

Toronto Star Sludge Series: Soiled Land



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Part I: Is sewage fertilizer safe?

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Is sewage fertilizer safe?

Worries grow over 'stew' of chemicals spread on farmland

Feces, urine, vomit, blood. Synthetic hormones, heart pills, antibiotics, illicit drugs, Viagra. Bacteria, viruses, E. coli, parasites. Household cleaners, shampoo, solvents, pesticides and traces of arsenic, mercury, cadmium, lead, dioxins and flame retardants.

Each day, this chemical cocktail is piped from our homes, businesses and industries to sewage plants across the province. The water is filtered and reclaimed.

The solid waste that remains is turned into biosolids, more commonly called sludge. For more than 30 years, Ontario's sludge has been trucked out to farmland for use as fertilizer.

Then in 1996, the province, which monitors sludge dispersal, increased promotion of the nutrient-rich goo to farmers as a beneficial alternative to chemical fertilizers. Officials insist sludge is tested and safe and that there are no documented cases of adverse health effects when requirements are followed.

But some rural residents who live near properties where sludge has been used have argued for years that what ends up on fields isn't benign fertilizer, but a "toxic stew" that's harming them and the environment.

"It takes the air out of your lungs and burns your eyes. It's nasty, nasty stuff," said Crystal Chordis, a resident of Corbetton north of Orangeville.

Country-dwellers exposed to sludge complain of a litany of ailments including respiratory problems, diarrhea, headaches, nausea, rashes, fatigue and pneumonia.

Ontario's acting chief medical officer of health, Dr. David Williams, says a clear link to adverse health effects hasn't been established. He is satisfied that the practice of using biosolids on farmers' fields is safe and says the process of monitoring possible health issues is "active and ongoing."

Just what is making people ill is difficult to pin down but two things are apparent.

Firstly, what is making its way into our sewage system has changed with new drugs and chemicals raising questions as to whether the testing and tests are keeping pace.

Secondly, local officials who investigate health complaints are not required to report their findings to the province.

And while experts on both sides of the issue are mostly at odds, they agree on the first point: There is still a lot to learn about sludge.

"A complete analytical characterization of sludge's pathogen, endotoxin and chemical contaminant composition has never been attempted," says researcher Dr. Rob Hale of the Virginia Institute of Marine Science. Forty per cent of the sludge produced by Ontario's municipal sewage plants – 120,000 dry tonnes each year spread on 15,000 hectares – is put on soil where crops are grown. The bulk of it, which is given to farmers free, ranges in consistency from a thick liquid to a drier cakelike form.

A plant in Windsor turns a small amount of biosolids into dried pellets for which farmers pay about \$19 a tonne. (What's not spread on farmland is burned or sent to landfills.)

Eighty per cent of Ontario's municipalities spread sludge on agricultural land. Last year, 13 per cent of Toronto's sludge was put on farmers' fields.

What to do with municipal sludge is nothing new and for years it was incinerated, sent to landfills or simply dumped into the nearest Great Lake.

Diverting some of it to fields got its start in the 1970s but went into high gear in 1996 after the Great Lakes Water Quality Agreement stiffened sewage treatment guidelines and in turn created more sludge.

Since then, the province has pushed so-called land application as a safe option for municipalities struggling to deal with fast-filling landfills and a U.S. border that is slowly closing to Ontario's waste.

But the provincial regulations governing testing and application were last updated in 1998 and now a whole new range of chemical compounds is turning up in our sewer systems. Many of these, such as pharmaceuticals and personal care products, simply aren't tested for because there are few labs that can do that kind of analysis, no accepted methodology, and no benchmarks to say what's safe.

Yet, the lack of epidemiological studies means it cannot be determined whether sludge is making people sick. That has prompted a call for more research from Toronto toxicologist Dr. Anne Mildon.

"It's cause and effect," says Mildon, who treats several patients who believe sludge made them ill. "I'm too good a scientist to say, 'Yes, this is definitely it,' but it's very likely."

Several major food companies are not taking any chances. Del Monte, Campbell Soup and Gerber won't use food that has been fertilized with biosolids. Not enough is known about biosolids, they say.

Del Monte developed its no-biosolids policy in the early '80s, concerned that trace amounts of heavy metals and chemicals might find their way into the food chain. The other firms have also had long-standing policies.

Mildon, who led a provincial task force on radioactive waste in Port Hope during the 1990s, says the provincial government has been in a "state of denial" and has failed miserably to address public health concerns about sludge.

Her concerns are echoed here and around the world.

In parts of the United States, several deaths have been linked to sludge exposure. In Ontario, several citizens' group including those in Prince Edward County and near Orangeville have succeeded in halting or restricting sludging.

Sweden, Switzerland, France and Holland are among the countries that have either banned or introduced tougher standards on the use of biosolids as fertilizer. Instead, they are burning more of it in energy-from-waste plants.

Since 2002, Ellen Harrison, recently retired director of the Waste Management Institute, a research and training branch of Cornell University in Ithaca, N.Y., has argued for a ban on sludge application. She expresses frustration over the paucity of health studies.

One of the few is a recently published report by researchers from the University of Toledo in Ohio, which found a significant increase in problems such as abdominal bloating, jaundice and weight loss among residents exposed to treated fields.

The 2005 study surveyed 613 people over one month and researchers also noted an increased risk for respiratory, gastrointestinal and some chronic diseases such as multiple sclerosis. Four hundred and thirty-seven of the people surveyed lived within 1.6 kilometres of fields treated with biosolids, 176 lived further away.

In 2002, under pressure from concerned residents, the City of Ottawa commissioned a review on the health and safety of spreading biosolids.

Struck by the lack of medical information, the consultants concluded that a "surveillance system for monitoring health effects from biosolids does not appear to exist in any jurisdiction.

"While anecdotal cases are occasionally reported by the news media, few of these are investigated by trained teams of agronomists, engineers, toxicologists, microbiologists or public health professionals, let alone make their way into peer-reviewed research literature," the final report read.

After a two-year moratorium, sludge-spreading resumed in Ottawa.

Today, provincial officials do not know how many health complaints have been reported or how many investigations have been done in Ontario.

(Complicating the issue is people who experience illnesses they believe are related to sludge often are afraid to report anything because it would mean blowing the whistle on neighbours they value as friends and helping hands.)

Here's how the complaint system works in Ontario: Anyone with a health complaint they believe is related to biosolid-spreading should report it to their local health unit. The local medical officer of health investigates the complaint to determine whether a health hazard exists.

He or she notifies and consults with the environment ministry, which assesses if the sludge was applied according to provincially set regulations and standards. The medical officer of health also consults with the agriculture ministry. If provincial guidelines were violated or a health hazard exists the environment ministry can order the problem fixed and may lay charges.

After investigating, the health officer sends a written report to the complainant but there is no requirement to send the report to anyone at the provincial level.

Communication is at the discretion of the local health units, said David Jensen, a spokesperson for the health ministry. He added that Williams, the acting chief medical health officer, is required by law to keep himself informed "on matters related to occupational and environmental health."

Williams said he expects local medical officers of health to keep him in the loop but "there is no requirement by law to tell me everything they're doing."

Cornell's Harrison finds it "appalling" that Ontario does not catalogue complaints or do a thorough and immediate investigation. When a sludge-related health issue is suspected, she says, an investigation should be launched at the source, as it would be in an outbreak of food-borne disease.

Harrison had some advice for politicians: "If it is possible to err on the side of caution, do it: Put in place a system for complaints investigation, and (don't) continue with a 'head in the sand' approach that everything is all right."

Where your waste goes

How yesterday's meal ends up on a farmer's field

The human body excretes about 1.5 litres of urine and 150 grams of feces every day. It and everything else dumped in the sewer system ends up in a sewage treatment plant where it's turned into clean water and solid waste known as biosolids.

Five hours after a toilet flushes in north Whitby, the contents arrive at the Corbett Creek Water Pollution Control Plant near the shoreline of Lake Ontario. Corbett Creek, one of 11 waste water treatment facilities in Durham Region, handles 65 million litres a day.

The first thing you notice in the arriving muck is that Whitbyites eat a lot of corn. They also practise safe sex.

But all evidence has disappeared by the time the final product emerges at the other end looking like thick black paint.

It's a 15-day process that starts with screening the raw waste water to remove large objects such as sticks and cans. From there it goes to a tank where sand, gravel and other heavy material settles to the bottom.

In the next stage, the waste water is kept in a tank for several hours so the solid particles can sink.

The water moves on to an aeration tank which plant manager Thom Sloley likens to a giant feed lot. Instead of cattle, microbes or "bugs" feed on the material.

"They eat it, get big and fat and happy, and then we sink them out – that's the biosolids."

The liquids are sent on for chlorination before being piped out to the lake while the sludge is moved to a digester, which is like a big cooking vat.

The process to this point takes eight to 10 hours.

The sludge then spends the next two weeks in the digester where it's heated to 37C to break down into organic molecules and kill off pathogenic bacteria. The methane that's produced is burned off and the sludge goes to storage tanks, incinerators or farmland for spreading.

Sewage material is sampled coming into and leaving the plant and also on a daily basis to ensure it is safe, explains Sloley.

"We want those biosolids to be clean. If they're not, you have a problem."

Treatment plants are heavily regulated by the environment ministry because "we're in the business of protecting public and animal health, and the environment," says Sloley, adding Durham Region's biosolids program is the best in the province.

About one-third of the region's sludge is used as fertilizer on agricultural land. It's tested for E. coli, heavy metals, potassium, nitrogen and phosphorous. About 99 per cent of the pathogens are destroyed and those that survive die off in the field, he says.

"We do everything we can to make sure it's safe based on the information we have so far. Do we catch everything that could happen? That's not possible. But (sludge) has to meet the guidelines or it can't go on the fields."

Part II: Farmers split over safety

July 13, 2008

Farmers split over safety

Free biosolids tempting at a time when prices of commercial fertilizer are skyrocketing

The price is right. With savings of more than \$100 an acre for fertilizer, the offer of free stuff is tempting for farmers struggling to make a living in the face of rising costs and diminishing returns.

Harry Buurma wishes he could get enough sludge to cover his entire 3,000-acre farm in Watford, partway between London and Sarnia. As it is, he supplements commercial fertilizer with biosolids to feed his cash crops. Sludging cornfields, for example, saves him \$75 on fertilizing costs of \$150 per acre, he says.

"Fertilizer prices have doubled and tripled so biosolids are a better deal than ever," says Buurma, who uses both free liquid sludge and dried sludge pellets that cost him \$19 a tonne.

The pellets have less odour and a reduced pathogen content, and there are fewer restrictions on when and how they can be applied, he says.

The beauty of biosolids, apart from the price, is their nutrients and organic matter, says Buurma, who believes they are as safe as pig or cow manure. "The soil and plants process this stuff and render everything harmless. We're not eating it directly."

He scoffs at statements that contaminants from industrial waste find their way into biosolids.

"That's a total misconception. Industrial waste doesn't go into city sewers. Twenty or 30 years ago, yes, but the level of heavy metals – except for copper – has been reduced 90 per cent. We have a really tight system now."

The "real crime," he says, is that not all biosolids are spread on farmland.

"Taking the stuff to landfill is wrong, really wrong," especially when the ingredients in fertilizer will run out in 50 years, Buurma says.

But while biosolids are fine for his crops, he is not so sure about vegetables. He thinks it could be bad for business. "If I had a vegetable stand, I wouldn't be selling it because of the image."

People recoil at the thought of eating food grown in their own feces, regardless of how it might have been treated. That perception helps fuel the division within the agricultural community on the merits of sludge. While some farmers like Buurma can't get enough of the stuff, others are reluctant because of public opposition and concerns about safety and liability.

The Ecological Farmers Association of Ontario recently passed a resolution calling for a moratorium on spreading sludge and for more research to determine its long-term effects. The organization is concerned that harmful chemicals and pathogens in biosolids are contaminating the food chain.

While a number of farmers believe sludge has made their livestock ill, the evidence is largely anecdotal. But some argue the uncertainty is enough to raise questions about its use.

Fred Price used biosolids on his farm near Hanover more than 10 years ago. After feeding his 100 head of beef cattle hay grown on sludge-treated land, only half the usual number of cows became pregnant, he says.

"You couldn't find anything wrong with them but once we quit spreading sludge and once they went onto pasture in the spring, they were breeding again."

Price suspects the cause was hormones found in birth control drugs finding their way into the land through the sludge. He says three other farmers experienced similar problems.

His farm is now sludge-free. "I sure don't want it any more. I'm always looking for cheaper ways to get fertilizer but it ended up costing a lot."

Donald Good is an Ottawa lawyer who has spent years warning farmers about the inherent risk of using material "contaminated with human diseases."

"Never adopt a practice that undermines the confidence of consumers in the safety of food you produce," he advises farmers. "The application of sewage sludge to farmland does just that."

III When wells are contaminated

They started to become ill when a farmer spread sludge on his fields, then their wells became contaminated

There's a note of quiet desperation in Wendy Deavitt's voice.

"I'm sitting here being continually poisoned. I am scared to death."

It started in the summer of 2006 when a farmer near her home in Trent Hills, 90 minutes northeast of Toronto, spread sewage sludge on his fields. She and her family immediately developed diarrhea, headaches, coughs and hoarseness. Since then she has been plagued with fatigue, nausea, cramps, malfunctioning kidneys and bowels and elevated levels of lead, barium and potassium.

"I've never been this unhealthy in my life. My bowels are shutting down at 47 years old."

Deavitt and her husband, William, are one of four couples in the area who are being treated by a Toronto toxicologist for everything from chronic diarrhea to pneumonia.

Dianne and Wayne Cooke have spent \$6,000 on weekly infusions of vitamins and minerals to help rid their bodies of toxins. Their immune systems have been compromised since the wind first brought contaminants to their hilltop home in the fall of 2005.

Linda Donaldson and her husband, Roger, sold the farm that had been in her family for 150 years and moved to Campbellford to get away from sludge – only to find it being spread there, too.

"It has just totally devastated us," says Linda, a retired nurse practitioner. When they became ill after the sludging, she drove to every house in a large circle around the site and discovered 22 people were sick with the same symptoms.

Since then, families' wells have become contaminated and people have been told not to drink the water. They blame it all on biosolids.

"I remember standing on the road watching it spray 25, 30 feet into the air," says Deavitt. "My eyes were burning from the smell. It makes you want to vomit."

Her six horses, donkey, cats and dog all became ill with diarrhea, swollen lymph nodes and other ailments. She has sent some to live elsewhere for the sake of their health.

In the fall of 2006, the couples organized a letter- and email-writing campaign to local health authorities and government officials about their medical problems. Last December, the medical officer of health for the area, Dr. Lynn Noseworthy, sent them letters saying she had investigated but failed to find a "causal relationship" between their ill health and biosolids.

Noseworthy said her investigation of the cases included reviews of literature, correspondence and medical information as well as consultations with the environment ministry and health ministry. While she concluded sludge didn't cause the illnesses, she didn't determine what did.

The group, however, isn't satisfied. The attitude at Queen's Park is "we're making all this up," says Deavitt, who worked in the medical field for 14 years.

"There's so much proof here – what are they waiting for, a body count?"

Oakville family files suit over treated sewage lagoon near their home

Don't try to tell Laurie Eagles sludge is safe.

Twelve years after prolonged exposure to a pit of human waste, she and her family of four are still suffering from bouts of pneumonia, bowel disease and respiratory disorders.

They were living in rural Oakville in 1996 when a lagoon for Toronto's treated sewage opened less than a kilometre from their home.

The lagoon, which was the size of two football fields, was supposed to be a temporary storage facility at the W.A. Bill Johnson Biosolids Management Centre but "it got bigger and bigger and fuller and fuller," recalls Eagles.

"It was an open pit. The stink would bring you to your knees – it burned your nose, it was horrendous."

"I didn't know what was in the stuff but the more I learned, the more scared I got. At one point, I was calling (authorities) five and six times a day, the smell was so bad."

In the summer of 2000, their well tested positive for E. coli, Eagles says, and her husband, Allan, spent 10 days in hospital with Crohn's disease.

When the pit was finally closed in 2002 after years of fighting with the regional and provincial governments, their symptoms suddenly stopped, they say.

"I am absolutely convinced it was the cause of our health problems. It was as if we were living beside a field that was being sludged every day with no let-up."

The family has filed a \$2 million lawsuit against Halton Region and American Water, the parent company of Azurix North America (Canada) Inc., which transported the sludge to the site.

The lawsuit has yet to be heard in court.

The Halton health department investigated complaints by the Eagles and other families who lived near the lagoon but according to medical officer of health Dr. Bob Nosal, no conclusions could be drawn because of the small number of people involved and their varied responses. (Of 14 surveyed, four linked their health problems to the facility.)

However, subsequent reports by the health department warned of potential risks to soil, water, food and human health if sludge is not stored and handled properly.

Nosal told the Star he could not discuss the Eagles' case because of the lawsuit.

Part III: When sludge disposal rules are broken

July 14, 2008

When sludge disposal rules are broken

Trucking tonnes of smelly black goo out to the country and spreading it on farmland is safe, says the environment ministry – as long as rules are obeyed and guidelines followed.

Still, things can go horribly wrong, as residents of Cedarville, Ont. found out on a hot, muggy August day when a load of sewage sludge was dumped on fields in their tiny hamlet in Southgate Township, about 40 kilometres northwest of Orangeville.

"The stench was like nothing you'd experienced in this life," recalls resident Glenn Norman. "We were literally swarmed with flies as we stood outside discussing it." Their eyes were red and swollen for hours after and several residents were forced out of the area for the day by the odour.

"How dare they say it's safe? It's not," Norman fumes eight years later.

Terratec Environmental Ltd., the hauler, later pleaded guilty to odour violations and was fined \$12,000.

Eileen Smith of the Ministry of the Environment insists biosolids guidelines and established procedures do serve to safeguard human health and the environment.

Yes, rules are sometimes broken "but it's not a big problem," says Smith, policy and special projects manager for the environment ministry's waste management policy branch.

Similar to the Cedarville incident, a small rural neighbourhood in Oakville felt it when things went awry at a sludge storage facility, including several spills, a torn tank liner and an open pit of Toronto's muck that was overfilled.

In reports following investigations into odour, health and contamination complaints, Halton Region's medical officer of health called for more vigilant monitoring and warned of the need to properly store and handle biosolids because of potential risks to human health, soil, water and food.

Sludge is the solid waste left over at the end of the sewage treatment process, when clean water is removed from the soup of human, commercial, hospital and industrial waste that comes down the pipe.

Each year, close to half of Ontario's nutrient-rich sludge is taken by farmers and spread over 15,000 hectares of land. Municipalities have for years struggled with what to do with sludge and so it has been incinerated, sent to landfills or simply dumped into the nearest lake.

Diverting some of it to fields began in the 1970s. Then in 1996, the Great Lakes Water Quality Agreement stiffened sewage treatment guidelines. This created more sludge and Ontario started recommending it for use as fertilizer for farm crops. Faced with fast-filling landfills and a U.S. border slowly closing to Ontario's waste, many municipalities accepted.

But today – 10 years after the regulations governing testing and application were updated – a whole new range of chemical compounds is turning up in our sewer systems. And local officials who investigate health complaints are not required to report their findings to the province.

Terratec, the province's biggest sludge hauler, and two affiliated companies have racked up more than 40 convictions for violating environmental laws between 2001 and 2007, according to documents provided by sludge watchdog Maureen Reilly and acquired from the province.

Fines levied against Terratec, Azurix North America (Canada) Inc., which no longer exists, and their parent company, wastewater giant American Water Services Canada Corp., totalled more than \$300,000.

Several charges against Terratec are still before the courts. The firm, which has been in the biosolids business more than 25 years, handles about half of the land-applied sludge in the Golden Horseshoe area, servicing more than 300 farmers and spreading waste from urban centres on 4,000 to 6,000 hectares a year.

President Phil Sidhwa admits there have been a "small number of cases" where guidelines weren't followed, but maintains the majority of his company's convictions had to do with maintenance and operations. Those that were related to biosolids were mostly beyond their control such as odour issues, which he said originate at the treatment plant.

"We run a safe operation and use best management practices to protect the environment and people's health," he says.

But the ministry has taken action against Terratec, says spokesperson John Steele, citing fines, frequent inspections and increased setback distances.

The province does about 200 inspections a year – at less than half of the 400 to 500 sites that are treated with biosolids annually. The MOE also handles about 100 complaints a year, usually to do with odour or application conditions. Typically, five to 10 convictions result each year, says Steele.

In a move that Eileen Smith says will raise safety, odour and application standards, the government is introducing changes that will drop the requirement for a certificate of approval for sludge spreading and allow it to be handled by farmers as part of the Nutrient Management Act. And biosolids will be referred to as "non-agricultural source materials."

With the proposed changes, which Smith says won't take effect for more than a year, sludge will be the joint responsibility of the Ministry of Agriculture, Food and Rural Affairs and the environment ministry, which will continue to handle compliance and enforcement.

"The changes we're proposing are designed to further protect human health and the environment while enhancing productivity of the soil," she explains.

But sludge opponents see the move as a step backwards that will wrap the biosolids program in bureaucracy and secrecy.

Certificates are "transparent, publicly available documents" that tell people what's being spread, where and in what amounts, notes Reilly. Eliminating them means that information will be difficult to get from the agriculture ministry, she says.

Federal workplace safety agency recognizes sewage sludge disease

People who contend that sludge contains hazardous chemicals and has intact biological components appear to have an ally in the federal government.

More than 10 years ago, "sewage sludge disease" was recognized as a potentially fatal illness.

One of a group of diseases known as extrinsic allergic alveolitis, it is triggered by intense or prolonged exposure to animal and vegetable dust, according to the federally funded Canadian Centre for Occupational Health and Safety.

The centre's website says that sewage sludge disease is triggered by the body's natural defensive reactions and is associated with sewage waste that has been heat-treated.

An acute attack would include symptoms such as: fever, muscular aches and a general, unwell feeling. These symptoms are accompanied by tightness in the chest, a dry cough, and shortness of breath.

A lower level of exposure is marked by coughing, shortness of breath, sweating, sore throat, headache, and nausea.

The disease can become chronic with both types of exposure. And chronic cases can lead to permanent lung damage and even death.

Prevention includes dust control, protective clothing and good ventilation.

Part IV: Food firms shun sludge use

July 15, 2008

Food firms shun sludge use

The corn flakes you had for breakfast this morning could have been made from corn nourished by sewage sludge. The milk in the bowl could have come from a cow raised on sludge-fertilized feed.

Is this safe? The provincial government says yes, and claims to have science on its side. But several food companies, including Del Monte, Campbell Soup and Gerber baby foods, aren't so sure and have decided to err on the side of caution.

Del Monte developed a no-biosolids policy in the early 1980s, over concerns that trace amounts of heavy metals and chemicals might find their way into the food chain.

"Our main concern is upholding the high standard of healthy, nutritious foods that our consumers trust and expect," says Mary Sestric, a spokesperson for the company in Pittsburgh.

Similarly, the soup maker won't use produce grown on land treated with biosolids because of the "potential toxicological food safety risk posed by concentrated heavy metals in the soil," explains Anne Yourt, brand communications manager for Campbell Company of Canada.

"These concentrated heavy metals may be absorbed by the plants at levels that would be unacceptable for human consumption."

Nestle, the world's biggest food and drink company, also shies away from sludge-fertilized crops in its Gerber baby products, says a spokesperson for Nestle Canada.

Sludge is the solid waste left over at the end of the sewage treatment process. Every year nearly half of Ontario's municipal sludge is spread on 15,000 hectares of land.

The practice existed in the 1970s but began in earnest in 1996 when water quality agreements stiffened sewage treatment guidelines, thus creating more sludge. But the provincial regulations governing testing and application were last updated in 1998 and today a new range of chemical compounds is turning up in our sewer systems.

Research has shown that grains, potatoes and leafy vegetables like lettuce, spinach and swiss chard readily absorb cadmium, one of the heavy metals that may find its way into sewage, according to soil scientist Murray McBride, a specialist in heavy metals. Cadmium has been linked to loss of kidney function.

More than 30 years ago, University of Toronto researchers discovered mercury contamination of food and forage crops grown in sludged soil. Unwashed samples of tomatoes, beans, carrots, lettuce, wild barley and quack grass had higher than permissible levels of mercury, they said in a study funded by the environment ministry.

Well-scrubbed tomatoes and beans showed higher levels than samples grown in unsludged soil. For tomatoes, levels were up to 50 times higher than permissible, said the peer-reviewed report, published in 1974. Mercury, which can be particularly hazardous to pregnant women and young children, interferes with the brain and nervous system.

It's difficult to identify what produce is grown in sludge-treated soil and where. But growers in Holland Marsh, the source of about half of Ontario's carrots and onions and most of Toronto's locally produced Asian greens, don't use biosolids because the soil there is highly organic and not suitable.

"There is no sewage sludge in Holland Marsh that I'm aware of," says Art Janse, who was in charge of the area's drainage system for 36 years. "There'd be no benefit."

However, in agricultural areas where livestock graze directly on sludged pasture or eat crops grown with it, there are concerns about pollutants that accumulate in milk and meat.

McBride, director of Cornell Waste Management Institute in Ithaca, N.Y., worries about effects on dairy farms. He cites a U.K. study that showed sheep reared on sludged pastures produced smaller, hormonally affected offspring.

Bill Mitchell, spokesperson for the Dairy Farmers of Ontario, says consumers have nothing to worry about because of the rigorous testing milk undergoes. "No food that's consumed by the public is more tested than milk," he says.

Every load is tested and inspectors visit all dairy farms a minimum of once every two years to ensure quality and safety standards are met, Mitchell says, listing tests for "things you'd expect like bacteria, protein, butter fat and antibiotics" – though not such contaminants as PBDE, a flame retardant that shows up in sludge and has been found in human mother's milk.

The marquee case for sludge opponents came last February, when a federal judge ordered the U.S. Department of Agriculture to compensate a Georgia farmer whose land was poisoned in the 1980s and 1990s, and whose cows – fed on crops from those fields – died by the hundreds. Tests found their organs contained toxic levels of copper and zinc, as well as high levels of cadmium, lead and other pollutants. Sick cows recovered when fed crops from non-sludged fields.

The judge was highly critical of the U.S. Environmental Protection Agency for ignoring the farmer's concerns, for endorsing unreliable and sometimes "fudged" data and for trying to quash questioning of the EPA's biosolids program.

While sludge standards and spreading practices differ in Ontario, the province relies on testing and monitoring in other countries to set its standards, even as attitudes in Europe, at least, have shifted, including some countries banning the agricultural use of sludge.

Keeping sewage off farm fields a burning issue

Incinerating sludge, sometimes to generate power, among the alternatives to putting it on farmland

If we don't spread it, then what?

The flow of sewage and the need to do something with it is a daily dilemma. "You can't stop it," says Abdul Khan, Hamilton's director of water and wastewater treatment.

As sludge loads increase and controversy grows over the safety of spreading it on farmland, the search is on for other disposal options.

Hamilton is following the lead of Peel and York regions by moving toward burning processed human and industrial waste, after deciding land application isn't sustainable.

The city's Biosolids Master Plan, which predicts that population growth will see sludge production increase by 80 per cent over 30 years, cited a lack of available land, fewer farmers willing to take sludge due to odour and contaminant concerns, and more complex rules.

York sends sludge to Durham Region for incineration. Peel burns its sludge in two incinerators and is poised to build two more, making its Lakeview plant the largest sludge incineration facility in North America. Sludge burned to ash is sometimes used in construction materials or sent to landfills.

Peel's biosolids management review six years ago looked at pelletization, land application and composting, says Mark Schiller, water division director. Incineration, the review deemed, "was still the best way to go" in terms of environmental and cost concerns.

Toronto currently turns only a small amount of its sludge into fertilizer pellets but has plans to increase that to about half.

In Hamilton, Jim Harnum, senior director of water and wastewater, has expressed concern about toxic metals, pathogens and pharmaceutical residue in municipal sludge as a threat to land application. Hamilton sends 1,250 truckloads of sludge a year to farm fields.

The city is conducting an environmental assessment of its proposal to build an incinerator like Peel's. Other options on the table include California-based Liberty Energy's aim to generate electricity by burning sewage sludge and woody waste.

Biomass gasification involves heating organic material at low temperatures to release gases, called syn-gas or biogas, which can be burned to drive turbines and generators that make electricity.

Environmentalists favour using sludge as fuel. In Ottawa, where city council last month approved a plan by PlascoEnergy Group to use ultra-high-temperature plasma torch technology to dispose of garbage in a waste-to-energy system, anti-sludge residents hope the process can be applied to biosolids.

"Is it not possible to combine the sewage with the city garbage and still get sufficient syn-gas to generate some electricity?" Jim Poushinsky, chair of Ottawa Citizens Against Pollution by Sewage, asks in a letter to PlascoEnergy.

The company's plant, which is awaiting provincial approvals, will be the first of its kind in the world. The firm has told Poushinsky that, while the process could be modified to include sludge, for now they are concentrating on solid waste.

Meanwhile another plasma torch company, Fabgroups Technologies Inc., is working in Quebec on a system to process wet biosolids by heating them to the point where they oxidize.

Farther afield, a British scientist is developing a process that would use "gut bugs" – bacteria from the human lower intestine – to turn raw sewage into energy.

In an online newsletter, Prof. David Stuckey describes a bioreactor he'll build alongside a sewage treatment plant to break down effluent, create energy and reduce sludge by 90 per cent. His technology uses membranes to filter wastewater for potential reuse as well as bacteria that don't require oxygen to break down waste.

Stuckey recently got a \$500,000 grant from an independent U.K. academy to develop his system.

"Imagine a day when mini bioreactors, located under apartment buildings, are able to convert raw sewerage from flats into valuable methane gas for use in household heating, and treated water recycled back to flush toilets," Stuckey says.