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I would first like to introduce myself as the new president of your association. I have been a director and vice-president for the past four years, and my involvement with WEAO goes back over 30 years. I organized my first seminar in 1981 on Landfill Leachate Treatment. The next, and more important part of my message, is to thank the Conference Committee, our professional staff, the Ontario Pollution Control Equipment Association, conference volunteers, sponsors and attendees for making our 39th Annual WEAO Technical Symposium and OPCEA Exhibition the most successful ever. You will be reading more about it, and the people involved, in this publication.

I would like to invite you to submit an abstract for the 40th Annual WEAO Technical Symposium and OPCEA Exhibition. Please see the Call for Abstracts on page 6.

WEAO is in its 40th year, and it should not go without notice that we have also been celebrating Earth Day for 40 years. Earth Day Canada reports that April 22, Earth Day, is celebrated as the birth of the environmental movement. According to the U.S. Census Bureau, the world population is expanding at a mind-boggling rate. The world reached one billion people in 1800; two billion by 1922; and over six billion by 2000. It is estimated that the population will swell to over nine billion by 2050. That means that, if the world’s freshwater resources were evenly distributed, people in 2050 will only have 25% of the water resources per capita that people in 1950 had. But, as Ontarians, we clearly know that this natural resource is not evenly distributed, which makes our association’s vision even more important. Ontario has a bountiful freshwater supply and we live amidst countless rivers and streams; 250,000 freshwater lakes and, according to the Ministry of the Environment, “one third of the Earth’s fresh water within and among our borders.” Our very existence depends on having access to clean water. A person can live about a month without food, but only about a week without water. Water that has been polluted or that contains pathogens can make us sick, or worse.

The challenges of our generation are immense, and the vision of our association to address these challenges is a strong one: “WEAO will be the pre-eminent organization of technical and professional individuals dedicated to the preservation and enhancement of Ontario’s water environment.”
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### Important Dates

- **Abstract Submission Deadline:** **FIRM September 30, 2010**
- **Acceptance Notification:** **December 1, 2010**
- **Full Manuscripts Due:** **March 1, 2011**
- **Presentations Due:** **March 20, 2011**

### Guideline for Submission of Abstracts

**ABSTRACT LENGTH AND FORMAT**

Abstract submissions should be in the extended format consisting of a minimum of two and a maximum of four double-spaced pages (excluding Submittal Form). Abstracts should clearly, but briefly, define the objectives of the investigation or study, including what was done, the conclusions drawn and what the findings mean to the environmental industry. Please do not send any attachments with the abstracts.

Authors are requested to complete and return the ABSTRACT SUBMITTAL FORM (available at www.weao.org). Please indicate the SESSION for which the abstract is submitted. If you wish to submit a paper that does not directly relate to the list of session topics, please enter “other” in the space provided. One copy of the completed form and abstract should be forwarded to the Association's office by email or mail only (see address on the left). Faxed copies will NOT be accepted.

Authors of selected abstracts shall prepare and submit a manuscript for inclusion in the proceedings by the appropriate deadline. These proceedings will be distributed at the conference. In addition, all authors will make podium presentations. In accordance with current practice, all presenters will be required to register for the conference and pay the attendance fee. Inclusion as a speaker in the final program is contingent upon receipt of a paper for inclusion in the proceedings, and upon receipt of a signed Copyright Release using the form provided by the WEAO.

The Abstracts submitted by September 30th will be considered for the technical program. Abstracts submitted late will only be considered if there are gaps in the program.
A BUSY TIME

The past few months have flown by, as work at the Water Environment Association of Ontario (WEAO) has increased. There are moves afoot to complete the work plans for the five-year Strategic Plan, an outline of which was presented at the Annual General Meeting at the WEAO Conference in April. The Strategic Plan focuses the association’s efforts and aids us in being a progressive, successful organization, a leader in the transfer of technology and knowledge to the wastewater sector.

The Government Affairs Committee has held another successful FORUM, meeting with representatives from a number of government departments. The association is increasingly being asked to participate in stakeholder consultations on a variety of water related issues. This is a chance for us to share our expertise and perhaps aid in the development of more science-based policy and legislation.

WEAO has also been involved in two major projects, one which received funding from the Ministry of the Environment and included the updating of the 2001 report entitled Assessing the Fate and Significance of Selected Metals, Trace Organics, and Pathogens in Sewage Biosolids Applied to Agricultural Land. The report should be available shortly on the WEAO website. The other project has been the updating and collation of various guidance manuals into one Optimization Guidance Manual for Sewage Works, with funding by the Ministry of the Environment and Environment Canada. In addition, WEAO obtained funding from the Lake Simcoe Clean-Up Fund to undertake a review of sewage treatment plants (STPs) in the Lake Simcoe watershed. The overall focus is to look at phosphorus reduction strategies for STPs. These two reports will also be available shortly on the WEAO website.

There have been a number of Environmental Bill of Rights (EBR) notices that the Government Affairs Committee and others have reviewed and provided comments on. The proposed federal regulation (Wastewater Systems Effluent Regulations) under the Fisheries Act is currently out for review and comment before it goes to final Gazette before the end of 2010. WEAO will be providing comments on behalf of members. Ontario Region Environment Canada and the Ministry of the Environment presented information at the April 20 Conference about the proposed regulation and how it may fit within the Canadian Council of Ministers of the Environment (CCME) National Strategy. The WEAO response will be posted to the WEAO website. The EBR initiatives or federal government initiatives we see as relevant to members are posted to the website and members are encouraged to submit comments to us in order to develop an association response.

Other recent notices are related to phosphorus and reductions within the Lake Simcoe watershed as well as water quality trading and the modernization of the approvals process. WEAO has been invited to participate in stakeholder discussions on the modernization process. I welcome comments.

Another item of interest to WEAO membership is the Private Member’s Bill 13, championed by David Caplan. Bill 13 was previously Bill 237 (before the provincial government prorogued in March) which had received second reading. It is back as Bill 13, has had first reading and was due for second reading. There are some who feel that as a Private Member’s Bill, it is unlikely to move forward, however, others believe we should provide comment. Bill 13 (An Act to sustain and encourage improvement in Ontario’s water and waste water services and to establish the Ontario Water Board) enacts the Sustainable Water and Waste Water Systems Improvement and Maintenance Act, 2010 and repeals the Sustainable Water and Sewage Systems Act, 2002. The Bill sets out the purposes of the Act, which includes ensuring that public ownership of water and waste water services is maintained. The Bill establishes the Ontario Water Board, and encourages smaller systems to join together in water and waste water management, where doing so would ensure better effectiveness of services. There are a number of other points that will be of interest to readers. I encourage you to review the proposed Bill and provide us with your comments.

The other major piece of legislation on the books is the proposed Fisheries Act regulation, Wastewater Systems Effluent Regulations. There was a presentation on the proposed regulation at the Conference and, since then, we have been gathering responses from members in order to assist in preparing a WEAO response before the May 19, 2010 deadline. We encourage you to read the website under the Government Affairs Committee to keep abreast of this important regulation.

All committees have been extremely busy. The Conference Committee has taken a very short break before starting the planning for next year. Plans include sending out the Call for Abstracts in June this year. Hopefully, this gives potential submitters more time to prepare. Member Services and Special Events have joined forces under the banner of the Planning Events and Promotions Committee (PEP), which we hope will aid members and promote WEAO in an even better way than the two former committees did. Other activities have included undertaking joint seminars, student chapters and committees with other associations. This is becoming more important as the economy changes and all associations are looking at ways to be more effective with less resources.

Enjoy this issue of INFLUENTS, and remember that articles are always welcome, as are volunteers for the Communications and other committees.
Duane Forth knows that, when his operators are asked to lend operational support and expertise at another wastewater treatment plant (WWTP) within Haldimand County (where they may have less familiarity), one of the first things they need to do is review the standard operating procedures (SOPs) associated with plant operations. “They look it up, read it, follow the directions and get the job done properly,” says the project manager for eight WWTPs operated by Veolia Water Canada employees in this 1250-square-kilometre area abutting Lake Erie, south of Hamilton.

As a reminder, employees carry a little card in their pockets. The Mental Safety Assessment (MSA) card represents the importance of mentally going through their day as soon as they enter the plant. On their wrists (as safety and operational conditions allow), they wear red bands citing a pledge initiated (and worn 24/7) by the company’s CEO Laurent Auguste: “Service First, Safety Always.”

“Each employee goes over in his or her mind the things needed to be done that day and the questions needed to be asked,” explains Forth. “What am I going to be faced with? What could I be faced with? If the weather is bad, what are the things that could happen?”

MSA is only one of several different programs devoted to promoting safety. From SOPs and personal protective equipment to job safety, process hazard analysis and a Disciplinary Action Program, Veolia has developed a robust array of tools, training, resources, materials, policies and procedures that promote and enforce strong safety standards throughout the company. As project manager, Forth ensures that all persons working at area wastewater facilities are equipped and prepared to assume their responsibilities for safety on the job.

“Safety is a number one priority with me and with the company,” he explains. “It comes from the top down. From our CEO to the newest employee, everybody in the company is required to work safely. It is not an option. It is a condition of employment.”

By making safety a priority, Veolia has succeeded in setting a new safety record for the fourth consecutive year, continuing to significantly outperform private-industry water, wastewater and other comparable utility systems, as well as municipally operated systems that share safety statistics. In fact, 95% of all Veolia projects in North America celebrated ‘no lost-time incident’ milestones in 2009.

At Haldimand, the WWTPs have logged 12 years with no loss-time-incidents and five years without a recordable incident. In the past 10 years, Canadian employees from Moncton to Walkerton/Brockton have only experienced five injuries, none requiring hospitalization, with two related to rare winter occurrences with falling ice.

These accomplishments would not be possible without a rigorous culture of safety and accountability. Creating this safety mentality involves several steps. The first is to create programs, policies and procedures.

Obviously, one of the most basic programs is to provide employees with personal protective equipment. These include hard hats, safety glasses, safety shoes, gloves and any other clothing and equipment specific to performing a particular job.

Then, of course, there are the SOPs. But that is not all. Starting with the MSA, Veolia trains its employees to approach every aspect of their work from a safety point of view. Before performing their duties, employees must conduct a Process Hazards Analysis, an assessment of all of the hazards associated with the jobs in a WWTP. “Then we perform a Job Safety Analysis by looking at each particular job and pinpointing all the safety requirements,” says Forth.

Of course, all the programs require ongoing training and encouragement. Every employee receives weekly emails from the CEO encouraging him or her to practice the procedures in which they have been trained. As well, the company sends weekly safety updates.

It is not always obvious where a risk may lie or how it can best be avoided. There are lessons to be learned from all incidents, as well as from near misses.

That is why Veolia Water recently instituted a Near Miss Recordings program. “Near misses need to be addressed,” explains Forth. “If you can take care of the near misses, you can stop an actual mistake from occurring. It is all about prevention.”

Last November, the Haldimand Project Manager had the chance to minimize the possibility of at least...
one near miss from recurring. At some point near dusk, while a sub-contractor was doing work on a lagoon, hunters inadvertently shot at his truck. “A lot of the time, my staff is out there with the sub-contractors,” notes Forth. “They could have been there and they could have been hurt.” In response, he instituted a new SOP for staff and purchased reflective clothing that they are now required to wear in this and similar situations.

“When you have a near miss,” Forth continues, “you ask yourself if there is a policy or procedure in place to ensure that this does not happen again. If none exists, you create one.” He adds that safety is an ongoing process aimed at continual improvement. Policies and procedures are constantly evolving. Part of Forth’s role is to continuously encourage safety, while following up to ensure that it is actually being practiced. “It is not something you can turn on and off at the gates of the plant,” he says. “Safety is a way of life.”

This credo has guided Forth’s career ever since he joined the Health and Safety Committee for the Greenway WWTP in London, Ontario, back in the early 1980s. In 1993, he became a member of WEF-WEAO. Forth had a brief stint on the Conference Committee in the last half of the 1990s, and then, in 2006, he joined the Professional Development Committee and acted as liaison for public education.

It was during this time that Forth suggested WEAO develop a separate committee devoted to health and safety issues. At first, Health and Safety was a sub-committee under Professional Development. Then, two years ago, Environmental Health, Safety & Security became a standing committee in its own right.

Now that it has found its feet, the committee is preparing to launch a number of initiatives. One project involves the creation of a Health and Safety Survey. “We want to find out where everyone is at with their health and safety programs so that we can address some of the needs,” explains Forth.

Future plans also include an Awards Program to recognize successful health and safety programs in the wastewater industry. All these activities will contribute to raising the profile of health and safety, a goal the committee is eager to pursue. Members hope to have strong participation at its first Security Seminar, to be held on December 1 in London, Ontario.

As Forth points out, safety is not limited to certain types of jobs or certain employees. It is a concern that affects everyone and every aspect of water and wastewater treatment. Those that ignore safety can endanger not only themselves, but also others. Individuals are equally responsible for their personal safety and for ensuring that their colleagues are acting safely as well. “It is everyone’s responsibility, at all times,” says Forth. “It is a mindset.” Or, as he reminds his employees every single week, safety is simply and absolutely a way of life.

Duane Forth is a Project Manager with Veolia Water Canada Inc.
WEAO’S STUDENT CHAPTER PROGRAM REACHES NEW MILESTONE

Erin Longworth, B.Sc.E., EIT, AECOM, 2010-2011 Chair of the New Professionals Committee

On April 18, the WEAO Board of Directors approved our 11th and 12th student chapters. These two new chapters, at the University of Western Ontario and the University of Guelph, are significant in that, together with our 10 existing student chapters, they give WEAO the distinction of having the most student chapters of any WEF member association (MA). This is a monumental accomplishment for an organization that, five years ago in 2005, had only one active student chapter. The distance we have come in that time is nothing short of astonishing, and has made WEAO a significant point of contact for other MAs looking to grow their student chapter program. The WEAO New Professionals (NP) Committee has worked hard to provide a link between the association and the students at universities and colleges across Ontario. In the past couple of years, we have also shifted our focus from forming new chapters to maintaining those chapters we have. The Student Chapter Leadership Forum, an information sharing venue for student chapter leaders, has been extremely successful the past two years and the third annual event is in the planning stage for this August.

The two new student chapters are unique within WEAO in that they are joint student chapters with the Ontario Water Works Association (OWWA). This partnership recognizes the need to provide students at universities and colleges with an opportunity to explore careers in the related water and wastewater fields, without competing for their time and interests. This partnership between WEAO and OWWA is timely, as the parent organizations, the Water Environment Federation (WEF) and the American Water Works Association (AWWA), have joined forces on a public outreach campaign that will enhance the image of water careers and encourage students and job seekers to ‘Work for Water.’ The outreach will address one of the water community’s top concerns in the coming decade, i.e., the expected retirement of 30% of the water workforce and the need to recruit new talent to the field. One of the primary resources of the Work for Water effort is a web-based clearinghouse that provides a gateway to the many recruiting and retention resources already available throughout North America. The campaign’s website (www.WorkforWater.org) launched in May 2010. This aligns well with one of the many goals and initiatives of the NP Committee for the upcoming year, i.e., to provide improved access to job opportunities for the active student members of our association.

New Professionals Program

Do you have 10 or fewer years working experience in the industry? Are you age 35 or less? If yes, then you are a WEAO NP, and the NP Committee is here for you. Sign up for our email distribution list to stay up-to-date on professional development, networking events, and leadership opportunities specific to NPs. Email us at NP@weao.org. Also, check out our website for NP information and upcoming events: http://www.weao.org/committees/New_professionals/New_professionals.html

UNIVERSITY STUDENTS’ PERSPECTIVE ON THE 2010 WEAO TECHNICAL SYMPOSIUM AND SDC

Nancy Afonso, Ruston Bedasie, Kirill Cheiko, and Andrew Iammatteo

The WEAO Student Design Competition was a great experience, which far exceeded our expectations. Putting together the report and preparing for the presentation has taken a great deal of effort and dedication on the part of each team member, but the payoff was well worth it.

The objective of this year’s SDC project was to develop a proposal for Ryerson University design team: (L-R) Kirill Cheiko, Ruston Bedasie, Nancy Afonso, Dr. Manuel Alvarez-Cuenca (Faculty Advisor), and Andrew Iammatteo.
the Port Darlington WPCP expansion to double its treatment capacity for phase I and include provisions for phase II. At the start, we had frequent meetings with our faculty advisor Dr. Manuel Alvarez-Cuenca, where the team established a design philosophy of selecting innovative, yet field-proven processes and technologies, with environmental sustainability in mind. Once our process was selected and an extensive literature review performed, we were introduced to our industry advisors – Giselly Anania and Jeremy Kraemer from CH2M-HILL. Working with them has allowed us to experience and learn how professional reports and projects are handled, managed and implemented. We knew the theory behind many technical concepts and have prepared quite a number of reports for courses throughout our studies, but our industry advisors helped us bridge the gap between academic and real-life consulting reports. We were also introduced to several design engineers and vendors, who have helped us immensely with the design and cost estimation for our proposal.

The 39th Annual WEAO Technical Symposium and OPCEA Exhibition at the London Convention Centre was an exciting experience for all of us. The Student Design Competition presentations were one of the first events of the conference. The ice breaker held later that day was a great opportunity for us to not only meet many seasoned professionals in the field, but to put faces to the names of the many suppliers, vendors, and other industry representatives that helped us throughout the competition.

The technical sessions during the conference were very informative, highlighting many interesting projects in the industry. There were also many events geared specifically towards the student attendees of the conference, such as the NP Meet-and-Greet, where we were able to connect with many students from other universities and colleges in Ontario. There was also a student panel discussion about careers. The panelists were from a variety of backgrounds, showcasing the wide range of career paths available to new professionals in the field. Events such as the awards ceremony and banquet were great to recognize many of the individuals and groups that have made significant contributions to the industry.

Overall, the conference was an exciting experience for all of us. It was a great place to be for graduating students who are looking to enter the industry. We were eager to meet seasoned professionals, attend captivating seminars, participate in social events, and, of course, give out our résumés. We strongly recommend that students participate in next year’s SDC. It will not only teach them a great deal about wastewater, but will also expose them to the industry, and may even help them get a job.

In the next few months, our team will be preparing for the upcoming SDC at WEFTEC in October. The competition will showcase competing teams from all across North America, and we are excited to represent Ontario. We would like to thank everyone who has helped us with our project; we could not have completed it without the assistance of all those involved. We look forward to representing everyone we worked with and WEAO at WEFTEC this October.

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UNIVERSITY OF GUELPH
JOINT STUDENT CHAPTER LAUNCH A SUCCESS
Kathleen Hum and Monique Waller, CH2M HILL

On February 2, 2010, (hot on the heels of the recent joint student chapter launch presentation at the University of Western Ontario in November), the Water Environment Association of Ontario (WEAO) and the Ontario Water Works Association (OWWA) converged at the University of Guelph to kick-off the new University of Guelph Water and Wastewater Society (a joint student chapter between the WEAO and the OWWA).

The evening began with opening remarks by the student chapter program managers of each association, Monique Waller and Kathleen Hum (both CH2M HILL). A highlight of the evening was the presentations by WEAO Director Michael Payne (Ontario Ministry of Agriculture, Food and Rural Affairs) and OWWA Past-President Tom Moulton (Emco Corporation) that provided an introduction to the associations as well as some job-hunting tips. Next, a presentation of the available career paths in the municipal wastewater and water industry was given by Bill White (CH2M HILL), Troy Leyburne (Region of Peel), Anthony Abruscato (CH2M HILL), Eric Moulton (Paitco Inc.) and Vaughn Ash (Thompson Rosemount Group).

The presentations were well received by a full-house of approximately 40 students from both the Engineering and Environmental Sciences faculties. Thanks go to the two enthusiastic students (Jamie Croft and Laura Robertson) from the University of Guelph (U of G) and supportive U of G faculty member, Professor Hongde Zhou, for their work to advertise the event and work with the OWWA and WEAO team to make the evening and chapter launch a success.

The student chapters at the Universities of Western Ontario and Guelph both recently received official approval from the associations, making them the first joint WEAO/OWWA student chapters in Ontario. This significant accomplishment is the end result of approximately one year of discussions on the matter of joint student chapters between the WEAO and the OWWA. ♦

NEW PROFESSIONALS DOUBLE-HEADER
– ENWAVE DEEP LAKE WATER COOLING PLANT TOUR & ST. PATRICK’S DAY SOCIAL
Charlie Chen, AECOM, NP Committee Past-Chair

On March 19, 2010, a day packed with technical learning and festive fun was enjoyed by dozens of new professionals in the water environment industry. The two events were jointly hosted by the WEAO New Professionals and the OWWA Young Professionals.

The Enwave Deep Lake Water Cooling Plant tour took place at Enwave’s Energy Transfer Station, at the heart of the world’s largest lake-source cooling system. Using state-of-the-art heat exchangers, the Enwave system transfers heat to the city’s domestic intake water from Enwave’s closed-loop cooling water, which ultimately provides chilling power to as many as 100 commercial towers in downtown Toronto. This renewable chilling power significantly reduces users’ electricity consumption that would otherwise be required to run conventional air-conditioning units. With the assistance of Enwave’s knowledgeable staff, the tour showcased the water transfer pumps, heat exchangers, and, more importantly, the operation of the ‘green’ cooling power production system. A special thank you is extended to our tour guides, Andrew Wilcox, Peter Harasti, and Yianni Soumalias, of Enwave, and to tour organizer Shailesh Parmar of SPD Sales.

