



Managing Waste & Wildlife

# Composting

In Remote Northern Camps





*Composting is a simple way to divert a large portion of waste from the landfill and process it into a useful material that does not attract wildlife and can be used for remediation.*

# You need...

## Motivation

An interest in improving the current waste management system, or reducing bear problems.

## Compostable Materials

Food scraps and wood waste, shredded paper, cardboard, or leaves. This typically accounts for 75% of camp waste.

## Time and Equipment

Composting equipment (collecting bins/pails, composter or tumbler, watering system, bear fencing, etc.).

Time to set up the composting program and teach employees. Organics are normally collected in the kitchen so it is easy to separate.



*This simple in-vessel composter made from oil drums effectively composts organic waste in Kakisa, NWT*

Composting is a biological process that breaks down organic material like food waste and paper products into soil.

Composting can work on any scale, from a small community producing 1 tonne of organic waste per year (Mount Lorne, YT), to a large mine producing 500kg of organic waste per day (Ekati Diamond Mine, NT). It can be done in almost any location, including rugged boreal forest country and tundra but takes longer in colder temperatures, especially when it is open to the elements.

# Benefits

## Safety

Can increase safety for operators, employees, and visitors to the camp as wildlife will not be attracted by food in the landfill.

## Wildlife

Can reduce wildlife problems, (i.e. problem bears).

## Cost

Can reduce the cost of incinerating or transferring waste off site, and extends life of existing landfills.

## Environment

Reduces greenhouse gases produced by landfilling or incinerating and reduced impact on local ecosystem.

## Soil

Clean, finished compost can be used in reclamation, as a cover material, or to grow food.

## Reputation

Improves your ecological footprint and public relations.

# Waste and Wildlife

## Bears

Bears can be a problem at worksites where waste is disposed of onsite. They are attracted to garbage dumps by the smells of rotting food. Bears that find food are more likely to return frequently, and increase human bear interactions and could become a “problem bear,”. Problem bears take greater risks around humans and can be aggressive. Removing food from the landfill discourages them from frequenting the site.

A landfill with food waste is considered an ecological trap, because it attracts bears to the site until they become a safety concern and need to be culled.

The Government of Newfoundland and Labrador has banned on-site disposal of kitchen waste at remote worksites, and requires that it either be composted in an in-vessel composter onsite, or stored in bear proof containers until it can be transferred off site. This policy protects the safety of both humans and wildlife at remote sites.

Food waste can attract other animals to the landfill including wolverines, foxes, wolves, coyotes, squirrels, mice, voles, gulls and ravens. Bears are almost always the primary safety concern at remote sites in the North. All food and food waste should always be stored securely prior to landfilling, composting, incineration, or transfer off site. Operators and employees should receive bear awareness and waste management training. Installing bear fencing around the perimeter of camp, or around the landfill and composting location, is a simple and effective way to keep bears out. In areas where polar bears are a concern, further precautions should be taken.



*(photo: Lisa Pirie-Dominix, Canadian Wildlife Service)*

Bears don't eat finished compost. They may investigate the new pile initially, but they realize quickly that there is no food for them there and will leave the pile alone.

## Strateco Resources

Province/Territory: Quebec

The Matoush Project was a small, remote uranium prospecting camp in northern Quebec. Strateco implemented a composting program that was highly successful. The system involved a small, in-vessel composter that was able to divert 75% of waste inputs from the landfill and greatly reduce the volume of wildlife attractants in the landfill. The composter was protected from the wind and situated next to the building that housed the generators, so that residual heat from the generators could be used to keep the compost active year-round. Cooking grease, which is high in nitrogen, was added to the compost in order to allow greater quantities of paper and cardboard waste to be incorporated into the compost recipe. The camp had a workforce of around 30 people and produced approximately 10-15 tonnes of compost per year.



*In-vessel composter at a small uranium mine prospecting camp in northern Quebec. (photo: Paul Larouche, Brome Compost)*





# Step by Step

NITROGEN / KITCHEN WASTE / COFFEE GROUNDS / MEAT / FISH BONES /  
CARBON / PAPER / NAPKINS / CARDBOARD / WOODCHIPS / SAWDUST / LEAVES

## ❶ Source Separation of Organics

Organic kitchen waste should be collected and be free of contamination at the source (kitchen). Carbon (cardboard, paper, sawdust, woodchips, dried grass clippings or yard waste) should be separated where they are produced and stored at the composting site.

## ❷ Transfer to Compost Site

A rough ratio of carbon to nitrogen (~30:1) by volume is recommended. Adding carbon to, or on top of nitrogen will reduce odours and wildlife concerns (this is less a concern with in-vessel systems). Once the feedstocks have been mixed and transferred into a pile or vessel, the active phase begins. Water must generally be added to the pile to promote biological activity and temperature increase.

### FISH:

Fish waste is a great source of nitrogen for composting, but also a strong wildlife attractant. If adding quantities of fish waste, ensure that it is covered immediately with ample carbon.

## ❸ Active Phase

The active phase can take as little as 1 – 3 weeks with careful management of air, water and temperature. Grinding or shredding feedstocks can help to speed up the composting process, and will provide better cover material and odour reduction.

## ❹ Turning and Watering

Compost should be mixed and watered regularly. The goal is to get the compost cooking at a high temperature, and keep it there by maintaining good levels of moisture and air.

## ❺ Curing Phase

The active phase will end when the temperature decreases, and the material looks uniformly dark and humousy. Transfer the compost into a new pile/windrow for curing. The curing phase can take between 1 and 12 months, and is dependent on the air temperature.

## Water!

Water is needed to keep compost active. In small camps this may be as simple as keeping a rain barrel handy.

