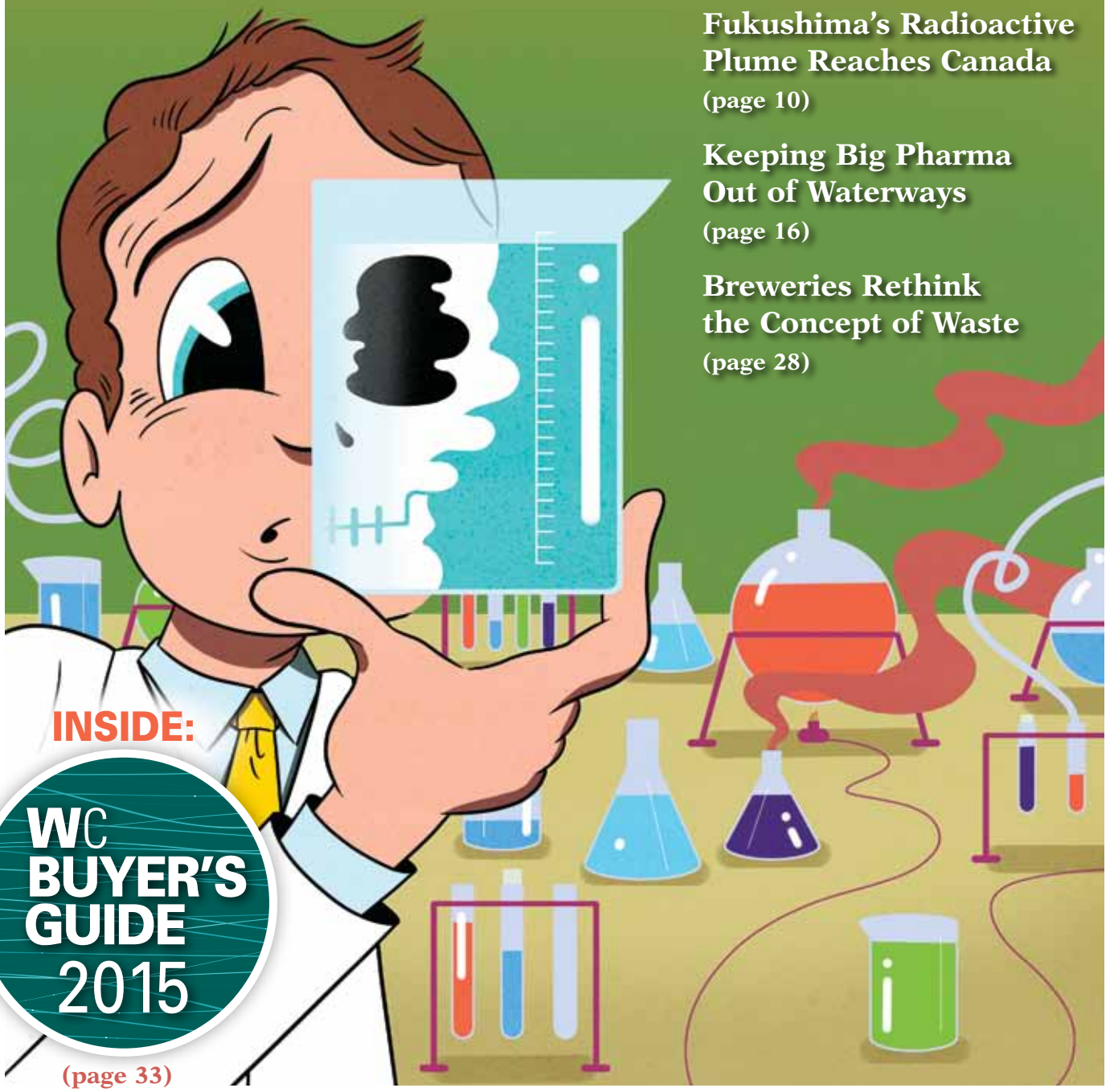
THE COMPLETE WATER MAGAZINE

NOVEMBER/DECEMBER 2014

WATER CANADA

Toxic Detection

Researchers Tackle Emerging Contaminants



INSIDE:

WC BUYER'S GUIDE 2015

(page 33)

Could Canada Solve the World's Water Crisis?

With the global population expected to reach nine billion by 2050 and water spending expected to reach $1 trillion a year by 2020, Canada should invest heavily in the water sector to become a world-leading water solutions country. Home to one of the greatest freshwater supplies on the planet, Canada is well positioned to capitalize on global demand and play a significant role in developing—and profiting from—clean and smart solutions for the impending global water crisis. This is the main finding from ***Canada as the Water Solutions Country***, a report by the Blue Economy Initiative, which identifies opportunities for watersmart Canadian businesses to prosper in a water-scarce world.

Issues explored

- How do we develop innovative technologies with global applications while also ensuring high-quality water for all Canadians?
- What are the world's future water needs? What opportunities does Canada have when it comes to managing water loss, improving agricultural water use, and developing ways to harvest rainwater?
- How can Canada attract foreign investment and jobs while also competing with the United States?
- What strategies and tools should be used to nurture and grow Canadian water companies into major global players?
- How can Canada strengthen its water research capability?

About the author: David Crane is a journalist, a director of Technology Evaluation in the Networks of Centres of Excellence and a member of the Advisory Committee of the Canada-United States Law Institute.

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Canada as the Water Solutions Country includes a nine-part strategy for achieving a successful water future in Canada while developing new technologies and solutions that will benefit the world.

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NOVEMBER/DECEMBER 2014
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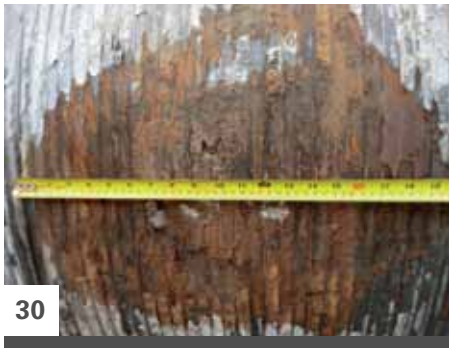
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Confusion and Clarity after Mount Polley

BY RACHEL PHAN

QUESNEL LAKE IN BRITISH COLUMBIA was once considered the cleanest deep water lake in the world—and it showed. In images taken before August 4, the lake was crystal clear and pristine, but more recent images show a startling difference: the lake is cloudy, soupy, and a "funny" shade of green, locals say.

This, of course, is the result of the Mount Polley mine disaster that released millions of cubic metres of water and tailings into Polley Lake, Hazeltine Creek, and Quesnel Lake. By August 8, four days after the initial breach, the four-square-kilometre tailings pond was "virtually empty."

It's now been more than two months since the breach occurred at the Imperial Metals tailings pond in Likely, British Columbia, and there's been plenty of confusion and uncertainty since then.

"The full impacts are unknown, but there are serious concerns about long-term impacts from the plume of suspended sediments circulating around Quesnel Lake, because sediments include toxic metals," said Calvin Sandborn, legal director at the University of Victoria's Environmental Law Centre. "There are intense concerns about the long-term impact on the aquatic environment and invaluable salmon runs."

In the midst of all the uncertainty, there has been one clear question: how did this happen?

"In the last decade, both federal and provincial governments have seriously weakened environmental laws and environmental enforcement," Sandborn said. "This disaster is the inevitable result."

Environment Minister Mary Polak has gone on record saying there is no evidence government cutbacks to enforcement and inspections are to blame for the breach in the dam. This response has done nothing to quell public mistrust. Recent reports show the government conducted just three inspections across British Columbia in 2010, down from 22 the year before, and in 2011, only two inspections were completed. The Mount Polley dam was not inspected at all in those two years.

Of course, like Polak said, there may be no connection between the decrease in inspections and the breach, but the disaster still serves as a call-to-action for significant law reform that will toughen environmental monitoring and regulation of mines.

Sandborn said he and his colleagues have proposed a "comprehensive Fair Mining Practices Code based on best practices from other jurisdictions." That code, he said, "needs to be implemented by government if it wants to retain the social licence for the mining industry to operate in the province."

We'll have to wait and see if the government actually implements these suggestions, but this much is clear: British Columbia needs to adopt source water protection planning by assessing threats to water in specified areas and coming up with emergency response plans for those regions. It also needs to review its regulatory practices, not just for the mining industry, but for all resource development, especially with the feds pushing the Northern Gateway pipeline. If it doesn't, and this era of deregulation continues, we can expect more—and worse—disasters ahead with potentially devastating impacts on our waterways. WC

Contact Rachel at 416-444-5842 ext. 116
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For daily news and discussion, visit
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PG 24

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PG 58

ABOUT THE COVER

As the list of contaminants of emerging concern grows, Canadian water experts are working to determine just how much of a risk these invisible threats pose to people and waterways. This issue, we explore the growing coverage and concern about emerging contaminants, and possible solutions to combat a problem with unknown impacts.

Art Illustration by Ryan Snook

NEXT ISSUE: JANUARY/FEBRUARY

- **Canada's Top 5 Water Projects**
- **Town Sued by Gas Company for Protecting Water**
- **Water Supply and Safety in 2050**

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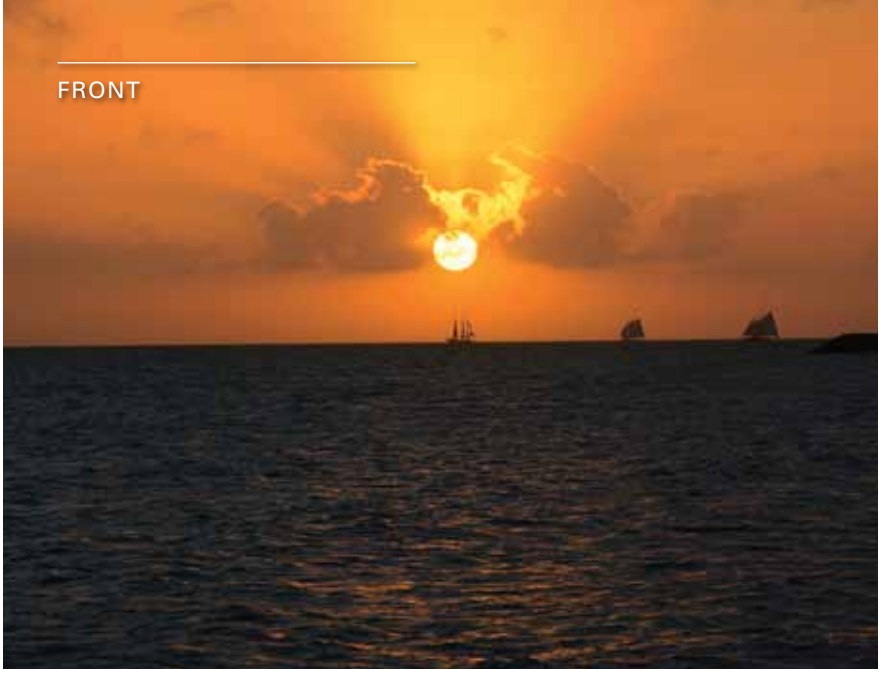


Is Earth's Water Older Than the Sun?

A TEAM OF RESEARCHERS believes that up to half of the water in Earth's oceans is older than the solar system. The scientists came to this conclusion by running simulations of two chemical processes that can form water in deep space.

As explained by the CBC, "one is a reaction between individual hydrogen and oxygen atoms that takes place on tiny dust grains," while the second "is a hotter reaction that takes place in stars and involves molecules of hydrogen gas."

The first reaction is much cooler than the second and produces water containing more deuterium, a form of hydrogen containing both a proton and a neutron.

The team of researchers examined the amount of deuterium on Earth and found that between 30 and 50 per cent of the planet's water came to be through the first process, and was thus created before the sun was formed. It is likely the water came to Earth via comet several billion years ago.

"What that means is a lot of the water that exists on our planet was made before our solar system and it came from a different part of our galaxy altogether," said CBC science columnist Torah Kachur on CBC's Homestretch.

While it might be exhilarating to imagine swimming in or drinking water older than the sun, the findings have more far-reaching implications. Water is essential to life as we understand it, and as such, the existence of water elsewhere in the universe is considered imperative to the existence of extraterrestrial life.
—Staff

CORRECTIONS

At the time of publishing, certain information in the article "Water Under Pressure" from Water Canada's July/August 2014 issue was out-of-date. Vale has hired SaskWater to build a regional non-potable water supply system via Buffalo Pound Lake for their Kronau potash project in Saskatchewan and is no longer sourcing it from Katepwa Lake in the Qu'Appelle Valley. This 90-kilometre water pipeline is currently under review by the Saskatchewan Ministry of Environment and, if approved, will service a future Kronau potash mine. It also has the potential to be shared with other industrial users up to the Belle Plaine Corridor.

Vale's Kronau project is currently in the final feasibility study stage. A decision about whether or not to proceed with construction of the mine will be made at the end of 2015. Vale's water needs for an operational Kronau mine are estimated to be around 21 million cubic metres per year.

Water Canada's September/October 2014 story "Small Towns Thinking Big" misattributed the following quote by Nick Reid to Neil Thomas: "OCWA has started an initiative to help with financial planning and ratesetting—based on projects, to help determine viability."

FEEDBACK

WATER CANADA'S RECENT ISSUE, "Time to Pay" [September/October 2014], carries a strong message about the risks and costs of neglecting our water infrastructure—a fact that bears repeating. Too often we've failed to make appropriate investments in our water systems: the "infrastructure gap" has been a rallying cry for increased funding. But rather than calling for new money for status quo projects, couldn't we focus on less costly ways to build, operate, and maintain systems? Shouldn't we promote, provide incentives for, and ultimately require innovative approaches that reduce, avoid, or defer capital and life-cycle costs?

In "The Rise of Water P3s," Clark Kingsbury notes that public sentiment about public-private partnerships (P3s) is changing. While it's good to consider all viable options, especially those that enable innovative approaches and technologies, P3s are not the only tool in the toolbox. Additionally, P3s don't begin to demonstrate value for money until projects require $100-million in private investment (generally a $200-million total capital investment). Most of Canada needs solutions on a much smaller scale.

In the same article, PPP Canada's John McBride posed "more pressing questions": Is the project necessary? Can the municipality afford it? What is the most effective method of delivering it?

I agree—but we need to go further. Rather than the project, let's focus on the service the municipality needs to deliver. How do we sustainably and affordably achieve the desired level of service? What options offer the lowest life-cycle cost and highest benefit? Other contributors to the issue shed light on these options. Let's put them front and centre.

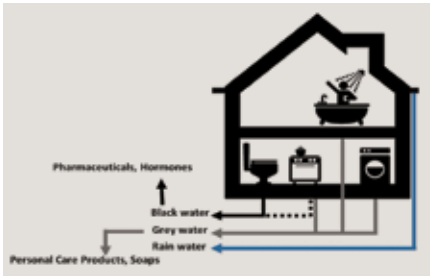
When we ask these questions, we begin to prioritize optimization, efficiency, and innovative approaches and technologies. For example, when a municipality reaches the capacity of its wastewater collection and treatment system, asking these questions might reveal opportunities to build capacity by addressing major leaks or sources of infiltration, or undertaking optimization programs rather than major upgrades and builds. Wouldn't it be prudent to fully consider these options before we direct public resources toward a traditional infrastructure solution?

WaterTAP's Sustainable Infrastructure Working Group is focused on changing the message and helping municipalities ask different questions. With the Invest to Save approach, we hope to help them address funding gaps, apply lower-cost solutions, and have a better handle on the state of their infrastructure. At the same time, we might also create willing clients for local water technology companies offering innovative solutions.

Brenda Lucas is the executive director of the Southern Ontario Water Consortium and chair of WaterTAP's Sustainable Infrastructure Working Group.

Online at WATERCANADA.NET

INTERVIEW: Water Canada interviews Warren Wishart of the Canadian Water Network about the Integrated Risk Management Framework for Municipal Water Systems project. ***bit.ly/WarrenWishart***



BLOG: A Dutch-Canadian partnership deals with emerging contaminants in new sanitation systems. ***bit.ly/NewSanitation***

VIDEO: McMaster researchers address the problem of expensive and painfully slow water-testing by turning the process upside-down. (*For more, see page 20.*) ***bit.ly/LabInAPill***

TRENDING

Credit: Sarah C via Flickr

How does estrogen in municipal water systems affect certain types of freshwater fish? Some male fish are rapidly becoming feminized.

bit.ly/EstrogenWater

GIVEAWAY

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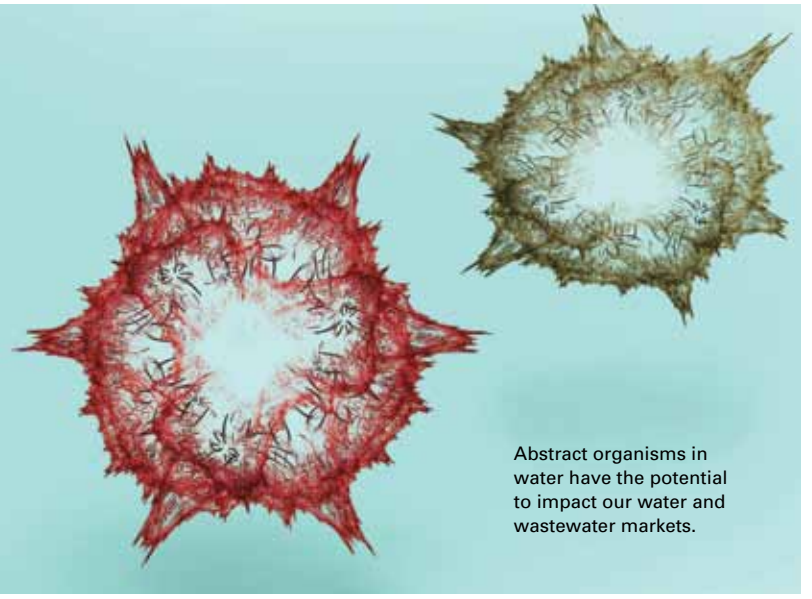
How Do Contaminants Indicate Growth in Water Markets?



