



Analytical Methods Approved for Compliance Monitoring under the Surface Water Treatment Coliform Rule

Analysis for the following contaminants shall be conducted in accordance with the methods in the following table, or their equivalent as determined by EPA. The methods and monitoring requirements for these contaminants are specified in 40 CFR 141.74(a)(1). Additional methods are listed in Appendix A to Subpart C of Part 141.

The CFR is the legal reference for approved methods and takes precedent over this table. The table should accurately reflect the analytical methods information published in 40 CFR 141.

§141.74(a)(1)– Analytical and monitoring requirements

(a)(1) Analytical requirements

(1) The time from sample collection to initiation of analysis may not exceed 8 hours. Systems must hold samples below 10 °C during transit.

The procedures must be done in accordance with the documents listed at §141.74(a)(1) or one of the alternative methods listed in Appendix A to Subpart C of Part 141. For Standard Methods Online, the year in which each method was approved by the Standard Methods Committee is designated by the last two digits following the hyphen in the method number. The methods listed are the only online versions of the method that maybe used. For vendor methods, the date of the method listed in §141.74(a)(1) or Appendix A to Subpart C of Part 141 is the date/version of the approved method. The methods listed are the only versions that may be used for compliance with this rule. Laboratories should be careful to use only the approved versions of the methods as product packaging inserts may not be the same as the approved versions of the methods.

Contaminant

Total Coliforms - lactose fermentation methods:

Method	Organization	Reference Title/Source	Date	Notes
9221 A, B, C	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 18 th Edition Standard Methods	1992	Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between lactose broth and lauryl tryptose broth using the water normally tested, and if the findings from this comparison demonstrate that the false-positive rate and the false-negative rate for total coliforms, using lactose broth, is less than 10 percent. Media should cover inverted tubes at least one-half to two-thirds after the sample is added.

Method	Organization	Reference Title/Source	Date	Notes
				No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.
9221 A, B, C	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater, 19th Edition</i> Standard Methods	1995	Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between lactose broth and lauryl tryptose broth using the water normally tested, and if the findings from this comparison demonstrate that the false-positive rate and the false-negative rate for total coliforms, using lactose broth, is less than 10 percent. Media should cover inverted tubes at least one-half to two-thirds after the sample is added. No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.
9221 A, B, C	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater, 20th Edition</i> Standard Methods	1998	Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between lactose broth and lauryl tryptose broth using the water normally tested, and if the findings from this comparison demonstrate that the false-positive rate and the false-negative rate for total coliforms, using lactose broth, is less than 10 percent. Media should cover inverted tubes at least one-half to two-thirds after the sample is added. No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.
9221 A, B, C	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater, 21st Edition</i> Standard Methods	2005	Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between lactose broth and lauryl tryptose broth using the water normally tested, and if the findings from this comparison demonstrate that the false-positive rate and the false-negative rate for total coliforms, using lactose broth, is less than 10 percent. Media should cover inverted tubes at least one-half to two-thirds after the sample is added. No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.
9221 A, B, C	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater, 22nd Edition</i> Standard Methods	2012	Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between lactose broth and lauryl tryptose broth using the water normally tested, and if the findings from this comparison demonstrate that the false-positive rate and the false-negative

Method	Organization	Reference Title/Source	Date	Notes
				<p>rate for total coliforms, using lactose broth, is less than 10 percent.</p> <p>Media should cover inverted tubes at least one-half to two-thirds after the sample is added.</p> <p>No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.</p>
9221 A, B, C	Standard Methods	<p><i>Standard Methods for the Examination of Water and Wastewater, 23rd Edition</i> Standard Methods</p>	2017	<p>Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between lactose broth and lauryl tryptose broth using the water normally tested, and if the findings from this comparison demonstrate that the false-positive rate and the false-negative rate for total coliforms, using lactose broth, is less than 10 percent.</p> <p>Media should cover inverted tubes at least one-half to two-thirds after the sample is added.</p> <p>No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.</p>
9221 A, B, C-99	Standard Methods Online	<p>Online version. Approval year is designated by the last 2 digits. Only online versions cited in the regulations or in Appendix A to Subpart C of Part 141 are approved. Standard Methods</p>	1999	<p>Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between lactose broth and lauryl tryptose broth using the water normally tested, and if the findings from this comparison demonstrate that the false-positive rate and the false-negative rate for total coliforms, using lactose broth, is less than 10 percent.</p> <p>Media should cover inverted tubes at least one-half to two-thirds after the sample is added.</p> <p>No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.</p>
9221 A, B, C-06	Standard Methods Online	<p>Online version. Approval year is designated by the last 2 digits. Only online versions cited in the regulations or in Appendix A to Subpart C of Part 141 are approved. Standard Methods</p>	2006	<p>Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between lactose broth and lauryl tryptose broth using the water normally tested, and if the findings from this comparison demonstrate that the false-positive rate and the false-negative rate for total coliforms, using lactose broth, is less than 10 percent.</p> <p>Media should cover inverted tubes at least one-half to two-thirds after the sample is added.</p> <p>No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.</p>

