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Should We Panic Over Lead?

BY ANDREW MACKLIN

I HAVE TO ADMIT, I think this might mark the first occasion that Water Canada and its sister publication, ReNew Canada, are having the same editorial conversation at the same time.

The March 2019 announcement by Health Canada announcing a 50 per cent reduction in the acceptable level of lead in Canada's drinking water from 0.01 milligrams per litre (mg/L) to 0.005 mg/L was reason raised eyebrows, but didn't exactly make headline news. That changed in early November, when a yearlong investigation by a group of over 100 journalists across Canada exposed lead levels in communities across Canada were above the new standard. Yearlong investigation where the standard changes halfway through and makes the numbers at the investigation looks more severe (as a colleague said "I don't believe in coincidences").

Regardless of what you think of the aforementioned timing, it has brought an important issue some much-needed limelight. Suddenly the public is concerned about the impacts of lead in water infrastructure, and what it might do to human health. Some have ever gone as far as panicking over the potential for a second Flint to occur (even though no levels were realistically close) but the issue grabbing headlines made people's minds drift in that direction.

But I digress.

The issue has made people, and municipalities, take a good long look at the expense of replacing lead

pipe infrastructure. One Toronto Star reporter (Robert Cribb) remarked that he had replaced lead pipes within his own home at a cost of \$5,000-\$10,000. And a handful of municipalities, most notably Halifax, are ramping up their lead pipe replacement program. Pipe replacement is already a common practice as part of the asset management programs of most municipalities, but some are now looking at ways to step up their efforts.

The problem is, I don't know if we need to press the panic button or not? Are the modern technologies we have to reduce water levels not effective enough? Was the testing done as part of the journalist study done in a consistent and accurate fashion? How were the sites chosen? I am sure some of these questions might have been answered, but those answers were drowned out by the dramatic prose illustrating elevated levels written by journalists with little understanding of the science behind the figures.

With so many unanswered questions, questions far too important to leave unanswered, we are going to attempt to fill some of the important blanks of this important conversation. We will be reaching out to stakeholders from across Canada to truly wrap our heads around what comes next in the national lead agenda, in the hopes of creating a roadmap to move forward with..

Stay tuned. wc

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WaterCanada



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of the Northern
Confluence Initiative.
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ABOUT THE COVER

When the boil water advisories are gone, what are the next water issues that must be addressed? The Assembly of First Nations is working to build a roadmap for the future. To learn more, turn to page 12.

Coming up in the next issue:
MARCH/APRIL

**THE WATER
INFRASTRUCTURE
ISSUE**

A Roadmap for Lead



Battling Ontario's Flooding



Canada's Largest Water Projects



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Government of Yukon Releases Five-Year Water Plan

THE GOVERNMENT OF YUKON released the five-year report on the Yukon Water Strategy and Action Plan at the fourth annual Yukon Water Forum.

“This report marks the end of the Yukon Water Strategy and Action Plan, but not the end of our ongoing work with partners to sustainably manage and conserve Yukon’s most vital resource—our water,” said Pauline Frost, minister of environment. “Thank you to all those who helped implement this water strategy. I look forward to ongoing collaboration with Yukon water stewards and managers to ensure our water is managed responsibly.”

The final report highlights key actions taken since the water strategy was put into place in 2014. These initiatives include work from the Government of Yukon, federal, First Nations, and municipal governments, as well as researchers, industry, and community organizations. The actions include:

- Creating a Yukon government groundwater program;
- Increasing water monitoring across the territory; and
- Providing enhanced technical advice to inform decision-making processes.

The report also provides information on ongoing work and future priorities, including:

- Improving flood-forecasting tools to ensure communities are more resilient to climate change;
- Continuing to develop a wetland policy;
- Advancing transboundary water management agreements; and
- Coordinating efforts to monitor surface and groundwater quality and quantity.

“We are part of the land and part of the water! As the Headwaters of the Yukon River, it is crucial for Carcross/Tagish First Nation to have dialogue in respect to water,” said Lynda Dickson, Carcross/Tagish First Nation Haa Shaa du Hen (Chief). “We are Revitalizing our Tlingit and Tagish water laws and looking at developing a joint working group and developing a joint water legislation. Most importantly, people need to be educated on Spiritual aspects surrounding water. This forum was the perfect place to have that dialogue and strengthen relationships.” **wc**

— Staff

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Water Supply at Risk for 1.9 Billion People

NEW RESEARCH HAS FOUND that water towers, which provide water resources to 1.9 billion people globally, are at risk due to the threats related to climate change, growing populations, mismanagement of water resources, and other geopolitical factors.

The authors of the study also concluded that it is essential to develop international, mountain-specific conservation, and climate change adaptation policies and strategies to safeguard both ecosystems and people downstream.

As a part of the study, scientists from around the world assessed the planet's 78 mountain glacier-based water systems and, for the first time, ranked them in order of their importance to adjacent lowland communities, as well as their vulnerability to future environmental and socioeconomic changes.

These systems, known as mountain water towers, store and transport water via glaciers, snowpacks, lakes, and streams to 1.9 billion people globally—roughly a quarter of the world's population.

Reliance and vulnerability

To determine the importance of these 78 water towers, researchers analyzed the various factors that determine how reliant downstream communities are upon the supplies of water from these systems. They also assessed each water

tower to determine the vulnerability of the water resources, as well as the people and ecosystems that depend on them, based on predictions of future climate and socioeconomic changes.

Of the 78 global water towers identified, the following are the five most relied-upon systems by continent:

- **Asia:** Indus, Tarim, Amu Darya, Syr Darya, and Ganges-Brahmaputra.
- **Europe:** Rhône, Po, Rhine, Black Sea North Coast, and Caspian Sea Coast.
- **North America:** Fraser, Columbia and Northwest United States, Pacific and Arctic Coast, Saskatchewan-Nelson, and North America-Colorado.
- **South America:** South Chile, South Argentina, Negro, La Puna region, and North Chile.

The study assessed the importance of each water tower by looking at how much water its stores and provides. The study also examined how vulnerable these systems and communities are to a number of likely changes in the next few decades.

The study was led by Professor Walter Immerzeel and Dr. Arthur Lutz of Utrecht University. The research was supported by National Geographic and Rolex as part of their Perpetual Planet partnership. wc

— Staff

Online at
WATERCANADA.NET



NEWS: Beaver First Nation Opens Wastewater Treatment Plant.

bit.ly/BeaverFN



REPORT: Study Examines Methane Emissions from Lakes.

bit.ly/EmitMethane



NEWS: Program to Help Ontario Farmers Improve Water Quality.

bit.ly/FarmerWater



REPORT: Plastic Pollution in Great Lakes a Growing Concern.

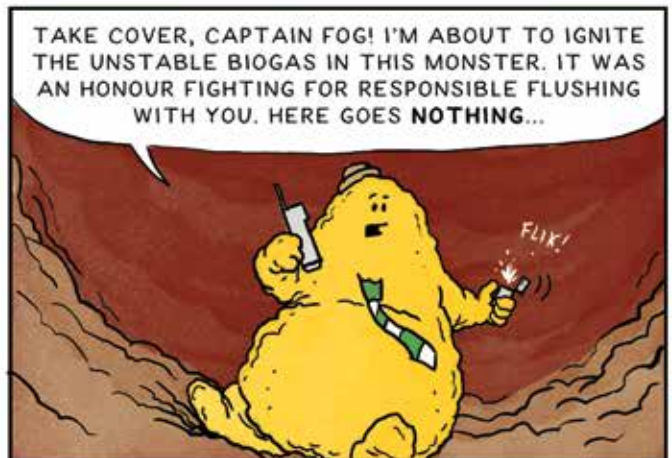
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THE ADVENTURES OF FATBERG



PRESENTED BY KSB CANADA, WATER CANADA & MESUG
STORY & DRAWINGS BY NATHAN T. WRIGHT



VISIT KSB.CA/CONQUER-THE-CLOG TO LEARN MORE ABOUT CLOGGING AND STRATEGIES TO COMBAT IT.

Nathan T. Wright is a freelance illustrator and artist based in Des Moines, Iowa, USA.



Low tide on the sandy beach at the popular quaint seaside community of White Rock surrounding Semiahmoo Bay near Vancouver in British Columbia

Removing Arsenic and Manganese in White Rock

When the City of White Rock needed a solution to remove arsenic from the community's drinking water supply, they turned to AdEdge.

The City purchased the utility from EPCOR Utilities Inc. in 2015 and collaborated with RES'EAU-WaterNET to decide the best solution for removing arsenic and manganese from the community's groundwater supply. Arsenic and manganese are found naturally in groundwater in all regions of British Columbia. Concentrations that approach or exceed the drinking water quality guidelines can occur locally anywhere in the province.