Abstract organisms in water have the potential to impact our water and wastewater markets.

BY ANKUR JAJOO

AN INCREASING NUMBER of water contamination cases across North America has resulted in greater public awareness of just how outdated much of the existing water purification infrastructure is. For the first time in years, we're seeing public outcry over contaminated water sources and a drive to ensure the sustained availability of clean drinking water.

Varying factors contribute to this increase in awareness, including drinking water contamination associated with hydraulic fracturing and oil and gas drilling (*see* "The Fracking Point" *on page 22*). Another factor is the extreme shift in climate change in parts of North America, especially in arid states, where severe droughts add pressure to available water resources.

The water and wastewater industry has long been in the shadows of other industries and is often perceived as just another component process of manufacturing operations. However, recently, emphasis has shifted—so much so that municipal treatment plants, plant operators, and industrial companies seek ways not just to treat wastewater contaminants, but to make recovering waste to sell as a byproduct or use as a recaptured power source valuable. Even for engineering, procurement, and construction firms, projects are being designed to treat water at a suitable cost and lower total operating costs of facilities through sustainable design features. This may sound obvious, but the processes and technologies available to drive approvals for such projects are contingent on the types of waste contaminants being treated.

In the post-recession era, despite budget freezes, new procurement models and private investors have helped drive water treatment projects that emphasize financial payback. The main challenge now is understanding which key factors will lead decision makers to approve such projects. The answer lies within the contaminants.

Numerous contaminants found in sewage and sludge waste, pharmaceutical waste, fats, oil, grease, flowback, and produced water can lead to algae blooms and microbial bacterial contamination. These, over time, become resistant to traditional treatment chemicals and technologies. Waterborne diseases are not uncommon to the industry, but high concentrations of nitrates and phosphates can be fatal in the long term.

Organic and non-organic contaminants, including metals like mercury, copper, arsenic, lead, and zinc, are naturally found in the environment. At low concentrations, these contaminants are essential for ecosystems in varying degrees, but what about the long-term collateral damage? How much scrutiny goes into managing and ensuring low levels are maintained? Some common answers given in the industry today are: "a little bit," "a lot," and "not as much as there should be." There is a clear inconsistency found in these answers. Clearly, fighting these challenges is an issue not taken seriously across the board.

Technologies are available to produce clean water, but then what? What else can be done to incentivize plant operators and industrial manufacturing facilities to produce better ecosystems that will not harm rivers, lakes, and waterways?

To meet this need, plant operators, state bodies, and regulators must refocus how to best implement solutions with the following capacities:

- Treating water effluents;
- Recovering waste contaminants to be reused in a suitable manner; and
- Providing easier decision-making for stakeholders and private investors to help fund projects.

This three-fold challenge largely depends on the contaminant type and its ultimate future use. This is a window of opportunity for treatment equipment manufacturers to design systems and provide ways to generate value for specific contaminants. It will also ultimately determine how quickly projects can proceed. WC

Ankur Jajoo is an energy and environment research analyst with Frost & Sullivan.

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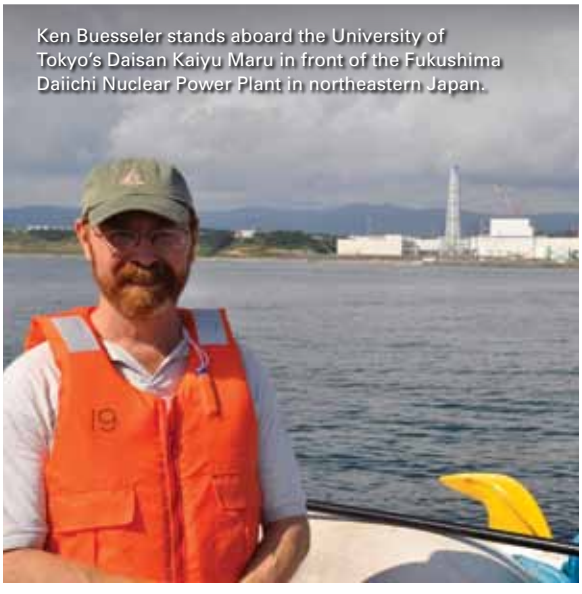
Credit: Ken Kostel, Woods Hole Oceanographic Institution

Woods Hole Oceanographic Institution senior scientist and marine chemist Ken Buesseler (foreground) checks a CTD sampler prior to deploying the instrument to collect data and water samples from the ocean off the coast of Fukushima, Japan, in 2011.

Credit: Ken Buesseler, Woods Hole Oceanographic Institution

Water sampling off the coast of the Fukushima Daiichi Nuclear Power Plant.



Credit: Ken Buesseler, Woods Hole Oceanographic Institution

Ken Buesseler stands aboard the University of Tokyo's Daisan Kaiyu Maru in front of the Fukushima Daiichi Nuclear Power Plant in northeastern Japan.

Shock Waves

Fukushima's radioactive plume reaches Canadian waters.

BY SAUL CHERNOS

IN MARCH 2011, a powerful earthquake triggered a tsunami that crippled the Fukushima Daiichi Nuclear Power Plant in northeastern Japan. More than 15,000 people died as a result of the 9.0-magnitude quake and 14-metre-high tidal wave. And although these fatalities haven't been directly linked to radiation released when three of the plant's six reactors had their cooling systems flooded, the World Health Organization and other agencies are predicting increased long-term risks for leukemia, thyroid malignancies, and other cancers in certain subsets of the population.

While thousands of evacuees have yet to return home and radioactive water continues to leak into the Pacific Ocean, the crisis has largely moved from an acute phase to one more chronic. Radiation levels, measured off the Fukushima coast immediately afterward at close to 50 million times their normal range, have diminished significantly though a regional fisheries ban remains in effect, and radioactive soil, damaged equipment, and other debris will require secure storage for generations. However, while the brunt of the disaster has been largely regional, scientists detected the leading edge of an identifiable radioactive plume of water less than 100 kilometres off the British Columbia and Washington state coastline in June 2013 and are forecasting it could reach the beaches sometime this year or next.

Scientists detected the leading edge of an identifiable radioactive plume of water less than 100 kilometres off the British Columbia coastline in June 2013 and are forecasting it could reach the beaches sometime this year or next.

The plume, largely propelled by the powerful Kuroshio oceanic current, was not discovered by accident. Government scientists have plied the world's seas for decades looking for radioactivity. John N. Smith, a researcher with Fisheries and Oceans Canada's Bedford Institute of Oceanography, told Water Canada that modest amounts from natural sources and from nuclear weapons tests conducted in the 1950s and '60s have helped them trace ocean currents. Based in Nova Scotia, Smith and his Bedford team had largely worked the Arctic and north Atlantic oceans. However, when a team from the Institute of Ocean Scientists, a Fisheries and Oceans laboratory in British Columbia, was embarking on a routine sampling mission to the north Pacific 1,500 kilometres west of Vancouver Island in June 2011, just three months after the disaster, its members were asked to bring back additional samples for special analysis. Scientists generally pinpoint the source of radiation by identifying individual compounds and then calculating their respective radioactive

lifespans. No radiation from Fukushima was detected in those particular samples, but Smith said it was clear based on ocean currents that the first traces of radioactive "signals" from Fukushima could reasonably be expected to reach the North American west coast in fairly short order.

Indeed, by June 2013, Fisheries and Oceans researchers measured Cesium 134, one of several radioactive isotopes produced through nuclear fission, about 100 kilometres south of Victoria. "We saw the signal arrive on the continental shelf, but we haven't yet seen it on the shore itself," Smith said, adding that overall radiation levels from Fukushima recorded thus far consistently average roughly two becquerels per cubic metre, well below concentration levels in the order of thousands that governments consider acceptable in drinking water. (Becquerel measurements are based on the rate at which radioactivity decays.) "We're now seeing the arrival of the Fukushima signal in Canadian territorial waters at levels maybe equivalent to, or slightly greater than, the fallout background from the nuclear weapons tests," he said. "The levels are several orders of magnitude below any level that would be considered a threat to the environment or human health."

Health Canada, which sets concentration safety standards for drinking water in Canada, turned down an interview request. However, media relations officer Sara Lauer pointed to data and a notice on the department's website stating categorically that the damaged reactors do not pose a health risk to residents of British Columbia or the rest of Canada. Citing data from Fisheries and Oceans Canada, the International Atomic Energy Agency, and Japan's Nuclear Regulation Authority, the notice stated that "radionucleide levels in the North Pacific resulting from the Fukushima Daiichi nuclear accident are so low that they are well below drinking water guidelines and are not of concern to public health."

Fisheries and Oceans and Health Canada are not alone in Canada in measuring the plant failure's impact on Canadian waters. Inland, Ontario's Ministry of Labour tests on a routine basis for the province through its Radiation Protection Monitoring Service. Ministry spokesperson Bruce Skeaff said samples taken from 21 water treatment plants with airborne fallout in mind showed no measurable increases from those recorded prior to the meltdown. "Solid agreement was found when these results were compared with the results of similar sampling obtained by Health Canada," Skeaff wrote in an email.

Thus far, government authorities have been reassuring. Still, might the plume's full arrival significantly heighten radiation levels or impact west coast fisheries? Can people expect to be able to safely skinny dip at Vancouver's Wreck Beach or kayak with killer whales in Johnstone Strait? Ken Buesseler, a scientist with the Massachusetts-based Woods Hole Oceanographic Institution who has monitored levels in Japan and along coastal North America, said radioactivity is always a human health concern, but he said he believes levels on this side of the Pacific are unlikely to pose any significant threat because radioactive compounds tend to dilute as they travel through water. "As the plume moves 5,000 miles across, it's mixing with cleaner and deeper water," Buesseler explained, expressing confidence that the plume might increase existing radioactivity in the water by two to 10 times when it peaks, but will still remain well within values governments consider safe.

"What I try and tell people is that we already live in a radioactive world and if cesium jumps five times that's not of significant concern," he said. "We should be diligent, we should be monitoring waters, fish and other things, but I don't think we should be scared of going in the ocean or eating [North American west coast] seafood until there's evidence—and I don't think there will be—that the contamination is too high." WC

Saul Chernos is a Toronto-based writer and frequent Water Canada contributor.

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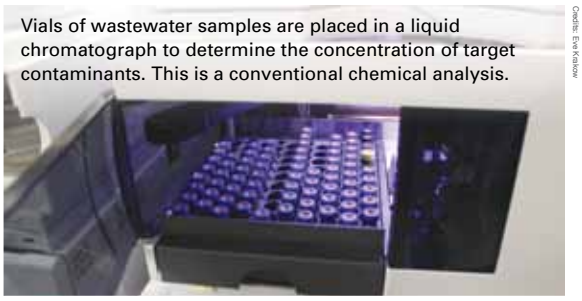
Meghan Marshall tests the effect of atrazine, a pesticide known to inhibit photosynthesis, on an algae-based bioassay for use in wastewater toxicity testing.



Vials of wastewater samples are placed in a liquid chromatograph to determine the concentration of target contaminants. This is a conventional chemical analysis.

Research assistant Adamo Petosa feeds cells as part of cell culturing—or growing cells—for the bioassays.

Credits: Eve Krakow

Toxic Relationship

Researchers make advances in monitoring the potential toxicity of contaminants in wastewater effluent.

BY EVE KRAKOW

WHEN MCGILL professor and researcher Viviane Yargeau used to visit wastewater treatment stations to explain her work on controlling contaminants of emerging concern, municipalities were doubtful. With thousands of new compounds out there, did she really expect them to ever have the resources to monitor them all?

But about two years ago, the chemical engineer shifted direction. And now, regulatory agencies and industrial partners are paying close attention to the work of her McGill University lab.

Contaminants of emerging concern (CECs) refer to an array of compounds that have emerged over the past 10 to 20 years and are not yet regulated because their effects on human health are still somewhat unknown. They're found in pesticides, antibiotics, pharmaceuticals, personal care products, illicit drugs, plasticizers, transformation products, nanomaterials, and much more. Whether through industrial discharge or the flush of a toilet, they end up in our water.

Monitoring toxicity

"It's very tedious to study one compound at a time," Yargeau said. "You study compound A, and the results say UV treatment is better. Then you study compound B and find ozonation is better. The same conditions may not be optimal for all compounds at the same time. So now, rather than focusing solely on the removal of specific compounds, we're looking for ways to monitor toxicity of the wastewater. We no longer look at one compound at a time or at target compounds, but at whatever is in the wastewater."

To do this, researchers are using "bioassays"—essentially algae, enzymes, or mammalian cells—to measure how living things react from being exposed to these compounds. Different bioassays can be used to measure different effects due to different modes of actions, to determine, for example, if a water sample is estrogenic or androgenic, if it causes cell disruption, et cetera.

"Nowadays, there are so many chemicals out there, the wastewater coming into treatment plants is so complex, so unknown, that what you really want to know is the response. That is, how living organisms are being affected," explained Meghan Marshall, a chemical engineer pursuing her Ph.D. in Yargeau's lab.

There's a second big reason for this new approach. Research has shown that, in some cases, when certain compounds are removed (such as through UV treatment or ozonation), they are transformed into products that might be more toxic than the original compounds. "Developing target removal levels for selected compounds might not be the way to go, because maybe these were transformed into more toxic products. As well, this approach is limited to known toxic compounds," Yargeau said. "Therefore, rather than trying to optimize the treatment sequences to remove selected compounds, we should optimize them to remove toxicity."

Why focus on wastewater instead of drinking water? "By improving treatment for wastewater, we ensure that anyone who takes that water as a source of drinking water will have a water of higher quality—and we protect the environment at the same time," Yargeau said. She also noted that, while the impact on human health may still be unclear, the harmful effects on aquatic life and ecosystems have already been clearly demonstrated.

Government and industry partners

The Ontario Ministry of the Environment and Climate Change recently commissioned Yargeau's lab to

assess the effectiveness of a suite of cell-based assays to measure the potential toxicity of CECs in wastewater effluent.

"Essentially, these are quick, rapid tools, that are hopefully cost-effective and sensitive enough to assess the presence of CECs in the effluent," said Monica Nowierski, an aquatic risk assessment scientist with the ministry's standards development branch.

Funding for the $90,000 project with McGill comes from the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem, known as COA. One of Ontario's commitments under COA is to promote the reduction of CEC releases, specifically from municipal sewage treatment plants. "To achieve this commitment, the ministry is partnering with academics to get information that will help to direct policy and management initiatives," Nowierski said.

Yargeau's lab is also working with Air Liquide Canada, a world leader in gases, technologies, and services for industry and health. The company has been looking into gas-based advanced oxidation technologies to reduce the impact of chemical and biological contaminants in industrial wastewater systems. Impressed by Yargeau's research in this area, they initiated a joint project with McGill, along with Chris Metcalfe at Trent University, to develop alternate efficient technologies for treating municipal wastewater including ozone. The project is partly supported by NSERC over three years.

"We'd like to develop a solution that will reduce CECs to the lowest possible level, starting by what is expected to be legislated eventually in Europe and North America," said Michel Epiney, chemical engineer and business development specialist M&E at Air Liquide Canada. "At the same time, we want a solution that will provide toxicity reduction; we want our solution not to generate by-products that could be detrimental."

While research on using bioassays to monitor toxicity in wastewater is still in the early stages, Yargeau said it marks a change in paradigm that is gaining favour. She notes that a similar approach already exists in wastewater management for organic materials, where biological oxygen demand is used as an indicator.

"Chemical analysis is still important," Yargeau emphasized. "But if we continue that route alone, one chemical at a time, it will never end." Not only would this new approach be less costly and more feasible to implement, but "we would be more confident that regardless of what is in the water, we're not missing anything, because toxicity would be a global indicator of the quality of the wastewater." WC

Eve Krakow is a freelance writer based in Montreal.

