Analytical Methods Approved for Compliance Monitoring under the Enhanced Surface Water Treatment 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. 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. If you find discrepancies, please notify The Safe Drinking Water Hotline (800-426-4791) so that EPA can correct the table.

Contaminant / Method	Organization	Reference Title	Date	EPA Publication Number	Publication Order Number	Source of Method
Disinfectants						
Free Chlorine		If approved by the State, residual disinfectant concentrations for free chlorine and combined chlorine may be measured using DPD colorimetric test kits. If approved by the State, free chlorine may be measured using ITS free chlorine test strips. Use of the test strips is described in Method D99-003, "Free Chlorine Species (HOCl- and OCl-) by Test Strip," Revision 3.0, November 21, 2003, available from Industrial Test Systems, Inc., 1875 Langston St., Rock Hill, SC 29730.				
334.0	EPA	Determination of Residual Chlorine in Drinking Water Using an On-line Chlorine Analyzer	August 2009	EPA 815-B-09-013		http://www.epa.gov/safewater/methods/analyticalmethods_ogwdw.html
4500-Cl D	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
4500-Cl D	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods
4500-Cl D	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods
4500-Cl D	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods

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4500-Cl D-00	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/
4500-Cl F	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
4500-Cl F	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods
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4500-Cl F	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods
4500-Cl F-00	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/
4500-Cl G	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
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4500-Cl G-00	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/
4500-Cl H	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
4500-Cl H	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods
4500-Cl H	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods
4500-Cl H	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods
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ChloroSense	Palintest Ltd	Measurement of Free and Total Chlorine in Drinking Water by Palintest ChloroSense	September 2009			Palintest Ltd.
D1253-03	ASTM International	Annual Book of ASTM Standards, Vol. 11.01				http://www.astm.org
D1253-08	ASTM International	Annual Book of ASTM Standards, Vol. 11.01				http://www.astm.org
D1253-86	ASTM International	Annual Book of ASTM Standards, Vol. 11.01				http://www.astm.org
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334.0	EPA	Determination of Residual Chlorine in Drinking Water Using an On-line Chlorine Analyzer	August 2009	EPA 815-B-09-013		http://www.epa.gov/safewater/methods/analyticalmethods_ogwdw.html
4500-Cl D	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
4500-Cl D	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods
4500-Cl D	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods
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4500-Cl E	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
4500-Cl E	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods
4500-Cl E	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods
4500-Cl E	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods
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4500-Cl F	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
4500-Cl F	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods
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4500-Cl G	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
4500-Cl G	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods
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4500-Cl G	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods
4500-Cl G-00	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/
4500-Cl I	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
4500-Cl I	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods

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4500-Cl I	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods
4500-Cl I-00	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/
ChloroSense	Palintest Ltd	Measurement of Free and Total Chlorine in Drinking Water by Palintest ChloroSense	September 2009			Palintest Ltd.
D1253-03	ASTM International	Annual Book of ASTM Standards, Vol. 11.01				http://www.astm.org
D1253-08	ASTM International	Annual Book of ASTM Standards, Vol. 11.01				http://www.astm.org
D1253-86	ASTM International	Annual Book of ASTM Standards, Vol. 11.01				http://www.astm.org
Chlorine Dioxide						
327 Rev 1.1	EPA	Determination of Chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection by Visible Spectrophotometry	May 2005	EPA 815-R-05-008		http://www.epa.gov/safewater/methods/analyticalmethods_ogwdw.html

Contaminant Method	Organization	Reference Title	Date	EPA Publication Number	Publication Order Number	Source of Method
Disinfectants						
Chlorine Dioxide						
4500-ClO2 C	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
4500-ClO2 C	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods
4500-ClO2 C	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods
4500-ClO2 C	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods
4500-ClO2 C-00	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/
4500-ClO2 D	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
4500-ClO2 D	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods
4500-ClO2 D	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods
4500-ClO2 E	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
4500-ClO2 E	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods

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Disinfectants						
Chlorine Dioxide						
4500-ClO2 E	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods
4500-ClO2 E	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods
4500-ClO2 E-00	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/
Ozone						
4500-O3 B	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
4500-O3 B	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods
4500-O3 B	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods
4500-O3 B	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods
4500-O3 B-97	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/
Microbial Contaminants						

Contaminant / Method	Organization	Reference Title	Date	EPA Publication Number	Publication Order Number	Source of Method

Microbial Contaminants

Total Coliforms

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

9221 A	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods

No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.

Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between this medium and lauryl tryptose broth using the water normally tested, and this comparison demonstrates that the false-positive rate and false-negative rate for total coliform, 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.

9221 A	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods

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Microbial Contaminants

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

9221 A-99	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/
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		Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between this medium and lauryl tryptose broth using the water normally tested, and this comparison demonstrates that the false-positive rate and false-negative rate for total coliform, using lactose broth, is less than 10 percent.				
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MI agar also may be used. Preparation and use of MI agar is set forth in the article, "New medium for the simultaneous detection of total coliform and *Escherichia coli* in water" by Brenner, K.P., et al., 1993, Appl. Environ. Microbiol. 59:3534-3544. EPA/600/J-99/225. Available at: http://www.epa.gov/nerlcwww/online.htm. Verification of colonies is not required.

Coliscan® is approved as a modification of MI under the ATP program. It is available from Micrology Laboratories, P.O. Box 340, Goshen, IN 46527-0340.

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9222 A-97	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/

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9222 B	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods

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Coliscan® is approved as a modification of MI under the ATP program. It is available from Micrology Laboratories, P.O. Box 340, Goshen, IN 46527-0340.

9222 B	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods

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9222 B	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods

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Contaminant Method	Organization	Reference Title	Date	EPA Publication Number	Publication Order Number	Source of Method

Microbial Contaminants

Total Coliforms

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

9222 B-97	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/
		MI agar also may be used. Preparation and use of MI agar is set forth in the article, "New medium for the simultaneous detection of total coliform and *Escherichia coli* in water" by Brenner, K.P., et al., 1993, Appl. Environ. Microbiol. 59:3534-3544. EPA/600/J-99/225. Available at: http://www.epa.gov/nerlcwww/online.htm. Verification of colonies is not required. Coliscan® is approved as a modification of MI under the ATP program. It is available from Micrology Laboratories, P.O. Box 340, Goshen, IN 46527-0340.				
9222 C	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
		MI agar also may be used. Preparation and use of MI agar is set forth in the article, "New medium for the simultaneous detection of total coliform and *Escherichia coli* in water" by Brenner, K.P., et al., 1993, Appl. Environ. Microbiol. 59:3534-3544. EPA/600/J-99/225. Available at: http://www.epa.gov/nerlcwww/online.htm. Verification of colonies is not required. Coliscan® is approved as a modification of MI under the ATP program. It is available from Micrology Laboratories, P.O. Box 340, Goshen, IN 46527-0340.				
9222 C	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods
		MI agar also may be used. Preparation and use of MI agar is set forth in the article, "New medium for the simultaneous detection of total coliform and *Escherichia coli* in water" by Brenner, K.P., et al., 1993, Appl. Environ. Microbiol. 59:3534-3544. EPA/600/J-99/225. Available at: http://www.epa.gov/nerlcwww/online.htm. Verification of colonies is not required. Coliscan® is approved as a modification of MI under the ATP program. It is available from Micrology Laboratories, P.O. Box 340, Goshen, IN 46527-0340.				
9222 C	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods
		MI agar also may be used. Preparation and use of MI agar is set forth in the article, "New medium for the simultaneous detection of total coliform and *Escherichia coli* in water" by Brenner, K.P., et al., 1993, Appl. Environ. Microbiol. 59:3534-3544. EPA/600/J-99/225. Available at: http://www.epa.gov/nerlcwww/online.htm. Verification of colonies is not required. Coliscan® is approved as a modification of MI under the ATP program. It is available from Micrology Laboratories, P.O. Box 340, Goshen, IN 46527-0340.				

Contaminant / Method	Organization	Reference Title	Date	EPA Publication Number	Publication Order Number	Source of Method

Microbial Contaminants

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9222 C-97	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/

MI agar also may be used. Preparation and use of MI agar is set forth in the article, "New medium for the simultaneous detection of total coliform and *Escherichia coli* in water" by Brenner, K.P., et al., 1993, Appl. Environ. Microbiol. 59:3534-3544. EPA/600/J-99/225. Available at: http://www.epa.gov/nerlcwww/online.htm. Verification of colonies is not required.

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9223	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods

The ONPG-MUG Test is also known as the Autoanalysis Colilert System.

9223	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods

The ONPG-MUG Test is also known as the Autoanalysis Colilert System.

9223	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods

The ONPG-MUG Test is also known as the Autoanalysis Colilert System.

9223	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods

The ONPG-MUG Test is also known as the Autoanalysis Colilert System.

Contaminant / Method	Organization	Reference Title	Date	EPA Publication Number	Publication Order Number	Source of Method

Microbial Contaminants

Total Coliforms

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

9223 B-97	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/

The ONPG-MUG Test is also known as the Autoanalysis Colilert System.

Fecal Coliforms

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

9221 E	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods

A-1 broth may be held up to 7 days in a tightly closed screw cap tube at 4°C.

9221 E	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods

A-1 broth may be held up to 7 days in a tightly closed screw cap tube at 4°C.

9221 E	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods

A-1 broth may be held up to 7 days in a tightly closed screw cap tube at 4°C.

9221 E	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods

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 of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/

A-1 broth may be held up to 7 days in a tightly closed screw cap tube at 4°C.

Contaminant / Method	Organization	Reference Title	Date	EPA Publication Number	Publication Order Number	Source of Method
Microbial Contaminants						
Fecal Coliforms		The time from sample collection to initiation of analysis may not exceed 8 hours. Systems must hold samples below 10°C during transit.				
9222 D	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
9222 D	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods
9222 D	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods
9222 D	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods
9222 D-97	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/
Heterotrophic Bacteria		The time from sample collection to initiation of analysis may not exceed 8 hours. Systems must hold samples below 10°C during transit.				
9215 B	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
9215 B	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods
9215 B	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods
9215 B	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods

Contaminant / Method	Organization	Reference Title	Date	EPA Publication Number	Publication Order Number	Source of Method
Microbial Contaminants						
Heterotrophic Bacteria		The time from sample collection to initiation of analysis may not exceed 8 hours. Systems must hold samples below 10°C during transit.				
9215 B-00	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/
SimPlate®	IDEXX Laboratories, Inc.	IDEXX SimPlate TM HPC Test Method for Heterotrophs in Water	November 2000			IDEXX Laboratories, Inc.
Water Quality Parameters						
Turbidity		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 Rev. 2.0	Hach Co.	Hach Filter Track Method, "Determination of Turbidity by Laser Nephelometry," Revision 2.0	January 2000			Hach Company
180.1 Rev 2.0	EPA	In Methods for the Determination of Inorganic Substances in Environmental Samples	August 1993	EPA/600/R-93/100	PB94-120821	http://www.nemi.gov
2130 B	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992			Standard Methods
2130 B	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995			Standard Methods
2130 B	Standard Methods	Standard Methods for the Examination of Water and Wastewater, 20th Edition	1998			Standard Methods

Water Quality Parameters

Contaminant / Method	Organization	Reference Title	Date	EPA Publication Number	Publication Order Number	Source of Method
Turbidity		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	Standard Methods for the Examination of Water and Wastewater, 21st Edition	2005			Standard Methods
2130 B-01	Standard Methods Online	Online version of Standard Methods for the Examination of Water and Wastewater. Approval year by Standard Methods Committee is designated by last 2 digits. This is the only online version that is approved.				http://www.standardmethods.org/
AMI Turbiwell	SWAN Analytische Instrumente AG	Continuous Measurement of Turbidity Using a SWAN AMI Turbiwell Turbidimeter	August 2009			http://www.nemi.gov
Method 2	Great Lakes Instruments, Inc.	GLI Method 2, "Turbidity"	November 2, 1992			Great Lakes Instruments, Inc.
Mitchell M5271	Leck Mitchell	Determination of Turbidity by Laser Nephelometry	March 5, 2009			http://www.nemi.gov
Mitchell M5331	Leck Mitchell	Determination of Turbidity by LED Nephelometry	March 5, 2009			http://www.nemi.gov
Orion AQ4500	Thermo Scientific	Determination of Turbidity by LED Nephelometry	May 8, 2009			http://www.nemi.gov

Contact information for methods that are not available on the Internet are summarized in the report titled "Sources of Approved Analytical Methods for National Drinking Water Regulations."