# Types of Composting

	In-Vessel	Window / Open Pile
Capacity	Adaptable to large or small sites.	Larger piles maintain temperature more efficiently and can process fish, meat and bones.
	1 – 5000 tonnes/year	5 – 50 000 tonnes/year
Decomposition	3-7 days for large systems, up to several months for small barrel systems. Decomposition time is less dependent on temperature.	Decomposition time is dependent on temperature.
	3-7 days to months	3 – 12 months
Odour	Compost is enclosed during the active phase when odours are produced.	Odour is minimized through proper aeration and watering.

In-vessel composting is done in a drum, barrel or tank that can be rotated, either by hand or powered by electricity.

In-vessel composting is generally faster and ideal for keeping odours down thus deterring animals. Once the food has decomposed it can be left to cure outside without fear of attracting animals.

In-vessel composters can be kept indoors or outside and work better in low temperatures than open piles of similar capacity. Shielding the composter from the wind with a tent or simple structure can help to reduce wildlife, and maintain temperatures required for biological activity to continue through colder seasons. Large windrows and heated in-vessel composters may continue working throughout much of the winter, however prolonged extreme cold will cause most compost piles to go dormant until temperatures increase. At this time feedstocks can be stockpiled until spring because most animals are less active.

Composting in open piles (or windrows) is a simple method of piling organic kitchen waste, covering with a source of carbon, and mixing and wetting regularly.

Composting in open piles or windrows is simple and effective, and odours can be kept to a minimum through proper management. Open piles are more accessible to wildlife while the food waste is decomposing, and so additional precautions, like installing bear fencing, may be necessary to control access to the pile.

### DECOMPOSITION TIME FACTORS:

TEMPERATURE / INSULATION /  
VOLUME / MOISTURE / NUTRIENT  
RATIOS / PH / ELECTRICAL  
CONDUCTIVITY

# Barriers to Composting in Remote Camps

REGULATION / CAPITAL COSTS / KNOWLEDGE

Composting at remote work camps and communities in Canada is not widely practiced. It can be limited by a lack of or unclear regulations, financial resources, understanding of the compost process, worries about wildlife, fear of cold climate, lack of skills and knowledge.

Composting is a very simple process that with relatively little investment in time and money can provide effective results at reducing costs and challenges associated with waste management, while reducing wildlife risks.

If composting is considered to challenging due to cold temperatures or wildlife, trying an in-vessel system might just solve the problem. Lack of financial resources can be a limiting factor. Acquiring the human investment of time, energy, interest, and expertise may also be a challenge, and this can limit an organization's or business's ability to pursue waste diversion, despite the benefits of doing so.

## Case Study: Ekati Diamond Mine

Province/Territory: Northwest Territories

Ekati Diamond Mine is a large operation in the Lac de Gras Region, about 300km northeast of Yellowknife, NT. There are over 1,800 employees and contractors making up the workforce. Resources must be flown in or trucked into the site along a winter road. Before the installation of their industrial composter, all organic waste was incinerated, and the company had a strong financial incentive to reduce fuel costs. The large mine has a large supply of cardboard boxes, which are used as carbon amendment. Their composter, conveyor and mixer are housed in the waste management building onsite, and the system is operational year-round, processing approximately 500kg of food waste and cardboard per day. Ekati saves between \$30,000 and \$40,000 per month in fuel costs by composting, and significantly reduces their greenhouse gas emissions.

## Kuujjuaq Greenhouse

Province/Territory: Quebec

Kuujjuaq is a small community in the eastern arctic, in Nunavik, Quebec, with a small-scale open pile composting program. The Kuujjuaq Greenhouse started as a pilot project in 2011 through funding from Laval Université and grants from the Government of Quebec. Through this initiative a composting program was established, utilizing food waste from local grocery stores and shredded paper from local offices. Compost is kept on a small pad next to the greenhouse, bordered on two sides by plywood barriers that protect the site from high winds. The compost pile is located right in town and there have been no problems involving bears. The pile is open to the elements, and composting is put on hold during the winter. Despite this fact, the program has been a success, diverting waste from the landfill and providing local gardeners with a source of rich soil amendment. The composting program in Kuujjuaq continues to expand and incorporate feedstocks from more businesses and local residents.



(Photo: Sarah Rogers, Kuujjuaq greenhouse 2013)

## Funding

In many provinces and territories, government capital support and/or carbon credits may be available for waste diversion initiatives at remote sites. These incentives can help make composting organic waste both technically and economically feasible at small remote camps. Contact your local Department of Environment to find out what incentives are available in your province or territory.

# Recommendations for Managing Waste and Wildlife at Remote Sites

1. Provide information, awareness training, and equipment (air horns, bear spray, etc.) necessary to protect operators and employees.
2. Install bear fencing around landfill and compost site.
3. Don't throw organic waste in the garbage!
4. Store food waste in bear proof container with a latched lid.
5. Transfer organic waste from the kitchen to the compost during the light of day. Use an ATV or truck, and cover food scraps immediately with a layer of carbon amendment.
6. Keep compost moist and aerated to control odours.
7. If possible use an in-vessel composter.
8. Store other scented or odorous non-compostable waste in a building or in sealed containers, until it can be disposed of off site.

# Resources and Further Reading

There are many resources available on composting in northern climates. Ecology North has compiled a list of useful resources on our website: [www.ecologynorth.ca](http://www.ecologynorth.ca).

If you would like more information on how to move ahead with composting at a small camp in the NWT, you can contact Ecology North directly or visit our website for an updated list of compiled resources.

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Ecology North is a NWT-based charitable, non-profit organization formed in 1971 to support sound decision-making on an individual, community and regional level.

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