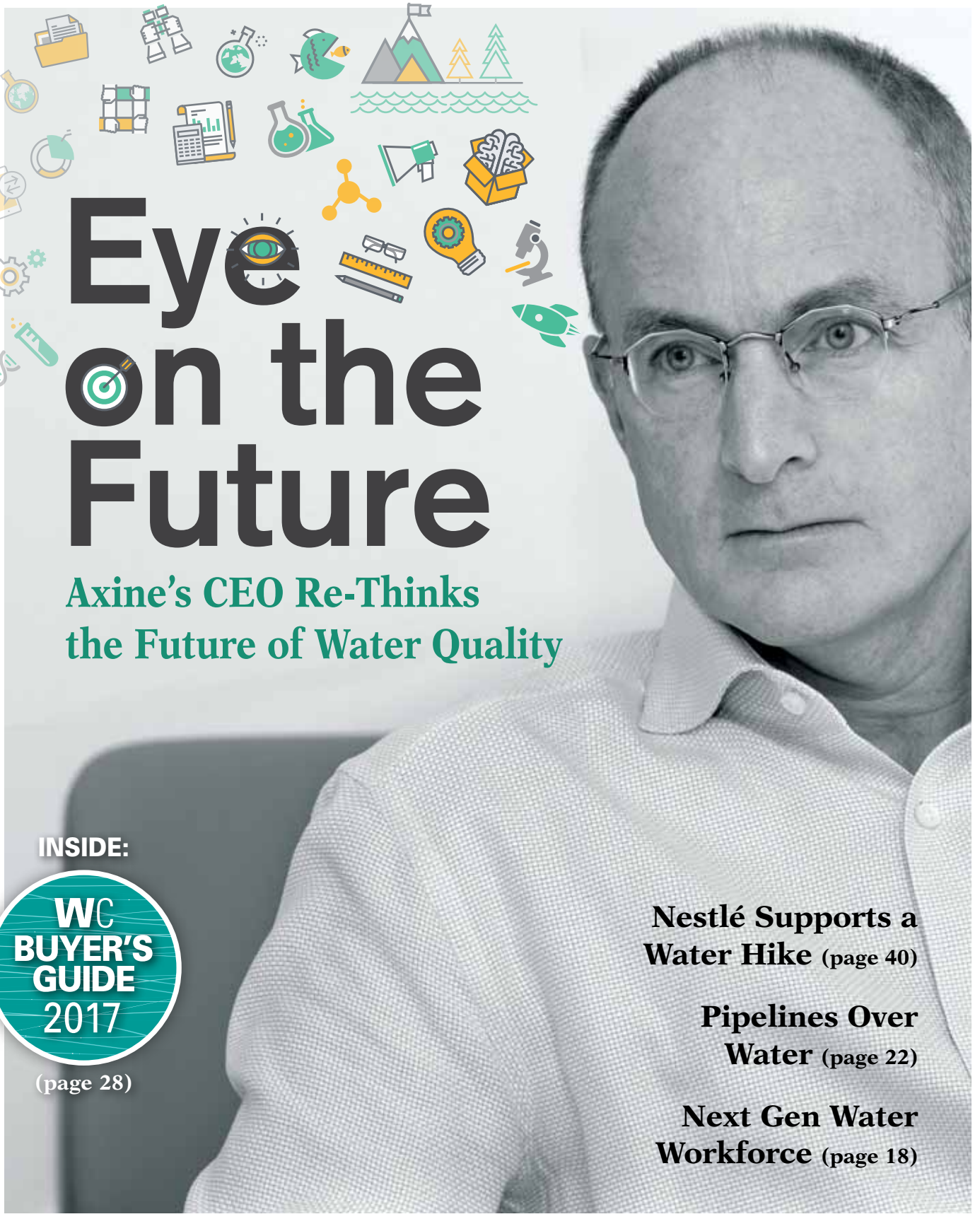
THE COMPLETE WATER MAGAZINE

NOVEMBER/DECEMBER 2016

WATER CANADA



Eye on the Future

Axine's CEO Re-Thinks the Future of Water Quality

INSIDE:

WC BUYER'S GUIDE 2017

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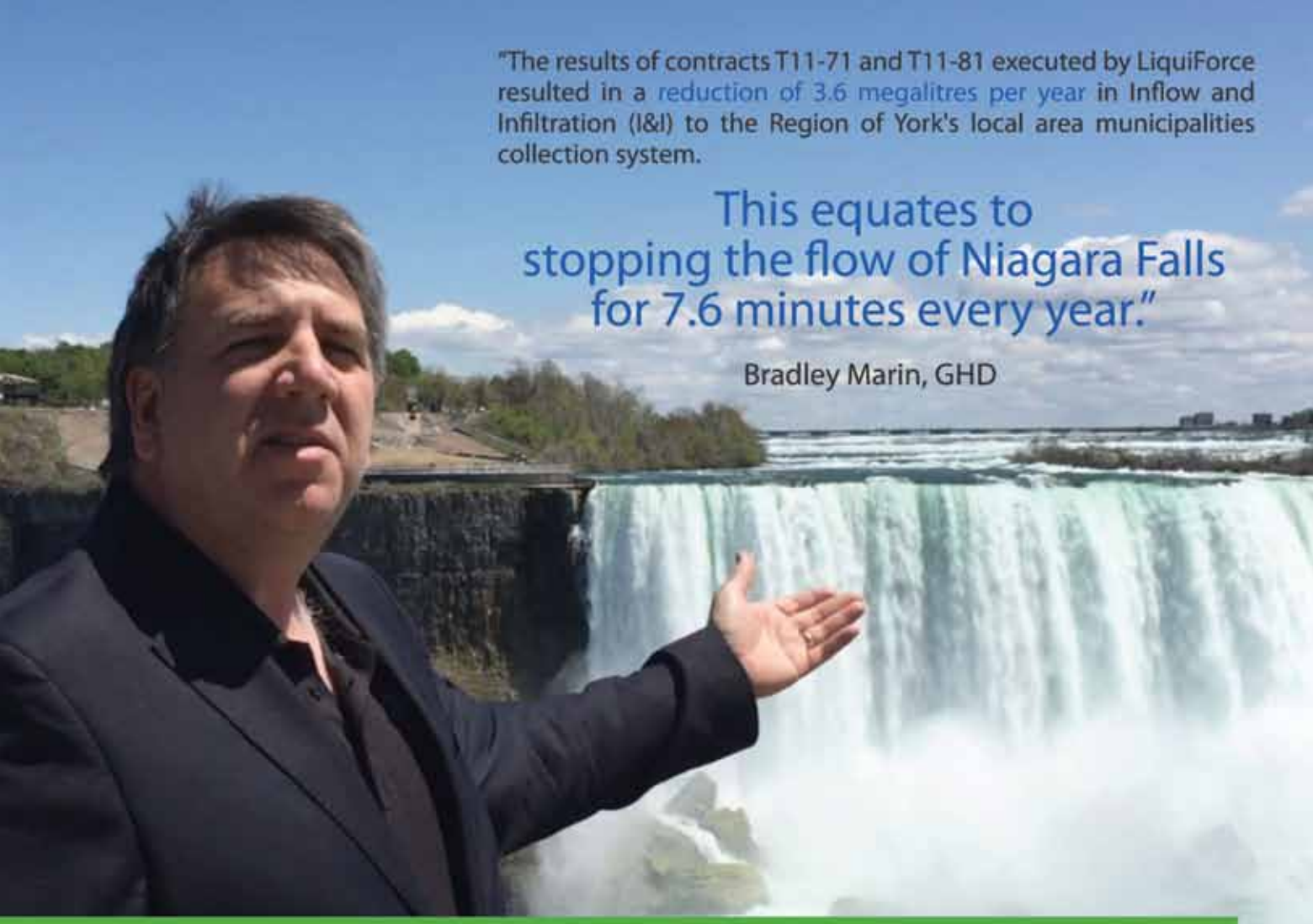

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Phone: 416-444-5842

Subscription/customer services:
416-444-5842 ext. 211

Water Canada subscriptions are available for $39.95/year or $64.95/two years and include the annual Buyer's Guide issue.

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Printed in Canada.

MIX
Paper from responsible sources
FSC® C014584

Undeliverable mail return to:
147 Spadina Avenue, Unit 208
Toronto, ON, Canada M5V 2L7

Canadian Publications Mail Product
Sales Agreement 40854046

ISSN 1715-670X

Proud member of:
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Legacy Contaminants: Act I

BY KATHERINE BALPATAKY

DO YOU EVER WONDER if history will be kind to those of us who work in the water sector? In October, the Water Canada team attended Tarragon Theatre's production of The Watershed. The play is a non-fiction account of the events surrounding the federal budget cuts to the Experimental Lakes Area (ELA)—a freshwater research station in northwestern Ontario that has contributed climate and freshwater research unmatched by any other experimental operation on the planet.

Staged as a documentary, playwright Annabel Soutar interviews scientists, politicians, and advocates who were involved in the protests and eventual takeover of the now infamous research station—including Hank Venema, Maude Barlow, MP Gary Goodyear, David Schindler, and the young scientist who put her career on the line for the cause, Diane Orihel.

You wouldn't necessarily think that a Canadian research station that lost its funding through budget cuts would lend itself to an arresting political drama. However, the play encompasses larger issues, such as the muzzling of science, left-wing and right-wing ideologies, Canada's energy future, and the role of human bias in decision-making. For the script, acting, choreography, and staging, it is entertaining and compelling. By exposing the flaws of its characters, Soutar humanizes the scientific struggle and clarifies the human values and reasoning behind each opposing view.

It has been said that theatre is society's sharpest way to hold a live debate. So, The Watershed has me thinking: What stories about our current success or failure in water management in Canada will become fabled in our history?

In this issue of Water Canada, we tackle the meaty issue of contaminants in water. We profile individuals and groups who are tackling legacy contaminants as well as new ones. Jonathan Rhone from Axine technologies—the subject of our cover story on page 10—discusses an exciting new technology that may well change the notion of acceptable limits for industrial pollution. Rhone explains how, through electrochemical water decontamination, it may be possible and affordable to eliminate contaminated discharge.

On Page 14, Saul Chernos explores the paradigm shift that's happening in brownfield remediation. I spoke with David McGuinty, MP for Ottawa South, about this same topic recently, and he said, "Given every major city in the country has a target of at least a 10 per cent increase in densification, working to reclaim these sites has become both more important and more urgent." Brownfield solutions are a proud part of McGuinty's history; he headed up our national brownfield strategy as part of the National Roundtable on the Environment and the Economy.

We hear from Patrick Smyth, the vice-president of safety and engineering at the Canadian Energy Pipeline Association on page 22. He explains how CEPA members are collaborating with other sectors to safeguard water resources from spills while getting energy resources to market. He argues that the employees of pipeline companies appreciate Canada's water resources, just like you and I do.

Of course, there are many contaminants of importance that could be featured here as well as leaders across Canada who are working to address them. I welcome your thoughts on who we should profile in Act II. WC

To read a Q&A with playwright Annabel Souter visit **bit.ly/WatershedTarragon**

Contact Katherine at 416-444-5842 ext. 116 or email katherine@watercanada.net

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PG 24

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Mike is the chair of Wellington Water Watchers.
PG 40

NELSON SWITZER
Nelson is the chief sustainability officer at Nestlé Waters North America.
PG 40

ABOUT THE COVER

Jonathan Rhone is the CEO of Axine Water Technologies, a venture-backed company commercializing a new method for treating industrial wastewater. In 2009, BC's Technology Industry Association named him Person of the Year and he is currently a member of the BC Premier's Technology Council. "One of the great fringe benefits of being a tech entrepreneur is that we get the luxury to imagine the world in a completely different form," said Rhone at Walrus Talks event in August. On page 10, we speak to Rhone about his vision.

