

Biosolids Analytical Methods

General Permit for Biosolids Management



Analytical Methods

The methods outlined below are approved for use under the general permit for biosolids management per WAC 173-308-140. Ecology maintains this list separate from the general permit to enable regular updates as necessary. If you have any questions about the methods listed below, please reach out to your biosolids coordinator.

Enteric viruses

Methods Source	Methods Number	Reference
“Standard Practice for Recovery of Viruses From Wastewater Sludges”, 1992 Annual Book of ASTM Standards: Section 11 - Water and Environmental Technology, ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.	ASTM D 4994-89	Method
“Control of Pathogens and Vector Attraction in Sewage Sludge”, Revised July 2003, National Risk Management Research Laboratory Cincinnati, OH 45268	Appendix H, EPA/625/R-92/013	Method

Fecal coliform

Methods Source	Methods Number	Reference
“Standard Methods for the Examination of Water and Wastewater”, 18th Edition, 1992, American Public Health Association, 1015 15th Street, NW, Washington, DC 20005.	Part 9221 E	9221 E (1992) is no longer available. 9221 E (2017)
“Standard Methods for the Examination of Water and Wastewater”, 18th Edition, 1992, American Public Health Association, 1015 15th Street, NW, Washington, DC 20005.	Part 9222 D	9222 D (1992) is no longer available. 9222 D (2017)
40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants	EPA Method 1680	Method
40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants	EPA Method 1681	Method
“Control of Pathogens and Vector Attraction in Sewage Sludge”, Revised July 2003, National Risk	Appendix F, EPA/625/R-92/013	Method

Methods Source	Methods Number	Reference
Management Research Laboratory Cincinnati, OH 45268		

Helminth ova

Methods Source	Methods Number	Reference
Yanko, W.A., "Occurrence of Pathogens in Distribution and Marketing Municipal Sludges", EPA 600/1-87-014, 1987. National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161 (PB 88-154273/AS).	Yanko, 1987	Method
"Control of Pathogens and Vector Attraction in Sewage Sludge", Revised July 2003, National Risk Management Research Laboratory Cincinnati, OH 45268	Appendix I, EPA/625/R-92/013	Method

Salmonella sp. bacteria

Methods Source	Methods Number	Reference
"Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992, American Public Health Association, 1015 15th Street, NW, Washington, DC 20005	Part 9260 D	9260 D (1992) is no longer available. 9260 D (2017)
Kenner, B.A. and H.P. Clark, "Detection and enumeration of <i>Salmonella</i> and <i>Pseudomonas aeruginosa</i> ", Journal of the Water Pollution Control Federation, Vol. 46, No. 9, September 1974, pp. 2163-2171. Water Environment Federation, 601 Wythe Street, Alexandria, Virginia 22314.	Kenner and Clark, 1974	Method
40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants	EPA Method 1682	Method

Specific oxygen uptake rate (SOUR)

Methods Source	Methods Number	Reference
"Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992, American Public Health Association, 1015 15th Street, NW, Washington, DC 20005.	Part 2710 B	2710 B (1992) is no longer available. 2710 B (2017)

Methods Source	Methods Number	Reference
"Control of Pathogens and Vector Attraction in Sewage Sludge", Revised July 2003, National Risk Management Research Laboratory Cincinnati, OH 45268	Appendix D (2), EPA/625/R-92/013	Method

Total, fixed, and volatile solids

Methods Source	Methods Number	Reference
"Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992, American Public Health Association, 1015 15th Street, NW, Washington, DC 20005.	Part 2540 G	2540 G (1992) is no longer available. 2540 G (2017)

Inorganic pollutants

Methods Source: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA Publication SW-846, Second Edition (1982) with Updates I (April 1984) and II (April 1985) and Third Edition (November 1986) with Revision I (December 1987). Second Edition and Updates I and II are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161 (PB-87-120-291). Third Edition and Revision I are available from Superintendent of Documents, Government Printing Office, 941 North Capitol Street, NE, Washington, DC 20002 (Document Number 955-001-00000-1).

Methods Number	Reference
SW-846 6010	SW-846 6010 is no longer available. SW-846 6010D
SW-846 7061	SW-846 7061 is no longer available. SW-846 7061A
SW-846 7000A	SW-846 7000A is no longer available. SW-846 7000B
SW-846 7470	SW-846 7470 is no longer available. SW-846 7470A
SW-846 7471	SW-846 7471 is no longer available. SW-846 7471B
SW-846 6020B	SW-846 6020 is no longer available. SW-846 6020B
SW-846 7010	SW-846 7010
SW-846 7741A	SW-846 7741 is no longer available. SW-846 7741A

Total Kjeldahl Nitrogen (TKN)

Methods Source	Methods Number	Reference
"Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992, American Public Health Association, 1015 15th Street, NW, Washington, DC 20005.	SM 4500, Norg B	Method
"Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992, American Public Health Association, 1015 15th Street, NW, Washington, DC 20005.	SM 4500, Norg C	Method
ASTM International, Book of Standards Volume 11.01, Standard Test Methods for Total Kjeldahl Nitrogen in Water, 1994, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA	ASTM D3590-89R94E01	Method
ASTM International, Book of Standards Volume 11.02, Standard Test Methods for Total Kjeldahl Nitrogen in Water, 1994, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA	ASTM D3590-02	Method

Nitrate-nitrogen

Methods Source	Methods Number	Reference
40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants	EPA 353.2	Method
"Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992, American Public Health Association, 1015 15th Street, NW, Washington, DC 20005.	SM 4500-NO3 E, F, or H	Method

Ammonia-nitrogen

Methods Source	Methods Number	Reference
"Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992, American Public Health Association, 1015 15th Street, NW, Washington, DC 20005.	SM 4500-NH3 B + C, D, E, or G	Method

Organic nitrogen

Methods Source	Methods Number	Reference
See TKN and Ammonia-Nitrogen	Calculated: TKN minus NH3-N	See TKN and Ammonia-Nitrogen

Total phosphorus

Methods Source	Methods Number	Reference
40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants	EPA 365.1	Method
40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants	EPA 365.3	Method
“Standard Methods for the Examination of Water and Wastewater”, 18th Edition, 1992, American Public Health Association, 1015 15th Street, NW, Washington, DC 20005.	SM 4500-P B + E or F	Method
Bray, Roger H.; Kurtz, L. T.2 Determination of total, organic, and available forms of phosphorus in soils, Soil Science: January 1945 - Volume 59 - Issue 1 - p 39-46	Bray	Method
Olsen, S. and Sommers, L. (1983). Phosphorus. In Methods of Soil Analysis, A. Page (Ed.). https://doi.org/10.2134/agronmonogr9.2.2ed.c24	Olsen	Method
A. Mehlich (1984) Mehlich 3 soil test extractant: A modification of Mehlich 2 extractant, Communications in Soil Science and Plant Analysis, 15:12, 1409-1416, DOI: 10.1080/00103628409367568	Mehlich-3	Method

Semi-volatile organic compounds

Methods Source	Methods Number	Reference
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods”, EPA Publication SW-846, Second Edition (1982) with Updates I (April 1984) and II (April 1985) and Third Edition (November 1986) with Revision I (December 1987). Second Edition and Updates I and II are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161 (PB-87-120-291). Third Edition and Revision I are available from Superintendent of Documents, Government Printing Office, 941 North Capitol Street, NE, Washington, DC 20002 (Document Number 955-001-00000-1).	SW-846 8270E	Method

Volatile organic compounds

Methods Source	Methods Number	Reference
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods”, EPA Publication SW-846, Second Edition (1982) with Updates I (April 1984) and II (April 1985) and Third Edition (November 1986) with Revision I (December 1987). Second Edition and Updates I and II are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161 (PB-87-120-291). Third Edition and Revision I are available from Superintendent of Documents, Government Printing Office, 941 North Capitol Street, NE, Washington, DC 20002 (Document Number 955-001-00000-1).	SW-846 8260D	Method

Additional volatile solids reductions for *anaerobically* digested solids

Methods Source	Methods Number	Reference
“Control of Pathogens and Vector Attraction in Sewage Sludge”, Revised July 2003, National Risk Management Research Laboratory Cincinnati, OH 45268	Appendix D.1, EPA/625/R-92/013	Method

Additional volatile solids reductions for *aerobically* digested solids

Methods Source	Methods Number	Reference
“Control of Pathogens and Vector Attraction in Sewage Sludge”, Revised July 2003, National Risk Management Research Laboratory Cincinnati, OH 45268	Appendix D.3, EPA/625/R-92/013	Method

pH

Methods Source: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods”, EPA Publication SW-846, Second Edition (1982) with Updates I (April 1984) and II (April 1985) and Third Edition (November 1986) with Revision I (December 1987). Second Edition and Updates I and II are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161 (PB-87-120-291). Third Edition and Revision I are available from Superintendent of Documents, Government Printing Office, 941 North Capitol Street, NE, Washington, DC 20002 (Document Number 955-001-00000-1).

Methods Number	Reference
SW-846 9040C (if <80% solids)	Method
SW-846 9045D (if >80% solids)	Method

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