Credits: CWF and OCWA

Alex and Tyler Mifflin of TVO's The Water Brothers launch the I Don't Flush campaign.

A screen grab from the I Don't Flush PSA shows Gino Reda of TSN's That's Hockey.


Actors Scott Yaphe and Jessica Holmes film their PSA segments.

I Don't Flush staff members show off returned medications at a take back event.

I Don't Flush

A new public awareness campaign aims to encourage proper disposal of unused pharmaceuticals.

IT SHOULD COME AS NO SURPRISE that wastewater operators continue to be plagued by non-flushables on a daily basis. Dental floss, personal care products, paper towels, cotton swabs, and even toys are just a few of the items wreaking havoc on our treatment systems, and the damage can be clearly seen in images of blocked and clogged sewer mains (*bit.ly/TheToiletToll*).

But what about the damage we cannot see? Items that have less visible impacts on the sewage system are constantly being flushed down the toilet, like solvents; fats, oils, and grease; and household hazardous wastes. Instead of forming a mass and coiling around drains and mains, these elements remain undetected before being released back into the environment.

> "Maybe someday the issue of pharmaceuticals will hit the wallet [...] but for the sake of the future, we can at least start influencing behavioural change now." —Nick Reid

Pharmaceuticals are just one example of an unseen element, often making their way into the environment through improper disposal when people throw unused or expired medications down the sink or toilet. Even when thrown in the garbage, pharmaceuticals can either seep into groundwater or accumulate in landfill leachate, which is typically sent to a wastewater treatment plant for disposal. Many people are unaware pharmacies and municipal collection centres will take back unused medications for proper disposal in a controlled environment.

To educate the public on proper disposal methods of pharmaceuticals and other non-flushables, the Ontario Clean Water Agency (OCWA) and the Clean Water Foundation (CWF) teamed up to create an awareness campaign. The I Don't Flush campaign encourages Ontarians to bring their unwanted medications back to pharmacies across the province and consists of a public service announcement (PSA) that features notable Ontarians, a social media presence, and a series of public events. The campaign was developed as an accompaniment to the A Prescription for Clean Water initiative launched by OCWA and CWF in 2012 after stories of prescription drug abuse among youths led to concerns that worried parents would hastily dispose of unused medications.

While discussing the future of A Prescription for Clean Water, the working group began brainstorming ways to promote the message more broadly. "We wanted to create something memorable that would really grab the public's attention," said Amy Lane, OCWA's

corporate social responsibility specialist. "We were throwing out all kinds of crazy ideas and I Don't Flush came up. We laughed initially, but we all knew we had hit a winning combination: a little cheeky and fun, but with the right messaging."

The plan was to create a PSA that would point people to the I Don't Flush website to learn more about non-flushables and to find nearby participating pharmacies using a tool courtesy of the Health Product Stewardship Association. From there, the I Don't Flush campaign started to build momentum. York and Peel regions both expressed interest and came on board to support the campaign, and several notable Ontarians signed on to be featured in the PSAs and on the website.

"We were delighted to have so many talented and committed Ontarians sign on as supporters for I Don't Flush—everyone from ET Canada's Rick Campanelli to TVO's The Water Brothers and TSN's Gino Reda," said Christopher Hilkene, the president of CWF. "The combination of interesting personalities lent itself to a really fun message with a serious undertone, which is about stewardship of the environment and protecting our drinking waters."

In the end, two PSAs were created: one for a traditional broadcast like television and radio, and a longer, more humourous version for social media purposes, where organizers are certain the campaign will have a large presence.

While the campaign only officially launched in October 2014, organizers are already looking ahead to potential initiatives and opportunities for 2015.

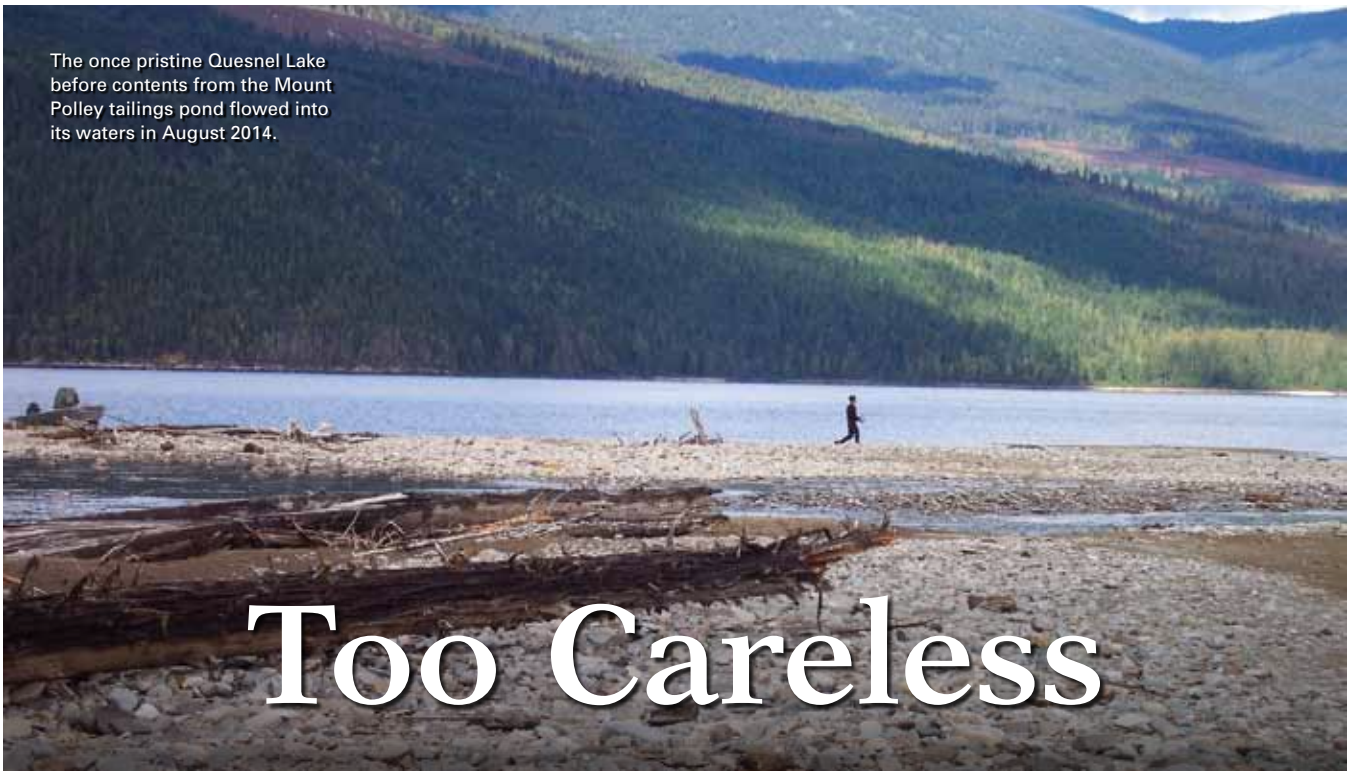
"The way the thinking is going is to engage a broader section of the municipalities here in Ontario," said Nick Reid, executive director of strategic partnerships at OCWA. "We'd like to reach out to municipal groups with common interests to expand the program in 2015, and we have high hopes for the sector to see the program as a success and for it to gain a lot of momentum into the future as we continue to face challenges around the sustainability of our infrastructure."

He also stressed the urgency of the campaign since the public currently uses collection systems in ways that jeopardize their capacities and abilities to do their jobs. Pharmaceuticals and trace contaminants are often seen as being a future concern because, unlike visible garbage, the financial impacts on municipalities are not as obvious.

"Maybe someday the issue of pharmaceuticals will hit the wallet and they'll have to put in a treatment technology," Reid said. "But for the sake of the future, we can at least start influencing behavioural change now." WC

—Staff

Visit **idontflush.ca** or visit the Facebook page via their website to view the PSAs.



The once pristine Quesnel Lake before contents from the Mount Polley tailings pond flowed into its waters in August 2014.

Credit: Larry Griffith

Too Careless

Canadians remain indifferent to the toxins they flush into water systems.

BY ANDREW FAZEKAS

ASK ANY CANADIAN and they will tell you the country is blessed with a bounty of water resources—more than any other nation on the planet. However, recent disturbing events like the toxic algae blooms in Lake Erie and Lake Winnipeg and a mine tailings pond spill in British Columbia have warned us that, if we aren't more careful, it can be a curse too.

Turns out that many of the problems increasingly worrisome today are the same ones we knew about a generation ago. We thought that science would have solved them by now, but in some cases, it has just gotten worse. Take our excess use of agricultural fertilizers or the contaminants in our stormwater runoff for example.

But in many cases when it comes to water pollution, scientists only have educated guesses as to what is really going on. This is the case when it comes to chemicals, including pharmaceuticals and personal care products that we use in our everyday lives and are being flushed down the drain.

"One of the most important are our drugs, particularly hormones, because they were designed to be incredibly powerful chemicals," explained Douglas Holdway, a senior aquatic toxicologist with the Canadian Rivers Institute. "You can have 100 billion cells affected by a single molecule of estrogen, for example. These potent drugs within birth control pills actually pass through us and are urinated out, practically all unmetabolized, meaning they may still have quite a potent effect when they exit the body and enter the natural environment."

Unfortunately, the sewage treatment plants were never designed to take out these chemicals, Holdway pointed out, so eventually they are ending up in our lakes and rivers, impacting our wildlife. "Our river-based ecosystems are so complex, there are literally hundreds of thousands of species out there, and we know next to nothing about how this would affect all these organisms," he said.

A seminal seven-year-long University of New Brunswick research study published in 2008 showed that even minuscule amounts of estrogen flushed into the rivers can wreak havoc with wild fish populations living downstream. The residue from these pills has led to some sex oddities, actually disrupting fish endocrine systems to the point of bending their genders. Male fish exposed to the sex hormone have become feminized, producing egg protein normally produced by females.

> "Right now we have a few hotspots; generally it's not too bad. But if we continue to do what we're doing, we will pay the price later."
>
> — Hanspeter Shreier

Even seemingly harmless chemicals appear to be contaminating our natural water supply, but their effects as of yet are not fully known.

Holdway and his research team are now looking at the active ingredient in common odour removers and laundry

soaps. Known as cyclodextrin, it is a sugar that is actually used to send drugs into our body that we wouldn't normally get across cell membranes, but can also mask odours.

"It's used in lots of things; it's that liquid you spray around, people are inhaling it because you have it in air deodorizers in cars and in their houses, and releasing it in little puffs as you walk by. Makes you wonder, doesn't it?" Holdway said. "We believe it's not toxic to humans, but we're not the only organism on this planet, and that's the problem."

But it has a number of purposes, and it's being flushed in huge amounts down our drains. Many researchers, including Holdway, believe it's going to be showing up in sewage treatment plants.

"We were kind of curious, and it turns out they bind fat-soluble hormones—like estrogen," he said. "That means that when the body needs them they might not be available."

Holdway started to do experiments that look at cyclodextrin's effects on fish, and sure enough, even with very low concentrations over a lifespan, it affected them and even the next generation.

Early results are showing that it reduces fish's ability to sustain toxin exposure by about a factor of three to four.

Both Holdway and Hanspeter Shreier, senior water pollution scientist at University of British Columbia in Vancouver, worry that as a nation, we are being more reactive rather than proactive when dealing with issues of water pollution.

A case in point: The accidental spill of the mine tailings pond in northern British Columbia. It now is a hotspot for potential long-term metal contamination of the surrounding aquatic ecosystem. Common in these types of mines, copper sulphide can oxidize and form sulphuric acid over time. This is what Shrieier said can cause serious problems with metal pollution in the years ahead in the form of acid mine drainage.

Also worrisome are the fracking operations in remote regions that use lots of water with chemicals to help in lubrication of the bedrock when extracting fossil fuels. Shipping these nasty chemicals to remote sites along dirt roads with little oversight, as is the current practice, might not be the safest option.

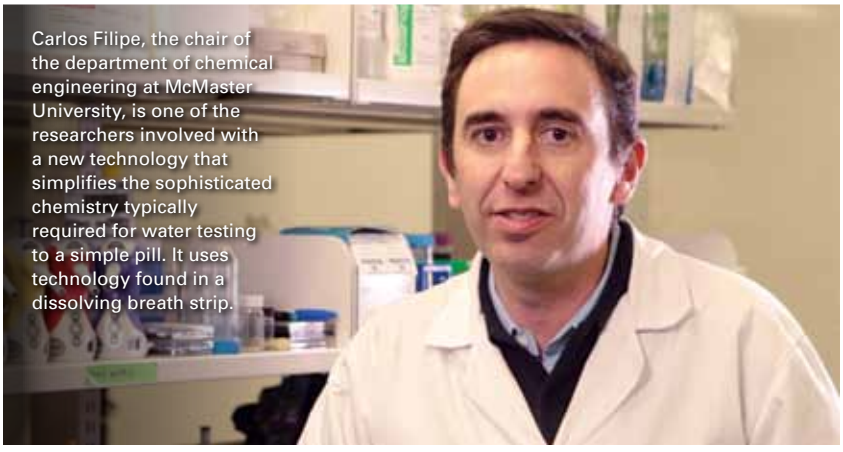
"My fear is that we are going to have a few more spills coming in the future," Shrieier warned.

"Right now we have a few hotspots; generally it's not too bad. But if we continue to do what we're doing, we will pay the price later." WC

Andrew Fazekas is a science and weather expert for Yahoo Canada News. This is an edited version of an article that originally appeared in Yahoo Canada News' water series, made in partnership with Water Canada. *To see the complete water series, go to ca.news.yahoo.com/water*

Credits: McMaster University

This tiny breath-strip-inspired pill is capable of storing agents that can instantly test water for contamination.



Carlos Filipe, the chair of the department of chemical engineering at McMaster University, is one of the researchers involved with a new technology that simplifies the sophisticated chemistry typically required for water testing to a simple pill. It uses technology found in a dissolving breath strip.

Lab in a Pill

Researchers develop an inexpensive pill that improves remote water testing.

BY CLARK KINGSBURY

SOMETIMES INSPIRATION HITS US at the most unassuming moments.

Researchers working in the Biointerfaces Institute and Department of Chemical Engineering at McMaster University in Hamilton have developed a tiny pill that could change the way water quality is tested in remote communities and developing nations around the world. The pills are made with pullulan, a natural, edible polysaccharide used in dissolving breath strips by companies like Listerine and Benadryl. Although the current uses for the substance are fairly mundane, pullulan could soon help increase access to water quality testing worldwide.

The process of using the pills is simple: drop one in a vial of water and shake vigorously. The pullulan dissolves in the water, releasing the agent without interfering with the test. The water will either turn blue, indicating cleanliness, or stay colourless, which shows contamination.

The inspiration for the pills came when Sana Jahanshahi-Anbuhi, a chemical engineering PhD student, took a trip to the supermarket. She noticed a package of breath freshening strips and wondered whether the dissolvable technology might have more meaningful uses.

After her moment of inspiration at the supermarket, the McMaster team developed the new technology, creating a way to bring the lab to the water instead of having to ship water to a lab for testing.

The process of testing water for contaminants like pesticides, heavy metals, and *E. coli* is typically lengthy and expensive. It requires either testing agents that have to be stored at very cold temperatures and shipped in chunks of dry ice, or access to a laboratory that can perform the tests.

> The pills are shockingly easy and inexpensive to make. The team is capable of making 1,000 pills a day for as little as a dollar.

The new pill makes storing and shipping enzymes and other testing agents a simple task by protecting them against thermal and chemical damage

without expensive equipment. It also drastically improves the shelf life of the agents, allowing them to be stored stably at room temperature for months. Additionally, the pills are shockingly easy and inexpensive to make: the team at McMaster is capable of making 1,000 pills a day for as little as a dollar.

"What we are trying to do is allow any person to be able to check his or her water quality, on site, without expense," said Carlos Filipe, professor of chemical engineering at McMaster. "That is the goal."

The research team will push forward toward that goal with upcoming field testing in India. "We invited a researcher from India to be trained on how to make the pill here," Filipe explained. "She will take with her the expertise to make three types of testers: one for pesticides, another for heavy metals, and a final one for *E. coli*."

The scope of the testing is expected to be fairly small and will focus on educating people on how to deal with unclean water. The team in India has a mobile laboratory that will go through villages and educate the citizenry on how to use the pill.

Although developing countries will be the primary target for the technology, it could have uses in Canada, where it could be employed at cottages, by people who live off wells, or in First Nations communities with minimal access to clean water.

When the pills will be widely available is anyone's guess, but the fact that pullulan has already been approved for wide use could potentially fast track the product to the market, with the possibility it could be available within two years. In the meantime, the team at McMaster believes the breath-strip-inspired technology may have several other applications. The pills could possibly be used to store and maintain vaccines, which generally necessitate refrigeration. There is also hope that the method could be used in food packaging that would change colour when the food spoils. The team has even developed a cell phone app that will be used alongside the water-testing pills to track GPS coordinates of the test site.