Water that contains arsenic is only a health-related concern if it is used for drinking or cooking. There are short term or acute symptoms for exposure to high levels of arsenic, but the primary concern

is related to decades long exposure of even low levels of concentration in drinking water. This exposure can increase the risk of developing certain cancers.

Recent research is showing that manganese is more than an aesthetic annoyance and is actually a health and development related concern. Studies have proven that exposure to manganese can cause lower IQ and poor motor functions in young children, and also cause a disorder similar to Parkinson's disease in the elderly.

The process for removing manganese is a well-known and proven process that AdEdge efficiently and cost-effectively applies to dozens of projects across North America every year. The AdEdge Bayoxide E33 media for arsenic removal is particularly unique in that it is the highest

performing and longest lasting adsorption media available in the market. Using this media results not only in the most economical system for reaching the very low arsenic treatment targets set by White Rock on the project, but also the system with the lowest operating cost because media replacements are reduced as much as possible.

After the manganese is removed, the water goes through a second set of pressure vessels that contain a specialized media called AdEdge Bayoxide E33. This media is a granular ferric oxide (which means it is made mostly from iron) and the arsenic binds itself to the media through a process called adsorption.

Thanks to the introduction of the AdEdge's patented technology, residents of White Rock can feel safe in drinking water straight from the tap. ■



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Blueberry River First Nations participants in the CABIN field practicum training for ecosystem health assessments.

Photo: Ripper Anderson, Living Lakes Canada



Blueberry River First Nations, Living Lakes Canada and World Wildlife Fund-Canada teamed up to complete training and monitoring of river sites for ecosystem health assessments across BRFN territory.



Joanna Chipesia of the Blueberry River First Nations collecting benthic invertebrates via the CABIN protocol for ecosystem health assessments.

The Quality of Our Water

Working with the community to improve our waters.

BY NICOLE TRIGG

THE BLUEBERRY RIVER FIRST NATIONS (BRFN) Traditional Territory is located in the Peace Region of B.C., roughly a one-hour drive north of Fort St. John. Once a pristine landscape with abundant fresh water, wildlife, and forests, the territory is now experiencing the serious long-term environmental and social impacts of decades of intensive resource extraction.

A 2016 report co-authored by Ecotrust Canada and the David Suzuki Foundation based on B.C. government data found that almost 70 per cent of Blueberry traditional territory was covered by active petroleum and natural gas tenures, with almost 75 per cent of the territory lying within 250 metres of an industrial disturbance (including clear cuts, oil and gas wells, processing plants, roads, dams, and other infrastructure developments). More than 80 per cent lies within 500 metres of such disturbances.

In response to Blueberry's subsequent water quality concerns stemming from these cumulative impacts, Environment and Climate Change Canada (ECCC) referred the band to Living Lakes Canada. With the mandate to enhance the protection, restoration, rehabilitation and health of watersheds in B.C. and across Canada, Living Lakes Canada builds capacity through community-based water monitoring (CBWM) and facilitates cross-sector collaboration and research to support progressive decision-making for improved water stewardship. One such collaboration is the STREAM project, a partnership between the University of Guelph, ECCC, World Wildlife Fund-Canada (WWF-Canada), and Living Lakes Canada.

STREAM (Sequencing the Rivers for Environmental Assessment and Monitoring) is a national community-based water monitoring initiative that works with interested parties—including Indigenous and non-Indigenous communities, water stewardship groups, academia, all levels of government and industry—to collect data for health assessments of Canadian waterways.

STREAM uses an adapted version of the Canadian Aquatic Biomonitoring Network (CABIN) protocol developed by ECCC that involves the collection of benthic macroinvertebrates (benthics are strong indicators of water quality due to their high sensitivity to pollutants and other factors that impact aquatic ecosystem health). Benthic samples are then analyzed using the new technology of DNA metabarcoding developed by the University of Guelph.

WWF-Canada's Watershed Reports set the stage for STREAM. The 2017 report found data deficiency was an issue in 15 of Canada's 25 watersheds and that 110 of 167 sub-watersheds were lacking the data necessary to assess watershed health. Then, in early 2019, the University of Guelph

It was an impactful experience
working with BRFN and we look
forward to continuing the
relationship into the coming years.

received a \$2.6 million grant from Genome Canada to support DNA metabarcoding sample analysis for Canadian watersheds over three years, effectively launching STREAM. The goal of the project is to collect 1,500 samples from 15 nationally distributed watersheds—five watersheds per year—through CBWM.

Planning for the first STREAM field season was already underway when Living Lakes Canada was contacted by BRFN, and the decision was made to include the Peace-Athabasca Basin as one of the priority watersheds for Year 1 of the project in order to deliver CABIN and DNA metabarcoding training to the Nation.

"We were originally planning for the Liard Basin (northeast B.C.) as one of the first five watersheds for 2019, but at the time there were no requests for training coming from groups in that

region, so we changed the watershed to accommodate BRFN," said Living Lakes Canada STREAM program manager Raegan Mallinson.

Living Lakes Canada and WWF-Canada travelled to Blueberry territory in late August, where the need for water monitoring was immediately apparent. Dangerous sour gas leaks occur on a regular basis and, during site reconnaissance for the course, a hydrogen sulphide gas detector was worn by the band's restoration specialist. Locating tributaries for training was challenging due to high water levels caused by unseasonably heavy rains. The tributaries that were appropriate ran turbid, providing insight into the land-use disturbances in the area.

"The community members spoke about times when they used to swim in these creeks, and remember the waterways running clearer," said Mallinson.

Outfitted in hip waders, the 15 Blueberry Nation participants were nonetheless in high spirits and eager to hop in the streams to learn the kicknet procedure to collect the benthics, and how to perform stream health assessments and open-source data inputs. The diverse group was comprised of BRFN fisheries technicians, the band's restoration specialist, Guardians, elders and youth. The vastness of the territory meant hours of travel time to get from site to site. Over the course of the training, four sites were sampled on Upset Creek, Blueberry River, and Fox Creek.

"The participants were confident carrying out the monitoring," said Mallinson. "We learned so much from being on the land with the participants. BRFN showed us how strong a community can be when they work together; they taught us about loyalty to each other and the land, and they shared their hopes and struggles. It was an impactful experience working with BRFN and we look forward to continuing the relationship into the coming years."

Blueberry River First Nations launched legal action against the Province of BC in 2015 for the cumulative impacts of resource development in their traditional territory. A decision by the courts is expected mid-2020. In the

interim, Blueberry are aiming to set up their own CABIN CBWM program as part of a new Guardian program that is currently in development.

"We are scoping development of water quality monitoring in the watersheds around the BRFN reserve and expect our STREAM training to play an integral part. Benthic macroinvertebrates are ubiquitous and critical indices of water quality. We are looking forward to answering our research question about the scope and breadth of impacts on aquatic systems in our territory," said Jane Calvert, the BRFN Lands & Resources Manager.

"The optimism, perseverance and motivation of BRFN to set up their CABIN CBWM program is really encouraging," said Mallinson. "We are now exploring options to deliver additional training."

In October 2018, Living Lakes Canada and WWF-Canada worked with the Kaska Dena Council in B.C.'s Liard Basin to expand their Dane Nan Yé Dāh Guardian Program by starting a freshwater monitoring program on the Liard River that included benthic collection. This training was one of the initial pilot training programs and monitoring projects for STREAM.

Community-based water monitoring is growing across Canada. Results from a national scan conducted by Living Lakes Canada, Simon Fraser University and the University of Acadia in 2016 revealed that CBWM had grown three-fold within 10 years.

"Communities are engaging in cross-sector collaborations to build local water monitoring programs in order to better understand the health of local watersheds," said Living Lakes Canada Executive Director Kat Hartwig. "By piloting new technology that can potentially help provide faster, more accurate and cost-effective results, STREAM is aiming to support decisions that protect the water-based ecosystems on which we all depend." WC

Nicole Trigg is the communications coordinator at Living Lakes Canada.



To learn more about STREAM
visit stream-dna.com



Four young First Nations women participated in an open dialogue about their connection to water.

National Strategy

What needs to be included in a long-term water and wastewater strategy for First Nations communities post-2021? BY SIMRAN CHATTHA

A NATIONAL WATER AND WASTEWATER STRATEGY for First Nations communities needs to be developed by First Nations.

That was the key message from the presentation by Caleb Behn, special advisor on water at the Assembly of First Nations (AFN), when he kicked off day two of the 3rd Annual AFN National Water Symposium and Tradeshow in November 2019.

“As a part of Budget 2016, \$1.8 million was allocated towards First Nations water and wastewater infrastructure,” said Behn. “Most of this went towards solving the long-term drinking water advisory issues. We found out relatively recently that there was a holdback on those funds. What has to happen is that [Indigenous Services Canada] ISC has to table a long-term strategy to the federal government and Cabinet that got announced yesterday [November 20, 2019].”

“The problem is, with no disrespect, white people in Ottawa probably don’t have the right ability to develop for us what a long-term strategy should be for

water and wastewater,” Behn added. “I don’t mean to be disrespectful. I don’t mean to be rude. I don’t mean to be challenging. It’s a fact that a long-term strategy for us, as First Nations, cannot be developed by non-Indigenous people in a bureaucratic setting in Ottawa. You guys [First Nations] know what you need. Your Nations know what they need. Your histories tell you what you need related to water and wastewater.”

Following his introductory remarks, Behn provided an update on the preliminary table of contents that was developed by the AFN in consultation with about 100 First Nations experts. The table of contents contains a list of 36 topics, in no order of priority, that can be used to inform a First Nations Water and Wastewater Strategy Post-2021, including:

Establishing baseline information for critical infrastructure. This would be established to develop an understanding of what the infrastructure needs are and where the data gaps are.

Also, a national critical infrastructure assessment is needed.

Regional considerations, including asserted provincial jurisdiction. A part of this conversation includes jurisdiction, which refers to the fact that some provincial and territorial governments assert ownership over territories.

Addressing predatory processes and entities. “There is an ecosystem of bureaucrats and preferred contractors who use First Nations critical infrastructure as a business,” Behn said. “There are tactical consultants who predate leadership and nobody talks about it publicly. But in the long-term, if we’re serious about critical infrastructure, we have to acknowledge and engage with the fact that there are people and entities who have used our critical infrastructure as a business model.”

Do not replicate the Indian Affairs approach. “What this [says] is that do not allow a federal government to dictate to

us what the long-term strategy should be,” Behn said. “Why are water, wastewater, health, and the environment not connected? Why do you [First Nations] have to apply for funding every year? The City of Toronto does not plan like this. Why do we have to plan like this?”

Supporting relationships between First Nations water operators and First Nations leadership.

“What we heard is that operators have a profound utility and leadership has a profound utility,” Behn said. “But rarely do they connect in a way that allows maximum utility from both. Operators can give you the technical insight, they can give you a lot of things, but leadership has a responsibility for the political. But rarely do those two connect. [...] This link needs to be tangibly supported.”

Acknowledging and ending Divide and Conquer strategies and chronic underfunding of First Nations.

“Why are there various Tribal Councils fighting between themselves for scarce resources?” asked Behn. “Why does one Nation have to fight another Nation to get a project? They both need water plants. Why do they have to compete to get the resources they need?” Behn also added that “your water operators shouldn’t be competing with your health, with your education, with your litigation components in your Nations.”

Engaging automation and technological evolution for efficiency.

“As First Nations, over the long-term, we’re going to have to think about what innovation and technology can do for us,” Behn said. “But also how automation and technology will make us reliant on service providers, for example. [...] The thing we heard is that efficiency has to be found. The provision for critical infrastructure is massively inefficient, which is why it’s such a gong show. It can change but you [First Nations] are going to have to find every single efficiency you can. You can use technology and automation as a solution. When do you become reliant? How do we maintain our security relative to these new technologies? Big questions.”



At the 3rd Annual AFN National Water Symposium and Tradeshow, Caleb Behn presented on topics that can be used to inform a First Nations Water and Wastewater Strategy.



One of the afternoon sessions on Thursday, November 21 discussed the approaches that First Nations are using to solve their water and wastewater challenges.

Political relationships, alliances, and considerations.

“Any long-term strategy that we create has to be politically optimized,” Behn said. “We can all the leaders and technicians in the room and they can come up with X, Y, and Z theory. Getting through Cabinet, you’re going to have to create a strategy that is politically viable. Not just technically viable but also politically viable.”

Acknowledging, honouring and maximizing the utility of First Nations operators institutional knowledge and experience.

“What we’re dealing with here is anyone who’s spent 20, 30, 40 years running the plant in their community,” Behn said. “They know more about their community than most other people. They know where their pipes are buried. They know who’s sick and who’s not. They know whose healthy. They know where the friction points are. They know a lot about their community and the thing is that First Nations operators, what they know is actually highly valuable.”

Creating a structural implementation mechanism for the long-term strategy.

“We’re not into a paper exercise,” Behn said. “This long-term strategy has to be implemented in a tangible way. What that means is that maybe we write this into legislation. Most of you know me through the work I do on the repeal and replacement of the Safe Drinking Water for First Nations Act. If they [the federal government] is going to repeal and replace this piece of legislation, why don’t they write in respect for [...] what First Nations want?” WC



Simran Chattha is the associate editor of Water Canada.



To learn more about the work being done by AFN to develop its post-2021 strategy, afn.ca



Arctic Water

Despite vast amounts of water throughout the territory, access to clean, safe water can be difficult.

An abundant resource in short supply. BY KEN JOHNSON

IT IS ESTIMATED THAT 37 per cent of Canada's total freshwater is contained in the three territories. In spite of this abundant resource, water can be a scarce commodity, particularly in Northern communities that require a clean source of water year-round. Winter can last eight to ten months of the year, and in winter, most of the surface water is frozen with ice up to two metres thick covering it. The north is also a desert with most regions receiving less than 250 millimetres of annual precipitation, most of it as snow. Given these fundamental challenges, community water supply in Nunavut is particularly challenging due to geographic isolation, an extreme cold climate, permafrost geology, extreme costs, limited level of services, and other unique northern community attributes.

Water supply and delivery in Nunavut communities

Nunavut is the largest of the three territories with 20 per cent of Canada's land mass and only 30,000 people. The 25 communities of Nunavut range in size from Grise Fiord in the far North, with 140 people, to Iqaluit, with 7,000 people, in the south. Eleven of the 25 communities have over a 1000 people, and all of the communities except one (Baker Lake) are

coastal. Surface water provides drinking water to all of the communities because permafrost does not permit access to any groundwater resources.

Community water supplies come from lakes and rivers, and provide either year-round, or a seasonal water supply. To use lakes and rivers year-round as a water source, the surface ice, up to two metres thick must be taken into consideration. The ice formation can damage the piping in lakes if it is placed in water, which is too shallow, and in rivers it is vulnerable to damage, particularly during spring break of river ice. Lakes and rivers that provide a seasonal water supply are used to fill long-term storage reservoirs. Nine Nunavut communities have engineered storage reservoirs that have sufficient water stored for up to a year of the community's needs. An allowance for the formation of ice must be considered in the design of these reservoirs.

Proximity of water to the community itself presents another challenge because of the cost of roads and pipelines, including the operation and maintenance to keep the roads and pipelines functioning. At nearly \$1 million (Canadian) per kilometre to build for a road and a pipeline in some locations, the economics places distant piped water sources beyond the reach

of most communities. Add to this cost the potential for pipeline freezing, and the severe operating conditions during blizzards, and closer becomes a lot better.

Drinking water is disinfected in Nunavut before delivery to the users. More substantial treatment using filtration technologies is being introduced into Nunavut communities to provide a multi barrier against the potential for drinking water contamination. Water treatment improvements are encouraged by public health officials, and may ultimately be mandated by public health regulations.

The cost of Nunavut water

The cost of northern water, including both the capital cost, and the operation and maintenance costs, is a function of the cost of labour and materials, which are influenced by the geographic isolation, the extreme cold climate, and the permafrost geology. The water and sewer systems have operating challenges associated with the potential freezing of the piping due to heat loss, which is solved with pipe insulation, water circulation, and heating the water.

An example of the capital cost of a piped system in Nunavut is the replacement of the piped system in Resolute, which was tendered several years ago. The lowest

tender received for the project was \$44.4 million, which put the project budget approximately \$18 million (70 per cent) over the pre-tender construction estimate of \$26 million. Resolute has a population of 250 people, so the cost per person for the system replacement was nearly \$180,000.

An example of the operation and maintenance costs of a water and sewer system in this Territory are the costs for water and sewer in the community of Grise Fiord. Grise Fiord is the northern-most community in Canada. The annual cost was over \$2,200 per person in 2002, or 6.4 cents per litre for water and sewer (4.5 cents per litre or \$45 per cubic metre for water only); the overall water use was 5,680,000 litres or 95 litres per capita per day.

Extreme water issues and the future of Nunavut water

As challenging as 'normal' water supply is in Nunavut, there are several examples of extreme water use issues in Nunavut. In Grise Fiord, the stream that annually

fills the water reservoirs dried up during one filling season, and the community ran out of drinking water before the reservoir could be refilled the following spring. The community resorted to harvesting icebergs, chopping and placing the ice into the reservoir to maintain the water supply.