Immediately following the Enwave tour, the St. Patrick’s Day social took place at Grace O’Malley’s Irish Pub. This event is one of several social events that the WEAO New Professionals and the OWWA Young Professionals organize annually to promote networking and interaction among new professionals and students in a fun and relaxed atmosphere. A special thank you is extended to Michelle Walters of Hatch Mott MacDonald for organizing this social event. ♦
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The first two presentations at Centennial College were subject to some unforeseen challenges. A snow storm prevented many students from attending the first scheduled presentation and, the next time, a power failure made the presentation very difficult. However, on April 14, 2010, Jeremy Kraemer (CH2M Hill) and Bill Luisser (Metcon Sales & Engineering) introduced the students at Centennial College to the Water Environment Association of Ontario (WEAO) and highlighted potential career paths within the wastewater industry.

Terry and Amber (Centennial College Chapter co-presidents) began by introducing the students to their chapter, highlighting the activities and positions available. While the students enjoyed some pizza, Jeremy and Bill continued the talk on how students can make the transition from a student and find a career in the wastewater industry.

With the 39th Annual WEAO Technical Symposium and OPCEA Exhibition the following week in London, Jeremy made a suggestion for these students to register as a member of WEAO and see first hand the people in the industry. One student, Prasenjit Pal, took some time off school and hopped on a bus to attend the conference.

Special thanks to Connie Zehr (Centennial College) and Kathleen Hum (CH2M Hill) for organizing this event.

(L-R) Jeremy Kraemer, Bill Luisser, and Centennial College WEAO Student Chapter co-presidents Amber Iqbal and Terry Leung

Amber Iqbal, Prasenjit Pal and Carol Moore with the WEF plaque signifying Centennial College as an official WEF/WEAO student chapter.
39TH ANNUAL WEAO TECHNICAL SYMPOSIUM AND OPCEA EXHIBITION

RECAP

ONE World ..... ONE Water Environment

THE LARGEST CANADIAN TECHNICAL CONFERENCE FOR THE WASTEWATER INDUSTRY
2010 Conference

ONE World ... ONE Water Environment

Neil Awde, P.Eng., WEAO Conference Chair

The 39th Annual WEAO Technical Symposium and OPCEA Exhibition, held in London, was a huge success thanks to the attendees, exhibitors and presenters of technical papers, as well as our sponsors and the very active conference committee. Not only was a new attendance record set, but OPCEA sold out the London Convention Centre with a record number of booths. This is fantastic news for both WEAO and OPCEA, and speaks volumes to the dedication of our members.

From our first planning meeting in September and our facility tour on November 12, the planning for the conference built momentum to the opening day on Sunday, April 18. The conference theme “ONE World ... ONE Water Environment,” launched in 2008, has become a staple in our organization, as we continue to highlight our contribution to the environment and wastewater industry.

The Ice Breaker Reception on Sunday evening was again a packed house and provided an opportunity to catch up with friends and colleagues. The food was the hit of the party. Kudos to the London Convention Centre for the decorative, tasty and plentiful food stations.

The Opening Session on Monday morning was a great follow-up to last year’s event and was very well attended. Our highly-renowned keynote speaker, Bob McDonald, host of CBC Radio’s Quirks and Quarks and a reporter for CBC television’s The National, provided a hilarious, yet thought-provoking presentation on the state of our water environment here on earth. Bob reinforced the importance of our industry by highlighting the limited supply of accessible potable water on earth and recognizing that it is our job to clean it and return it to the environment.

The Awards Luncheon recognized the hard working volunteers of the association and those who continue to make a difference in the wastewater industry. The newly-founded Geoffrey T.G. Scott Memorial Award was awarded in its second year to Tom Davey, in recognition of his demonstrated leadership and inspiration in the water environment field as a champion of a worthy endeavour. Tom’s distinguished career has spanned more than 50 years with over 30 awards for his writing on environmental issues.

In its second year running, the New Professionals’ Student Design Competition was a tremendous success on Sunday afternoon. The winners of the New Professionals’ Student Design Competition were recognized at the Awards Luncheon. Ryerson University placed first, and will receive the support of WEAO to represent Ontario at WEFTEC’s Student Design Competition in New Orleans this coming October. University of Windsor and University of Guelph placed second and third, respectively.

Following up on its inspiring win of the 2009 WEAO Student Design Competition, the University of Toronto placed second at the WEFTEC Student Design Competition in Orlando Florida. Congratulations to the University of Toronto team for their win and for representing WEAO in the first Canadian attended event.

Ed McCormick, the WEF Representative, and a member of WEF’s Board of Trustees, was a great presence at this year’s conference and delivered a great speech on the industry as a whole. Ed ended the conference on a ‘high note’ by singing a wastewater-focused rendition of a classic rock hit with the banquet entertainment.

The 5S Society new inductees were: Janice Janiec, Ken McKinnon, George Lai, Gord Miller and honorary inductee Ed McCormick (WEF Rep). Congratulations to all.

All 19 technical sessions at the conference ran smoothly and on schedule during Monday and Tuesday. Kudos to the session co-chairs for creating a professional environment for the competent delivery of 74 technical papers, representing projects from across the province and around the world.

The new WEAO Board members announced at the AGM were Jeremy Kraemer and Graham Simpson. The new vice-president is Rosanna DiLabio.

No conference would be complete without the Operations Challenge. This year, we had five teams competing for the prize, including the Region of Durham – Sludge Hammers, City of Toronto – Craptors, Stratford - OCWA Jets, Wasaga Beach (OCWA) – Flangetastic Four, and the City of London – Incinerators. First place was won by Durham Region.

The closing banquet included the band Spirit which entertained us during the pre-dinner cocktails and again with a second set after the program that included some classic rock songs that got people up dancing. Through the raffle draw, silent auction, speakers gift donations and teddy bear draw, nearly $10,000 was raised for Water For People, resulting in an outstanding finish to the 39th Annual WEAO Technical Symposium and OPCEA Exhibition.

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Donation to Water For People from Session Chairs and Symposium Speakers (LR) Neil Awde, Louis Hollingsworth (WFP) and Don Hoekstra

Conference Keynote Speaker Bob McDonald of Quirks & Quarks on CBC Radio

Conference Committee

Committee Chair
Neil Awde, AECOM

Past Committee Chair/Proceeding
Darla Campbell, Amonavi Consulting Group Inc.

Budget
Richard Todd, City of London

Local Arrangements
Rob Anderson, H2Flow Equipment Inc.

Technical Program
Ryan Connor, CH2M HILL Canada Limited

Board Liaison/Sponsorship
Gary Burrows, City of London

Operations Challenge, PWO Program & TWGS
John Rammler, Region of Durham

OPCEA Exhibition Lead
Greg Jackson, ACG Technology

New Professionals Program/Banquet Entertainment
Anthony Abruscato, CH2M HILL Canada Limited

AV Requirements
David Evans, R.V. Anderson Associates

Conference Pocket Program
Erin Longworth, AECOM

Communications Officer & Conference Program
Marc Johnson, Wastecorp Pumps

Keynote Speaker
John Levie, ASI Group Limited

Guest Program
Debbie Crane
Award Luncheon, 5S & Banquet Program
Janice Janiec, City of Guelph

Signs and Banners
Lloyd Clarke, WiKa Instruments Ltd.
Frank Farkas, SPD Sales Ltd.
Conference Sponsorships/WWT&T Committee Liaison
Michael Mark, MYM Consulting Services

Charity Draw
David Kirkland, Kenaidan Contracting Ltd.

Media & Marketing
Catherine Jefferson, WEAO

WEAO Executive Administrator
Julie Vincent

WEAO Administrative Assistant & Speaker’s Gifts
Anne Baliva

Board of Directors Observer
George Lai, Ministry of the Environment

Operations Challenge, PWO Program & TWGS second
Norma Linkiewicz, Region of Niagara

OPCEA Exhibition second
Mark Reeves, Can-Am Instruments

NP Program second
Matthew Simons, AECOM

(LR) Anne Baliva, Carrie Humphrey and Julie Vincent

Cordell Samuels and Ed McCormick (WEF delegate)

120 companies exhibited at the OPCEA Trade Show

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2010 Operations Challenge

The 39th annual WEAO Technical Symposium and OPCEA Exhibition marked the 20th anniversary of the Operations Challenge Competition in Ontario. The Operations Challenge Committee is responsible for organizing, planning and executing the Professional Wastewater Operator Tour and Technical Program, Operations Challenge Competition and Totally Wasted Game Show events at the annual conference. The entire committee would like to thank all of the judges, volunteers and sponsors that help to make these events possible.

Meet and Greet

The annual Operations Challenge Meet and Greet was held Monday afternoon following the process control event. This event gives team members, coaches, judges, volunteers, sponsors, Operations Challenge Committee members and special guests the opportunity to see old friends and make new ones.

The Meet and Greet is also a time when we are able to thank supporters who raise funds to help the winning teams travel to the WEFTEC competition. This year, it will be held in New Orleans, Louisiana. Thanks to OPCEA, PWO NE Region and PWO SW Region for their ongoing support of Operations Challenge teams at WEFTEC.

The Operations Challenge Committee also presents a Key Supporter Award annually to an individual or organization that has been instrumental in the continuing success of the Operations Challenge in Ontario. This year, the Key Supporter Award was presented to Julie Vincent. Congratulations and thanks to Julie from the entire Operations Challenge Committee for ensuring our success.

Special thanks to this year’s sponsors of the Meet and Greet: SNF Canada, Veolia Water, and WILO Canada Inc.

2010 PWO Tour

The 2010 PWO Facility Tour participants were welcomed at the City of London’s Oxford Pollution Control Plant (PCP). Elvio Zaghi, a project manager with Stantec Consulting, accompanied us on the bus ride and gave an overview of the wastewater system while enroute to our destination. The Oxford PCP is a conventional secondary activated sludge wastewater treatment plant, which primarily serves the north-western section of the City of London. Significant development has taken place in recent years in the sewershed, and substantial additional development is projected in the next 20 years. As a result, Oxford PCP underwent another expansion/upgrade to a membrane bioreactor treatment system. The footprint for this system is much smaller than any other expansion/upgrade to a membrane bioreactor treatment system. The 2010 PWO Facility Tour was presided over in the south-eastern section of the City of London by the largest of its kind in Canada. Thanks to Scott Lenhardt from Pro Aqua Sales, Geoff Totten from GE Water, Bernhard Wessendorf from Boerger Pumps and Ed Broeders from H2Flow for assisting Elvio with the tour presentations. We also appreciated City of London staff Richard Todd and Todd Atkinson hosting us at their facility. Thank you to our sponsors Stantec Consulting and Pro Aqua Sales.

2010 PWO Technical Workshop Session

One of the biggest challenges facing operators today is successfully writing and passing Ministry of the Environment (MOE) certification exams. This year, the PWO offered a one-day workshop entitled ‘Wastewater Certification Challenge,’ as an informal and highly interactive session focusing on wastewater treatment exam-writing strategies. Hany Jadaa from Lexicon Environmental led the workshop, which targeted specific technical topics such as working with math problems, understanding science basics, and tackling difficult process application questions. Participants were asked to think ahead of time about wastewater treatment exam-writing problems and challenges they have faced in the past and bring them to the session for discussion. The attendees appreciated the interactive nature of the presentation. Thanks to ACG Technology and Syntec Process Equipment for sponsoring the session.

If you are interested in being a presenter for the PWO Technical Session at the 2011 WEAO Annual Conference in Toronto, please contact Carrie Brunet at Niagara Region (carrie.brunet@niagararegion.ca or 905-685-4225 x3767).

Pump Maintenance Event 2010

I would first like to personally thank all of our competitors, suppliers, sponsors, volunteers, committee members and judges for their part in making the Maintenance Event portion of the Operations Challenge itself a success. Without these partners putting in long hours months ahead for planning and practicing, and then employers committing to their teams and co-ordinators to attend the conference, it would simply not be possible to put out our ‘product’ with such a high degree of competency. We are truly blessed in this province with some of the greatest working relationships possible, even when in the throes of competition. Well done everyone!

This year’s Maintenance Event had the spotlight, as we presented a new event with new equipment and maintenance procedures to be followed. Wilo Canada partnered with ASL Roteq to build the platform with the submersible pump and mixer that both required service in the field. Each team performed a detailed set of instructions on both the lockout/tagout of the panel, pump maintenance, and mixer maintenance using a hoist. With every new event, there are some adjustments that have to be made by both competitors and the event co-ordinator. This year was no exception. However, we had a great day of competition with great results posted by all teams.

Judges were also challenged with judging an event that had not been performed before in Ontario, but team penalties were discussed with all team captains at the end of their portion of the event.
For the most part, the event was performed without many penalties assessed, and with excellent raw times recorded. I would also like to add that I felt the teams conducted themselves with a high degree of professionalism and expertise, making this another memorable year – well done to all. This year’s winners of the Pump Maintenance Event were: 1st place City of London Incinerators, 2nd place Region of Durham Sludge Hammers, and 3rd place Stratford OCWA Jets.


**Laboratory Event 2010**

Baffled, bazaar, believable, best
Objectionable, obsessed, optimistic, outstanding
Daring, dynamic, distracted, detailed
These adjectives might be what one would use to describe the 2010 Lab Event or its team members, but along with those adjectives is an acronym BOD, which stands for Biochemical Oxygen Demand. Once again, the operators had to put their lab skills to work while under extreme pressure to perform a simulated BOD test.

This year, five teams began the event by performing a pH test using the Thermo Orion 3 Star pH meter. They then continued on to prepare various dilutions of a sample, seed and standard. Steady hands were required to fill 10 bottles with dilution water and record the initial dissolved oxygen reading using a Thermo Orion 3 Star Bench Dissolved Oxygen Probe and Meter. The math whiz of the team had the challenging task of calculating and reporting the final BOD results in mg/L.

Congratulations to all the teams on a job well done. Your hard work and dedication did not go unnoticed. Next year’s event promises to be even more challenging, so stay tuned.

Thank you to the Laboratory Event Sponsors Anachemia Science, Exova Accutest, John Meunier Inc, OCWA, SGS Canada Inc., Thermo Scientific Orion-Electrochemistry Products, and USA BlueBook.

Also, many thanks to the OCC volunteers and judges Colleen Niesink, Niagara Region; Paula Bustard, City of London; Chantel Da Silva, City of London; and OCC Assistant Co-ordinator Sylvia Murcia-Jones, OCWA.

The top three teams in the Laboratory Event this year were:
1) Durham Sludge Hammers  2) OCWA Jets  3) Toronto Craptors

**Process Control Event 2010**

The Process Control Event is the only event held on the first day of the WEAO Conference. The event may appear straightforward and simple. The challenge is to answer 120 multiple choice questions and four situational operation problems characteristic of those found on operator certification examinations. All four members of the competing teams must participate in the examination. Unlike the certification exams, which allow three hours to complete the standard 100 multiple choice questions; in the Process Control Event, competitors must complete the exam without the aid of given formulas and only have a maximum of 30 minutes to finish. It is very impressive, and is a testimony to Ontario’s excellence in wastewater operations. Congratulations to all competitors.

Special thanks to the Process Event sponsors Eramosa Engineering, Poisson Engineering Inc. and Troy Ontor Inc. It is the generous donations of these sponsors that make the Process Event possible and a success.

Thanks to all the OCC members, volunteers and judges who oversee the exams and the marking afterwards. It was a very close year with all teams performing to their best.

The top three teams for this year’s event were:
1) Sludge Hammers, Region of Durham
2) Flangetastic Four, OCWA
3) Jets, OCWA

Again, congratulations to all of the competing teams. You are to be commended for your preparation and performance.

**First Place – The Durham Sludgehammers**

(l-R) Wade Hunt, Barry Hughes, Andy Griffen, Jamie Gratix, Scott Meier, Operations challenge chair John Rammler, Coach Jeff Lang

**Second Place – The Toronto Craptors**

(l-R) Chris McDonald, Tyson Ferreira, Harlutt Singh, Patrick Dowman, Dave Smith Jr.

**Third Place – The OCWA Jets**

(l-R) Dennis Rau, Michael Paola, Mocel Misuraca, Al Robdup
Gary Burrows and John Rammler
– PWO South West Cheque Presentation

Elvio Zaghi, of Stantec explains some of the challenges faced in retrofitting existing secondary clarifier tanks into MBRs

John Rammler and Rick Niesink
– PWO North East Cheque Presentation

Using an individual fibre, Scott Lenhardt of Pro Aqua describes the mode of operation of the ZeeWeed hollow fibres in the membrane tanks

Heinz Held, John Rammler, Frank Farkas (LR)
– OPCEA Cheque Presentation

Key Supporter, Julie Vincent

ONE World ….. ONE Water Environment
The competition was fierce...
Safety Event 2010

The 2010 Safety Event was the sophomore year for this procedure. Again, the teams were tested for speed, safety and performing their tasks to ensure the event went penalty free for them.

The event procedure was as follows. You find a co-worker at the bottom of a (confined space) lift station unconscious. You suspect he/she has been overcome with an unknown chemical gas or lack of oxygen. You immediately call for the in-plant rescue team. As you begin setting up the rescue effort, another co-worker has a heart attack. This person is unconscious, so one of the rescuers calls 911 emergency services. An automated external defibrillator (AED) is available; the heart attack victim will need to have an airway established. His or her breathing and pulse is checked. There is no pulse, an AED is retrieved and administered. After one shock from the AED, the victim’s pulse returns and emergency services have arrived. While this is happening, the rescue team is removing the victim from the confined space and decontaminating the victim.

The teams performed with incredible skill and determination. Congratulations to the Toronto Craptors for winning the 2010 Safety Event with a very smooth and penalty free run.

Special thanks go to the event judges: Head Judge – Eldon Wallis, Hands on Training and Consulting; Perry Rose, City of London; Craig Dignard, Region of Durham; and Barry Hughes, Region of Durham. Of course, a special thank you is also extended to the event sponsors, without you this would not be possible: Kemira Water Solutions, Ontario Clean Water Agency and SEW-Eurodrive.

Collection Event 2010

The Collection Event was an exciting, fast-paced success again this year, providing thrills and spills which kept the teams and spectators on their toes. The surprise this year was the exciting performance of the new team from the City of London; the Incinerators, which managed a great second place result with a calm, well-paced run. The event was again carried out with lighting speed. The top two teams finished the event just above the two-minute mark and the team from Durham Region; the Sludge Hammers were crowned champions by beating out the Incinerators. Third place went to the City of Toronto’s Craptors, fourth was Stratford’s OCWA Jets and fifth place was Wasaga’s Flangetastic 4. All in all, every team had a great performance and the day was a big success with lots of laughs.

I would like to thank the sponsors of the Collection Event: Can-Am Instruments, Directrik Inc., IPEX, and OCWA. Thanks also to the judges who worked all day setting up and dismantling the event each time.
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Conference Awards

WEAO and WEF Conference Awards

WEAO tries to ensure volunteers and others deserving of special recognition get their time in the spotlight. It is one small way we can thank all of our tirelessly working volunteers and add special honour to those who have gone above and beyond the call of duty. These awards also show employers and others the great service they provide the organization. In addition, the newer professionals to the sector are also recognized and encouraged to participate and add value to the association and wastewater sector itself.

This year’s awards include:

The Geoffrey T.G. Scott Memorial Award
Tom Davey
The Golden Manhole Award
Imran Motola
The Student Design Competition
Ryerson 1st place, Windsor 2nd place, Guelph 3rd place
Kenneth J. Miller Founder’s Award
Don Hoeskstra
WEAO Service Awards
John Duong - Asset Management
Susan Hansler - Member Services
Charlie Chen - New Professionals
John Rammler - Operations Challenge
Janice Janiec - Residuals & Biosolids
Michael Albanese - Special Events
Troy Briggs - Wastewater Treatment & Technologies
Greg Jackson - OPCEA Exhibition Lead
George Lai - Long Service 2004-2010
Outstanding New Professional
Kathleen Hum
Scholarship Program
Jacque-Ann Grant - Sasha Rollings - Scattergood
Barry O’Doherty - Maryam Reza
Exemplary Biosolids Management Award
Township of Bonnechere Valley Nutrient Management Facility
Arthur Sidney Bedell Award
Peter Takaoka
William D. Hatfield Award
Michael John Rammler
2010 Operators Challenge Award
Durham Sludge Hammers (overall first) Team members Jamie Gratix, Wade Hunt, Scott Meier, and Andy Griffen, coached by Jeff Lang
Best Student Presentation
Andrew Oosting - Guelph University
2010 Conference Chair Award
Neil Awde
Past President Award
Mark Rupke
Golden Knob Award
Ryan Connor
5 S recipients
Ken McKinnon - George Lai - Gord Miller - Janice Janiec

Water Environment Federation Conference Awards

The Arthur Sidney Bedell Award

The Arthur Sidney Bedell Award acknowledges extraordinary personal service to a Member Association. The award was established in honour of Arthur Sidney Bedell, the second president of the Federation who exemplified its purpose by his long devotion and service to the New York Sewage and Industrial Waste Association, now the New York Water Environment Association. This year’s recipient is Peter Takaoka.

Peter has been active in the Water Environment Association of Ontario for over 30 years. He joined the Seminar Committee of the Pollution Control Association of Ontario (PCAO), the forerunner of the WEAO, in the mid-1970s and spent nearly 10 years in this group. In 1987, Peter served as Chairman of the Annual Conference. During the period from 1988 to 1991, he sat as Director on the WEAO Board. In 1996, Peter became the Chair of the Newsletter Committee, which evolved into the Communications Committee. During his 10 years as Chair, the 12- to 16-page newsletter was replaced by the magazine called INFLUENTS. Also, the WEAO website was launched. In 2007, Peter was elected to the position of vice-president of the WEAO and served as president during the 2008-2009 period. After his term as president, Peter has continued to be active in the Communications Committee, the Government Affairs Committee and the Water For People – Canada Committee. Peter is a member of the Select Society of Sanitary Sludge Shovelers.

The William D. Hatfield Award

The William D. Hatfield Award is presented to operators of wastewater treatment plants for outstanding performance and professionalism. The award was established in honour of Dr. William D. Hatfield, Superintendent of the Decatur, Illinois Sanitary District, who was president of the Central States Sewage Works Association in 1944-45 and served as president of the Federation in 1958-59. This year’s recipient is Michael John Rammler.
John has been employed by Durham Region for 30 years. He started at Duffin Creek WPCP and worked as an operator for 20 years, Harmony Creek for three years, then Pringle Creek for one year. Since then he has been District Plant Supervisor for Corbett Creek and Pringle Creek WPCP and Durham's Biosolids Program. While at Duffin Creek he got involved in the Operations Challenge as a team member from 1997-2003; placing first in 2000 and 2002. After competing for six years, he joined the Operations Challenge Committee. He served as Maintenance Event Coordinator for five years. For the past two years, he has been Chair of the Ops Challenge Committee. He is looking forward to continued involvement with the Operations Challenge Committee.

5S inductees

The Select Society of Sanitary Sludge Shovelers was formed to provide a means of recognizing those who have contributed freely their time and talents to the growth, well-being and success of their individual associations. Many of these hard workers do not become president of their association, or receive one of the coveted awards associated with water pollution control activities. The Five S Society does provide a concrete method of expressing recognition and gratitude for their efforts.

This year’s inductees to the coveted 5S Society are Janice Janiec, Ken McKinnon, George Lai, Gord Miller, and honorary inductee Ed McCormick (WEF Rep).

Geoffrey T.G. Scott Memorial Award

This award has been established in honour of Geoffrey T.G. Scott, P.Eng., who was the second non-American president of the Water Environment Federation in 1979-1980. Geoff traveled widely and was instrumental in establishing numerous chapters of the Select Society of Sanitary Sludge Shovelers.

This award is in recognition of someone who has demonstrated leadership and inspiration in the water environment field as a champion of a worthy endeavour. This year’s recipient of the Geoffrey T.G. Scott Memorial Award is Tom Davey.

Throughout his distinguished career of over 50 years, Tom has demonstrated exceptional leadership in the championing of environmental issues in the water environment industry in Ontario and across Canada. His work has traversed a broad spectrum of writing and presentations to both environmental professionals and lay audiences, often translating complex technical environmental issues for the public without the loss of scientific accuracy. Tom has won some 30 awards for his writing on environmental issues.
Golden Manhole Award: Membership in the Golden Manhole Society indicates having made a significant contribution which promotes professionalism, pride, and high ideals among those working in the design, management, construction, operations and maintenance of Collections Systems. Members have contributed significant effort over an extensive period of time, positively contributing the betterment of individuals associated with Collections Systems. This year’s recipient is Imran Motala.

Kenneth J. Miller Founder’s Award: The Kenneth J. Miller Founder’s Award recognizes volunteers for their outstanding service and leadership in the advancement of the Water for People mission at the local committee and regional levels. The award was established in honour of Kenneth J. Miller, one of the founders of Water for People and its first President. This year’s recipient is Don Hoekstra.

Exemplary Biosolids Management Award: This Award recognizes excellence in the management of biosolids in the Province of Ontario. This year’s recipient is Township of Bonnechere Valley Nutrient Management Facility, Accepted by Kevin Bossy, CEO of Bishop Water Technologies, Inc. (LR) Mark Rupke, Kevin Bossy, Janice Janiec (Chair, Residuals & Biosolids Committee).

Kathleen Hum of CH2M Hill was voted as the Outstanding NP in recognition of her contribution to the New Professionals Committee, particularly in developing WEAO student chapters and organizing the 2009 Student Chapter Leadership Forum.

Scholarship Program: The WEAO scholarships were established to promote student awareness of, and recognize outstanding students in, the water environment field. This year’s recipients are: Jacque-Ann Grant, Sasha Rollings-Scattergood, Barry O’Doherty, Maryam Reza.

WEAO Service Awards: These awards are given in recognition of outstanding service to WEAO through participation on the Board or through Association Committees. This year, the WEAO Service Award recipients are: John Duong – Asset Management Susan Hansler – Member Services Charlie Chen – New Professionals John Rammler – Operations Challenge Janice Janiec – Residuals & Biosolids Michael Albanese – Special Events Troy Briggs – Wastewater Treatment & Technologies Greg Jackson – OECEA Exhibition Lead George Lai – Long Service 2004-10 (Absent)

Centennial College and Queen’s University received their Student Chapter Plaques from the Water Environment Federation. Prasenjit Pal accepted the plaque on behalf of Centennial College.

Mark Rupke passing gavel to Don Kemp
Reg Andres Recipient of OPWA Joe Johnson Sr. Award

Reg Andres, Vice President of R.V. Anderson Associates Limited, has been honoured as the recipient of the Ontario Public Works Association’s (OPWA) Joe Johnson Sr. Private Sector Service Award. The Joe Johnson Sr. Private Sector Service Award recognizes outstanding individual achievement through corporate activities in support of OPWA’s strategic plan, goals, and objectives.

Over the last decade, Reg has led numerous projects across Canada dealing with infrastructure asset management principles specifically aimed at improving the delivery of public infrastructure. His advice has been instrumental in establishing concepts for determining infrastructure asset values, leading to full cost accounting and renewal strategies.

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engineering • environment • infrastructure

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WEAO Student Design Competition

Five teams present their designs

Student teams from five universities in Ontario enthusiastically participate in the second annual WEAO Student Design Competition, showcasing commendable design and presentation skills.

This year’s WEAO Conference marked the second WEAO Student Design Competition (SDC). The competition is open for students registered in an Ontario university, who are interested in pursuing a career in water and wastewater engineering and sciences.

This year’s design project was generously provided by the Regional Municipality of Durham, with the competition organized by the New Professionals Committee (NPC) as part of the student chapter program. The project involved the conceptual and preliminary design for several expansion components at the Port Darlington Water Pollution Control Plant (WPCP), which services the Bowmanville urban area. The design also included the development of layout, capital and life-cycle cost estimates, and the implementation schedule.

Outstanding presentations and designs

The teams completed exceptional designs that were well documented in a substantial design notebook and presented to the distinguished panel of judges. Each submission was over 100 pages with appendices.

Oral presentations were made during the 39th Annual WEAO Technical Symposium and OPCEA Exhibition at the London Convention Centre on April 18, 2010.

And the winner is…

The team from Ryerson University scored first, followed by the University of Windsor, the University of Guelph, Carleton University, and the University of Toronto. All participants received a year’s free student membership in WEF, while the first, second and third place teams also received a recognition plaque and a monetary award, presented by WEAO. The monetary award for the winning team includes WEAO’s sponsorship and the privilege to represent Ontario at the WEF Student Design Competition, which this year will take place in New Orleans, Louisiana in October.

The New Professionals Committee and WEAO thank all five teams who participated in the competition this year. The hard work and dedication of these students are the keys to the success of a growing event that captured the interest of a numerous and diverse audience that included officials from Durham Region, seasoned professionals and some WEAO Board members.

Acknowledgements

This year’s project would not have been possible without the continued support of the Regional Municipality of Durham. Special thanks to John Presta, John Thompson, Bernie Kusilikis, and Marek Krynski for their overall support and, in particular, to Bernie, Marek and Jeff Murray for the site tour and the many answers and additional information provided to the students throughout the competition.

Many thanks also go to the four distinguished judges who spent a great deal of time evaluating the submitted designs and provided valuable feedback to improve future competitions:

- Ansel Bather (AECOM)
- Gustavo Jacome (Stantec)
- Bernie Kusilikis (Regional Municipality of Durham)
- Gerry Sigal (R.V. Anderson)

Special thanks to the faculty advisors, industry advisors and all team members (Table 1), for their enthusiastic participation and support throughout the competition.

What’s next?

The SDC Committee wishes all the best to the Ryerson University team on their future participation representing Ontario at the WEF SDC in New Orleans, LA.

Stay tuned for the Third WEAO Student Design Competition, which will be announced in July/August 2010 on the WEAO website and through the 12 WEAO student chapters throughout Ontario.

SDC Sub-committee members: Charlie Chen of AECOM; Edgardo Tovilla of the Ministry of the Environment; Bill White of CH2M HILL; Rafiq Qutub of AECOM; and Bernardo Majano and Rina Kurian of R.V. Anderson.

WEAO Student Design Competition participating teams and advisors

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<th>Student Team members</th>
<th>Faculty Advisor(s)</th>
<th>Industry Advisors</th>
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<td>Ryerson University</td>
<td>Nancy Aloixo, Ruston Bedasie, Kirill Cheko, and Andrew Iammatto</td>
<td>Dr. Manuel Alvarez-Cuenca</td>
<td>Gasalti Ariana, Jeremy Kraemer, Abu-Hussain (CH2MHILL), Rob Anderson, Darrin Hopper (H2Flow), Edward M. Pekovnik (ENV Treatment Systems), Allen Vivian, Geoff Coate (Pro Aqua), Frank Ferrie (ITT), Dale Jackson (ACG Technology), &amp; Michel Bruneau (John Menzies).</td>
</tr>
<tr>
<td>University of Windsor</td>
<td>Sara Aduagdu, Allison Bauden, Katharina Freund, and Jingniao Shi</td>
<td>Dr. Rajesh Seth, Dr. Niharendu Biswas, Dr. Edwin Tam, and Dr. Paul Henshaw</td>
<td>Chris Marzon (Little River WPCP); Dr. Jian Li (Stantec); Dr. Louis Tasfi (Dillon); Darrin Hopper and Rob Anderson (H2Flow); Donna Morano (EIMCO); Oscar Cid (ITT); and Jon Palmer (Trane).</td>
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<tr>
<td>University of Guelph</td>
<td>Scott Hillaby, Brendan Hussey, Ryan Lachanthy, Sasha Rollings-Scattergood, and Jeffrey Snider-Nevin</td>
<td>Dr. Hongde Zhou</td>
<td>Christopher M. Bye (EnviroSim).</td>
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<td>Carleton University</td>
<td>Alexander Befian, and Xavier Redhead</td>
<td>Dr. Ointa Basu, and Dr. A.O. Abd El Halim</td>
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<td>University of Toronto</td>
<td>Anilutha Dani, Aaron Xavier Fernandez, Julia Gwersonski, Kevin Kim, Snezana Kirova, and Dan Romita</td>
<td>Dr. S. Andrews</td>
<td>B. Palynchuk.</td>
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Totally Wasted Game Show

This year’s contestants were:

Team 1
Act-U-A-Tors
Mark Rupke
Veolia Water
City of Toronto
Troy-Ontor Inc.

Team 2
BioSolids
Don Hoeskstra
Sweetwater Environmental
OCWA – Wasaga Beach
SNF Canada

Team 3
B.O.Demons
Paul Howard
City of London

Team 4
TSS-This
Rob Dickson
Cancoppas

The 2010 TWGS winning team was Team 1. Thank you to the Totally Wasted Game Show sponsors Black & Veatch, Cancoppas Limited and Troy Ontor Inc. Also, thank you to master of the quiz Dave Spiller, scorekeeper Wendy Rammler, and emcee Rhonda Harris.
Guest Program 2010, London

Monday morning the group met at the hotel for breakfast. After enjoying a leisurely meal, we were on our way to an all-day card-making workshop. Our instructor taught us many different techniques that can be used for creating our own cards. We all left the workshop with 10 completed projects, supplies to use at home, and a wealth of information.

Tuesday morning we met again at the Market Cafe for breakfast. Once we were done, we ventured down the 401 to a bee apiary. We were not able to see the bees at work because of the time of year, but did enjoy the on-site shop. We left with jars of honey and other products the bees helped to make. It was then off to do some shopping at one of the malls in London before returning to the hotel.

See you next year in Toronto.

Water For People Canada

Once again the Water For People – Canada Committee was allowed to participate in various fundraising activities at the conference.

As an organization, Water For People functions with a very limited overhead and, as a result, over 85% of all fundraising dollars end up going directly to program work in the countries where WFP operates. For this reason, funds raised throughout the conference make a significant contribution towards providing people in program counties with access to clean water and safe sanitation.

Speaker gifts
In a first for 2010, the Conference Committee decided to donate $30 per speaker to WFPC in lieu of speaker gifts. As a result of this, $3,240 was raised for WFPC.

Sick Kids bear raffle
Rhonda Harris and Ken McKinnon once again purchased and raffled off Sick Kids bears, raising an incredible $2,073 for WFPC. Rhonda and Ken have been raffling the bears at this conference for a number of years and their commitment to WFPC through this fundraiser is truly appreciated.

Charity draw
This year the charity draw had over 20 prizes, with a total value in excess of $4,000. These prizes were generously donated by various consultants, suppliers, contractors and sub-contractors who are active in the wastewater industry. A total of $1,428 was raised through the charity draw.

As in previous years, the incredible generosity and support of prize donors, conference participants and New Professionals never fails to amaze the WFPC Committee and we want to thank all of those people who contributed to the success of the charity draw.

OPCEA reception
Conference participants again enjoyed the hospitality extended by OPCEA at their annual Monday evening reception. As usual, this event was a tremendous opportunity for networking and catching up with friends and acquaintances from the wastewater industry. OPCEA offered food and refreshments to all those attending and, in return, asked only for donations to WFPC. As a result, OPCEA was able to raise $1,588 for WFPC.

To all OPCEA members, the WFPC Committee offers its gratitude for once again supporting the activities of WFPC.

A Late Supper with the Blues
Immediately following the OPCEA reception, Water For People held what promises to be a regular conference event, a buffet dinner with live music. Music by the Village Blues band provided a great backdrop for over 100 dancing WEAO members. Special guest salsa dancers Alvin Pilobello and Fabienne Haller added just the right touch of class to our event. Over $900 was raised as a result of the evening.
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Conference Perspective

A great experience for New Professionals and students at this year’s conference

Matt Simons, 2009-2010 NP Conference Program Assistant, AECOM

The 39th Annual WEAO Technical Symposium and OPCEA Exhibition was another great success. Anthony Abbbruscato, New Professional Conference Lead, with assistance from Matt Simons and many other NP Committee members, organized a terrific mix of technical and social events for NPs and students. The support provided by WEAO resulted in a high attendance by students at this year’s 2010 conference.

Everyone at the conference was reminded of the importance of the up and coming members within the association, as our NP Committee and student chapters were recognized by Ed McCormick, WEAO’s WEF representative, who indicated that WEAO’s NP Committee and student chapters have been instrumental in the success of involving new professionals and students within the water environment industry. The NP program featured many activities, including some new ones this year designed to keep NPs and students busy throughout the conference.

The conference kicked-off Sunday afternoon with the 2nd Annual WEAO Student Design Competition, where student teams from five universities presented their design concepts for the Port Darlington WPCP expansion. Congratulations to the Ryerson University team for winning this year’s competition. A special thanks to the sponsors of the event Hatch Mott MacDonald and Luccia Gafarova; the Regional Municipality of Durham for providing this year’s design problem; this year’s judges Ansel Bather from AECOM, Gustavo Jacome from Stantec, Bernie Kuslikis from the Regional Municipality of Durham, and Gerry Sigal from R.V. Anderson; as well as the Student Design Competition Sub-committee members Rina Kurian from R.V. Anderson, Bernardo Majano from R.V. Anderson, and Edgardo Tovilla from the Ministry of the Environment.

Sunday evening saw enthusiastic participation from NPs, students and seasoned professionals at the NP reception, a.k.a. ‘The Social Hour: Connecting New and Seasoned Professionals.’ This reception was a tremendous opportunity for students and NPs to meet and network with seasoned professionals in a relaxed social atmosphere. Following the NP reception, the Ice Breaker reception featured some great food and an exciting atmosphere in which to mingle and chat with everyone who was attending the conference. A special thanks to R.V. Anderson and SEW Eurodrive for sponsoring the event.

Monday was full of action for NPs and students. The NP technical session featured eight NP presentations throughout the day that covered a wide range of interesting topics. Also, as part of the technical program, students from Carleton University, University of Waterloo and University of Guelph presented papers eligible for this year’s Best Student Presentation Competition. The prize was awarded to Andrew Oosting from the University of Guelph, whose presentation entitled ‘Development of a Risk Assessment Tool for Developing Prioritized Management Strategies for On-Site Wastewater Systems’ was selected from a talented field of students who made presentations.

The Awards Luncheon on Monday was another testament to the strong presence of NPs and students, as many awards and recognitions were presented to our young WEAO members. The recipients of the WEAO scholarships were Jacque-Ann Grant of the University of Toronto, Sasha Rollings-Scattergood of the University of Guelph, Barry O’Doherty of the University of Waterloo, and Maryam Reza of Ryerson University. Recognition plaques from WEF were presented to newly-formed student chapters at Centennial College, Mohawk College and Queen’s University. The Outstanding New Professional Award went to Kathleen Hum of CH2M Hill for her valuable contribution as Student Chapter Program Manager, and other significant contributions to the NP Committee. Outgoing NP Committee Chair, Charlie Chen of AECOM, was presented with a Service Award for his dedication and efforts as chair for the 2009-2010 year.

The first ever Student Panel Discussion was held in the Hilton Hotel Prince of Wales Room. The panel discussion gave an opportunity for NPs and students to ask questions pertaining to all sectors of the water environment industry, and obtain useful information about different career paths for students and new professionals. A special thanks to panel members Vincent Nazareth from R.V. Anderson, Cordell Samuels from the Region of Durham, Michael Payne from the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), George Lai from the Ministry of the Environment (MOE), Catherine Jefferson from WEAO, and Blake Tonogai from ACG Technology Ltd. (representing OPCEA) for their valuable insight.

Monday night’s NP and student activities featured an informal dinner at the Honest Lawyer. This event was well attended by about 35 NPs and students coming and going throughout the night. Many of the NPs and students also attended the Water For People event which took place at Downtown Kathy Brown’s, just upstairs from the Honest Lawyer. Both events gave NPs and students opportunities to socialize and make connections.

Tuesday provided the NPs and students with an opportunity to attend a number of interesting technical sessions representing a wide range of topics, visit all of the excellent displays at the OPCEA Exhibition, as well as watch the always exciting Operations Challenge.

The conference also featured a Networking Board, which included company information and job postings from several employers as well as many résumés generating interest from potential employers.

The NP Committee would like thank everyone who was involved with making this year’s conference another success. The conference presented an excellent opportunity for NPs and students to participate in the WEAO activities and gain an appreciation for the many opportunities that exist for them within the water environment industry.
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The Communications Committee wishes to thank Duane Forth and the members of the Environmental, Health, Safety & Security Committee for their assistance in developing this section on Health and Safety.
LONE WORKER PROTECTION

Ross Humphry, Canadian Safety Equipment

Do you work alone? Who would call for help should you get into difficulty? The issue of workers who work alone and how to protect them has become a hot topic across Canada. While there have always been ‘lone workers,’ the problem has increased over the last few years as employers have been forced to ‘realign’ their staff due to economic uncertainty and increased costs. Where typically two people were on shift at the local water or sewage treatment plant, that work may now be handled by only one. This presents a serious issue with the safety of the lone worker should he or she be injured or incapacitated.

Governments are beginning to recognize this problem and have started to enact legislation to deal with the issue of lone worker safety. There are typically two types of lone worker scenarios:

1. A maintenance worker who is called in to work in a large or small facility, but is working alone without immediate supervision.
2. A worker who regularly works alone. You can be a lone worker in a large facility where there are several employees on shift, but that worker is out of sight or earshot of other workers. Or you can be the only person in the facility.

Workers have been injured and even killed in water and wastewater facilities in Ontario while working alone, and while there is no way to guarantee a worker’s complete safety, technology has now been developed to get immediate help to a disabled worker that is so critical to his or her survival.

Employers have tried numerous methods of protecting their workers with limited success at best. Methods such as phoning in every two hours is only effective during the phone call, leaving the worker unprotected until the next call, and using the phone or radio to call for help will not be effective if the worker is unconscious or incapacitated.

The most important issue with lone worker protection is the speed of the response when a worker is in distress.

**TIME SAVED = LIVES SAVED**

For many years, the fire service has used a device called a PASS (Personal Alert Safety System) Alarm that activates when a fire fighter is disabled. These devices monitor a fire fighter’s motion and, when the motion stops, they emit a 95db audio alarm after a predetermined time (30 seconds in the fire service) has elapsed.

GRACE Industries, the world’s only manufacturer of stand alone PASS devices for the fire service, has developed a wireless system that will send a signal back to a receiver when the fire fighter’s PASS device goes into alarm.

This technology provides an excellent solution to the lone worker problem, and a complete range of PASS products has been developed to cover facilities of all sizes and any number of workers.

Lone Worker Products utilize a spread spectrum signal that is very difficult to interfere with and has a line of sight range of up to 1.2 km (¾ mile). Remote antennae and repeaters allow an unlimited area to be covered and devices can be ordered with 30-60-90-120 second time delays so as to suit the specific application. Sixty seconds is the most common in the water and wastewater industries. Each device also has a panic button that can be activated by a worker immediately rather than wait for the time-out sequence to elapse. The main receiver provides a relay contact that can activate a telephone dialer, activate remote alarms or even be tied into the plant’s emergency alarm system. The computer-driven system for large facilities can use locators which will tell the receiver where the victim is on the site.

GRACE has taken this technology even further by utilizing satellite monitoring and the basic PASS and receiver. This allows a mobile worker to travel from site to site and be up to 1.2 km (¾ mile) from his vehicle. The system is tied into a vehicle-mounted satellite tracking system which will alarm back to the monitoring station should the worker’s PASS device activate.

A new development of this technology allows two lone workers in a large plant to monitor each other. If one PASS device activates, the other unit will alarm.

