

Title: Using UUVs/Drones to Improve Hydrographic Survey Quality and Operator Safety

Contact: Jerry Roy - jroy@mcelhanney.net

Marine Survey Drones can be used in a variety of hazardous / challenging settings to provide better information which means more informed decisions for all.

The presentation will focus on how new technologies can be applied to optimizing Wastewater Lagoons and Storm ponds. We will discuss how data has been traditionally collected with a comparison to the creation of bathymetric reports using the different sensors that can be outfitted on a marine drone. Best practice for the boat to be used in a specific waterbody will also be discussed.

The application of this data for accurate sludge volume estimates will be explored. Managing sludge build-up and monitoring particulates in certain areas which can have an impact on cell(s) performance will be discussed.

Representatives from our Survey/drone and Civil groups, will be present to discuss how technology in the hand of the knowledgeable professional can provide an enhanced platform that addresses safety, cost and quality concerns. The in-depth conversation is related to lagoon and pond management however other topics include bridge design, flood management, river/lake/marina profiling and other applications that a specific municipality may be faced with.

Title: Piloting of Oxygen-based Forcemain Odour Control in Chestermere, AB

Presenter by: Davey Robertson (EPCOR) – Site Manager, Chestermere [drobertson@epcor.com](mailto:d Robertson@epcor.com)

Max Wong (Capital H2O) - max@capitalh2o.com

Chestermere is a primarily residential community of 18,000 residents several kilometres east of Calgary. The City does not have local wastewater treatment facilities, but rather transfers its sewage to the Calgary collection system via forcemain. Due to the extended detention times of over 12 hours, there is a recurring issue with high H₂S concentration at the discharge point, with associated concerns for odour and corrosion for Calgary's collection system. Operations currently rely on dosing of nitrate-based chemical solution at various lift stations within the Chestermere system to manage H₂S formation.

The utility owners and operators partnered with a local representative to trial an oxygenation technology for odour control at one of Chestermere's sewage lift stations. The system injects an oxygen-rich compressed air stream into the forcemain, creating an aerobic environment through the length of the forcemain. While a dissolved oxygen residual is maintained in the sewage, H₂S formation does not occur. The system was successful in virtually eliminating H₂S and dissolved sulfide at the discharge point of the test forcemain through the pilot period.

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A comparative cost analysis was performed and the results were also favorable for the oxygenation system. While this system requires significantly higher capital investment than a liquid chemical system, the operating cost is significantly lower. Breakeven is projected within 3-4 years. Full-scale implementation of this technology at its main lift station is now under way.

Title: Implementing a Cress Connection Program

Presented by: Colin Stebner (colin.stebner@reddeer.ca) and

Troy Murray (Troy.Murray@reddeer.ca)

In our presentation we will cover the importance and process to implementing a successful Cross Connection and Backflow Prevention program. The main goal is to safeguard the drinking water supply from pollution or contamination. This program is a cooperative effort to mitigate the cross connection risks which many different municipalities across Alberta face laid out in the Drinking Water Safety Plan (DWSP). The program is in collaboration with The City of Red Deer Water Utility, Inspection & Licensing department, certified testers, purveyors and property owners. It aims to establish and administer guidelines for controlling cross connections to ensure the drinking water supply is protected backed by the AWWA Cross Connection Control Manual.

We will be covering the backflow assembly requirements which are determined by the nature of the business or institution. All backflow prevention assemblies must be tested by a certified backflow assembly tester annually to comply with the municipalities utility bylaw. We will describe how to effectively manage all the administrative duties required to run a successful cross connection program. This includes managing the backflow devices within a municipality, plumbers list, as well as recording test results.

Title: Operator Risk Management Strategies for Capital Projects

Presented by: Doug Simpson, PMP, LLED AP BD+C
Colliers Project Leaders Infrastructure Lead
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Chris Monson, BS, PMP, LEED Green Associate
Colliers Project Leaders Project Principal
christopher.monson@colliersprojectleaders.com

The operator's knowledge of the operation and maintenance of a system is invaluable when planning and delivering a project. Operators are typically involved in projects as a stakeholder and in many cases account as being the "ultimate stakeholder" as they will be responsible to operate and maintain systems that are being constructed or refurbished. Project management principles and in particular project risk mitigation strategies are items that need to be understood when dealing with any new or improved capital project. Operators provide a huge benefit of being a part of a project team, from planning to commissioning. This knowledge is vital and intangible when identifying and mitigating project risks.

This presentation will explain why risks exist and highlights the purpose and importance of the development of a risk management plan. Risk management is essential to effectively manage a capital project and describes what is needed before risk management can begin. A risk management plan

should establish the framework in which the project team and stakeholders will identify risks and develop strategies to properly manage both foreseen and unforeseen risks. Before these risks can be identified and managed, there are preliminary project elements which must be completed. Before risk management commences, it is fundamentally important that a foundation is established and understood. The presentation will focus on the defined process utilizing a PMBoK methodology to complete to develop, manage and integrate a risk management plan.

Title: Characterizing source water organics and pretreatment to mitigate ultrafiltration membrane fouling.

Presented by: Amanda Scott, GE Analytical Instruments,
Amanda.scott@ge.com or 720-390-9714.

Growing populations and expanding industries are putting stress on water resources while adding nutrients and pollutants to water sources. These facts coupled with heightened public demand for quality water at affordable prices are leading municipalities to seek highly efficient and effective treatment methods. Ultrafiltration (UF) membrane technologies are able to provide long term, reliable, and cost-effective treatment to ensure cities meet stringent regulatory requirements and effluent limits. With low life-cycle costs and low footprint requirements, UF membranes often outperform conventional plants as long as membrane fouling is mitigated.

Most membrane systems undergo pilot testing to determine appropriate pre-treatment processes and establish effluent quality. However, source waters vary from town to town and can change from day to day. Climate change, industrial growth, and population expansion all put stressors on environmental waters. A recent study with source waters and pre-treated waters from across North America investigated the effects of organics in source water on membrane fouling potential. Water quality was analyzed with size exclusion chromatography dissolved organic carbon detection to correlate particular organic size fractions to membrane fouling potential. Sample analysis from raw, pre-treated (coagulation, DAF, oxidation), and permeate revealed which organic fractions were removed by pre-treatment and membrane treatment and which are the main contributors to fouling potential. Results offer insight into hard to remove compounds and can be used to optimize pre-treatment processes.

By analyzing the organic size fraction footprint from water samples with high, medium, and low fouling sources, more intelligent treatment decisions can be made through connecting water quality and membrane performance. Organic size characterization was coupled with particle size analysis, zeta potential, and an array of standard water quality parameters (e.g., pH, alkalinity, metals, hardness, and suspended solids). The results of this study can be used to improve pilot testing and optimize pre-treatment design to ensure efficient membrane operation with necessary permeability, rejection, and durability.

Title: Membrane Autopsy: A Troubleshooting Tool to Optimize Water Systems

Presented by: Mazen Ellabban - Mazen.Ellabban@pwtchemicals.com

Membrane desalination gained a lot of attention during the last few decades. Over the course of operation, the membranes' permeability and performance will be affected due to the accumulation of

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foulants. While Membranes represent 10% of CAPEX, Pre-mature replacement is expensive totalling to 25% of OPEX.

A membrane autopsy is a very useful troubleshooting tool to optimize the operations of water treatment systems:

- Economically by increasing the longevity of the elements (less frequency of replacement)
- Technically by maintaining a steady water production in terms of permeate flow and quality

By Definition an autopsy is: the physical dissection of a membrane and the resulting analysis of its foulants to determine what contaminants to clean. The autopsy provides a historical look at the system to help troubleshoot performance issues.

The following topics will be covered during the technical session:

Why do an Autopsy

- Understand reasons for changes in permeability: performance or operating conditions
- Check the performance of antiscalant, compatibility of pre-treatment
- Identify scaling and fouling problems
- Determine most effective cleaning protocols
- Verify if an RO system is working properly

Title: Gibbons Pump Station Bypass – Our Experience with a Fisheries Act Violation

Presented by: Mike Darbyshire. P. Eng., General Manager – mdarbyshire@acrwc.ab.ca

In 2013, the Alberta Capital Region Wastewater Commission (ACRWC) was charged by the Federal Government for a violation of the Fisheries Act. This arose from an incident in 2012 of a dry-weather bypass of wastewater to the Sturgeon River at a pump station.

The charges were laid after a lengthy investigation by Environment Canada. The subsequent legal discussion with the Public Prosecution Services of Canada eventually lead to the ACRWC pleading guilty in 2014 to the offence. A joint submission was presented to the Provincial Court of Alberta. The ACRWC was ordered to pay a fine, pay a contribution to the Environmental Damages Fund, update its Standard Operating Procedures and provide evidence of that all employees received training on the updated SOP. The charges, the investigation and the legal process took a significant toll on the organization. However, this incident and the experience has resulted in many positive changes to how the ACRWC manages the utility.

The proposed presentation will go through the events leading up to the incident, the subsequent investigation by Environment Canada, the reaction to the charges through to the joint submission and the follow-through on our court-ordered obligations. It will also highlight the utility management improvements stemming from the incident.

The presentation will be of interest to all water and wastewater utilities since wastewater as well as chlorinated or chloraminated drinking water are considered deleterious substances in the Fisheries Act and discharges out of the normal course of events are inevitable for all utilities. The presentation will provide insights from one utility's perspective in terms of considerations for exercising due diligence to possibly avoid prosecution as well as what to expect when an investigation is initiated by the federal government.

**Title: Drinking Water Challenges in the Amazon Basin:
A story of Elevated Fluoride in Rural Bolivia**

Presented by: Jesse Skwaruk, EPCOR Water - jskwaruk@epcor.com

While effective water treatment poses a challenge everywhere on globe, the problem of treating water in lesser developed regions of the world is much more complex due to financial and technical restrictions. In countries like Canada, we are fortunate to have access to a wide variety of treatment options to ensure we produce clean, safe and healthy drinking water. Beyond the treatment of conventional parameters such as colour, turbidity and pathogens, many regions face naturally occurring contaminants which are difficult to remove from water, such as fluoride.

This presentation is based on a volunteer field visit to San Pedro, Bolivia in the heart of South America as part of the World Water Corps under Water for People. While in Bolivia, 19 communities were visited that are currently facing excessive levels of naturally occurring fluoride in their groundwater resources. The levels of fluoride in the groundwater are well beyond the World Health Organization (WHO) limit of 1.5 mg/L. Levels beyond 1.5 mg/L may lead to various health conditions, such as dental and skeletal fluorosis. The overall aim of the project was to identify what technologies or methods may be applied in rural Bolivian communities to reduce fluoride to acceptable levels below the WHO limit of 1.5 mg/L. In order to investigate the challenge of removing the naturally occurring fluoride in drinking water sources, various methods were used throughout the project. These methods include: an in-depth literature review of the potential methods which may be used to remove fluoride; community and stakeholder consultation; field level assessment of the various communities in the municipality; laboratory water testing; and preliminary trials using various filter media. Several innovative solutions were discovered, such as potentially using agricultural by-products as a carbon source for the production of biosorption filter media to remove fluoride from water. While several potential innovative solutions were discovered, there is a need for further field level testing to evaluate their feasibility. Overall, this project has provided an initial assessment and overview of the challenge of removing excessive naturally occurring fluoride in San Pedro, Bolivia.

Title: SCADA – The Next Generation – Strathcona County Case Study

Presented by: Zane Spencer MPE Engineering - zspencer@mpe.ca,
Mark Williams, Strathcona County - mark.williams@strathcona.ca

SCADA and process control systems have become ubiquitous with water and wastewater infrastructure. Beginning in the early nineties these systems have enabled municipalities to efficiently monitor and control water and wastewater infrastructure. Over the years, there have been numerous additions and enhancements to SCADA system functions; however many of the systems in use today are “stuck in the past”. Often, it is difficult for system owners to gain an understanding of what is available in the marketplace due to the vast selection of vendors and software packages available throughout the industry.

This presentation will discuss industry trends and new / enhanced features of modern SCADA systems including:

- Graphics – colors and images vs. shades of grey symbols (pictures vs. P&ID)
- Alarming – Alarm management, diagnostics and notifications

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- Data Management – Historical data, reporting, big data, IIOT
- Scalability – How many sites / tags / remote users can the system support and what is required when scaling up the application

Additionally, we will discuss how to get where you want from where you are. This is fairly easy with new SCADA system, but most owners already have systems in place. Discussion of the specifications / RFP process will help owners know how to ask for what they want and have the mechanisms in place to make sure they get it.

A case study will be presented showing the migration of the Strathcona County Utilities SCADA system which was completed in the Fall of 2016. The migration included replacement of legacy process graphics with high performance HMI graphics. Discussion will focus on the drivers for a migration vs. upgrade, the added benefits realized by the new system, and the adjustment of operators to this significant change.

Title: Wastewater Source Control: Development of Oil & Gas Sector Code of Practice

Presented by: Wade Teveniuk, Alberta Capital Region Wastewater Commission - wteveniuk@acrwc.ab.ca

Alberta Capital Region Wastewater Commission (ACRWC) has identified Oil & Gas Operations and Support Services industrial, commercial and institutional facilities as significant contributors of contaminants to the Alberta Capital Region's sanitary sewer system. Hundreds of Oil & Gas related businesses operating within the Alberta Capital Region have the potential to discharge industrial wastewater laden with petroleum hydrocarbons and other contaminants, which may be volatile, flammable or even explosive in nature, into municipal sanitary sewer systems.

ACRWC's Quality of Wastewater Bylaw references the Oil & Gas Operations and Support Services Sector Code of Practice and supporting Best Management Practices. Together, the Code of Practice and Best Management Practice provide a balance of prescribed elements and best practices to better manage discharges from industrial, commercial and institutional facilities within the sector and is defined as any business with operations including but not limited to:

- Oil and gas upgrading, refining or distribution
- Oilfield services,
- Bulk liquid products transport,
- Waste recycling,
- Industrial laundering,
- Heavy-duty vehicle and/or equipment washing and/or servicing.

The Code of Practice contains a set of prescribed requirements that apply to Oil & Gas Operations and Support Services industrial, commercial and institutional facilities operating in one or more of ACRWC's thirteen member municipalities. The supporting Best Management Practice serves as a guide to environmental regulations and also provides information on best practices to assist industrial operators in adhering to the Code of Practice, meeting regulations and improving their overall environmental performance.

Title: Unique, compact hollow fiber rack assembly to reduce footprint and energy

Presented by: David Shin, Hydranautics – USA - dshin@hydranautics.com

Finding ways to reduce the overall cost is one critical factor in choosing a suitable hollow fiber Ultrafiltration (UF)/Microfiltration (MF) technology. A couple of the key capital and operational cost contributors are footprint and energy, respectively. Thus, an integrated UF rack is developed to further push the envelope in improving these two critical areas.

An Ultrafiltration (UF) module has already been developed which has many distinguishing factors, including TIPS PVDF fiber, high surface area (at up to 105 m² per module), air scour alone with no backwash to physically clean the modules, and dual filtration direction which effectively reduces inner fiber flow path length and pressure drop in the longitudinal direction. With these developments, such a UF module typically requires a smaller footprint having a higher packing density per square foot of area as well as eliminating the need for a separate backwash tank and pump. It also reduces the overall energy required to pump feed water through the module by directly filtrate to both top and bottom.

This unique UF membrane technology has now been integrated into a new, innovative, compact header design, which will eliminate the need of designing a separate, larger rack and header system further reducing the overall footprint of the UF system. Such an integrated header system has three separate streams for feed/concentrate, filtrate, and air. The main objectives of developing such an integrated rack is to simplify UF rack designs, reduce the overall footprint and eliminate the need of miscellaneous spare parts compared to conventional rack systems, while still maintaining the key distinctive features like no backwash requirement and dual filtration direction.

Title: Impact of Non-Flushables on Wastewater Systems

Presented by: Vanessa Higgins, Strathcona County - vanessa.higgins@strathcona.ca
Tony Wizniuk, Strathcona County - Tony.Wizniuk@strathcona.ca

Some manufacturers of moist toilet tissues and other non-biodegradable cleaning clothes have been marketing their products as flushable, however once flushed down the drain these products find their way into the collection system. These non-dissolvable products can pose a series of problems for maintainance of the sewage collection system and increase sewage collection costs.

When homeowners flush wipes down the toilet it can cause problems with the internal plumbing such as sewer backups which is often a costly and stressful experience for the homeowner. Professionals will have to be called in to clear the blockage and homeowners could be looking at unplanned repairs to the home.

Once in the collection system non flushable wipes get caught up on misaligned joints, flow meters, collect in sags and get hung up on root intrusions. Theses collections of non-flushables cause blockages known as “fatbergs”. Fatbergs are created when grease accumulates along with the wipes and their presence costs the utility time and money to deal with the wipe related problems. Once a fatberg has developed, removing it with traditional cleaning methods is not always effective.

Any Non-Flushables which travel to the wastewater treatment plant also cause additional maintenance in the headworks. Bar screens may require more cleanings and there is the cost of disposal. The wipes are usually hauled to the landfill where they end up being buried anyway.

Until manufacturers label their products as non-flushable consumers will continue to dispose of them by flushing them down the drain. Some manufactures advertise their product as a replacement for toilet paper although it is made up of materials that do not breakdown in existing sewage systems. People should be advised to only flush the three Ps: Pee, Paper and Poo. Utilities will need to counter this message through non-flushable education programs with their customers to reduce costs and avoid difficult back-ups and fatbergs from happening in the future.

Title: CCTV I GIS Asset Management "Connecting the Dots"

Presented by: Mark Maurier, Cam-Trac Inspection Services - Info@camtrac.ca

Picture this ... You have just started in your new position with water & sewer, you start looking for maps on where your assets are located or previous maintenance records, information on which areas have a history of backing up. You find a little bit of information here and there or possibly no maps or records at all, you could ask the lead hand he knows everything but you better hurry he just retired. When it comes to maintaining municipal assets, whether it be sanitary, storm or water, knowing as much information as possible is necessary for budget planning and keeping unexpected or unnecessary costs too a minimum. With the advancement in technology, Cam-Trac has become a leader in the industry with our cloud based integrated GIS mapping and maintenance program. Our user-friendly system requires no additional software or hardware to be purchased and our site can be accessed 24/7 on any computer or mobile device. By linking GIS location, CCTV video and relevant reports together, all the information is at your fingertips to be viewed or printed! Any municipal asset can be added into a map, the possibilities are endless for any fixed asset!

A few examples of how GIS mapping can work for you:

1. We colour code your map to reference the Pipeline Assessment Certification Program (PACP) Condition Grading System. This gives you a quick overview of your entire network at a glance and allows you to easily view any problem lines you may have. Imagine the possibilities that this tool can help with for strategic planning by highlighting problem areas now for budgetary purposes later.
2. What if someone went on holidays and no one relayed the information that some work had taken place? Can you remember what lines have been flushed, root cut or inspected last year? Did you have a Capital Project area? No worries, we can create for you a yearly map that can highlight these areas and more, no more guessing or searching for the information!
3. You or a crew head out to a manhole in the middle of winter due to a sewer back-up, you find the manhole that is full of water but where is the dry manhole you need to unplug the sewer? Looking around where you think it is, all you see is 3 feet of snow. No problem! Instead of digging around where you think it may be, you log into our site from any mobile device, click on the measure tool, measure on your map from the full manhole to the dry manhole you are looking for and you now have the location within one tenth of a meter.

The session will focus on an overview of the CCTV/ GIS Mapping & Maintenance site. You will see how easy it is to use and how it can make your day-to-day job more efficient!

Title: Water Quality Based Effluent Limits for the City of Wetaskiwin - and what to do about chlorine false positives

Presented by: Dörte Köster, Ph.D., Hutchinson Environmental Sciences Ltd.,
dorte.koster@environmentalsciences.ca
Peter Pullishy, City of Wetaskiwin - peter.pullishy@wetaskiwin.ca

This City of Wetaskiwin was required by Alberta Environment and Parks (AEP) to develop Water Quality Based Effluent Limits as a condition to renew their approval to operate a wastewater system. This presentation describes the process and results of the study, including collaboration with consultant engineers, study adaptation in response to consultation with AEP, and involvement of operator staff with sample collection to reduce cost.

The City of Wetaskiwin wastewater lagoons are discharged twice a year into an unnamed creek, which ultimately discharges into the Battle River 12 km downstream. Battle River is enriched in nutrients and depleted in oxygen under ice in winter, requiring a study focus on nutrients and BOD. A review of existing informing found limited to no previous water quality and stream flow data for the creeks that could be used for the study. We therefore designed an aquatic monitoring program during and outside of discharge periods to establish baseline conditions in the receiving waters and to track the impact of the lagoon discharge.

An effluent characterization sample taken prior to discharge showed unexplained chlorine concentrations, which exceeded the federal effluent standards. Upon further investigation and in collaboration with an accredited laboratory (Maxxam), we implemented a testing method to find the reason for the elevated chlorine values. This allowed us to prove that the detected chlorine concentrations were not real but the result of an interference with elevated metal concentrations. The collected data, alongside with modeling and low flow analysis, are used to develop recommended effluent limits that are based on local environmental sensitivities and current and future effluent volumes. These effluent limits will be used by M2 Engineering to develop preferred options for treatment of wastewater for the City of Wetaskiwin.

Title: Improvement of Anaerobic Sludge Digestion using Biological Enhancement Technologies - Case Studies

Presented by: J. Lee a, J. Peterson b, J. H. Tay C, R. Pishgar C
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Today's demand to process and manage biosolids is ever increasing. The resulting large amounts of sludge buildup generated from wastewater treatment plants around the world, often deposited on farmland, in landfill sites and in waterways. Increased levels of sludge production are causing system stresses; decreased capacity issues and are often negatively affecting our environment.

There are three main areas of concern in addressing the issues around sludge management. First, environmental implications of handling biosolids are extensive, and the stringent land application regulations plant operators and managers are facing continually change.

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Second, improving digestion and decreasing the amount of solids within normal operations is proving unachievable without major capital expenditures.

Third, increased digestion through the means of all-natural and biological treatment methods are generally unproven, which leaves the industry hesitant in adopting the use of biological enhancement technologies that have been promoted for many years.

Biological enhancement technologies warrants further research, application and perhaps widespread adoption because of its natural origins and its potential to reduce environmental damages. This paper addresses these problems through the implementation and testing of a specific biological enhancement technology into full-scale anaerobic digesters to demonstrate any improvements in anaerobic digestion thereby decreasing the environmental impact such as transportation and land application. This process and use of biological enhancement technology has the potential to bridge the gap between these separate problems while increasing the effectiveness of digesting bio-solids, decreasing bio-solids production, increasing the rate of release of biogas production for energy production, and improving water quality.

This paper will further cover the overall objectives and targets through the use of the biological enhancement technology. It will also outline design and protocols implemented, measurements and analysis completed, and the observations and end results achieved. A deeper look into the use of biological enhancement technologies will allow us to understand how we can improve anaerobic digestion beyond normal operations without the need of expensive infrastructure upgrades.

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Contact: Jerry Roy – jroy@mcelhanney.net

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Title: Sludge Reduction in Lagoons: a more affordable approach

Presented by: Dr. Paul Deprez, Nordevco Associates Ltd - pdeprez@nordevco.net

However good a sewage lagoon is operated, sludge will accumulate in lagoons over time, reducing both its hydraulic and organic capacities. Physical removal and disposal of the sludge (which really places the problem in another location) or adding a new primary cell to regain capacity, are quite expensive. Using bacteria to break down the organic sludge is a cost effective method for most municipalities. The in-situ sludge reduction also lessens the financial burden on the local authorities and is also far less likely to run into regulatory obstacles. Nordevco, a Manitoba company, manufactures a product called BactiDomusR has been proven effective in many municipal lagoons, by achieving a cost effective way of regaining capacity and thereby delaying expensive expansions. Case studies will be presented.

Title: A Guide to Laboratory Quality Control and Method Detection Limits

Presented by: Blair Easton, ALS Environmental - blair.easton@alsglobal.com

As a part of their ISO 17025 accreditation requirements, contracted laboratories routinely report Quality Control (QC) data with their analytical reports, and it is important for users of laboratory services to be able to understand and interpret what is being presented. Quality control is designed to detect, reduce, and correct deficiencies in a laboratory's internal analytical process; as well as, provide a high degree of confidence in the analytical data being reported.

Laboratory Quality Control samples are specific samples of known concentration carried through the analytical process and are treated as if they were client samples exposed to the same testing conditions. Quality Control samples are used to determine the reliability of a laboratory test result by providing a measure of accuracy and precision within an analytical batch; as well as, provide the laboratory with a long term measure of a method's statistical performance. In addition to accuracy and precision, a method's sensitivity (i.e. detection limit) is equally important to consider, as a method with a detection limit above an applicable Regulatory Limit would not meet the needs of the Regulator.

As there are often different analytical methods for the same analysis with different sensitivities, it is important to communicate any Regulatory requirements with the laboratory. From time to time a laboratory may need to qualify reported results when quality control objectives are not met, and re-analysis is not possible - so it is important to understand those qualifications and be able to pass these along to all users of the reported results.

These basic concepts are the cornerstones of reliability of test results and provide the confidence that the Regulator needs when using the reported laboratory results.

Title: 'Beyond the Catch Basin' – Advances in Storm Water System Sediment Removal

Presented by: Brian Brost, City of St. Albert bbrost@stalbert.ca
Andrew Pow, Product Line Manager – Integrated Services, BOS Solutions
Craig Jones, E.I.T, Applications Engineer, BOS Solutions

In 2016, the City of St. Albert embarked on an innovative storm water system solids processing and dewatering pilot project that proved to be an effective and environmentally sound alternative to known conventional methods. Typically, sediment mitigation from storm water systems occurs via collection then disposal including: localized stockpiling, drying pads, direct discharge into a lagoon or in some instances, flushing to eventual down-pipe discharge. These methods may potentially result in land contamination, pose significant operational demands and costs or system capacity reduction.

The City required a solution that could receive, process and de-water all sediment and debris collected via vacuum trucks removing material from any of the over 3000 catch basins and 20 oil and grit interceptors to maintain the seasonal storm water system maintenance program, could be deployed and set-up in a relatively small site, operated independently (no reliance on fixed electricity or natural gas services), nor capital investment by the City for the pilot project.

BOS Solutions, a leader in drilling fluid conservation, solids control, and waste mitigation throughout Canada and the US was contracted and provided all equipment and services to the City for this exploratory pilot project.

With the patented BOS Solutions Tank System for dewatering that produces clean and reusable water combined with state of the art high volume variable speed centrifuge units sized accordingly for this application being deployed and set up in a day, BOS Technicians could effectively process 30 cubic yards of sediment material in under an 8-hour period. The product produced by BOS achieved material composition requirements of the local landfill entity and met the needs of the City for solids processing in carrying out the overall storm system annual maintenance program.

This technical presentation will offer delegates the opportunity to learn how the BOS Solutions system is an emerging method to effectively process sediment and debris collected from storm water systems. Delegates will also learn how the City carries out its' annual storm water system maintenance program including advances in increasing productivity through application of mobile GIS technology and analytics that influence operational decisions.

Title: Hinton Water Treatment Plant – 6 Years Later

Presented by: Richard Tombs, ISL Engineering - RTombs@islengineering.com

In 2011 the Town of Hinton commissioned and completed a major upgrade to the Water Treatment Plant that provides potable water to its residents. This upgrade had two specific objectives. One, provide additional treatment stages to address the presence of Cryptosporidium and Giardia with the source water, and two, mitigate the elevated turbidity caused by the annual transition to lime softening each fall. To achieve these objectives, the upgrade included the application of a Pall Microfiltration

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System with a downstream UV disinfection stage, which have been in continuous use since the commissioning occurred in mid-2011.

In 2017, as part of a larger project, the operation and performance of the membrane system is undergoing a review as the membranes are half way through their “guaranteed life” and the Town wishes to estimate the remaining service life of the membrane modules. The review includes an on-site review of the system’s performance with the supplier, the completion of a membrane autopsy to determine how the annual “transition” is affecting the life of the installed membranes, and discussions with the operational staff to understand how the membrane system really works. Additional objective of the review include the updating the facilities Standard Operating Procedures and to determine if any further modifications to the membrane system are required in the near future.

This presentation will provide an overview of water treatment process, including the work completed in the 2011 upgrade, and a summary the results of the review discussed above. In addition to presenting a comparison of the membrane performance in 2011 and 2017, insight and information from the operating staff will be presented, as well as any background to “issues” that were not necessarily covered within the training that they operators received.

Title: UV 101 - Compliance with Reduced Chemicals - Is it the right solution?

Presented by: Phyllis Butler Posy, Atlantium Technologies Ltd. – phyllisp@atlantium.com

Learn the fundamentals of UV – what makes it work and how can you determine if it will work in your situation? What do the different standards mean and how do they translate into real operations? Will it work for viruses? What about hardness and fouling?

Learn the terminology of UV disinfection so you can understand what the various configurations will provide and what they won’t. What to do if you need a residual and what technologies make the best partners with UV.

Using UV can be best way to achieve 4-log virus disinfection before the first customer, crypto and giardia protection, avoid the danger of DBPs and chemical taste & odor, the expense of re-pumping, and combat threats from algae, pseudomonas, molds – but sometimes it is not. Hear about how to tell the difference.

Title: Operational Reporting, Technology and Results

Presented by: Adam McCardle, Eramosa Engineering - adam.mccardle@eramosa.com

Considering the increasing number of sources of data; historical time stamped data collected by control systems, nonnumeric data from LIMS systems, bacti sample results, weather and river data available through the internet and manually entered data, many facilities have chosen to use solutions capable of capturing data from these sources and providing the information to operations. As access to the reporting solutions is changing, with increased remote access, legacy spreadsheet solutions may not meet the needs of operations and the entire municipality anymore.

This presentation will focus on the importance of generating reports that use different data sources that meet requirements from operations, management, IT, and any other department within the

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organization, and how these data sources are best provided to external stakeholders such as regulatory authorities and the public. Integration of a quality control process and the ability to edit data while tracking the changes is becoming more important to ensure an audit trail. As well as the positive impacts on facility optimization, safety records, AEP compliance and preventative maintenance.

As part of this presentation sample reports and dashboards utilized by the Town of Cochrane will be shown. The Town of Cochrane has under taken an initiative to improve operational awareness by building reports and dashboards using multiple data sources available at the town's water treatment plant.

Samples of the reports and dashboards that have been developed with operations will be shown along with a discussion on how they have used the data that they already have available to them to help meet and maintain compliance and improved efficiency on a real-time basis.

Title: Mixing, Best Practices

Presented by: Rana Elbittibssi, Xylem - rana.elbittibssi@xyleminc.com

Best-practices to achieve good mixing in Biological Nutrient Removal (BNR) selector basins have advanced to new levels. Demands for energy-savings and flexibility have driven new developments. These new developments enable successful mixing with less energy and more flexibility than ever before.

Mixing plays a key role in biological nutrient removal. An understanding of best practices can help operators optimize process efficiency and get the most out of their plants with the least amount of energy. It can help save energy and solve problems like unmixed or over-mixed areas. It is important not to create surface aeration by over-mixing. A relatively calm surface is best.

The need for mixing has grown considerably as plants convert or expand to incorporate nutrient removal. When a conventional activated sludge plant is converted or upgraded to nutrient removal, aeration basins are converted to either anoxic zones or anaerobic zones. In those zones, the air diffusers are either turned off or removed. With the loss of air in those zones, mixers must then be added to maintain good mixing.

The five main goals of mixing in BNR:

- Preventing settling
- Preventing short-circuiting of inflows
- Forcing strong contact between microbes and wastewater.
- Minimizing energy consumption
- Maximizing process flexibility

This talk will cover best-practices to achieve all of these goals in BNR selector basins regardless of mixer type or brand.

I will present:

- best mixing techniques and strategies for biological nutrient removal
- pros and cons of various mixing technologies in BNR
- benefits of energy-savings and flexibility in design
- several case studies from around the US

Best Practice Case Study #1:

Less Mixing Yields Big Savings in BNR Selector Basins

Significant energy savings were achieved at the Madison Metropolitan Sewerage District (MMSD, Madison, Wisconsin) by replacing submersible mixers in the biological selector basins with low-energy

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submersible mixers. This was done as part of an overall plant goal to reduce energy consumption. MMSD operates a single wastewater treatment facility, the Nine Springs WWTP. Nine Springs WWTP is an enhanced biological phosphorus removal (EBPR) facility serving 43 municipal entities and around 330,000 people. Average flow at Nine Springs averages around 158 ML/d (42 MGD), and is treated in a conventional activated sludge process. The EBPR process utilized is a modified UCT process utilizing selector zones to achieve conditions for biological phosphorus removal. Evaluation of the mixing system in the biological selector basins revealed the potential for significant savings as a result of recent process improvements that removed heavier solids prior to biological treatment. By removing these heavier solids with grit-removal and fine-screening, less mixing energy was required to suspend the remaining solids in the selector basins, permitting the change to lower energy mixing in the system, resulting in energy savings without compromising the integrity of the biological treatment process. Now operating for 3 years, the new mixing system is using about 1/2 as much energy as before. Performance is meeting projections and the estimated payback on the project will be under 3 years, not including a Wisconsin Focus on Energy grant that was approved for the project. The mixer change-outs resulted in an annual savings of over \$100,000 for the selector mixers.

Best Practice case Study #2:

How Low Can You Go? Minimizing mixing energy in conventional activated sludge

Results of a mixing energy study at MMSD in Milwaukee, WI show that a power consumption of only 0.28 W/m³ is sufficient to fully homogenize activated sludge. This record-setting low energy was achieved using a high-efficiency variable-speed/variable-thrust mixer combined with optimum mixer-position in a selector basin 48 ft long x 30 ft wide x 15 ft deep. TSS profiles and power measurements were studied as power levels in the selector basin were gradually reduced over time. The study concludes that a well-placed high-efficiency variable-speed submersible mixer creating a bulk flow loop that conforms to the basin shape is a remarkably efficient method for mixing typical activated sludge. More case studies will be presented.

Title: The Basics on Electrical Equipment used by operators and maintenance – MCC, Switchgear, VFDs, SoftStarts and Motors

Presented by: Marc Goldade, Carbon Controls Ltd. - marcg@carboncontrolsltd.com

In facilities associated with Water & Wastewater Treatment, the majority of rotating equipment is driven by electric motors. The operators and maintenance personnel are required to have a basic comprehensive knowledge of the technology related to MCC, Switchgear, VFDs, SoftStarts and Motors. This presentation will provide the attendees with the basic knowledge for the operation of MCCs, Switchgear, VFDs, SoftStarts and Motors. Having this knowledge will help each operator and maintenance personnel develop confidence and professional enthusiasm, therefore, increasing their efficiency.

The presentation will cover the following:

- The role of a basic MCC - provides a compact, modular grouping for motor control and electrical distribution components
- The duty of Low Voltage switchgear - to switch on and off and to control, once or repeatedly several times, different electrical circuits during normal as well as abnormal operating conditions.

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- How VFDs operate? Discuss some of the common problems and what to do to correct them
 - Softstarts – application and use - reduces mechanical wear and tear on motors better than across-the-line starting methods.
 - Motors – Hollow Shaft, Features & Benefits:
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Title: Optimization of the Red Deer Water Treatment Plant residuals outfall to determine water quality-based effluent limits

Presented by: Tara Roumeliotis, Hutchinson Environmental Sciences Ltd. - tara@environmentalsciences.ca

The City of Red Deer Water Treatment Plant (WTP) takes water from the Red Deer River and treats it for drinking water supply purposes. After treatment, some of the sediment removed from the water, along with residual treatment chemicals, are discharged back to the Red Deer River as concentrated residual waste. The City of Red Deer is planning to build a Residuals Management Facility (RMF) in order to reduce impacts of the WTP residual discharge on the Red Deer River.

The purpose of our study was to evaluate outfall design options to optimize RMF operations and determine effluent limits. City of Red Deer WTP operations require the most resources during high flow periods when river turbidity is high. A receiving water study was conducted to determine 1) water quality-based effluent limits, and 2) if optimizing the outfall for better mixing would allow by-pass of treatment at the RMF during such high flow periods. The study analyzed effluent mixing at the existing bank discharge and a potential mid-river discharge through a multi-pronged approach: A) a desktop review of the regulatory context and existing data; B) a field program to collect site-specific data (i.e., Red Deer River, existing plume from WTP); C) mixing zone modelling to assess different outfall locations and configurations; and D) a high and low flow dye tracer study to calibrate and validate the mixing zone models.

The study found the mid-river discharge (with either a single or multi-port diffuser structure) improved in-river dilution significantly over the existing bank discharge, translating to higher effluent limits required for the mid-river discharge. Further, modelling of the mid-river discharge with median TSS concentrations and turbidity levels in Red Deer River and estimated residuals quality and quantity predicted that residuals treatment may be by-passed 186 days each year (i.e., 51%). Next steps are 1) economic analyses of the different options; and 2) applications for regulatory approvals.

Title: Drinking Water Electronic Reporting – File based data

Presented by: Kathleen Pongar, AEP - kathleen.pongar@gov.ab.ca

Electronic Reporting of Drinking Water data (to satisfy monitoring requirements) has been in effect since 2003. AEP's ability to receive data in an AEP file format has been around almost as long. This includes receiving file data from contract laboratories. A new file format will be presented, the file content will be explained and the implementation steps will be outlined. The main portion of this talk will highlight the file changes and be of benefit to operators and engineers.

This talk will also explain the importance of the Contact Information (for the Bacteriological Protocol) tab, new in June 2015. There will be further mention of acceptable sample identification, critical for file

based data, for both Contract Laboratory and Provincial Laboratory analyses. Handout(s) will be available.

Title: Fun times planning, commissioning and running a tertiary filtration pilot

Presented by: Daniel du Toit, Associated Engineering - dutoitd@ae.ca
Debbie Wier, Regional Municipality of Wood Buffalo – debbie.wier@rmwb.ca

The Regional Municipality of Wood Buffalo conducted a tertiary filtration pilot on their secondary effluent to determine the best technology that will achieve more stringent effluent quality limits. The pilot involved testing two types of disc filtration systems (inside-out and outside-in) and a membrane filtration system. A total of 1.2 MLD (5% of the secondary effluent average day flow) was treated through the pilot system. The presentation will not focus on the results of the pilot, but more on the lessons learned with setting up, commissioning, operating and evaluating the pilot systems.

An Engineering Service agreement between the Municipality and Associated Engineering (AE) was put in place to allow AE to provide the piloting services. AE was responsible for the pilot equipment procurement, set up, installation, commissioning and operation of the pilots. The pilot planning was initiated October 2015, with the pilot scheduled to occur during the typical lower effluent quality period, December to March.

A brief overview of the overall pilot process will be provided and focus will be on the following:

- Initiating the interested parties,
- Contracting vendors,
- Site preparation for the pilot,
- Scheduling equipment deliveries,
- Commissioning planning and execution,
- Operational challenges with the various equipment, and
- Pilot evaluation process.

The presentation will provide valuable information on how to plan a pilot project of any nature and what to watch out for during the planning phase, the set up phase, the commissioning phase and the operational phase. Interesting challenges and how they were overcome will also be highlighted.

Title: Process reliability and efficient operations depend on effective polymer management

Presented by: Martin Caspar, Veolia Water Technologies Canada, martin.caspar@veolia.com
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Chemical cost is a significant part of the operating budget for many water and wastewater treatment plants, with polymers often being a large component. Polymers are used for various applications, including flocculation, thickening and sludge dewatering. Numerous considerations affect the efficiency and performance of polymer, hence it is important for both designers and operators to understand

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these to ensure reliable process performance and to manage costs. These considerations include what type to use (e.g. emulsion based or dry), how to prepare it, and how to dose it.

A particular challenge for operators is knowing whether hydrated polymer has reached sufficient activation (i.e. full maturity), and is therefore ready for use. Current practice is typically simply time based, but this ignores factors that can affect maturation (e.g. water quality, temperature etc.). Importantly, the first time operators become aware of a problem with a polymer batch is typically when the performance of the treatment process using the polymer fails.

This presentation discusses the suitability of polymer types for different applications, the keys to successfully making down dry polymer and presents some polymer management equipment currently available. It also presents methods of evaluating polymer activation, including a new online polymer activation measurement instrument.