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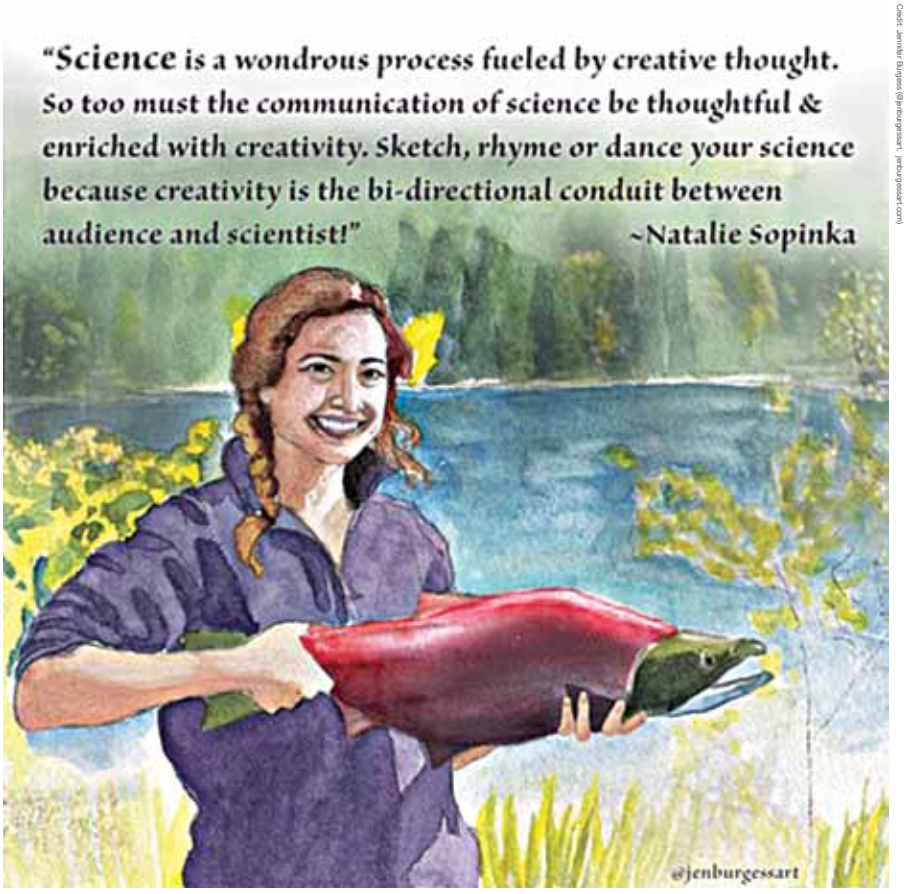


Credit: Jennifer Burgess (@jenburgessart, jenburgessart.com)

#SciComm

Social media campaign features Canadian science communicators.

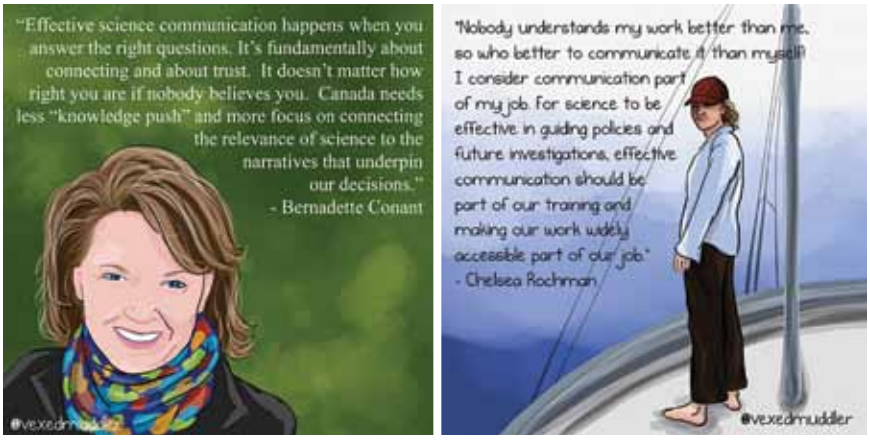
BY TODD WESTCOTT

SINCE SEPTEMBER, Science Borealis, Canada's digital science salon, has been puncturing the social media bubble with "Reflections: 100 Voices for Canadian Science Communication." The campaign pairs thoughtful quotations with bubbly portraits of science communicators.

Operating under #scicomm100, the campaign has brought deserved attention to a gamut of Canadian scientists, science communicators, science dreamers, and people of many-hyphenated science talents.

The project goal is described as, "To share a broad view of the Canadian science communication landscape, open a conversation around science communication in Canada, and deepen readers' appreciation of the importance of accurate and engaging scientific lessons." Moreover, the project offers a long-term teachable tool in the form of punchy and expressive assets that can grab the attention of kids in the classroom or serve as a call-sign for Canadian science.

Many of the featured communicators used the space to address the complexities of delivering science to the public. "Science is all about storytelling. From forming hypotheses to analyzing results we are examining how things fit together to tell a story about our world. Scientists require the precision and accuracy of jargon and mathematics to communicate to each other. The public needs the story," said Ele Willoughby, an artist and marine geophysicist, for the project.



Credits: Peggy Muddler (@vexedmuddler, etsy.com/ca/shop/thevexedMuddler)

Science Borealis asked 100 Canadians from the science communication community to share a statement of their vision of #scicomm in Canada. Partner group, Agence Science-Presse, have begun a parallel effort focusing on French-language communicators (#100LaScience). (L-R) Natalie Sopinka, a post doc at the Cooke Lab at Carleton University; Bernadette Conant, CEO of the Canadian Water Network; Chelsea Rochman, assistant professor of freshwater and marine ecology, University of Toronto.

Asked about the online response to the initiative, Sarah Boon, the founding member of Science Borealis said, "We started collecting quotes for this campaign back in the spring. Initially we had a difficult time getting people to participate. Now that we've launched, however, the response has been tremendous. People from a variety of backgrounds are commenting and sharing the quotes on Twitter and Facebook. Other science communication voices are requesting to be added to the list (we're already taking names for next year!). We had a signal boost from the Minister of Science, Kirsty Duncan, twice during our campaign."

Duncan, while not immodest, was not the only media-friendly persona captured. Jay Ingram, former host of the long running science journalism show Daily Planet, and Chris Hadfield, Canada's astronaut turned media impresario, both contributed text bites to the program.

"Overall, this initiative has really opened up a broad discussion of science communication across the country. It has inspired people to think about why and how they communicate science in their everyday lives. We're now working to make as many of the quotes as possible available as prints that people can purchase, with proceeds going to support new Science Borealis initiatives," Boon said, emphasizing the broad appeal of science to Canadian consumer.

What's the water connection? The project has featured a number of prominent water scientists and communicators: Brett Favaro, research scientist and instructor at the Fisheries and Marine Institute of Memorial University; Steve J. Cooke, professor of fish ecology and conservation physiology, and Canada Research Chair; and Water Canada's own Katherine Balpataky, among quite a few others.

Science Borealis is grateful to these talented artists: Peggy Muddles, Raymond Nakamura, Jen Burgess, Catherine Lau, Geoff Lee, Hannah Brazeau, Premee Mohamed, Mika McKinnon, Robert Bateman, and Jacques Goldstyn. WC

Todd Westcott is Water Canada's content and marketing manager.

We love hearing from you! Tweet us **@CanadianWater**

Online at WATERCANADA.NET

BLOG: Hey young professionals, check out our new SYP-focused blog, BUBBLE by blogger-in-residence Jessica Neal. ***bit.ly/BUBBLEblog***

VIDEO: The International Joint Commission invites input on its preliminary recommendations to address microplastic pollution in the Great Lakes. ***bit.ly/MPlasticsIJC***

REPORT: New report on Ontario water rates. ***bit.ly/OntWaterRates***

All back issues of Water Canada are available for download at **library.actualmedia.ca**

Credits: The Regional Municipality of York

Process control systems technologist, Kyle Carlen, inspects water infrastructure equipment to ensure the uninterrupted delivery of clean, safe drinking water.

Operator Diane King conducts extensive water testing to confirm regulatory requirements are met.

Sewer use bylaw enforcement officer, Jen Ryan, is part of a team who guard against pollution before it goes down the drain.

Branch Out

York Region's collaborative approach to source protection against contaminants.

BY MIKE FAIRBANKS AND TANYA KAMPHERM MARTIN

THE REGIONAL MUNICIPALITY OF YORK is responsible for the delivery of safe, high-quality drinking water to more than 1.1 million residents. Water is collected from various sources, including 41 groundwater production wells, two surface water intakes in Lake Simcoe, and two intakes in Lake Ontario through partnerships with City of Toronto and Regional Municipality of Peel.

Managing existing and potential contaminant sources plays an important role in protecting municipal drinking water. York Region uses a multi-barrier approach through training, treatment, monitoring and testing, emergency preparedness, and Source Protection—mitigating risks on the landscape today and preventing future risks through land-use planning.

Contaminant threats

In order to prevent contamination, threats to drinking water sources require effective tracking and management. Potential threats in York Region include septic systems, industrial and commercial activities such as the storage and handling of fuels and solvents, and agricultural threats. Legislation governing the management of these threats has recently come into effect and requires the development of risk management plans.

Figure 1: Branch vs Contributions to Multi-Barrier Approach

Capital Planning and Delivery	Designs and builds water and wastewater infrastructure.
Environmental Promotion and Protection	Includes water resources staff who are primarily responsible for implementing Source Protection initiatives.
Infrastructure Asset Management	Conducts asset life cycle and system performance analysis.
Operations, Maintenance, and Monitoring	Responsible for operator training, drinking water quality testing, and water treatment.
Strategy and Business Planning	Ensures financial sustainability and continued resources.
Strategy Liaison and Policy Implementation	Oversees internal processes, and provide checks and balances to ensure all regulations are met.

Collaboration is key

In order to ensure the success of this multi-barrier approach, York Region's Environmental Services department collaborates across all six of its branches. The department is comprised of six branches. (see figure 1)

Addressing potential threats to source water includes such actions as evaluating on-site activities, implementing risk management measures, and negotiating a Risk Management Plan with the affected business or land owner. To help with the implementation, York Region Council approved an incentive program to subsidize the costs of risk management measures and foster relations with affected landowners and businesses.

Emerging contaminants

Emerging risks to source water are also being incorporated into York Region's protection efforts. With the identification of emerging issues such as pharmaceuticals and personal care products in the water industry, York Region established an Emerging Contaminants Working Group. This internal group has representatives from various business units and provides an intra-departmental forum to discuss research initiatives and coordinate activities related to emerging contaminants.

Outreach to local municipal partners and realtors has helped prevent potential new threats, by making them aware of land uses and activities that present risks. Regular enquiries are made to local municipalities to ensure new land development decisions align with the region's Source Protection requirements. Approximately 90 development applications per year are reviewed—many of which require land-use planning policies be implemented so that York Region is able to protect drinking water sources.

Significant success

Since 2011, all of the approximately 500 sites with potential threats initially identified in the region have been verified and either confirmed or removed from the list of potential threats. Through proactive engagement, continued research, and collaborative outreach and communication, more than 300 additional sites with potential threats were added to the list. To date, approximately 75 per cent of those new sites have been verified and either confirmed or removed. In addition, a total of 53 Risk Management Plans are in effect for sites that were confirmed to be a significant threat to drinking water. To ensure compliance with negotiated Risk Management Plan, 30 of those sites were inspected in 2015 and 2016.

In 2016, York Region was selected as a recipient of the American Water Works Association Exemplary Source Water Protection Award for Metropolitan Source Water Systems. The award was a wonderful tribute to the success gained through collaboration between each of the branches within our Environmental Services department. However, the most gratifying result is safe and reliable drinking water. WC


Mike Fairbanks is a program manager, water resources, and Tanya Kampherm Martin is a hydrogeologist and risk management inspector at York Region.

Credit: Axine Water Technologies

The Axine management team (L-R) Goran Sparica, senior VP of engineering; Jonathan Rhone, CEO; James Yates, director of wastewater solutions; David Harvey, director of product development.

Rise of the West

Jonathan Rhone of Axine Water Technologies has vision for the next hub of innovation and de-contamination. BY JEFF SANFORD

MODERN MANUFACTURING METHODS have delivered technological miracles like the smartphone. But the advanced materials these products are composed of generate new challenges in terms of wastewater treatment. Enter Axine—a west-coast start-up, about to bring a new product to market, that just may have the solution for treating complex, modern wastewater streams.

Based in Vancouver, British Columbia, Axine Water Technologies is getting ready to scale-up it proprietary electrochemical water decontamination system into a commercial product that will treat the waste streams from microelectronic production, chemical operations, pharmaceutical firms, and oil and gas projects. A successful 100-site test program has confirmed the technology works. Now the company plans to install the first commercial installations with the help of a just-announced $8-million round of venture capital financing from Japanese multinational Asahi Kasei Corp.

