OPERATOR DIGEST

FALL 2021 | NUMBER 150

EOCP

Quarterly Newsletter of the Environmental Operators Certification Program – BC/Yukon

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OPERATOR DIGEST

The **Operator Digest** is the official newsletter of the **Environmental Operators Certification Program**.

Submissions for publication in the Digest are welcome. Please email them to the EOCP office at eocp@eocp.ca

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OPERATOR PROFILE

Sonia Custock

CWP CWWP, Tradesman, City of Langley

How did you become an Operator? It wasn't actually something that was particularly deliberate or planned. After several years of being a traffic control person and having regular interactions with City of Langley staff, they quickly became my favourite crews to work with and it became somewhat of a dream. I applied and to my amazement they hired me to pick garbage and empty bins, it was a foot in the door, so I jumped on the opportunity. I was given chances to fill in on the construction crews and was eventually able to post into a position. I realized quickly how much I enjoyed the work so as soon as I had the required hours, I achieved my certification to become an Operator.

How long have you been an Operator? Since June of 2006, however I was hired on at the City of Langley in 2003.

What are your core functions? Trouble shooting and inspecting, responding to calls for service. Working for a small municipality provides excellent diversity to work with all utilities in all aspects, we don't particularly have departments so much as a team of people that need to be broadly experienced and flexible.

What is your typical day? The best part is there isn't a day that is typical, it could be absolutely anything from emergency water shutoffs to service locating. I might have to deal with a sewer blockage, do some camera work or dye testing of sanitary services and mains. Some days are calmer with water meter inspections, outfall inspections, leak detection or residential consumption issues and just about anything else my superintendent needs someone to go take a look at.

What do you enjoy most about the work? The satisfaction in solving problems is the highlight for me: being given puzzles with pieces and clues, using experience of past situations to try to make them all make sense. I also enjoy the variety in my days and the opportunity to be outside working in the elements and engaging in my community.

What are some challenges you face? Being a woman in this line of work does come with a few extra challenges, mainly it's the constantly having to prove my knowledge and ability to everyone from plumbers and contactors to homeowners. Men in the same position tend to be

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MESSAGE FROM THE DIRECTORS AND STAFF

Every year, it seems that we are caught off-guard when writing this message in what is the last issue of the year.

We thought last year was difficult with a raging pandemic, this year was even more so, with a pandemic and wildfires. Ooof, what a year it has been! Yet, we have many accomplishments to celebrate:

Chris Lawrence *Kalpna Solanki*

1. The Operator Peer Network was started up in 2019, but last year many of the volunteers made themselves available in case a community needed help during the pandemic. This year the OPN volunteers were available to help in case a community was affected by the pandemic and/or wildfires. We are incredibly thankful for the support provided by the volunteers.
2. We've continued with exam sessions in BC and YK. Between September 2020 and now, we've had more than 400 exam sessions! Imagine!
3. We completed our new Strategic Plan which involved staff, directors, and external stakeholders, and together we developed four priorities that will help chart our journey over the next four years.
4. We are thrilled that 22 students will be graduating from the first cohort of the 'Fundamentals of Water and Wastewater Operations' program at BCIT, and we've welcomed the second cohort that has just started the program. This program will help develop some home-gown talent – training Operators where they are needed most acutely.
5. The Building Water Systems certification was launched and already has some graduates who will help control outbreaks of Legionellosis – this is the first certification of its kind in North America, and we hope that this model will spread across Canada.
6. We asked you what you wanted...you wanted a mobile-friendly CRM, and we made that happen.
7. We also recognized that it isn't always easy to specify in your email signature or your business cards the credentials that you have worked so hard for. So, we trademarked CWP and CWWP – Certified Water Professional, and Certified Wastewater Professional. These are provided to you to use as long as you are certified by the EOCP in SWS, SWWS, WT, WD, WWC, and WWT.
8. We have hired a renowned competencies consultant to oversee the validation of the EOCP's competency framework – workshops will be held in Nanaimo, Surrey, Terrace, and Kelowna
9. We worked on a new video series profiling the important work of Operators. The first video features Sonia Custock, and the second features Hanna Burton, and three more videos are under development. The videos can be seen here: https://tinyurl.com/cnnmsuc5
10. The EOCP's conference for 2021 turned out to be the largest to date. By the numbers:
    a. 565 delegates
    b. 2 full days
    c. 3 learning streams
    d. 33 interactive sessions
    e. 720 minutes of skills development

Plans are already under way for EOCP2022, with the theme 'Respond – Recover – Thrive'. We hope the next conference will be in a hybrid format, but we are ready for whatever the future brings.

This is the last issue of the Operator Digest for 2021, and we look forward to connecting with you again in 2022.

In the meantime, please be kind, be calm, and be safe.

Chris Lawrence, Board Chair
Kalpna Solanki, President and CEO

Isometric Rendering of the Water Treatment Facility

PLANT PROFILE

COMOX VALLEY WATER TREATMENT FACILITY

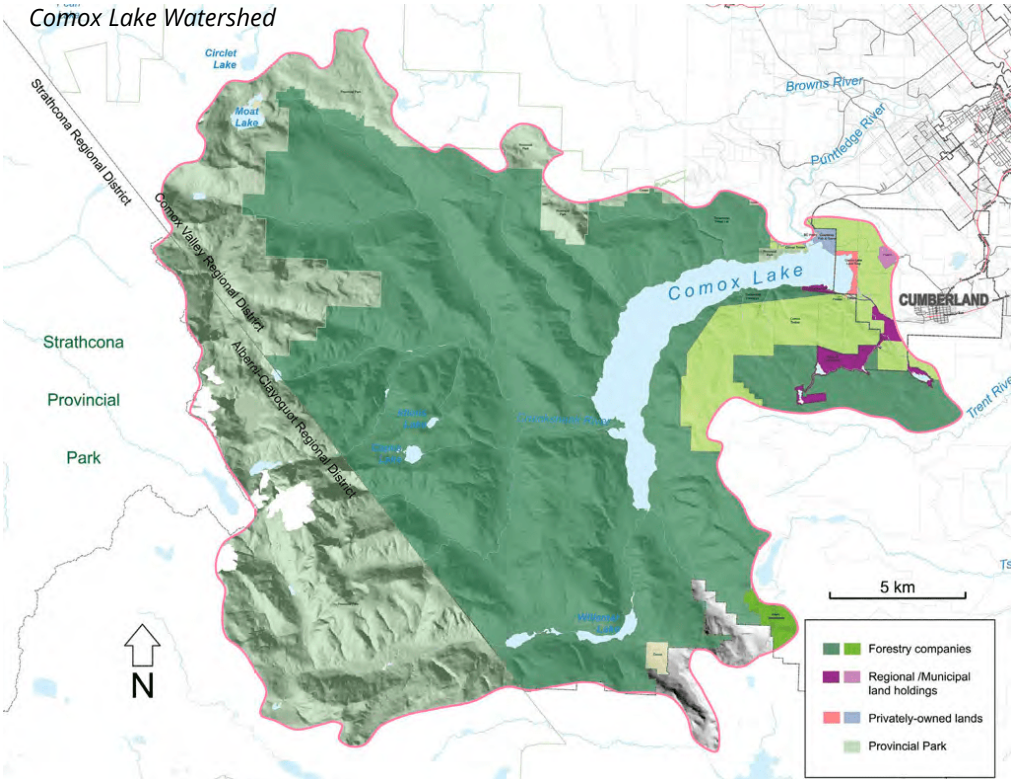
By Kalpna Solanki CPHI(C) BSc MBA

On a recent visit to Vancouver Island, I was fortunate to have the opportunity to visit the Comox Valley Regional District's (CVRD) Comox Valley Water Treatment Project. The contract for this project was awarded in May 2019, construction began in the Fall of 2019, and the facility is currently being commissioned. I was fortunate to get a tour with Brian Thorburn (WT IV, WD IV, WWT III) of EPCOR and Dan Frazer of AECON, with a follow-up phone meeting with the manager of water services, Mike Herschmiller (WD IV) of the CVRD.

The Comox Lake watershed is approximately 461 square kilometres, and the majority is K'ómoks First Nation traditional territories or privately owned. Balancing interests such as private ownership, active logging, recreation, and hydroelectric power generation, while sustaining critical fish and wildlife habitat, provides numerous challenges for watershed management.

The Comox Valley Water System provides drinking water to approximately 50,000 residents in Courtenay, Comox, and surrounding areas. The history of water quality issues in the Comox Valley dates back to before 2005, when Vancouver Island Health Authority (VIHA) ordered the CVRD to complete a Watershed Risk Assessment, which identified major risks to the Comox Lake water source. At that time, water was obtained from a BC Hydro penstock and was treated with chlorine with the addition of UV in early 2018. However, with more frequent and severe rain events, there was a landslide in the watershed that resulted in very high turbidity levels. In 2014, there was a Boil Water Notice that lasted for 47 days, and over the next five years, 12 more Notices added up to approximately 140 total days of boiling water for anyone connected to

Comox Lake Watershed



Tour guides Brian Thorburn (EPCOR) and Dan Frazer (AECON)

UV Treatment System

the Comox Valley water system. Something obviously needed to be done.

What is unique about this project is that compared to many similar facilities that are design-bid-build, the procurement model used here was design-build. This required a great deal of work upfront needing strong legal contracts, deficiency and performance holdback criteria, an Engineering 'indicative design', and detailed Statement of Requirements, and only then did the project go to market. Involved through this process were WSP in its role as the owner's engineer, Deloitte as a financial advisor, and Norton Rose Fulbright as the owner's legal team. Led by CVRD's manager of capital projects Charlie Gore, the CVRD put together a team of Operators to review and consult alongside Stantec during the design phase. The initial team consisted of Mike Herschmiller along with Steve Prunkle, CVRD's senior Operator of water transmission and distribution, (WD IV, WT III, WWC I), Metro Vancouver's Willyam Dragon (WT IV) and District of Summerland's Alistair Wardlaw (WT IV, WD IV, WWC I).

The contract was awarded to AECON Water Infrastructure Inc. along with its design engineering firm, Stantec, and commissioning team, EPCOR.

The new $126 million project is based around the direct filtration facility, which is expected to classify as a Level IV Water Treatment plant, and will comply with the provincial surface water treatment objectives guideline and deliver three main benefits:

1. Eliminate the need for turbidity-related boil water notices
2. Remove the risk of viruses and bacteria in the drinking water
3. Provide a secure supply of reliable, high quality drinking water for decades to come

The water for this facility comes from Comox Lake, and what is unique about this is that the K'ómoks First Nation (KFN) and the CVRD signed a Mutual Benefit Agreement on 28th September 2018 confirming cooperation and collaboration in the management of water resources in the region. With the signing of this agreement, KFN has stated its support of the Comox Valley Water Treatment Project and the CVRD's water license application.

The water is transported over a distance of 2 km from the intake which is 5-13 m deep (based on lake levels) and is pumped via four 160 HP pumps.

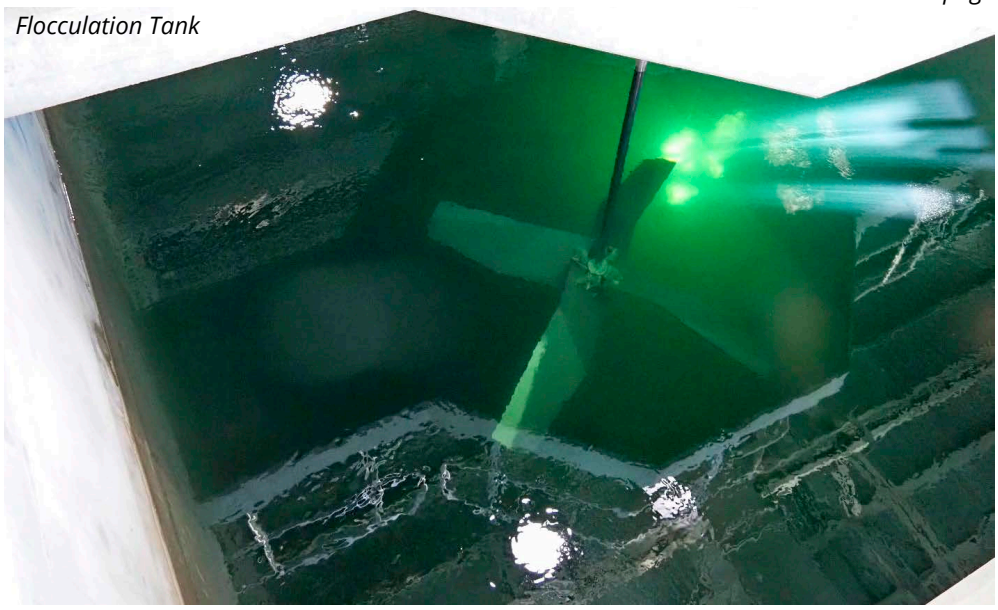
Once in the facility, a coagulant is added, the mixture then goes through a flocculation tank before undergoing filtration.