And to think, all this came from an everyday trip to the supermarket. WC

Clark Kingsbury is Water Canada's assistant editor.

A protest banner against fracking in Auld's Cove, Nova Scotia in 2012. The Nova Scotia government introduced a fracking ban bill in late September 2014, allowing fracking for testing and research purposes only.

The Fracking Point

A look at the latest developments in shale gas drilling and its potential effects on drinking water wells. BY ERIN MURPHY-MILLS

What's Fracking?

GAS IS naturally contained in small pores between fine mineral grains that compose sedimentary rocks known as shale (hence the name "shale gas"). In order to access the trapped gas, a two-step system is commonly used: horizontal drilling and hydraulic fracturing. The extraction process begins with the drilling of a vertical well into the area just above a shale gas reservoir, which is then angled until it reaches the reservoir on a horizontal plane. Holes are punched in the well to create the greatest contact between the gas reservoir and the well. Hydraulic fracturing is the technique used to access the shale gas: a fluid containing sand or another fine material is forced down and through the well's perforations. This causes the shale rock to separate along existing fractures or forms new cracks in the rock, creating direct pathways to the well. The fine material, called a proppant, stays within the fractures to keep them open for gas extraction. In Canada, there are some areas where shale gas is present in large enough quantities that it provides a viable source of fossil fuel for extraction. WC

THE TOTAL VOLUME of shale gas present across Canada is estimated to be greater than 4,995 trillion cubic feet (Tcf), and approximately 573 Tcf of this is recoverable with current extraction technology. However, given Canada's short history with shale gas production and development, potential reservoirs have not been fully assessed, especially outside of the western provinces where shale gas extraction first began in Canada. Shale gas can be found in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, the Northwest Territories, the Yukon, New Brunswick, and Nova Scotia. Given the widespread potential reservoirs available in Canada, this is a discussion that literally stretches from coast to coast.

Although shale gas has sometimes been referred to as a bridge fuel between traditional fossil fuels and other energy sources, there remains an overriding concern from the public about the potential impacts of its extraction process on the environment, especially the quality of water in nearby surface water bodies or underground aquifers. The Council of Canadians recently released poll results that found that 70 per cent of people in Canada, regardless of political belief, region, age, or education, support a moratorium on hydraulic fracturing. And on October 11, 2014, there was a Global Frackdown, a day of action to call for a ban on fracking.

Given the public concern about this issue, a report prepared for the Petroleum Technology Alliance Canada and Science and Community Environmental Knowledge Fund in 2012 examined the pathways for water contamination from fracking to occur. The report acknowledged that contamination has been linked to improper drilling, development, and production processes, including the leaking of methane gas due to poor well construction and accidental spills at the surface. But it was ultimately concluded that "none of these incidents [of environmental contamination across North America] have been documented to be caused by the process of hydraulic fracturing."

Countering this conclusion, Joel Gehman, an assistant professor at the Alberta School of Business, pointed out the hundreds of recently confirmed water contamination cases in Pennsylvania. Were it not for hydraulic fracturing, none of these wells would have been drilled. He said, although the report may be technically correct, "for many people, fracking has come to stand for the entire unconventional shale process," and these concerns need to be addressed regardless of

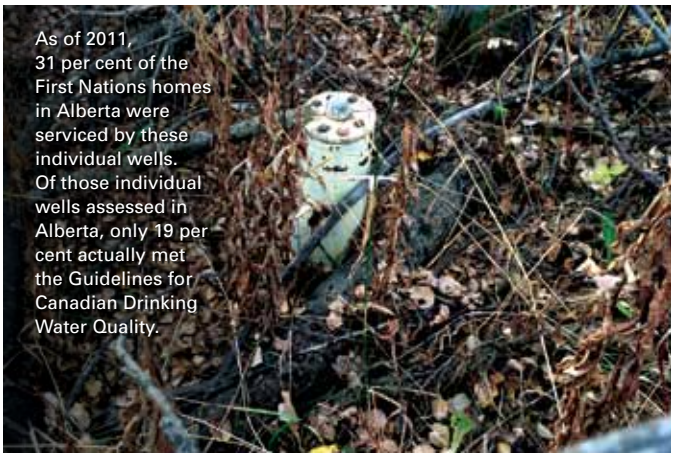
when water contamination occurs in the unconventional shale development process.

Academic research has proven that hydrocarbon gas has contaminated groundwater wells for some shale gas projects, with poorly constructed wells being cited as the mostly likely cause. "[The fact that water] contamination by fugitive methane and other components of natural gas occurs in some cases is essentially uncontested at this point," said Daniel Alessi, assistant professor at the University of Alberta and Encana chair in water resources. "Another major concern is that fracturing fluid, flowback, and produced water [can spill] during the storage and transportation of these fluids," meaning contamination near surface water bodies could occur. But Alessi added, "My conversations with industry, government, and some concerned citizens in Alberta indicate that all parties are taking these environmental issues very seriously."

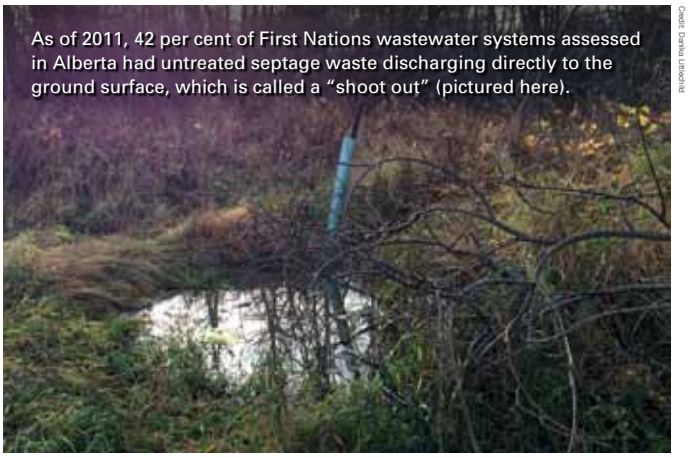
Regulations are in place to protect water quality, including standards for drilling and well construction to keep materials associated with hydraulic fracturing separate from drinking water sources. Agreements like the *Oil and Gas Conservation Act* in Alberta also protect groundwater resources through regulatory standards for hydraulic well casing and cementing. According to the Canadian Association of Petroleum Producers (CAPP) website, all natural gas production in Canada "isolates and protects drinking water (groundwater) from natural gas operations." Pre-tests are conducted before hydraulic fracturing occurs to ensure the well and associated equipment are in working order and can safely withstand the application of the fracture pressures and flow rates required for the process. This includes an evaluation of well casings and cements installed during the well construction process to prevent the flow of fluids beyond the well casing. Markus Ermisch, CAPP's media relations officer, said that "wellbore integrity […] is strictly regulated by provincial regulators" and that preventative measures are put in place to keep materials in the well from coming into contact with the surrounding geology.

Despite these agreements and regulations, water contamination still occurs as a result of shale gas extraction. More research and time are needed to thoroughly examine the proper management practices necessary to develop shale gas responsibly. It's also important to recognize that, moving forward, Canadians need to be kept engaged and informed in the process of shale gas regulation. WC

Erin Murphy-Mills is a source protection assistant at Cataraqui Region Conservation Authority.



As of 2011, 31 per cent of the First Nations homes in Alberta were serviced by these individual wells. Of those individual wells assessed in Alberta, only 19 per cent actually met the Guidelines for Canadian Drinking Water Quality.



As of 2011, 42 per cent of First Nations wastewater systems assessed in Alberta had untreated septage waste discharging directly to the ground surface, which is called a "shoot out" (pictured here).

Credit: Danika Littlechild

Rights and Reconciliation

Alberta First Nations take on the federal government over unsafe drinking water.

BY DANIKA LITTLECHILD

THIS SUMMER, four Alberta First Nations decided to pursue judicial consideration of their right to water. Over the past decade, the issue of unsafe drinking water in First Nations communities across Canada has garnered increasing public interest and scrutiny. In spite of years of debate, reports, analysis, and some action, very little has been accomplished in narrowing the divide between the deplorable state of First Nations water and that of other Canadians.

In the Province of Alberta, the number of drinking water advisories issued by Health Canada and First Nations has not decreased in a significant way over the past decade, as shown in Figure 1.

The lawsuit was filed in federal court by the plaintiffs Sucker Creek First Nation, Ermineskin Cree Nation, Kainai Nation, and Tsuu T'ina Nation. All four First Nations are located in the lands and territories of historic Treaties 6, 7, and 8.

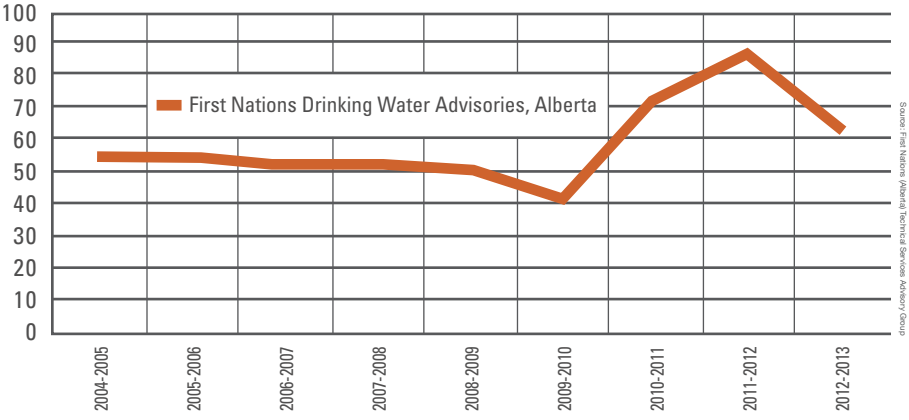
Indigenous peoples in these regions entered into Treaty with the Crown in the late 1800s, setting the stage for non-Indigenous settlement of Canada. This history, and the unique rights that come along with it, are part of the reason that aboriginal and treaty rights are protected under the Canadian *Constitution Act*. First Nations also face a legislative quagmire of rights, responsibilities, and liabilities related to water under other Canadian laws, including the recent enactment of the federal *Safe Drinking Water for First Nations Act*. In the lawsuit, the four First Nations argue this new act is merely a tool to absolve the Crown of liabilities as opposed to making substantive progress.

There have been a lot of Canadian court decisions on aboriginal title, aboriginal rights, and treaty rights. However, much of the jurisprudence has avoided explicitly ruling on an aboriginal or treaty right to water. The lawsuit filed by the four Alberta First Nations highlights the question of the Crown's obligations to ensure safe drinking water for First Nations reserves through appropriate resources and investments.

Only about one-third of the Alberta First Nations population is served by a public water system. The rest are served by private wells or cisterns, with major issues of maintenance and monitoring. The impacts of sub-standard wastewater systems on reserves are also of importance. Treated water is a service that can only be accessed by a fraction of the First Nations population. Even where treated water is available, a 2011 National Assessment of First Nations water infrastructure found significant numbers of facilities to be high to medium risk.

This fact informs one impetus behind the lawsuit, as described by Clayton Leonard, general counsel for the four First Nations plaintiffs: that most First Nations have suffered and "continue to face serious risks to human health" vis-à-vis the water they consume and are exposed to. This is a direct result of a lack of infrastructure and investment in safe drinking water on reserves.

Figure 1: First Nations Drinking Water Advisories, Alberta



Source: First Nations (Alberta) Technical Services Advisory Group

David Boyd, author of The Right to a Healthy Environment, commented, "All Canadians have the right to safe drinking water, yet this fundamental human right has been systematically violated for decades on Aboriginal reserves. Promises to solve this problem have been made and broken, made and broken. This lawsuit may force the federal government to finally fulfill its constitutional obligation to ensure safe drinking water for the Ermineskin Cree Nation, Tsuu T'ina Nation, Sucker Creek First Nation, and Blood Tribe. It's about time!"

A little more than a month after the lawsuit was filed, the Supreme Court of Canada issued its groundbreaking decisions of *Tsilhqot'in Nation v. British Columbia* on aboriginal title and *Grassy Narrows First Nation v. Ontario (Natural Resources)* on treaties. The Supreme Court described a new basis for dialogue and reconciliation between First Nations and Canadians.

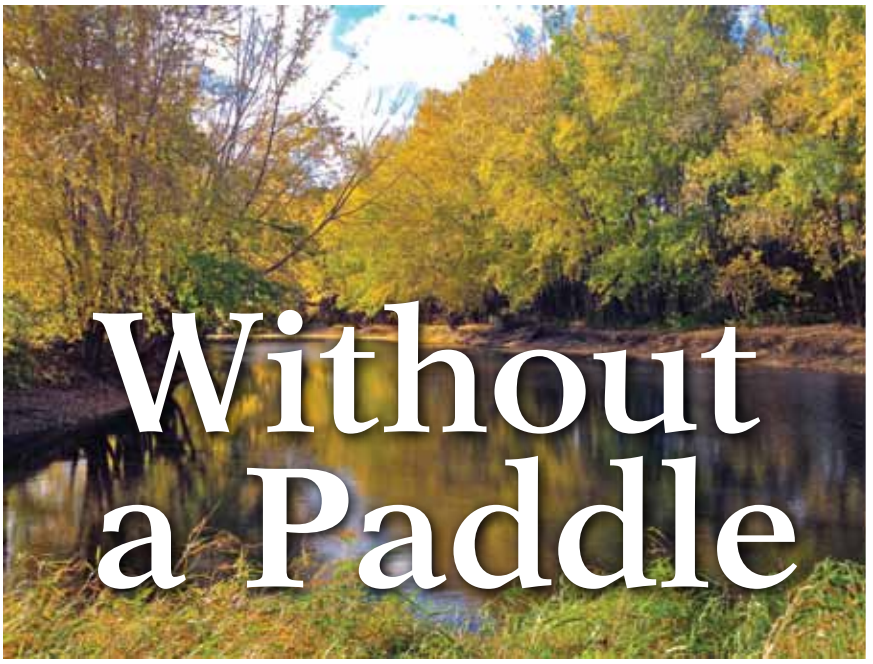
Tsilhqot'in provided the first ever grant of aboriginal title to a First Nation. The Supreme Court also held that aboriginal rights are a limit on both federal and provincial jurisdiction. This may have implications for laws and policies relating to water, in particular water located on or around aboriginal title lands. The decision emphasized our need to collectively shift from a paradigm of assimilation to a dialogue focused on reconciliation. While the Court explicitly chose not to address the issue of water, it is difficult to imagine a grant of aboriginal title functioning without water.

The *Grassy Narrows* decision confirmed that a province has all the constitutional obligations of the Crown, is bound by and must respect treaty and fulfill treaty promises in accordance with Indigenous interests in treaty lands. First Nations treaty rights, and the reserves that were set aside further to treaties, require healthy safe waters and a healthy environment in order to function properly.

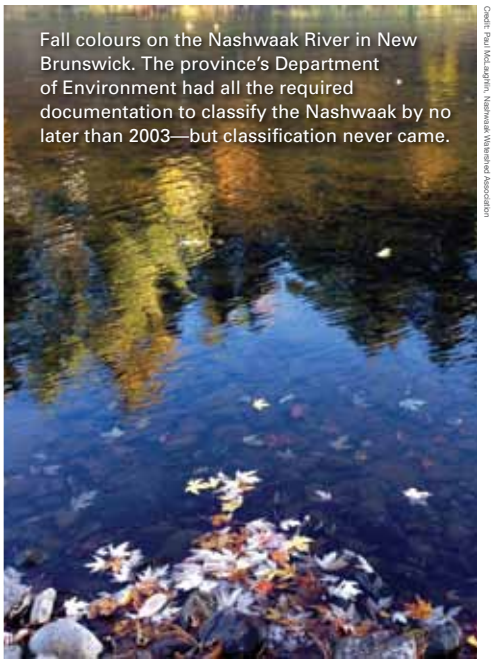
The plaintiffs in the lawsuit argue that the remedies to address the crises of unsafe drinking water on reserves lie in processes of consultation, enhancement of First Nations powers, and the achievement of minimum acceptable standards of water for human use, amongst others.

The directive of reconciliation issued by the Supreme Court of Canada in *Tsilhqot'in* and *Grassy Narrows* will be important to the achievement of the proposed remedies and the future of the lawsuit launched by the four Alberta First Nations. More generally, the Supreme Court decisions—and the path of reconciliation they describe—is vital to securing healthy waters for all. WC

Danika Billie Littlechild is the VP of the Canadian Commission for UNESCO. She is a member of the Neyaskweyahk Ermineskin Cree Nation and acts as consulting legal counsel for the International Indian Treaty Council.



Without a Paddle



Fall colours on the Nashwaak River in New Brunswick. The province's Department of Environment had all the required documentation to classify the Nashwaak by no later than 2003—but classification never came.

Credit: Paul MacLaughlin, Nashwaak Watershed Association

Documenting the failure—and the potential—of New Brunswick's Water Classification Program.

