



**Bacteria Equivalency Strategy for Using the Optimal Indicator
Organisms for WQS and NPDES Permitting**

**Watershed Protection Branch
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1.0 Technical and Regulatory Background

The Clean Water Act (CWA) authorizes US EPA and delegated states to develop and implement water quality standards to protect human health and the environment. Pathogens and viruses from fecal contamination are a significant pollutant that can cause negative human health outcomes for people who come in contact with contaminated waters. US EPA recommended the use of fecal coliform bacteria as a pathogen indicator¹ for fecal contamination and gastrointestinal illness risk in the 1970s. Research and epidemiological studies in the 1970s and early 1980s showed the efficacy of enterococci as an indicator of fecal contamination and gastrointestinal illness risk in marine waters and *Escherichia coli* (*E. coli*) as an indicator of fecal contamination and gastrointestinal illness risk in freshwaters. US EPA updated their fecal indicator recommendations in 1986 to reflect these findings.

In November 2012, US EPA published updated national recommended water quality criteria for primary recreation waters to protect human health from bacteria during immersive water contact activities such as swimming. The updated criteria are based on the National Epidemiological and Environmental Assessment of Recreational Water (NEEAR) study (US EPA, 2010). The NEEAR study used a primary contact gastrointestinal illness rate of 8 per 1000 recreators to derive the *E. coli* criteria and a gastrointestinal illness rate of 19 per 1000 recreators to derive the enterococci criteria.

2.0 Development and approval of the bacteria water quality standard using optimal indicator organisms

During the 2013 Triennial Review, Georgia adopted *E. coli* and enterococci as the pathogen indicators for waters designated as recreation where primary contact recreational activities such as swimming, water skiing, and white-water boating occur. The instream criteria are given as a 30-day geometric mean and a Statistical Threshold Value (STV), which represents the estimated 90th percentile of the water quality distribution.

As part of the 2019 Triennial Review, Georgia proposed *E. coli* and enterococci criteria for waters designated as fishing, coastal fishing, and drinking water to protect secondary contact recreators who may inadvertently ingest water. The Georgia Environmental Protection Division (EPD) adopted the primary contact criteria for the recreational months, May through October, when immersion is expected to occur. For November through April, when immersion is expected to be limited, EPD adopted secondary contact recreational criteria based on the estimated incidental water consumption rate from the US EPA 2019 update to Chapter 3: Ingestion of Water and Other Select Liquids of the *Exposure Factors Handbook: 2011 Edition*. EPD calculated the secondary contact criteria based on a water ingestion rate for secondary contact recreators that is 2.1 times less than for primary contact recreators. As a result, both primary and secondary contact recreation criteria yield the same gastrointestinal illness rate (8 per 1000 recreators for *E. coli* and 19 per 1000 recreators for enterococci) and are equally protective of human health.

The summer-time *E. coli* criteria meet the same illness rate as the current fecal coliform criteria and, therefore, are as protective as the current summer-time fecal coliform criteria. The winter-time *E. coli* criteria are more stringent and, as a result, more protective than the current winter-time fecal coliform criteria for secondary contact recreation. Therefore, the new bacteria criteria are equivalently protective of human health as the fecal coliform criteria (same illness rate).

¹ A pathogen indicator, as defined in section 502(23) of the CWA, is “a substance that indicates the potential for human infectious disease.”

2.1 Removal of bacteria criteria specific to non-human sources

The language for the *E. coli* and enterococci criteria for waters designated as fishing, coastal fishing, and drinking water to protect secondary contact recreators also removed higher bacteria criteria for fecal coliform in the case where water quality and sanitary studies showed that fecal coliform from non-human sources exceeded the instream water quality standard. This change was motivated by two considerations. First, fecal coliform is a large group of bacteria, which includes some groups, such as klebsiella, that are not necessarily fecal in origin. *E. coli* and enterococci are better indicators of fecal contamination and gastrointestinal illness than fecal coliform. Studies that show a large contribution of non-human sources to the fecal coliform in a waterbody may indicate lower risk of gastrointestinal illness. Second, US EPA's recommended recreational bacteria criteria guidance for *E. coli* and enterococci does not make any allowances for non-human sources of bacteria. With this change, all the designated uses are equally protective of primary contact recreation.

The criteria must be approved by the DNR Board and US EPA prior to use for Clean Water Act purposes. The DNR Board adopted the criteria on January 28, 2022, and US EPA approved the criteria on August 31, 2022.

