

# Leachate Management

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*Leachate can be defined as “the liquid that results when water comes in contact with a solid and extracts material, either dissolved or suspended, from the solid” [On-Farm Composting Handbook, ed. Robert Rynk, 1992]. On a composting facility site this refers to “liquid that has percolated through and drained from feedstock or compost and has extracted dissolved or suspended materials” [Code of Practice for Compost Facilities, Alberta Environmental Protection]. In this way, leachate differs from other water that may accumulate on the site due to precipitation or flooding, since leachate may contain any combination of nutrients, soluble chemicals, and organic matter. In the interest of environmental protection, most Canadian composting facilities are required to manage the leachate produced on site as a key part of their environmental protection plan targeting ground and surface water safety.*

## KEY CONCEPTS

The type of composting system you operate will dictate whether leachate management is part of your overall on-site water management plan or an isolated processing issue. Leachate management falls into two phases:

- ❑ **Control and Collection**, and
- ❑ **Use or Treatment**

## CONTROL AND COLLECTION

### Systems Open to Weather

Leachate is different from other categories of on-site water (such as precipitation or floodwater) because it has percolated through compost or feedstocks and picked up some combination of nutrients, soluble chemicals, and organic matter. It is important, however, that all sources of water on the site be managed effectively.

Examples of open systems: uncovered windrows, aerated static pile systems.

Leachate management forms part of the overall on-site water management plan. The key goals are to keep the composting area from becoming muddy and inaccessible, and to ensure the safety of



surface and ground water. In addition to the required groundwater monitoring sites your province may require, the following structures or practices should be considered:

- ❑ Have the site graded to encourage run-off without increasing erosion. A slope of 2-4% is ideal.
- ❑ Divert water entering the site (composting and storage areas) through the use of diversion ditches or channels, berms, or interceptor drains.
- ❑ Observe the recommended or required separation distances from surface and ground water sources—check with your provincial Department of Environment.
- ❑ Do not allow runoff from the composting pad, feedstock storage or curing area to empty directly into surface water sources, with the exception of an engineered wetland designed to treat such liquid.
- ❑ Maintain windrows and piles at a moisture content below the maximum recommended level of 65%. Proper carbon/nitrogen ratio (C:N ratio) balancing will also help to minimize the loss of nitrogen into the leachate.
- ❑ Windrows should be oriented with the slope of the pad rather than across it to encourage effective drainage.
- ❑ Store feedstocks and curing or finished compost away from surface water drainage paths.
- ❑ Feedstocks prone to leaching should be stored on an impervious surface under cover, and leachate should be collected.

Depending on the surface of the composting area, leachate may be collected in a variety of ways, including:

- ❑ High precipitation areas—a system of lined gutters moving liquid to a holding pond
  - ❑ Low precipitation areas—orientation of the windrows or piles to facilitate drainage down the site's slope towards a leachate pond at the bottom
- (Both of these systems will collect precipitation that falls on-site as well).

### Closed Systems

- ❑ The leachate produced in in-vessel, channel, or containerized systems can often be collected easily using options built into the system. This liquid can be stored in a holding tank and treated or used directly as discussed below.

## **USE OR TREATMENT**

Leachate can be a significant source of soluble plant nutrients and organic matter, and therefore may be valuable in a variety of applications. However, the content of soluble or suspended material in the leachate at a specific composting site is wholly dependent on the composition of the feedstocks being processed there. In open systems which pool all on-site water including run-off from raw feedstocks, this may be of particular concern. Besides plant nutrients, leachate can contain trace elements, salts, pesticide residue, and pathogens. For this reason, it is very important that operators who are planning to manage

their leachate in any way other than disposing of it have it tested so that they are aware of what the leachate contains.

Leachate that is free of elements of potential concern can be considered a valuable resource and used in a variety of applications:

- ❑ It can be applied directly to plants as a source of liquid nutrients.
- ❑ Leachate can be used to rewet material still in the active composting stage. This returns soluble plant nutrients to the next compost batch.
- ❑ Some operators are using their collected leachate and runoff water to rewet their biofilter.
- ❑ Some facilities market their leachate as a separate product, often under the designation of “compost tea”.

[See *Facility Runoff, Beneficial Reuse* in Useful Tools].

Leachate may also be disposed of through a variety of methods. Again, the best approach will be dictated by the content and concentration of the dissolved and suspended material in the leachate. Protection of ground and surface water is critical: it is important to ensure that potentially hazardous substances are not being released into the environment in an uncontrolled manner.

Canadian facility operators are using a range of disposal methods for leachate management, including:

- ❑ Disposal through the local waste water treatment system, either by tanker truck or direct pipeline.
- ❑ Release through an engineered wetland designed to purify the type and volume of leachate generated at the facility.
- ❑ Release through other engineered natural purification systems, including grassy swales and filter fields.

Again, the most appropriate method is strongly dependent on the actual content of the leachate produced at a particular site.

## USEFUL TOOLS

Facility Runoff, Beneficial Reuse: <http://www.cwc.org/organics/org981fs.pdf>

## ADDITIONAL INFORMATIONAL LINKS

The Composting Council of Canada: <http://www.compost.org>

Composting.ca (a Manitoba-based resource site): <http://www.composting.ca/>

US Composting Council: <http://compostingcouncil.org/index.cfm>

Cornell Composting: [http://compost.css.cornell.edu/Composting\\_homepage.html](http://compost.css.cornell.edu/Composting_homepage.html)

US Environmental Protection Agency Composting: <http://www.epa.gov/compost/>

The Composting Association of the UK: [http://www.compost.org.uk/dsp\\_home.cfm](http://www.compost.org.uk/dsp_home.cfm)

Washington State University Compost Connection: <http://csanr.wsu.edu/compost/>

Compost Education and Resources for Western Agriculture: <http://www.aste.usu.edu/compost/>

Recycling and Composting Online: <http://www.recycle.cc/>

For further information, contact Resource Conservation Manitoba's *Compost Action Project*

Toll-free in Manitoba: 1-866-394-8880 or (204) 925-3776

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