Jonathan Rhone, CEO of Axine, recently explained what potential Asahi sees in the business. "They recognize that the whole area around the interface of advanced materials and manufacturing processes and wastewater treatment is a huge issue. There is no question about it, the products we manufacture today are much more complex from a chemical standpoint. Complex organics, recalcitrant polymers, surfactants, and toxic organics are creating waste streams that are much more complex than has traditionally been the case [...] Water decontamination today requires a rethink."

The technology

To treat these modern waste streams, Axine has developed its electro-chemical process, which uses advanced membranes similar to those in so-called fuel cells used to create electricity and power cars. In an energy generating fuel cell, an advanced membrane strips

Credit: Axine Water Technologies

(L-R) Victor Leung, product development engineer; David Harvey, director of product development; and Melody Lu, analytical chemist of Axine Technologies. The group are seen here reviewing product development materials at Axine's product development centre in Vancouver.

Credit: WikiCommons

A group accompanies Washington State Governor Jay Inslee on a visit of the world's largest radioactive waste treatment plant in Washington. Inslee has signed a memorandum of understanding with B.C. Premier Christy Clark affirming their mutual interest in creating a Western clean tech hub, known as the Cascadia Innovation Corridor for cross-border collaboration.

ions from hydrogen gas producing electricity and generating only water as a by-product. Axine applies a similar membrane-based solution to water decontamination.

The founder and chief engineer at Axine, Colleen Legzdins, once worked for B.C.-based Ballard Power, a company that has been producing fuel cells for industrial use for years. But Rhone is careful to distinguish the Axine product from the Ballard one. Axine's product cleans water. Ballard's product generates electricity. "There is an advanced membrane involved. But we're a completely different product," he said.

In the case of the Axine technology, an electrified catalyst inlaid in the membrane creates a system that oxidizes contaminants in water and reduces those contaminants to their basic chemical components.

"We're not just filtering the water. The ionic exchange membrane generates oxidants, which break down the pollutants," said Rhone. "What's left over are harmless by-products like nitrogen and oxygen." The advantages to such a system are many.

Conventional processes for industrial water treatment include bio-decontamination or simple filtration, which create sludge that has to be disposed of. Upgrading these traditional

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Credit: Shrum Science Centre

Simon Fraser University chemistry student Rachel Ashley (right) assists B.C. Premier Christy Clark and Port Moody-Coquitlam-Port Coquitlam MP James Moore in an experiment in the Shrum Science Centre at SF University. SFU supports many clean technology innovations in energy storage and water treatment sectors.

Credits: University British Columbia

Being able to partner with universities, such as the University of British Columbia, make Vancouver an attractive city to establish a startup.

Credit: GLOBE Series

Prime Minister Justin Trudeau delivered the keynote speech at GLOBE 2016 in Vancouver in March, 2016. He spoke about Canada's plan to invest in clean growth, and how western Canada has, and continues to be, a significant driver of the clean economy.

systems requires huge outlays in plants and equipment. Axine offers a system that is small, modular, and can be attached to existing systems so that the wastewater stream is polished to a level that it can be discharged into the municipal water system.

Matters of competetiveness

"Some of these wastewater streams are so challenging customers have to truck that wastewater off-site. But that's expensive. We can disrupt that and treat on site so that the water can reused or discharged to local municipal system[s]," said Rhone. Think of the technology as a sort-of polishing system that can bring water up to acceptable levels of clean. "It's [a] low-cost solution that can decontaminate water without creating other waste products."

Axine doesn't sell the system. They install it and then charge a monthly fee, which means no upfront cost. The initial application will focus on treating ammonia—a massive global market. But the company will extend the system to treat other contaminants. "Depending on what catalyst is used in the membrane, different waste streams can be treated. And we have a pipeline of researchers working on a number of different catalysts," said Rhone.

"Some of the wastewater streams being created today are fairly complex and involve multiple streams. We've already got customers coming in saying, 'Can you do this?'"

There is real interest in growing this company into something much larger.

The west as an innovation hub

Helping Axine succeed in its growth plans is the nurturing environment of the burgeoning west coast clean-tech sector. Rhone is a member of the B.C. Premier's Technology Council, on the advisory board of the Pacific Institute for Climate Solutions, as well as chair of the BC Cleantech CEO Alliance. He is at the center of an exciting, growing industrial hub.

Case in point, this past February, Justin Trudeau spoke to a delegation of over 1,400 people at the GLOBE 2016 Innovation Expo and Leadership Summit—an event positioning itself as North America's largest sustainable-business event. In January— only days after the B.C. government announced it

would not support the Trans Mountain Pipeline expansion—oilsands companies Suncor and Cenovus committed $50-million a new fund in partnership with the BC Cleantech CEO Alliance. In September, Premier Christy Clark and Washington Governor Jay Inslee signed a memorandum of understanding affirming their shared interest in creating a Cascadia Innovation Corridor.

> In the last 10 years, Vancouver Area and B.C. in general has emerged as one of the top global centres of clean tech and innovation.

"I'd say in the last 10 years Vancouver area and B.C., in general has emerged as one of the top global centres of clean tech and innovation. We have world class universities, fantastic technical talent, great entrepreneurs. There are almost 300 pure play clean-tech companies here now," said Rhone. That is, there is a functional community that includes research institutions, companies, and funding from venture capital firms from Europe and Asia.

"We're finding that increasingly the world is looking to Vancouver to find these solutions," said Rhone. Asked if living among the stunning natural environment along the west coast inspires those in the B.C. clean-tech sector he said, yes. "People say that... and I think there's some truth to it. There is an intangible asset living here. There is an amazing natural environment out here and people tend to get out in it and take environment issues seriously. That's an intangible asset here."

As the global economy increases in terms of the complexity and sophistication of the products produced, the West Coast is developing the methods and technologies to manage the waste, including new and complex wastewater streams. "Whether it's a pharmaceutical plant in southeast Asia that produces difficult wastewater or a plant in the oil sands, we need to continue to think about how to treat these difficult pollutants. We can't let these wastes find their way into the water and then into what we eat. We need more innovation to make sure the cost of wastewater doesn't put the economy and the culture out of business," said Rhone. "This technology solves a multi-billion-dollar problem." WC

Jeff Sanford is a freelance journalist in Toronto.

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Sherbourne Common, the iconic waterfront park, transformed from a brownfield site, along Lake Ontario in downtown Toronto. It is the first park in Canada to integrate a neighbourhood-wide stormwater treatment facility into its design.

Credit: Jason Pang

Installation of injection remediation infrastructure by Vertex Environmental Inc. beneath roadway at spill site in central Ontario.

Remediation crews installing injection infrastructure adjacent to Lake Ontario in Toronto's Portlands district.

Credit: Vertex Environmental Credit: Vertex Environmental

Extreme Sites

New technologies go after brownfield contaminants at the source. BY SAUL CHERNOS

NO ONE WANTS residual diesel or chlorinated solvents in their drinking water. Yet, scant decades ago, fuel tanks were left to rot underground, and liquid waste was disposed of with little regard for the future. Out of sight, out of mind. Various estimates suggest that there are tens of thousands of known or suspected contaminated sites in Canada. However, new and emerging technologies designed to remediate contamination on-site are providing opportunities to restore these deserted spaces and protect groundwater resources. As such, traditional dig and dump brownfield cleanups could someday become a thing of the past.

The wrong kind of legacy

Through the late 1980s and 1990s, communities began to confront chemical trails left by earlier generations. Hollywood captured this with two courtroom thrillers. A Civil Action, starring John Travolta, addressed the leakage of the industrial solvent trichloroethylene (TCE) into a local aquifer. Two years later, Erin Brockovich, featuring Julia Roberts, took on an energy company's release of hexavalent chromium from its evaporating ponds. While some public unease about moving into brownfield spaces lingers, the increasing demand for real estate—particularly on waterfront and riverbank properties—is overcoming these fears.

"As people become more sophisticated in their understanding of contamination—what levels are okay and what aren't—there's much more acceptance of buying property on a former brownfield site," said Bruce Tunnicliffe, president of Vertex

Credit: Vertex Environmental

Remediation crews installed horizontal well infrastructure underneath a contaminated roadway in response to a formaldehyde spill near Trout Lake near North Bay.

Credit: Vertex Environmental

In response to a heating oil spill, crews injected oxidants to a site adjacent to a lake in eastern Ontario.

Credit: Jason Paris

Sherbourne Common transformed a brownfield site into an outdoor living room and urban park.

Environmental in Cambridge, Ont.

Tunnicliffe has overseen a considerable number of brownfield remediation projects. He said projects typically involve participation from all three levels of government. While the provinces generally regulate clean-up practices and standards, the federal government oversees sites on federal and First Nations lands. Municipalities also play a key role—they often own or have a stake in properties where pollution has occurred. While municipalities are a key driver, remediation efforts can be cooperative, with upper levels of government sometimes helping finance clean-ups and related activities.

Olympic efforts

When the 2010 Olympic Winter Games were awarded to Vancouver, the city moved forward plans to construct new subway lines, including the redevelopment of old industrial land. Tunnicliffe recalls a small patch in the vicinity that was contaminated with polychloroethylene (PCE) from a dry cleaner. Vertex Environmental helped engineer removal of contaminants from the soil. "We injected an oxidant called permanganate into the ground and then extracted and tested the groundwater underneath to see the effects," Tunnicliffe explained. Injecting remediation compounds into the soil is a modern technique for treating contamination in situ, as opposed to removing contaminated soil and treating and then disposing of it elsewhere, Tunnicliffe said. Vertex used this same in situ injection technique to remove TCE from a site close to the company's head office in Cambridge. Tunnicliffe said the groundwater flowing underneath the site was dissolving the contaminants, with the mixture migrating underneath approximately 900 homes and into a nearby river.

TCE tends to quickly dissipate in open air, but in this case, some of the solvent became trapped in underlying bedrock. "We controlled the source such that the remaining plume, over time, will dissipate and decrease in concentration. But with some of these contaminated groundwater issues we deal with, we have to resort to management almost as much as remediation."

In situ clean-ups have largely focused on permeable sands and gravel, where plumes reside (a plumes is the area in which a contaminant spreads through soils). However, practitioners of remediation work have their sights set on denser clay environments where contaminants tend to concentrate. Dense environments tend to create an ironic safe zone for pollutants, protecting them from efforts to eradicate them.

"There's been no way to flush a lot of water through a clay layer," said Michaye McMaster, a senior principal with Geosyntec Consultants who works from the Florida-based company's Guelph, Ont. office. "Dig-and-haul has been a common historical approach to cleaning up these sites."

Charged up

Geosyntec is working to change the brownfield remediation game with two technologies so new they're still partially under trial. One of them, electrokinetic technology, uses an electrical field created by electrodes placed in the ground to move chemicals, and in some cases microorganisms, in and out

of target formations in the subsurface "We're aiming to deliver remediation compounds such as oxidants, bacteria, and electron donors into these layers," McMaster said. Environmental electrokinetics, developed in the 1990s, has proven to have great potential for remediating low-permeable soils such as clays and silt.

> It's unpalatable to me that we've thought it acceptable to take contamination and haul it somewhere else.

With a full-scale application underway in Denmark, Geosyntec embarked on a pilot study in southern Ontario earlier this year aimed at treating chlorinated solvent residues contained in a low clay and till mix underneath an operational industrial site. "The basis of electrokinetics is to treat the source, not just the plume," McMaster explained.

Geosyntec is also in the early stages of applying another new technology, branded STAR by its developers at the University of Edinburgh, which heats the underground contamination to temperatures as high as 800°C so that it smoulders. The idea, McMaster said, is to turn thick, toxic compounds to vapour.

While Geosyntec is conducting indoor lab tests to assess the technology's capabilities to treat various compounds, the company is using it for a New Jersey client looking to clean up a lagoon containing coal tar residue. "Coal tars don't move," McMaster said. "The liquids are very sticky, so the treatment remedy has been to either excavate them or stabilize them using cement. However, both methods are costly, and STAR was developed as an alternative to treat it on-site."

McMaster said she hopes the new technologies will spell an end to dig-and-haul and improve the protection of precious water resources. "It's unpalatable to me that we've thought it acceptable to take contamination and haul it somewhere else and think it's fine," she said.

As far as protecting water resources, McMaster said dealing with deeper, denser soils and clay zones is vital to long-term protection, because this is where contaminants concentrate. "These source areas have to be treated so we're not impacting water resources in the decades to come." WC

Saul Chernos is a Toronto-based freelance writer with a focus on environment and infrastructure issues.