3.0 Ambient Monitoring Transition

EPD currently monitors 145 sites for fecal coliform and 90 sites for *E. coli* each year. At approximately 20 sites, both fecal coliform and *E. coli* are monitored. EPD monitors all *E. coli* sites and approximately half of the fecal coliform sites every year as part of the state's trend monitoring efforts. This leaves EPD with the capacity to monitor approximately 70 new sites a year.

In 2022, EPD began monitoring for *E. coli* and enterococci instead of fecal coliform, prioritizing segments that had been identified previously as impaired for fecal coliform. EPD will reassess the sites impaired for fecal coliform for *E. coli* or enterococci at a rate of approximately 70 sites per year. By initiating this shift in monitoring in 2022, EPD will be prepared to include the most up-to-date information for the appropriate bacteria criteria for the 2024 303(d)/305(b) List and Integrated Report.

Georgia's Coastal Resources Division (CRD) designates certain waters of the State as shellfish growing areas and further designates shellfish harvesting areas within those growing areas. CRD monitors these waters for fecal coliform contamination in accordance with Food and Drug Administration (FDA) requirements. Waters within "shellfish growing areas" are not subject to the change to enterococci. Georgia's 2022 303(d)/305(b) list includes two waters listed as impaired for fecal coliform based on shellfish criteria (GAR030602040121 - Betz Creek, TMDL issued in 2016; and GAR030602040120 – Bull River).

3.1 Sampling Quality Assurance Plans

Interested stakeholders may submit data for use in the development in the 2024 305(b)/303(d) List provided they have an EPD-approved Sampling and Quality Assurance Plan (SQAP) in accordance with Rule 391-3-6-.03(13) of the Rules and Regulations for Water Quality Control. Historically, most third parties have focused on collecting fecal coliform data on waters that are assessed as impaired for fecal coliform. SQAP data is typically used for delisting a water for fecal coliform rather than listing waters as impaired for fecal coliform.

Stakeholders with approved SQAPs for fecal coliform bacteria were contacted on May 13, 2022, by email after the Board of Natural Resources adopted the change in pathogen indicator. This email informed the stakeholders of the anticipated change from fecal coliform to *E. coli* or enterococci and their associated criteria. The SQAP stakeholders were advised that the fecal coliform data collected

before the new criteria are approved by US EPA will be used in 2024 305(b)/303(d) List development, and to submit their fecal coliform data no later than June 30, 2023. Furthermore, the SQAP stakeholders were informed that after US EPA approves the new pathogen indicators and their criteria, EPD will not use fecal coliform data for 305(b)/303(d) purposes and a revised SQAP reflecting the change in pathogen indicator will need to be submitted to continue data submittal for waterbodies they are currently sampling.

Upon US EPA approval of the criteria, the SQAP stakeholders were contacted on September 8, 2022, again by email, to notify them of the approval and to remind them to submit a revision to their SQAP for the new pathogen indicator(s) if the data is to be used for 305(b)/303(d) assessment purposes.

4.0 TMDL Updates and Implementation

4.1 Background

EPD has developed more than 900 fecal coliform TMDLs. The loading curve approach was used to compare the critical load that led to impairment to the allowable summer and winter seasonal loads. To determine the needed reduction, the critical loads or loads that violated the water quality standards were determined using bacteria data collected consistent with Georgia's instream bacteria standards to calculate the geometric means and multiplying these values by the arithmetic means of the flows measured at the time the samples were collected. Georgia's instream bacteria standards are based on either a geometric mean of samples collected over a 30-day period, with samples collected at least 24 hours apart, or the single sample maximum. To reflect this in the load calculation, the bacterial loads are expressed as 30-day accumulated loads with units of counts per 30 days or single day maximums depending on the criteria violated. This is described by the equation below:

$$L_{\text{critical}} = C_{\text{critical}} \times Q_{\text{mean}}$$

Where: L_{critical} = critical bacteria load

C_{critical} = critical bacteria concentration (as a 30-day geometric mean or single sample maximum) that violated the criteria

Q_{mean} = stream flow as an arithmetic mean

The maximum bacteria load at which the instream bacteria water quality criteria will be met can be determined by setting C equal to the instream bacteria criteria (C_{standard}). This load equals the TMDL. However, the TMDL depends on stream flow and is a continuum for the range of flows that can occur in the stream over time. An example of how the TMDL incorporates stream flow is provided below:

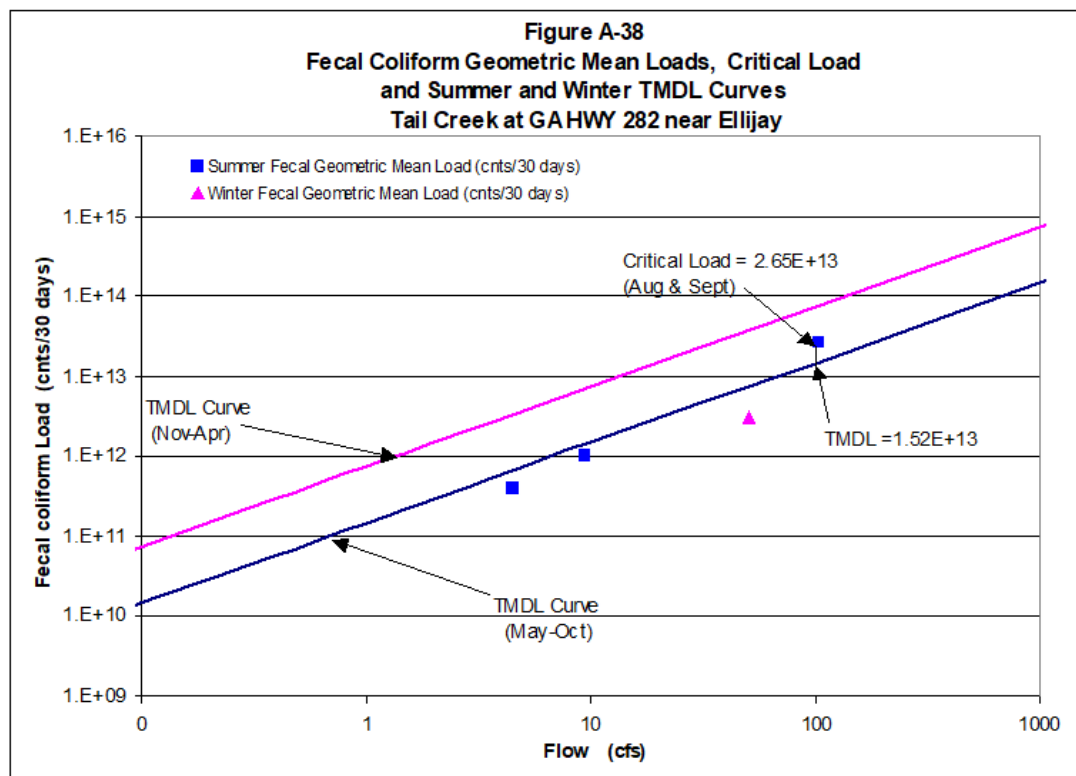


Table A-38. Data for Figure A-38, including: observed fecal coliform, instantaneous flow fecal coliform load, fecal coliform geometric mean, mean flow, fecal coliform geometric mean load.

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Geometric Mean (cnts/100 ml)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (cnts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (cnts/30 days)
27-Feb-01	20	29				
5-Mar-01	50	32				
14-Mar-01	20	16				
20-Mar-01	2300	125	82	51	3.05E+12	3.71E+13
15-May-01	130	7				
22-May-01	490	7				
29-May-01	80	14				
12-Jun-01	90	10	146	9	1.02E+12	1.39E+12
28-Aug-01	40	5				
5-Sep-01	570	147				
10-Sep-01	460	257				
18-Sep-01	1400	6	348	104	2.65E+13	1.52E+13
2-Oct-01	81	5				
4-Oct-01	110	5				
9-Oct-02	170	4				
15-Oct-01	130	4	118	5	3.91E+11	6.61E+11

For waterbodies designated as recreational waters, a single curve represents the TMDL and is the 30-day recreational geometric mean criteria for the various bacterial indicators. For waterbodies designated as fishing, coastal fishing, and drinking water, two curves represent the TMDL. One curve represents the summer TMDL for the period May through October when the 30-day geometric mean water quality criteria is equal to the primary contact recreation bacteria criteria for the various

indicators, and the second curve represents the winter TMDL for the period November through April when the 30-day geometric mean criteria is higher and is equal to the secondary contact recreation bacteria criteria.