Filtration is via a dual media filter comprising of a 0.3m layer of sand and 1.7 m of anthracite. The next step in the process is UV disinfection followed by chlorination using sodium hypochlorite.

The residuals are processed through a press, the supernatant goes to the front of the process whilst the solids may go to a landfill or get composted.

'Comox' continued next page

Flocculation Tank



'Comox' continued from previous page

Some knowledge to impart to anyone undertaking a similar project:

1. Communication is key
2. Getting as much work done up front for a Design-Bid process reduced the guesswork (the project is only slightly over time and budget, which is remarkable considering the pandemic and fire related challenges)
3. Involvement of the operations team in the project
4. Feedback from seasoned WT and WD Operators
5. A collaborative process involving the CVRD, WSP, AECON, Stantec, and EPCOR

The project is also designed to have three phases over a 70-year period to allow for increase in population and demand for water – the raw water main, the treated water main, the clearwell, and pumps are all sized for ultimate build-out. The designed, current capacity of the facility is 75 MLD, with expansion plans for 120 MLD. It is expected that even though there is capacity for population growth, there will be more widespread use of residential water meters in the community to aid in water conservation measures and reduce future infrastructure costs.

The Operators who have been hired to work at the facility are excited to begin work at this brand new, Operator-friendly facility, that is 'best of class'.

WORKFORCE STRATEGIES – A SUCCESS STORY

Profile – Rob Binks

Supervisor, Construction - Water Services, Integrated Water Services, Capital Regional District, Victoria BC

By Todd Scaber CWP, Manager, JdF Water Distribution Operations, Integrated Water Services, Capital Regional District

Todd Scaber and Robb Binks

Rob joined the water industry back in 1991. He started working in a traditional role of a labourer and worked his way through the positons of pipe layer, pipe fitter, charge hand, finally earning the position of Supervisor with a WD III certification. He is part of a team of 33 Operators and two managers and is responsible for deploying 11 Operators and as many contracted partners on a daily basis.

In 1998 all the traditional water works roles were amalgamated to create an Operator Program where the key components of water worker were separated into three parts: Construction, Customer Service, and Regional Supply.

Water workers were divided into the three areas and are rotated every 6 months to a year through each of the more specific roles. This is based on Operational needs and recognizing that some positions take longer to gain proficiencies than others. The program could be compared to the traditional apprentice program where the Operators start as an Operator 1 and progress without competitions to an Operator 4. When eligible, the Operators are required to write the EOCP Water Distribution certification exams. Based on experience and certification after 7 years of rotation, the Operators become an Operator 4 holding a minimum of a WD II ticket.

In the Construction rotation where Rob is the Supervisor, the Operators work together to perform watermain replacements of 4km a year on average, install 15 hydrants, and fix many leaks on services and water mains. The most complex part of the job is completing an average of 50 developer connections and doing all the tie-ins on the upgraded pipe. These connections require system shutdowns, excavations over 1.2 m, heavy crane lifts, etc. Rob is also in charge of a crew that installs and replaces up to 660 water meters per year. Basically, a group of 13 Operators and up to 10 contractors take care of 450 km of watermains, and 2,500 services in 6 different municipalities that are growing by more than 3% annually, and in some areas are over 50 years old and have system pressure exceeding 100psi.

In the Customer service rotation, the Operators take care of the preventative maintenance of 150 meters from 50mm to 200mm. 13 large reservoirs, tanks and above ground concrete chambers, 2,300 hydrants, 33 pump Stations, 55 pressure control stations, 400 air valves, and 9,000 valves of all different types. This rotation has 11 Operators and also many contracted strategic alliance partners.

The Transmission System or Supply System takes water from the main reservoir way up in the protected pristine watershed to the municipal customers of Greater Victoria. In this rotation the responsibilities are the same as the others, the pipe and appurtenances are just much larger. This rotation has 11 Operators and also many contracted strategic alliance partners.

Rob is the first to say this would not happen unless the Engineering, Finance, Billing, Fleet, Stores, Human Resources, IT, and Safety departments were not all high functioning and aligned to the common goal of delivering potable water to the good people of greater Victoria.

Over the last 30 years Rob has been a key part of developing at least a hundred Operators. The system we use creates very diverse and highly skilled Operators who can perform technical functions, run heavy equipment, and work with electricians, mechanical fitters, and SCADA technicians. The Operators all liaise with local fire departments and various regulatory agencies. The group also works closely and focuses on safety and quality of work.

