checks and there was an insufficient amount of the sample for re-analysis.
	QC	Quality Control problems
	QCI	Quality Control incomplete
	RPO	% RPD outside of acceptable limits
	SCA	Suspected Contamination, lab analysis
	SCF	Suspected Contamination, field
	SCP	Suspected Contamination, lab preparation
	SCX	Suspected Contamination, unknown
	SSR	Surrogate standard acceptance criteria not met
	SUS	Result value is defined as suspect by data owner. (HV) High variability: questionable precision and accuracy
	TMLF	Time missing in logger file.
	TOC	Temperature outside of criteria
	UNC	Value Not Confirmed
	V	Surrogate recoveries out of range

6.15. dSampleFraction

Domain Description	Code	Code Description
Result sample fraction: partitioning between the dissolved and particulate phases	dissolved	That portion of the analyte found in the liquid medium. Cannot be removed by filtration.
	particulate	That portion of the analyte which is extracted from the liquid medium by filtration.
	interstitial water	Pore water, subterranean water in the pores of rocks, soils, and bottom sediments of oceans, seas, lakes, estuaries, and rivers.
	total	The total of all fractions of the analyte.

6.16. dSampleMedia

Domain Description	Code	Code Description
Identifies the environmental medium sample was taken	Sediment	Includes bottom material and suspended sediment sample media. Bottom material is a mixture of mineral and organic matter that compose the top bed deposits (usually the first few inches) underlying a body of water. Suspended sediment is sediment carried in suspension by the turbulent components of the fluid or by the Brownian movement (a law of physics).
	Water	The physical or chemical composition of the water at the monitoring site.

6.17. dSampleType

Domain Description	Code	Code Description
Type of sample collected	Composite	A method of combining multiple samples into one to represent the average characteristics of a group over a period of time.
	Discrete	One sample taken from a single point, at a specific time; also called a 'grab' sample.
	Passive	A technique that uses a collecting medium to accumulate pollutants over time.

6.18. dStationLoc

Domain Description	Code	Code Description
Station Location	EST	Estuary
	IMP	Impoundment
	IN	Instream
	OUT	Outfall
	OTH	Other

6.19. dStationType

Domain Description	Code	Code Description
Station Type	BACT	Bacteria
	CHEM	Chemical
	CHLO	Chloride only
	PCB	PCB source tracking

6.20. dStormBaseflow

Domain Description	Code	Code Description
Is Sample Storm or Base Flow	BF	Base Flow
	S	Storm

6.21. dWeightBasis

Domain Description	Code	Code Description
Applicable to sediment samples	dry	The material dried in a dry oven
	wet	The wet weight of the material

7. References

MDE (Maryland Department of the Environment). 2021. *National Pollution Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permits, 2021 MS4 Monitoring Guidelines: BMP Effectiveness and Watershed Assessments, Oct 2021*. Baltimore, MD: Maryland Department of the Environment. Also available at https://mde.maryland.gov/programs/Water/StormwaterManagementProgram/Documents/Final%20Determination%20Dox%20N5%202021/2021%20MS4%20Monitoring%20Guideline%20Final%2011%2005%202021.pdf.

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USEPA (U.S. Environmental Protection Agency). 2024. *Storage and Retrieval and Water Quality eXchange Domain Services and Downloads* - ResultMeasureQualifier. https://cdx.epa.gov/wqx/download/DomainValues/ResultMeasureQualifier_CSV.zip (Accessed July, 2024