The TMDL also has a single sample maximum criterion for fecal coliform or a Statistical Threshold Value (STV) for *E. coli* and enterococci. The single sample maximum applies for the months of November through April; whereas the STV applies year-round. The STV shall not be exceeded more than 10% of the time in a 30-day period. If a single sample exceeds the maximum criterion or the STV and a geometric mean criterion was also exceeded, then the TMDL is based on the criteria exceedance requiring the largest load reduction. The difference between the critical load and the TMDL curve represented the load reduction required for the stream segment to meet the appropriate instream standard.

The TMDL load calculation is given using the following equation:

$$\text{TMDL} = C_{\text{standard}} \times Q$$

Where: TMDL = Total Maximum Bacteria Load either as a 30-day geometric mean or a single sample maximum

C_{standard} = applicable state water quality standard

Q = stream flow

The *E. coli* and enterococci water quality criteria are equivalently protective of human health as the fecal coliform criteria. The applicable water quality standard for fecal coliform is:

May-October 200 counts/100 mL (as a 30-day geometric mean)

November-April 1,000 counts/100 mL (as a 30-day geometric mean)

November-April 4,000 counts/100 mL (as a single sample maximum)

The applicable water quality standard for *E. coli* is:

May-October 126 counts/100 mL (as a 30-day geometric mean)

May-October 410 counts/100 mL (as a STV)

November-April 265 counts/100 mL (as a 30-day geometric mean)

November-April 861 counts/100 mL (as a STV)

The applicable water quality standard for enterococci is:

May-October 35 counts/100 mL (as a 30-day geometric mean)

May-October 130 counts/100 mL (as a STV)

November-April 74 counts/100 mL (as a 30-day geometric mean)

November-April 273 counts/100 mL (as a STV)

TMDLs represent the assimilative capacity of a specific waterbody or watershed and are the sum of all point source wasteload allocations (WLA) plus nonpoint source load allocations (LA) plus a margin of safety (MOS), or, stated as an equation, $\text{TMDL} = \sum \text{WLA} + \sum \text{LA} + \text{MOS}$. TMDLs have established WLAs for all point sources equivalent to the recreational 30-day geometric mean criteria. The LA has also been given as the appropriate seasonal 30-day geometric mean criteria.

4.2 Implementation

Based on communication with US EPA, EPD understands that states have the option to address the change in pathogen indicators by amending existing TMDL's bacteria allocations to provide *E. coli*

or enterococci-based allocations in addition to the original fecal coliform-based allocations. The TMDL supplements include WLA and LA for the new bacteria indicators, as well as equally protective 30-day geometric mean WLAs for *E.coli* or enterococci. Appropriate seasonal (May through October and April through November) STVs for *E. coli* or enterococci were also provided. The table below shows the equivalent bacteria criteria for the various bacteria indicators.

Designated Use	counts/100 mL		
	Recreation	Drinking Water*/ Fishing	Drinking Water*/ Fishing
	Year Round	May-October	November-April
Fecal Coliform			
30-day Geomean	200	200*	1000*
Single Sample Maximum			4000*
<i>E. coli</i>			
30-day Geomean	126	126*	265*
STV	410	410*	861*
Enterococci			
30-day Geomean	35	35	74
STV	130	130	273

* Criteria that apply to waterbodies designated as drinking water.

EPD prepared 40 bacteria TMDL supplements that addressed the more than 900 waterbodies covered by existing fecal coliform TMDLs. The supplements received concurrence from US EPA and became effective on September 12, 2022, when they were public noticed.

A target date of December 31, 2023, has been set for the development, public noticing, and approval of TMDLs for all waterbodies on the 2022 303(d) List for fecal coliform. These TMDLs will include limits for both fecal coliform and *E. coli* or enterococci.

5.0 305(b)/303(d) Assessment Updates and Implementation

5.1 Background

Section 305(b) of the CWA requires states to assess their water quality every two years and publish their findings in a water quality report. To develop this report, Georgia compares water quality data collected across the state against the water quality standards using EPD’s Listing Assessment Methodology and places each waterbody into one of three broad assessment categories: 1) supporting their designated use; 2) not supporting their designated use (impaired); or 3) assessment pending. Section 303(d) of the CWA requires states to submit a list of all waters that are not supporting their designated uses and need to have a TMDL developed. EPD submits both lists concurrently to US EPA through the Integrated Report.

TMDLs will be developed for all segments impaired for fecal coliform on the 2022 303(d) List and waterbodies will be monitored for either *E. coli* or enterococci beginning in 2022, unless it is a shellfish growing area designated by CRD as described in Section 3.0. Therefore, the 2024 303(d) List will not contain any segments impaired for fecal coliform, except for those in shellfish growing areas.