Technological advancement in PASS systems can now provide a lone worker with 100% continuous coverage while on the job, providing a peace of mind never had before, and PASS systems are now used in every application imaginable from water and sewage treatments plants to manufacturing facilities, military bases, breweries and other industrial facilities, from British Columbia to the Maritimes.

Ross Humphry is the founder and owner of Canadian Safety Equipment Inc. and CSE Incendie et Securite Inc. He has written numerous articles on Lone Worker and Confined Space Entry/Rescue and has given presentations at conferences across North America.
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Among the various occupational hazards associated with working in a wastewater treatment plant (WWTP) are those resulting from the inhalation of aerosolized particles and gases. It has been known for decades that agitating water surfaces, and the turbulence associated with fast moving water in open channels, can form droplets of water that remain in the air long enough to be inhaled (Hickey and Reist, 1975). Furthermore, evaporated droplets can leave behind organic and inorganic particles small enough to reach the pulmonary region of the lung. Likewise, gases are emitted from wastewater in detectable quantities. This article will discuss the results from two studies devoted to assessing these hazards with a focus on endotoxin and hydrogen sulfide inhalation. Several studies have shown high prevalence rates of respiratory health problems among WWTP workers (Laitinen et al., 1994; Lee et al., 2007; Thorn et al., 2002). Therefore, this is an important issue from the standpoint of maintaining a healthy workforce in this municipal industry.

A study of hydrogen sulfide and endotoxin levels (Lee et al., 2006) was initiated by the author and his doctoral student at the request of a WWTP organization that had one of its workers die of hydrogen sulfide poisoning. The worker was found on a staircase attached to an open-topped basin. During the still morning hours, the hydrogen sulfide had apparently drifted over the side of the basin because it is heavier than air, and without dilution by wind, built up to concentrations high enough (i.e. > 800 parts per million (ppm)) to knock down the worker and cause his death. Although the rotten egg smell of hydrogen sulfide is detectable by the human nose at levels below 1 ppm, it is well known that this gas at high concentrations will quickly overwhelm the olfactory nerve, thus leaving the worker without warning of the dangerously high levels. This was an isolated incident, but it accentuated the need to be cognizant of hydrogen sulfide levels throughout a plant as it will cause irritation of the eyes, nose and throat even at low levels (<10 ppm). The gas is developed by respiration of anaerobic bacteria and, therefore, is most prevalent in situations where low-oxygen conditions exist such as anaerobic digesters, but can also be present in other operations such as sludge dewatering and secondary clarifiers. The eight-hour threshold limit value (TLV) for hydrogen sulfide is 10 ppm.

Because bacteria are inherently ubiquitous in sewage, and droplet aerosolization of wastewater occurs in various operations, exposure to bacteria in WWTPs is practically inevitable. Some bacteria can be aerosolized directly or when attached to a particle. A subset of bacteria, the Gram-negatives, have a large, chainlike molecule scattered over their outer shell, which a chemist would refer to as a lipopolysaccharide (LPS) but is more commonly referred to as ‘endotoxin.’ There is no TLV for endotoxin established in North America, but a level of 50 EU/m³ (endotoxin units/m³) has been suggested by European experts (Heedrick and Dowues, 1990). Oddly, endotoxin exposure has been shown to produce a protective effect where consistent exposure since youth may help to inhibit the development of allergies. However, high concentrations in work environments can have deleterious effects including the development of organic dust toxic syndrome (Liebers et al., 2008). Interestingly, the bacteria that produce the endotoxin do not have to be present to cause an ill-effect; just the LPS molecules are needed to induce an adverse reaction, which initially results in an inflammatory response of the lungs and then leads to more chronic conditions.

During our study, we sampled for hydrogen sulfide with a direct-reading instrument (Jerome 631-X, Arizona Instruments, Phoenix, AZ) and for endotoxin by taking filter measurements that were transported to a lab for analysis. Sampling took place at four wastewater treatment plants at a variety of indoor and outdoor locations situated as close as possible to six unit operations generically termed as grit removal, primary and secondary clarification, biological degradation, sludge dewatering and sludge digestion. Most measurements took place during sunny days, but we did not account for variations in wind, which would necessarily affect the dilution of these contaminants in outdoor areas. Our results indicated that hydrogen sulfide levels varied in the parts per billion (ppb) range with 17 measurements exceeding...
1 ppm. The levels obtained in the grit removal and sludge dewatering operations were statistically higher than levels in the other units. These were primarily indoor, or partially enclosed, operations. We also tested at the lowest point of these operations that a worker may enter to measure in settings that would produce worst-case scenarios.

No association was found between endotoxin and hydrogen sulfide concentrations, thus, these two contaminants exist for independent reasons and should be mitigated, if necessary, separately. Endotoxin levels ranged from 6 to 1250 EU/m³. This broad range is typical of studies involving endotoxin analysis, as many factors can influence their concentration, even on a day-to-day basis at the same location. However, the results indicated that levels were often much higher than should be breathed over a workshift. Again, grit removal and sludge dewatering resulted in the highest concentrations.

Although the results for hydrogen sulfide indicated very low levels, there is evidence that, even at these low levels, adverse effects to the nervous system, such as headache, lightheadedness, and concentration difficulties can occur (Beauchamp et al., 1984). In a subsequent study, we tried to determine whether these symptoms were present in WWTP operators and found that workers performing the plant inspection task had both elevated indications of concentration difficulties and respiratory symptoms compared to the control group, water treatment operators (Lee et al., 2007).

So what can be done to protect WWTP workers from airborne hazards? First, long-term workers should be trained in precautionary work practices, even when the exposure levels of contaminants are relatively low. Second, periodic surveillance and prevention programs for depression and other nervous system disorders should be implemented. We found a rate of depression (45%) that was considerably higher than the general male population (18%). On an individual basis, respirators can be worn in areas known to have high aerosol and/or gas concentrations, especially those with high water agitation or low-level areas where hydrogen sulfide can ‘pool.’ We also recommend the use of personal sampling on a periodic basis for endotoxin and hydrogen sulfide. Commercial labs are available to analyze for endotoxin based on a simple-to-obtain filter sample, and the technology in hydrogen sulfide monitors is improving to the point that they are available in sizes small enough to be worn on the waist and accurate to 1 ppm. Although these do not control the exposure, they give the worker, and managers, the information needed to make informed decisions to help maximize the health of the WWTP workforce.

References
n the past several months, arc flash has become a popular topic of discussion in both the electrical and occupational health and safety industries. Much information and advice has been provided on arc flash studies and Personal Protective Equipment (PPE), through articles, software, etc. While it is clearly a part of CSA Z462 - Workplace Electrical Safety, little has been said about electrical shock hazard and protection.

According to CSA Z462, an electrical hazard is defined as a dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast. Also discussed is an electrical hazard analysis in which, if electrical conductors or circuit parts operating at 50 volts or more are not placed in an electrically safe work condition (lockout and verification), other safety-related work practices shall be used to protect workers against the hazards of both electrical shock and arc flash. The following is a discussion of electrical shock hazard and means of protection.

When current passes through the human body, the danger or risk of injury depends mainly on the magnitude and duration of the current flow. The relationship between current and voltage is not linear, because the impedance of the human body varies with the touch voltage. The different parts of the human body such as skin, muscle, blood and bone present variable impedance to electric current. Several other factors impact the severity of damage to human tissues including duration of current flow, frequency, degree of moisture of the skin, surface area of contact, pressure exerted and temperature.

Knowledge of the effects of alternating current is primarily based on findings related to the effects of current at frequencies of 50 Hz or 60 Hz, which are the most common in electrical installations.

Accidents with direct current are much less frequent than would be expected from the number of DC applications. Fatal electrical accidents usually occur only under very unfavourable conditions, such as in mines.

Effects of sinusoidal alternating current
The threshold of perception is the minimum value of touch current which causes any sensation for the person through which it is flowing. This value depends on several factors, such as the contact area, the conditions of contact (dry, wet, pressure, temperature), and also on the physiological characteristics of the individual.

The threshold of reaction is the minimum value of touch current which causes involuntary muscular contraction. This is generally 0.5 mA independent of the duration of contact. The effect on muscles may result from current flowing through the affected muscles or through associated nerves or the associated part of the brain.

The threshold of let-go current is the maximum amount of touch current at which a person in contact with an electrical source can let go. This too depends on several factors such as contact area and the physiological characteristics of the individual. A value of approximately 10 mA is assumed for adult males.

The threshold of ventricular fibrillation (VF) or the very rapid uncoordinated fluttering contractions of the lower chambers (ventricles) of the heart is the minimum value of touch current through the body which causes this cardiac arrhythmia. Incidence of VF depends on physiological factors such as the anatomy of the body and the person’s state of cardiac function. In addition, electrical factors such as duration and pathway of current flow can increase the risk or chance of VF should a person come into contact with electrical current.

Other physiological effects of contact with electrical current include muscular contractions (severe enough to fracture bones), and damage or paralysis due to current passing through highly conductive nerve tissue.

With currents of several amperes lasting more than seconds, severe full thickness burns and other internal injuries may occur, but not be readily apparent on the external surface of the body. Surface burns may also be seen.

Effects of direct current
Similar to alternating current, the threshold of perception and reaction with direct current depends on several factors, such as contact area, conditions of contact (dryness, wetness, pressure, temperature, etc.), duration of current.
flow, and physiological characteristics of the individual. Unlike alternating current, only making and breaking of current is felt and no other sensation is noticed during the current flow at the level of the threshold of perception. The threshold of reaction is approximately 2 mA for adult males. Unlike alternating current, there is no definable threshold of immobilization or let-go for direct current. Only making and breaking of current lead to painful and cramp-like contractions of the muscles. Above approximately 100 mA, a sensation of warmth may be felt in the extremities during current-flow. Within the contact area, painful sensations are felt. Above 300 mA, unconsciousness frequently occurs. With currents of several amperes lasting longer than several seconds, severe burns or other injuries and even death are likely to occur.

Related non-electrical injuries, such as traumatic injury from being thrown, falling or from muscle contractions themselves should be considered.

Prevention of electrical shock
In the prevention of electrical shock, CSA Z462 describes the shock hazard analysis as to determine the voltage to which personnel will be exposed, boundary requirements, and the personal protective equipment necessary to minimize the possibility of electrical shock. The shock protection boundaries identified as limited, restricted and prohibited approach boundaries are applicable to the situation in which approaching personnel are exposed to energized electrical conductors or circuit parts. In addition, unqualified persons shall not enter spaces in which exposed energized electrical conductors or circuit parts operating at 50 volts or more are not suitably guarded, unless the electrical conductors and equipment are in an electrically safe work condition.

Rubber insulating gloves with leather protectors
As primary protection for shock, rubber insulating gloves with leather protectors must be specified correctly and managed properly in the workplace. Rubber insulating gloves and leather protectors work as a system and, if either component is not suitable for use, the worker could be exposed to a shock hazard when used. When you purchase rubber insulating gloves with leather protectors for your workers, make sure you:

- specify the correct size(s) of the rubber insulating gloves;
- order black as the preferred colour of the rubber, as it performs better when arc flashed before it will break down;
- ensure you order the matching class and size of leather protectors;
- order the manufacturer’s protective storage bag;
- ensure the rubber insulating gloves and leather protectors are stored correctly in the manufacturer’s storage bag, separated and lying flat and with the glove openings into the bag;
- identify each pair of gloves with a unique identification tag that can be used for tracking purposes in your preventive maintenance program;
- ensure that you establish a preventative maintenance schedule for dielectric testing to the applicable ASTM Standards (six months, or more frequently depending on usage) or Government Regulations (Class 1 or higher must be tested every three months in Ontario, six months for OSHA in the United States); and
- regularly audit the rubber insulating gloves you have issued to workers to ensure that all of the above items are complied with.

It is important as a supervisor that, after you purchase rubber insulating gloves with leather protectors and provide them to workers, you ensure they are used by the workers and properly managed as outlined above.

Finally, it is important to understand that electrical safety encompasses protection against shock, in addition to arc flash, and blast. These hazards have their own requirements for protection. Careful attention must be paid when selecting PPE for each of these hazards to ensure they integrate properly and offer the worker the maximum protection available.

CSA Z462-08: Workplace Electrical Safety

- “Provides assistance in determining the severity of potential exposure, planning safe work practices, and selecting personal protective equipment to protect against shock and arc flash hazards.” – Canadian Electrical Code 2009
- Specifies electrical safety requirements for workplaces that are necessary for the practical safeguarding of workers during activities such as installation, operation, maintenance, and demolition of electrical conductors, electrical equipment, signaling and communication conductors and equipment, and raceways.
- Defines arc flash as “a dangerous condition associated with the possible release of energy caused by an electric arc.”
- Electrically safe work condition is defined as “energized electrical conductors and circuit parts to which a worker might be exposed shall be put into an electrical safe work condition before a worker works within the limited approach boundary of those conductors or parts.”
- Defines the shock protection boundaries as limited, restricted, and prohibited approach boundaries.
- An arc flash analysis shall determine the arc flash protection boundary and the personal protective equipment that personnel within the arc flash boundary shall use.
- Arc Analysis Results will rate the Hazard/Risk Category from 0 to 4 (0 is the lowest hazard, 4 is the highest). A table details the PPE required for each category.
- Arc flash labels are put on equipment to define the Hazard/Risk Category.
- Arc flash analysis not required if circuit is rated 240 V or less, circuit is supplied by one transformer, transformer supplying the circuit is rated less than 12.5 kVA.

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HEALTH AND SAFETY AUDITS

Gary O. Houghton, P.Eng., Gary O. Houghton Consulting Ltd.

This article provides an overview of health and safety audits. While it gives some guidance to the process, reference should be made to the sources in the article, or your own internal policies and procedures for more detailed audit information.

Why audit?
Health and safety audits of wastewater facilities can help ensure that the workplace is safe and that the proper systems are in place to effectively address any safety issues. Besides keeping people safe, audits show to the Workplace Safety and Insurance Board (WSIB) that an effective program is in place to protect workers. You have maintained due diligence. Aside from the health and safety benefits, the audit process, by ultimately reducing workplace injury, reduces injury-related costs, noting also that, on the monetary front, the outcome of audits may influence your WSIB premiums.

The health and safety audit framework
The Occupational Health and Safety Act is the basic regulatory instrument that health and safety programs must address and the WSIB’s Workwell Program is that organization’s means to gauge the level of success in meeting the Act. The WSIB website (www.wsib.on.ca) provides very specific information on what constitutes an effective health and safety program. The WSIB identifies a number of areas or elements that must be covered, which can be grouped as follows:

1. your health and safety plan;
2. the responsibilities of managers, workers and contractors;
3. the proper posting of health and safety documents;
4. hazard identification and control and standards and procedures;
5. health and safety representatives, and, where applicable, the make up of the health and safety committee;
6. training programs;
7. first aid;
8. inspections by management and how these are documented; preventive maintenance;
9. accident and incident investigations;
10. roles of the senior management team; and
11. procedures for early and safe return to work.  

It is hoped that your organization has covered many of these aspects listed in the Workwell audit and that they form the basis of your health and safety program.

Getting started
Some larger municipalities or firms have the in-house resources to complete an audit. But regardless of the size of the organization, it is recommended that you first contact the workplace safety association (e.g., the Infrastructure or Health and Safety Association for Government Services) to which your organization belongs. They can build on the Workwell framework and assist in developing a workplan. If you have never completed an audit, or have been contacted by WSIB that you will be subject to an audit, your first call should be to your health and safety association.

If your workplace is subject to a collective agreement, involve the union representatives. Aside from their obvious need to be involved on behalf of their members, they may also have resources that can assist in the audit process.

What the audit looks for
The audit is not intended to evaluate the minutia of the health and safety procedures, though evidence of poorly crafted programs may require a more thorough evaluation of procedures down the line. Rather, the audit will focus on the delivery of the program, and will look for evidence that the program is being followed, using the framework elements identified above. Documentation is the basis of proof. The person conducting the audit should be looking to see that there is written evidence to support the program. Anecdotal or verbal information is not acceptable.

To meet regulations, there must be evidence that the plan addresses all legislated requirements. This is an area where the safety organizations can be of great benefit in navigating through the acts and regulations that have a health and safety implication. There must be clear evidence that the health and safety program is communicated to all those in the workplace. This evidence must not only document what was communicated, but how it was communicated, and that the method used is effective. For example, only using emails to communicate your program, where a small fraction of staff regularly opens emails, would not be considered effective.

Evidence that the health and safety program is dynamic and current must be presented. Do not develop a program, then never revisit or update it. Keep it current, through regular reviews of legislation, including subscribing to an update alert service, training sessions that will include feedback on the procedures, and scheduled complete reviews, no less than annually.

Summary
While we like to think that our health and safety program has covered all possible aspects, an audit can document to what extent you have met this goal. This will give you the opportunity to revise and correct the program before an incident occurs.
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ARC FLASH HAZARD ANALYSIS – HOW ACCURATE IS IT?

Len Cicero, Lenco

Introduction
Arc flash hazard analysis is done on a daily basis with thousands of labels being applied every year to warn electrical workers of the dangers involved. The analysis and labelling is based on protective device curves that, on paper, are not necessarily how the equipment performs in the field. Protective devices frequently do not operate as per the time current characteristics of the study. It is imperative that protective devices be tested and maintained to ensure their true operating times. Even a slight variation between the time current characteristics in the study and the actual equipment operating time in the field can mean a change of hundreds of calories per square cm and associated major increase in flash protection boundary and hazard risk categories. This scenario creates a dangerous situation and can give field personnel a “false sense of security” based on the theoretical tripping times of the protective devices.

Proper operation of electrical power distribution equipment is paramount in determining arc flash values and protection boundaries. A key factor in the analysis of incident energy is the predicted operating time of the protective devices. The proper performance of electrical power equipment is critical if calculated values of incident energies are to be accurate and the correct application of personal protective equipment is to be accomplished. A national survey was conducted on the performance of service-aged electrical equipment, and the results indicated that a considerable number of the protective devices currently in operation do not follow their time current characteristics or do not operate at all. This poses a huge threat to workers that rely on a flash hazard analysis based on equipment in good working order.

NETA survey
A survey was conducted by NETA (International Electrical Testing Association) on the performance of electrical protective devices. A national survey of field performance on approximately 340,000 protective devices was reviewed, and the results of those findings are quite alarming. Understanding these key areas of performance, the dilemma it creates with arc flash incident energy exposures, and the overall impact of the performance to personnel will help the owners and users of the electrical equipment provide a safer workplace.

Based on the results of the survey, approximately 23% of the circuit breakers tested had an issue affecting the protective device operation. This data closely correlates with failure data presented in IEEE Std. 493-2007, Table 5-1 in the ‘fair’ (18.1%) to ‘poor’ (32.8%) maintenance quality category. With percentages in these ranges, approximately one in four of the devices in the field will not operate as indicated on the time current curves. The impact to personnel in the field is that in most cases incident energies will significantly increase on the defective equipment.

Another alarming statistic was the fact that, on average, 10.5% of the devices did not function at all when tested. This means that, when overload or short circuit current is applied to the device, it was found to be inoperable. If a fault were to occur, it would severely impact personnel safety when working on or near that particular piece of equipment. Of the units with issues affecting performance, 42.8% were mechanical issues, and 26.7% had issues related to electrical diagnostic testing. Lubrication issues were the predominant mechanical failure at 51.4%. This has been a long-standing problem within industry and is often vetted during preventive maintenance operations.

Maintenance criticality and impact to personnel
Proper performance of electrical power equipment is paramount if calculated values of incident energies are to be accurate. The results of the findings illustrate that proper personnel protection and PPE assessment cannot be performed without accurate and reliable data, including properly functioning protective devices.

If protective equipment does not function as designed or intended, the results can be disastrous, as the results of engineering studies for protective device clearing times as well as safety-related data such as arc flash studies become invalid, as clearing times become an unknown element. It is common for facilities to perform a flash hazard analysis using commercially-produced software, relying on the published trip times of the protective devices. When possible, the initial protective device settings are modified (lowered) to decrease incident energies and hazard labels are applied to indicate the circuit parameters. If electrical protective devices do not function as designed, the arc flash study is not valid and severe increases in incident energies can be obtained, which could render the PPE assessment as inadequate.

Along the same line, determining risk categories and PPE requirements using the tables in CSA Z462 assume that the equipment is actually functioning. Pay close attention to the footnotes in the tables and the specific reference to clearing times. The condition of the equipment and the latest test or calibration records should be considered when determining the risk category and performing the overall hazard risk assessment.

Maintenance standards
During the development of CSA Z462, working group 6 on Safety Related Maintenance Requirements researched the available national standards in Canada for electrical maintenance. A few references were found, but a national standard did not exist. There are two main standards that exist in the North American industry for maintenance of electrical power distribution equipment and systems. These standards are utilized in conjunction with the manufacturer’s individual recommendations to provide an overall quality program.

The NFPA 70B Recommended Practice for Electrical Equipment Maintenance and the NETA Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems are standards that are used throughout North America. The NFPA 70B provides a complete guideline of the maintenance requirements for electri-
cal, electronic and communications systems and equipment used in industrial and commercial applications. The NETA standard consists of step by step procedures used by NETA certified technicians to evaluate equipment for continued safe and reliable service.

**Frequency of maintenance**

The ideal maintenance program is reliability-based and is unique to each plant’s operating environment, power system and individual piece of equipment. Where this information is not readily available, the following guideline (See Figure No. 1) provided by the International Electrical Testing Association (NETA) can be used as a multiplier for regularly scheduled maintenance intervals. The frequency multiplier in this matrix is utilized in conjunction with a baseline interval for power distribution equipment found in ANSI/NETA MTS–2007 Standard for Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems. From Appendix B of the NETA MTS-2007 standard:

**APPENDIX B**

**Frequency of maintenance tests**

NETA recognizes that the ideal maintenance program is reliability-based, unique to each plant and to each piece of equipment. In the absence of this information and in response to requests for a maintenance timetable, NETA’s Standards Review Council presents a time-based maintenance schedule and matrix.

