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SOURCE SEPARATED COLLECTION AND COMPOSTING EXPANSION



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In April 2007, curbside organics collection will be rolled out to 270,000 households. Composting capacity of 72,000 metric tons/year is already on-

line.

Robert Spencer

THIS April, a 10-year old pilot program to collect and process source separated residential organics is expanding to full-scale curbside collection services for more than one million residents in the communities of Brampton, Caledon and Mississauga, Ontario, Canada. Waste management services for 270,000 households are the responsibility of the Region of Peel Public Works Department. Peel operates a network of recycling centers for residents and small businesses to drop off recyclable and nonrecyclable materials, household hazardous waste and reusable goods. These dropoff services supplement weekly curbside and apartment collection programs.

The comprehensive recycling program is designed to divert 70 percent of waste from disposal by 2016, increasing from the current 45 percent. There are no limits to the amount of Blue Box recyclables and organic materials - including food scraps and yard trimmings - that can be placed at the curb. A three-bag limit is imposed on garbage; tags can be purchased for \$1 each and must be placed on all garbage bags, containers or bundled wood in excess of three. Extra bags or containers without the \$1 tag are not collected.

A version of the anticipated full-scale program was rolled out to about 11,000 households in Caledon and sections of Brampton in 2005. They receive biweekly cart-based organics collection services. Participating households are given a schedule indicating organics collection days. The Region also places advertisements in the community newspapers advising residents of the organics collection calendars. The 13-gallon Norseman wheeled organics carts will be distributed to these households, along with a kitchen collector. Close to 300,000 of these units will be distributed by April.

Acceptable organic items are placed in the wheeled green carts for collection. Materials allowed include food waste (vegetables, dairy products, baked goods, meat, fish), paper products (napkins, plates, pizza boxes, tissues, microwave popcorn bags), and other items such as houseplants, hair and wood chips. Diapers and animal waste, along with nonbiodegradable plastic bags, are not accepted in the organics container. Residents are encouraged to top off their green carts with yard trimmings if they are not full by collection day. If organic waste is contaminated with Blue Box materials or garbage, the organics carts will not be collected, and residents are responsible for removing contaminants.

Large amounts of yard trimmings, including brush, are collected during spring and fall seasons only. Households with backyard composting units are instructed to continue using their bins, but to also participate in curbside collection of meat, pizza boxes, and other organics not recommended for home composting.

ORGANICS PROCESSING

To accommodate the five-fold expansion of the composting program, a new plant was constructed at the Peel Integrated Waste Management Facility (IWMF) in Brampton. The site includes a transfer station and a MRF, which opened in early 2006. The new composting facility began operating in the fall of 2006 and has a design capacity of 60,000 metric tons/year. It utilizes six 250-ton Christiaens Group vessels to compost a blend of

shredded yard trimmings and food waste.

Design of the facility is based on the successful pilot program using eight Herhof Bio-cells located at the Region of Peel's Caledon Landfill. The first set of Herhof boxes was installed in 1995. Additional units were added over time; total processing capacity is 12,000 tons/year. The Herhof vessels are reinforced concrete boxes that provide an aerobic composting environment by circulating air through the box using a series of holes in the floor. Leachate water is collected on the floor, and circulated to a spray system on the ceiling of the box. Larry Conrad, Peel's Manager of Waste Operations, explains that Peel was pleased with the performance of the Herhof boxes, but they were no longer available. "Otherwise, we would have purchased more units. Instead, we went to a similar technology from Christiaens." The Caledon facility will continue to operate, bringing total source separated organics processing capacity to 72,000 metric tons/year.

Thus far, Conrad is very pleased with the performance of the new boxes, which he says have more computer-controlled variables than the older Herhof boxes. "It's a nice system, with no moving parts, so it is relatively simple to operate, and does not require many employees," he explains.

Operations at both composting sites are similar, with organic waste processed the day it is received. After weighing each truck, material is emptied onto a tip floor and visually inspected for contamination. Next, a 50-50 mix of yard trimmings and food waste is loaded into Vecoplan shredders (one at each facility). Material emerges as 4-inch minus particles, and is conveyed into the composting boxes.

After seven days in the boxes, loaders move the material into trailers, and it is transported to a new 10-acre compost curing pad at the former Chinguacousy Landfill Site, a 30 minute haul from both locations. Currently, 1.5 employees operate the Caledon composting plant, four work at the IWMF, and three are at the curing operation. One part-time truck driver delivers compost. "We split employee time between the various operations, which also include a number of dropoff facilities. The MRF is operated under contract by Waste Management," says Conrad.

During the pilot, compost was cured and screened at the Caledon site, but that has been discontinued now that the new, \$3.5 million curing operation is open. An Erin star screen (Model 400), which was moved from the Caledon site, is used to make three grades of compost product - half-inch, half to 2.5 inches, and 2.5 inches plus.

The Caledon facility has been using a Vecoplan shredder (Model VNZ 210) to process yard trimmings and food waste since December 2005. Conrad has found the shredder produces the right particle size for composting, and has a high tolerance for tramp metal and other foreign matter. It can process 30 to 40 tons/hour, and achieve a particle size of 4-inch minus. Based on that experience, a second Vecoplan shredder (Model VNZ 250 XL Hurricane) was purchased for processing yard trimmings and food at the IWMF in Brampton.

"Even though the waste we process for composting is source separated, with curbside collection tramp metal and other inorganic contaminants are always a concern," emphasizes Conrad. Protection features built into the shredders include a limit switch on the spring torsion arm with the gear box, a shock-absorbing bedknife, and a dual-shaft solid rotor design with replaceable bolt-on cutting teeth. In addition, hydraulically operated drop-down doors allow for removal of tramp metal or other contaminants that get into the cutting chamber.

COMPOST SCIENCE "AT ITS BEST"

Conrad is cautiously optimistic about the efficacy of expanding the program to 72,000 tons/year. "This is a big science experiment, but it's also compost science at its best based on our successful pilot project over the last ten years," he says. One major concern as Operations Manager is meeting the odor standard at both composting facilities and the curing site - a requirement to maintain less than one odor unit at the nearest receptor.

The Herhof compost boxes at the Caledon site were equipped with individual biofilters to treat off-gases from the units. They have since been replaced with one BioRem biofilter, an enclosed, proprietary system. The Christiaens compost vessels also are mated with a BioRem biofilter. Those filters use a synthetic media supplied by the vendor. "So far, the biofilters are working very well," says Conrad.

Because there is no aeration system installed at the curing site, odor control is accomplished by making sure the product delivered from the vessels has been adequately degraded, and properly managing the materials on the pad. "We are just now starting to screen the cured compost from our start-up this fall, and we have not yet been through hot summer weather when odors tend to be more of a problem," says Conrad. The closest receptors to the curing site are residents 500 meters away in an agricultural setting. If necessary, the Region may try an odor enzyme product such as Bio-Zyme (distributed by Biosmart in Ontario) to control odors. A second potential challenge for Conrad is to maintain the correct blend of yard trimmings and food waste as the program transitions to higher volumes of residential organics. "We typically try to get a 50-50 mix by volume, and as we take more food, it will displace yard waste since we do not compost unprocessed yard waste on the curing pad, reserving that capacity for the shredded food/yard waste mix," he explains. "We transfer yard waste to a third party composter, but for optimal composting and odor control, we will try to stay at the 50/50 mix."

During the transition to full-scale operations, there are uncertainties about the ultimate mix of materials flowing to the compost facilities, as well as the amount of inorganic contaminants. In addition to Peel Region's residential organics collection, private haulers are allowed to use the facility for food waste as long as there is capacity. Peel intends to operate the composting system at design capacity, which will initially result in greater percentages of yard waste than food waste, but over time yard waste will be backed out as food waste quantities increase.

The potential for contamination is complicated by the number of sources, particularly the commercial food waste collection programs. "We have two different tip fees, the mid \$60/ton range for clean organic waste, and

mid \$80/ton for more contaminated material," says Conrad. The compost currently curing on the pad "looks pretty clean," he adds, "with minimal plastic bags. However, we intend to let residents use certified compostable bags for food waste starting this April." Conrad estimates the residue rate from the composting operation is between five and eight percent of the total incoming materials. The price tag for the new Christiaens composting system and its related operational equipment is \$8.3 million (Cdn). The Biorem biofilters cost \$1.6 million, and \$898,000 was spent on the two Vecoplan shredders.

EXPANDING MARKETS

Peel sells its compost in bulk for \$35/ton, with about 2.5 cubic yards in one ton. Delivery for orders of 2.5 cubic yards or more can be arranged for a fee. "We have been in the fortunate position of selling all of our compost the last few years, totaling 2,000 to 3,000 tons/year," says Conrad. "Everyone loves the half-inch material." With the significant increase in food waste to be composted, he projects there will be about 20,000 tons/year to sell. Instead of relying on existing markets, the Region is investigating other outlets.

For the half-inch to 2.5 inch size product, Peel has been working on erosion control applications. "We have used that middle size product at our landfill site so we know it works. This could be a big market for that product," Conrad explains.

Other markets being investigated include burning the largest size fraction as a fuel, a market Conrad thinks could have more value than compost. Another energy-related outlet is to incorporate the large particle size compost into agricultural fields that are growing corn and soybeans as a source of ethanol. Conrad explains that production of crops for fuel has a potential negative impact on the soil by "mining carbon." He suggested that farmers might find value in returning carbon to the soil in the form of compost, and reaping the nutrient benefits at the same time.

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