The 305(b) List will include all segments previously listed for fecal coliform and indicate that TMDLs have been completed for each one (Category 4a). The fecal coliform TMDL will remain in place and include supplements with WLA and LA for *E. coli* or enterococci. The impairment will be reassessed as new *E. coli* or enterococci data is collected.

5.2 Implementation

The Listing Assessment Methodology provides information about the quantity and quality of data needed for listing decisions. In general, for a waterbody to be considered supporting, 10% or fewer of the bacteria samples (30-day geometric mean, single sample max, or STV) may exceed the specific water quality criteria. EPD's 2024 Listing Assessment Methodology will reflect the approved bacteria criteria, and assessments for the 2024 List onward will use the new water quality standards reflecting the new bacteria indicator.

The 2024 303(d) List will not contain any segments impaired for fecal coliform, except for those in shellfish growing areas. The waterbodies will be identified on the 305(b) List as impaired for bacteria (fecal coliform) with a completed TMDL (Category 4a). The waterbody will remain in Category 4a based on the historic fecal coliform data that indicated that pathogens were likely present at levels that could result in human illness.

A review of historical Georgia-specific data where both *E. coli* and fecal coliform data were collected at a single location shows the majority of the time when fecal coliform data exceeded its criteria, the *E. coli* data also exceeded its criteria. EPD looked at data from 2019 and 2020 where *E. coli* and fecal coliform samples were taken concurrently at the same location. Based on the calculated 148 paired 30-day geomeans for *E. coli* and fecal coliform, EPD found a high level of correlation between the *E. coli* and fecal coliform data. Approximately 85% of the time, the *E. coli* and fecal coliform 30-day geomeans either both met their criteria or both violated their criteria.

Once the criteria for fecal coliform have been replaced, the segments listed for fecal coliform will be assessed using the available *E. coli* or enterococci criteria. If no *E. coli* or enterococci data are available for assessment, EPD will collect *E. coli* or enterococci data to confirm the impairment. If the results of the assessment indicate *E. coli* or enterococci criteria are being met, then the waterbody will be moved to Category 1 (supporting its designated use).

6.0 NPDES Permitting Transition & Implementation

6.1 NPDES Point Source Wastewater Permitting

EPD is required to issue permits that protect human health and aquatic life. Based on the nature of a waste stream or of the treatment process, point source discharges may have the reasonable potential to discharge bacteria in quantities that may cause or contribute to a violation of the instream water quality standards for bacteria. Hence where appropriate, EPD includes effluent limits for bacteria protecting the instream bacteria water quality standards in point source wastewater NPDES permits.

As discussed in Section 1.0, as part of the 2013 Triennial Review EPD adopted new bacterial indicators (*E. coli* and enterococci) for waterbodies with a designated use of recreation. After US EPA approved the new water quality criteria and as the permits authorizing discharges to recreational waterbodies came up for reissuance, EPD began transitioning the bacterial effluent limits from fecal coliform to *E. coli* or enterococci.

EPD intends on using the same process here; EPD will not open or modify current permits to include *E. coli* or enterococci effluent limits, as they will be included at the time of permit reissuance.

6.1.1 Calculating the WQBELs

For use in NPDES point source wastewater permits, the *E. coli* and enterococci criteria must be translated into average monthly limits (AML) and average weekly limits (AWL) for POTWs and AML and maximum daily limits (MDL) for Non-POTWs. US EPA noted that there are two general approaches for establishing short and long-term effluent limits stringent enough to meet the water quality criteria: the “end-of-pipe” approach and the Technical Support Document (TSD) approach (*FAQ: NPDES Water-Quality Based Permit Limits for Recreational Water Quality Criteria*, April 2015). EPD evaluated both approaches and determined that the “end of-pipe” approach is the most suitable for regulated community.

In the “end-of pipe” approach the water quality criteria for *E. coli* and enterococci are applied directly as the 30-day geometric mean for AML at the permitted compliance discharge point. The MDL for Non-POTWs and AWL for POTWs is set equal to the Statistical Threshold Value (STV). This approach is the simplest for facilities’ operational compliance and is the most common method used to develop bacterial effluent limits because there is no consideration of dilution or mixing with the receiving water. Due to the natural variation of bacteria, EPD does not consider dilution nor allow a mixing zone for bacteria, see Section 6.1.6 below for further discussion of mixing zones.