One should contact a NETA full-member company for a reliability-based evaluation.

The following matrix is to be used in conjunction with NETA’s Frequency of Maintenance Tests table. Application of the matrix is recognized as a guide only.

Specific condition, criticality, and reliability must be determined to correctly apply the matrix. Application of the matrix, along with the culmination of historical testing data and trending, should provide a quality electrical preventive maintenance program.

The numbers in the matrix above provide a factor for the frequency of maintenance. For example, if the electrical equipment is in good condition and is not very critical to the operation, i.e., low reliability requirement, the table indicates that the normal interval between maintenance events can be extended by a factor of 2.5. Whereas, if the piece of equipment is in poor condition and is critical to the operation, the table indicates that the normal interval between maintenance events should be shortened by a factor of 4 (0.25)

**Conclusions**

Electrical devices must be regularly maintained to the latest available standards. Field test data shows that lack of or improper maintenance severely affects protective device operation, thus affecting the overall arc flash values. Determination of risk categories using the CSA Z462 tables, performing arc flash studies, incident energy calculations and PPE assessments become invalidated with improper operation of protective devices. Schedule a maintenance testing shutdown.

**Figure 1 – MAINTENANCE FREQUENCY MATRIX**

<table>
<thead>
<tr>
<th>EQUIPMENT RELIABILITY REQUIREMENT</th>
<th>EQUIPMENT CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>POOR</td>
</tr>
<tr>
<td>LOW</td>
<td>1.0</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>0.50</td>
</tr>
<tr>
<td>HIGH</td>
<td>0.25</td>
</tr>
</tbody>
</table>

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MANAGING STRESS
– THE KEY TO SAFE WORKING

Pat Coleman, P.Eng., AECOM
and Henry Coleman

Safe working’ is based on the premise that employees are fit for work, cognizant of their responsibilities and communicating with their team. Health and safety professionals now argue that stress is the number one threat to safe working because stress interferes with the employee’s ability to do his or her work. For example, it is estimated that 60% to 80% of accidents on the job are stress-related, including the Three Mile Island and Exxon Valdez disasters.

Mental health issues cost Canadian industry over $35 billion per year. A study done by the Canadian Mental Health Association reported that 59% of established working age people feel really stressed at least a few times each week. This survey and others show that ‘work’ has overtaken ‘financial issues’ as the #1 cause of stress among employees.

What is stress?
The ‘stress response’ is a fight or flight mechanism. When you are ‘threatened,’ the body ‘kicks in.’ At first, the body releases adrenaline, your heart beats faster, and you start to breathe more quickly. Both good and bad events can start this reaction. Second, if, for some reason, you do not escape from the situation, your body begins to release stored sugars and fats from its resources. At this stage, you will feel driven, pressured and tired. You may experience anxiety, memory loss, catch colds or get the flu more often than normal. Finally, if you do not resolve your stress problems, the body’s need for energy will become greater than its ability to produce it, and you will become chronically stressed. At this stage, you may experience insomnia, errors in judgement, and personality changes. You may also develop a serious sickness, such as heart disease, ulcers or mental illness.

Like the machinery in our wastewater treatment plants, we are not designed to operate under extreme conditions all the time. If we get “stuck” in the “stress response”, we will stop performing and burn out.

What should you do if you feel your judgement is being impaired by stress?
A person who is not fit for work should not be carrying out a hazardous procedure. This said, if you feel you are stressed, but are still fit for work, you should consider the following advice:
• Slow down and double-check each step of the task. Even if you have done the task many times before, work through how you will do the task given your mental or physical state. If you do not feel alert, then do not take on the task where being alert is critical to accomplishing the task safely.
• Study any and all safety precautions of new or rarely used equipment you are expected to operate. Even if you feel confident in your abilities to operate the equipment, when you are under stress your brain can become foggy and easily distracted.
• If you feel the task is too much for you, do not be afraid to ask for assistance from co-workers.
• Have a colleague or co-worker double-check the procedure for you. For example, do not just read it, talk it through with one of your co-workers.
• If you feel stressed, do not take on a new and unfamiliar task or operate new equipment if at all possible. During times of stress, your brain will not retain new information easily.
• Do not hesitate to take a break from a task if you become distracted by stress. Your mind and body may need a short break so that you can re-gather focus to complete the task at hand. Walk away, take some deep breaths and do a couple of stretches.

Changing the way we manage our employees can reduce stress
It is economically and morally preferable to assess and repair the failed work system or organization. This action reduces the risk of future failure and the likelihood of future work-related ill-health. This approach focuses attention on the antecedents of work related stress in the design and management of work – but recognizes that interventions at the individual level have a part to play.
This is the approach promoted by NIOSH (USA), Health and Safety Executive (HSE) in the UK and the Canadian Centre for Occupational Health and Safety (CCOHS). For example, NIOSH published NIOSH Publication No. 99-101 Stress at Work and the CCOHS published Best Advice on Stress Risk Management in the Workplace. The HSE established a stress website (www.hse.gov.uk/stress) and published management standards for work related stress.

The HSE provides a number of examples where companies have trained managers using their management standards for work-related stress. Scottish Power, one of the UK’s top customer service suppliers of gas and electricity, with around 5.2 million customers, reduced sick days taken by employees by 11%. Birmingham City Council, the largest local authority in the UK, reduced anxiety and depression-related illnesses among employees by 6%.

There are similar examples in North America. For example, the management of Waste Management, Inc. from Oakbrook, Illinois, believed that worker stress was contributing to absenteeism and medical claims. The company instituted a stress management program, which has resulted in a cost savings of $3,750 to $15,000 savings per participant, (amount of savings depended on their annual income).

**What might be in ‘management standards for work-related stress?’**

The management standards cover six key areas of work design that, if not properly managed, are associated with poor health and well-being, lower productivity and increased sickness absence. In other words, the six management standards cover the primary sources of stress at work. These are:

1. **Demands** – this includes issues such as workload, work patterns and the work environment.
2. **Control** – how much say the person has in the way they do their work.
3. **Support** – this includes the encouragement, sponsorship and resources provided by the organization, line management and colleagues.
4. **Relationships** – this includes promoting positive working to avoid conflict and dealing with unacceptable behaviour.
5. **Role** – whether people understand their role within the organization and whether the organization ensures that they do not have conflicting roles.
6. **Change** – how organizational change (large or small) is managed and communicated in the organization.

The management standards represent a set of conditions that, if present, reflect a high level of health, well-being and organizational performance.

### Stress and safe working

Now that ‘workplace’ stress has been identified as the primary cause of stress among employees, a health and safety policy must include measures to reduce this stress by improved work flow design and management practices. Teams that work together should also take into account the mental and physical well being of their team members when planning their work. Both employees and employers need to continually improve the way work is executed and people work together to eliminate stress caused by ‘bad working.’

(Henry Coleman is a co-op student with Watershed Training Solutions (www.watershedtraining.ca))
Delivering safe, clean water services
The aim of health and safety, beyond the safeguarding of employees from preventable accidents and illnesses, is to strike a balance between business need, corporate responsibility and public accountability – concepts based on a culture of responsible stewardship and accountable governance.

Most water professionals would agree that the industry has never been safer; but we all recognize that day-to-day risk is very real and ever-present. Hazardous chemicals, compressed gasses, high pressure liquids, confined spaces, high voltage equipment and performing work on roadways all pose dangers to employees.

Building on a well-established health and safety program, the Ontario Clean Water Agency (OCWA) made a renewed commitment to health and safety in 2007 that resulted in significant reductions in lost time incidents and lost time days. In OCWA’s largest operations in the Regional Municipality of Peel (South Peel), the agency has successfully increased awareness of health and safety and decreased incidents by integrating health and safety into our daily operations and marrying its enterprise-wide infrastructure with a knowledge-based work management system.

Health and safety in day-to-day operations
Health and safety is at the top of everybody’s mind. The Board of Directors sets the tone regarding the importance of working safely and nurtures a culture where safety is everyone’s responsibility. With senior management, Board members review and approve OCWA’s health and safety policy, jointly participate in award programs and lead initiatives to increase health and safety awareness.

According to David Edwards, Regional Manager of the South Peel Facilities and a member of the agency’s Senior Management Committee (SMC), successes in health and safety are directly related to holding everyone from the boardroom to the facility floor accountable for the protection and well-being of people working or visiting OCWA facilities; and the agency’s willingness to embrace innovation throughout all levels of the organization.

In terms of the South Peel facilities, a system that is valued at approximately $2 billion, health and safety is a commitment that can be seen at all levels of the operation. The facility’s more than 130 staff provides services for 1.5 million people over an area nearly 1,300 km². With a processing network comprised of two water, two wastewater and one transmission system, as well as nine remote pumping stations, storage reservoirs and two elevated tanks, leadership sets the tone regarding the importance of working safely to protect the health and safety of employees and people in nearby communities.

This concern for public health as well as the safety of employees did not happen by accident. South Peel’s operation is very complex and its incineration, ultra-violet, microfiltration, membrane and ozone technologies and supervisory control and data acquisition system are just a few of the environmental and maintenance systems that OCWA’s senior managers, engineers, and field staff have had to consider when developing and implementing innovative ways to manage health and safety.

At the local level, South Peel’s Joint Health and Safety Committee (JHSC) plays an integral role in identifying and managing risk. Comprised of specially trained and Workplace Safety and Insurance Board of Ontario certified staff and managers, the JHSC supports the health and safety infrastructure by working with decision-makers to manage, control, minimize and eliminate hazards. Some of their activities include helping to develop policies and procedures, conduct audits and incident investigations, as well as being actively involved in training activities.

System integration
Recognizing that the average worker in Peel is expected to be aware of hundreds of technological and procedural requirements for more than 26,000 pieces of equipment, it made sense to provide workers with the necessary safety procedures and equipment information to complete the job. As a result, the management systems used to collect and distribute information were modified to more effectively complement operational needs.

OCWA integrated its existing health and safety system with its quality environmental management system to ensure that its procedures, documenta-
tion and commitment to continuous improvement was as strong on safety as it was on environmental compliance. This alignment is significant because a quality management system is the driver for compliance in all water systems.

Health and safety has also been integrated into a scalable work management system (WMS). OCWA uses its WMS as a conduit between the health and safety and QEMS systems. The WMS provides an element of control by relaying information to the right people at the right times. It also improves the ability to plan, schedule and report on activities such as emergency management protocols, contingency plans, standard operating procedures and other types of information. The practical benefit of this bottom-up and top-down communications approach is realized in the way it supports planning, reporting and the performance measurement of work activities.

Work management systems
“OCWA’s work management system standardizes the entry point for all tasks performed within the facilities, ensuring that OCWA’s health and safety requirements will not fall through the cracks,” says Ian Farion, OCWA’s Maintenance Projects Specialist. “This is an important aspect of the health and safety infrastructure, as any number of systems, alarms and controls can be monitored from one of several locations. There is an intrinsic benefit to this type of system in a water and wastewater operation as the financial, operational or even personal loss that might result from a control system failing could be extremely high.”

With more than 600 health and safety preventive maintenance activities and the complexity of the South Peel operations, a work management system integrated with OCWA’s occupational health and safety program was extremely beneficial. According to Darko Kodric, Services Manager at the Peel Facilities, the WMS is the foundation for OCWA to carry out its business activities in a consistent manner. It allows us to shift focus from reacting to issues and completing administrative tasks to more actively planning, analyzing and predicting future needs.

In addition to other practical uses like scheduling maintenance activities, OCWA’s WMS is used to assign health and safety tasks including the management of inspections from their scheduling to prioritizing findings and establishing time frames for addressing any outstanding issues. The system also provides reports demonstrating that inspections took place and that assigned tasks were completed. Through analysis of the data captured, the Joint Health and Safety Committee also receives valuable insight towards determining future areas of focus.

Infrastructure alignment
OCWA is currently investigating improving the alignment of work management systems to other enterprise software and process control systems such as supervisory control and data acquisition systems. Although not yet a reality in South Peel, there are obvious benefits when infrastructure systems communicate with one another, particularly when there is an opportunity to eliminate the duplicity often found in similar, but independent enterprise systems.

Conclusion
A health and safety culture is realized when safety is recognized as everyone’s responsibility. The agency’s success in developing this culture has been achieved by integrating health and safety into all areas of the organization through clear and consistent messaging from leadership, involvement of staff in ensuring their own safety and integrating health and safety requirements into the operational systems used by front-line employees each day.

About the author
John Weaver is the Regional Training/Health and Safety Advisor for OCWA at the Peel facilities. He has a Master of Business Administration degree and is a Certified Human Resources Professional (CHRP) specializing in the areas of training and development, and health and safety.

The Ontario Clean Water Agency is a provincial crown agency mandated to provide safe, reliable and cost-effective clean water services. The agency functions as a commercial business and operates over 500 facilities ranging in size from small municipal water systems to large urban water treatment and distribution systems. In 2009, OCWA renewed its partnership with the Region of Peel by entering into a 10 year $455M contract.
We all know that a successful safety program requires commitment to worker and workplace safety at all levels of an organization. Everyone has a part and must be held responsible and accountable for fulfilling individual and collective roles. What you may not know is that this same organizational model can be quite effective in regard to a utility’s security program.

Physical security features have been addressed and improved upon over the past decade and are now most often ‘designed-in’ as standard equipment in the engineering and construction plans of new facilities and system upgrades. These plans often include components such as perimeter fencing, single entrance points, outside lighting, video surveillance, chemical leak detectors, smoke detectors, intrusion alarms, real-time monitoring of system pressures, turbidity, chemical dosages and other process variables that, when out of range, could signal an anomaly as the result of a potential breach in security. Even with any or all of the aforementioned security features, a utility must develop a strong security culture within the organization. Similar to safety, a security program can have state-of-the-art equipment, standard operating procedures, and documented training – but, if not used, maintained, tested, and enforced, the utility is no more secure than a system with minimal security features.

The following table illustrates the typical security features and measures often found within a water or wastewater treatment system for very different security cultures.

<table>
<thead>
<tr>
<th>Security Feature/Measure</th>
<th>Poor or No Security Culture</th>
<th>The Desired Security Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perimeter fencing and gates</td>
<td>Strands of barbed-wire missing or in disrepair.</td>
<td>Visual observations of fencing are made by O&amp;M personnel as part of their normal daily rounds and assignments.</td>
</tr>
<tr>
<td></td>
<td>Sections of fence with holes large enough for human entry.</td>
<td>A more thorough inspection is conducted as a preventive maintenance task on a monthly basis.</td>
</tr>
<tr>
<td></td>
<td>Weeds and brush growing along fence line.</td>
<td>Missing or damaged sections of barbed-wire or fencing are promptly reported and repaired.</td>
</tr>
<tr>
<td></td>
<td>Gates remain open during normal business hours – even during short [off-site] lunch or parts runs.</td>
<td>The grounds maintenance program includes proper weed and brush control along fence lines to improve and expedite fence inspections.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gates are closed when ever the worksite is unmanned (regardless of length of time). Best case scenario is gates closed at all times with call-box.</td>
</tr>
<tr>
<td>Facility Lighting</td>
<td>Several pole lights are out of service due to electrical problems.</td>
<td>Faulty lights are promptly reported and repaired.</td>
</tr>
<tr>
<td></td>
<td>Several pole lights and/or external building lights have burnt-out light bulbs.</td>
<td>This includes bulb replacement as necessary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A more thorough inspection is conducted as a preventive maintenance task on a monthly basis.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This is most important where facilities are not normally staffed during night-time hours.</td>
</tr>
<tr>
<td>Exterior and Interior Doors</td>
<td>Exterior building doors are left un-locked for staff convenience.</td>
<td>All external doors and internal-sensitive doors remain locked regardless of the number of entries and exits expected during the course of the day or shift.</td>
</tr>
<tr>
<td></td>
<td>Interior doors to sensitive areas (e.g., laboratory, control room, electrical switchgear, etc.) are left un-locked.</td>
<td></td>
</tr>
<tr>
<td>Security equipment (cameras, motion detectors, intrusion alarms, chemical alarms, etc.)</td>
<td>Cameras are out of focus, out of position, footage is not monitored.</td>
<td>Process/security equipment is properly operated, monitored, tested, and maintained.</td>
</tr>
<tr>
<td></td>
<td>Motion detectors and intrusion alarms are not routinely armed or tested.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chemical alarm has been turned off due to numerous false positives.</td>
<td></td>
</tr>
</tbody>
</table>

(1) Should have the same level of priority as a ‘safety’ work request/order.

Finally, it is recommended that an assessment of an employee’s commitment to security be as much a part of their performance review/appraisal as other performance measures such as safety, quality of work, quantity of work, dependability, and the like. Security commitment could easily be taken into account as part of the employee’s safety rating and discussion, as after all, security is on the same plateau as safety.
THE NEW CSA STANDARD FOR MANAGEMENT OF WORK IN CONFINED SPACES AND YOU

Wagish Yajaman, IAPA and a member of the CSA Z1006 technical committee

Failure to understand the hazards of working in a confined space can lead to serious injuries and death for both workers and first responders. Examples of injuries and causes of death include asphyxiation from gas, shocks, falls and explosions. To address the health and safety issues relating to working in confined spaces, the Canadian Standards Association (CSA) recently developed a new standard, CSA Z1006 Management of Work in Confined Spaces, to provide guidelines on how to manage work within confined spaces.

The purpose of the CSA Z1006 standard is to help companies develop a managed system to reduce and eliminate any potential workplace injuries and deaths that may result from working in a confined space. It does this by outlining specific requirements and procedures for both working in confined spaces and coordinating safe rescues. (To view the standard in its entirety, visit the Canadian Standards Association website at www.csa.ca.)

Taking the time to review and understand the new requirements is important for workers entering confined spaces such as tanks, pits, vaults, sewers or digesters. It also provides employers and employees with an excellent opportunity to review current confined spaces practices and training requirements, and to identify areas of improvement. For instance, it is not uncommon for some workers to become complacent about their entries into confined spaces as they may not be up-to-date on their training or may develop bad habits over the years. Other issues that may arise during the review include the lack of proper equipment to enter/exit the space, no hazard assessment conducted prior to entry, and no rescue team to extract an individual in the space should something happen.

When reviewing your confined space program, make sure that it includes the following three elements:

• **Part 1: Recognize or identify a confined space.** The CSA defines a confined space as a workspace that is fully or partially enclosed and is not designed or intended for continuous human occupancy, has limited or restricted access or egress, or an internal configuration that can complicate first aid, evacuation, rescue, or other emergency response services.

• **Part 2: Assess the confined space hazards.** Identify potential hazards that may occur upon entering, working in, and exiting the confined space. This includes atmospheric, fire, energy and mechanical hazards. You should also review general health and safety hazards in the space. It is very important to have someone who has the knowledge, training and experience to carry out such an assessment. The assessment should be completed before workers enter the space.

• **Part 3: Control the hazards.** Using information collected in Parts 1 and 2, create a plan for working in the confined space. In addition to dealing with potential hazards, make sure that the plan deals with other issues such as clothing, personal equipment, devices, rescue procedures and lockout/isolation of energy. During this phase, ensure that all workers both working in the confined space and those tasked to do rescues are adequately trained to perform their roles. Finally, create a permit entry system to document the assessment prior to entry, outline who will be working in the confined space and the duration of the job, equipment and emergency rescue procedures.

The CSA standard sets a process for the assessment of the hazards in the workplace and a format to address the roles and responsibilities of each worker. It also outlines a planning process to cover the various aspects of hazard recognition, rescue, training, equipment and other controls required to safely work inside the confined space. The annex in the standard also provides practical tools such as sample forms, examples of spaces, and flow diagrams to make sense of what the standard expects.

The standard is intended to be applied as a best practice across Canada and to ensure everyone is held accountable for managing the safe entry and work in a confined space. The standard is very comprehensive and incorporates American, British and Australian standards to create a comprehensive Canadian framework. It goes a long way to assist employers and employees across Canada in addressing the hazards in a confined space so that injuries and fatalities can be reduced or eliminated.

Wagish Yajaman, M.H.Sc., CIH, and CRSP, is an Occupational Hygiene Specialist in the GTA with the IAPA and a member of the CSA Z1006 technical committee that developed the standard.
Digester gas collection and utilization is an important part of the anaerobic digestion process. The biogas generated through this process is an energy source which can be collected and utilized to run a boiler for heating the anaerobic digester and/or be used to fuel a cogeneration engine to generate electricity.

Biogas produced from anaerobic digestion is typically wet, dirty and contains corrosive element such as hydrogen sulfide. The gas is flammable and provides a potential safety hazard if not handled properly. For this reason, the designer must take into account these properties to ensure that the gas system is easy to maintain and safe to operate.

The key aspect of design is to recognize that digester gas handling equipment operates as a system. In some cases, the gas system must utilize equipment with special materials such as low copper cast aluminum, which has proven to be extremely corrosion resistant to the $\text{H}_2\text{S}$, and proven to operate in the very low gas pressures available from the anaerobic digester.

Varec Biogas Equipment has been the leader in the industry since its formation in 1926, with the vast majority of the digester gas safety equipment installations in Canadian anaerobic digester gas plants.

Recently, the TSSA in Ontario has begun an inspection of all of the Ontario anaerobic digestion facilities, to ensure conformance with CAN/CGA-B105-M93 (R2007) Code for Digester Gas and Landfill Gas Installations. When the code is revised in 2011, the designation will change to CSA B149.6.

