



GO WITH THE FLOW

Atlantic Canada Water and Wastewater Association Newsletter

An affiliate of the American Water Works Association and the Water Environment Federation

FALL 2012

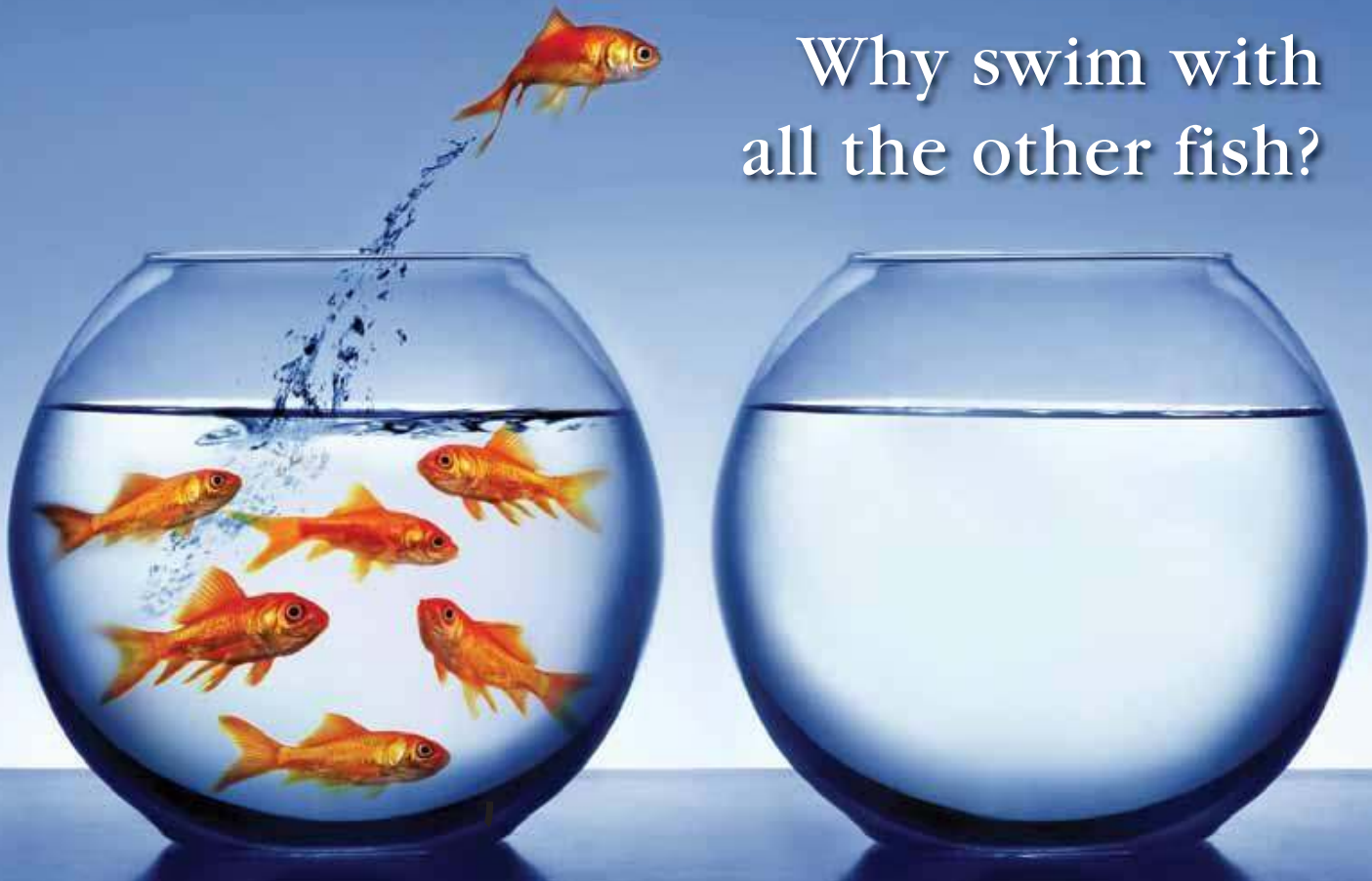
GET READY FOR WATER WORKS!

Charlottetown Hosts 2012 Conference

AWWA, WEF Explore Collaboration
Nanotechnology for Water Treatment
New Effluent Regulations

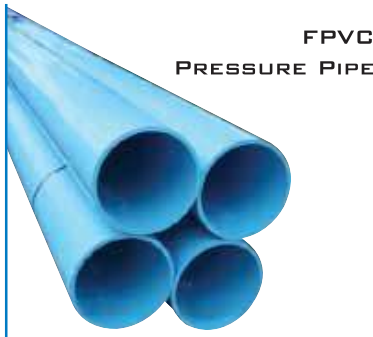


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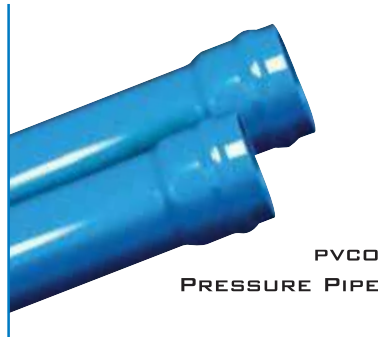
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Curved boardwalk across water to sand dunes and the sea in Prince Edward Island National Park. Situated along the island's north shore, fronting the Gulf of St. Lawrence, and established in 1937, the park's mandate includes the protection of many broad sand beaches, sand dunes and both freshwater wetlands and saltmarshes.

Chair's Corner



ACWWA Reaps Membership Awards

by Jamie Hannam, MBA, P. Eng., Halifax Water

Welcome to the Fall 2012 edition of *Go With the Flow* magazine, providing news about water and wastewater matters across Atlantic Canada. This informative magazine is one of the many benefits of membership in ACWWA.

Over the past year, I have had the opportunity to meet and discuss issues with other Sections. From this experience, I have come to further appreciate the strength of our association here in Atlantic Canada. We are fortunate to have a very high representation of municipalities, consultants, regulators and suppliers enrolled—and a remarkably high percentage of our members attend our annual conference. Despite this excellent position, we continue to

grow in new members. Over the summer ACWWA was recognized by AWWA for exceptional membership recruitment, including the following specific awards:

- **Zeno A. Gorder Award** recognizing the individual member (Clara Shea) who recruits the most new members during one year.
- **Retention Award** for having the highest retention rate of any Section. (95 percent!)
- **Nicholas S. Hill Jr. Award** for having the highest gain in membership of any Section (22.5 percent!)
- **The Club Seven Award** for having the highest percent increase in new members in our division.

Special thanks to Clara Shea, our executive director, and John Eisnor, chair of

the Membership Committee, for their award-winning efforts.

ACWWA continues its leadership role in the water and wastewater industry, as we bring our local members together in Charlottetown in October for our annual conference. This show is one of the prime benefits of membership in ACWWA and offers excellent professional development, networking and social opportunities. Read the details in the pages that follow and plan to attend.

If you have any comments or concerns, please email me at Jamie.hannam@halifaxwater.ca or contact Clara at contact@acwwa.ca.

Enjoy the magazine, WORK SAFE, and we will see everyone in Charlottetown in October!

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WEF Delegate's Update



Wastewater Never Stops, Even in Summer by Gary Chew

WEF has been a little quiet, with summer activities taking up a lot of the time. But wastewater still moves, so there is always something to say.

Membership is remaining stable, though we would always like to see an increase.

We are all hoping for the activities to begin to meet all the new wastewater guidelines. WEF and other associations like CWWA and AWWA are continuing to work together to ensure the continuation of infrastructure programs to assist municipalities in their efforts to upgrade facilities to meet the guidelines. It should be very exciting over the next 10 years, with plants being built and upgraded to compliance, so it is a great time to be part of WEF and the wastewater industry. I encour-

age everyone involved in the wastewater industry to have a look around your operations and find candidates to join WEF, so they can benefit from the resources they receive as members, helping them do their jobs better and keep up with technologies and products.

WEFTEC will take place in New Orleans in late September, and this is the number one trade show and conference in the industry. The dates are Sept. 29-Oct. 3 at the New Orleans convention center. You can read about it at WEFTEC.com. If it is too late to budget for this year's attendance, be sure to start making plans for 2013 now! As the WEF delegate for ACWWA, I will be attending and taking part in any activities that will

help make our association better.

Shortly after WEFTEC we have our ACWWA conference in Charlottetown, Oct. 14-16. We are honored this year to have WEF President Cordell Samuels attending our conference. He is a proud Canadian, and it is a great accomplishment for him to be assuming the position of president of WEF and certainly well deserved. Be sure to shake his hand and say hello when you see him in Charlottetown.

Last but not least, ACWWA/WEF continue to strive to offer the best we can in education for wastewater operators. Please make an effort to get involved, even if it is just to drop me an email to suggest a course you would like to see us present.

See you all in Charlottetown.

AWWA Director's Report



News From ACE12, and Get Ready for Charlottetown

by Reid Campbell

AWWA put on another fine conference this past June with ACE12 in Dallas. Aside from the extremely warm temperatures and the requirement to eat Texas beef every day, it was an excellent conference. As a member of the Atlantic Canada Section it was extremely gratifying to witness our Executive Director, Clara Shea, receive the Zenno A. Gorder award, given to the Section staff member who recruited the most members in 2011.

The Atlantic Canada Section also received four other membership awards. Clara Shea received the Diamond Pin Award for recruiting more than 25 members over a two-year period. Clara and John Eisnor, our membership director, were on hand to receive three awards from AWWA President Jerry Stevens. Congratulations to John and Clara and everyone else who was part of our membership recruitment efforts.

While in Dallas, I had the pleasure of attending the Presidential Gavel Passing and President's Reception for new President Charlie Anderson, of Arlington, Texas. The entertainment for the evening was the AWWA On-Tap band, featuring our own Gary Chew.

During his inauguration speech, Charlie Anderson introduced his biggest priority for his tenure as president, the formation of a Special Presidential Panel (SP2). The mission of the SP2 is to examine all current AWWA and Section operational and business practices, and develop a re-engineered operations and business partnership model that directs the necessary resources to support education, training, volunteer opportunities and other member needs. I was very honoured to be asked to join the panel as the liaison between the SP2 and the

Executive Committee, and I look forward to reporting to you on the progress of the panel.

On July 20, AWWA and WEF jointly announced that they have established an exploratory committee to examine models of enhanced collaboration and partnership to better serve their members. I will provide updates as they become available.

I trust you are looking forward to our annual conference in Charlottetown in October. Craig Walker and his committee have great conference planned, with a strong technical program. We have the privilege of hosting AWWA Immediate Past President Jerry Stevens as our visiting officer, along with his wife, Julie. They are looking forward to their visit to Atlantic Canada.

See you all in October!

Membership Corner

ACWWA Cleans Up at ACE12 by John Eisnor, P. Eng

As mentioned in the previous issue of the newsletter, during AWWA's Annual Conference and Exposition in Dallas, ACWWA received three membership awards.

- The Nicholas S. Hill, Jr. Award, which recognizes the AWWA Section that achieves the greatest net percentage growth during 2011;
- The Club Seven Award, which recognizes the AWWA Section that achieved the highest percentage increase in new members in 2011, within its division;
- The Retention Award, which recognizes the AWWA Section that achieves the greatest overall retention rate during 2011.

In addition, ACWWA Executive Director Clara Shea received two individual membership awards.

- The Zenno A. Gorder Section Staff Award, which recognizes the section staff member who recruited more new members than any other section staff member on an annual basis;
- The Diamond Pin Award, which recognizes members that have recruited more than 25 new members.

An update for the AWWA Membership Challenge is shown at right.

As of halfway through the year, we are still shy of our membership objective for the AWWA Membership Challenge and need to recruit one more student member and four more young professionals. If you know of any young professionals who work in the water and wastewater industry



John Eisnor and Clara Shea receiving the Nicholas S. Hill, Jr. Award and the AWWA Retention Award from AWWA President Jerry Stevens.

AWWA Membership Challenge Update			
	Prize	Objective	Status
2012 Year-End Total Student Members	\$100	16	15
New Young Professionals Recruited in 2012	\$150	11	7
2012 Year-End Total Membership	\$250	505	500

New ACWWA Members		
Name	Company	Membership
Kelly Brown	EMCO	AWWA
Nigel Crouse	Halifax Water	WEF
Heather Daurie	Dalhousie University	WEF
John Dawe	NL Dept. Municipal Affairs	AWWA
David Fay	Fay Environmental Canada	AWWA
Barry Gillingham	NL Dept. of Municipal Affairs	AWWA
Andrew Houlihan	Halifax Water	AWWA
James Jalbert	Town of Dalhousie	AWWA
Luminutra Technologies		AWWA
Jessica Mackay	Dalhousie University	AWWA
Dan Noseworthy	NL Dept. Municipal Affairs	AWWA
Andrew O'Connell	Fay Environmental Canada	AWWA
Sara Serrano	Luminutra Technologies Ltd.	AWWA
Chris Vienneau	City of Dieppe	AWWA
Ville de Caraquet		AWWA
Colin Waddell	Halifax Water	AWWA
Kent Wiezel	Stantec	AWWA
Jim Wilcox	Public Works Government Services Canada	WEF
Susann Woolgar	Hatch Mott MacDonald	AWWA
Lu Yang	Memorial University	AWWA

and are not members of AWWA, please ask them to join. Remember, if you recruit three new members in a quarter, you will receive a gift from AWWA.

As always, the ACWWA Membership Team is looking for enthusiastic individuals who have a desire to make ACWWA the leading professional association in Atlantic Canada. In particular, we are looking for individuals representing Nova Scotia, Prince Edward Island, and Newfoundland and Labrador, as well as representatives from various industry sectors. If you are interested in joining the committee, or would like to discuss membership in general, please contact John Eisnor at john@halifax-water.ca or at (902) 490-1930.



Clara Shea receives the Zenno A. Gorder Section Staff Award from AWWA President Jerry Stevens.

CWWA Director's Report

Effluent Regs Published Amid Concerns by Roland P. Richard, P. Eng., FEC

The final wastewater systems effluent regulations have been published in Canada Gazette II. CWWA will be taking an active role with the rollout of the new regulations.

The following communiqué was recently issued to members:

The Wastewater Systems Effluent Regulation was published in the *Canada Gazette Part II* on July 18, 2012. Once a Regulation is published in Gazette II it is final, and there is no further opportunity for comment. The final Regulation is available online at <http://www.gazette.gc.ca/rp-pr/p2/2012/2012-07-18/html/sordors139-eng.html>

BASIC REQUIREMENTS

The Regulation will establish minimum treatment standards for wastewater treatment across Canada and put in place some additional administrative and reporting requirements to support those goals.

The Regulation will apply to systems designed or collecting an average daily volume of 100 m³ or more of influent per year. It will not apply to systems in the far north.

The Regulation will require wastewater systems to meet the following conditions:

- The average carbonaceous biochemical oxygen demand due to the quantity of CBOD matter in the effluent did not exceed 25 mg/L;
- The average concentration of suspended solids in the effluent did not exceed 25 mg/L;
- The average concentration of total residual chlorine in the effluent did not exceed 0.02 mg/L, if chlorine, or one of its compounds, was used in the treatment of wastewater; and
- The maximum concentration of unionized ammonia in the effluent was less than 1.25 mg/L, expressed as nitrogen (N), at 15°C ± 1°C.

The Regulation sets out timelines for compliance based on a points system to

give sensitive areas a priority, while also balancing community size and other considerations. It also allows facilities to obtain "transitional authorizations," which will allow them to continue to discharge until compliance is achieved.

CHANGES FROM ORIGINAL VERSION

There have been substantial changes from the version originally published in *Canada Gazette I* on March 20, 2010, including:

- increasing the compliance threshold, which will exclude smaller facilities
- new categories of wastewater treatment plants intended to offer more flexibility for seasonal dischargers and lagoon systems

- removed environmental effects monitoring
- will require an annual report for combined sewer overflows

CWWA COMMENTS AND ADVOCACY

CWWA's Wastewater and Stormwater Committee reviewed the Regulation and submitted extensive comments. While CWWA supports the overall objective of establishing a minimum standard of secondary treatment across the country, the Association had major concerns, which are included in the comments submitted to Environment Canada and posted to our website.

Continued on page 19



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Register Now for Charlottetown!

The conference committee is busy getting ready to host the 65th Annual Conference of the Atlantic Canada Water and Wastewater Association in Charlottetown this fall.

Although the early bird registration date has passed, there is still time to register. Registration information was in the last *Go With the Flow* and is available online. Please take the time to register and make your reservation at the Delta Prince Edward. At last update, there are some rooms left, but they are going fast. Remember, conference registrations must be received by Sept. 10 to avoid the \$100 late registration fee.

The PEI Marathon is being held on the island October 12-14, should you wish to participate. It is a great warmup to the Water For People run/walk that takes place on Monday, Oct. 15.

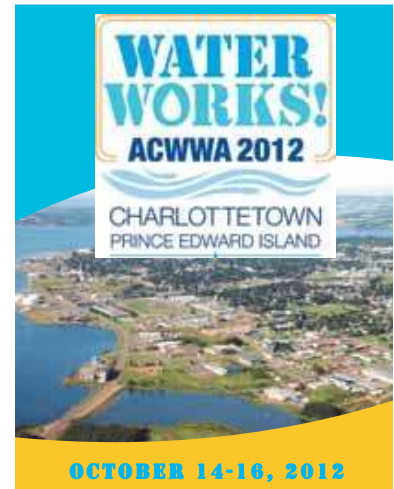
For those who enjoy walking and swinging a club, the conference starts with the traditional golf game on Sunday afternoon. If this is not your desire, there is a bus tour that will take you to the eastern part of the island, where you will see a number of lighthouses and get to stop at Rossignol Estate Winery for a tour and wine tasting. The bus will return in time for the young professionals to go to their mixer and for others to get ready for the meet-and-greet.

Start your Monday with the Water For People run/walk before attending the opening ceremonies and listening to keynote speaker, climatologist David Phillips. He will provide a very enlightening view of the weather with his enthusiastic presentation. While the companions are off to lunch at Dalvay and shopping at the Dunes, the delegates will have a variety of sessions to select and attend before the Top Ops Competition in the afternoon. Companions will arrive back mid-late after-

noon and be able to join the delegates at the hotel for refreshments and annual banquet. Comedian Patrick Ledwell will be the master of ceremonies, and he will be joined by singer/songwriter John Connolly. Afterwards, a short walk will take you to the Old Dublin Pub/Claddagh Oyster House where you can enjoy an evening of entertainment hosted by ABEA.

The Awards Breakfast is a great way to start the day after an evening out. After breakfast, companions head off to aqua-cise and a delicious lunch (complete with wine) while delegates attend sessions until lunch. ABEA have a great afternoon planned at the Trade Show with more than 50 booths for you to visit. Cash and/or gift cards will be drawn for every 30 minutes BUT you have to be present to win. There will also be activities until the end, so make sure you register to join us in the Water For People Fun Time. That evening, you can wind down (or wind up) with the Down East Feast and live island music that will get you up on the dance floor.

Book now to join us in a conference that you will remember!



AWWA, WEF Explore Collaboration

In 2011, the American Water Works Association (AWWA) and Water Environment Federation (WEF) boards approved a joint resolution that encourages collaboration among our members and greater coordination of programs and services.

AWWA and WEF remain committed to the spirit of the 2011 resolution. Both organizations have signed an Agreement of Intent that establishes an Exploratory Committee to examine potential models for enhanced collaboration and partnership to better serve our members.

The Exploratory Committee is comprised of leaders from both organizations and will examine potential models for enhanced collaboration and partnership ranging from efficiencies in some combined business practices and member services to full integration of the two organizations.

Discussions about enhanced collaboration and cooperation



between AWWA and WEF have occurred on and off for several years and are driven by a desire to deliver better service and value to our members as both organizations respond to significant changes in the water industry and among our members.

AWWA and WEF will continue to work together to best serve our members and the broader water industry and will keep our members apprised as our exploration of enhanced partnership continues.

If you have any questions, please contact your Section Services Representative.

Walker Wins MacNabb Award

The 2012 winner of the Ira P. MacNabb award is Craig Walker, in recognition of dedication and support of the Atlantic Canada Water and Wastewater Association and the water and wastewater industry in Atlantic Canada.

Over the last 20 years, Craig has been an ardent supporter of the industry. Every four years, when our annual conference is held in Charlottetown, the Charlottetown Water and Sewer Utility has been a key part of the conference's success, through financial support and the involvement of numerous staff in leadership roles. In recent years, even a strike at the utility concurrent with the conference did not get in the way of a successful event.

Most significantly, 2012 marks the third time that Craig has personally served as conference chair. This is a significant personal and professional commitment, the significance of which cannot be overstated. Through his commitment, Craig has been an important part of the conference, which is returning to Charlottetown every four years.

Craig has also served on the boards of ACWWA and the Canadian Water and Wastewater Association.

Craig Walker is a Professional Engineer

Nova Scotia Extends Hydraulic Fracturing Review

Nova Scotia is extending the review of hydraulic fracturing to mid-2014 to ensure its review committee has the best information to make informed recommendations.

Hydraulic fracturing is a technique used to extract gas and oil from shale by using pressure, chemicals and large volumes of water; it has been controversial in Nova Scotia and parts of North America.

No hydraulic fracturing approvals will be granted during the review, but traditional oil and gas operations will continue.

The review committee will continue to monitor and share information during the extension. New material will be posted at www.gov.ns.ca/nse/pollutionprevention/consultation.hydraulic.fracturing.asp as it becomes available.

who manages the City of Charlottetown's Water and Sewer Utility. A native of Prince Edward Island, Craig graduated from the University of New Brunswick in 1987 with a Bachelor of Science in Civil Engineering and returned to Prince Edward Island following graduation.

In his early career, working with local engineering consultants, Craig's work included structural and municipal construction, which led to a focus on municipal engineering.

In 1989, he began serving the citizens of Charlottetown as the director of engineering with the former Charlottetown Water Commission; in 1995, he continued serving the public as the engineer at the city of Charlottetown's Water and Sewer Department; and in 2002, he was offered the responsibility of managing that department.

Craig and his wife, Jo, are the proud parents of two married sons and are expecting their first grandchild around conference time.

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Announcement of Wastewater Effluent Regulations

by Kenda MacKenzie, P.Eng.

In February 2009, the Canadian Council of Ministers of the Environment (CCME) adopted Guidelines for the Management of Wastewater Systems throughout Canada. Since that time, the Federal Government, with involvement from the provinces, municipalities and other stakeholders, developed Canada's first national standards for wastewater treatment.

On July 18, the Honourable Peter Kent P.C., M.P., Minister of the Environment, announced the publication of the Wastewater Systems Effluent Regulations. The publication of the Regulations represents the fulfillment of a key commitment by the Government of Canada, under the Canada-wide Strategy, for the Management of Municipal Wastewater Effluent.

The Regulations allow municipalities and utilities to implement system improvements and upgrades over the next 30 years, beginning with addressing the highest-risk facilities by 2020.

The full text of the Regulations can be found on the Canada



Gazette website, at www.gazette.gc.ca/rp-pr/p2/2012/2012-07-18/html/sor-dors139-eng.html.

Any questions related to the Regulations can be forwarded to provincial and/or federal departments of environment.

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Walkerton Claims Settled

In May, 2011, the Ontario Government announced that over \$72 million has been paid to victims of the Walkerton, Ontario, tainted-water tragedy.

In May 2000, seven people died and more than 2,300 became ill when *E. coli* contaminated the community's water supply.

A total of 10,189 claims were made, with 9,275 qualifying for compensation. They should all be paid by the end of the year.

Attorney General Chris Bentley said that while nothing will ever make up for the tragedy experienced in Walkerton, he hopes the compensation plan has helped all those who suffered to continue along the path to healing. "As a society, we must never forget this chapter in our history," Bentley said. "As a government, we will continue to do everything we can to ensure safe, strong communities for Ontario families."

Scientists who studied the affected Walkerton residents are still mining their health data to learn as much as they can about the impact of *E. coli* bacteria. A 10-year study of 1,977 Walkerton residents, published in November in the *British Medical Journal*, concluded that those who were sickened in 2000 experienced an increased risk for hypertension, renal impairment and cardiovascular disease. The study authors said the findings have implications for others who become ill because of the bacteria.

"Our findings underline the need for following up individual cases of food or water poisoning by *E. coli* O157:H7 to prevent or reduce silent progressive vascular injury," the researchers concluded. "These long-term consequences emphasize the importance of ensuring a safe food and water supply as a cornerstone of public health."

SHAPING LIVES



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Shown here is Isla, step-daughter of Jamal, one of our valued employees in Atlantic Canada





Halifax Finishes Third in ACE12 Top-Ops Competition

A huge congratulations to the Halifax Top-Ops team, which represented ACWWA at the recent ACE12 Top Ops competition in Dallas. The team, comprised of Colin Waddell, Garry Oxner and Andrew Houlihan, competed in three preliminary rounds and the semi-finals. This competition, considered to be the “Stanley Cup” of all top-operators competitions, consisted of 17 teams from all over North America.

It was evident from the preliminary rounds that Halifax came prepared. In their first match they finished with a dominating victory. During the second round, they finished second of the three teams. As if the pressure of the competition wasn't enough, Halifax needed to finish first in their final round to earn a spot in the top-4 team semifinal. Equal to the task, the team finished first and moved into the semifinals. This marked the first time a team from ACWWA made it to the final rounds.

In the semifinal, Halifax lost to last year's champions, Palm Coast Water Buoys, from Florida. During their final match, the ACWWA representatives scored well enough to earn them a third-place finish.



Competing at this level takes a huge time commitment from very dedicated utility staff. A third-place finish in an international competition of this magnitude speaks well not only for Halifax, but for ACWWA also.

Well done, Halifax Water, and we look forward to seeing you in action this October in Charlottetown!

New NDMA Guideline for Drinking Water

The Federal-Provincial-Territorial Committee on Drinking Water has approved a new guideline for *N*-Nitrosodimethylamine (NDMA) in drinking water. This is a new guideline that sets the maximum acceptable concentration for NDMA in drinking at 0.00004 mg/L (0.04 micrograms per litre).

NDMA is a disinfection by-product that can be formed as a result of chloramination, and to a lesser extent, chlorination, as well as the use of some coagulants and anion-exchange resins. The best approaches to reduce the concentration of NDMA in drinking water include removing the organic nitrogen precursors (including humic substances) from the source water or modifying the disinfection process to minimize its formation (without compromising the efficacy of the disinfection process). Any modification to the disinfection strategy needs to consider the potential formation of other disinfection by-products in a holistic manner that includes pilot testing.

In general, monitoring of NDMA should be conducted on an annual basis, unless the characteristics of raw water or the treatment and disinfection strategies create the potential to

produce NDMA; in these cases, quarterly monitoring of treatment water from surface and groundwater sources is recommended. Monitoring should be conducted at the treatment plant and at points in the distribution system with the longest disinfectant retention time. Factors to consider when determining the monitoring frequency of NDMA include the following:

- presence of NDMA precursors or nitrogen-containing compounds
- type of coagulant used
- type of anion-exchange resins used
- disinfection practices (i.e. chloramination or booster chloramination)

Increased frequency of monitoring may be required for facilities using surface water sources during periods when water characteristics are more favourable to the formation of by-products.

The new Guideline Technical Document for NDMA in drinking water is now available on Health Canada's website: www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/ndma/index-eng.php.

Nova Scotia Releases Wetland Conservation Policy

Nova Scotia is conserving wetlands through a new policy released last October. The goal of the policy is to prevent the net loss of wetlands. It protects wetlands of special significance, promotes wetland protection and stewardship, encourages a long-term net gain in wetland types that have experienced high losses and raises awareness on the benefits of maintaining buffers near wetlands when developing new areas.

“Nova Scotians have told us they want to protect our natural environment,” said Environment Minister Sterling Belliveau. “Our wetland policy ensures we are taking steps to conserve these important ecosystems in our watersheds. Wetlands provide critical habitats for fish and wildlife and protect our drinking water. They also protect our communities by reducing the effects of flooding from severe weather events.”

An updated application process clarifies what is required before altering a wetland.



The release of the wetland policy meets a goal of the Environmental Goals and Sustainable Prosperity Act, provincial heritage strategy and the Water Resources Management Strategy—Water for Life.

The Nova Scotia Wetland Conservation Policy is available at www.gov.ns.ca/nse/wetland/.

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Plant Profile



Lunenburg Meets Its Needs with Unique System

Situated in the Town of Lunenburg, NS, a town famous for the schooners *Bluenose* and *Bluenose II*, is a new 95' x 19' potable water storage tank complete with an aluminum geodesic dome. While Aquastore tanks may be common in Atlantic coastal Canada, the Lunenburg tank has a feature that is rare for most water treatment applications.

Inside the 95' x 19' storage tank is a 34' x 20' fixed-volume chlorine contact tank that is continuously treating the town's water. As a key piece to the town's new \$7.2 million water treatment facility, the combination tank, constructed by Greatario Engineered Storage Systems with engineering firm CBCL Limited, proved to be the most economical and timely tank solution for Lunenburg's upgrade.

Prior to the installation, the town received its water from an open-air reservoir. Water was pumped through flow proportional chlorine equipment that was installed in 1990, but due to new Provincial Surface Water Treatment standards, the town's water treatment facilities needed to be upgraded, said Town Engineer Marc Belliveau.

"Because the open-air reservoir was exposed to the elements, our water was at risk of a variety of hazards that could potentially be harmful to our residents," Belliveau said. "The new provincial water standards required an enclosed reservoir and water filtration for the town's drinking water, so we were ultimately required to replace the reservoir with an entirely new water treatment system."

The town received funds from three levels of government to upgrade their water system to meet the new water quality requirements. Along with the tank, the project included a new water treatment plant, pump house upgrades, a wastewater pumping station and forcemain to provide water to the town's 2,500 residents. Because the town was limited on space to build two individual tanks, Steve Gregory of Greatario and Brett Pugh of CBCL were challenged to develop a water storage and chlorine contact unit that would be cost effective and require little maintenance.

"We came up with a few different ideas, but when it came down to maximizing the space we had to work with, the best alternative was to go with the tank-within-a-tank with fabric baffle design," says Gregory. "It's a very unique application; all you see is one tank, but it's actually doing the work of two."

A major concern of the design was making sure the inner chlorine contact tank maintained a fixed liquid level to prevent it from being crushed due to hydrostatic pressure from the outer water tank. Pugh and his team of engineers determined a way to make sure the inner tank stayed full at all times.

"We specified in the design to allow a piping configuration to have water go to the center tank and come right back out if it needs to maintain the exterior wall of the tank," Pugh said.



The geodesic dome on this tank hides a secret—another tank!

"In an unusual situation where maintenance on the tank was required, we have planned for a bypass to make sure that water level stays the same at all times."

Construction for the outer storage tank began in Fall 2009, which included erecting the tank with its dome using Aquastore's jack-build tank construction system. This allowed the building materials for the inner tank to be stored inside of the empty water complex to be completed at a later date. Greatario was able to maximize the 2010 building season by working on other jobs after the outer portion of the Lunenburg tank was finished, and return in the winter to construct the inner portion of the tank.

"Because we were building under the dome, the tank materials and construction personnel were protected from the elements," Gregory said. "Building in Nova Scotia in the dead of winter is not easy, but when you have a roof over your head protecting you, it makes a difficult job infinitely more tolerable."

"What made this project more attractive for everybody was that we were able to maximize the plot of land that we had to work with. We didn't require a lot of excavation or an expensive and time consuming process of building with reinforced concrete to get the desired results," Pugh said. "The tank-within-the-tank design is a pretty clever and efficient way to build a tank for this application, and building with glass-fused-to-steel eliminates a lot of long-term maintenance costs and boosts the tank's life cycle quality."

The water treatment plant, complete with tank and pumping station, officially opened in September 2010 and has been servicing the Lunenburg community with no setbacks. The complete treatment system was awarded the Atlantic Canada Water and Wastewater Association 2010 Small Utility Project of the Year.

"The new Aquastore system is doing a great job removing organics and microorganisms that were more from our raw water to a much higher standard than we were able to achieve in our previous water treatment arrangement," Belliveau says. "We are very pleased with its performance."

For more information, visit www.greatario.com.

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Innovation

Mary Ellen Tuccillo, Glen R. Boyd, and Anne Sandvig are with The Cadmus Group (www.cadmusgroup.com), Watertown, Mass. Jo Anne Shatkin is with CLF Ventures (www.clfventures.org), Boston. Dionysios D. Dionysiou is with the Environmental Engineering and Science Program, University of Cincinnati (www.ceas.uc.edu), Cincinnati.

Although the use of nanomaterials in drinking water treatment is being explored, our understanding of possible risks hasn't kept pace with research regarding potential applications. **BY MARY ELLEN TUCCILLO, GLEN R. BOYD, ANNE SANDVIG,**

JO ANNE SHATKIN, AND DIONYSIOS D. DIONYSIOU

NANOTECHNOLOGY WHAT ARE THE CHALLENGES AND EMERGING BENEFITS FOR WATER TREATMENT?

AMONG TODAY'S EMERGING contaminants, nanomaterials pose special challenges. But unlike other emerging contaminants, nanomaterials also offer the possibility of novel treatment technologies.

Nanomaterials comprise a diverse set of substances that are defined by particle size: They have at least one dimension that measures less than 100 nm. To put this into perspective, consider that the width of human hair is approximately 80,000 nm. Nanoparticles exist in nature, but engineered nanomaterials have captured the most attention in recent years. Commercial uses of nanomaterials have developed quickly, and global production of nanomaterials is expected to increase exponentially.

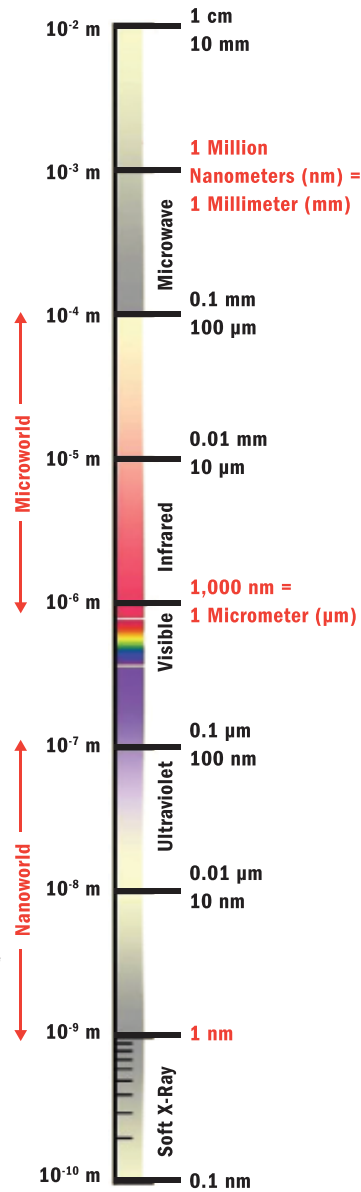
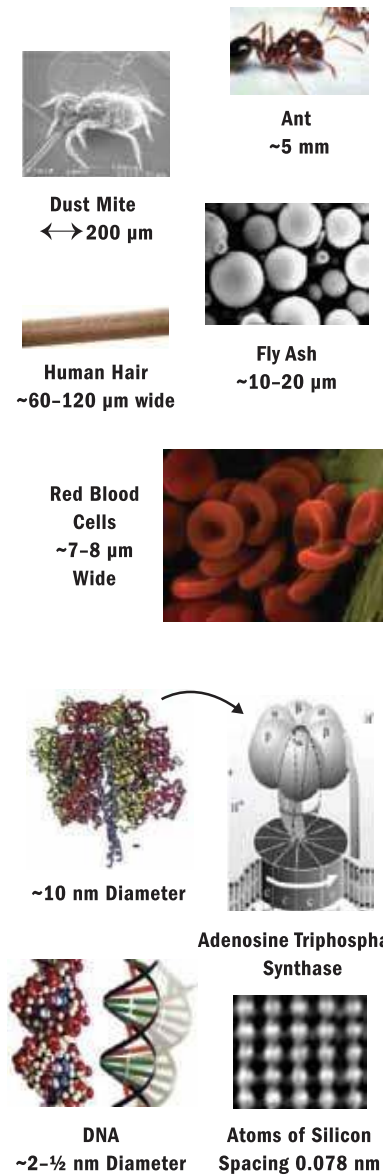
Nanomaterials are also being explored for potential use in drinking water treatment. Adsorption,

filtration, and photocatalytic processes may all be enhanced by incorporating nanomaterials. However, our understanding of the potential risks posed by nanomaterials hasn't increased as rapidly as research has regarding possible applications. Our understanding is also incomplete regarding release of nanomaterials into the environment, their occurrence in source waters, and their fate and transport in the environment and drinking water treatment.

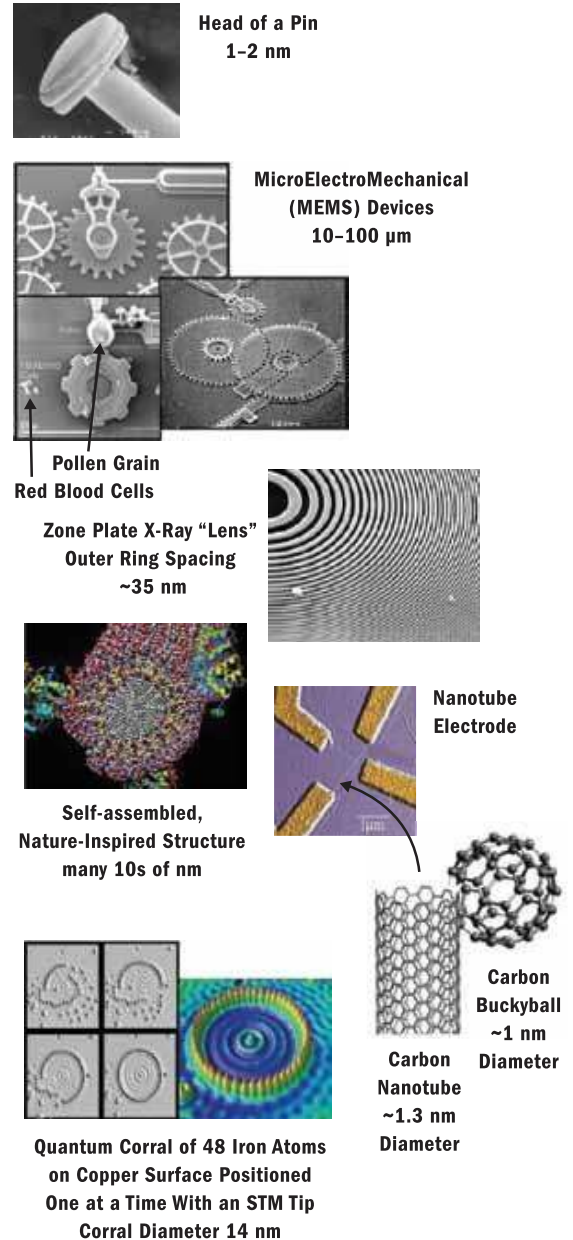
Water Research Foundation Project No. 4311, *Challenges and Opportunities of Nanomaterials in Drinking Water*, sought to provide drinking water utilities with information about various technical issues associated with nanomaterials, including topics of interest to the drinking water community. This article summarizes those findings.

The Scale of Things—Nanometers and More

Natural



Manmade

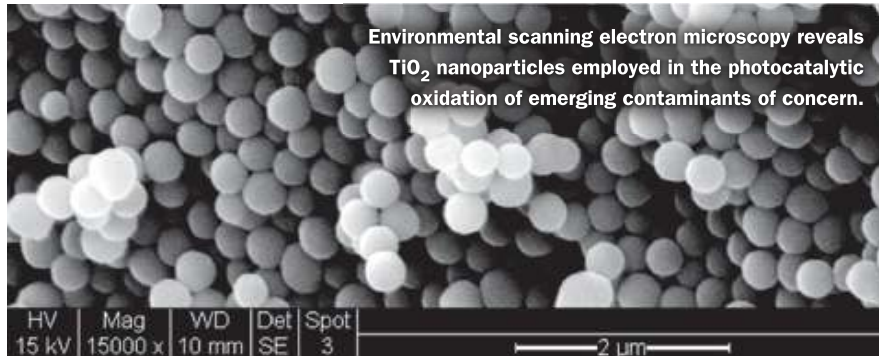


Nanoscale science, engineering, and technology are fields of research in which scientists and engineers manipulate matter at the atomic and molecular levels to obtain materials and systems with significantly improved properties. Exploring the science of nanostructures has become a new theme common to many disciplines, including water treatment.

The Challenge:

Fabricate and combine nanoscale building blocks to make useful devices, e.g., a photosynthetic reaction center with integral semiconductor storage.





NANOMATERIAL DEFINED

Nanomaterial includes nanoparticles (discrete nano-sized particles) and nanostructured materials (with nano-sized surface topography or other features). They may occur naturally (e.g., iron oxyhydroxides, amorphous silica, clay minerals, and viruses); be inadvertently generated, such as soot from combustion; or be engineered. Examples of engineered nanomaterials include nanosilver (n-Ag); nano titanium dioxide (nano-TiO₂); cerium oxide; and carbon-based nanomaterials such as fullerenes, carbon nanotubes, and quantum dots (semiconductors whose electronic characteristics are closely related to the size and shape of the individual crystal).

Their minute size bestows nanomaterials with properties that differ from those of larger particles. These properties include a large surface-area-to-mass ratio, increased reaction kinetics, disinfectant capabilities, and optical and electrical properties. Their special properties make nanomaterials attractive for many applications, ranging from cosmetics to medicine. In recent years, manufacture and use of nanomaterials has spanned a wide range of products, but our understanding of health and environmental effects hasn't caught up with the increased level of technological development.

POTENTIAL HEALTH EFFECTS

Because nanomaterials are diverse, generalizations about their toxicological effects can't be made. Most studies involve inhalation exposure; studies of

dermal and ingestion pathways are relatively few. However, absorption across the gut has been reported, and some types of nanoparticles have been found to distribute in the body.

Existing data suggest that some nanomaterials cause adverse health effects, but data are too limited to draw general conclusions. Some of the ongoing research needs include identifying which metrics to use in toxicology studies and conducting experiments at environmentally relevant concentrations. A mass-based dose might not be the right metric; basing measurements on other properties, such as size or total surface area, may be more appropriate.

REMOVING NANOMATERIAL FROM DRINKING WATER

Data on environmental occurrence of nanomaterials are lacking. Releases to the environment may occur via point sources, such as releases from manufacturing plants, wastewater treatment plant effluent, or nonpoint runoff (e.g., wear and tear of nanomaterial-based products). To understand whether engineered nanomaterials are present in source waters at concentrations that should cause concern requires sampling and analysis of surface waters, wastewater treatment plant effluents, and soils.

Available literature on the removal of nanomaterials during drinking water treatment includes jar tests to simulate removal of nanoparticles by coagulation, flocculation, sedimentation, and filtration.

Researchers have found that alum coagulation can remove varying amounts of the nanoparticles' total mass, depending on alum dosage and water chemistry. Filtration with a 0.45-µm filter also improved removal of aggregated metal oxide nanoparticles.

Although membrane processes are used increasingly by municipalities for drinking water treatment, there are few published studies regarding their effectiveness for removing nanoparticles. Low-pressure membrane filtration—such as microfiltration and ultrafiltration (UF)—show promise for removing aggregated nanoparticles. Because nanofiltration (NF) and reverse osmosis can remove inorganic and organic contaminants down to 1 nm in size, these higher-pressure membranes should also be capable of removing nonaggregated nanoparticles. However, membrane use presents major challenges regarding fouling and concentrate waste treatment and disposal.

There are few published studies regarding the effectiveness of sorption processes for removing nanoparticles. However, because nanoparticles have high specific surface areas and high adsorption capacity, certain adsorptive processes remove nanoparticles with high efficiency. Similarly, lime softening may remove nanoparticles, depending on the particles' association with other constituents in the water.

The US Environmental Protection Agency (USEPA) has identified the following research questions related to removing nanoparticles during treatment:

- Are nanoparticles effectively removed in drinking water treatment? If yes, by what mechanisms?
- Do nanoparticles affect removal of other substances during drinking water treatment processes or facility performance?
- How effective are existing treatment processes—such as carbon adsorption, filtration, coagulation, and settling—for treating nanomaterials?

Nanomaterials are being investigated for potential use in several types of water treatment.

POTENTIAL USES OF NANOPARTICLES

Many of the characteristics that make engineered nanomaterials useful for industrial purposes also present opportunities for drinking water treatment. Nanomaterials are being investigated for potential use in several types of water treatment, including

- membranes customized for reactivity or disinfection.
- new types of adsorbents that can remove organic compounds or metals.
- arsenic removal.
- photocatalytic processes (using TiO_2) for destroying organic compounds or disinfection.
- devices for monitoring water for specific contaminants.

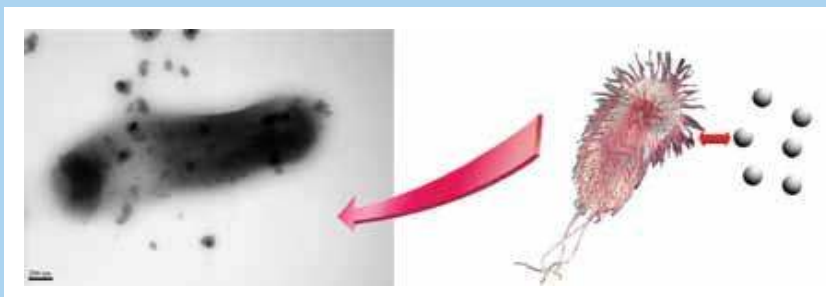
However, nanomaterial-based treatment is still in the developmental stage. Key challenges associated with incorporating nanomaterial-based treatment into full-scale water treatment plants include availability of adequate volumes of nanomaterials, integration of nanomaterials into existing treatment processes, and uncertainties regarding the release of nanomaterials during treatment.

Membranes. Nanostructured membranes being investigated for use in water treatment include carbon nanotube-based membranes, nanocapillary array membranes, and nanoceramic membranes. These membranes may be useful for removing bacteria and viruses. Non-reactive membranes are nanomaterials that have been chemically functionalized to increase their affinity, selectivity, and capacity for targeted organic and inorganic solutes, as well as ions in solution.

Adsorbents. Research is under way to develop nanosorbents for metals, anions, and organic compounds. Nanomaterials that can serve as sorbents include zeolites, carbon nanotubes, and self-assembled monolayers on mesoporous supports (SAMMS), which blend mesoporous ceramics with

Transmission Electron Microscopy (TEM)

A TEM image shows *E. coli* after exposure to silver (Ag) nanoparticles in the dark.



self-assembled monolayer chemistry, creating a sorbent that shows promise for removing metals and radionuclides from water.

Arsenic Removal. Removal of arsenic from water has been demonstrated by using titanium-based nanomaterials and an ion-exchange resin impregnated with nanoscale iron hydroxide. For example, researchers found that titanate nanofibers can be used as an adsorbent in a porous packed-bed reactor setting to remove arsenic. Iron oxide-coated sand has been investigated as a potential home arsenic removal treatment system in developing countries.


TiO_2 Photocatalysis. Because of its high removal efficiency and rapid degradation rates for organic compounds, TiO_2 is a promising photocatalyst for water treatment. TiO_2 use is especially appealing because of growing concerns about persistent pollutants and emerging pollutants, such as pesticides and endocrine disrupting compounds. Ultraviolet-based and visible-light-activated nano- TiO_2 films also have been used to degrade cyanotoxins and to inactivate various microorganisms.

Nanosensors. Nanomaterials—such as carbon nanotubes, gold nanoparticles, quantum dots, and magnetic nanoparticles—have been studied as sensor components because of their unique physical, chemical, and electrical properties. Such sensors may prove valuable for water

quality monitoring. Sensors based on nanoparticles' optical properties have been used to develop sensitive and selective detectors for pollutants.

ONGOING RESEARCH NEEDS

Source waters are expected to contain naturally occurring nanoparticles. Although they may also contain engineered nanoparticles, the quantities released into the environment are unknown. Concentrations of engineered nanoparticles in drinking water sources also remain unknown; such information is needed for estimates of human and ecological exposure. Concentrations in source waters are likely to be low, but confirmation is needed.

In addition, continued development of methods to detect and characterize nanomaterials is needed. To be useful to those concerned with drinking water quality, methods must be sensitive, cost-effective, and suitable for use with complex matrices, such as surface waters. Continued research on the fate and transport of nanoparticles in the environment and in a drinking water system is also needed to better understand whether nanoparticles will be transported from point or nonpoint sources, through treatment processes, and ultimately into a distribution system. A more complete understanding of human and ecological health effects is also needed, especially at environmentally relevant nanoparticle concentrations. 

Scholarship Announcement



Atlantic Canada Water and Wastewater Association (ACWWA) Lloyd Douglas Scholarship (2012 Competition)

The Atlantic Canada Water and Wastewater Association (ACWWA) established the Lloyd Douglas Scholarship in 2010 in recognition of dedicated service rendered by long-time member and tireless ACWWA supporter, Lloyd Douglas. ACWWA is comprised of over 550 water professionals from Atlantic Canada representing the water and wastewater industry from a number of disciplines, including System Design & Consulting, Utility Management & Operations, Academia & Students, and Service Providers & Contractors. The goals of the association under its Strategic Plan are to:

- Support industry best practices
- Provide our industry with an education for the future
- Promote information exchange in the water and waste water industry
- Conduct annual conferences
- Enhance government relations
- Increase/optimize membership
- Improve our association effectiveness

NUMBER AND VALUE:

Up to Four/\$1,000 (one for each Atlantic Canadian province: NB, NL, NS, and PEI)

TENURE:

One year (nonrenewable)

ELIGIBILITY:

An applicant shall

- Be a Canadian citizen or permanent resident of Canada;
- Be registered as a full-time student in a post-secondary institution in Atlantic Canada;
- Have successfully completed at least one year of post-secondary education;
- Intend to pursue a career related to the water or waste water industry.