For *E. coli*, the long-term, AML is set as the 30-day geometric mean of 126 counts/100 mL and is calculated each calendar month. The short-term, MDL and AWL is set as the STV of 410 counts/100mL in any calendar month. For enterococci, the long-term, AML is set as the 30-day geometric mean of 35 counts/100 mL and is calculated each calendar month. The short-term, MDL and AWL is set as the STV of 130 counts/100mL in any calendar month.

6.1.1.1 WQBELs and the removal of bacteria criteria specific to non-human sources

As described in Section 2.1, the bacteria criteria for *E. coli* and enterococci no longer include separate, higher numeric criteria for fecal coliform for waters where water quality and sanitary studies show levels from non-human sources exceeding the in-stream water quality standards. As a result, WQBELs derived from the new *E. coli* and enterococci bacteria criteria will not allow any modifications for permit limits in response to water quality or other studies indicating non-human sources of bacteria.

6.1.1.2 Permitting

EPD reviewed all effective permits with fecal coliform limits. Approximately 80% of these permits have a fecal coliform AML of 200 counts/100 mL (geomean) and AWL of 400 counts/100 mL. At the time of permit reissuance, these permits will be given the appropriate in-stream water quality standard for the new bacteria indicators (AML of 126 counts/100 mL (geomean) and AWL of 410 counts/100 mL for *E. coli*, or AML of 35 counts/100 mL (geomean) and MDL of 130 counts/100 mL for enterococci).

Approximately 14% of permits have a fecal coliform monthly geomean limit of 23 counts/100 mL. These permits all follow the reuse requirements as specified in EPD’s 2002 *Discharges in the Metro Chattahoochee Basin* Memo. These permits will receive an AML of 20 counts/100 mL (geomean) for *E. coli*. This limit was informed by the information collected and published by US EPA in the 2012 *Guidelines for Water Reuse*. The remaining 6% of permits will be evaluated on a case-by-case basis.

A small number of facilities have seasonal limits. As permits are reissued with the new bacteria criteria, the seasonal limits will be removed, since the facilities were designed to meet the more stringent summer-time effluent limit it is reasonable to require the facility to meet the more stringent limit year-round.

6.1.1.3 Compliance

Facilities with treatment technology for fecal coliform will utilize the same treatment technology for *E. coli* and enterococci. EPD does not anticipate that facilities will have compliance concerns meeting the *E. coli* and enterococci permit limits. If facilities need assistance identifying an approved laboratory or need training on *E. coli* sample collection, EPD can provide technical assistance.

6.1.2 Implementation of TMDLs in NPDES Wastewater Permits

If an applicant discharges to a waterbody with a bacteria TMDL and/or the applicant reports bacteria as “believed present” on an application, has a sanitary waste stream or if the facility is listed in the bacteria TMDL with a bacteria WLA, then the NPDES wastewater permit will be issued with monitoring and/or effluent limitations in accordance with the requirements of the applicable TMDL. Concurrent to this process, the fecal coliform TMDLs are being updated to provide WLAs for the new bacterial indicator to protect designated uses. See Section 4.0 above for further discussion on bacteria TMDLs. Permits issued after August 31, 2022 will have updated WLAs and permit limits to reflect the appropriate bacteria criteria for the designated use of the waterbody.

6.1.3 Federal Effluent Limit Guidelines Implemented in NPDES Wastewater Permits

EPD will continue to implement federal Effluent Limit Guidelines (ELG) for Non-POTW permits. NPDES wastewater permits will be issued with the specific bacterial indicator identified in the ELG and the appropriate bacterial indicator for the designated use of the waterbody.

6.1.4 Effluent Limit Compliance Schedules in Wastewater Permits

If an effective wastewater NPDES permit has never had a bacteria effluent limit, at the request of the permittee, a schedule to allow for the implementation of a water-quality based effluent limit may be established by EPD and included in the permit per Rules 391-3-6-.03(2)(g) and 391-3-6-.06(10) of the Rules for Water Quality Control. The schedule must be the shortest reasonable period of time necessary to achieve compliance. EPD believes a 24-month compliance schedule is a reasonable amount of time to upgrade a POTW to include disinfection treatment. EPD will not provide compliance schedules to permittees with effective permits that already have bacteria effluent limits.

6.1.5 Mixing Zones

The water quality bacteria criteria that originated from US EPA’s 2012 recreational water quality criteria are designed to protect the public from exposure to harmful levels of pathogens while participating in water-contact activities such as swimming, tubing, wading, and surfing in all water bodies designated for such recreational uses (both primary and secondary recreation). EPD does not and will not approve mixing zones (allow dilution) in the development of permits limits for bacteria.