To ensure safety throughout the plant, the following are some of the key areas of the TSSA inspections:

- Digester roof must be protected by a pair of flash-back (flame) arrester and pressure/vacuum relief valves, with a three way manual change-over valve installed in the common supply piping so that there is always one safety relief assembly in effective service at all times. Finally, the entire safety relief assembly, consisting of all of the above components, must be protected from the weather by a suitably insulated enclosure to ensure reliability. (This is typically achieved by the installation of an aluminum insulated gas dome, more commonly referred to as the ‘doghouse.’ (Figure 1)

- Boiler and engine burner digester gas trains must have a flash-back (flame) arrester and check valve installed downstream of the automatic safety shut-off valve. Also, a check valve must be installed in the standby gas or propane valve train immediately upstream of the standby connection to provide isolation for the standby train.

- Waste gas burners must have a flash-back (flame) arrester and thermal valve installed not more than 5m from the burner, and be equipped with detection of ignition failure coupled with an alarm. A pilot is required and must be fueled with natural gas or propane. It is not permissible to use digester gas to fuel a pilot because it is wet and corrosive making it unreliable for this application. Clearances must be met including: waste gas burner must be minimum 4m above grade or the maintenance platform; must not be less than 15m measured linearly outward from perimeter of...
digester or other potential source of combustible gas; and must not be less than 7.5m measured horizontally from a property line or road. In Ontario, the waste gas burner also requires TSSA field approval to allow its initial or continued use in burning the digester gas.

- Drip traps must be installed in accessible and easily seen locations, at the low points of a digester gas system. They must be of either the manual, mechanically-operated type, or continuous flow type, with a reliable gas seal of not less than 1.5 times the maximum operating digester gas pressure.
- Manholes with gas tight covers are required in the roof of a digester. Every digester roof must be equipped with at least one manhole which cannot be less than 1.05m internal diameter, and of sufficient area to allow a person equipped with an air pack easy access into the digester using a portable ladder, under extreme emergency conditions.

TSSA is a not-for-profit, self-funded ‘delegated administrative authority’ that administers and enforces public safety laws in the four designated sectors under the province’s Technical Standards and Safety Act.

The Technical Standards and Safety Authority (TSSA) assumed jurisdiction for digester plants, landfill sites and bio gas production sites in November 2007. Bio gas sites include any gas being produced by an anaerobic process other than that from anaerobic waste water treatment plants.

The primary code being used is the CAN/CGA-B105-M93 – Code for Digester Gas and Landfill Gas Installations.

During recent audits at various digester plants, TSSA has found the majority of the boilers and flares (waste gas burners) are not approved. Since there is currently no certification standard covering flares or boilers utilizing gas other than natural gas, propane or fuel oil, these appliances need to be field approved by TSSA.

Technical Standards & Safety Authority (TSSA) was created in 1996 to deliver public safety services on behalf of the Government of Ontario in four key sectors:

- boilers and pressure vessels and their associated operating engineers;
- amusement and elevating devices (elevators, escalators, ski lifts);
- hydrocarbon fuels (transportation, storage and distribution, utilization);
- upholstered and stuffed articles.

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Bill 168 on Ontario Employers

Bill 168 represents a significant change in how, and to what extent, both workplace violence and harassment are regulated in Ontario. It also broadens the definitions of workplace violence and places new requirements on Ontario employers.

Bill 168 outlines many requirements for Ontario employers related to workplace violence and harassment, including:

- Specific assessments to measure the risk of workplace violence;
- Measures to control the risks identified in these assessments;
- Written and posted policies and procedures addressing these risks;
- Employee training in these policies and procedures;
- Incidents or threats of workplace violence must be reported to the employer or supervisor;
- Establishment of how the employer investigates and manages incidents, complaints, or threats of workplace violence; and
- Employee refusal to work where he/she has reason to believe that there is a danger of being a victim of workplace violence.

With regard to domestic violence, the bill states “If an employer is aware or ought to be aware that domestic violence is likely to expose a worker to physical injury may occur in the workplace, the employer must take every reasonable precaution to protect the worker.” This places the onus on employers to ensure that they make reasonable attempts to ensure the safety of the worker if domestic violence is likely to occur.

How Ontario compares to other provinces

Most Canadian jurisdictions have a ‘general duty provision’ in their Occupational Health & Safety legislation that requires employers to take all reasonable precautions to protect the health and safety of employees.

Other jurisdictions in Canada that have specific workplace violence and harassment prevention regulations (or both) include Alberta, British Columbia, Saskatchewan, Manitoba, Nova Scotia, Prince Edward Island, Newfoundland and Labrador, and the federal government. Quebec has legislation regarding ‘psychological harassment,’ which may include forms of workplace violence. Many jurisdictions also have working alone regulations, which may have some implications for workplace violence prevention.

The regulations in all jurisdictions share many commonalities and differences. Some are more specific than others in their various definitions, provisions, and applicability. Ontario’s Bill 168 appears to be unique in the area of allowing worker refusal to work where he/she has reason to believe that there is a danger of being a victim of workplace violence.

Policies and procedures

Ontario employers should closely examine their policies and procedures to ensure compliance with Bill 168. Policies and procedures relating to the prevention of and response to violence and harassment begins with clear definitions of both as they relate to a specific workplace. There should also be a system in place for reviewing and evaluating these policies and procedures on a regular basis. As conditions, patterns and practices change, policies and procedures may also need review and revision to support employees.

In conducting policy review, Ontario employers should consider the definitions of violence and harassment under Bill 168:

Workplace violence is defined as:

- The exercise of physical force by a person against a worker in a workplace that causes or could cause physical injury to the worker;
- An attempt to exercise physical force against a worker, in a workplace, that could cause physical injury to the worker; or
- A statement or behaviour that it is reasonable for a worker to interpret as a threat to exercise physical force against the worker, in a workplace, that could cause physical injury to the worker.

Workplace harassment is defined as:

- Engaging in a course of vexatious comment or conduct against a worker in a workplace that is known or ought reasonably to be known to be unwelcome; and
- That is not already protected under the Human Rights Code.

The ‘harassment’ definition borrows from Human Rights Code (HRC) language. However, unlike the prohibition on harassment under HRC, the harassment policy required under Bill 168 would not be limited to specific grounds (like sex, age, creed, etc.). In other words, employers are now required to have a policy that addresses harassment at work generally.

Under Bill 168, a worker will be able to refuse work when there is a risk of workplace violence, but cannot if they are victims of harassment.

Employers must provide adequate training for any employee potentially exposed to significant risk of violence, including an orientation for all new employees. Employees should understand their rights and responsibilities, measures the employer has taken to decrease the risk of violence and harassment, information and skills related to recognizing and responding to violence and harassment at work, and specific procedures on reporting and documentation.

Training tips

The Crisis Prevention Institute (CPI) has been training employees at all levels to manage disruptive and challenging behaviour since 1980. CPI’s internationally recognized programs provide training in verbal de-escalation strategies and emphasize the prevention of potentially aggressive situations. We have learned many lessons during over a quarter century of professional practice in this field.

CPI supports a fairly broad definition of workplace violence because violence does not occur in a vacuum. CPI’s Workplace Violence Continuum includes behaviours ranging from discourtesy and disrespect to intimidation, harassment, retaliation, verbal assault, and physical aggression.
The behaviours along this continuum can be observed, understood and influenced. Each category of behaviour identified often occurs with one or more of the others. Each can also lead to the other, and each can stand distinct from the others as serious workplace issues. Prevention efforts involve observing all behaviours along the continuum and responding as early as possible. The earlier we intervene, the safer we will be. All of these behaviours have an impact on the culture within an organization.

Ongoing training for all employees at all levels in all areas of the continuum is essential to the prevention of violence and harassment in Ontario workplaces as required under Ontario law. Bill Badzmierowski is the Director of Instructor Services with the Prepare-Training program at the Crisis Prevention Institute, Inc. He can be reached at wbadz@crisisprevention.com.

"Ontario employers should closely examine their policies and procedures to ensure compliance with Bill 168. There should also be a system in place for reviewing and evaluating these policies and procedures on a regular basis. As conditions, patterns and practices change, policies and procedures may also need review and revision to support employees."

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**Introduction**

Municipal wastewater or sewage typically contains human excrement and any waste material that is discharged into the sewer and/or stormwater collection system for treatment. This nutrient-rich water could potentially contain all infectious agents that are present in the community, including both biological hazards (‘biohazards’) and harmful chemicals.

The four primary methods of infection are (1) ingestion (direct, or hand to mouth), (2) skin contact (via broken or damaged skin), (3) via the conjunctiva of the eye (membrane that covers the eye), (4) inhalation, and (5) injection.

Ingestion normally occurs via splashes or hand to mouth contact from touching dry or wet surfaces. Infection can pass through into the body via cracked skin, cuts or penetrating wounds. It can also be passed through the surface of the eye if the eyes are rubbed with a contaminated hand. Infection can be inhaled by breathing in dust or aerosols. Aerosols can be created by jetting, brushing, sweeping and process offgas (e.g., aeration tanks, sludge dryers). Injection occurs via penetrating wounds caused by razor blades, needles and other sharp objects.

Health effects associated with exposure to sewage fall into one of three groups: (1) infections caused by bacteria, parasites or viruses; (2) allergies caused by proteins in microorganisms foreign to the human body; and (3) poisoning or harmful effects caused by harmful gases or chemicals that may be present when working with sewage.

Workers in the wastewater collection and treatment facilities are often at risk of exposure to the wastewater and any chemicals and biohazards that result during the treatment process.

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**Table 1: Typical wastewater treatment processes and their risk areas**

<table>
<thead>
<tr>
<th>Process</th>
<th>Risk Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection System</td>
<td>The pipes transporting the wastewater to the WWTP are filled with pathogenic micro-organisms, including the dry wells and manholes along the conveyance line. The level of ‘bioaerosols’ can be inhaled from the air in these areas depends on the speed and turbulence of the moving wastewater. These aerosols may contain bacteria and harmful chemicals suspended in the air. Debris poses a threat to workers in terms of cuts, lacerations and bruises.</td>
</tr>
<tr>
<td>Stormwater</td>
<td>In a separated system (i.e., stormwater and sanitary systems are separated), the level of pathogen microorganisms are generally much lower than that of sanitary systems. However, storm runoff can carry pathogenic microbes released from the feces of wild or domestic animals, e.g., rats and cows. Debris poses a threat to workers in terms of cuts, lacerations and bruises.</td>
</tr>
<tr>
<td>Pump Station</td>
<td>In cases where gravity cannot convey wastewater in the collection system, workers can be exposed to higher flow wastewater with the same set of micro-organisms, increasing the generation of aerosols. Furthermore, in pump failure and flooding situations, workers may be directly exposed to wastewater during maintenance procedures. Debris poses a threat to workers in terms of cuts, lacerations and bruises.</td>
</tr>
<tr>
<td>Raw Intake Pumps</td>
<td>In the head section of the WWTP, workers can be exposed to aerosols generated from open channel pumps and contaminated surfaces that are in direct contact with the sewage. Debris poses a threat to workers in terms of cuts, lacerations and bruises.</td>
</tr>
<tr>
<td>Screening</td>
<td>Coarse and fine screens remove debris of various sizes and the turbulence at the screen can create large amounts of bioaerosols. The screenings can be a medium for multiplying bacterial populations, thus exposing workers if stored for days prior to disposal at a landfill. Screened debris also poses a threat to workers in terms of cuts, lacerations and bruises.</td>
</tr>
<tr>
<td>Grit Removal</td>
<td>Workers may be exposed to raw wastewater and solids if required to maintain, clean and repair grit removal equipment.</td>
</tr>
<tr>
<td>Sedimentation</td>
<td>In primary and secondary sedimentation, workers can be exposed to aerosolization from high-pressure jets that can be used to prevent foaming. Otherwise, workers are exposed to the wastewater and contaminated surfaces during maintenance periods.</td>
</tr>
<tr>
<td>Aeration basin</td>
<td>Due to the turbulent (i.e., mixing) nature of this step, aerosols of the wastewater are generated. Workers are generally exposed to the wastewater and contaminated surfaces during maintenance or repair procedures, especially if dewatering the tank or replacing aeration equipment.</td>
</tr>
<tr>
<td>Chlorination</td>
<td>Apart from the chemical exposure to chlorine, workers generally have low biohazard exposure in this step and there is low aerosolization.</td>
</tr>
</tbody>
</table>
### Table 2: Summary of common illnesses and diseases

<table>
<thead>
<tr>
<th>Illness/Disease</th>
<th>Effect/Description</th>
<th>Cause/Source</th>
<th>Prevention/Cure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastroenteritis</td>
<td>Inflammation of the stomach and intestines, characterized by cramps, stomach pains, diarrhea and vomiting.</td>
<td>Number of different micro-organisms in sewage.</td>
<td>Minimizing sewage exposure through good workplace design and hygiene. Employer should monitor the cause of workers’ illness to determine how they became ill and what can be done to prevent it in the future.</td>
</tr>
<tr>
<td>Skin Infection</td>
<td>Inflammation of the area surrounding injured or damaged skin or around open wounds.</td>
<td>Organisms can cause minor infections in open wounds, injuries or damaged skin not protected by waterproof dressing.</td>
<td>Good hygiene and protection of wounds with waterproof dressing. Employers should follow up with employees after it has been entered into the accident book to ensure that it has not become infected.</td>
</tr>
<tr>
<td>Eye Infection</td>
<td>Inflammation of the eye.</td>
<td>Direct infection (e.g., eyes splashed with sewage) or indirect (e.g., rubbing eyes with hands).</td>
<td>Wear proper eye protection for prevention, especially in high splash risk situations (e.g., sampling from a valve). If splashed, eyes should be flushed and receive first aid.</td>
</tr>
<tr>
<td>Tetanus</td>
<td>Acute (rapid onset) and often fatal disease cause by an extremely potent neurotoxin produced by Clostridium tetani.</td>
<td>The organism is found in soil and detected in the intestine of animals and humans. Cuts, animal bites, punctures and lacerations that are contaminated with soil or feces can introduce the neurotoxin into the body.</td>
<td>Good hygiene and immunization are best prevention methods. The Canadian immunization guide recommends that adults receive a booster every 10 years. One booster should be Td (Tetanus, Diphtheria, Pertussis) and the rest should be T (Tetanus, Diphtheria).</td>
</tr>
<tr>
<td>Respiratory Illness</td>
<td>Breathing problems.</td>
<td>Inhalation of micro-organisms and endotoxins from aerosols. Chemical gases, vapours and toxic gases such as methane and Hydrogen sulphide in the treatment process areas. Lack of oxygen in enclosed spaces.</td>
<td>Use proper respiratory equipment especially in enclosed spaces and around potentially oxygen-deficient environments.</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>Inflammation of the liver with jaundice. Complete recovery occurs over a period of weeks.</td>
<td>Good hygiene; vaccinations. Research has shown no consistent evidence that sewage workers are any more likely to catch Hep A than members of the public in other occupations.</td>
<td>Water-borne virus that can be found in sewage containing feces from infected individuals.</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Severe inflammation and sometimes fatal illness. Can cause long-term disability and associated with an increased risk of liver cancer.</td>
<td>Blood to blood contact; through sexual intercourse with infected individuals, sharing of needles, or through wounds with infected blood. Although the Hep B virus does not survive freely in raw sewage (i.e., blood and bodily fluids diluted in sewage do not present a significant risk), it can be carried in dried blood for up to one month within a needle. It would have to be ingested or injected to contract Hep B and this risk is low, compared to the healthcare industry, for example.</td>
<td>Immunization and good hygiene. Prevention of workers from handling screenings or unplug pumps handling unscreened sewage due to the possible presence of infected needles.</td>
</tr>
<tr>
<td>Using C</td>
<td>Rare in sewage workers because it is transmitted via blood to blood contact.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weil's (Leptospirosis)</td>
<td>Bacterial disease that is difficult to diagnose and can lead to long-term disability. Characterized by mild flu-like symptoms, sudden fever, headaches, nausea, vomiting, jaundice, muscle pain in the calves, or sore eyes in the last 4 to 9 days. In rare cases (if untreated), major body organ failures occur.</td>
<td>Spread through contact with water, soil or food contaminated with urine from infected animals (e.g., rats, dogs, raccoons, cows). The bacteria can enter the body through cuts, abrasions or through the mucous membranes in the eyes, nose or mouth after contact with infected urine or contaminated water (sewers, ditches, ponds or slow-flowing rivers).</td>
<td>No vaccine is licensed in Canada for this disease. The only prevention is good hygiene and vigilance towards its symptoms or any suspicious health irregularities. Control of infected animals (e.g., rodents) will also minimize contamination of the transfer medium (water, soil, food). Since symptoms are flu-like, it can be misdiagnosed easily by medical practitioners – thus it must be mentioned that the worker handles sewage.</td>
</tr>
<tr>
<td>HIV (Human Immunodeficiency Virus)</td>
<td>HIV is a blood-borne virus that cannot reproduce outside of a host or survive long periods outside of the body. It exists in low concentrations in infected blood and is diluted in sewage.</td>
<td>Requires blood to blood contact to transfer the virus to another person, including needle sharing and sexual intercourse.</td>
<td>Good personal hygiene and exercise caution to minimize exposure. Good rule of thumb is that following good practice to avoid Hep A will also protect workers against HIV. The Centre for Disease and Control states that there is no scientific evidence that HIV is spread through wastewater or its aerosols.</td>
</tr>
</tbody>
</table>
The wastewater treatment process: risk areas
At each step of the wastewater treatment process, there exists a unique set of exposure risks to the worker. It must be realized that risks are plant-specific and the following only describes the most common features of the treatment process.

After municipal wastewater is collected through a network of mains and pump stations, it is often sent to a wastewater treatment plant (WWTP), where it is treated prior to release into a body of water. The physical, biological and chemical processes treatment processes are intended to remove particulates, nutrients and debris. While aerosols are a general concern in the wastewater liquids handling section, debris (needles, sharp objects, etc.) are also a concern for workers – cuts, lacerations and bruises can be sustained if not properly equipped when handling unscreened liquids.

Generally, workers will always be exposed to the wastewater and/or contaminated surfaces when handling and performing maintenance or repair on equipment. The following briefly outlines the exposure risks featured in each process step.

The diseases and conditions
The most common diseases or conditions are Gastroenteritis, skin infections, Tetanus and Polio, Hepatitis, eye infections, Weil’s Disease and respiratory illness. Although Hepatitis varieties are classified under a single name (‘Hepatitis’), viruses that cause the types A through F are not related.

In all cases shown in Table 1, good hygiene and caution in minimizing exposure and risks are a common prevention of these biological infections. Equipment and administrative controls are also good prevention methods. More detailed descriptions on hygiene, controls and minimizing exposure and risks are covered in the ‘Methods of Prevention’ section.

Methods of prevention
The employee (worker) and the employer both carry responsibilities to minimize health hazards from working with wastewater and prevent illnesses from such risks and exposure as much as possible. Both parties need to ensure that proper hygiene standards are used within the workplace and that the workers are properly protected during their work. Such protection can come in the form of controls, immunization, hygiene protocols and ensuring that workers are fit for duty in a wastewater environment.

Controls
For hazard control implementation, the employer should develop a plan which includes all methods of control to eliminate or prevent exposure including:

- **Engineering controls** — Elimination, ventilation and structural rearrangement of the workplace;
- **Administrative controls** — Safe work practices or protocols, worker education and training. If these two primary methods cannot ensure control of exposure then personal protective equipment should be used. WERF recommends these controls be part of a Hazard Analysis Critical Control Point (HACCP) occupational safety plan.
- **Personal protective equipment** — Use of gloves, gowns, respirators, etc. when working in areas where there is a risk of exposure.

Immunization
Immunization should be just one component of an overall program to protect the worker from potential occupational exposures. The worker should discuss immunization with a doctor. There may be issues to do with their health history or lifestyle choices that determine the immunizations the worker should receive.

The Canada immunization guide recommends that adults be immunized against diphtheria, tetanus, pertussis (whooping cough), measles, mumps, rubella and varicella (chicken pox). Routine immunization for poliomyelitis is not considered necessary for adults living in Canada. It is important to confirm, not to assume, that employees immunizations are up to date.

The decision to immunize for Hepatitis A and B should be based on a risk assessment. The risk of infection depends on the prevalence of these diseases in the general population. The risk may be higher for those working in a sewer in the proximity of a hospital.

Most guidance varies between:
- not recommending routine immunization but requiring a case by case evaluation of the risk of exposure, and
- recommending routine immunization.

Canadian Immunization Guide, Seventh Edition – 2006, Immunizations for adults – specific risk groups does not identify sewage workers as a ‘risk group’ requiring immunizations above and beyond what is recommended for adults in Canada. However, it does state that:

Hepatitis A vaccination is recommended for those at increased risk of exposure (see Hepatitis A Vaccine chapter). Universal immunization against hepatitis B is recommended in childhood in Canada, and opportunities should be provided for adults to receive hepatitis B vaccine.

There is no Ontario document that addresses immunization of sewage workers.

In the case of sewage workers, the Alberta Government recommends that sewage workers receive immunization against Hepatitis A, but is silent on Hepatitis B. This said, they recommend that “Prior to the implementation of a workplace immunization program, it is important that a hazard assessment be completed to determine the level of the worker’s risk of exposure.”

Saskatchewan does not recommend
routine immunization of sewage workers for Hepatitis A, but suggests it should be offered to employees. Overall, strong evidence is lacking to support a requirement that employers offer routine vaccination to sewage and waste treatment workers for Hepatitis A virus. However, the employer should inform workers that the vaccination is available and what protection it provides. Employers may wish to consider offering this vaccination to their sewage workers.