BY JON MACNEILL

DURING THE HEIGHT OF fishing season in New Brunswick, as anglers lured Atlantic salmon on the famous Miramichi River and kids navigated through thickets to seek out their favourite summer swimming holes, a report came forth casting a stark and sobering reality for the rivers so enjoyed in the province.

On August 15, 2014, Charles Murray, the New Brunswick ombudsman, an independent authority of the provincial legislature, released the details of his investigation into the Department of Environment's handling of its Water Classification Program. The program was the first in Canada to take a proactive, watershed-based approach to river protection when it was introduced in 2002. But the ombudsman determined the program was, in effect, nothing more than an illusion, giving New Brunswickers a woefully false impression about the safety of their rivers for more than a decade.

In the 12 years since it was established, not a single waterway has been protected under the classification system. The program was instead plagued by bureaucratic confusion, lacklustre political will, and misuse of power from the elected officials charged with overseeing it.

"Like a smoke detector without batteries," Murray wrote in his report, "[the regulation] appears to address and remedy a problem when in reality it does nothing of the sort." The classification program, he concluded, "exists primarily as a mirage, misleading observers to their detriment."

That's certainly a far cry from what was expected by conservationists and departmental officials alike when the program was first unveiled. The Water Classification Program was brought forth under Regulation 2002-13 as a progressive attempt to set water quality standards for New Brunswick rivers. The regulation allows community-based organizations to collect water samples, analyze water quality, and set goals to maintain or improve the water quality of rivers. It was the final piece of a progressive regulatory regime put in place by the provincial government, complementing the Wellfield Protected Areas Designation passed in 2000 and the Watershed Protected Areas Designation enacted in 2001.

> "Like a smoke detector without batteries, [the regulation] appears to address and remedy a problem, when in reality, it does nothing of the sort." —Charles Murray

Over time, the department received 19 separate proposals for classification from groups across the province. Among them was an application from the Nashwaak Watershed Association, which had been exceptionally proactive on the file, having secured funding from the government to conduct water quality tests before the regulation had even been passed.

In his report, the ombudsman noted the department had all the necessary documentation required to classify the Nashwaak by no later than 2003. What followed were years of correspondence between the department and the Nashwaak association, during which officials described the river and other provincial watercourses as being "provisionally" classified, giving the impression that full classification was just around the corner.

Frustrated by the lack of movement on the program, the Nashwaak Watershed Association and its supporters,

including the Conservation Council of New Brunswick, filed a complaint to the office of the ombudsman in February 2013, spearheading Murray's investigation.

"I think New Brunswickers were blindsided and even surprised to learn our rivers were not being protected," said Stephanie Merrill, freshwater protection program coordinator for the Conservation Council of New Brunswick. "And we should be. It's a shame that in a province like New Brunswick, where so much of our culture, heritage, and recreation is based around our rivers, that we do not have fundamental protections for our waters. It's so basic. New Brunswickers have assumed that's covered."

In an interview with the Conservation Council for this article, the ombudsman said the most troubling finding from his investigation was simply that government gave citizens a false impression for so many years that watercourses were being protected.

"That speaks to a really fundamental failure," Murray said. "It can't really be a larger failure than that."

His report offered some explanations—citing confusion within the Department of Environment over the legal authority of the regulation and the troubling misuse of ministerial discretion by successive ministers to avoid approving the applications—but above all else, Murray said a lack of focused political will is primarily to blame.

But therein lies the hope for New Brunswick's waterways moving forward.

A new provincial government, under the leadership of Liberal Premier Brian Gallant, was sworn into power on October 7. During the fall election campaign, the Liberal Party of New Brunswick pledged to "take steps to help ensure the health of our rivers and drinking water." What better opportunity, Murray said, then moving swiftly to approve the 19 rivers submitted under the Water Classification Program?

"Why not be proactive and make yourself the champion of that change?" Murray said of the new government. "To me, this is an opportunity for the Minister of Environment to demonstrate competence, good faith, and to rebuild some bridges of trust between the department and the communities."

With some focused attention and priority, by the time New Brunswickers set out with their fishing rods or swimming suits to indulge in our waterways next summer, they'll hopefully do so with the full confidence that regulations are in effect to ensure rivers will remain safe and healthy for them to enjoy. WC

Jon MacNeill is the communications officer for the Conservation Council of New Brunswick.

Two test tubes of beer indicate that its production is a science.


Empty beer cans ready to be filled.

Credits: Scott Harper

Wasted Opportunities

It's time to rethink the concept of waste in Ontario's craft brewing industry.

BY SCOTT HARPER

THE INGREDIENTS are gathered and enter processing, grains cracked and boiled before moving throughout the facility in water that slowly becomes beer. The liquid passes from one tank to another, changing. Hops are added, yeast is added, and the recipe is given time to mature. When all is ready, the solids are removed and discarded, and a tasty beer is enjoyed. But what happens to these solids? It would be easy to think of this process as simple and logical, much like the body: resources in, waste products out. But are these inputs—no more than grains, hops, and yeast—really waste?

Processors of any kind, from the food and beverage industry to petrochemical, use resources and create "waste" in order to make their products. But the inputs are not the same, and the waste is not the same. Still, wastewater is applied as a blanket term, and the waste stream of a brewery requires treatment like any other facility. Breweries are charged if their wastewater is high in "contaminants," just like a petrochemical plant. With this in mind, let's recontextualize what a brewery's wastewater really is: wasted resources and wasted opportunities for cost savings and reducing environmental impacts. Fortunately, Ontario's craft brewing industry has become wise to the opportunity their product affords them, and are taking measures to manage their wastewater.

> Let's recontextualize what a brewery's wastewater really is: wasted resources and wasted opportunities for cost savings and reducing environmental impacts.

Cows love the spent grain extracted from the brewing process. The anecdotes are the same across the province: cows galloping across fields as if possessed, farmers forced to spread the feed in order to prevent overeating, and trucks riddled with dents from the overexcited livestock. Removed before fermentation takes place, the entirely non-alcoholic grain is picked up by farmers and has become one of the common practices in Ontario's craft brewing industry.

Along with removing spent grains, a number of techniques are employed to

The boiling process, where ingredients like cracked grain and hops are first added to water, takes place in a lauter tun.

A look inside a steel vat during the boiling process.

prevent yeast from entering the waste stream. Lake of Bays brewery noted that its primary net loss is the result of beer trapped in yeast during production, which the company is addressing with the addition of a new solids removal system—a centrifuge. Re-use of cleaning products is another method commonly employed by breweries to mediate their wastewater strength.

But in spite of their efforts and the nature of their ingredients, many breweries are still having issues with their wastewater. "We contribute more biological treatment to the municipal wastewater system than the rest of the town combined," said Darren Smith, the owner of Lake of Bays. Despite being a well-run facility, the Lake of Bays brewery still deals with the issue of wastewater.

So what is contributing to the wastewater strength of breweries, and what can be done about it? The BLOOM Centre, an organization focused on water management, believes a holistic and integrated approach, featuring small and strategic operational changes, is the answer, not an expensive "end-of-pipe" wastewater treatment system.

Steam Whistle is one of Ontario's leading craft brewers and has a facility that is subjected to high surcharges on wastewater. An environmentally proactive facility and winner of the Ministry of Environment and Climate Change's 2011 award for water conservation, Steam Whistle has wastewater issues that stem from other operational efficiencies.

"We've been using captured steam for our hot water needs, including cleaning, but the decrease in our wastewater volume has led to a higher concentration of contaminants. We're saving 4,500,000 litres of water a year, but our surcharges have gone up," said Sybil Taylor, Steam Whistle's director of communications. In order to address this problem, Steam Whistle has begun working with the BLOOM Centre to develop an understanding of what parts of their processes contribute most to their wastewater. "We don't have the space to install a wastewater treatment system," Taylor explained. Steam Whistle has instead decided to employ operational changes at strategic points to address its wastewater problem.

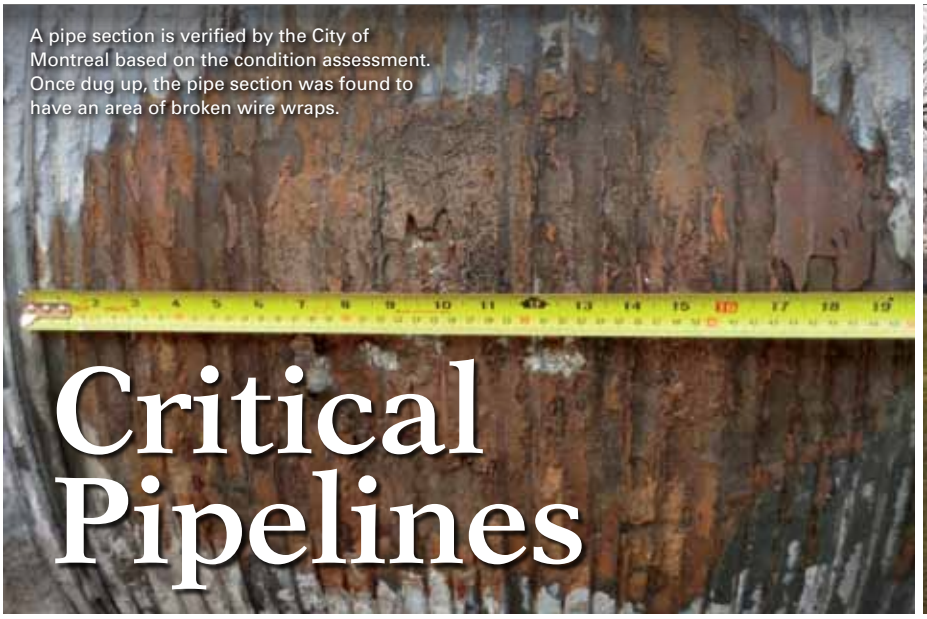
"It makes a lot more sense to identify the root and address a problem at the source, before it becomes diluted and added to the rest of the wastewater stream," said Colin Banting, Steam Whistle's assistant brewmaster. By simply examining its company processes more holistically, Steam Whistle expects to transcend the need for a wastewater treatment system.

While Ontario's craft brewing industry is well on its way, there is still work to be done. The Ontario's Craft Brewers, along with the BLOOM Centre, are taking those next steps. Presently, site visits of more than 15 breweries are being conducted to establish the baselines of their operations. These site visits will lead to a full wastewater characterization of six to eight breweries in order to pinpoint when and how ingredients are entering the wastewater stream.

"We want to determine what part of the process is actually contributing the most to our wastewater stream," Banting said. "We want the information to form a strategy [because] right now we just don't know. We want to pinpoint trouble areas and address them."

Ontario is in a position to be global leaders in resource efficient brewing, and the Ontario Craft Brewers have committed to employing the appropriate technical help to get them there. "You never reach perfection," Taylor said. "You simply fix one thing and you're on to the next." WC

Scott Harper is the communications manager at BLOOM Centre.



A pipe section is verified by the City of Montreal based on the condition assessment. Once dug up, the pipe section was found to have an area of broken wire wraps.

Critical Pipelines

The robotic condition assessment tool is inserted into a PCCP pipeline. It remains tethered to the surface during inspection to allow the operator close control.

Credits: Pure Technologies

The City of Montreal rolls out an inspection program to pinpoint problem areas in an aging system.

BY CAMERON WHITE

CRITICAL LARGE-DIAMETER water transmission mains frequently run beneath city streets in busy urban environments. Like the majority of water infrastructure across North America, these pipes are reaching the end of their design life, causing an increased number of leaks and failures.

Although these assets are beneath the ground, the United States Environmental Protection Agency estimates that buried pipelines represent two-thirds of a utility's value. Despite this, the majority of capital investment has historically been focused above the ground. Although this has changed recently after several industry studies highlighted the growing need for pipeline renewal, water and wastewater service providers still must employ innovative solutions to manage their buried pipelines.

While it is important for utilities to manage their entire inventory of buried infrastructure, pipelines in urban environments pose a significantly greater risk and challenge for water utilities. These pipelines are high risk because of their high consequence of failure; if a pipe beneath a busy downtown street fails, the repair costs can quickly escalate and the failure causes a massive disruption to businesses and commuters. In some cases, failures in urban environments have cost utilities upwards of $5 million to remediate. A failure not only carries a high repair bill, but contributes to a negative public perception of the utility that can harm consumer confidence.

With such high risk, utilities often prioritize these mains ahead of those with lower consequence of failure. However, because they are located in high-traffic areas, assessing them is far more challenging than assessing a linear main in a rural area.

Dealing with above ground obstructions, commuter delays, and a lack of access points means operators need to have close control over inspection technologies. Additionally, the technology must provide the best possible information to allow for accurate repair and excavation decisions.

Like other major metropolitan areas, the City of Montreal has aging pipeline infrastructure that runs through its downtown core. In Montreal—one of the oldest cities in North America—this infrastructure is very old and beginning to reach the end of its design life. In order to proactively identify problem areas in its prestressed concrete cylinder pipe (PCCP) assets, the city is in the midst of an inspection program using advanced non-destructive technologies. In total, the city will assess the condition of more than 60 kilometres of PCCP by 2015.

In order to successfully manage PCCP, the water industry has widely adopted the use of condition assessment techniques, which have a proven track record of identifying and averting PCCP failures. PCCP owners and operators continue to use these condition assessment methodologies combined with sound engineering analysis to effectively and safely manage their critical assets.

In the majority of cases, assessing the condition of assets to identify problem areas has high value for utilities, since the majority of pipelines have remaining useful life, despite their age. This allows for selective rehabilitation in favour of full-scale replacement. This is particularly important in urban areas since excavation costs are higher and more disruptive.

For a large portion of the condition assessment, the city is using the PureRobotics electromagnetic (EM) platform, since it is ideal for challenging urban environments. The tool remains tethered to the surface during inspection and is controlled by an operator. It also features live high-definition video to observe internal pipe conditions. These features allow the city to closely verify areas with potential problems.

In addition, the tool identifies broken

prestressing wire wraps in PCCP. As PCCP ages, the prestressing wires, which make up the main structural component, begin to break due to a number of factors. The presence of broken wires is the main indication the pipe will eventually fail. Unlike metallic pipe materials that typically fail after a long period of leakage, PCCP is prone to sudden failures when too many wires break in one area.

Recently, the city has completed the assessment of a little more than 17 kilometres of its urban PCCP assets with diameters of 600, 750, and 900 millimetres (24, 30, and 36 inches). Of the 2,798 pipe sections assessed, only 97 (3.5 per cent) have shown evidence of distress. This is slightly below the industry average of five per cent.

Using condition assessment, the city has been able to identify isolated distress on its critical urban mains while leaving pipeline assets with remaining useful life in operation. After completing the initial phases of condition assessment, the city has excavated certain sections of pipe for validation of the inspection results, as well as repair of any damage. Both the excavation locations and presence of distress have been very accurate. This has allowed the city to repair isolated pipe sections, which restores the overall condition of the pipeline. This will help to prevent failures that would significantly disrupt day-to-day life in the city.

Through the use of condition assessment technologies, the city has been able to gain a valuable baseline condition of the pipelines it assessed with EM technology. This helps in the development of future capital planning for monitoring or re-inspection.

By proactively assessing its transmission mains, the City of Montreal is taking steps to prevent pipe failures while allowing for more fiscally responsible asset management in the future. WC

Cameron White is the regional manager for Atlantic Canada at Pure Technologies.

Streamlining Approvals

A look at new protocols for performance testing and verification of water and domestic wastewater treatment technologies.

BY JIM FERRERO AND JOHN NEATE

IN CANADA and other jurisdictions, different regulatory authorities have diverse requirements and performance criteria for the approval and acceptance of drinking water and domestic wastewater treatment technologies. They can all benefit from access to scientifically defensible and verifiable performance data applicable to a range of possible end-use requirements and operating conditions to support their decisions.

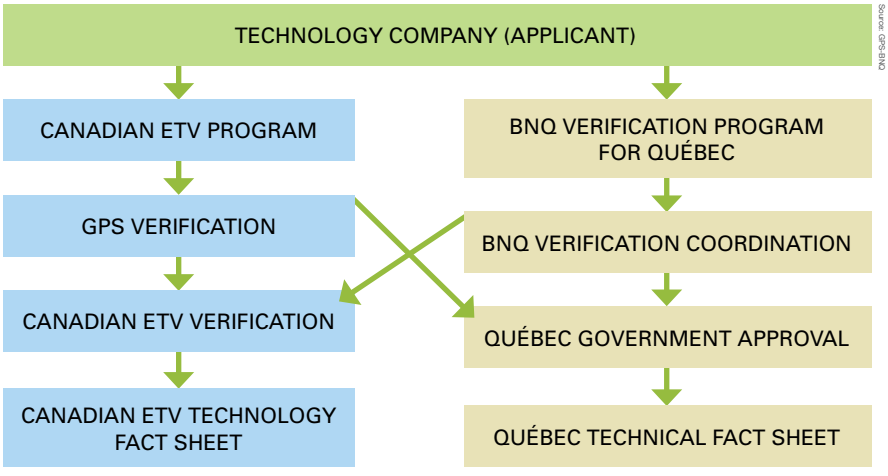
To this end, GLOBE Performance Solutions (GPS) and the Bureau de normalisation du Québec (BNQ) have entered into an agreement to harmonize procedures for verifying the performance of drinking water and domestic wastewater treatment technologies. This includes the development of two new protocols to provide guidance and a common approach for independently testing and verifying these technologies under controlled conditions. The independent verification of the performance data will be a valuable tool for regulatory authorities and other affected stakeholders to objectively evaluate treatment options.