The communities of Kugluktuk and Kugaaruk are experiencing issues with saltwater intrusion into their river-water supply systems because tidal action is creating a salt water wedge that advances up the river to the point of the water supply intake. In the community of Sanikiluaq, saltwater intrusion may also be occurring with the ocean water making its way into the lake that supplies the community.

Most northern communities also have limited capacity for dealing with water issues, whether they be financial, administrative, or human capacities resources capacities. In spite of this limited capacity communities are facing the increasing demands

for finance, administration, and human resources being driven by increasing regulatory demands, and the increasing sophistication in the technology associated with the water for treatment of drinking water and wastewater management.

Climate change is also emerging as an issue for water supply in Nunavut. The water supply issues in Grise Fiord, Kugluktuk, Kugaaruk, and Sanikiluaq may not be conclusively caused by climate change, but the warming of the Arctic is making the problems such as these worse. It is anticipated that the warming Arctic climate in Nunavut will influence the quantity and quality of water that is already in short supply. Water supply options for the future are being studied to appropriately increase redundancy, and resiliency. WC

Ken Johnson is a senior environmental planner and engineer, cold regions specialist, at AECOM Canada Ltd.

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Credit: Hannah Environmental Equipment Inc.



Pictou Wastewater Treatment Plant.

Credit: Lloyd Morgan, Nexom



MCN's wastewater treatment plant operator Clarence Cook closes a valve used to expel condensation collected in the SAGR's aeration system over winter.

Small Solutions Big Progress

Serving Indigenous communities with reliable, easy to operate small solutions.

BY TRISH JOHNSON

WATER IS CONSIDERED SACRED by Indigenous people for its interconnectedness to all life, making the stakes for wastewater treatment performance far higher than simple regulatory non-compliance. Given their unique relationship to water, any systems installed in Indigenous communities need to be capable of reliably discharging effluent quality designed to protect local fish and wildlife.

With many Indigenous communities in Canada located in remote areas, some as far north as the famous 60th parallel latitude, already limited access is further restricted to certain times of the year. Inevitably, geography and cold climate conditions create major challenges for both existing and proposed wastewater treatment facilities.

Achieving a limit for ammonia in wastewater is a challenge for many technologies, especially in cold weather because the microbes that are required for nitrification slow down or even die off. Even still, system performance must meet Canada's Wastewater System Effluent Regulations (WSER, 2012), which specify that effluent un-ionized ammonia cannot exceed 1.25 mg/L. Wastewater effluent also cannot be acutely lethal to fish. WSA Saskatchewan research suggests the limit for un-ionized ammonia may be as low as 0.2 mg/L.

In addition to system performance, there are challenges with operations and

maintenance (O&M) since many facilities are constrained by tight budgets for repairs and upgrades that are required to keep up with federal regulations. It may be expensive and time consuming to get parts and expertise on site if repairs are required. In remote communities, staffing issues also arise. It can be difficult to find individuals who possess the qualifications needed to run O&M intensive treatment facilities.

To help Indigenous communities overcome these challenges, two Canadian companies—Nexom and Hannah Environmental Equipment Inc.—are actively providing solutions for Indigenous communities in Canada that are reliable, easy to run, and easy to maintain.

Nexom

Nexom is the new name for Nelson Environmental, a Winnipeg-based company that has had a rich history since its founding in 1997. In 2016, with the addition of filtration technologies and a broader focus designed to better serve customers, Nexom was formed.

The company has pioneered SAGR post-lagoon cold water technology, a process that provides full nitrification as well as BOD and TSS polishing in cold to moderate climates. The only moving parts in this process are the blowers supplying air to the system, so the O&M requirements are similar to an aerated

lagoon. Process control requirements are limited to seasonal manipulation of the influent control valves. Additional benefits of the SAGR system include low capital and operation costs, full nitrification in all seasons, compatibility with existing facultative lagoons, and fecal and total coliform removal.

Misipawistik Cree Nation

In 2012 the existing two-cell facultative lagoon at Misipawistik Cree Nation (MCN) in Manitoba was unable to meet the new regulatory requirements for wastewater. Biological wastewater treatment using lagoons has been a common answer for communities seeking low O&M solutions, but they come with significant challenges for cold climates.

The goal at MCN was to create a process that would be cost-effective and simple to operate, while also providing consistent performance in winter water temperatures that can fall below 1°C

At MCN, two SAGR beds for post-lagoon secondary treatment were constructed in parallel. The water from the lagoons is divided and distributed evenly between cells before recombining for the final discharge.

The MCN lagoon aeration upgrades and SAGR installation were commissioned by the Nexom team in the fall of 2013. Due to a late season start-up date, the SAGR system was unable to

produce the expected nitrification targets during the first winter of operation. Cold water temperatures during system startup prevented the SAGR system from growing enough biomass within the bed to provide full nitrification.

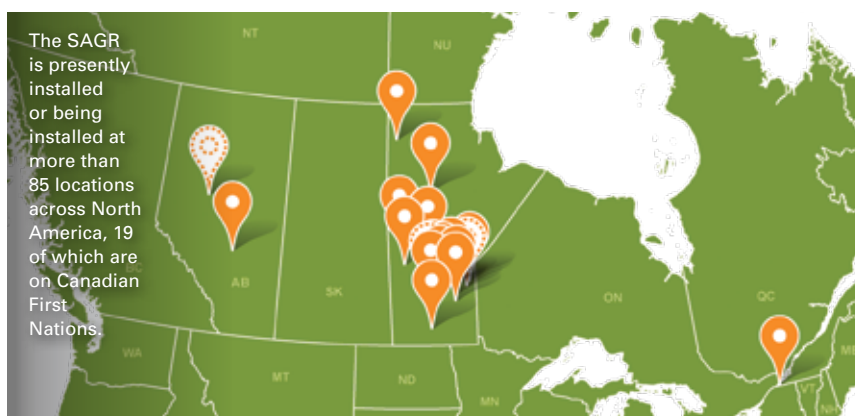
Nexom staff and engineers worked with the team at MCN to support and overcome this challenge. Once water temperatures increased in the spring, enough biomass was established to allow the SAGR system to fully nitrify secondary treated lagoon effluent to less than 1 mg/L.

Now MCN has a technologically advanced wastewater treatment system that is both simple to operate and maintain, while also capable of growing with the community. Since its first winter of operation, the system has reliably met federal wastewater regulations. In doing so, MCN has become an exciting example for small rural and remote Canadian communities looking to achieve full wastewater effluent quality compliance without giving up on their existing infrastructure.

Hannah Environmental Equipment Inc.

For more than three decades, Simon Hannah and his team at Hannah Environmental Equipment Inc. have manufactured dozens of wastewater treatment plants for First Nations communities across Canada. Identifying key drivers including affordability, ease of approvals, low O&M, and consistent conformance with regulations has allowed Hannah Environmental Equipment Inc. to address community needs across the country—from a growing Indigenous population at Pictou Landing, Nova Scotia to Ahousaht, British Columbia that has stringent requirements to protect a sensitive coastal shell fishing area.

The Hannah team has earned this privilege one community at a time by developing deep First Nations relationships, understanding each community's requirements, and providing appropriate solutions and support. It has built trusted relationships to achieve pragmatic progress by consistently delivering plug and play systems with proven simplicity, reliable performance, and low energy usage. In addition, an



important part of what Hannah offers is ongoing, hands on, mechanical, and process support for all of its remote Canadian sites, regardless of location.

Pictou Landing First Nation, Nova Scotia

A new Hannah sewage treatment facility has been serving the community of Pictou Landing First Nation since 2012. This facility includes a biological treatment system providing advance or secondary treatment. It replaced an aging Hannah unit in the original plant that the community had outgrown. The original plant, which had performed well for decades, was reaching the end of its asset life.

Today, thanks to innovation and design ingenuity, the original plant is continuing to deliver value. It now houses a pumping station and the tanks provide storage for flows during peak demand. The new plant provides greater protection for a growing population and the environment by offering

larger capacity. It is also highly reliable with low operation and maintenance requirements for the community.

Hannah's proven Rotating Biological Contactor systems incorporate advanced treatment technologies enabling them to meet the most stringent effluent discharge levels including BOD and TSS of 5 mg/L, total ammonia nitrogen of 1.0 mg/L, and total phosphorus 0.1 mg/L. Achieving these limits is necessary to protect FN fisheries and human health.

Companies like Nexom and Hannah Environmental Equipment Inc.—among others in Canada—are offering a new way forward. They are providing sound environmental protection for Indigenous communities across Canada through reliable, easy-to-use solutions. **wc**

Trish Johnson is an environmental consultant specializing in working with communities to create wastewater solutions.



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Water management practitioners across Canada require decision support tools and practical guidance to effectively manage the challenges of increased urban development, aging infrastructure, and the need to build resilience and adapt to climate change. CSA Group's new water management standards are one type of tool that can help address these challenges.