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1 The R. C. Harris Water Treatment Plant in Toronto, Ont., is both a crucial piece of infrastructure and an architecturally acclaimed historic building named after the longtime commissioner of Toronto's public works R.C. Harris. 2 Participants at the Walkerton Clean Water Centre (WCWC) take part in a watermain tapping course. 3 Lindsay Ariss, WCWC technician and instructor, explains a component of an online turbidity meter to a group of Centennial College students in the Technology Demonstration Facility. 4 Venkat Ramani delivers water-related training courses across the province and also develops new water-related courses. 5 Operators gain hands-on training during Maintenancefest at the WCWC. Here participants conduct simulated watermain repair under the new Ontario Watermain Disinfection procedure.

Workforce of the Future

How are we training the next generation of water sector professionals?

BY TRISTAN SIMPSON

AT THE EAST-END OF TORONTO on on Lake Ontario lies the R.C. Harris Water Treatment Plant. This vast facility has been providing clean drinking water for more than 70 years. And for 70 years the building has been a fixture on Toronto's shoreline. The plant, dubbed "the jewel by the lake," is a good example of the evolution in water treatment that has taken place across the country. While the building's exterior and its employees' objectives remain unchanged, the actual business of making clean drinking water has been completely transformed.

In generations past, most water operators gained employment straight out of high school; these days, however, operators are required to have a strong foundation in science, engineering, and technology. EPCOR quality assurance director Steve Craik said, "For large water treatment facilities with their own laboratories (like EPCOR in Edmonton), the greater degree of sophistication means more reliance on individuals with advanced degrees like an M.Sc. and PhD." Craik said that students entering the work force are generally more computer savvy than their predecessors, which is warranted with the greater reliance on computers.

Emerging technologies

Within a 10-year timeframe, water management has been transformed with new technologies coming online

for monitoring, treatment, and distribution. For example, operators can test for emerging containments and pathogens that couldn't be identified before. Labs use advanced water treatment technologies such as ultra-filtration membranes and analytical instrumentation that can detect micro-pollutants to parts-per-billion and parts-per-trillion levels.

William Fernandes, the director of water treatment and supply for the City of Toronto said that, overall, there has been a shift to automated systems and computerized applications to store information and support operations and maintenance. Even field instrumentation has transitioned to microprocessor from analog control he said. Improved reliability and automation of equipment has improved efficiency, allowing workers to focus on higher-level functions. Time spent on paper charts and manually recording data can now be used to focus on system-wide challenges. For example, Supervisory Control and Data Acquisition (SCADA) systems help staff to rapidly address equipment issues or changing water quality. As a result, "There is a greater need for workers w ith automation, instrumentation, or controls backgrounds to support plant operations, and those related to information technology," said Fernandes.

"Operators need to understand how systems work from source to final discharge," said Pat Miller, Sun Peaks Utilities' director of utilities. "They also need to know how equipment works and the impacts of their actions on a broad scale." In the age of automation, Miller believes that the skills necessary to code in PLC/SCADA software are critical when troubleshooting issues. "That being said, operators still need to know how to operate heavy equipment, like backhoes, skid steers, and excavators," said Miller.

Hands-on training needs

Despite the need for higher education, employers still place a heavy emphasis on hands-on experience. The 2015 BC

L-R: Pat Miller, Sun Peaks Utilities' director of utilities—the first female operator on the Environmental Operators Certification Program board; Venkat Ramani, a senior operational instructor at Walkerton Clean Water Centre, who was instrumental in establishing a partnership with Bimose Tribal Council for the delivery of training to First Nation Operators; William Fernandes, the director of water treatment and supply for the City of Toronto; and EPCOR quality assurance director Steve Craik.

Water and Wastewater Sector Workforce Survey noted that hands-on learning and certification are keys to progress in water- and wastewater-sector careers: "There are limited pathways for new operators to successfully enter the workforce, and additional education options are required to train underemployed individuals with related degrees and diplomas."

"To fully understand the equipment, an operator needs hands-on experience and training. We provide training both by a peer-to-peer method and by utilizing educational organizations," said Mike Gosselin, past chair of the EOCP board and a city of Kelowna wastewater manager. Industry professionals praise schools and training programs that offer co-op placements. Training videos are more prevalent now than in the past. Many suppliers are starting to put training videos on sites like YouTube, and some firms actually require suppliers to provide videos or animations for teaching. Even industry associations are training through videos and animations.

People skills

Miller noted that communications skills are also increasingly important for water operators. Managers need to interact with decision-makers and the communities they serve now more than ever before, because there is a greater awareness and desire to understand how water is being treated. "Being aware of people's perceptions can make or break a system, help or hinder funding for new projects, and is crucial for making customers understand issues like water conservation or non-flushable wipes," said Miller.

Kate Reilly, a PhD candidate and

educator in integrated water resources management at McGill University, said this is also true of practitioners who are managing source water at the watershed level. Reilly currently teaches an M.Sc. course in watershed systems management that places a significant emphasis on approaches to public engagement for water management. Reilly said, "A common risk of current watershed planning is that once plans are produced, the process is considered finished and the plan's recommendations are not implemented. Therefore, we [the educators] concentrate on evaluating and prioritizing the problems in a watershed, taking advantage of windows of opportunity, building momentum by successfully implementing small actions, and building stakeholder ownership of the process." Reilly added, "We emphasize stakeholder participation in watershed management decisions, including how to design a participation process, use its results, and evaluate its effectiveness. While we do not expect all our students to run a stakeholder participation process in their future jobs, it is vital that they understand the value of stakeholder input to decision-making."

Diversifying the workforce

Encouraging females to join the water sector is another key priority for leaders and educators in the industry. Historically, the number of women working as water operators has been low. For example, a 2015 survey of by the BC Water and Wastewater Association found that women accounted for only 12.9 per cent of the water sector workforce in British Columbia, and that numbers are even lower for operator and supervisor positions.

Miller is the first female operator on the Environmental Operators Certification Program (EOCP) board. The EOCP is responsible for certifying water and wastewater operators in British Columbia and the Yukon. The organization evolved 50 years ago from a handful of wastewater treatment plant operators. Miller said that the female participation in the sector is increasing. "When I started with EOCP, I found that there were around 100 certified female operators. Now, 12 years later, there are just over 200 female operators," she said.

Advice for those looking for a career in water management? Miller, Reilly, and Gosselin all agree that while training programs are delivering what's needed to learn the fundamentals, maintaining skills and keeping current with technological advancements must be ongoing. Craik stressed that new recruits should be prepared for continuing education after they enter the workforce. WC

Tristan Simpson is a freelance writer in Toronto.

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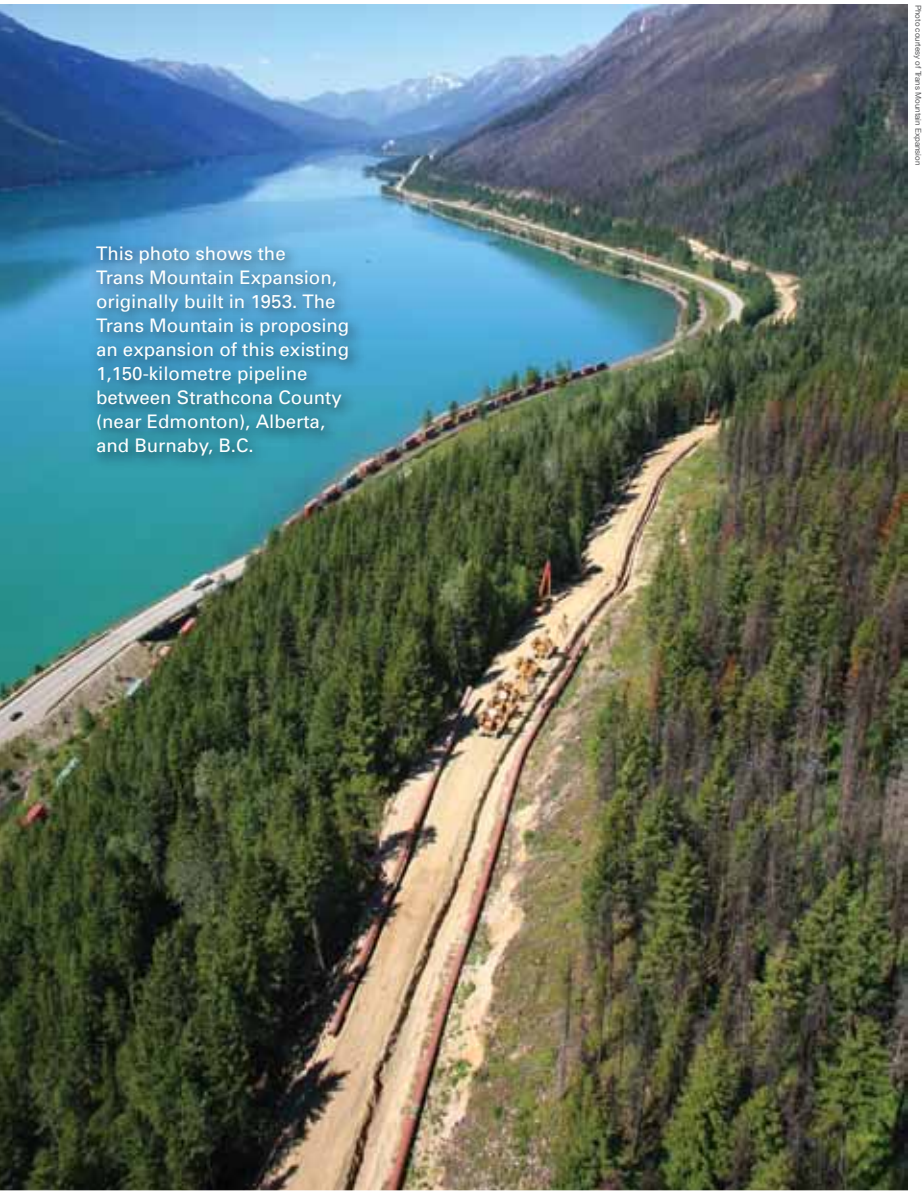

Photo courtesy of Trans Mountain Expansion

This photo shows the Trans Mountain Expansion, originally built in 1953. The Trans Mountain is proposing an expansion of this existing 1,150-kilometre pipeline between Strathcona County (near Edmonton), Alberta, and Burnaby, B.C.

Credit: Canadian Energy Pipelines Association

Pipeline operators regularly conduct emergency response exercises, including in bodies of water, to ensure they are prepared to effectively respond.

Over & Under

Water protection remains a critical focus for the oil and gas pipeline industry.

BY PATRICK SMYTH

LAKES, STREAMS, AND RIVERS make up approximately nine per cent of the country's ecosystem, and water is the life blood of Canadian communities—many of which are home to our Canadian Energy Pipeline Association (CEPA) member employees and their families. We all understand the critical importance of keeping these waterways safe.

Transmission pipelines are the safest method to transport oil and gas products, with strict regulations, comprehensive codes and standards, and guiding documents in place to ensure acceptable practices are employed for watercourse management. This is the result of extensive research and investment that has gone towards ensuring that the ecosystem is protected at every stage throughout the life cycle of any given pipeline.

Recognizing the real and perceived risks associated with the industry, CEPA members are constantly innovating with new research and safeguards like protective coatings, and advanced technologies like acoustic monitoring. Over 100 biologists, engineers, government officials, and other experts are working with the pipeline industry to update our comprehensive guidelines for constructing pipelines that cross bodies of water.

Through this engagement and research, our members have identified six priorities to protect waterways:

Selecting the route

Biologists, environmentalists, and other experts go through a comprehensive process when selecting the safest place for a pipeline to cross a body of water. They explore ways to minimize the pipeline's impact by analyzing factors like bank stability and presence of wildlife, vegetation, and fish habitat. CEPA and its member companies continue to explore and implement best practices in this area to ensure the optimal safety of the pipeline and protection of the environment within and adjacent to a proposed water crossing location.

Over 100 biologists, engineers, and government officials are working with the pipeline industry to update our comprehensive guidelines for constructing pipelines that cross bodies of water.

Designing the pipeline

Pipelines that must cross waterways and are in the proximity of aquifers are designed to strict criteria. These criteria include thicker walls and for larger water bodies, automated block valves are installed on one or both sides of the watercourse crossing, which stop the flow of product in the pipeline further reducing the possibility of an accidental spill or leak. Operators apply protective coatings to the pipes during construction to prevent the steel from having direct contact with water or soil, which can cause corrosion. Where necessary, cables, bolts, and weights may be installed for extra stability.