FIELDS OF STUDY:

University degree in engineering/science or college diploma in water/wastewater field.

ASSESSMENT CRITERIA:

- Academic record after at least one year completion of post-secondary education (30%);
 - Statement/essay (60%); and
 - Work experience and extracurricular activities (10%).
- Preference will be given to candidates with demonstrated interest in working in the water or wastewater treatment sectors.

APPLICATION:

The application shall include

- Contact information including name, phone number, mailing and email addresses;
- A 500-word statement or essay of the applicant's interest, knowledge and future goals in the water/wastewater industry together with applicable work experience or extracurricular activities;
- A description/list of planned future studies; and
- Supporting documents including i) an official transcript completed to date (can be mailed by the institution) and ii) proof of Canadian citizenship or permanent residence.

The Scholarships Committee **accepts only electronic applications**, which should be received via email by **October 19, 2012**. Scanned copies of the supporting documents are acceptable.

APPLY TO:

Dr. Bing Chen, Chair of Scholarships Committee
Atlantic Canada Water and Wastewater Association (ACWWA)
PO Box 41002, Dartmouth, NS, B2Y 4P7
Email: contact@acwwa.ca

SELECTION:

Selection will be based on the principle of open and equal opportunity and carried out by the Scholarships Committee. The award winners will be announced in January.

CWWA Director's Report

Continued from page 5

CWWA was offered an opportunity to review the revised draft before its finalization and publication in Gazette II. We noted that the final Regulation contains changes that reflect the practical and technical concerns we have raised. We have also noticed a significant improvement in the structure and language of the final draft.

We are especially supportive of the decision to raise the compliance threshold to exempt utilities with small influent volumes from the provisions of the Regulation.

CWWA also supports the decision to remove Environmental Effects Monitoring (EEM) requirements. Taking the time to develop an effective and comprehensive approach to environmental effects monitoring will ultimately result in a more robust and useful program. We also look forward to representation on the proposed EEM working group to be established on this important issue.

While we commend the hard work by Environment Canada, the Association has some remaining concerns:

- **CSO Annual Reporting:** Interpretation is needed, since trending will only be valuable over a long term, and the report will be more reflective of rainfall over the year than of efforts to reduce overflows.
- **Guidance on Application and Interpretation:** This is a complex Regulation, and guidance on both the interpretation and enforcement is necessary to ensure that it is implemented appropriately across the country.
- **Inconsistency between CEPA and the *Fisheries Act* for TRC**
- **Unanticipated Authorizations:** The Regulation provides no flexibility if effluent is lethal for reasons other than ammonia
- **Administrative Agreements and One-Window Reporting:** Provincial/territorial Administrative Agreements and "one-window" reporting system are

vital components for the implementation of the Regulation.

- **Funding:** CWWA maintains its previous belief that a committed funding program on the part of the Senior Levels of Government will be essential to assist municipalities in particular.

The complete comments, with more details on these issues, are posted to the CWWA website: www.cwwa.ca/home_e.asp.

NEXT STEPS

CWWA and our Board of Directors are currently discussing and evaluating data on the needs for infrastructure investment for both the water and wastewater sector and will be using this to inform advocacy work, as the federal government is planning to launch a new infrastructure fund when the current one expires. The cost of implementing the WSER will be an important consideration in this work.

CWWA will also be tracking the legislation as it's implemented to help ensure that it functions as expected.

TWO NEW POSITION PAPERS

In other news, CWWA just released two new position papers. The first is a statement concerning stormwater management. The second addresses fluoridation, generally supporting its use and providing links to relevant resources on the topic. The papers are available on our website at www.cwwa.ca.

CONCERNS WITHIN CWWA MEMBERSHIP

At our Spring Meeting in May, the CWWA Board identified three major topics of common concern across the country.

- **Operator Certification:** The board established an advisory task group to consider the issues regarding operator certification and what role the CWWA can play to promote greater standardization of process.
- **Infrastructure Funding:** The board also

established an advisory task group to consider the concerns of our utility members faced with aging and/or non-compliant infrastructure. Meanwhile in June, the Transport and Infrastructure Canada announced it will be holding a series of roundtables this summer to consult with municipalities and others on how to develop a long term plan for infrastructure.

- **Biosolids:** There appears to be growing concern across the country on this issue and a series of new legislation regarding the re-use and disposal of biosolids. Our Biosolids Committee will be reviewing what role the CWWA can play.

UPCOMING EVENTS

- **National Drinking Water Conference**
Kelowna, BC
Oct. 21-24
Theme: Assessing and Managing Risk
- **Window ON Ottawa**
Ottawa
Nov. 28-30
Including a Water and Wastewater Security and Emergency Management Workshop, and a Climate Change Workshop
- **National Wastewater Conference—2013**
In partnership with the Canadian Association for Water Quality, CWWA will be hosting their biennial wastewater conference early in 2013. The details are just being worked out, but we are planning for late February in the Hamilton/Greater Toronto Area. We hope to hear more from the Canadian Water Network on the National Research Agenda on Municipal Wastewater and Biosolids, the work undertaken and accomplished by the CCME Task Group on Biosolids, wastewater and biomass as renewable energy source, among others.
Should any other information be required on CWWA activities or initiatives, please contact me at rrichard@gmsc.nb.ca or visit the CWWA website at www.cwwa.ca.

Certification Corner



Excerpted from the August 2010 issue of *Opflow*, published by AWWA. Reprinted by permission. For more information and references, visit www.awwa.org.

WATER

- 1. What's the main characteristic of raw water that enables blue-green algae to grow?**
 - a. Presence of copper sulfate
 - b. Low pH
 - c. High hardness
 - d. Presence of nutrients
- 2. What's the best time to perform a flushing program on mains?**
 - a. Spring when the weather is usually mild
 - b. Fall when water usage is low and the weather not yet harsh
 - c. Late at night to lessen traffic disruption and minimize customer complaints
 - d. Summer when many residents are on vacation
- 3. What should the flowmeter read in gpm if a 12-in.-diameter main is to be flushed at 5 ft/s?**
 - a. 39.2
 - b. 78.5
 - c. 392
 - d. 1,764
- 4. An 8-in. main line needs to be flushed. The length of pipeline to be flushed is 250 ft. How many minutes will it take to flush the line at 25 gpm?**
 - a. 7 min
 - b. 13 min
 - c. 26 min
 - d. 31 min

WASTEWATER

- 1. An Imhoff cone measures**
 - a. volume of settleable solids.
 - b. how fast sludge water will filter through a membrane.
 - c. depth of transparency in a digester.
 - d. sludge carry-over from a digester.
- 2. The color of biofilm on a rotating biological contactor undergoing nitrification appears**
 - a. grayish green.
 - b. grayish brown.
 - c. greenish brown.
 - d. reddish brown to golden.
- 3. A settleability test is performed on a secondary clarifier at an activated sludge plant. If the sludge floats too soon, reduce sludge age and**
 - a. increase dissolved oxygen (DO).
 - b. decrease biochemical oxygen demand (BOD).
 - c. increase the food-to-microorganism ratio.
 - d. decrease the food-to-microorganism ratio.

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Wastewater: 1. a, 2. d, 3. c

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