6.1.6 Sufficiently Sensitive Analytical Test Method

A sufficiently sensitive analytical test method shall be used as required by 40 Code of Federal Regulations (CFR) Part 136 of the federal regulations and the detection limit shall be provided to EPD upon request. In accordance with 40 CFR §122.44(i)(1)(iv)), a method is considered “sufficiently sensitive” when “(1) The method minimum level (ML) is at or below the level of the

effluent limit established in the permit for the measured pollutant or pollutant parameter; or (2) The method has the lowest ML of the analytical methods approved under 40 CFR part 136 or required under 40 CFR chapter I, subchapter N or O for the measured pollutant or pollutant parameter.”

6.1.7 Antidegradation Considerations

In Georgia, an antidegradation review is triggered when there is:

- An increase in a permitted pollutant loading,
- A discharge of a pollutant not currently discharged, or
- An increase in the mass of a pollutant discharged that triggers the need for a new effluent limitation.

The replacement of the fecal coliform effluent limit with either *E. coli* or enterococci effluent limits is considered equivalently protective of the instream water quality fecal coliform criteria, so there is no expected increase in a permitted pollutant loading for bacteria, there will not be a discharge of a pollutant not currently being discharged, and there will not be an increase in the mass of a pollutant discharged triggering the need for a new effluent limitation. The *E. coli* or enterococci effluent limits apply water quality criteria at the “end-of-pipe” and a discharge in compliance with the effluent limits will not cause or contribute to excursions above the current water quality criteria for fecal coliform nor the new *E. coli* or enterococci criteria. Therefore, EPD believes that the replacement of fecal coliform effluent limits with *E. coli* and enterococci effluent limits is compliant with Section 303(d)(4)(A) and Section 303(d)(B) of the CWA as the existing effluent limitations are based on either a WLA or TMDL, and the water quality modeling indicates that attainment of the water quality standards is assured. EPD does not believe that the change in bacteria indicator will result in further degradation of the receiving water(s) or have any effect whatsoever regarding the protection of designated uses. See Section 6.1.3 for discussion on the implementation of the new bacteria criteria in NPDES permits.

6.1.8 Anti-backsliding

Changing the pathogen indicator and associated effluent limits in NPDES point source permits is not considered backsliding. The inclusion of *E. coli* and enterococci effluent limits simply use a different pathogen indicator to provide the same level of protection for the designated use of primary and secondary contact recreation as is currently required in Section 301(b)(1)(C) of the CWA and at 40 CFR 122.44(d).

6.1.9 Watershed Protection Plans

Certain permit holders are required to conduct a Watershed Assessment (WA) and develop and implement a Watershed Protection Plan (WPP). These documents require the permit holder to conduct water quality monitoring of streams and other waterbodies within their jurisdictional and service area boundaries. Monitoring for fecal coliform and *E. coli* or enterococci has been included in EPD guidance for the development of the WA and WPP documents since 2005.

US EPA approved the change in the pathogen bacterial indicators on August 31, 2022 and EPD has revised the WA and WPP guidance documents to reflect the new bacteria indicators. In addition, EPD notified appropriate permit holders that the new bacteria criteria have been approved and fecal coliform sampling under their WA or WPP may cease and only *E. coli* or enterococci sampling is now required.

6.2 NPDES Nonpoint Source Stormwater Permitting

Stormwater NPDES permitting falls under three broad categories: construction stormwater, industrial stormwater, and municipal stormwater. Of those, only the General Permit for Stormwater Discharges Associated with Industrial Activity (Permit No. GAR050000, “IGP”) and the Municipal Separate Storm Sewer System (MS4) permits for Phase I Large and Phase I Medium communities include requirements specific to bacteria. EPD does not plan to open and modify current permits to include *E. coli* or enterococci.

Industrial Stormwater

Currently, to be eligible for coverage under the IGP, permittees are required to perform one of the following activities if they discharge into, or within one linear mile upstream of, and in the same watershed as, any portion of an impaired stream segment: 1) prevent all exposure to stormwater of the pollutant for which the water is impaired, 2) document that the pollutant is not present at the facility, or 3) provide data documenting that the discharge will not cause or contribute to an exceedance of a water quality standard. Specific to bacteria impairments, a permittee may conduct scientific testing, such as DNA analysis, to document that the bacteriological constituents found in discharges from the facility are not a result of industrial activity at the site or the permittee may choose to capture stormwater discharges likely to contain bacteria and use chemical addition to disinfect prior to discharge. However, if the permittee chooses to conduct Impaired Stream Segment Sampling, the results of the sampling are to be compared against the impaired waters benchmark value for the pollutant of concern to determine if the best management practices (BMPs) implemented by the facility are effective in enabling the facility to meet the applicable water quality standard. If sampling results indicate that the stormwater discharge exceeds the impaired waters benchmark value, then improvements must be made until the sampling does not exceed the impaired waters benchmark.