Building on the combined synergies of the Canadian Environmental Technology Verification (ETV) Program and the technology permitting and approvals process in the Province of Quebec, this collaborative effort will:

- Increase national recognition and acceptance of effective drinking water and domestic wastewater treatment technologies across Canada;
- Establish a common approach to testing and verifying the performance of drinking water and domestic wastewater treatment technologies;
- Improve and streamline the permitting and approval of innovative technologies for drinking water and domestic wastewater treatment; and
- Facilitate pan-Canadian market access for innovative technology and solution providers.

The GPS-BNQ agreement supports the objectives of evidence-based regulatory approaches while respecting the authority of provincial regulatory and approvals authorities. In Quebec, for example, this includes the Ministry of Sustainable Development, Environment and the Fight Against Climate Change (MDDELCC) in administering the Environmental Quality Act (EQA), and the Ministry of Municipal Affairs and Land Occupancy in assessing projects seeking financial assistance. Similar synergies are envisaged for other provinces and territories across Canada.

GPS-BNQ Agreement for Performance Testing and Verification of Drinking Water and Domestic Wastewater Treatment Technologies



Roles and responsibilities

Under the agreement, GPS is responsible for coordinating the verification process to ensure consistency with the requirements of the Canadian ETV Program. This includes validating test protocols, overseeing test procedures, verifying test results, preparing verification reports, and issuing verification statements and technology fact sheets for publication and posting on the ETV Program website.

BNQ is responsible for coordinating the administration of the committee on treatment technologies for drinking water and the committee on treatment technologies for domestic wastewater. Among their responsibilities, the committees validate test protocols, verify test results, and approve the relevant technical information sheets for publication on the MDDELCC website.

In addition to the commitments specific to each organization, GPS and BNQ intend to harmonize, to the extent possible, procedures for applications, reporting, and verification renewals, as well as the process for determining necessary qualifications and expertise.

Considering the similarity of the protocols and procedures used for drinking water and domestic wastewater technology approvals in Quebec relative to the general verification protocol of the Canadian ETV Program, it makes sense to apply a common approach for testing and verifying these technologies throughout Canada. This will assist both regulatory authorities and the developers of new technologies. WC

Jim Ferrero is a standards development coordinator with the BNQ. John Neate is the president of GLOBE Performance Solutions.

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The information compiled in this year's guide was provided by the product and service providers. Besides basic summary listings and contact information, some companies provided more detailed information in the form of full details listings, banner ads, logos, and showcases.

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Chemicals – Potable Water Treatment
Keytech Water Management

Carbon – Silver Impregnated
Prominent Systems, Inc

Chemical Water Treatment
Aqua Pure Depot
BioteQ Environmental Technologies
FloChem Ltd.

Chlorinators
BI Pure Water, Inc.
ProMinent Fluid Controls Ltd.

Chlorine
ProMinent Fluid Controls Ltd.
FloChem Ltd.

Chlorine Anti-Scale Additives
Keytech Water Management

Chlorine Removal Systems
AquaMaster (ACi Distributing Inc.)
Kinetico Canada Incorporated
Tri-Aqua Water Systems

Chlorine Testing Equipment
Endress+Hauser Canada
ProMinent Fluid Controls Ltd.
Water Concepts

Coatings
Belzona Great Lakes Holdings

Compressors & Blowers
Kaeser Compressors Canada Inc.
USABlueBook

Computer Services
KISTERS North America, Inc.

Containerized Treatment Solutions
AdEdge Water Technologies, LLC

Consultants
Actual Media
EMCO Corporation
ENVionX
Enviseng Environmental Consulting Services (EECS)
GLOBE Performance Solutions
PICA: Pipeline Inspection and Condition Analysis Corp.
Vincent Roa Group, LLC

Consultants – Wastewater
AECOM
Endress+Hauser Canada
Enviseng Environmental Consulting Services (EECS)
MMM Group Limited
WILDCAT WATER TECHNOLOGIES LTD.
XCG Consultants Ltd.

Consultants – Water Treatment
AECOM
BI Pure Water, Inc.
Endress+Hauser Canada
Environmental Services Association of Alberta (ESAA)
Enviseng Environmental Consulting Services (EECS)
Kellys Water Store
MMM Group Limited
XCG Consultants Ltd.

Consultants – Software & Technology
ENVionX
Version 2.0 Inc.

Containerized Treatment Solutions
GRAYL in Canada

Control Panel Components
Endress+Hauser Canada

Conveyors
Enviro-Care Company
H2FLOW TANKS & SYSTEMS INC.
IPEC COnsultants Ltd.

Coolers & Cooling Towers
Cooling Tower Resources, Inc.

Couplings
Victaulic

Cyst Reduction
UV Pure Technologies Inc.
Water, Inc.

D

Data Acquisition
Echostream
Ecoinsight Instruments Inc.
Endress+Hauser Canada
KISTERS North America, Inc.

Data Analysis & Reporting
Echostream
Endress+Hauser Canada
Good Harbour Laboratories
KISTERS North America, Inc.

Data Radios
Version 2.0 Inc.

Disinfection Equipment & Chemicals
FloChem Ltd.
Greenway Water Technologies
ProMinent Fluid Controls Ltd.
UV Pure Technologies Inc.
VIQUA

Dispensing Equipment
Tomlinson Industries
Tri-Aqua Water Systems

Distributor
Alkaline Water Distributor
AquaMaster (ACi Distributing Inc.)
Aqua Pure Depot
Belzona Great Lakes Holdings
BI Pure Water, Inc.
Bluline Canada
Canadian Infrastructure Products Ltd.
Cooling Tower Resources, Inc.
Danamark WaterCare
EcoWater Canada Ltd.
EMCO Corporation
FloChem Ltd.
GRAYL in Canada
Greenway Water Technologies
H2FLOW TANKS & SYSTEMS INC.
Kellys Water Store
Keytech Water Management
Kinetico Canada Incorporated
Kontek Ecology Systems Inc.
NeoLogic Solutions – Filtration Division
Nimbus Water Systems
Nova Filtration Technologies Inc.
Polywest Ltd.
Purus North America
Safe Drinking Water Foundation
Triangular Wave Technologies, Inc.
Tri-Aqua Water Systems
USABlueBook
Water Concepts
WESTUND/EMCO Water Solutions
WILDCAT WATER TECHNOLOGIES LTD.

Dredging & Dewatering Services
Aquatech Dewatering Company

Drinking Water Systems
AdEdge Water Technologies, LLC
Advance Products & Systems
Alkaline Water Distributor
AquaMaster (ACi Distributing Inc.)
Bluewater Biosciences Inc.
Dyna-Pro Environmental
EcoWater Canada Ltd.
Engineered Treatment Systems
ERE Inc.
Excalibur Water Systems
Greenway Water Technologies
H2FLOW EQUIPMENT INC.
Kellys Water Store
Kinetico Canada Incorporated
NeoLogic Solutions – Filtration Division
Nimbus Water Systems
Nova Filtration Technologies Inc.
PICA: Pipeline Inspection and Condition Analysis Corp.
Tri-Aqua Water Systems
VIQUA
Water, Inc.

Drinking Water Treatment Education
Alkaline Water Distributor
Global Training Solutions Inc.
Safe Drinking Water Foundation

Dry Chemical Feeders
ProMinent Fluid Controls Ltd.

E

Effluent Treatment Chemicals & Equipment
Dynamix Agitators Inc.
FloChem Ltd.
UV Pure Technologies Inc.
Xogen Technology Inc

Electrocoagulation
Xogen Technology Inc

Electrodeionization
Kellys Water Store

Engineering Services
BI Pure Water, Inc.
Endress+Hauser Canada
MMM Group Limited
PICA: Pipeline Inspection and Condition Analysis Corp.
Victaulic

Environmental Services
ADI Systems Inc.
AECOM
BioteQ Environmental Technologies
DDI
Environmental Services Association of Alberta (ESAA)
GLOBE Performance Solutions
MMM Group Limited
Therma-Flite Inc.
XCG Consultants Ltd.

Ethernet Industrial Components
Endress+Hauser Canada

F

Faucets
Tomlinson Industries
Water, Inc.

Field Connection Devices
Endress+Hauser Canada
SeCal Instruments Inc.
Victaulic

Filter Media
Aqua Pure Depot
Cooling Tower Resources, Inc.
NeoLogic Solutions – Filtration Division
Nova Filtration Technologies Inc.

Filter Systems
Alkaline Water Distributor
AquaMaster (ACi Distributing Inc.)
Concord Screen Inc
Danamark WaterCare
Excalibur Water Systems
GRAYL in Canada
Greenway Water Technologies
Imbrium Systems
Komline-Sanderson
Nova Filtration Technologies Inc.
Wahl Water
Water, Inc.

Filtration
Acme Engineering Prod. Ltd.
Imbrium Systems Inc.
Nova Filtration Technologies Inc.

Fittings & Connectors
Victaulic

Floor Access Doors
The Bilco Company

Flow Measuring Equipment
Endress+Hauser Canada
Universal Flow Monitors, Inc.

G

Gauges
Endress+Hauser Canada
WESTUND/EMCO Water Solutions

Grating
Cooling Tower Resources, Inc.
Fibrelite Composites
The Bilco Company

Groundwater Data Loggers
Endress+Hauser Canada
Solinst Canada Ltd.

Groundwater Monitoring
Bluewater Biosciences Inc.
KISTERS North America, Inc.
Solinst Canada Ltd.
Version 2.0 Inc.

H

Heat Exchangers
Belzona Great Lakes Holdings
DDI

Housings
NeoLogic Solutions – Filtration Division

Hose
Polywest Ltd.

Hydrometeorology
Endress+Hauser Canada
KISTERS North America, Inc.
Version 2.0 Inc.

I

In Situ Groundwater
KISTERS North America, Inc.

Instrumentation
Ecoinsight Instruments Inc.
Endress+Hauser Canada
SeCal Instruments Inc.

Ion Exchange Equipment
Excalibur Water Systems

Iron Removal
Excalibur Water Systems
Purifiner Sudbury
Tri-Aqua Water Systems

L

Laboratory Equipment
USABlueBook

Laboratory Services
Endress+Hauser Canada
GLOBE Performance Solutions
Good Harbour Laboratories
Maxxam Analytics
SGS Canada Inc

Legal Services
Miller Thomson LLP

LID Technology
Purus North America

Liners
FER-PAL Infrastructure
Geomembrane Technologies Inc. (GTI)

M

Manhole Rehabilitation
LiquiForce

Manufacturer
Acme Engineering Prod. Ltd.
AdEdge Water Technologies, LLC
Advance Products & Systems
BioMaxx Wastewater Solutions Inc.
BI Pure Water, Inc.
Bluewater Biosciences Inc.
Bluline Canada
Concord Screen Inc
Cooling Tower Resources, Inc.
CULTEC, Inc.
Danamark WaterCare
DDI
Dynamix Agitators Inc.
Dyna-Pro Environmental
Echostream
Ecoinsight Instruments Inc.
Endress+Hauser Canada
Engineered Treatment Systems
ERE Inc.
Excalibur Water Systems
Fibrelite Composites
GRAYL in Canada
Greenway Water Technologies
Hydrosil International
Imbrium Systems Inc.
Industrial Test Systems, Inc
IPEC COnsultants Ltd.
Kaeser Compressors Canada Inc.
Kellys Water Store
Keytech Water Management
KISTERS North America, Inc.
Komline-Sanderson
Kontek Ecology Systems Inc.
Kryton International Inc.
KSB Pumps Inc.
LiquiForce
Medora Corporation
NeoLogic Solutions – Filtration Division
Polywest Ltd.
ProMinent Fluid Controls Ltd.
Prominent Systems, Inc
Purus North America
Quanics Inc.
RainGrid
Safe Drinking Water Foundation
Singer Valve
Solinst Canada Ltd.
Tank Connection
The Bilco Company
Therma-Flite Inc.
Tomlinson Industries
Triangular Wave Technologies, Inc.
Tri-Aqua Water Systems
Universal Flow Monitors, Inc.
UV Pure Technologies Inc.
Version 2.0 Inc.
Victaulic
VIQUA
Water, Inc.
Xogen Technology Inc
Xylem

Marketing Services
Actual Media
ENVionX
Environmental Services Association of Alberta (ESAA)
Vincent Roa Group, LLC

Membranes
Belzona Great Lakes Holdings
Kryton International Inc.
Nova Filtration Technologies Inc.

Metals Removal
BioteQ Environmental Technologies
Hydrosil International

Meters
Endress+Hauser Canada
Industrial Test Systems, Inc
Safe Drinking Water Foundation
Universal Flow Monitors, Inc.
WESTUND/EMCO Water Solutions

Mixers
Dynamix Agitators Inc.
H2FLOW TANKS & SYSTEMS INC.
KSB Pumps Inc.
Medora Corporation

Monitors
Ecoinsight Instruments Inc.
KISTERS North America, Inc.
Universal Flow Monitors, Inc.

MTBE Removal
Kinetico Canada Incorporated
Water, Inc.

N

Nitrate Removal
Kinetico Canada Incorporated
Quanics Inc.

No-Dig Lateral Rehabilitation
FER-PAL Infrastructure
LiquiForce

O

Odour Control
BioMaxx Wastewater Solutions Inc.
Fibrelite Composites
Geomembrane Technologies Inc. (GTI)

Oil/Water Interface Meters
Solinst Canada Ltd.

Ozone Systems
ProMinent Fluid Controls Ltd.
Xylem

P

Permeable Pavement Alternatives
Purus North America

PH Adjustment
ProMinent Fluid Controls Ltd.
Purifiner Sudbury

PH Analyzers
Endress+Hauser Canada
ProMinent Fluid Controls Ltd.
Safe Drinking Water Foundation
Water Concepts

Phosphorus Removal
Imbrium Systems Inc.

Pipes
Advance Products & Systems
EMCO Corporation
WESTUND/EMCO Water Solutions

Plastic Molding
Polywest Ltd.

Pneumatic Valves
Singer Valve

Pollutant Capture
Imbrium Systems Inc.

Portable Purifying Units
GRAYL in Canada

Potable Water Treatment – Chemicals – Polyphosphates
Keytech Water Management

Product Development
KISTERS North America, Inc.

Project Management
Actual Media
GLOBE Performance Solutions
LiquiForce

Publisher
Actual Media

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KSB Pumps Inc.
ProMinent Fluid Controls Ltd.
Quanics Inc.
USABlueBook
Xylem

Pump Maintenance Services
Belzona Great Lakes Holdings
Global Training Solutions Inc.
KSB Pumps Inc.

R

Rain Harvesting
Polywest Ltd.
ProMinent Fluid Controls Ltd.
RainGrid

Research
Actual Media
Echostream
ENVionX
Good Harbour Laboratories
Vincent Roa Group, LLC

Resin Suppliers
Hydrosil International

R.O. Equipment & Systems
AdEdge Water Technologies, LLC
AquaMaster (ACi Distributing Inc.)
Aqua Pure Depot
Danamark WaterCare
EcoWater Canada Ltd.
Excalibur Water Systems
Greenway Water Technologies
Kinetico Canada Incorporated
Nimbus Water Systems
Purifiner Sudbury
Tri-Aqua Water Systems

S

Safety Equipment
GRAYL in Canada
USABlueBook

Scale – Control
Keytech Water Management
Triangular Wave Technologies, Inc.

Scale Removal
Kinetico Canada Incorporated

Screens & Strainers
Acme Engineering Prod. Ltd.
Concord Screen Inc
Enviro-Care Company
IPEC COnsultants Ltd.

Scrubbers
BioMaxx Wastewater Solutions Inc.

Sensing Equipment
Ecoinsight Instruments Inc.
Endress+Hauser Canada

Site Dewatering Services
Aquatech Dewatering Company

Softener Components & Accessories
Aqua Pure Depot
Kellys Water Store

Software & Technology
Endress+Hauser Canada
KISTERS North America, Inc.
Version 2.0 Inc.

Specialty Chemicals
FloChem Ltd.
Keytech Water Management

Sterilizers
UV Pure Technologies Inc.

Stormwater
Canadian Infrastructure Products Ltd.
CULTEC, Inc.
Echostream
Fibrelite Composites
Imbrium Systems

Stormwater Management
AECOM
Canadian Infrastructure Products Ltd.
CULTEC, Inc.
EMCO Corporation
MMM Group Limited
RainGrid
XCG Consultants Ltd.