Total coliforms - membrane filtration methods:

Method	Organization	Reference Title/Source	Date	Notes
9222 A, B, C	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 18 th Edition Standard Methods	1992	
9222 A, B, C	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 19 th Edition Standard Methods	1995	
9222 A, B, C	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 20 th Edition Standard Methods	1998	
9222 A, B, C	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 21 st Edition Standard Methods	2005	
9222 A, B, C	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 23 rd Edition Standard Methods	2017	
9222 A, B, C-97	Standard Methods Online	Online version. Approval year is designated by the last 2 digits. Only online versions cited in the regulations or in Appendix A to Subpart C of Part 141 are approved. Standard Methods	1997	
1604	EPA	Method 1604: Total Coliforms and <i>Escherichia coli</i> in Water by Membrane Filtration Using a Simultaneous Detection Technique (MI Medium), September 2002 EPA Method 1604	2002	

Total coliforms - enzyme substrate methods:

Method	Organization	Reference Title/Source	Date	Notes
9223 Colilert	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 18 th Edition Standard Methods	1992	
9223 Colilert	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 19 th Edition Standard Methods	1995	
9223 Colilert	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 20 th Edition Standard Methods	1998	
9223 Colilert	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 21 st Edition Standard Methods	2005	
9223 B Colilert	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 22 nd Edition Standard Methods	2012	
9223 B Colilert	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 23 rd Edition Standard Methods	2017	
9223 B-97 Colilert	Standard Methods Online	Online version. Approval year is designated by the last 2 digits. Only online versions cited in the regulations or in Appendix A to Subpart C of Part 141 are approved.	1997	
9223 B-04 Colilert	Standard Methods Online	Online version. Approval year is designated by the last 2 digits. Only online versions cited in the regulations or in Appendix A to Subpart C of Part 141 are approved.	2004	

Contaminant

Fecal coliforms – Fecal Coliform Procedure (following Lactose Fermentation Methods):

Method	Organization	Reference Title/Source	Date	Notes
9221 E	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 18 th Edition Standard Methods	1992	A-1 broth may be held up to 7 days in a tightly closed screw cap tube at 4°C
9221 E	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 19 th Edition Standard Methods	1995	A-1 broth may be held up to 7 days in a tightly closed screw cap tube at 4°C
9221 E	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 20 th Edition Standard Methods	1998	A-1 broth may be held up to 7 days in a tightly closed screw cap tube at 4°C
9221 E	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 21 st Edition Standard Methods	2005	A-1 broth may be held up to 7 days in a tightly closed screw cap tube at 4°C
9221 E	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 22 nd Edition Standard Methods	2012	A-1 broth may be held up to 7 days in a tightly closed screw cap tube at 4°C
9221 E	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 23 rd Edition Standard Methods	2017	A-1 broth may be held up to 7 days in a tightly closed screw cap tube at 4°C
9221 E-99	Standard Methods Online	Online version. Approval year is designated by the last 2 digits. Only online versions cited in the regulations or in Appendix A to Subpart C of Part 141 are approved. Standard Methods	1999	A-1 broth may be held up to 7 days in a tightly closed screw cap tube at 4°C
9221 E-06	Standard Methods Online	Online version. Approval year is designated by the last 2 digits. Only online versions cited in the regulations or in Appendix A to Subpart C of Part 141 are approved. Standard Methods	2006	A-1 broth may be held up to 7 days in a tightly closed screw cap tube at 4°C

Contaminant

Fecal coliforms – membrane filtration methods:

Method	Organization	Reference Title/Source	Date	Notes
9222 D	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 18 th Edition Standard Methods	1992	
9222D	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 19 th Edition Standard Methods	1995	
9222 D	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 20 th Edition Standard Methods	1998	
9222D	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 21 st Edition Standard Methods	2005	
9222 D	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 22 nd Edition Standard Methods	2012	
9222 D	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 23 rd Edition Standard Methods	2017	
9222 D-97	Standard Methods Online	Online version. Approval year is designated by the last 2 digits. Only online versions cited in the regulations or in Appendix A to Subpart C of Part 141 are approved. Standard Methods	1997	

Method	Organization	Reference Title/Source	Date	Notes
9222 D-06	Standard Methods Online	Online version. Approval year is designated by the last 2 digits. Only online versions cited in the regulations or in Appendix A to Subpart C of Part 141 are approved. Standard Methods	2006	

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Heterotrophic bacteria – culture method:

Method	Organization	Reference Title/Source	Date	Notes
9215 B	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 18 th Edition Standard Methods	1992	
9215 B	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 19 th Edition Standard Methods	1995	
9215 B	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 20 th Edition Standard Methods	1998	
9215 B	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 21 st Edition Standard Methods	2005	
9215 B	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 22 nd Edition Standard Methods	2012	
9215 B	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 23 rd Edition Standard Methods	2017	

Method	Organization	Reference Title/Source	Date	Notes
9215 B-00	Standard Methods Online	Online version. Approval year is designated by the last 2 digits. Only online versions cited in the regulations or in Appendix A to Subpart C of Part 141 are approved. Standard Methods	2000	
9215 B-04	Standard Methods Online	Online version. Approval year is designated by the last 2 digits. Only online versions cited in the regulations or in Appendix A to Subpart C of Part 141 are approved. Standard Methods	2004	

Contaminant

Heterotrophic bacteria - enzyme substrate methods:

Method	Organization	Reference Title/Source	Date	Notes
Simplate	IDEXX	IDEXX SimPlate™ HPC test method for Heterotrophs in Water, November 2000. IDEXX Laboratories, One IDEXX Drive, Westbrook, ME 04092	2000	

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Turbidity methods:

Method	Organization	Reference Title/Source	Date	Notes
2130 B	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 18 th Edition Standard Methods	1992	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
2130 B	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 19 th Edition Standard Methods	1995	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin

Method	Organization	Reference Title/Source	Date	Notes
2130 B	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 20 th Edition Standard Methods	1998	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
2130 B	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 21 st Edition Standard Methods	2005	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
2130 B	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 22 nd Edition Standard Methods	2012	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
2130 B	Standard Methods	<i>Standard Methods for the Examination of Water and Wastewater</i> , 23 rd Edition Standard Methods	2017	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
180.1	EPA	Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993 National Environmental Methods Index	1993	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
Method 2	Great Lakes Instruments	Great Lakes Instruments Method 2, Turbidity, November 2, 1992 GLI Method 2	1992	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
10133	Hach	Hach FilterTrak Method 10133, Revision 2.0, Determination of Turbidity by Laser Nephelometry, January 2000 Hach FilterTrak Method 10133	2000	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
M5271	Leck Mitchell	Mitchell Method M5271, Revision 1.1, Determination of Turbidity by Laser Nephelometry, March 5, 2009 Mitchell M5271, Rev. 1.1	2009	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin

Method	Organization	Reference Title/Source	Date	Notes
M5331	Leck Mitchell	Mitchell Method M5331, Revision 1.1, Determination of Turbidity by LED Nephelometry, March 5, 2009 Mitchell M5331, Rev. 1.1	2009	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
AMI Turbiwell	Swan Analytische Instrumente AG	Continuous Measurement of Turbidity Using a SWAN AMI Turbiwell Turbidimeter, August 2009 SWAN AMI Turbiwell	2009	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
AQ4500	Thermo Scientific	Orion Method AQ4500, Revision 1.0, Determination of Turbidity by LED Nephelometry, May 8, 2009 Orion AQ4500, Rev. 1.0	2009	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
M5331 (Rev. 1.2)	Leck Mitchell	Mitchell Method M5331, Revision 1.2 Determination of Turbidity by LED or Laser Nephelometry, February 2016 Mitchell M5331, Rev. 1.2	2016	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
10258 (Rev. 1.0)	Hach Company	Hach Method 10258, Rev. 1.0 Determination of Turbidity by 360° Nephelometry, January 2016 Hach 10258, Rev. 1.0	2016	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
10258 (Rev. 2.0)	Hach Company	Hach Method 10258, Rev. 2.0 Determination of Turbidity by 360° Nephelometry, March 2018	2018	Revised method allows the use of sealed vials prefilled with Hach StablCal™ for quarterly calibration
8195 (Rev. 3.0)	Hach Company	Hach Method 8195, Rev. 3.0 Determination of Turbidity by Nephelometry, March 2018	2018	Revised method allows the use of sealed vials prefilled with Hach StablCal™ for quarterly calibration

Method	Organization	Reference Title/Source	Date	Notes
Lovibond PTV 1000	Tintometer, Inc.	Continuous Measurement of Drinking Water Turbidity using a Lovibond PTV 1000 White Light LED Turbidimeter, December 2016 Lovibond PTV 1000, Rev. 1.0	2016	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
Lovibond PTV 2000	Tintometer, Inc.	Continuous Measurement of Drinking Water Turbidity using a Lovibond PTV 2000 660-nm LED Turbidimeter, December 2016 Lovibond PTV 2000, Rev. 1.0	2016	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin
Lovibond PTV 6000	Tintometer, Inc.	Continuous Measurement of Drinking Water Turbidity using a Lovibond PTV 6000 Laser Turbidimeter, December 2016 Lovibond PTV 6000, Rev. 1.0	2016	Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin