

ORGANIC MATTER RECYCLING REGULATION

TECHNICAL WORKING GROUP REPORT 2024



Ministry of
Environment and
Climate Change Strategy

Table of Contents

Purpose.....	2
Background	2
Recycling Organic Matter	2
The Organic Matter Recycling Regulation.....	3
Biosolids and Compost.....	3
Updating the Organic Matter Recycling Regulation	5
Contaminants of Emerging Concern	5
Technical Working Groups.....	7
2015 Technical Working Group	7
2022 Technical Working Group	7
Key Message 1 – Each Compost and Biosolids Product is Unique	8
Key Message 2 – Importance of Source Control	9
Key Message 3 – Our Understanding is Constantly Evolving.....	9
Key Message 4 –Identifying and Managing CECs Requires a Strategy.....	9
Key Message 5 – Provide Context for Clear, Factual, Easily Understood Information.....	10
Acknowledgements	10
References	12

Purpose

This document provides a summary of the discussions and recommendations of the technical working group formed by the Ministry of Environment and Climate Change Strategy to share scientific information on the management and use of biosolids and compost. To aid the reader and provide necessary context, a brief description of organic matter and the Organic Matter Recycling Regulation are also included.

Background

Recycling Organic Matter

Organic matter is a major component of soil health. The organic matter in soil improves water retention and reduces the potential for erosion. Soil organic matter also stores and slowly releases nutrients, such as nitrogen, phosphorus and sulfur, which plants need to grow (Quideau et al., 2021). These properties make organic matter essential for soil function, soil fertility, and crop yield. The organic matter in soil also plays an important role in the carbon cycle including storing carbon in soil which helps fight climate change (Krzic et al., 2021). Some of the most important sources of organic matter are recycled organic waste.

Organic waste is unprocessed waste from homes, businesses, and institutions. Examples include food scraps, yard and garden trimmings, food soiled paper products and biosolids. Organic waste can be transformed into organic products that have beneficial uses. This happens through processes such as composting or digestion. These products are a valuable source of organic matter and can be added to soil or used as fertilizers through proven best management practices.

Currently, 40% of the material sent to landfills in B.C. is organic waste (Ministry of Environment and Climate Change Strategy, 2022). When organic waste is sent to a landfill, it takes up landfill space and generates methane, which is a powerful greenhouse gas. In response, many B.C. communities have a full or partial ban on disposing organic waste into their landfills. Instead of sending this material to a landfill, these communities support recycling organic waste and creating high-quality compost, soil amendments and fertilizers.

The Organic Matter Recycling Regulation

The [Organic Matter Recycling Regulation](#) (OMRR) ensures the protection of human health and the environment while supporting the recycling of organic matter. The OMRR accomplishes these goals by regulating the construction and operation of composting facilities, as well as the production, distribution, sale, storage, use, and land application of biosolids and compost in the province. Implemented in 2002, the OMRR was developed over a six-year process. This process involved a peer review group of experts from throughout North America and extensive research.

Biosolids and Compost

Both biosolids and compost are nutrient-rich products resulting from the recycling of organic matter. These products can be used to improve soil quality and help plants grow. The OMRR sets the regulatory requirements that allow for the beneficial use of these products.

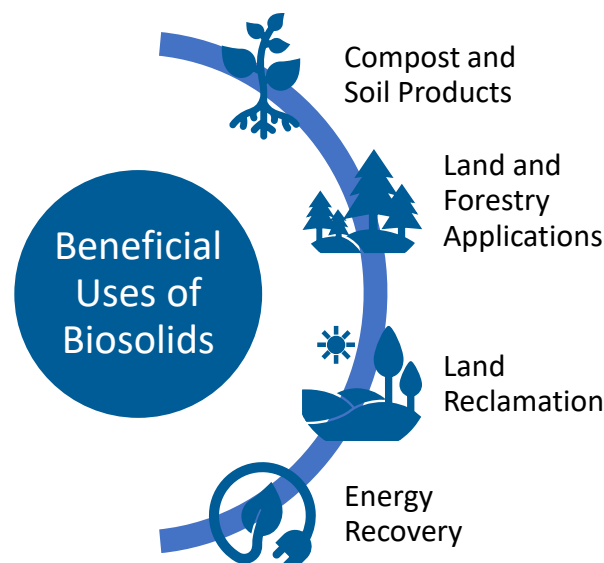
Biosolids are the products created at the end of the multi-step wastewater treatment process. The process begins when wastewater leaves our homes and businesses and makes its way to a treatment plant. Wastewater is treated using microorganisms at room temperature or higher temperatures over many days to remove pathogens and reduce odours. The OMRR defines which treatment processes can be used and sets out requirements that must be met to reduce pathogens and vector attraction. For example, this includes making the solids less desirable as food to animals such as insects, birds, or rodents. In addition, the treated solids must meet quality criteria, for example having concentrations of metals under specified maximum amounts. Only after the treated solids are confirmed to meet the standards set out in the regulation can they be referred to as Class A or Class B biosolids.

The beneficial use of biosolids aligns with the Canadian Council of Ministers of the Environment's (CCME) approach to biosolids management. Released in 2012, the *Canada-wide Approach for the Management of Wastewater Biosolids* recognizes that biosolids contain valuable nutrients and organic matter that can be beneficially reused if mandatory quality and management standards, such as those in the OMRR, are met. The CCME identified energy production, compost and soil products, agricultural land and forestry applications, and land reclamation as potential beneficial use options for biosolids (CCME, 2012a).

Composting is a controlled biological treatment process that involves different microorganisms decomposing organic waste, such as food and yard waste, into

compost. The OMRR regulates commercial composting facilities by requiring plans and specifications be developed by qualified professionals. These include the design of the facility, collection of the leachate (i.e., liquid that flows from the piles of solid material and carries away some of the contents), odour management, and closure of the facility. Like biosolids, the OMRR also sets requirements for reducing pathogens and vector attraction and quality criteria such as metal concentrations and foreign matter in compost.

The most common method of using biosolids and compost is to apply them to land to improve soil quality. Land application of these products has been practiced for decades across Canada and involves spreading the product on the soil surface or incorporating the product into the soil. When applied to land, both biosolids and compost enhance soil fertility, improve soil structure, and close the loop on nutrient and carbon cycles. Land application occurs at different types of sites including grazing lands, forests, mine reclamation sites, brownfield sites, and golf courses. The OMRR ensures protection of human health and the environment by setting requirements such as minimum setbacks from water sources and roads, and by requiring qualified professionals to prepare plans and confirm the land application was done according to the plan. In addition, the OMRR requires that other provincial regulators, including the Agricultural Land Commission and the local medical health officer, are notified prior to land application for some sites. Medical health officers also have the authority to set further requirements on land application.



Updating the Organic Matter Recycling Regulation

The OMRR has gone through several regulatory reviews since it was enacted in 2002 under the joint authorities of the [Environmental Management Act](#) and the [Public Health Act](#). The Ministry of Environment and Climate Change Strategy (the ministry) has published four policy intentions papers ([October 2006](#), [July 2011](#), [September 2016](#), and [September 2018](#)) describing proposed revisions to the regulation. In addition to these, the ministry issued a project update in [June 2022](#).

The regulatory reviews have indicated opportunities to update the OMRR to:

- better align requirements with present day practices, advances in science, and evolving standards in other jurisdictions;
- promote best achievable technology and practices;
- improve clarity regarding requirements and expected end results; and
- enhance transparency and Indigenous participation through increased information sharing and better engagement around organic matter management in British Columbia.

Revising the OMRR is intended to continue to support a circular economy, reduce the emission of greenhouse gases, and preserve landfill space by supporting the diversion and recycling of organic waste. The ministry has proposed greater information sharing and transparency on regulated activities to support engagement with Indigenous peoples and to align with *the Declaration of Rights for Indigenous Peoples Act*. To support this, the ministry is developing a digital tool to show information about compost facilities and land application activities, as well as future reporting for contaminants of emerging concern (CECs).

The proposed amendments align the OMRR with our current scientific knowledge to ensure ongoing protection of human health and the environment. These amendments will update quality standards for biosolids and compost, revise requirements for compost facility enclosure and leachate management, and enable the ministry to require sampling and analysis for CECs.

Contaminants of Emerging Concern

Contaminants of emerging concern is a term used for a broad category of chemicals, including both naturally occurring and human-made substances, which are not currently regulated but may be considered for future regulation (Pena-Pereira et al., 2021; Yadav et al., 2021). CECs can be defined in contrast with legacy

contaminants. Legacy contaminants, such as heavy metals, have been well researched and are managed through established regulations, whereas CECs have limited regulatory oversight because the body of research explaining their suspected risks typically does not have a long history and relies instead on recent scientific studies (Landis et al., 2018).

We are exposed to a range of CECs in our everyday lives. Human-made chemicals are used for various purposes including agriculture, healthcare, industry, and transportation. These chemicals can be found in products such as pesticides, cosmetics, personal and household care products, textiles, and pharmaceuticals (Gavrilescu et al., 2015).

Research has shown that both biosolids and compost can contain CECs (O'Connor et al., 2022; Pozzebon & Seifert, 2023). Because biosolids are the end-product of wastewater treatment processes, CECs that withstand those treatment processes can collect in biosolids (Venkatesan & Halden, 2020). CECs are understood to end up in compost from a variety of sources including the processing of food waste contaminated with CECs such as herbicides, and through the contamination of the waste stream (Kenny, 2021).

However, the presence of a contaminant is not enough to determine the risk posed. Whether the contaminant results in a negative impact on an organism depends on many other factors including the nature of the contaminant, the nature of the organism, the amount of the contaminant the organism is exposed to, how the organism was exposed to the contaminant, and other environmental conditions (McCarty et al., 2020). Some CECs can be identified in biosolids but occur at concentrations below natural soil background levels and at a level of exposure level that is far below what humans are exposed to in their own homes (Brown et al., 2020). CECs, such as per- and polyfluoroalkyl substances (PFAS) and microplastics, have been shown to resist degradation, stay in the environment for long periods of time, and bioaccumulate in organisms. CECs with these characteristics pose higher concerns and require regulatory attention.

In the 2016 and 2018 intentions papers and 2022 project update, the ministry signaled its intention to enable the director to require sampling of biosolids for CECs as part of the planned revisions to the OMRR. An improved monitoring and reporting regime will provide additional data on the constituents of biosolids. This data, together with the most recent scientific knowledge will help inform future regulatory efforts that protect human health and the environment. One possible

use of this data could be to inform efforts to prevent CECs from entering wastewater at their source and monitor the effectiveness of those efforts.

Technical Working Groups

A technical working group (TWG) is a collection of experts who have been brought together to exchange information and develop recommendations on a specific topic. Over the last decade, the ministry has formed two TWGs to exchange scientific information on composting and biosolids production and waste management practices.

2015 Technical Working Group

In response to questions concerning the land application of biosolids, the ministry formed a technical working group in 2015 to complete a scientific review of biosolids. The 2015 TWG included technical and scientific staff from within the provincial government, the First Nations Health Authority, Interior Health, academia, and industry professionals.

The 2015 TWG activities included a review of the scientific and academic literature on the land application of biosolids; which helped in developing a sampling plan for contaminants of emerging concern for both biosolids and soils where biosolids were applied.

The literature review and technical reports developed by the 2015 TWG are available on the [ministry's website, in addition to the sampling project for CECs conducted by the ministry](#). In 2016 the ministry announced a review of the OMRR, resulting in the 2018 intentions paper.

2022 Technical Working Group

A new technical working group was formed in the fall of 2022. The membership of the 2022 TWG included some members from the 2015 TWG as well as new members with new perspectives. Members were drawn from federal, provincial, and local government staff, academia, industry practitioners and qualified professionals.

The 2022 TWG had a limited scope. Many of the proposed updates to the OMRR described in the intentions paper released in 2018 and the project update released in 2022 predated the formation of the 2022 TWG. For example, the 2022 TWG was not engaged on the ministry's planned initiatives to improve transparency and

enhance Indigenous engagement through increased information sharing and better engagement. The scope of the 2022 TWG focused on drawing from their scientific, regulatory, and practical expertise in managing organic matter. The focus of the 2022 TWG was to:

- identify new scientific information on biosolids and compost constituents and management; and
- share new information on biosolids and compost quality, specific to CECs, which may have arisen since the 2015 TWG.

The 2022 TWG met seven times, ending in September 2023. These meetings included presentations and discussions on:

- the proposed amendments to the OMRR;
- research on the ecological impacts of land applying biosolids and compost;
- CECs, including per- and polyfluoroalkyl substances (PFAS) and microplastics;
- communicating with the public; and,
- approaches taken by other jurisdictions.

During the 2022 TWG, the ministry heard the following key messages.

Key Message 1 – Each Compost and Biosolids Product is Unique

Biosolids and compost products are unique to their origin. Different wastewater treatment plants have different sources of inputs (e.g., industrial vs. residential) and may use different treatment processes which results in a unique biosolids product (CCME, 2012b). Likewise, because different compost facilities accept different organic feedstocks and can employ a variety of composting processes, each facility produces compost that is distinct to the facility.

In addition to their unique characteristics, biosolids and compost are land applied to an equally unique receiving environment: soil. Soil is a complex habitat which is home to tremendous biological diversity (Walley et al., 2021). Therefore, an OMRR land application plan, which is a site-specific tailored plan, is prepared for each biosolids or compost application. The plan considers the characteristics of the product that will be applied to the land, as well as the particular aspects of the receiving environment.

Key Message 2 – Importance of Source Control

The quality of biosolids and compost is directly related to their inputs. The constituents of the wastewater that is received by a treatment plant will impact the quality of the biosolids produced at that plant. Similarly, if the feedstock received at a compost facility is contaminated (e.g., plastic bags), the quality of the compost will be impacted. As such, the 2022 TWG advocated for regulations that focus on preventing contamination at the source. This recommendation included advocating for regulations at the federal level to control the introduction of these contaminants into Canada, and regulations at the provincial level that target sources of contamination. This recommendation also extends to public information campaigns to encourage responsibility for what we personally add to the wastewater system or place in organics recycling or green waste bins for treatment at a composting facility.

Key Message 3 – Our Understanding is Constantly Evolving

Advancing science will continue to evolve our understanding. The 2022 TWG stressed the challenges in keeping pace with evolving science due to continued advances in testing methods and instrumentation. These advances have allowed the detection of concentrations of substances in biosolids that were previously too minute to detect. Further, methods to reduce and treat pollutants, including CECs, are also evolving. The 2022 TWG recommended that the ministry devote resources to monitoring the scientific literature and be transparent about which research the ministry has used to inform policy.

Key Message 4 – Identifying and Managing CECs Requires a Strategy

The 2022 TWG recommended that the ministry develop a comprehensive and transparent strategy for identifying and managing CECs. This strategy should consider not only whether a contaminant can be found, but also whether it poses a risk. The strategy should be scientifically sound and should have a clear goal.

The ministry is working to update the OMRR to provide more tools to increase sampling, monitoring, and reporting for CECs in the environment and in biosolids. However, the 2022 TWG stressed that the presence of a CEC does not equate to an unacceptable risk. The 2022 TWG recommended the ministry focus on understanding the potential impacts on plants and organisms posed by CECs. To improve our understanding, the 2022 TWG strongly recommended putting more confidence in field-based studies rather than laboratory based or spiked studies

(i.e., studies in which increasing amounts of the chemical being studied are added to uncontaminated or artificial soils in a laboratory setting). While both field and laboratory studies work to advance our understanding, studies in the field more accurately reflect real-life scenarios.

In addition, the TWG recommended being transparent about how the monitoring data would be used once it is collected. During the working group, the strategy used by Michigan's Department of Environment, Great Lakes, and Energy (Michigan) was discussed as an example. Michigan required wastewater treatment plants to sample and report the concentrations of select PFAS chemicals in their biosolids. Using a threshold-based ranking, Michigan was able to identify which wastewater treatment plants were receiving wastewater impacted by industrial activities and set additional requirements for those biosolids.

Key Message 5 – Provide Context for Clear, Factual, Easily Understood Information

The 2022 TWG was asked to provide comments on the composting and biosolids information provided to the public on the ministry's website. The 2022 TWG suggested starting with an explanation for "why" we compost and use biosolids to provide context for regulatory requirements.

The 2022 TWG recommended developing communication materials that are factual, science-based, and easily understandable for those who might be hearing about biosolids for the first time, and that the appropriate context be included. The TWG also suggested that the United States Environmental Protection Agency's web page on biosolids (<https://www.epa.gov/biosolids>) may provide a good example to follow. This web page includes four sections: basic information about biosolids, laws and regulations, technical resources for biosolids managers, and opportunities for the public to learn more and provide feedback.

Acknowledgements

The ministry would like to acknowledge the contributions of the various groups that shared their technical expertise and provided input during the technical working group and aided in the development of this report.

- **Members from Academia**, including:
 - Dr. Lynda McCarthy, Professor, Department of Chemistry and Biology at Toronto Metropolitan University

- Dr. Gordon Price, Professor, Department of Engineering at Dalhousie University
- **Government of Canada**
 - Environment and Climate Change Canada
 - Shirley Anne Smyth, P.Eng., M.Eng., Wastewater Science Unit, Science & Technology Branch
- **Local Governments**
 - City of Kamloops
 - Dan Steinke, P.Chem, Wastewater Treatment Plant Process Operator
 - City of Kelowna
 - Jose Garcia, MASc., PAg, Compost Operations Supervisor
 - Metro Vancouver
- **Industry Practitioners and Qualified Professionals, including:**
 - EverGen Infrastructure Corp.
 - Scott Kerr, CCP
 - Ramo
 - John Lavery, PAg
 - SYLVIS Environmental Services
 - Mike Van Ham, P.Ag, RPF, RPBio ret.
- **Government of British Columbia**
 - Ministry of Environment and Climate Change Strategy
 - Ministry of Health

References

- Brown, S., Ippolito, J. A., Hundal, L. S., & Basta, N. T. (2020). Municipal biosolids — A resource for sustainable communities. *Current Opinion in Environmental Science & Health*, 14, 56–62. <https://doi.org/10.1016/j.coesh.2020.02.007>
- Canadian Council of Ministers of the Environment. (2012a). Canada-wide approach for the management of wastewater biosolids. Canadian Council of Ministers of the Environment. PN 1477.
- Canadian Council of Ministers of the Environment. (2012b). *Guidance document for the beneficial use of municipal biosolids, municipal sludge and treated septage*. Government of Canada Publications.
- Gavrilescu, M., Demnerová, K., Aamand, J., Agathos, S., & Fava, F. (2015). Emerging pollutants in the environment: Present and future challenges in biomonitoring, ecological risks and bioremediation. *New Biotechnology*, 32(1), 147–156. <https://doi.org/10.1016/j.nbt.2014.01.001>
- Krzic, M., Walley, F.L., Diochon, A., Pare, M.C., & Farrell, R.E. (Eds.) 2021. *Digging into Canadian soils: An introduction to soil science*. Pinawa, MB: Canadian Society of Soil Science. <https://openpress.usask.ca/soilscience/>
- Landis, W. G., Sofield, R. M., & Yu, M.-H. (2018). *Introduction to environmental toxicology: Molecular substructures to ecological Landscapes* (5th ed.). CRC Press.
- Kenny, S. (2021, August 18). *Emerging issues in food waste management: Persistent chemical contaminants*. Science Inventory. https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=353978&Lab=OSAPE
- McCarty, L. S., Borgert, C. J., & Burgoon, L. D. (2020). Evaluation of the inherent toxicity concept in environmental toxicology and risk assessment. *Environmental Toxicology and Chemistry*, 39(12), 2351–2360. <https://doi.org/10.1002/etc.4881>
- Ministry of Environment and Climate Change Strategy. (2022, August 31). *Food and organic waste*. Province of British Columbia. <https://www2.gov.bc.ca/gov/content/environment/waste-management/food-and-organic-waste>
- O'Connor, J., Mickan, B. S., Siddique, K. H. M., Rinklebe, J., Kirkham, M. B., & Bolan, N. S. (2022). Physical, chemical, and microbial contaminants in food waste management for Soil Application: A Review. *Environmental Pollution*, 300, 118860. <https://doi.org/10.1016/j.envpol.2022.118860>
- Organic Matter Recycling Regulation. (2002). B.C. Reg. 18/2002.

- Pena-Pereira, F., Bendicho, C., Pavlović, D. M., Martín-Esteban, A., Díaz-Álvarez, M., Pan, Y., Cooper, J., Yang, Z., Safarik, I., Pospiskova, K., Segundo, M. A., & Psillakis, E. (2021). Miniaturized analytical methods for determination of environmental contaminants of emerging concern – A review. *Analytica Chimica Acta*, 1158, 238108. <https://doi.org/10.1016/j.aca.2020.11.040>
- Pozzebon, E. A., & Seifert, L. (2023). Emerging environmental health risks associated with the Land Application of Biosolids: A scoping review. *Environmental Health*, 22(1). <https://doi.org/10.1186/s12940-023-01008-4>
- Quideau, S., Simpson, M., & Gillespie, A. (2021). Soil organic matter. In M. Krzic, F. Walley, A. Diochon, M. Pare, & R. Farrell (Eds.), *Digging into Canadian soils: An introduction to soil science* (pp. 66–99). essay, Canadian Society of Soil Sciences. Retrieved from <https://openpress.usask.ca/soilscience/chapter/soil-organic-matter/>.
- Venkatesan, A. K., & Halden, R. U. (2020). Using national sewage sludge data for chemical ranking and prioritization. *Current Opinion in Environmental Science & Health*, 14, 10–15. <https://doi.org/10.1016/j.coesh.2019.10.006>
- Walley, F., Krzic, M., Diochan, A., Pare, M., & Farrell, R. (2021). Introduction. In M. Krzic, F. Walley, A. Diochan, M. Pare, & R. Farrell (Eds.), *Digging into Canadian soils: An introduction to soil science* (pp. 3–12). essay, Canadian Society of Soil Science. Retrieved from <https://openpress.usask.ca/soilscience/chapter/introduction/>.
- Yadav, D., Rangabhashiyam, S., Verma, P., Singh, P., Devi, P., Kumar, P., Hussain, C. M., Gaurav, G. K., & Kumar, K. S. (2021). Environmental and health impacts of contaminants of emerging concerns: Recent treatment challenges and approaches. *Chemosphere*, 272, 129492. <https://doi.org/10.1016/j.chemosphere.2020.129492>