Stormwater Management Solutions
CULTEC, Inc.
Imbrium Systems
Purus North America

Stormwater Treatment Systems
Canadian Infrastructure Products Ltd.
EMCO Corporation
Imbrium Systems Inc.
Purus North America
RainGrid

Submersible Pumps & Mixers
KSB Pumps Inc.
Quanics Inc.
USABlueBook

Sulphur Removal
Excalibur Water Systems

Supplier
Actual Media
ADI Systems Inc.
AECOM
Aquatech Dewatering Company
BioteQ Environmental Technologies
Cooling Tower Resources, Inc.
Echostream
Ecoinsight Instruments Inc.
EMCO Corporation
ENVionX
Enviro-Care Company
Environmental Services Association of Alberta (ESAA)
Enviseng Environmental Consulting Services (EECS)
ERE Inc.
Filter Butler
Geomembrane Technologies Inc. (GTI)
Global Training Solutions Inc.
GLOBE Performance Solutions
Good Harbour Laboratories
Goslyn Ontario
GRAYL in Canada
Greenway Water Technologies
H2FLOW EQUIPMENT INC.
Kellys Water Store
Keytech Water Management
Kontek Ecology Systems Inc.
Maxxam Analytics
Miller Thomson LLP
MMM Group Limited
PICA: Pipeline Inspection and Condition Analysis Corp.
Polywest Ltd.
ProMinent Fluid Controls Ltd.
Purifiner Sudbury
Purus North America
RainGrid
SeCal Instruments Inc.
Safe Drinking Water Foundation
SGS Canada Inc
Therma-Flite Inc.
Triangular Wave Technologies, Inc.
Tri-Aqua Water Systems
Vincent Roa Group, LLC
Wahl Water
WESTUND/EMCO Water Solutions
Xylem

Surface Water Monitoring
AECOM
Bluewater Biosciences Inc.
Echostream
KISTERS North America, Inc.
Solinst Canada Ltd.
XCG Consultants Ltd.

T

Tanks
Advance Products & Systems
Fibrelite Composites
H2FLOW TANKS & SYSTEMS INC.
RainGrid
Tank Connection
Therma-Flite Inc.

TDS Indicators
Safe Drinking Water Foundation
Water Concepts

Technology Assessment
ENVionX
GLOBE Performance Solutions
Good Harbour Laboratories

Testing Equipment & Services
Good Harbour Laboratories
Industrial Test Systems, Inc
PICA: Pipeline Inspection and Condition Analysis Corp.
SeCal Instruments Inc.
Water Concepts

Total Suspended Solids Removal
ADI Systems Inc.
Goslyn Ontario
Komline-Sanderson

Training
Global Training Solutions Inc.
KISTERS North America, Inc.

U

Ultrafiltration Systems
BI Pure Water, Inc.
Danamark WaterCare

UV Cured Lining
LiquiForce

UV Equipment & Systems
Aqua Pure Depot
Engineered Treatment Systems
Excalibur Water Systems
Greenway Water Technologies
H2FLOW EQUIPMENT INC.
Kellys Water Store
ProMinent Fluid Controls Ltd.
Purifiner Sudbury
Triangular Wave Technologies, Inc.
Tri-Aqua Water Systems
UV Pure Technologies Inc.
VIQUA
Wahl Water

V

Valves – Equipment & Supplies
Singer Valve
Tomlinson Industries
USABlueBook
Victaulic
WESTUND/EMCO Water Solutions

W

Waste to Energy Systems
ADI Systems Inc.
Goslyn Ontario
H2FLOW TANKS & SYSTEMS INC.

Wastewater
ADI Systems Inc.
CULTEC, Inc.
DDI
Dynamix Agitators Inc.
Enviro-Care Company
Geomembrane Technologies Inc. (GTI)
Kontek Ecology Systems Inc.
KSB Pumps Inc.
NeoLogic Solutions – Filtration Division
PICA: Pipeline Inspection and Condition Analysis Corp.
Polywest Ltd.
Tank Connection
WILDCAT WATER TECHNOLOGIES LTD.
Xogen Technology Inc
Xylem

Wastewater Collection Treatment
Belzona Great Lakes Holdings
BioMaxx Wastewater Solutions Inc.
Ecoinsight Instruments Inc.
Enviro-Care Company
Global Training Solutions Inc.
Therma-Flite Inc.
Xylem

Wastewater Treatment Systems
ADI Systems Inc.
Advance Products & Systems
BioMaxx Wastewater Solutions Inc.
BioteQ Environmental Technologies
DDI
Engineered Treatment Systems
Enviro-Care Company
ERE Inc.
Geomembrane Technologies Inc. (GTI)
Goslyn Ontario
H2FLOW EQUIPMENT INC.
IPEC COnsultants Ltd.
Komline-Sanderson
Kontek Ecology Systems Inc.
Medora Corporation
Quanics Inc.
Therma-Flite Inc.
WILDCAT WATER TECHNOLOGIES LTD.
Xogen Technology Inc

Water & Wastewater Facility Management
CULTEC, Inc.
KISTERS North America, Inc.
Therma-Flite Inc.

Water & Wastewater Package Plant
BI Pure Water, Inc.
BioMaxx Wastewater Solutions Inc.
DDI
H2FLOW EQUIPMENT INC.
Kontek Ecology Systems Inc.
WILDCAT WATER TECHNOLOGIES LTD.
Xogen Technology Inc

Water Analysis
Bluewater Biosciences Inc.
Endress+Hauser Canada
Industrial Test Systems, Inc
KISTERS North America, Inc.
Maxxam Analytics
Water Concepts

Water Conditioners
AquaMaster (ACi Distributing Inc.)
EcoWater Canada Ltd.
Kinetico Canada Incorporated
Triangular Wave Technologies, Inc.
Wahl Water

Water Conservation Devices
Polywest Ltd.
RainGrid

Water Coolers & Equipment
Danamark WaterCare
Dyna-Pro Environmental
Global Training Solutions Inc.
Greenway Water Technologies
Tomlinson Industries

Water Level Indicators
Endress+Hauser Canada
SeCal Instruments Inc.
Solinst Canada Ltd.

Water Management Services
Environmental Services Association of Alberta (ESAA)

Water Meters
Endress+Hauser Canada
ProMinent Fluid Controls Ltd.
SeCal Instruments Inc.
Safe Drinking Water Foundation

Water Quality Data Management
Endress+Hauser Canada
KISTERS North America, Inc.

Water Recycling & Reuse Systems
Engineered Treatment Systems
Komline-Sanderson
Kontek Ecology Systems Inc.
WILDCAT WATER TECHNOLOGIES LTD.

Water Samples
Alkaline Water Distributor
KISTERS North America, Inc.

Water Softeners
AquaMaster (ACi Distributing Inc.)
Danamark WaterCare
EcoWater Canada Ltd.
Excalibur Water Systems
Greenway Water Technologies
Kinetico Canada Incorporated
Purifiner Sudbury
Tri-Aqua Water Systems
VIQUA

Water Store Equipment
Dyna-Pro Environmental
Nimbus Water Systems
Tri-Aqua Water Systems

Water Treatment
AdEdge Water Technologies, LLC
Advance Products & Systems
AquaMaster (ACi Distributing Inc.)
BioteQ Environmental Technologies
Dynamix Agitators Inc.
EcoWater Canada Ltd.
Engineered Treatment Systems
Excalibur Water Systems
Fibrelite Composites
Filter Butler
Global Training Solutions Inc.
Greenway Water Technologies
H2FLOW EQUIPMENT INC.
Kaeser Compressors Canada Inc.
Kontek Ecology Systems Inc.
Medora Corporation
NeoLogic Solutions – Filtration Division
ProMinent Fluid Controls Ltd.
Triangular Wave Technologies, Inc.
Wahl Water
WESTUND/EMCO Water Solutions
Xylem

Water Vending Machines
Dyna-Pro Environmental
Nimbus Water Systems
Tri-Aqua Water Systems

Well Treatment Supplies
Excalibur Water Systems
Wahl Water

Whole House Systems
AquaMaster (ACi Distributing Inc.)
Greenway Water Technologies
Kinetico Canada Incorporated
Tri-Aqua Water Systems
VIQUA

Wireless Industrial Components
Endress+Hauser Canada

Water Without Borders

What is Canada's role in water security?

BY JON FENNELL AND OKSANA KIELBASINSKI

WE ALL KNOW WATER is a critical resource to sustain life on our planet. It is evident increasing pressure is being placed on our global water supplies, resulting in many countries experiencing deficit conditions. The agriculture industry is by far the largest user of freshwater and accounts for 70 per cent of all consumption, a percentage that is expected to increase as the world heads toward a projected population peak of around nine billion by 2050.

Although water resources are local, the mounting global water crisis proves shortages can, and likely will, become a limiting factor for some countries, especially if the concept of water security is ignored. This begs the question: what is Canada's role in water security?

Defining water security

In the broadest sense, water security is ensuring access to water of suitable quantity and quality, when and where it is needed to support human development and sustain our watersheds. It is influenced by availability and reliability, which are not the same thing. Water availability is the ability to meet demands, taking into consideration seasonality, climate change, and cumulative effects from competing activities. Reliability, on the other hand, is the assurance that water supplies will not change significantly over time, resulting in unanticipated shortages and business disruptions due to variability in quantities and quality.

Canada is ranked as the fifth-largest agri-food exporter in the world, yet it has approximately 20 per cent of the world's total freshwater reserve. While this is an enviable position, with high abundance comes high use, and Canada is currently one of the largest per-capita users of water, with one of the lowest prices in the world. At a cost of approximately $0.30 per cubic meter (Figure 1), water is essentially free, providing little to no incentive for Canadians to conserve or use water more efficiently.

In fact, overusage, conflicting interests, over-allocation, water quality concerns, and changing water balances have created water challenges in specific areas across Canada.

In Central and Eastern Canada, major challenges are predominately centred on water quality. For example, significant inputs of phosphorus to the Great Lakes from urban and rural sources are increasing the occurrence of algal blooms. In Western Canada, water stresses are evident in the southern regions of Alberta and Saskatchewan, where the largest irrigated landmass in the country exists. Issues relating to sustainable energy development (including oilsands and the emerging shale gas sector), First Nations access to clean drinking water, and non-point source water quality issues related to agricultural development are becoming more common.

Water is location specific and may not always be available when and where we need it. Contrary to popular belief, water stresses can still occur in areas with perceived abundance. Canada, as a whole, is lucky, but as a water lucky nation we are failing to ensure water security through a solid understanding of supply inventories and dynamics, demands, risks, opportunities, and an appreciation of its true value.

Environment Canada estimates that approximately 60 per cent of Canada's gross domestic product (GDP) is directly dependent on water. In 2009, Canada's total GDP was approximately $1.6 trillion. In the same year, approximately 38 billion cubic metres of water was withdrawn from Canada's rivers, lakes, and groundwater sources. The thermal power generation industry withdrew the largest volume, followed by municipalities and the manufacturing sector (Figure 2). The vast majority of water withdrawn was circulated back to the source from which it was taken, while approximately 3.4 billion cubic metres of water was "consumed." Of this consumed water, about 84 per cent was associated with the agricultural sector.

The exact contribution of water to the Canadian economy, taking into account both direct and indirect GDP dollars, is difficult to pin down due to major data gaps in metering and monitoring efforts. However, an approximate value of $41.10 per cubic meter of water may be derived by simple calculation (that is, $1.6 trillion per 38 billion cubic metres).

Globally, the International Energy Agency in its World Energy Outlook 2012 identified that freshwater use for energy production amounted to roughly 580 billion cubic metres every year. At about 15 per cent of the world's total water withdrawal, this figure is second only to

Figure 1: Global Water Consumption and Cost per Litre per Capita

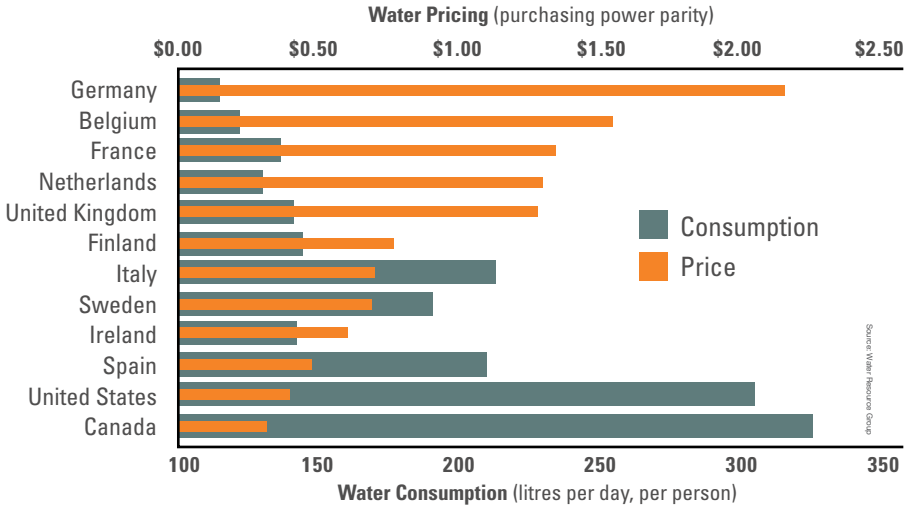
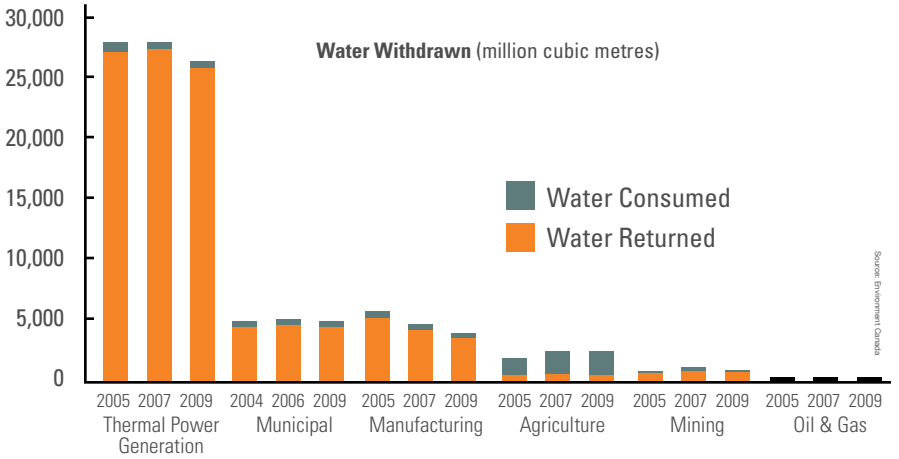


Figure 2: Water Withdrawal by Sector in Canada



agriculture. Canada, being positioned as a major producer of oil and gas resources, is again in an enviable position, but do we have enough water to stay relevant in the energy game?

In a period defined by explosive population growth and climate change, the lack of thinking regarding the concept of water security may possibly lead to conflict, famine, economic instability, increasing costs, and growth constraints.

How do we ensure our water is secure? By balancing the needs of the environment, society, and the economy through effective management of water resources, we will be able to achieve the goal of water security as a nation. This will require a rethink about the value of water and application of a systematic, holistic, and integrated approach to water management—even perhaps a national water security strategy.

As many countries struggle with water scarcity, increasing pressure will be placed on Canada to step up and assist in meeting the demands beyond our borders. To do so, Canada needs to act locally and think globally as it relates to the accounting and investment of its water resources. We need to monitor how much we have, where and when we have it, and place a proper value on it. How we source, use, distribute, monitor, manage, and conserve water will dictate the success of our future. WC

Jon Fennell is VP of geosciences and water security at Integrated Sustainability Consultants Ltd. Oksana Kielbasinski is a sustainability and risk specialist at Integrated Sustainability Consultants Ltd.

Moving Targets

A snapshot of the challenges we face when it comes to drinking water quality.

BY KLAS OHMAN

AS LOCAL UTILITIES and provincial governments delve into the causes of boil water advisories, such as aging infrastructure or the efforts to upgrade this infrastructure, they also face increasing scientific scrutiny over what is in the water we treat. Nanoparticles, as part of a growing list of emerging contaminants, are becoming more challenging to address as we simultaneously confront climate change and its impact on the water quality of our water supply system. The logistics and technologies to tackle these challenges are either in the process of being developed or are already available, but we, as a society, have created a constantly moving target that evolves at a fast pace.

These moving targets become a troublesome beast when we add the challenges of changing terminology. For example, climate change used to be called the greenhouse effect, and emerging contaminants of concern (or similar variations of this) used to be called pharmaceuticals and personal care products. To add to this confusion, what qualifies as an emerging contaminant of concern is always changing; for example, microcystin from cyanobacteria is now included in this terminology.

Periodically, events resurface, such as the spate of deaths in Quebec due to legionella from cooling towers. These issues keep us mindful of the need to be ever vigilant about where local and regional concerns may arise. Fortunately, the level of diligence with our drinking water facilities continues to increase. Ontario inspects all drinking water plants to ensure their process laboratories are meeting their license to operate. Alberta is moving forward with its drinking water safety plans and surface water quality monitoring frameworks while Quebec legislates the monitoring of legionella in cooling water though its building code.