EPD reissued the IGP in May 2022. As part of the reissuance process, EPD included modifications to “Appendix C – Impaired Stream Segment Sampling and Requirements” to reflect the change to the pathogen indicator. Facilities that discharge to a stream segment listed as impaired or having a TMDL that includes a wasteload allocation for bacteria are required to conduct sampling for the current pathogen indicator and compare their results against the seasonal STV to assess their BMP performance against the applicable in-stream water quality standard to demonstrate that the discharge will not cause or contribute to an exceedance of a water quality standard.

Municipal Stormwater

Similar to the IGP, Phase I Large and Phase I Medium MS4 permittees must identify impaired waters located within their jurisdictional area which contain MS4 outfalls or are within one linear mile downstream of MS4 outfalls and within the same watershed. For those impaired waters, the permittee must propose an Impaired Waters Plan (IWP) as required by the permit, addressing each pollutant of concern. The IWP must include sampling locations, frequency of sampling, an implementation schedule, a map, a description of BMPs to be used to control and reduce the pollutant(s), and a schedule for implementation of those BMPs. If a TMDL containing a wasteload allocation specific to one or more of the permittee’s outfalls is approved, then the wasteload allocation must be incorporated into the Stormwater Management Program.

For waters impaired for bacteria, Phase I Large and Phase I Medium MS4 permittees with a population equal to or exceeding 10,000 at the time of permit issuance must collect four geometric means during the annual reporting period (16 samples total) as required by the permit. If two years of data demonstrate that the level of bacteria is consistently below the numeric criteria, then the permittee must prepare a Sampling Quality and Assurance Plan (SQAP). Monitoring data collected

in accordance with an EPD-approved SQAP must be submitted to EPD's Watershed Monitoring Program to be used, along with data obtained from other sources, to evaluate the possible removal of the waterbody from the 303(d) list.

Phase II (population exceeding 10,000) MS4 permittees must also identify any impaired waterbodies located within its jurisdictional area and propose a monitoring and implementation plan (MIP) addressing each pollutant of concern. Consistent with Phase I MS4 permit requirements, the MIP must include sample locations, sample types, frequency, and any seasonal considerations, a monitoring schedule, a map of the impaired waterbodies, monitoring locations and outfalls, a description of BMPs to be used to control and reduce the pollutants of concern, and a schedule for implementation of these BMPs.

All MS4 permittees (except Phase II with populations less than 10,000) are required to submit an annual report that includes all monitoring data collected during the reporting period, an assessment of the data trends over time for each pollutant of concern, and an assessment to determine the effectiveness of the BMPs employed and what, if any, additional adaptive BMP measures may be necessary to return the water to compliance with State water quality standards.

Phase II (population less than 10,000) MS4 permittees are required to identify any impaired waters located within their permitted area and propose an Impaired Waters Plan to reduce the pollutant of concern including a list of the impaired waters and pollutant(s), a map showing the location of the impaired waters, a list of BMPs that will be implemented to address each pollutant of concern, and a schedule for implementing the BMPs.

Upon notification by EPD, Phase I Large and Phase I Medium (population equal to or exceeding 10,000) MS4 permittees will be expected to revise their Impaired Waters Plan (IWP) and begin sampling for *E. coli* in place of fecal coliform according to current permit requirements. For consistency, the Phase II (population equal to or exceeding 10,000) MS4 permit will be revised upon reissuance to reflect the same bacteriological monitoring requirements, as in the Phase I (population equal to or exceeding 10,000) MS4 permits. EPD will solicit permittee and stakeholder feedback on all updates regarding bacteria indicators and limits during the permit reissuance process. It is anticipated that Phase II (population less than 10,000) MS4 permittees will remain exempt from the monitoring requirements.

6.3 Emergency Actions

The language in the Emergency Action section of the Rules for Water Quality Control 391-3-6-.05(3)(c) will be updated to reflect the appropriate bacteria criteria.