The Water Environment Research Foundation Report Waterborne Infectious Pathogens in Wastewater: Determination of Presence, Survivability, and Risks to Wastewater Treatment Plant Workers and Collection System Workers recommends routine immunization for Hepatitis A and B. This recommendation is based on the premise that the reservoir of infection in the general population is not known and can change.

**Fitness for work**
There are few medical conditions that may prevent individuals from working with sewage:

1. Individuals with recurrent or long-term skin disorders that predispose to infection. If areas of broken skin cannot be suitably covered with a waterproof dressing, then the individual may need to avoid work with sewage until the condition has been brought under control by medical treatment.
2. Individuals who are at a greater risk from infection, for example individuals undergoing chemotherapy treatment or suffering from a disease causing immunosuppression, such as leukaemia.
3. Individual’s fitness for high risk activities, such as confined space work and wearing of breathing apparatus when working with sewage must be assessed by a suitably qualified person on a regular basis.
4. Individuals with medical conditions such as epilepsy or diabetes on insulin, where the condition is not completely controlled by treatment and consequently the individual may be at risk of collapse in the hazardous working environment.

**Hygiene and health protocols**
The Water Environment Research Foundation published a number of ‘Personal Practices’ that were intended to reduce exposure to infectious microbial contaminants. These are consolidated as follows:

- Understand the work environment and the risks. Avoid touching face, mouth, eyes, nose, genitalia or open sores and cuts when working with sewage. Work smart and find ways to avoid exposing yourself to risks by avoiding contact with wastewater when possible. Disinfect work areas. Avoid aerosolizing sewage and maintain ventilation equipment.
- Wash your hands (sing ‘happy birthday’ twice for about 20 seconds) and exposed skin areas thoroughly with soap and water after contact with sewage or working in contaminated areas. Wash between fingers. Wash hands before you eat, drink or smoke. Wash your hands before and after you use the bathroom. Shower daily. Keep fingernails short. Use alcohol-based lotion dispensers for rapid cleaning/sanitizing of hands and exposed skin, which are provided at the entry and exit door to each of the enclosed process areas.
- Eat only in designated areas. Do not smoke or chew tobacco or gum when working with sewage. Do not enter the lunch/break rooms with contaminated work clothes. Lunch/break rooms should be in clean areas of each plant.
- Use the right personal protection equipment when performing tasks that require contact with wastewater or sludge. Use barriers (e.g., gloves) between skin and surfaces exposed to sewage. Use the PPE according to specifications and in areas with moderate to high levels of microbial contamination.
- Keep clothes and equipment clean. Change into work clothes promptly after arriving at work. Wash equipment if soiled. Sanitize contaminated tools after use. Clean shoes prior to entering vehicles or buildings. Change out of work clothes at work. Shower before changing into street clothes and going home. Launder work clothes at work, at the end of each shift.
- Obtain first aid. Be vigilant about your health: Wash and dress cuts and lacerations immediately and report the injury to determine if there is a need to see a physician. Explain to your doctor what your job is and discuss any health concerns you may have. Ensure that your vaccination is up to date.

**Conclusion**
Ensuring the safety and protection of workers against risks in working with wastewater is a co-operative effort between the workers and those who design and manage the work environment. Employers need proper administrative and engineering controls to accompany the protective equipment available for workers. On the other hand, workers must adopt safe work practices and adhere to personal hygiene standards. Immunization, along with the fact that they are not enforced, does not replace these controls and practices.

In the case of any illness, workers must consult a doctor and inform him/her of their exposure to wastewater, which could help the diagnoses. Documentation of illnesses can help employers to identify aspects of the workplace that can be improved to help prevent future causes of the illness.

**References**


The Centre to Protect Workers Rights 2004. Biological Hazards in Sewage and Wastewater Treatment Plants. Hazard Alert


ats, oils, and grease (FOG) can have negative impacts on wastewater collection and treatment systems, causing sanitary sewer blockages, stoppages, capacity reduction, overflows, customer backups and increased pipeline and lift station wet well maintenance costs. Effective management of FOG can minimize these adverse effects on municipal wastewater systems and the environment.

The WEAO Wastewater Treatment and Technologies Committee, in cooperation with the Water Environment Federation (WEF), organized a one-day specialty seminar on the Management of Fats, Oils and Grease (FOG) on March 8, 2010 at the Ramada Inn in Milton, Ontario. Approximately 60 people attended this seminar, making it a great success. Co-chairs of the seminar were Anthony Aruldoss of AECOM, Brian Gage of ATSI, and Susan Hansler of the Cole Engineering Group.

This is the first joint WEF/WEAO seminar that WEAO has organized. Over the last few years, WEF, in partnership with the US EPA, has developed a Fats, Oils, and Grease Management Training Course and has been conducting workshops at various locations across the country. Due to the logistics involved with US locations where such seminars were held, this seminar was brought to a central Ontario location in response to several requests.

The purpose of the seminar was to present a spectrum of options that can be used as a basis for utilities to design and implement their own site-specific FOG management programs for preventing the entry of FOG into the collection system. This seminar presented implementation details for a variety of FOG control options based on the knowledge and experience of experts involved in the management of FOG, as well as input from new developments such as research and implementation feedback. The seminar topics included: FOG program building blocks and strategic plan, source control, source management, and collection system management.

**WWTmod2010: 2**ND **IWA/WEF WASTEWATER TREATMENT MODELLING SEMINAR**

Leiv Rieger and Imre Takács, EnviroSim Associates; and Pat Coleman, AECOM

On March 28, approximately 120 modelling practitioners and specialists met at Mont-Sainte-Anne for the second time in two years. WWTmod2010 focused on current practice and recent advances in wastewater treatment modelling. The overall goal of this seminar series is to build consensus among industry leaders and clarify the differences between successful modelling approaches.

The seminar was sponsored by the International Water Association through the Canadian Association for Water Quality and the Water Environment Federation through its Quebec member association, Réseau Environnement.

As in 2008, the research group modelEAU, Université Laval hosted the event. The Scientific Committee was led by Leiv Rieger (chair) and Bruce John- son (co-chair). Peter Vanrolleghem and Imre Takács chaired the local Organizing Committee.

The event was sponsored by CDM, CH2MHill, EnviroSim Associates, Hydromantis and Veolia Water (Platinum Sponsors). MostforWater and Carollo Engineers contributed as Gold Sponsors.

What makes WWTmod2010 unique?

WWTmod2010 differs from traditional speciality conferences in three ways:

1. Attendees applied to attend. This was to ensure that the attendees covered the wide spectrum of model researchers, developers and users.
2. The program was designed to provide enough time for in-depth discussions to allow for the development of new directions for our industry. The seminar set-up reflected this special goal: 120 participants attended the seminar, contributed to seven parallel full-day workshops on Sunday, and discussed the 13 platform presentations on the two following days.
3. All sessions were prepared upfront and the proceedings distributed prior to the conference. Over 80% of the attendees participated as author, co-author, workshop contributor or member of the scientific or organizing committee.

**Who attended WWTmod2010?**
There was a good international mixture of academics and practitioners: 35% of the attendees have an academic background, 29% work as consultants with the remainder split between research institutes (18%), software or equipment suppliers, authorities/waterboards, and plant operators. 37% of the attendees were from Europe, 54% from North America and the rest from Asia, Oceania and South America.

**Young water professionals**
The participation of young water professionals (YWPs) in technical conferences is important for both the IWA and WEF. Altogether, 50 YWPs attended the seminar of which one third were female YWPs. A special YWP workshop took place on Saturday prior to the start of the seminar.

**Opening lecture**
The scene was set by Glen T. Daigger, Senior Vice-President and Chief Technology Officer at CH2MHill and IWA's President-Elect, who gave his personal perspective on current status and the future of wastewater treatment modelling. He claimed that we will have to widen our views and include the whole urban water system and life-cycle costs into our work. Modelling will play a seminal role in understanding complex systems and in developing decision making processes.

**Workshops**
Seven parallel full-day workshops were held on Sunday. The topic getting the most attention was on modelling green house gases (GHG). A very interesting statement was made that, at the moment, our industry is below the radar in terms of GHG emissions, but that this could easily change if recent findings on significant GHG emissions from wastewater treatment will be proven correct. A new IWA task group has been started recently to further analyse this topic. (see http://www.iwahq.org/Home/Networks/Task_groups/Task_group_on_green_house_gas/).

A workshop on ‘Reality vs. modelling concepts’ discussed what we can learn from new microbiological tools and understandings and what could help improve engineering models. It was agreed that metabolic models, closely linked to microbiological knowledge, will lead to more realistic models with less requirements for case to case calibration efforts. A review paper will summarize the discussions.

Data is often the weak part in simulation projects. A workshop on data collection and reconciliation discussed practical ways to check the accuracy of data sets for simulation studies and introduced a procedure developed by the IWA Task Group on Good Modelling Practice (see http://www.iwahq.org/Home/Networks/Task_groups/Task_Group_on_Good_Modeling_Practice/).

A specific WEF Task Group on Plant Data Collection, led by John Bratby, is also formed.

The critical components of biofilm models were discussed in another workshop highlighting the fact that most biofilm modellers often inappropriately apply experience derived from activated sludge modeling when using one-dimensional biofilm models to describe biofilm reactors. Decisions that model users make about model implementation have consequences on model output, and the modeller must be aware of the nature and extent of these consequences. Therefore, it is clear that industry guidance needs to be developed describing proper model use and calibration. However, a legitimate question was raised, does enough information exist to develop such a guiding document or is additional research and are further model improvements required?

The workshop discussing micro-pollutant modelling identified a list of research needs still showing a lack of basic understanding of both the objectives of our treatment systems with regard to the (known) pollutants and of the removal mechanisms. Simple models can currently be used to support decision making, while detailed models can help understanding the behaviour of micro-pollutants, e.g., with regard to co-metabolism, interactions with DOC, etc. Glen Daigger described the three phases we go through when dealing with emerging substances: 1) denial, 2) physico-chemical treatment, and, finally, 3) biological treatment, which is supposed to be the most sustainable approach.

Successful applications, limitations and future directions of computational fluid dynamics (CFD) were discussed in the workshop on ‘Understanding CFD modeling.’ A critical analysis of current practice in clarifier design was followed by applications of CFD models in SBR and bioreactor designs. It was discussed to establish a task group to update the CRTC clarifier design procedure.

The last workshop discussed model-
ling of physico-chemical processes, with the goal of developing a generalised modelling framework. These processes (pH, precipitation, etc.) affect everything in the context of whole plant modelling, but no industry consensus has been reached yet. The group will write a white paper and is discussing creation of a new task group.

**Sessions**

An intensive discussion took place on a new framework for standardized notation in wastewater treatment modelling deliberating about the ease of communication versus ease of use. In the end, a consensus was reached that this new notation system should become a new industry standard. A second presentation introduced a data base to collect parameters used in simulation projects to define the current praxis in model calibration. The goal is to extend the data base with more information and make it publicly accessible.

The session on nitrogen modelling showed excellent combinations of experimental work and modelling on organic nitrogen conversions and on multiple ammonia oxidizing biomass (AOB) populations, respectively. Both studies highlighted the fact that current models have limited capabilities to predict low nitrogen concentrations required by stricter effluent standards.

New model concepts were introduced in session 3. A first presentation discussed results from a simulation study on particle size distribution in granular sludge reactors showing that this issue causes major differences in effluent predictions. More research is required to define adequate model structures and simulation can help in directing experiments and testing hypothesis.

A second presentation combined the work of two groups studying heterogeneities within microbial populations by using agent based modelling of wastewater treatment systems. This approach models individual organisms rather than a lumped group as normally done in standard activated sludge models.

The last session on Monday focused on modelling in practice. The first presentation discussed the development and maintenance of a plant model for operation improvements and upgrade planning. Until now, $1 M (USD) was spent on the model leading to savings of $2 M (USD). This is another indicator that models have found their way into today’s engineering practice. Model applications directed wastewater projects towards significant savings and consequently people are willing to invest in simulation studies.

The second presentation showed several successful case studies, where models were used to design and test real-time control strategies. The presented savings showed the strong potential of introducing advanced instrumentation and control systems at WWTPs.

The last presentations of the day centered around the question ‘Why do we model and how should we model?’ highlighting typical modelling problems like data availability and quality. The conclusion was that we do not achieve the full benefits we could get from using models.

Uncertainties in wastewater treatment modelling was the hot topic at WWTmod2008, leading to the establishment of the IWA/WEF Design and Operations Uncertainty Task Group (DOUTGroup). [http://www.iwahq.org/Home/Networks/Task_groups/Task_Group_on_Uncertainty/](http://www.iwahq.org/Home/Networks/Task_groups/Task_Group_on_Uncertainty/).

At this year’s seminar, the focus was on methods for sensitivity analysis and examples of how to include uncertainties in wastewater treatment modelling.

The session on whole plant modelling was a good indicator on developments in wastewater treatment modelling. Whereas the first presentation discussed influent fractionation and calibration of anaerobic digestion models, the second one presented an integrated whole plant model. In the discussion, several practitioners expressed their need to have models covering standard processes and conditions.

The closing session was moderated by Gustaf Olsson and opened with discussion starters by Willi Gujer and Sudhir Murthy discussing model limitations and the role of modelling in speeding up knowledge capture and management.

**Conclusions**

Today’s process engineers are faced with the challenge of simulator and model selection, linked with the need for a strong knowledge about model limits and typical pitfalls. Better education in using models and improved communication about models will be essential to getting the full benefit out of wastewater treatment models. Training of our young water professionals is seminal to this goal and the WWTmod series will further strengthen its efforts toward YWPs.

The field of wastewater treatment modelling is experiencing a transition from models used as research tools to models used in daily engineering practice for plant design, optimization and operation. An important message from this year’s seminar was that consulting engineers are now setting the scene by defining their needs. This is quite a step from simply discussing the use of models to get a better understanding of reality to models used in engineering practice for design and scenario analysis. However, this seminar showed that we are ready for this challenge.

WWTmod2010 was a seminar of industry leaders discussing status and future of wastewater treatment modelling and giving new directions to our field. A WEFTEC.10 session has been organized to present the results to a broader public. Session 22 will present the best of WWTmod2010 and will take place on Monday, October 4, 2010 at 1:30-5:00 pm. ✨
W. WESLEY ECKENFELDER JR. (1926–2010)
International pioneer in industrial wastewater management

William Wesley Eckenfelder Jr., deemed the ‘godfather’ of industrial wastewater management by many of his colleagues, former students and peers, died March 28 in Nashville. He was 83.

Eckenfelder was known internationally as a pioneer in the field of water treatment and a leading authority in industrial wastewater management. In addition to founding several companies, he was an environmental engineering professor at Manhattan College, the University of Texas-Austin, and Vanderbilt University.

He came to Vanderbilt University in 1969 and retired as Distinguished Professor of Environment and Water Resources Engineering, Emeritus in 1989.

His primary research interest at retirement was advanced activated sludge technology. At his death, Eckenfelder was a technical director at AquAeTer, a Nashville-based engineering firm that focuses on projects related to energy, engineering, environmental, sustainability, and risk analyses.

Eckenfelder was a prolific writer who influenced countless numbers of engineers through his many textbooks, hundreds of journal articles, and courses. Among Eckenfelder’s more than 30 technical books, his second book, Industrial Water Pollution Control published by McGraw-Hill, is a classic text initially intended for the classroom. The most recent fourth edition is marketed and used by practicing professionals in the field.

Many students have said Eckenfelder instilled a sense of confidence in them and his door was always open to all. “As Wes Eckenfelder’s first Ph.D. student, and one whose life was professionally influenced by such a friend, mentor and icon, I am forever grateful that he came my way,” said Davis L. Ford, past-president, American Academy of Environmental Engineers.

In a 2008 interview published in Industrial WaterWorld, Eckenfelder said over the span of his career he was most proud of being one of the primary developers of biological treatment technology. His first book, Biological Wastewater Treatment, was published in 1960. In the 1950s, he designed his first activated sludge plant, which was a model for a pulp and paper plant, and for a pharmaceutical plant.

In October 2009, a memoir was released – Wwe: The life of an environmental pioneer – and a book signing reception was held at the School of Engineering. The following month, Eckenfelder spoke at the 2009 American Institute of Chemical Engineers (AIChE) annual meeting in Nashville. His presentation was entitled ‘60 Years of Biological Wastewater Treatment.’

Eckenfelder was the founding principal of several companies, including AWARE, Inc. in Nashville, Tennessee, which was later named Eckenfelder, Inc. in his honour. AWARE merged in 1998 with Brown and Caldwell, a California-based full-service environmental engineering firm. In recognition of Eckenfelder’s many contributions to the profession of environmental engineering, Brown and Caldwell established the Dr. W. Wesley Eckenfelder Scholarship.

He received 28 awards and accolades from professional societies. In December 1999, he was named one of three people named ‘20th Century Pollution Control Pioneers’ by Environmental Protection magazine. The other two were Rachael Carson, author of Silent Spring, the 1962 book widely credited with helping launch the environmental movement in the United States, and British Nobel Laureate and biochemist Archer J. P. Martin, who developed the method of gas-liquid chromatography.

One of the last awards he received was created in his honour by the Water Environment Federation. In 2007, he received the inaugural Dr. Wesley Eckenfelder Industrial Water Quality Lifetime Achievement Award at the revived Industrial Water Quality Conference in Providence, RI.

Eckenfelder was born in New York City in 1926 and graduated from high school at age 16. He received a bachelor’s degree in civil engineering from Manhattan College in 1946. He earned a master’s degree in sanitary engineering from Pennsylvania State University in 1948, and a master’s degree in civil engineering from New York University in 1954. He also pursued post-graduate studies at North Carolina State University and Penn State.

This obituary is taken from the Vanderbilt School of Engineering website.
ROSS HUMPHRY: SAFETY IN CONFINED SPACES

In a confined space with a gas hazard, most incidences result in a fatality rather than an injury. You either get out alive or you don’t get out at all,” says Ross Humphry. To ensure that people can enter and evacuate safely, the owner of Canadian Safety Equipment sells everything necessary for performing a confined space entry or rescue, for gas hazards as well as everything from flooding to entrapment. This includes gas detection equipment, breathing apparatus, fall protection equipment, barriers, guards, shields, stretchers and backboards.

It is a toolbox which has become essential to a wide variety of businesses and industries, including firefighters and wastewater treatment plants. So why not rely on the fire department, which usually has all this equipment? When oxygen deficiency can cause brain damage in four minutes, calling on firefighters is not always an option. It is nearly impossible for a fire department to arrive on scene and affect a successful rescue within four minutes of a worker getting into distress. In certain cases, the law even requires companies or utilities to be capable of conducting their own rescue.

That is where Humphry comes in. After moving from British Columbia to work for Rick Reeves’ Can-Am Instruments, Arjay Engineering and Enmet Canada in the late 1970s, he eventually became tired of all the traveling involved with his job. When Reeves suggested he become a distributor, Humphry took him up on the idea and launched Canadian Safety Equipment in March 1990.

The company started off as a one-man distributor of Enmet gas detection equipment. “That literally snowballed into other things related to confined space entry,” says Humphry, explaining that every type of client he was serving was faced with the same safety issues and, therefore, required a full range of equipment. Canadian Safety with its Quebec based Subsidiary (CSE Incendie et Securite) has grown to several million in sales and a permanent staff of 15.

Although the basic concepts have not changed, equipment has evolved to become lighter, better, faster and stronger. Breathing apparatus is becoming more sophisticated, with better ventilators and respirators. “And there are better communication systems now than in the old days for dealing with rescues in confined spaces,” notes Humphry.

He adds that one area which has seen extensive technological advancements is gas detection technology. “That is a very critical piece of equipment,” he says. “The sensors used today are better capable of detecting gases you can potentially run into.”

Another emerging area is lone worker monitoring. When an employee working alone fails to move for a certain period of time, a motion sensor equipped device sends a radio signal back to a receiver at the plant. Or, the system can activate a telephone dialer to call emergency services or off-duty personnel. This equipment can be a lifesaver for a lone employee rendered unconscious by gas or by an accident. With industries such as wastewater treatment reducing staff to save money, these devices could become indispensible. Canadian Safety Equipment is the master distributor in Canada of the lone worker monitoring systems from GRACE Industries, the world leader in this technology.

Humphry likes to keep abreast of all the latest developments in confined space entry. At one time, he also taught municipalities about the subject, but admits he no longer has the time. The continued growth of his company has also limited the time he has to devote to such activities as OPCEA, although he still gets involved as much as possible.

After joining the association in 1979, as an employee of Can-Am Instruments, he was elected to the Board, eventually becoming president in 1984/85. He then served as treasurer from 1986 to 2006. “When I took over, we had $800 in the bank, and, when I left, we had $80,000,” says Humphry.

The increased revenues have mainly resulted from sales of the directory, a project he initiated with Larry Madden in 1987. Membership has also increased, from around 30 to approximately 160, with all dues carefully reinvested back into the association. Humphry admits he is fiscally conservative. But, when it comes to safety, he notes, paying more for higher quality is a wise investment.
The 2010 AGM was held on February 16, 2010 at the Delta Meadowvale in Mississauga. Greg Jackson was welcomed as the new president of OPCEA for the 2010/2011 term. A plaque was presented to Wayne Harrison in recognition of being President for the 2009/2010 term. Openings for two vacant directors’ positions were filled by a vote of the delegates present at the AGM. After a very close ballot, Rick Fisher of Hayward Gordon Limited and Steve Davey of Environmental Science & Engineering Magazine were elected. Charles Rittner from the Region of Niagara was our guest speaker. He presented an excellent overview of the Region’s product review process. The meeting was followed by a delicious steak and salmon dinner.