Across Canada, other challenges persist, including great discussions about national drinking water quality. It can be difficult for water utility operators to defer to their local health authority on these issues, so the drinking water quality committee of the Canadian Water and Wastewater Association (CWWA) intends to have a one-day seminar on the topic to ensure utility practitioners are up to speed on the current state of the science. Often, the first party the media goes to is the one supplying and testing the water, not the one tasked to speak about health issues.

When it comes to boil water advisories, some jurisdictions struggle with confusion over who exactly is responsible for ordering the advisories in the first place. CWWA provided comments to Health Canada earlier this year on the latest draft of their Guidance Document for Issuing and Rescinding Boil Water Advisories, and a final version of the document should be published later this year or early next year.

As professionals, our only way to stay on top of all these moving targets is to stay informed and to be aware of what's going on in our industry. This can include attending conferences like CWWA's National Drinking Water Conference or next year's consolidated National Water and Wastewater Conference. On your own, reading whatever literature you have access to—preferably industry sponsored and supported publications—and becoming involved in technical committees or association boards are excellent ways to stay informed and up to date. The benefits of being informed and involved will not only be rewarding, but we'll find ourselves better prepared when the next challenge hits. WC

Klas Ohman is the chair of CWWA's drinking water quality committee.

HIRED

Carlos Zuniga

Hatch Mott MacDonald has hired **Carlos Zuniga** as principal project manager. He has 20 years of experience in the water and wastewater industry.

JOINED

Michael Prencipe

Michael Prencipe is joining the Canadian Institute of Plumbing & Heating as manager of operations. He will be responsible for the ongoing management of all operations and service areas, including office administration, and accounting and finance.

Louise Arbour

Louise Arbour, a former United Nations High Commissioner for Human Rights and Justice of the Supreme Court of Canada, has joined Borden Ladner Gervais LLP as counsel.

PARTNERED

IDE Technologies has come to an agreement with Fair Canada Engineering that will see the company's water treatment presence in Alberta's oilsands increase. Fair Canada President **John Fair** said he was excited to support IDE's growth in Canada.

APPOINTED

WaterTAP has added four water leaders to its board of directors: **Rhonda Harris**, director of training/consulting services at CH2M Hill International Ltd.; **Erin Mahoney**, commissioner of environmental services for the Regional Municipality of York; **Ken Morrison**, president of R.V. Anderson Associates Limited; and **Rick VanSant**, president and CEO of UV Pure Technologies.

Rhonda Harris

Erin Mahoney

Ken Morrison

Rick VanSant

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Credit: Actual Media

Lois Gibbs of the Centre for Health, Environment and Justice gives a passionate keynote on her personal experience as a Love Canal activist and champion for grassroots environmental health movements.

RemTech Banff, Alberta

The 13th annual Remediation Technologies Symposium was much like previous RemTechs: great people, excellent speakers, and must-attend parties in one of the most beautiful settings in Canada. There were a record 700 delegates, 76 technical presentations, 57 exhibits, and several very fun gatherings, including Mobtech, a themed opening reception with Al Capone lookalikes mingling around the Muscular Dystrophy charity casino and swinging to live music. **Joe Chowaniec**, his event staff, and the board of the Environmental Services Association of Alberta truly make RemTech a one-of-a-kind environment industry event. *See more photos at esaa-events.com/remtech*

Credit: OCWA

The OCWA Jets take a break during the WEFTEC operations challenge. L-R: Richard Junkin, Carly McLennan, Marcel Misuraca, Jason Mank, and Tom Nicol.

WEFTEC New Orleans

The OCWA Jets descended on New Orleans during September's operations challenge at the annual WEFTEC conference. The ops challenge teams competed in five events including collection systems, laboratory, process control, maintenance, and safety.

"We were thrilled to be representing WEAO—and Canada—in New Orleans," said **Richard Junkin**, OCWA's senior operations manager and Jets coach. "Participating in these challenges provides us opportunities to practice real-world scenarios in controlled environments and learn from other professionals around the world."

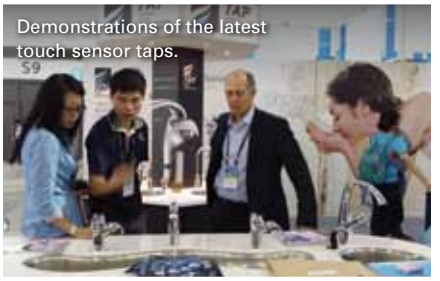
The Jets placed seventh overall out of more than 40 teams. Placing fourth in the maintenance event, they also took home a 'Spirit Award' for great team effort and enthusiasm.

Aqua Taiwan
Kaohsiung City, Taiwan

Credits: James Sbrolla

A tour boat passing by the Soaring Dragon Fish Statue.

Federal and local Taiwanese politicians at the opening ceremonies.



Demonstrations of the latest touch sensor taps.

A look at Taiwan Yes water, or deep ocean mineral water.

Located in the Pacific off the coast of China, the small island nation of Taiwan hosted the first Aqua Taiwan from October 8 to 10 with the hopes it would bring attention to the country's fledgling water sector.

The conference and tradeshow started with a theatrical opening ceremony. National and local dignitaries spoke about the business in Taiwan and globally. This was weaved into a show that included dry ice and cheerleaders. Representatives from Russia, the Middle East, the United States, and more were all in attendance.

The tradeshow had an abundance of faucet companies since Taiwan is one of the largest manufacturers of taps and faucets in the world. The country claims to have 50 per cent of the global market, and based on the number of companies on display, that comes as no surprise.

Taiwan also has a robust research and development sector, which was on display. A number of membrane and other filter technologies were showcased. Some were developed in university labs and others at commercial technology centres. One example was a "hollow tube membrane" that was developed over the past five years in a university lab and is now ready to compete with Zenon/General Electric in the North American market. While the technology is ready to compete on quality, its market strategy is to be very aggressive on price to capture initial market share.

One of the more remarkable (and also strange) "pitches" was on molecular water. Apparently good for your health, molecular water has benefited mountain people for thousands of years and can now be produced with a machine that uses vibration technology.

The last day included a memorable and interesting presentation. The company Taiwan Yes claimed there is great water accessible only from the deep ocean that is high in natural minerals and is without contamination. According to **Chen Guan**, the company's sales manager, "While it is very difficult to access this wonderful water [...] Taiwan has [the] geographic location that gives a competitive advantage." Taiwan Yes has spent US$1 billion building a facility to access and process water to capitalize on this elusive water. Guan boasted, "It's the most expensive water project ever undertaken—anywhere."

Aqua Taiwan was a success on two fronts: it highlighted some new and interesting technologies from Taiwan and Asia, and perhaps most importantly, it brought together water industry stakeholders from around the world and matched buyers and sellers of technology.

Annie Lian from the Singapore-based publication Water and Wastewater Asia had a good closing comment: "For a first-time event, Aqua Taiwan was a great success. If they can build on this platform, the future will bring many industry leaders and new technologies together, and it will become one the premier water events in Asia." —James Sbrolla

Credit: Dylan Neild

RBC presents a cheque for $100,000 to the National Water Centre on September 19, 2014. L-R: Ravi Arni, RBC; Mark Mattson, Lake Ontario Waterkeeper; Colin Krulicki, RBC.

National Water Centre Launch
Saint John, New Brunswick

Canada's first facility dedicated to water and culture opened on September 19. The National Water Centre is a 7,000-square-foot residence on 50 acres of riverfront property in Saint John, New Brunswick.

"Water has shaped every aspect of the Canadian identity, including our settlements, food supply, trade, and social history. It is one of the most powerful forces in our society, yet we rarely talk about it. The National Water Centre is a place to get that conversation started," said environmental lawyer and waterkeeper **Mark Mattson**.

In its first year, the National Water Centre will bring artists and water leaders together to study the influence of water on Canadian culture and business. It will also be home to the Watermark Project, an ambitious plan to create an archive for Canadians' water stories.

The centre is supported by artist **Edward Burtynsky**, filmmakers **Jennifer Baichwal** and **Nicholas de Pencier**, and musician **Gord Downie**, along with charities including Fraser Riverkeeper, North Saskatchewan Riverkeeper, Ottawa Riverkeeper, and Fundy Baykeeper. In preparation for the launch, Lafarge contributed environmentally friendly laneway improvements that give visitors access to the centre while minimizing stormwater runoff and preserving natural habitat.

The National Water Centre is owned by Lake Ontario Waterkeeper. Funding for the first season was provided by the RBC Blue Water Project. —Krystyn Tully

Credits: Actual Media

L-R: Marcus Gay, Bluetech Research, and Albert Cho, Xylem Water Solutions.

L-R: Jessica Underwood, GWI; Peter Nicol, CH2M Hill; Bruce Lounsbury, Newterra.

L-R: Christopher Gasson, GWI, and Kerry Freek, WaterTAP.

American Water Summit
Houston, Texas

The fifth annual gathering of American water professionals was convened by Global Water Intelligence under a "Smashing Silos" theme. More than 400 attendees gathered to talk about the need for new investment and cooperation to make the American water sector "function more efficiently," especially in the face of extreme drought in the southwest. There were many excellent sessions over two days, including the opening plenary where **Jud Hill**, managing partner of Blue Star Capital, poignantly said "Water is NOT free; a new perspective is needed on the cost of water. There isn't a scarcity problem, but an allocation of water pricing problem." Water Canada publisher **Todd Latham** also led a roundtable session and discussed the growth of water P3s in Canada and Ontario's effort to be an international water hub for technology through WaterTAP. *Visit americanwatersummit.com*

More news items can be found at **watercanada.net/topics/news**

Slipping through the Cracks

Ontario must strengthen its regulation of toxic substances.

BY NANCY GOUCHER

Credit: 7ns via Flickr

ARE ONTARIO'S POLICIES AND LEGISLATION adequate in protecting our water and our health? The short answer is no—but we are moving in the right direction.

In Canada, both the federal and provincial governments have something to say about the management of toxic substances. The former is generally responsible for making sure the chemicals and substances manufactured and sold in the country are safe, and for banning what is deemed dangerous. Many of these powers are enabled by the *Canadian Environmental Protection Act* (1999).

Provincial governments are generally responsible for matters of local or private concern. For example, the federal Pest Management Regulatory Agency decides which pesticides can be sold in Canada, but provinces determine how such chemicals are handled and applied.

The cornerstone of Ontario's management of contaminants is the *Toxics Reduction Act* (2009), designed to prevent toxic pollution and protect human health by reducing the use and creation of toxic substances. It does this by requiring large facilities to develop inventories of toxic substances and toxic substance reduction plans.

And this is good news. According to 2005 to 2010 data from the Taking Stock report released by the Commission for Environmental Cooperation in October 2014, Canada discharges significantly more pollutants per capita than either the United States or Mexico. Ontario, in particular, was found to be among the top polluters.

We need to do better, but part of the problem is that there are significant gaps in the *Toxics Reduction Act*. It can't penalize lawbreakers (the relevant sections haven't been brought into force yet); it doesn't adequately address new chemicals coming onto the market (until they go through a lengthy process to add them to the "living list"); and it doesn't go far enough in helping industry transition from using known chemicals of harm to safer alternatives. Finally, it fails to establish targets for toxics reduction and elimination.

Strengthening Ontario's toxics management framework is both necessary and possible. The good news is that there appears to be momentum for change. Recent advancements—such as the banning of pesticides for cosmetic uses and the closure of the last of Ontario's coal-fired power plants—as well as the re-election of a government with a keen interest in toxics reduction suggest we are likely to see more action on this front.

In the lead up to the election, Ontario Premier Kathleen Wynne stated that the government would work with business and industry to explore the idea of ensuring the public is better informed about products that contain toxic substances known to be linked with cancer. The government could do this by requiring products with chemicals linked to cancer to be labelled as such, similar to what happens in California. This would be a great step forward in encouraging businesses to remove harmful substances from products that often end up in waterways.

Another important leap forward would be the passing of the Great Lakes Protection Act, which is likely to be reintroduced shortly. The act is being developed, in part, to reduce and eliminate harmful pollutants in the Great Lakes. It's hoped the act will create a legal framework for setting targets. For example, targets could be created to reduce the use, creation, and release of toxic substances into the Great Lakes. Targets can be a powerful policy tool because they can motivate governments to take action to meet the stated goals.

Next up, it would be great to see the *Toxics Reduction Act* strengthened and fully implemented (compliance and enforcement; product labelling; toxics regulation; and substances of concern). It should require mandatory substitution of safer alternatives for toxic substances in production processes and establish an independent academic institute to help industry do so. Safer substitution is a growing area of research, and many companies are participating in efforts to clean up their products and processes. Ontario should get ahead of the curve and work more actively in this area.

Ontario has a lot of work to do before we can say that our air, water, and personal health is safe from toxic substances and contaminants, but with concerted advocacy, it's headed in the right direction. WC

Nancy Goucher is the water program manager at Environmental Defence.

Have a response? Send your letters to the editor to **rachel@watercanada.net**

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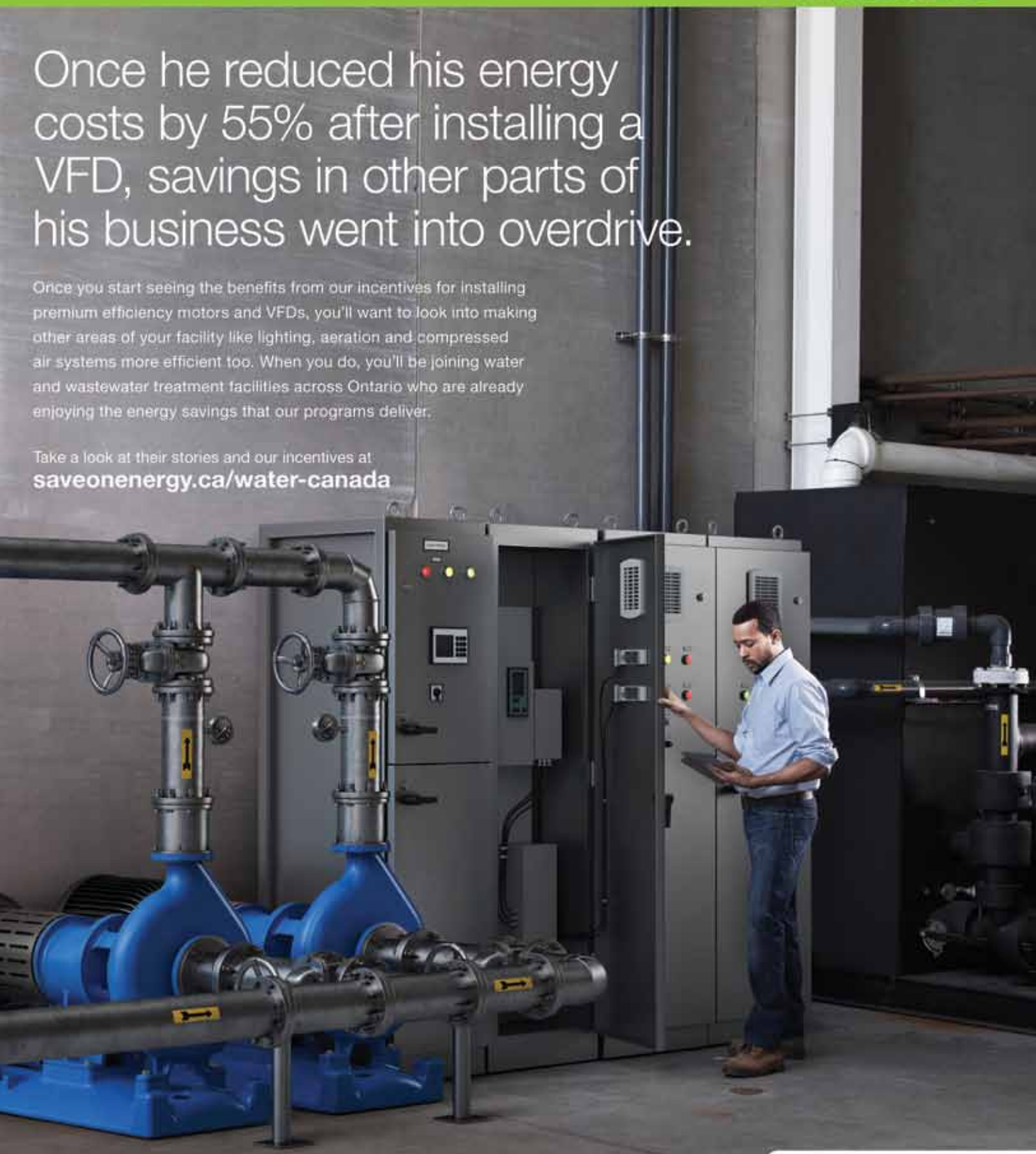

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