Constructing carefully

When building a pipeline across a waterway, operators choose the safest method based on the local ecosystems and industry-leading standards, and government regulations. For example, operators may use a trenchless method—such as horizontal directional drilling underneath the river—to minimize the environmental footprint on existing ecosystems through which the pipeline is installed. The industry continues to focus on new and improved technology to refine construction techniques, which will further minimize the environmental footprint associated with these activities.

Monitoring and inspection

Once in operation, pipelines have 24/7 monitoring systems keeping a close watch on the flow of product in the pipeline. If there are changes, alarms will alert the operator and valves will be shut immediately.

Pipelines are inspected regularly with in-line inspection tools that travel inside a pipeline to measure pipe thickness and metal loss. Company employees travel the pipeline right-of-ways looking for anything out of the ordinary, and aerial inspections give operators a bird's eye view of the right-of-way.

New pipeline monitoring techniques are being tested by some CEPA members, including using acoustic monitoring of sounds at several pipeline locations near river crossings. Additionally fiber optic technology—which can provide instant information about the condition of the pipeline—is being explored by some of CEPA's member companies.

Preparing for emergencies

While pipeline emergencies are rare, operators are prepared to quickly and effectively respond if an incident does happen. In 2015, CEPA members experienced zero significant liquids incidents and only one natural gas incident. All CEPA members carry out regular emergency response exercises and have emergency management plans in place. In addition, all CEPA members have an agreement in place, called Mutual Emergency Assistance Agreement, which can be triggered in an emergency when another member requests assistance.

Ensuring safety for life

Pipeline companies have a lifetime commitment to ensure their operations remain safe for the public and the environment, even if a pipeline isn't being used. Retired pipelines are subject to specific regulatory requirements to ensure their safety. Across Canada, very few transmission pipelines been retired to date. Smaller gathering, feeder and distribution lines go out of service more frequently, but when it comes to large diameter transmission lines, we have little experience to tell us what the long-term impacts might be along the right-of-way.

Since 2013, CEPA has been sponsoring a Pipeline Abandonment Research Program, in conjunction with the Petroleum Technology Alliance of Canada (PTAC).

The goal of the research program is to learn what happens to pipelines after they have been retired, and to develop guidelines for safe, economic and environmentally sound pipeline retirement. WC

Patrick Smyth is the vice president of Safety and Engineering for CEPA.

To learn more, please visit **aboutpipelines.com/en/environmental-protection/water**

Setting a global goal to be water neutral was an ambitious one, but in 2015, Coca-Cola became the first Fortune 500 Company to do so.

The Prairie Pothole Region in Manitoba where Ducks Unlimited has partnered with Coca-Cola to restore and preserve ecologically and hydrologically important wetlands.

All Photos: Ducks Unlimited

Taste the Feeling

Coca-Cola achieves water neutrality.

BY JOEL LONGLAND AND RON SORNEAU

WATER IS A PRECIOUS RESOURCE that we all share. Not only is it essential to the sustainability of Coca-Cola's business, but it's also fundamentally important to the communities in which we operate. That's why water stewardship remains key to our environmental sustainability efforts.

With this mindset, Coca-Cola announced an aspirational goal in 2007 that we would replenish 100 per cent of the water we use in our finished beverages—and their production—to become water neutral by 2020. We are proud to have achieved this goal five years early. Becoming water neutral on a global scale was an ambitious goal, but in 2015, Coca-Cola became the first Fortune 500 Company to do so.

At Coca-Cola, we replenish water in two ways: through community water partnership projects, such as watershed restoration, and comprehensive wastewater treatment.

Understanding our footprint

In Canada, we work with the municipalities where we have bottling facilities to understand the impact we have on the region's watersheds. For every bottling facility Coca-Cola operates, both in Canada and around the world, we conduct regular source water audits. These audits help us to understand the environmental, infrastructural, and quality risks and to mitigate those risks when necessary.

Replenishment inside our facilities

Water is an important ingredient in our finished products, but it's also required in our operations. Like most manufacturing industries, we need water for our packaging and to ensure that our physical spaces are kept clean and safe.

Inside the walls of each of our facilities, Coca-Cola's goal is to improve water efficiency by 25 per cent by 2020. This means, we are making the necessary investments to use less water while our business continues to grow. To achieve this, we are investing in new technologies and processes such as dry-line lubrication for our conveyor belts and rinsing our bottles with compressed air instead of water. These technologies and processes have helped Coca-Cola Canada conserve over two billion litres of water since 2010, and we are on-track to meet our 2020 goal.

Replenishment in communities

Even though we have met our global goal, our water replenishment work is not finished. In Canada, we continue to work with partners such as the Nature Conservancy of Canada to restore the Bow River watershed by reducing erosion and agricultural runoff. Replenishment has translated into building a new wetland at Tommy Thompson Park with the Toronto and Region Conservation Authority and other government partners. The new wetland not only provides habitat for wildlife, but will measurably improve water quality for the water entering Lake Ontario from the Don River. These projects and others across Canada and around the world are assessed by an independent third party to validate that they are measurably improving the water quality or quantity in a given watershed—meaning, we are replenishing the freshwater we are using.

Our approach is to collaborate on replenish projects with governments, NGOs, and other private sector actors in these water stewardship efforts. It's not only the right thing to do for communities and nature, but it's important for Coca-Cola as a business. Muhtar Kent, the chairman and CEO of The Coca-Cola Company recently said, "If you aren't responsibly managing water in your business, you won't be in business 20 years from now." It is a wake-up call for all of us to treat water as the important resource it is and take action together. WC

Ron Soreanu is a director of public affairs and communications for Coca-Cola Ltd. Joel Longland is a manager of sustainability and stakeholder relations at Coca-Cola Ltd.

Credits: Credit Valley Conservation

Measured Benefits

Bioswales on private property filter parking lot runoff and use it to irrigate beautiful landscape features.

Inset: Thermal imaging compliments measured success: LID practices cool both stormwater and urban environments.

Evaluating long-term performance from low impact development practices.

BY JENNIFER DOUGHERTY, KYLE VANDER LINDEN, PHIL JAMES, DEBORAH MARTIN-DOWNS, AND BILL TRENOUTH

IMAGINE USING an unassuming corner of your street, yard, or local park to improve the quality and security of water and the Great Lakes. It's possible with green infrastructure and low impact development (LID). These approaches can create beautiful garden or landscape features that also remove some of the most problematic urban nonpoint pollutants affecting our environment.

Traditional approaches to stormwater management, such as stormwater management ponds, prioritize peak flow and flood control. They have the unintended consequences of warming stormwater to unhealthy levels and reducing dissolved oxygen required by fish and other organisms. The result is the deteriorated quality and functionality of our most heavily impacted urban streams.

As our collective knowledge evolves, so do our stormwater management approaches and regulations. The Ontario Ministry of Environment and Climate Change is currently updating their stormwater management guidelines, which will place greater emphasis on LID and reducing runoff volumes.

Evaluating options based on experience

We have been working closely with our municipal partners and other stakeholders to construct and monitor LID practices for the last six years. Our monitoring program focuses on the long-term performance of different types of LID practices. We have evaluated the results of LID practices installed under a variety of unique and challenging conditions, looking specifically at water quantity and quality results.

Our performance monitoring data shows that LID can reduce annual runoff volumes by up to 80 per cent and remove 80 per cent of suspended solids, which are harmful to aquatic environments. Problem nutrients like phosphorus are reduced by more than 80 per cent, and filtered waters are cooled by more than 5°C, which is vital for cold-water fish. As well, heavy metal loads have been reduced from 50 to 90 per cent.

Some Ontario municipalities—such as Mississauga, Toronto, and Peel Region—have started to use these results to inform new infrastructure design standards along roadways, parks, and within institutional spaces. It's encouraging to see municipalities at the forefront. Unfortunately, 75 per cent of the GTA was built prior to any sort of flood control and 85 per cent prior to any water quality control. Nearly 60 per cent of this land is privately held.

We must look beyond public lands if we are serious about curbing stormwater pollution and localized flooding. The realities of climate change require us to be flexible.

Since 2008, the GTA has been hit with three 100-year storm events. This trend is likely to continue or get worse. Innovative LID solutions can go a long way towards alleviating these issues. While private lands present some of the greatest opportunities for LID implementation, they also face the greatest barriers.

Research to action

Research shows that the largest barriers to LID implementation are the upfront costs and the extended payback period, even in situations involving stormwater charge and credit programs. How can

we expect to see further reductions in urban stormwater pollution and wide-scale LID adoption without offering a viable business model for cash-strapped private landowners?

Using established programming as a model, Credit Valley Conservation is leading a research project to provide collaborative solutions for private landowners that will allow them to share the costs and benefits of LID. To address urban nonpoint source pollution, we need a distributed approach to filtering, polishing or treating, and reusing stormwater. Strategically placing LID is the best way to achieve this. WC

Jennifer Dougherty is a manager of water resources and water quality protection, Kyle Vander Linden is a senior specialist of integrated water management, Phil James is a manager, of integrated water management, Deb Martin-Downs is CAO, and Bill Trenouth is a water resources for Credit Valley Conservation Authority.

Seeking viable business for private landowners

Even when a utility offers financial incentives to improve stormwater management, the adoption of water technologies by private landowners is hindered by the return on investment. In response, many American cities who are leaders in the field have begun moving towards a model that supports aggregation of water management technologies on private property. The benefit? It supports a reduction of costs related to design, construction, operation, and maintenance (O&M) for private properties owners. However, municipalities don't currently have a process in place to make use of these tools to support implementation.

Credit Valley Conservation has initiated a project that will ultimately support wide-scale adoption of decentralized LID stormwater practices in Ontario on private lands through public-private partnerships.

Phase 1: Gap analysis and development of discussion papers that will explore topics such as market-based economic instruments, municipal and private adoption requirements, and potential aggregation models, 2017.

Phase 2: Development and refinement of an economic model that will harness grants, economies of scale, and utility rebates to share design, construction, and O&M costs on private properties. Development of an implementation framework to foster aggregation of private properties, 2017/2018.

Phase 3: Apply the economic model and implementation framework to a test catchment area, 2018/2019.

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The information compiled in this year's guide was provided by the product and service providers. Basic summary listings can be found online at watercanada.net/buyers-guide. Detailed listings—including contact information, descriptions of products and servives, social media links, and company logos, are showcased in this book.

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linkedin.com/company/canadian-water-and-wastewater-association

cwwa.ca

CWWA is a non-profit national body representing the common interests of Canada's public sector municipal water and wastewater services and their private sector suppliers and partners. CWWA is recognized by the federal government and national bodies as the national voice of this public service sector. CWWA is a Canadian organization that addresses Canadian water and wastewater issues at the national level and was founded in 1986 by Canadian municipal water/wastewater leaders and the Federation of Canadian Municipalities.

Canadian Water Quality Association

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The industry served by the Canadian Water Quality Association and its members encompass water quality improvement for homes, businesses, industry and institutions in these broad areas: drinking water and working water. CWQA is the information resource, and the recognized voice for water quality improvement in Canada. CWQA's mission is to support and grow the health, sustainability, and credibility of the water quality industry in Canada.

E

Endress+Hauser Canada Ltd.

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Endress+Hauser is renowned worldwide for its wide range of measuring devices and automation solutions for process industries. As a global provider of complete solutions for industrial measurement technology and automation, the company supplies and services instruments and systems which acquire, transmit, control, and record process information.

Environmental Services Association of Alberta (ESAA)

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facebook.com/Environmental-Services-Association-of-Alberta-ESAA

twitter.com/ESAARemTech

esaa.org

The Environmental Services Association of Alberta (ESAA) is a not-for-profit business association dedicated to building a strong environment industry through leadership in technology, human resources, quality improvement, and market development. ESAA delivers a number of events throughout the year, including WaterTech and RemTech.

F

FER-PAL Infrastructure

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G

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H

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Hammond Manufacturing

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Hammond Manufacturing is a global supplier of electrical enclosures, electronics packaging and electronic transformers. Established in 1917, the company has grown and evolved its product line to its current position as a leader in quality and service. The extensive electrical enclosure offering ranges from small junction boxes to large freestanding cabinets utilizing a variety of materials—mild steel, stainless steel, aluminum, and non-metallics.