2010 ANNUAL GENERAL MEETING

The 2010 AGM was held on February 16, 2010 at the Delta Meadowvale in Mississauga. Greg Jackson was welcomed as the new president of OPCEA for the 2010/2011 term. A plaque was presented to Wayne Harrison in recognition of being President for the 2009/2010 term. Openings for two vacant directors’ positions were filled by a vote of the delegates present at the AGM. After a very close ballot, Rick Fisher of Hayward Gordon Limited and Steve Davey of Environmental Science & Engineering Magazine were elected. Charles Rittner from the Region of Niagara was our guest speaker. He presented an excellent overview of the Region’s product review process. The meeting was followed by a delicious steak and salmon dinner.

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Tom Davey receiving his award from Mrs. Gail Scott

2010 WEAO CONFERENCE/OPCEA TRADESHOW

The 2010 OPCEA Tradeshow was held in conjunction with the WEAO Conference at the London Conference Centre, from April 18 to April 20, 2010. The OPCEA Tradeshow was a well attended event, with all the booths sold out, and many conference delegates exploring what the exhibitors had to offer for wastewater treatment equipment options. The Monday evening beer garden was again a popular event, raising over $1,500 for Water For People.

Tom Davey, Aurora writer and magazine publisher, was presented with the first Geoffrey T.G. Scott Memorial Award on April 19, 2010 at the WEAO Awards Luncheon. This WEAO award was in recognition of his being a “member of the water environment industry in Canada, who has shown an outstanding example of leadership in championing a worthwhile endeavor and thereby advancing the mission of the water environment industry.” Geoffrey Scott, who passed away in late 2008, was the second Canadian president of the 36,000 member Water Environment Federation. He was also an Aurora resident. During his 50-year career, Tom Davey won some 30 awards for writing on environmental issues. Tom Davey launched Environmental Science & Engineering Magazine (ES&E) in 1988. ES&E now has a circulation of 19,000 across Canada.
month or so ago, in the middle of the night, Emily Jarvis learned the real meaning of being an environmental steward. A violent storm had hit Caledonia, and, as a result, the rookie wastewater treatment plant (WWTP) operator spent an unexpectedly busy night checking levels then tweaking systems and settings to respond to the high flows.

After working through several storms during the past two years, Jarvis has learned the importance of keeping calm during a storm. “If you panic, you do not solve problems,” she explains. But, it was not until recently that she dealt with the art of getting some much needed rest once everything is under control.

As one of two operators at the Caledonia WWTP, Jarvis takes her turn being on call at night. “It is just another part of protecting the public’s health,” she says. But it is also fun. When the weather turns bad, everyone knows what they have to do and everyone works together. “You do not wait for the pager, you just go,” she says. “It can be pretty exciting.”

Jarvis enjoys the challenge, like when she needs to switch a pump to manual and find the speed that will provide the optimal flow to the plant without having to by-pass water into the storm sewers. The many opportunities to ‘make things better’ are what attracted her to a career in wastewater in the first place.

Not that Jarvis made the decision to be an operator while she was still in high school. But, she did have some early clues. She knew she wanted a career that would allow her to work outdoors while “doing something with the environment.”

After graduation in 2004, she signed up for the Environmental Management Diploma program at Ridgetown College. It was in her second year, during her co-operative work experience with Veolia Water, that she first came in contact with wastewater treatment.

“I really enjoyed my co-op,” says Jarvis. “There were so many aspects of the job that I found interesting. You get to do such a wide variety of work: administration, mechanical, laboratory... being a wastewater operator offers so many opportunities once you get that hands-on experience.”

The experience was so positive that she decided to write the exam for her operator’s license, when Ridgetown offered the opportunity at the end of the program. As a result, Veolia Water was eager to hire her when she graduated in 2006.

At first, she worked only twice a year on a contract basis, monitoring lagoon discharges. Then, two years ago, the company offered her a position as an operator at the Hagersville WWTP. With one plant, five pump stations and three lagoon systems, there was plenty to do at Hagersville.

But Caledonia – with one plant, five pump stations and only one operator – needed her even more. In January 2010, Jarvis transferred to the Caledonia WWTP.

Jarvis is eager to learn the particularities of the plant’s process control in order to solve problems. “I have only been here a few months and I think it takes a whole year before you really learn the trend of a facility,” she says. “In a wastewater treatment plant, you can find many ways to improve performance just by changing things such as the waste volumes or the return rates.”

It is this kind of creative problem solving that keeps the job interesting. Jarvis adds that Veolia offers excellent training opportunities in a variety of areas, including the chance to improve skills in math, equipment operation, new technology and administration.

The company also encourages its staff to join WEAO. Jarvis recently obtained her ‘new professionals’ card at the conference in London. She is very interested in becoming more involved in the association and hopes one day to have the opportunity to volunteer in a developing country. Until then, she is very happy to work at Caledonia, facing storms and helping to make things better.

Emily Jarvis is an operator with Veolia Water Canada

“...and it is also fun.”
ONTARIO’S OPERATOR CERTIFICATION PROGRAM AND THE OPERATOR CERTIFICATION WORKING GROUP (OCWG)

Ontario has a mandatory operator certification program that requires all operators of drinking water and wastewater systems to be licensed. The key goal of the program is to develop operators’ skills, knowledge and competence by establishing core professional standards.

To help ensure that program objectives are met, a team of regional representatives from several organizations in the water and wastewater industry was created. Members of the Operator Certification Working Group (OCWG) provide expertise to the Ministry of the Environment on key issues, and help communicate program requirements to operators, operating authorities and other organizations. OCWG members play a vital role as liaisons between their own organizations, the operators they represent and the ministry, and bring ideas and concerns of operators to the forefront for discussion.

Below are some of the issues the OCWG discussed and advised on at recent quarterly meetings:

- experience, training and education requirements to upgrade and renew certificates;
- communications strategies to facilitate outreach to operators;
- ways to improve administrative and technical processes, and share best practices;
- determining content of mandatory training courses;
- adopting standardized exams in Ontario;
- clarifying impacts of labour mobility through the national Agreement on Internal Trade (AIT); and

Sub-committees of the OCWG also validate exam questions, assist in setting Ontario’s certification exams, and provide guidance in the development of the drinking water training required by entry-level operators.

To stay abreast of key highlights of recent OCWG meetings, visit the Ontario Water and Wastewater Certification Office’s (OWWCO) website at http://www.owwco.ca/.

Operators may raise concerns or questions regarding the certification program for discussion at regular meetings by contacting the Water Environment Association of Ontario at julie.vincent@weao.org or the Ministry at operator.certification@ontario.ca.
ONTARIO’S NEW WATER OPPORTUNITIES STRATEGY WILL IT MAKE THE PROVINCE A LEADER IN WATER TECHNOLOGY?

By Juli Abouchar and Raj Bharati of Willsms & Shier Environmental Lawyers LLP

In his Speech from the Throne earlier this year, Premier Dalton McGuinty announced the creation of a strategy that seeks to make the province the North American leader in renewable energy generation and technology industries.

The strategy is part of the ‘Open Ontario Plan,’ which aims to spur job creation and foster a climate where business can thrive, as well as accelerate the province’s nascent economic recovery from the recession.

The key elements of the water strategy are as follows:

• introduce a new Sustainable Water Opportunity Act to support the development of new technologies and practices for water conservation and treatment,
• improve the efficiency of Ontario’s water and wastewater infrastructure,
• work with researchers and entrepreneurs to create jobs and to attract clean water expertise and investment in the province, and
• promote Ontario’s water technology sector at home and abroad.

The market for water technologies is huge, and growing. The Conference Board of Canada estimates the global market for water technology at more than US$400 billion per year, and doubling every five to six years.

The government sees Ontario as ideally placed to ride the coming wave, since it has a head start with the many water technology firms already located here, from start-ups to established companies. The government estimates that 22,000 people are currently employed by water technology companies in Ontario.

The strategy seeks to mimic last year’s Green Energy Act, which is intended to make Ontario the North American leader in renewable energy generation and technology industries.

The water strategy is described in more detail in a report entitled The Water Opportunity for Ontario, released in March 2009 (the Water Opportunity Report). The Water Opportunity Report is the result of a collaborative effort of the Ontario Centre for Environmental Technology Advancement (OCETA), XPV Capital Corporation, several branches and agencies of various levels of government, as well as NGOs, colleges and universities, and the private sector.

The Water Opportunities Act, 2010

As this article was going to press, the Water Opportunities Act, 2010 was introduced. The side bar provides a summary of the Act. The details of the Act will come in future regulations.

The OCETA Water Opportunity Report called for legislation with four main objectives:

• encourage sustainable water behaviour,
• adopt transparent costing and accounting of water use,
• support water technology demonstration and early adoption, and
• attract early stage, innovative water technology companies to Ontario.

Encouraging sustainable water behaviour

We can expect water conservation to be a major focus of the regulations to come under the Act. Ontarians currently use about 260 litres of water per capita per day, nearly twice as much as citizens of comparable countries like Germany, the United Kingdom and the Netherlands.

On the same day as the Throne Speech, a group of environmental non-profits issued a press release calling for a greater emphasis on water conservation, including measures such as implementing water efficiency standards, mandatory efficiency labelling for water fixtures, and linking infrastructure grants to water conservation goals. The Water Conservation Alliance has gained support with some 40 members. Private sector companies in the water and housing business and a regional municipality have joined the campaign.

By April 2010, the government had already announced that it is intending to mandate water-saving toilets. The proposal would require that all toilets sold in the province use no more than six litres of water per flush. The Ontario Building Code already restricts the installation of toilets using more than six litres per flush; the new proposal would make it illegal to sell them.

It is estimated that replacing a 13-litre per flush toilet with a six-litre model would save an average household about 35,000 litres of water a year.

The government expects to introduce a regulation under the Green Energy Act to implement the new high-efficiency toilet rules, which will likely require compliance by January 1, 2011. The proposed legislation was posted to the Environmental Bill of Rights Environmental Registry for public comment.

Adopting transparent costing and accounting of water use

Transparent costing and accounting of water use is expected to increase the motivation to adopt more efficient water technologies.

As reported in these pages in the previous issue of Influents, there is currently a private member’s bill, introduced by David Caplan, MPP for Don Valley East, before the provincial legislature. The bill would require municipalities to implement full cost accounting and full cost recovery for water and wastewater infrastructure – a concept introduced and supported in the O’Connor report on the Walkerton

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tragedy, as well as water reforms such as a Water Board to oversee rate setting. Since the writing of our last article, the bill survived second reading and was referred to the Standing Committee on General Government, in February 2010. The Association of Municipalities of Ontario raised concerns about the Caplan Bill, including about the potential effect on water rates. The Water Opportunity Report and the proposed Water Opportunities Act approach this issue in a way that responds to municipal concerns about the private member’s bill.

The Water Opportunity Report focuses on transparency in costing and accounting and providing more information to water users, in order to encourage the adoption of more efficient water technologies, conservation measures and management practices. The proposed Water Opportunities Act builds on the existing regulatory requirement for financial plans by requiring municipal water sustainability plans which include: (1) an asset management plan for the physical infrastructure; (2) a financial plan; (3) a water conservation plan (if the plan is for a municipal water service); (4) a risk assessment and plan to deal with any risks that may interfere with the

| Summary of Water Opportunities Act, 2010 |
|-----------------|-----------------|-----------------|
| Part | Purpose | Details |
| Part I | Sets forth the purposes of the Act | The Act is • to foster innovative water, wastewater and stormwater technologies and services in the private and public sectors, • to create opportunities for economic development and clean-technology jobs in Ontario, and • to conserve and sustain water resources for present and future generations. To further the purposes of the Act, the Minister of the Environment may establish aspirational targets in respect of the conservation of water and other matters. |
| Part II | Establishes a corporation without share capital named the Water Technology Acceleration Project | The objectives of the corporation include: • assisting in promoting the development of Ontario’s water and wastewater sectors; • assisting the sectors to develop, test, demonstrate and commercialize innovative technologies for the treatment and management of water and wastewater; • assisting the sectors to expand their business opportunities nationally and internationally; • providing a forum for governments, the private sector and academic institutions to exchange information and ideas; • encouraging collaboration and co-operation in the sectors; and • if requested by the Minister of Research and Innovation, assisting in the development of certification, labelling and verification programs for water and wastewater technologies. |
| Part III | Requires certain municipalities, persons and entities to prepare, approve and submit to the Minister of the Environment municipal water sustainability plans for municipal water, wastewater and stormwater services under their jurisdiction. | The Minister may establish performance indicators and targets for those services, and such indicators and targets may vary for different municipal service providers and areas of the Province. If a regulated entity does not achieve an applicable performance target, the Minister may invite the regulated entity to provide information on the strategies and steps to be taken by the regulated entity to achieve the target and may direct the regulated entity to amend its municipal water sustainability plan. |
| Part IV | Authorizes regulation-making. | Regulations may be promulgated requiring public agencies (including municipalities and ministries of the Government of Ontario): • to prepare water conservation plans; • to achieve water conservation targets established by the regulations; and • when acquiring goods and services or making capital investments, to consider technologies and services that promote the efficient use of water and reduce negative impacts on Ontario’s water resources. |
| Part V | Authorizes regulation-making. | Regulations may be promulgated prescribing information that must or may be included on or with a municipal water bill. |
| Part VI | Requires public reporting. | Minister of the Environment, at least once every three years, must prepare a report on various matters related to the Bill. |
future delivery of the municipal service (including the risks posed by climate change); (5) strategies for maintaining and improving the municipal service, including meeting future demand, the more efficient use of water, and cooperation with other municipal service providers; and (6) such other information as may be prescribed in regulation.

As described in our previous article, the first round of municipal financial plans under the Financial Plans Regulation will be due in July. These financial plans must show that the drinking water system is ‘financially viable.’ Municipalities required to prepare a financial plan will get a preview of the effects and opportunities presented by full accounting of water and wastewater systems.

Supporting water technology demonstration and early adoption

This goal will likely be promoted by establishing a reference customer network of ‘early adopters’ and demonstration sites for clean water technologies. These may include municipalities; First Nations communities; industrial sectors such as pulp and paper, mining, agriculture, food and beverage, automotive and chemical; and energy generation facilities.

These reference customers would provide feedback, promote market acceptance and accelerate the adoption of clean water technologies.

What sorts of new technologies can we expect? The Water Opportunity Report describes four main categories of technologies and solutions:

- **Demand destruction.** Solutions that reduce water consumption also help reduce the amount of chemicals, energy and other inputs in water treatment processes and can reduce costs and environmental impacts.
- **Wastewater to product.** Technologies exist to recover metals, fertilizers and other materials from industrial wastewater streams, and new technologies are being developed to help recover and generate energy from wastewater. Conceivably, every municipal wastewater treatment plant could be a renewable energy generator, not to mention a potential source of revenue.
- **Reuse.** Technologies such as membrane bioreactors, advanced oxidation and ultraviolet disinfection enable the reuse of wastewater streams.
- **Infrastructure renewal.** Extending the life of the existing infrastructure has the potential to reduce capital expenditure requirements. Technologies include leak detection equipment, in-situ pipe rehabilitation techniques that allow utilities to repair pipes without digging trenches, technologies that increase the treatment capacity of land constrained wastewater treatment plants that have exceeded their design capacity, instrumentation technologies that allow for remote monitoring and control, improved waterborne contaminant detection technologies, and ‘smart water grid’ solutions to optimize the existing infrastructure.

**Attracting technology companies to Ontario**

The Water Opportunity Report identifies the need to brand Ontario as a leader in sustainable water as a key to attracting water technology firms and capital. It also looks to three jurisdictions that have made significant progress as water technology leaders – Germany, Israel and Singapore – in order to learn from and emulate their accomplishments.

Germany has strong partnerships and associations that facilitate exchanging experiences, promoting innovation, creating trust and collaboratively solving problems. It has also successfully migrated German water standards, technical specifications and regulatory frameworks to developing countries, which assists in gaining a commercial foothold in new markets.

Driven by water scarcity and security concerns, Israel has been a leader in developing new technologies such as desalination, water reuse and drip irrigation. It has also created new technology incubators that have attracted large amounts of capital investment.

Singapore has numerous financial incentives in place that have attracted firms such as General Electric, Siemens and CH2MHill to establish sophisticated facilities in that state.

These case studies provide examples of the type of initiatives that Ontario may implement. Ontario will certainly build on its strengths, which include its geographic advantages (abundant water resources, easy access to global markets), well-developed regulatory framework, and its research capacity.

**Conclusion**

If the Ontario government follows through on its ambitious strategy, almost anyone with an interest in water or wastewater can expect to be effected by the Water Opportunities Act.

The legislation has been posted to the government’s Environmental Registry. This is your opportunity to review the draft legislation, comment on it, and think about what opportunities it may hold for you.

**End notes**

3 See ‘Renewable Energy Projects Under the Green Energy Act’ INFLUENTS (Fall 2009).
4 Available at http://www.oceta.on.ca/TheWaterOpportunityforOntario_Mar_2010.pdf
5 Page 7.
7 See http://www.conserveourwater.ca.
8 EBR registry no. 010-9765. At the time of writing, the public comment period was set to close June 10, 2010.
9 See ‘Is Sustainable Funding for Water and Wastewater Systems Finally Coming to Ontario?’ INFLUENTS (Winter 2010).
10 Pages 13-14.
11 At http://www.ebr.gov.on.ca

Juli Abouchar

**Juli is an Environmental Law Specialist certified by the Law Society of Upper Canada. She was Assistant Commission Counsel to Justice O’Connor during the Walkerton Inquiry, serves as a member of the CTC Source Protection Committee and is a Director of the Ontario Clean Water Agency.**

Raj Bharati

**Raj is an Associate Lawyer with a degree in environmental engineering.**
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<td>July 22</td>
<td>Communications Committee</td>
<td>WEAO Office, Milton</td>
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## AUGUST 2010

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<td>August 6</td>
<td>Submission Deadline for INFLUENTS</td>
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<td>August 11</td>
<td>Government Affairs Committee</td>
<td>City of Toronto</td>
<td>9:30 a.m.</td>
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<tr>
<td>Aug. 16-18</td>
<td>2010 AMO Annual Conference</td>
<td>Windsor</td>
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## SEPTEMBER 2010

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<td>Sept. 10</td>
<td>Committee Chairs Group</td>
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<td>9:30 a.m.</td>
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<tr>
<td>Sept. 14 &amp; 15</td>
<td>PWO Northeast Region Training Day &amp; Conference</td>
<td>Holiday Inn Sudbury</td>
<td>8:00 a.m.</td>
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<td>Sept. 16</td>
<td>12th Annual WEAO Golf Tournament Scholarship Fundraiser</td>
<td>Shawneekei Golf Club, Newmarket</td>
<td>11:00 a.m.</td>
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<td>Sept. 17</td>
<td>INFLUENTS Release Date</td>
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<tr>
<td>Sept. 18</td>
<td>WORLD WATER MONITORING DAY</td>
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<td>Sept. 21</td>
<td>Board Meeting</td>
<td>AECOM Offices 5600A Cancross Court, Mississauga</td>
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<td>Sept. 29</td>
<td>PWO Southwest Region Conference</td>
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<td>Great Canadian IceBreaker</td>
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<td>Oct. 2-6</td>
<td>WEFTEC®10</td>
<td>Ernest N. Morial Convention Center New Orleans, Louisiana</td>
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<td>Oct. 13</td>
<td>Government Affairs Committee</td>
<td>Hatch Mott MacDonald, Mississauga</td>
<td>9:30 a.m.</td>
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<td>Oct. 21</td>
<td>Communications Committee</td>
<td>WEAO Office, Milton</td>
<td>10:00 a.m.</td>
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<td>October 26 &amp; 27</td>
<td>PWO Southeast Region Workshop &amp; Conference</td>
<td>The Legion, Kingston</td>
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<td>Early Nov.</td>
<td>WWT&amp;T Committee Seminar</td>
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<td>Oct. 11-13</td>
<td>Science Teachers’ Association of Ontario STAO2010</td>
<td>DoubleTree International Plaza Hotel, Dixon Rd, Toronto</td>
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<td>Nov. 16</td>
<td>Board Meeting</td>
<td>AECOM Offices 5600A Cancross Court, Mississauga</td>
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<td>Nov. 17-19</td>
<td>A.D. Latornell Conservation Symposium</td>
<td>Alliston, ON</td>
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<td>Nov. 18</td>
<td>Asset Management Committee Seminar</td>
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<td>Dec. 1</td>
<td>EHS&amp;S Committee Security Seminar</td>
<td>AJ Tyler Operations Centre 663 Bathurst Street, London, Ontario</td>
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<td>Dec. 10</td>
<td>Committee Chairs Group</td>
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<td>Dec. 14</td>
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<td>Government Affairs Committee</td>
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<td>Jan. 18</td>
<td>Board Meeting</td>
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<td>Feb. 15</td>
<td>Board Meeting</td>
<td>AECOM Offices 5600A Cancross Court, Mississauga</td>
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<td>Mar. 8</td>
<td>Board Meeting</td>
<td>AECOM Offices 5600A Cancross Court, Mississauga</td>
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<td>April 10-12</td>
<td>40th ANNUAL TECHNICAL SYMPOSIUM &amp; EXHIBITION</td>
<td>The Westin Harbour Castle, Hotel, Toronto</td>
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<td>April 10</td>
<td>Board Meeting</td>
<td>President’s Suite Westin Harbour Castle</td>
<td>1:00 p.m.</td>
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<td>April 10</td>
<td>WEAO Annual General Meeting</td>
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## MAY 2011

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<td>May 19-20</td>
<td>WEFMAX British Columbia, Canadian Affairs Council Meeting</td>
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<td>Vector Process Equipment Inc.</td>
<td>416-527-4396</td>
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<td>Wilo Emu</td>
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<td>Xerxes Corporation</td>
<td>780-466-6448</td>
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