As an accredited standards development organization, the Canadian Standards Association is overseen and audited by the Standards Council of Canada. This provides independent assurance that the new water-related CSA Standards have been developed according to strict rules of process, transparency, and participation. As part of the process, CSA's Water Standards are developed and approved by a committee of leading national subject matter experts that has a balance of interest representation, through a process that requires expert consensus on the content and includes a mandatory public review. Thus, the CSA accredited Water Standards are robust

documents representing the combined wisdom of numerous diverse experts from across Canada, rather than a single expert or specific group's opinion.

Whether it be for designing a new community to be more flood resilient or directing contractors on how to properly construct a bioretention system, adopting the use of an accredited CSA Standard may help reduce municipality or stormwater practitioner risk because using a CSA Standard can help show that practitioners or municipalities have done their due diligence.

Unlike many other technical areas that have been successfully using CSA standards for years, practitioners in the stormwater management sector have very little experience using standards like CSA's. The CSA Water Standards are the first of their kind in this sector and therefore building awareness is an important first step to getting them adopted. As part of that awareness, demonstrating how these standards can support municipalities and municipal staff

and make municipal processes work better, is key.

The primary challenge of getting CSA standards adopted is helping municipalities and municipal staff understand how CSA's water standards can help make their jobs easier, reduce risk and save money. Another piece to this puzzle revolves around the provincial ministries and the guidance they pass down to stormwater and erosion and sediment control regulators at the municipal level as oftentimes, municipalities will take their lead from the province.

Sometimes people's understanding of what standards are (or are not) differ and can cause confusion. The main differences between guidelines and standards are essentially how the documents are written and their purpose. A guideline primarily answers the question "explain to me what this topic is about and what I need to understand," whereas a CSA Standard answers the question, "tell me what I need to do or what end results I need to achieve."

In a Stormwater management standard like CSA W204, Flood Resilient Design of New Residential Communities, the standard clearly outlines what needs to be done to design new communities that are more flood resilient. On the other hand, guidelines on the same topic might provide flood resiliency design considerations and other background information, ultimately putting the onus on the designer to decide everything about how to design a community for flood resiliency. Another difference is that the content in CSA Standards are written in compliance language and presented concisely in a defined structure that makes it easy to find specific requirements, and to use it in policy, bylaw, and regulation. Whereas the content of a guideline typically provides comprehensive information on a subject, and by its nature does not provide many specific requirements as it is intended primarily for educational purposes.

Finally, there are situations when regulators or specifiers want to know whether activities

taking place under their jurisdiction meet certain objectives or predefined requirements. A standard, written in measurable compliance-based language can be used to identify if the specified requirements and objectives have been met. Guidelines, however, are rarely written in a way that allows users to demonstrate compliance or that provide regulators any way to check things.

At TRIECA 2020, join Canadian Standards Association Project Managers Lynn Barber and Paul Steenhof as they present 'New Standards Help Build Resiliency Against Flooding'. This presentation will highlight two new CSA publications recently published that will help build resiliency against flooding through flood resilient design of new residential communities and through the data on extreme precipitation events that aids that design.

Delegates will also hear from Brian Zupancic, a Project Manager with the Canadian Standards Association as he

presents 'The Latest on ESC Standards and Related Research'. This presentation will introduce the soon to be published Erosion and Sediment Control Installation and Maintenance standard, which is the follow up standard to CSA/W202-18, Erosion and Sediment Control Inspection and Monitoring. ■



BRIAN ZUPANCIC
Project Manager,
Canadian Standards
Association



LYNN BARBER
Project Manager,
Canadian Standards
Association



PAUL STEENHOF
Project Manager,
Canadian Standards
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MANAGING STORMWATER POND SEDIMENT AS A SUSTAINABLE RESOURCE

Across Canada, regular sediment removal from the thousands of urban stormwater management (SWM) ponds represents both large volumes of waste to local landfills and large sums in landfill tipping fees paid by municipal governments tasked with maintaining these ponds.

With fears of landfills reaching capacity levels, and with the protection of human and ecological health in mind, what options are available for SWM pond sediment reuse?

Joining an exciting program of leading experts presenting at TRIECA 2020 is Francine Kelly-Hooper, a Contaminant Scientist at Stantec Consulting Ltd. Francine, who has over 24 years of experience in soil and SWM pond sediment contamination evaluations, recently gave us her insights on how SWM pond sediment could be transformed into a sustainable resource.

How much could municipalities be saving in landfill tipping fees if they could reuse rather than dispose of sediment from SWM pond clean outs?

Tipping fee savings is often substantial, with many municipalities routinely paying hundreds of thousands of dollars each year.

Given the significant savings available to municipalities if they are able to reuse sediment rather than transport to landfills, and knowing that Coal Tar Sealant (CTS) is one of the primary sources of polyaromatic hydrocarbons (PAHs) in stormwater sediment, in your opinion what is it going to take to ban

CTS products at the provincial or even federal level?

In my experience, collaborations between the scientific community and regulators is essential to the development and acceptance of weight-of-evidence that would support a ban on any harmful substance. The evidence must be substantial enough to allow federal and provincial regulators to impose a ban that would stand up to potential scrutiny by industry stakeholders.

What are some best management practices for reuse of SWM pond sediment?

Greenhouse and field trials have demonstrated that typical SWM pond sediment can support the growth of plant and tree species that are commonly used in roadside landscaping programs. The greatest number of Environmental Compliance Approvals (ECAs) in Ontario have been issued for the reuse of stormwater management pond sediments as roadside soils. Best Management Practices (BMPs) must always begin by evaluating sediment contamination levels, types of contaminants, organic content and soil texture. This information can be applied to a risk-based process for determining if the sediment can be safely matched to one or more recipient sites.

What are some of the other barriers that are preventing the reuse of SWM pond sediment?

The new Excess Soil BMPs have removed several significant barriers. However, two barriers continue to exist:

1. Municipal SWM pond managers routinely landfill sediments because they are not confident that the Ministry of the Environment, Conservation and Parks (MECP) will approve beneficial reuse ECAs for their projects.

2. Municipal road department managers can be instinctively adverse to SWM pond sediment reuse on their sites. I am hopeful that the growing number of ECAs approvals will eventually lead to routine SWM pond sediment reuse throughout Ontario.

Francine, along with Aroni McCutcheon, an Environmental Manager with the Ontario Ministry of Transportation, will be presenting 'New Success Stories on SWM Pond Sediment Reuse Approvals' at TRIECA 2020. This will be your chance to gain an understanding of how to obtain MECP approval for SWM pond sediment reuse under the new 'Excess Soil Regulation' and to learn how changes in urban land use practices could increase SWM pond sediment reuse opportunities as cost effective and sustainable alternatives to landfill disposal. ■



FRANCINE KELLY-HOOPER
Contaminant Scientist,
Stantec Consulting Ltd.



ARONI McCUTCHEON
Environmental Manager,
Ontario Ministry of
Transportation



CLIMATE CHANGE AND URBAN DEVELOPMENT

Urbanization, changes in climate patterns, and the timing, amount and intensity of extreme rainfall and flooding events will have significant implications on the approaches and strategies for the development of stormwater management systems for existing and future urban areas.

At TRIECA 2020, a project that will be featured will highlight the Town of Oakville's Stormwater Master Plan which has set out a plan to upgrade the town's stormwater management infrastructure in the historical part of the community that is greatly affected by aging infrastructure, expanding impervious areas (through intensification) and climate change effects.

The development of the town's Master Plan focused on pluvial flood risks by utilizing a dual drainage network modelling approach to assess the performance of existing stormwater drainage system and overall level-of-service. A strategic green infrastructure and low impact

development (LID) solution was advocated and while the plan for Oakville did not specify the specific LID practices, it established (through a sensitivity analysis) the required capture of runoff at source controls to meet the desired level of service. The Master Plan acknowledges that the actual practices would vary across the focus area based on local conditions, and ultimately the decision on the specific practices would be determined at the time of detailed design. Further, the practices would be implemented in both the public and private realm.

Based on the climate resiliency analysis completed for the Town of Oakville, is this an approach that can be replicated in other communities with similar development characteristics and water management concerns?

"Yes, the approach is in fact highly suited to mitigate climate change and intensification since the impacts of both are more gradual

than sudden," said Ron Scheckenberger, Principal Consultant of Wood Environment & Infrastructure Solutions. "This tailored form of mitigation can similarly manage the impacts incrementally."

Join Ron, who leads the Water Resources department of Wood's Burlington, Ontario Infrastructure Office, as he presents 'Building Climate Change Resiliency in Intensifying Neighborhoods' which will examine the approach used to build a Stormwater Management Master Plan that integrated flood control and stormwater drainage while improving and protecting both groundwater and surface water quality. ■



RON SCHECKENBERGER
Principal Consultant,
Wood Environment &
Infrastructure Solutions

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B.C. mining laws have some provisions that still date back to the gold rush of the 1850s.



Refining Mining

The gold rush still haunts B.C.'s mining laws.

BY NIKKI SKUCE

WHEN TASEKO PROPOSED to develop a mine that would dump waste into Teztan Biny (Fish Lake), the Tsihlqot'in unified to oppose it. When Fortune Minerals proposed to develop a coal mine near the headwaters of three major salmon rivers in the Sacred Headwaters, the Tahltan from Iskut set up a blockade. When the Stk'emlúpsenc te Secwépemc Nation undertook a community assessment of the proposed Ajax Mine near Kamloops using its own Indigenous decision-making process, they rejected the proposed project given potential irreparable harm to Pipsell (Jacko Lake).

The law underlying these conflicts and many more is the Mineral Tenure Act. In British Columbia, this law has changed little since the 1850s gold rush era and

continues to be a source of conflict. While other provinces have updated their mineral tenure laws to reflect rights of First Nations, land-use plans, protection of watersheds and municipal drinking water, B.C. mining laws have seen little reform.

British Columbia's history is inextricably tied to mining. It incorporated in August 1858 into the British Colony to maintain order and access to the gold fields. In 1859, Governor James Douglas established the Gold Fields Act to capture and control the mining process. This established the "free miner's certificate" and the right of free entry to most lands in the colony.

The gold rush era of the 1850s and early 1860s brought death from small pox,

and land and water destruction to First Nations people along the Fraser River. In 1864, after small pox devastations killed 60 to 90 per cent of some Indigenous populations, land commissioner Joseph Trutch argued: "The Indians have really no rights to the lands they claim." He refused to recognize title, stopped the treaty process, and favoured doling out land to miners and settlers.

Although the above provides just a glimpse of history amidst a bunch of resistance and rich Indigenous histories, the gold rush established the foundation of our mineral staking laws and policies that have changed little since then.

Today, mining activity is still given priority over virtually all other land uses in B.C.

In fact, the process for staking a claim has only gotten easier. Are you 18 years old, have \$25 and access to a computer? With just one click you can get your Free Miner's certificate and have a claim staked almost anywhere without having to go there—on other people's private property, First Nations hunting grounds, important salmon habitat, municipal drinking sources, or wildlife management areas. Particular parcels of land can be granted No Registration Reserve status by the Chief Gold Commissioner, but essentially mining activities are only off-limits in parks, under buildings, and at certain archeological sites. In other words, mining exploration can take place in over 80 per cent of the province, with little regard for the land, its people or its history.

There is also a legacy of mining claims. Almost the entire Fraser River from

authorities. Other jurisdictions, such as Quebec, forbid claims in areas where land use plans forbid mining. Municipal and regional governments in Quebec can also request that the province designate no-go zones for mining for "public interest purposes." B.C. should follow that precedent.

There's a great opportunity to do so with the province committing to modernizing land use plans and enabling watershed plans. Land or watershed plans can identify those areas that may be appropriate for mining and provide greater certainty to industry. The Mineral Tenure Act must ensure that these plans hold true for sub-surface activities as well. Lastly, no-go zones for mining should include Old Growth Management Areas, Wildlife Habitat Areas, domestic-use watersheds, fisheries-sensitive watersheds, and other designated sensitive areas. With ever decreasing biodiversity, mining should not be allowed in such sensitive areas.

The British Columbia government recently tabled Bill 41, Declaration on the

Rights of Indigenous Peoples Act. This is encouraging, as the current mineral claims process is at odds with UNDRIP, particularly the article pursuant to ensuring free, prior and informed consent. Some much-needed changes are hopefully forthcoming.

We have already seen a growing demand for climate action and calls for mined materials to transition toward a clean energy future. The time is now to bring B.C.'s mining laws into the modern era by reforming our Mineral Tenure Act to acknowledge the inherent legal rights of First Nations and respect for land-use and watershed plans. We also need to reduce risks to our watersheds and communities through a suite of mining law changes that prioritize the public interest. wc

Today, mining activity is still given priority over virtually all other land uses in British Columbia.

Hope to Lillooet is staked, and traces of mercury can still be found from older placer mining operations.

As part of the BC Mining Law Reform coalition, we have developed a set of briefs and recommendations to bring B.C.'s mining laws into the 21st century. With regards to the Mineral Tenure Act, no exploration activities should be approved without the free, prior, and informed consent (FPIC) of affected Indigenous peoples. Farmers in Kamloops recently learned that someone had staked the mineral rights out from under them. They were drinking wine on their porch when someone showed up to start exploration activities. Landowner consent should also be a requirement for mining activities on private property.

Mining claims should not be allowed where provincial, regional, municipal and Indigenous land use plans rule out mining. It is contradictory to allow a unilateral staking of a claim to upend land use choices made by land use

Nikki Skuce is the director of the Northern Confluence Initiative.

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Decentralized Wastewater Treatment

A designer's experience with designing large systems for the United States and Canada.

BY BRENDA MARTINEZ

DESIGNING LARGE SCALE wastewater treatment systems for the United States and Canada each come with their own set of familiarities and challenges. And of course, one cannot simply categorize design experience across an entire country as given design aspects encompass much more than regulatory considerations on a federal level.

When designing large scale wastewater treatment systems, many other factors must be taken into consideration including budget and site footprint constraints, facility usage habits and application, influent collection and effluent disposal methods, geography and soil conditions.

However, this article will focus on a few specific considerations that seem to come up almost every time a design is requested in Canada versus the United States. And to further define "large systems" for the sake of this article, this will be defined as anything over 5,000 gallons per day (GPD) design flow rate, or approximately 19,000 liters per day (l/d).

Where does the cost count the most?

The most reoccurring difference between Canada and the United States, in my experience, comes with the focus on where the money will be spent. In the United States, there seems to be more of an emphasis on a lower upfront cost to the wastewater treatment system. Upfront costs include any design and engineering fees, equipment, system purchase price, and installation charges associated with getting the system online and fully operational. This is the area where projects are most likely to be won or lost amongst manufacturers and installers with compatible products and treatment capabilities.

As a designer, my time is often spent in researching and designing a system that will certainly treat to the effluent expectations of a specific project, while lowering the upfront cost as much as possible to remain competitive on a bid. In the United States, we tend to focus more time and effort, understanding what this cost will be to our customers,

versus our counterparts to the north in Canada, who focus more on the long-term financial commitments.

Upfront costs are certainly a consideration when designing a large system for a Canadian site. However, I find that these costs are not scrutinized nearly as much as the long-term costs associated with maintaining and operating the system. When a bid is assembled for a site in Canada, a designer almost always needs to be prepared to provide information on costs associated with hydro use expectations, time for routine system maintenance, and the cost to replace expendable equipment with an expected lifeline associated with each. These are the costs that will likely win or lose a project involving decentralized wastewater system treatment. Upfront costs can be slightly higher, as more efficient equipment will be specified, as will systems that allow for enhanced remote monitoring to save time on operator labour.

Also, systems should be designed to accommodate usage patterns and influent characteristic fluctuations, so that

equipment isn't running unnecessarily, but only when the system requires it. Examples of these designs would include setting up treatment trains, so that trains can be shut down during non-peak seasons and the incorporation of variable frequency drives on aerators, coupled with dissolved oxygen meters so that the equipment only runs when necessary to maintain required oxygen levels. Typically, if these higher end add-ons result in a lower continuing operating cost, they are likely to be requested in place of lower end options if the long-term costs substantiate the use.

Regulations

The first item to consider in designing large decentralized wastewater treatment systems are the regulations surrounding the design, manufacturing, construction, and performance capabilities of the units themselves. The United States provides a somewhat flexible framework of policy, specified through the Clean Water Act and National Pollution Discharge Elimination System program, yet allows each state and local community to customize its specific decentralized programs towards the needs of their communities. The framework has some advantages as it provides a starting point and basis of design from which local agencies can work.

However, the individual customization for each area does present some challenges for designers who must be familiar with each local regulatory code. For example, most decentralized system manufacturers actively working in the United States have some basic form of certification covering their smaller treatment units: 400 GPD (1514.16 l/d) to 1,500 GPD (5678.12 l/d) design. This is usually in the form of an NSF 40 and/or 245 certification. Some states recognize this standard as sufficient evidence of a system's treatment capabilities and will allow use based on holding this certification alone. They will also in turn allow an upscale factor to be utilized when designing systems greater than 1,500 GPD (5678.12 l/d).

However, other states and counties require a more stringent set of performance requirements, usually based on their local hydrology and/or local environmental concern (bay, estuary, impaired waters, etc.), for a decentralized



Overview of the newly installed treatment system at the spa in the winter.

system to pass regulatory approval for installation allowance. In areas of Florida, for example, NSF certification is not enough. Manufacturers must prove systems can meet a more stringent nutrient removal percentage than the NSF standards require.

This sums up the focus on the United States standards: nutrient reduction. A designer must have a treatment system and design package in place to present to the customer and regulating body that demonstrates proven results that the designed system will meet their effluent requirements. A drawing package with stoichiometric calculations for any necessary chemical additions as well as oxygen demands will be required, as well as data from other systems performing successfully with similar discharge requirements.

Canadian regulations also stem from the NSF standards; however, they have their own set of certification requirements in the Quebec 910 standard and the CAN/BNQ 600 standard. These standards also incorporate additional requirements for nutrient reduction, incorporating climate change considerations, and temperature differences in treatment technology performance.

Most decentralized wastewater treatment systems are based on a microbiological process of organic and nutrient reduction. Because these reactions are temperature dependent, site climate conditions are an important factor to consider when designing a system. As part of a design package on a Canadian project site, a designer must be prepared to not only show a standard

drawing and calculation package, but also how the system is considering the low temperature environment and seasonal climate fluctuations. This requires thoughtful equipment considerations as well as potential larger footprints for the additional retention time required to overcome the reduced rate of microbiological activity when temperatures drop.

Both the United States and Canada have well-established framework policies for decentralized wastewater system designers to utilize when engineering a system for treatment. Careful consideration must be taken in researching project site local regulations to ensure all requirements will be fulfilled before a system is manufactured and installed. Design packages need to consist of all pertinent drawings, calculations, and justification for equipment selection to ensure treatment goals will be met. In addition to these standard engineering packages, the designer also needs to explore what is most important to that customer in terms of cost, ease of operation and maintenance, and easy opportunities for expansion. It is our ultimate responsibility as manufacturers and designers to maintain the quality of the performance of our systems and treatment package designs for both environmental health and community stewardship. WC



Brenda Martinez is a commercial project manager for Delta Treatment Systems.



Exceeding Expectations

Observing infrastructure development in Colombia and Ecuador. BY JAMES SBROLLA

IN PREPARATION FOR a recent trade mission to South America, I read some articles and did some research. I read that Latin America suffers from inadequate infrastructure. Evidently, 60 per cent of the region's roads are unpaved (compared to 46 per cent in emerging economies in Asia and 17 per cent in Europe) and that two-thirds of sewage is untreated. This had me prepared for a “developing” world experience.

Instead, I was very surprised with the experience. I spent a week in Ecuador and Colombia with time spent in two major cities and two small towns. Overall, I was very impressed.

Sure, there were some unpaved roads, but no more than I saw going to a cottage north of Peterborough. And if there was untreated sewage, they have done a good job of diverting it, because I didn't witness any (and I was looking).

Our first stop was Guayaquil, the biggest city in Ecuador. Quito is the capital, but much like Ottawa, it is a political centre, with Guayaquil being the

commercial and business hub. This city is relatively well organized and appears to be a thriving metropolis. According to local businessman Orlando Alcivar Nicola, “Guayaquil has grown into a world class port city that is a key artery for international companies wanting to do business in the northwest part of South America. Ecuador, and Guayaquil specifically, has been receiving foreign direct investments and have been seen as a good place for future ventures. As an example, a couple of months ago Heineken bought a US\$100M brewery.”

One of our meetings with Orlando and the mission team was with Inter Aqua (a division of Veolia) and we learned about both the water treatment systems being upgraded and new projects being planned. Our discussion, and the systems, included drinking water as well as wastewater. In every way it seemed like a “developed” world system.

Our mission took us also to the small Ecuadorian town of Coronel Marcelino Maridueña, where the Sugar Mill San

Carlos is located, on the River Chimbo, part of the canton Marcelino Maridueña, which belongs to the Guayas province and is an hour drive from Guayaquil. We visited a distillation facility that produces alcohol operated by a company is Soderal. There were security protocols in place, and we were greeted by a team of engineers, technicians, and management that was professional, thorough, and ready to talk business. They were keen to learn about new technology, and how they could improve their environmental footprint. This was not some backwater operation; despite its location in rural South America, this was an operation functioning well and looking for process improvements. Air emissions as well as water discharge were among the improvements they were looking to discuss with members of our group.

Our next stop was Medellin in Colombia. Our North American image of this city (at least for me) was set about 30 years ago when Pablo Escobar has a drug cartel operating there that generated



There is a real opportunity for Canadian cleantech solutions in the South American market.



By Photos: Water Canada

\$600 million U.S. profit daily. At the time, the city had the second highest murder rate in the world.

As it turns out, Medellin is a beautiful city—nestled in the mountains—with impressive infrastructure and multiple points of interest.

The worst neighborhood in the 1980's (Comuna 13), which was one of the

Actual Media Director James Sbrolla joined a trade mission to Ecuador and Colombia in July and was surprised by what he found.

battle grounds of the drug lords and cartel (and Colombian military), has been transformed into an arts community that has tens of thousands of tourists visit each day. There is a drain on the infrastructure (in terms of water and waste collection) but it's a thriving community with safe streets and hope for those that are working their way out of poverty.

Our last stop was Armenia, a small town in rural Colombia. The town, and the region surrounding it, was part of the traditional coffee growing economy. However the world coffee market has changed, and many of the region's farmers are looking at alternative crops. Our mission took us there as a Canadian investor group is looking at investing in a medicinal marijuana grow operation that has built a very impressive facility.

Again, our team was impressed with the infrastructure that has been built to support the new industry and the level of sophistication that they operate with.

Andrew White, CEO of CHAR Technologies and mission team member remarked "My expectations and what I found were very different. The specific opportunities that we identified before we departed from Toronto weren't there as we thought, but we found new opportunities that are even better than our original

expectations. The market in South America, particularly in the environmental and cleantech space, is robust and growing and there is tremendous potential. I would caution though—you wouldn't want to do it alone. It's a market where you want to have a local agent or some representation to help guide you, literally and figuratively. It was this local representation that helped identify new and exciting opportunities for us."

The expectation of many of the members of the mission was that the business opportunities would be rudimentary exports of Canadian technology from years back—selling things that we have been using for decades to an economy that is trailing behind. The reality is that Colombia and Ecuador are far more developed than most people realize, and the better business opportunities are for leading edge technologies into a market that most underestimate. **wc**



James Sbrolla is a director of Actual Media and frequently writes International Reports for ReNew and Water Canada Magazine.

APPOINTED



JONATHAN WILKINSON

Jonathan Wilkinson has been named the Minister of Environment and Climate Change. He replaces **Catherine McKenna**, who was named the new Minister of Infrastructure and Communities.

The 54-year-old Wilkinson has represented the riding of North Vancouver since being elected during the 2015 general election. Wilkinson had held the role of Parliamentary Secretary to the Minister of Environment and Climate Change from 2015-2018 before being named the Minister of Fisheries, Oceans, and the Canadian Coast Guard.



SHANE THOMPSON

Shane Thompson has been named the new Minister of Environment and Natural Resources for the Government of Northwest Territories.

The MLA representing the electoral district of Nahendeh (a large geographical area that encompasses the southwest of the territory that includes Wrigley and Fort Simpson), Thompson was first elected in 2015. He was the only

incumbent outside of Yellowknife to be challenged in the election.

Thompson has an extensive background in management role in the fields of education and sports and recreation. He has also served as a justice of the peace since 1991.



MAIKE ALTHAUS

Maïke Althaus has joined the Ontario Clean Technology Industry Association (OCTIA) as the acting executive director, as **Kerry Freek** is stepping away to

welcome her first child.

Althaus is a global brand-building and growth communications expert with extensive experience leading and managing integrated communications initiatives in North America and Europe. Her wide-ranging expertise includes strategic communications planning, advocacy, on- and offline stakeholder engagement, media relations, social media management, and corporate publishing.

She has been working in the global cleantech sector for over a decade. In 2011, she joined a global wind energy company that had just set up its North American operations in Montreal,

Quebec. As its communications director, she built the company's brand across North America and supported its growth.

As owner of Newhaus Communications, she helps purpose-driven new and expanding organizations thrive and brings her expertise, her strategic thinking capacity, and her hands-on mentality to bear.



BROCK CARLTON

Brock Carlton has announced that he will not seek to renew his contract as CEO of the Federation of Canadian Municipalities (FCM). His current deal expires

July 31, 2020.

"I make this decision having enjoyed a remarkable and fulfilling career at FCM. I joined FCM in 1991, having been brought on to serve the organization's international programs. In July 2007, the Board entrusted me with the tremendous honour of becoming CEO."

Carlton made the announcement at FCM's board meeting in November in Ottawa. Carlton has spent 12-and-a-half years in the role, taking the reins in July of 2007.

FCM will begin an immediate search to find Carlton's replacement.



Hassaan Basit, chief administrative officer of Conservation Halton, spoke about the organization's digital transformation journey.



Kaushik Chaudhuri, a senior leader from the strategic solutions unit at TCS, spoke at Latornell as a strategic partner in Conservation Halton's digital transformation journey.



Lesley McDonnell from the Hamilton Conservation Authority spoke about creating and managing databases with limited resources.

2019 Latornell Conservation Symposium Alliston, Ont.

"When you look at some of the big global CEOs, what do they consider as some of the external pressures that are going to drive or change their business in a fundamental way?"

This was one of the questions that **Hassaan Basit**, chief administrative officer of Conservation Halton, explored during his presentation at the 2019 Latornell Conservation Symposium.

Among pressures like climate change and urbanization, going digital is one of the biggest external pressures that

big global CEOs are facing, according to information Basit examined. This is a pressure that Conservation Halton is familiar with so the organization embarked on a digital transformation journey.

One area that Conservation Halton has been focusing on is ensuring that it has a business strategy that supports digitization. The organization's corporate strategy lists digital transformation as one of its key priorities, alongside public safety—one of Conservation Halton's core

mandate areas. "That's how important we view digital transformation," Basit said. "We didn't have a lot of money to throw at it but at least it was there, it had its space, and we knew that we were going to take the next two or three years to really, truly pursue this."

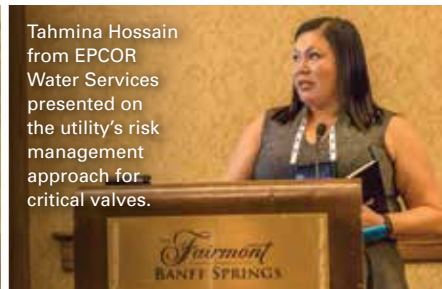
Following his presentation, Basit invited **Kaushik Chaudhuri**, a senior leader from the strategic solutions unit at TCS, to give a presentation as a strategic partner in Conservation Halton's digital transformation journey.



Kevin Bossy, chief executive officer of Bishop Water Technologies, spoke in a session on wastewater treatment research.



Melanie Debassige, executive director of the Ontario First Nations Technical Services Corporation (OFNTSC), presented in a session on First Nations and small systems challenges.



Tahmina Hossain from EPCOR Water Services presented on the utility's risk management approach for critical valves.

2019 NATIONAL WATER AND WASTEWATER CONFERENCE Banff, Alta.

The Canadian Water and Wastewater Association (CWWA) hosted the National Water and Wastewater Conference from November 3-6, 2019 in Banff, Alberta. Over 150 speakers contributed to the technical program that was put together by **Robert Haller**, executive director of CWWA, and a committee of volunteers. One of the sessions at the National Water and Wastewater Conference focused on distribution system management.

Tahmina Hossain and **Janelle Price** from EPCOR Water Services kicked off the session with an update on the utility's risk-based asset management approach for critical valves. EPCOR Water undertook a project "to identify the non-

operable deficient valves with major impacts during an emergency shutdown," Hossain said. The end goal of the project was to create a valve prioritization list that could be provided to stakeholders to optimize capital programs.

Rebecca Dziedzic from Concordia University continued the conversation about distribution system management by providing an update on her research that examined best practices for predicting water main breaks.

"The data I'm going to be talking about is from the National Water and Wastewater Benchmarking Initiative," Dziedzic said. "It was started over 20 years ago and now there are more than

50 municipalities participating."

Dziedzic went on to provide two examples of how municipalities are using their data and models to predict water main failures.

Mimi Luong from the City of Calgary concluded the session with an update on the theory and reality of modernizing Calgary's distribution monitoring program. "Our previous reviews of the existing [distribution monitoring] program have shown that we are compliant [to regulatory requirements]," Luong said. However, the existing program did not reflect changes in the population or the expansion of the distribution network.



Irving Leblanc, director of housing, infrastructure and emergency services, Assembly of First Nations.



Manitoba Regional Chief Kevin Hart, AFN housing and infrastructure portfolio holder.



Autumn Peltier speaks about the vital role of women in the water sector.

AFN WATER SYMPOSIUM Toronto, Ont.

On the day that the new federal cabinet was announced, Indigenous leaders from across Canada gathered to discuss one of the Liberal government's key promises and what would happen next once that promise was fulfilled.

During the previous mandate of Prime Minister Justin Trudeau-led government, there was a commitment made to end all of the country's boil water advisories by March 31, 2021. In its first term in office, the government managed to remove more than 80 of these advisories, but many more remain, many of which are within the province of Ontario.

As the AFN works to create a plan

for what happens next, one of the key issues raised at the symposium was the need for infrastructure investments to continue to be made in order to purchase the necessary equipment to help clean up the water. But the initial investment isn't the only concern for these communities. It's the costs that follow: operations and maintenance, getting parts to the communities when something fails, and having qualified personnel in place to run the equipment. While the latter is a problem faced by many communities across Canada, the first two can be unique to the more remote First Nations communities. The lack of broadband

access prevents these communities from utilizing the online resources that can help to troubleshoot system issues as they occur, and the changing weather conditions are making the transportation networks to many communities unstable, as ice roads have become less reliable and flying in parts can be a tricky proposition.

The discussions held at the water symposium will help to provide part of the foundation for an AFN water strategy moving forward, one that helps address the ongoing needs of provide clean water to communities once the threat of boil water advisories is no longer the primary concern.

For more information, visit afn.ca.



Grassy Narrows First Nation and Wabaseemoong Independent First Nation are still working to address the mercury contamination that has affected the two communities since the 1960's.

Mercury Contamination

Why has the federal government been so slow to respond?

BY SIMRAN CHATTHA

IT WAS IN 2009 that I first learned about the mercury contamination that affected Grassy Narrows First Nation and Wabaseemoong Independent First Nation. At the time, I was an undergraduate student in the Faculty of Environmental Studies at York University and was taking a course that explored race, racism, and environmental justice.

What I learned at the time was that a paper mill dumped effluent, which contained mercury used for bleaching paper, into the Wabigoon River in the 1960's and 1970's. The polluted water led to mercury poisoning that affected people in Grassy Narrows First Nation and Wabaseemoong Independent First Nation.

This led to health problems that have affected multiple generations in the two communities since mercury can be passed from mother to child. There was also evidence that many members of the two communities were negatively affected by Minamata disease, which is caused by mercury poisoning and affects the nervous system.

Although I was only an undergraduate

student at the time, I could tell this was wrong. Why couldn't the federal government? Why was the federal government dragging its feet and not acknowledging what had taken place in the community? Why was the federal government taking its time to respond to the issue?

Fast forward to 2019. Grassy Narrows First Nation and Wabaseemoong Independent First Nation are still seeking justice for the mercury poisoning that affected the two communities. We're now at a stage where the federal government has acknowledged that what took place was wrong and it committed to opening a treatment centre for Grassy Narrows First Nation.

"Honouring promises means keeping promises, and the federal government promised the people of Grassy Narrows First Nation a treatment centre two years ago," said Assembly of First Nations (AFN) National Chief Bellegarde. "High quality services will allow people to be treated at the mercury care home, with the care and respect they deserve."

In December 2019, the AFN—in

coordination with Grassy Narrows First Nation Chief Rudy Turtle, representatives from the First Nation, and NDP Leader Jagmeet Singh—called for immediate action to establish a mercury care home for Grassy Narrows First Nation.

"The people of Grassy Narrows need this, and the provincial and federal governments need to act now to work with Grassy Narrows for full construction and operation," Chief Bellegarde said. "The problem has been ignored for 40 years. It is time to act."

Overtime, there has been progress in that the federal government has gone from denying occurrences of Minamata disease in the two communities to making commitments to address the effects of the mercury contamination.

Yet, the issue still remains unresolved. Why? The reality is that it would have addressed by now if it had affected a major city like Toronto, Montreal, or Vancouver. WC

Simran Chattha is the associate editor of Water Canada.

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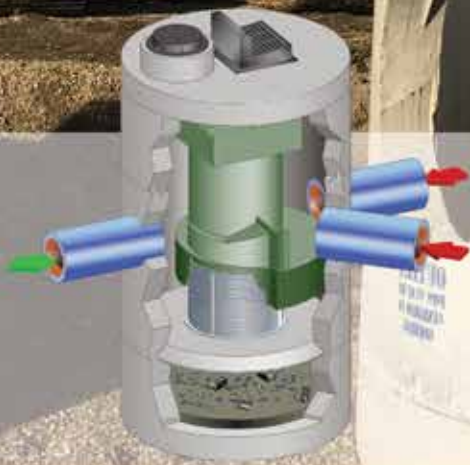


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