I

Imbrium Systems

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Imbrium Systems is an engineered stormwater treatment company that designs and manufactures stormwater treatment solutions that protect water resources from harmful pollutants. Technologies such as Stormceptor, Jellyfish Filter, and Sorbtive Media are designed to address the long-term impact of urban runoff, ensuring our clients' projects are compliant with water quality regulations. Imbrium products are sold through our network of value added partners.

K

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Kinetico is clearly a leader in the world of residential and commercial water treatment in Canada. Our innovative and patented solutions that have industry leading warranties and performance standards, set us apart from everyone else. For further information on our solutions or dealership opportunities, please visit us at Kinetico.ca.

KISTERS North America, Inc.

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KISTERS is a global IT company dedicated to developing leading-edge data analytics systems for sustainable management of water, energy, and air quality. Leveraging more than 50 years of engineering expertise KISTERS is recognized internationally for professional competence, operational insight, innovative and customized solutions. KISTERS supports environmental resource stewardship on six continents via clients ranging from small private firms to large governmental authorities KISTERS is recognized internationally for professional competence, operational insight, innovative, and customized solutions. KISTERS supports environmental resource stewardship on six continents via clients ranging from small private firms to large governmental authorities.

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L

LiquiForce

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LiquiForce is an international sewer and water contractor, specializing in no-gig technologies. Our patented systems allow us to rehabilitate pipes including sewer laterals without any excavation. Both the cleaning and installation equipment are launched through the existing manhole, and the result of this is a quicker and long lasting repair with fewer environmental and liability concerns along with significant reductions in cost. LiquiForce handles the entire job, from cleaning—to bypass pumping—and finally rehabilitation.

M

MSU Mississauga Ltd.

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N

newterra

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newterra is a global leader in engineering, manufacturing, and supporting modular water treatment systems. Our advanced, customized solutions are treating potable water, domestic wastewater, industrial process and wastewater, and contaminated groundwater for industrial, resource, institutional, municipal, and land development clients. newterra has been named one of Canada's Best Managed Companies for eight consecutive years.

P

Pentair Water Purification

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Pentair Water Purification strives to offer the highest quality products in water filtration solutions. As you seek to enhance the quality of your water, accept no imitations—insist on genuine Pentair parts manufactured in North America. For more than 40 years, Pentair has been the quality choice for water treatment professionals due to our strong, reliable product lines, including Pentek, Fleck, and Autotrol. We offer point-of-entry and point-of-use solutions that work to provide the quality water for residential, commercial and industrial applications.

ProMinent Fluid Controls Ltd.

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ProMinent Fluid Controls Ltd., manufactures products for water and wastewater treatment, specializing in sensors, controllers and chemical metering (chemical dosing pumps), and polymer preparation systems. ProMinent supplies components and complete standard and custom systems for chemical storage, transfer, measurement, sensors/controllers, and accurate metering of all water treatment chemistry. ProMinent has representation across Canada.

R

RWL Water

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RWL Water is a leading-edge, sustainable solutions company providing full solutions for desalination, water, wastewater, waste-to-energy, recovery and reuse, and food and beverage processing to municipalities and industries throughout the world.

S

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T

Tank Connection

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The Water Shed

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X

XCG Consultants Ltd.

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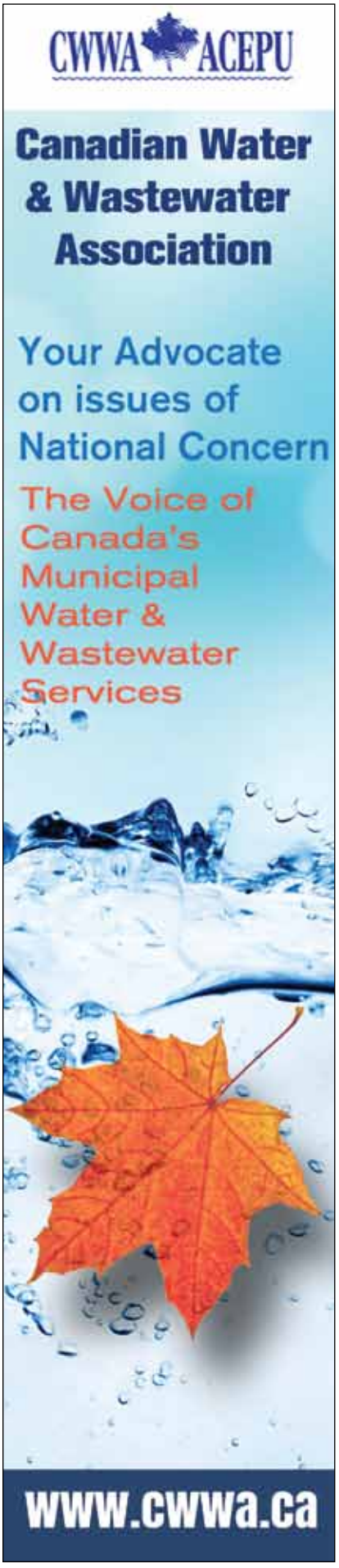
XCG Consultants Ltd.—an environmental engineering firm that is committed to delivering innovative, practical and sustainable solutions. Built on a solid foundation of senior engineering professionals, XCG offers clients across a wide range of industry sectors comprehensive services in water and wastewater treatment, municipal infrastructure, water resources, site assessment & remediation, risk assessment, solid waste, and training & operations.



Our Opportunity; Our Positions

Goals and priorities for Canada's water and wastewater infrastructure. BY ROBERT HALLER

THE CANADIAN WATER AND WASTEWATER ASSOCIATION (CWWA) exists to advocate on behalf of our members, the municipal utility sector. While we've been active since our inception, we haven't always broadcast our successes to our members. Therefore, we recently released a report titled, Our Impact, Our Opportunity, Our Position.

The report not only builds on past CWWA success but puts forward arguments for the better delivery of federal funding with regard to infrastructure.

There is an opportunity right now to provide further input as the government develops Phase 2 of the Infrastructure Plan—a plan that includes $15 billion for green infrastructure, including water and wastewater. In the report, the CWWA states how we believe such a program should work, with guiding principles for the use of funds in order for our members to gain the maximum returns from Phase 2.

HIGHLIGHTS OF THE REPORT

National goals vs. local priorities: We fully support the national goals regarding climate change and environmental protection, but ask the federal government to recognize local priorities. Water and wastewater projects can significantly address energy climate change targets by reducing the energy used in treatment or lost to waste and by providing new energy sources such as biogas.

Community Capacity-Building: Proper asset management and full-cost pricing are essential to move municipalities toward self-sufficiency and away from grant dependency. We feel that, in order to qualify for federal funding, municipalities should have an asset management program and a full-cost pricing program in place or commit to the development of such programs. In addition, the federal government can do much more by developing asset management templates, pricing models, training, programs for staff support, and other guidance tools to assist small and medium sized municipalities.

Long-term sustainable funding: Quick responses to short-term grant programs have led to improper planning. Together, the three levels of government must develop a reliable financing plan that extends far beyond a 10-year timeframe and reconsiders the distribution of taxes in Canada.

Value for Money: Our hope is to get the maximum impact from these funds and achieve the best value per dollar by considering big picture infrastructure goals. Infrastructure projects must consider the full life cycle of any asset, including the operating and maintenance costs for an asset's expected lifespan. A key element in project agreements must be optimizing the operation of an asset to reduce energy and resource consumption and draw maximum performance. We also feel that approved projects must commit to recommended maintenance scheduling, removing maintenance deferral as an option.

Flexibility: We need flexibility in timelines and technical approaches to maximize the impact of the Phase 2 funds. Allowing a little more time in some cases will lead to a better project, providing greater impact and greater value for money spent/invested. We also ask that the federal government be flexible and open to considering trade-offs as they relate to cost or benefits, that can achieve greater results.

Wastewater systems effluent regulations and other regulations: We are very pleased to see federal funds supporting the new regulations, but again, maximum flexibility is required on timelines. Federal funding must support the search for the best technology/procurement solutions and consider new technologies or trade-off projects.

Innovation: CWWA fully supports the goal of promoting the Canadian innovation sector and methods to ensure fair consideration of new technologies. Asset decisions must be based on full life-cycle costs and procurement must be open and output-based. But we also ask for assurance of federal support for communities willing to try new technologies.

We wait with great optimism for federal announcements on Phase 2. WC

Robert Haller is the executive director of the Canadian Water and Wastewater Association.

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APPOINTED

Andrew Stevenson

The Canadian Public Works Association (CPWA) has announced that **Andrew Stevenson**, manager at ATAP Infrastructure Management Ltd. in Saskatoon, Saskatchewan, has been appointed to serve as president of CPWA for a two-year term. Stevenson will represent CPWA and its members on national public works and infrastructure issues with the federal government in Ottawa and will work collaboratively with other stakeholder groups on issues of national concern. As a former superintendent, heavy equipment operator, trainer and certified contract water and wastewater operator, he brings over 20 years of management, technical and operation experience to the role.

Bryan Wattie

EFI Global is pleased to announce the official opening of a new office in Moncton, New Brunswick, led by **Bryan Wattie**. Wattie is a junior engineer with a Master's degree in Bioresource Engineering. His background includes environmental assessments, remediation, hydrology, and frameworks for sustainable engineering. Wattie brings a strong understanding of the regulatory process in New Brunswick as well as practical experience in field response work, including property-related spills and the remediation of impacted soil and groundwater and the restoration of impacted sites.

Michele Grenier

Dan Huggins

The Ontario Water and Wastewater Association (OWWA) announces that **Michele Grenier** has been selected for the manager of operations position at the OWWA office. Grenier brings extensive knowledge and experience from her career and history as a OWWA board member. As such, Grenier has resigned from the OWWA board position, and **Dan Huggins** will complete Grenier's term on the board of directors.

(L-R) KSB president Mike Blundell and Claude Goulet.

KSB Pumps is pleased to announce that **Claude Goulet** has joined the company as their new sales manager for installed base and aftermarket sales. Goulet is a 30-year veteran of pump and seals sales, specializing in oil, gas, chemical and petrochemical industries. "We are pleased to have Claude join our team and are looking forward to having him grow this important part of our business," said **Mike Blundell**, president and CEO of KSB Pumps, Inc. Goulet will be based in Ottawa and will also be responsible for aftermarket sales in Quebec.

Trish Johnson

The Water Technology Acceleration Project (WaterTAP) is pleased to launch its Better Best Practices Initiative and has appointed **Trish Johnson** to lead the initiative. The Better Best Practices is a series of collaborative projects that seek to continuously improve water management and leadership in Ontario by addressing challenges that can represent barriers to the adoption of innovative water technologies by end-users. Johnson brings more than 30 years of experience in public, private, and non-profit environmental management in Canada and the United States to the WaterTAP team. "Trish not only brings extensive experience in the water sector, she has a genuine drive to support municipalities in making the best possible decisions for current and future water needs," said **Peter Gallant**, president and CEO of WaterTAP.

AWARDED

Peter Hanlon

Peter Hanlon has been selected as the recipient of the Atlantic Canada Water and Wastewater Association's George Warren Fuller Award. Hanlon transferred to the Saint John water and sewage department in 1986, where he held several positions including operations engineer, manager of water and sewage services and chief water quality inspector, prior to retiring in 2010. Hanlon has been highly active in research and committees throughout his career, including AWWA Research Foundation and as New Brunswick director of the Canadian Water & Wastewater Association.

EVENTS

Credit: Ontario First Nations Technical Services Corporation

Chief Linda Debassige of the M'Chigeeng First Nation.

First Nations Chiefs' Water Crisis Summit

Niagara Falls, ON

The Ontario First Nations Technical Services Corporation (OFNTSC) hosted the First Nations Water Crisis Summit and Symposium at the Marriott on the Falls Hotel, Niagara Falls, Ontario on October 17 - 19, 2016. The event has was designed to address the 47 boil water advisories and do not consume orders in First Nation communities in Ontario, as well as federal priorities. OFNTSC executive director **Matthew Hoppe** presented a First Nations Led Approach to Chiefs at the summit. As well, participants issued a declaration for joint action plans between the Chiefs of Ontario and and OFNTSC.


Credit: Global Public Affairs

Global Public Affairs' inaugural Infrastructure Lab.

Infrastructure Lab

Toronto, ON

On September 15, Global Public Affairs, Canada's largest privately held public affairs firm, and Canada's UK Trade and Investment hosted The Infrastructure Lab—the first of a series of events focusing on thought leadership in infrastructure.

British Consul General for Toronto, and director-general for UK Trade and Investment, **Kevin McGurgan**, welcomed guests. Water Canada's editor, **Katherine Balpataky**, moderated the session with **Liv Garfield**, CEO of Severn Trent UK Plc, one of the largest of the 10 regulated water and sewage companies in England and Wales, and **Sangeeta Chopra**, the director of Engineering Services at Ontario Clean Water Agency.

Garfield shared insights on how Severn Trent has increased performance and managed risk in the water sector, using incentives such as challenging employees to come up with £70 in savings, and staff bonuses tied to profit, safety, and customer service.

David Caplan, vice chair of Global Public Affairs, gave the closing remarks.


Credit: Actual Media

An Ojibway Nation chief expressed his concern over the organizer's jurisdictional rights.

Great Lake Public Forum

Toronto, ON

From October 4-6, the governments of Canada and the United States rolled out the red carpet to members of the public at the 2016 Great Lakes Public Forum. The three-day forum held at Toronto's Allstream Centre was part of a broader effort to engage the public on binational priorities for science and action; and to provide an opportunity for the International Joint Commission to discuss and receive public comment on the Progress Report of the Parties, part of the Great Lakes Water Quality Agreement.

The Lieutenant Governor of Ontario, **Elizabeth Dowdeswell**, provided an opening keynote. Minister **Catherine McKenna** participated in an armchair discussion alongside Ontario's Minister of Environment and Climate Change, **Glen Murray**; United States Ambassador to Canada, **Bruce Heyman**; and United States Environmental Protection Agency senior advisor to the administrator, **Cameron Davis**; about the importance of our Great Lakes, threats to the Great Lakes basin, and opportunities for protection.

Presentations by government and non-government experts were delivered on issues such as algal blooms, climate change, invasive species, and the role of science in Great Lakes protection. Facilitated question and comment periods followed. Over 500 people attended.


Credit: Actual Media

Concerned citizens voice their opinions in small breakout groups.

International Joint Commission Public Meeting on Lake Ontario Toronto, ON

On October 5th, as a part of its year-long review of the bi-national work between Canada and the United States to safeguard the Great Lakes watershed, the International Joint Commission (IJC) hosted a public meeting at Toronto City Hall. Five presentations were given on topics of public concern to IJC commissioners followed by breakout sessions where participants could voice their concerns on those same topics and others. Commissioners will be tasked with incorporating a broad range of findings into a report to be shared with both governments to assess the health of the watershed.

The session was led by **John Jackson**, a veteran of community environmental advocacy who provided input on the original Great Lakes Water Quality Agreement. Presenters included the former mayor of Toronto, **David Crombie**; **Krystyn Tully**, co-founder of the Lake Ontario Waterkeepers (LOW), and, **Jacqueline Wilson**, counsel at the Canadian Environmental Law Association (CELA), who discussed unaccounted for contaminants of concern.

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watersummit.ca

Credits: Actual Media

(L-R) Andrea Miller, Ashlee Donaher, and Dave Tracey of LuminUltra Technologies.

A group from York Region, Environmental Services mingle at Preservation Hall for the GHD reception.

WEFTEC 2016 New Orleans, La.

More than 20,000 attend the Water Environment Federation's 89th annual WEFTEC conference and exhibition in New Orleans, Louisiana. Notable highlights included the installation of green infrastructure on the grounds of New Orleans City Hall; discussions during the Great Water Cities session, including George Hawkins of DC Water; the Sustainable (recycled water) Beer Smackdown; and the Water Environment Federation Student Design Competition. The Water Environment Federation (WEF) also launched their #mywaterlegacy social media campaign at the event aimed at promoting the tradition of working in the water sector.

Of course, much of the networking and best discussions during the week took place before and after hours. On Tuesday, the governments of Ontario and Quebec hosted a reception, overlooking the Mighty Mississippi with partners WaterTap, Grande Water Management Systems, and Hunter Expositions, for representatives of Canadian clean tech companies to attend. **Rita Patlan** of the Ministry of International Trade and **Kerry Freek** of WaterTap spoke and **Sara Wilshaw**, Consul General of Canada in Texas attended. Late evening highlights included GHD and XPV receptions in the heart of the French Quarter.

For companies seeking deeper networking opportunities, the Ministry of International Trade hosted a breakfast B2B session to make cross border introductions and increase business opportunities for Canadian firms. Canadian companies heard American utilities speak about their needs and how they assess potential technologies.

Credit: Actual Media

(L-R) Amy Langford, Patricia Wiebe, and Steven Zingaro.

Water Environment Federation Student Design Competition

New Orleans, La.

A record number of teams—including two from Canada—competed in the 2016 Water Environment Federation Student Design Competition at WEFTEC in New Orleans. This year, 15 teams presented innovative solutions to address real-world water quality issues. The University of Guelph team, including **Amy Langford**, **Patricia Wiebe**, and **Steven Zingaro**, advised by professor **Hongde Zhou**, presented their evaluation of alternatives for enhanced biogas production and energy recovery at the Duffin Creek Water Pollution Control Plant in York Region. The University of British Columbia team, under the guidance of professor **Eric Hall**, looked at phosphorous removal at the Whistler Wastewater Treatment Facility. The UBC team included **Leah MacGillivray**, **Kelsey Baker**, **Danielle Gutwillinger**, **Trudy Miller**, **Travis Reid**, and **Ma hew Waldie**.

Patricia Wiebe of the University of Guelph team said "I'm so glad that I participated. It was a real challenge. There was a lot of group work required to define the [water] problems before we could attempt to solve them [...] Getting to see the other teams' projects gave me an idea of issues one must face in the wastewater industry. I feel this design competition was a taste of what can be done after graduation."

Credits: Aquahacking

William Reese was a keynote speaker at this year's Aquahacking Summit.

The 2016 winning teams take to the stage to celebrate.

Television hosts The Water Brothers.

Aquahacking 2016 Summit

Montreal, QC

The 2016 AquaHacking Summit rallied citizens, water experts, the computer programmers to find innovative solutions to protecting the St. Lawrence River. The challenge focused on priorities for the river, including: adapting to climate change, spills and overflows, access to the River and how innovation, technology and creativity can support our waterways. Each hacking team came together to present their solutions in five minute presentations. The winners received $50,000 in cash prizes, support from the IBM Ecosystem, access to incubation/accelerator consulting.

The AquaHacking initiative was the brainchild of the children who represent the fourth generation of the de Gaspé Beaubien family. Brothers, **Louis-Alexandre** and **Philippe IV Beaubien**, are passionate about innovation and improving water for future generations.

The event featured keynote speakers **William Rees**, a former director and professor emeritus at the University of British Columbia's School of Community and Regional Planning, and The Water Brothers, **Alex** and **Tyler Mifflin**.

Ontario Water Innovation Week Toronto, ON

From October 17th–21th Ontario's clean tech community came together to discuss areas for accelerated adoption and areas of potential growth through a series of events hosted by Ontario WaterTap and partners. The week kicked off on Sunday October 16th in Ajax, Ontario with the Isle Utilities' Technology Approval Group (TAG) meeting. The forum allowed water and wastewater utility leaders to investigate emerging technologies that have been vetted by Isle's global network of experts (*see the Sept./Oct. issue of Water Canada for more on the TAG group*). **David Martin**, Canadian associate for Isle Utilities said, "Isle Utilities and WaterTAP took another step together to help share knowledge and solve problems for York Region and the City of Toronto." He added, "The uncommon Sunday time slot did not stop three of the carefully prepared companies from delivering their message well enough to already be successfully engaged in meaningful discussions about doing business here in Ontario. Isle is pleased to have once again enabled innovation and good business through our world renowned TAG program."

October 19-20 World Water-Tech North America

The fourth annual World Water-Tech North America 2016 (October 19-20), hosted by WaterTAP and Rethink Events, brought together global leaders to Toronto to discuss water innovation and investment. Ontario's Minister of Research, Science and Innovation, **Reza Moridi** emphasized the importance of water to provincial and national economies. Panel sessions explored such issues as new mechanisms for project financing, the role of regional clusters and cross-border collaboration in accelerating technology adoption, energy optimization, and closing loops in the circular economy.

Ontario Water Innovation Week capped off with its Courageous Conversations Procurement Workshop on October 21.

Credits: WaterTAP

Michelle Brownlee of the Smart Prosperity Institute discusses how "green tape" can advance environmental sectors.


Michael Chan, Ontario Minister of International Trade, welcomes delegates to the inaugural Ontario Water Innovation


(L-R) Tim Adams of Kingston, Ont-based TECTA-PDS, Terrie Romano of Ontario's Ministry of International Trade.

Water Innovation in Action 2.0 Toronto, ON

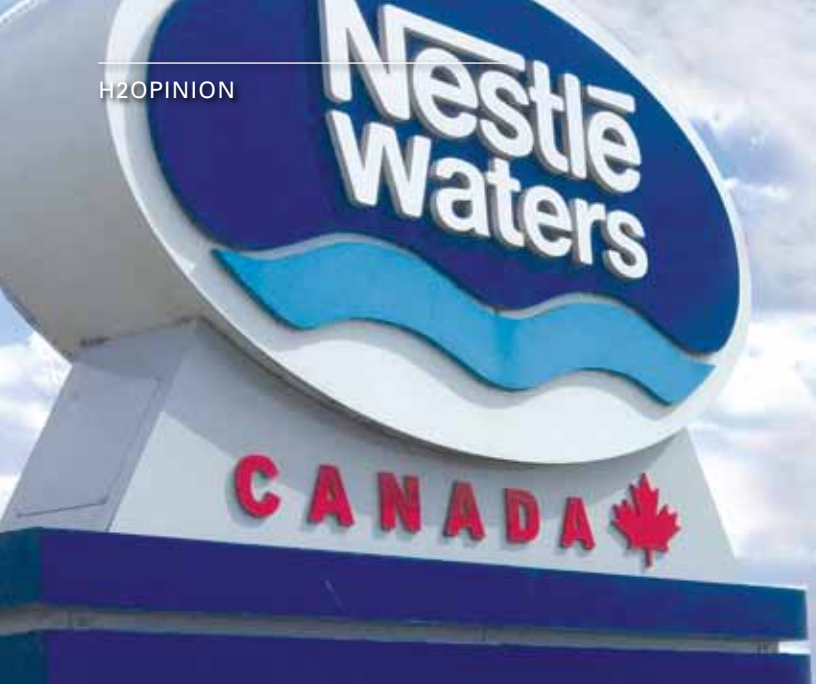
As part of Ontario Water Innovation Week, WaterTAP, the Ontario Clean Water Agency, and Southern Ontario Water Consortium hosted a day-long conference, Water Innovation in Action 2.0. The conference offered many insights into the Ontario water sector and paid particular attention to best practices in innovating and delivering water and wastewater at home and globally. More than 80 leaders from utilities, government, think tanks, industry, and technology gathered to discuss a broad range of topics within the sector from regulatory understanding to incorporating big data.

Keynote presentations from **Michael Chan**, Ontario minister of International Trade, and **Juan A. Alsace**, consul general, U.S. Consulate General Toronto, gave a firm sense of the economic breadth in the water industry and the role that local innovation plays in driving the economy and making Ontario a competitor in foreign markets. Minister Chan emphasized the 900 water-related companies operating in Ontario and their traction south of the border in the U.S.'s $589-billion water market. Consul Alsace provided a tangible sense of the cooperative role Ontario plays with U.S. partners to manage shared resources and educate both the public and youth on a precious environmental and economic asset.

Panelists included **Michelle Brownlee**, director of policy at Smart Prosperity (formerly Sustainable Prosperity); **Tom Kaszas**, director, Environmental Innovations Branch, Environmental Programs Division at OMECC; and **Kaszas Joeri van den Steenhoven**, director at MaRS Solutions Lab; **Tim Constantine** for CH2M; **Erin Mahoney**, commissioner of Environmental Services, York Region; **Geoff Rae**, CAO, City of Brantford; and **John Thompson**, director of environmental services, City of Barrie.

The primary takeaway message from the presenters was the need to establish shared outcomes across the water sector in an effort to inspire cooperative and innovative results. In particular, matching government policy outcomes with industry and technology outcomes can serve to expedite action and improvements in water management. The second panel translated the need for an outcomes-based approach into a value over cost imperative. Investment in sound, modular technologies that provide sustainable management and delivery long-term is worthy of spending.

Interactive breakout sessions tackled issues of big data in water management, multi-disciplinary approaches to solving challenges, best practice consultations, improving Environmental Assessment processes, and succeeding in Global Markets. The event capped with a panel discussion on taking the trends addressed in water and extending them over the next five years.



Nestlé Waters vs. Wellington Water Watchers

Opposing Nestlé's water takings: BY MIKE NAGY

WELLINGTON WATER WATCHERS (WWW) opposes Nestlé's permits and similar ones, because the wholesale removal of water for profit practiced by water extractors, such as Nestlé, run counter to public need and the intent of the Permit to Take Water (PTTW) regulations. The PTTW process is outdated and the provincial government of Ontario agrees. When the PTTW process was implemented about 30 years ago, it was intended to manage water takings from municipalities, agriculture, and in-process value added industry. As Premier Wynne has herself indicated, development of the PTTW process did not anticipate the wholesale extraction and export of water for profit. As a result, the PTTW process does not support the kinds of environmental or social safeguards that are now required.

A 100 per cent consumptive water taking, such as Nestlé's, is unique in that is will not replenish any of the water back into the local watershed. This is unlike other uses of groundwater, such as irrigation for agriculture, in-process manufacturing, or residential use through municipal systems. Moreover, groundwater mining for bottling a fossil-fuel intensive activity that produces minimal, if any, public good. It imposes immeasurable amounts of solid waste onto a planet already swimming in excess plastic, a problem that is growing exponentially each year. In short, Nestlé's water extraction is unessential, avoidable, and a poor use of Ontario's finite water and is inconsistent with the main Statement of Environmental Values of our Ministry of Environment and Climate Change.

Warning signs

Recent consultant reports showed that in Aberfoyle, where Nestlé has a well, the aquifer equilibrium has dropped 1.5 metres in the past four years and reverse flow occurs in the local Mill Creek. Reverse flow happens when naturally upwelling water is drawn down by pumping or diversion and not allowed to enter a watercourse. Nestlé's pump was identified as a major cause.

Nestlé's water taking in Aberfoyle is not sustainable. Evidence has suggested that there is an increased risk that contamination, via uncased local wells, could be drawn into Nestlé's pumps and neighbouring wells, making Nestlé's water taking at the Aberfoyle well unviable even before the aquifer is depleted. WWW believes that the unsustainability of the water taking at the Aberfoyle well and the risk of contamination was the motivation for Nestlé's recent outbidding of the Centre Wellington Township for the Middlebrook well.

Accountability

The 80 points of monitoring that assess Nestlé's water taking in Aberfoyle were imposed by the province in response to data presented to the MOECC by WWW during a past permit renewal. This extensive monitoring program was not put in place proactively by Nestlé as they like to imply.

Nestlé also officially opposed conservation measures that were imposed on their Hillsburgh renewal in 2012, resulting in the issue going before the Environmental Review Tribunal. Nestlé only withdrew its appeal and accepted the conservation measures after it was challenged by WWW with the aid of Ecojustice. In our view, leaving monitoring and conservation to large-scale water takers as a voluntary practice is not enough.

The Province must act

Nestlé wants approval for a new well in Middlebrook and renewal of their water-taking permits in Aberfoyle this year and next year in Hillsburgh.

Granting these permits will not benefit future generations. The permits should be denied, especially in light of the unsustainable environmental practices that are occurring in Aberfoyle that are the result of relentless pumping and removal of water. The answer is not rewarding the bottled water industry with more water. WC

Mike Nagy is the chair of Wellington Water Watchers.

To read the entire submission from Mike Nagy and Wellington Water Watchers visit **bit.ly/WWWNagy**

In this edition of H20pinion, we asked leaders from Wellington Water Watchers and Nestlé Waters North America to defend their positions on groundwater use in Aberfoyle, Ont.

For shared value: BY NELSON SWITZER

AS CONSUMERS, we expect that when we turn on the tap—whether for drinking, cooking, or cleaning—the water will flow. At Nestlé Waters North America, we expect the same thing, which is why we work tirelessly to manage our shared water resources. Water is both our passion and our business, so we approach our jobs as stewards with the mindset that we must work together to ensure the water we all depend on will be there today and tomorrow.

For over 15 years, more than 300 of us have been working in Wellington County, Ont. at the Aberfoyle water bottling plant. Many of our team members live here, too, and we are all deeply invested in the long-term well-being of the environment and community. As part of this commitment, we have developed and applied the Nestlé Waters Water Stewardship Roadmap. The roadmap to enhance our ability to protect our shared water resource and act as efficiently as possible while also creating shared value in the community. Some key principles of this roadmap include:

Use scientific data and standards to inform our decision-making and activities: We have more than 80 monitoring points at Aberfoyle that provide us with the data we need to make responsible decisions. We monitor groundwater levels hourly to closely track groundwater trends and publish this data on our website to help our stakeholders make informed decisions, too.

Select and manage spring sources as a sustainable resource: One of the reasons we chose Aberfoyle is that it is a renewable water supply—a source that is continuously recharged by natural systems. Our team of experts is dedicated to sustainable water resource management, which includes working alongside local agencies such as the Grand River Conservation Authority to ensure withdrawals do not exceed sustainable limits. For instance, we voluntarily reduced our maximum monthly permitted withdrawals by 20 per cent since a Level 2 drought was declared in the region.

Partner to solve shared water challenges: We create shared value through employment, local sourcing, volunteerism, sponsorships, partnerships, collective action, community investments, and more. For example, we recently donated $460,000 to the University of Guelph to support groundwater research in Wellington County aimed at ensuring the continuation of a safe and sustainable groundwater system. We also support the Friends of Mill Creek Stewardship Rangers program, which undertakes fishery and stream rehabilitation works, and the Green Legacy Programme, which helps to expand forest cover on our Aberfoyle property. Both programs recruit local high school and middle school students to participate in conservation and rehabilitation efforts and learn more about the importance of preserving our environment.

We agree with Ontario's Premier and the Minister of the Environment & Climate Change that the existing price of $3.71 per million litres of water is insufficient.

Shared water management

As a long-standing member of the Wellington County community, we believe that for the local watershed to remain a sustainable supply, all groundwater users need to follow a water roadmap and financial resources must be set aside to fund the sustainability of the watershed. That is why we agree with Ontario's Premier and the Minister of the Environment & Climate Change that the existing price of $3.71 per million litres of water is insufficient. We look forward to collaborating with the government and other key stakeholders to determine the equitable cost for all water users to sustain our shared water resources for years to come. WC

Nelson Switzer is the chief sustainability officer at Nestlé Waters North America.

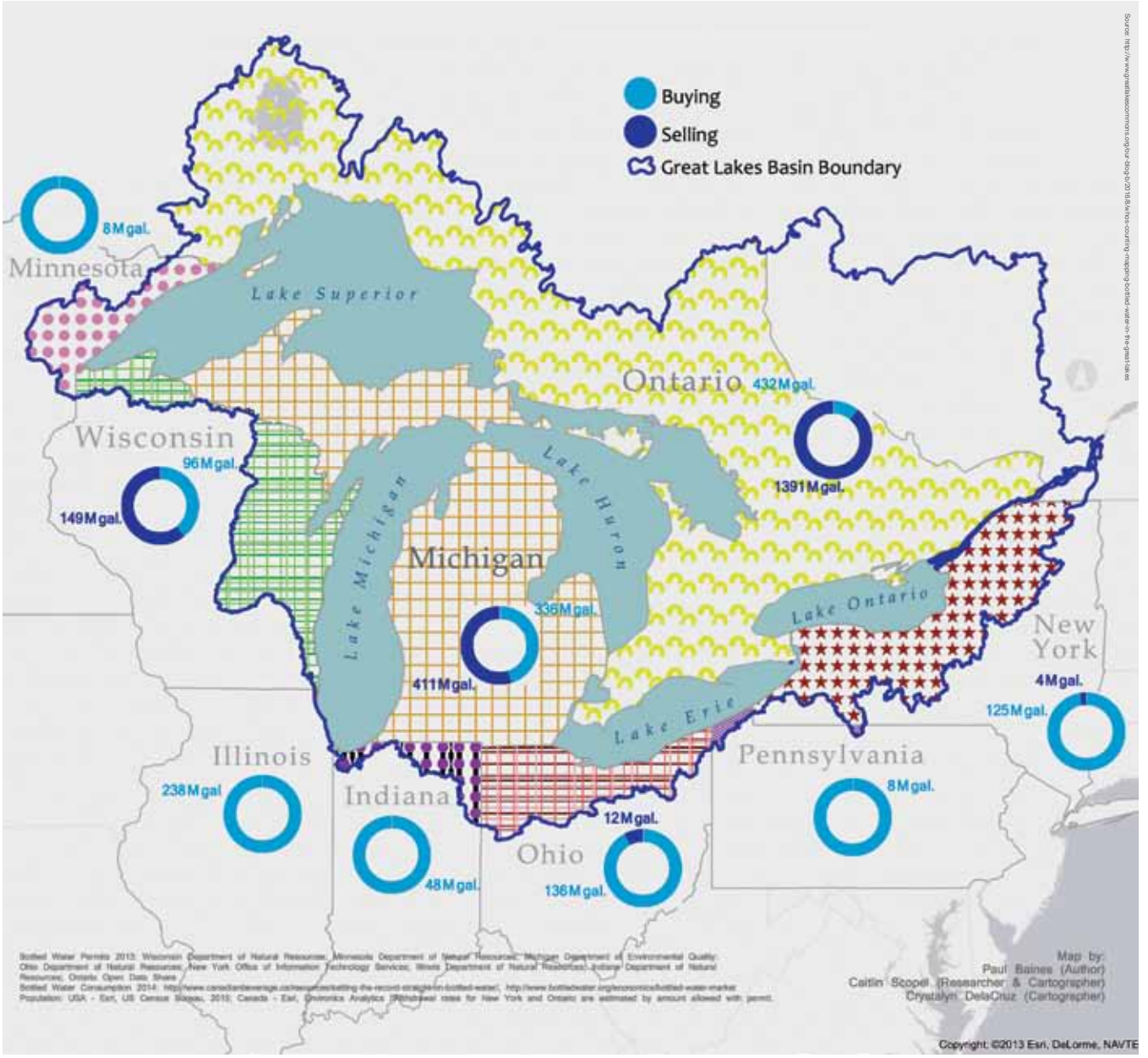
A copy of Nestlé's Water Stewardship Roadmap can be found online at **bit.ly/AberfoyleH20**

Want to share your H2Opinion? Email katherine@watercanada.net

Bottled Water in the Great Lakes Basin

THIS MAP of bottled water sales and consumption in the Great Lakes Region was developed by the Great Lakes Commons—a collective of environmental NGOs and concerned citizens. Consumption data is based on population numbers multiplied by the national average consumption of bottled water. The bottle water sales data was drawn from provincial and state water permit information. The focus here is the transport of water over political boundaries and potentially outside the watershed.

Water bottling companies have become easy targets for public criticism because of the visible nature of their water use as well as their use of plastic. Concerns over water bottling operations focus on permit prices, inter-basin transport, privatization, and plastic pollution. Ironically, many of the arguments used against them could apply to other water uses and consumer products. Everything we eat, drink, manufacture, or fuel uses water, whether that water is sipped from a bottle or tap, used to wash cars or to irrigate golf courses. The point is that we need to manage our water responsibly, and the private sector must be part of the solution. —Staff



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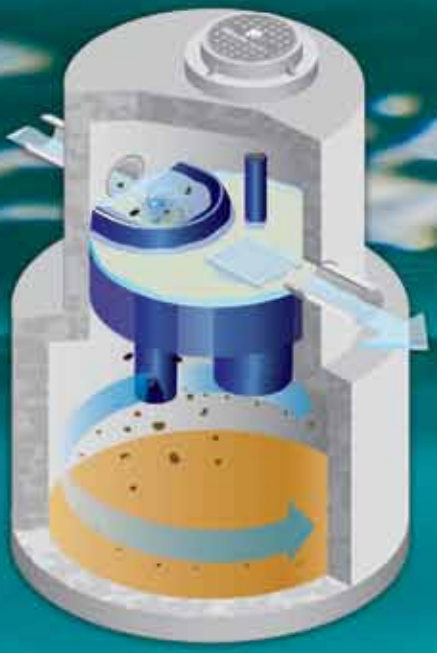

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