Operator training, close to home

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you work in a small community
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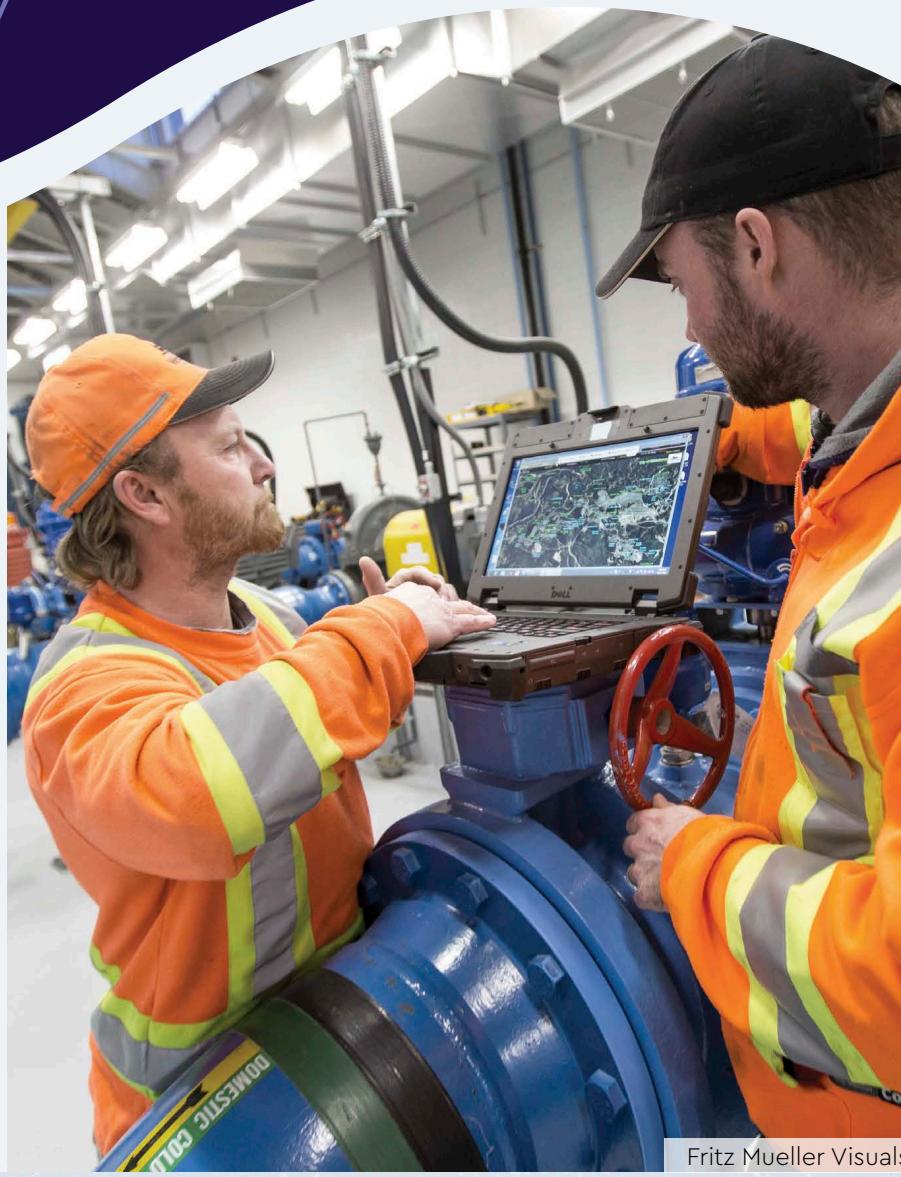

Fritz Mueller Visuals

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#EOCP2021 A SUCCESS

EOCP VIRTUAL CONFERENCE

Despite pandemic and wildfire challenges, this year's conference had more delegates than ever before!

Conference opening by Andrea Menard

Keynote by Eric Termuende

Welcome to the delegates by Chris Lawrence, EOCP Board Chair

Dave Brewer, a perennial favourite at the EOCP conference

Kalpna Solanki, EOCP President and CEO, welcoming the delegates on the 2nd day

By Kalpna Solanki CPHI(C) BSc MBA

In 2016 we conducted a survey of our Operators, and they overwhelmingly responded in favour of a conference. We had our first conference in 2018, then another in 2020, and one again in September 2021. Each time, the number of delegates has increased, with this year's conference having a record breaking 565 delegates.

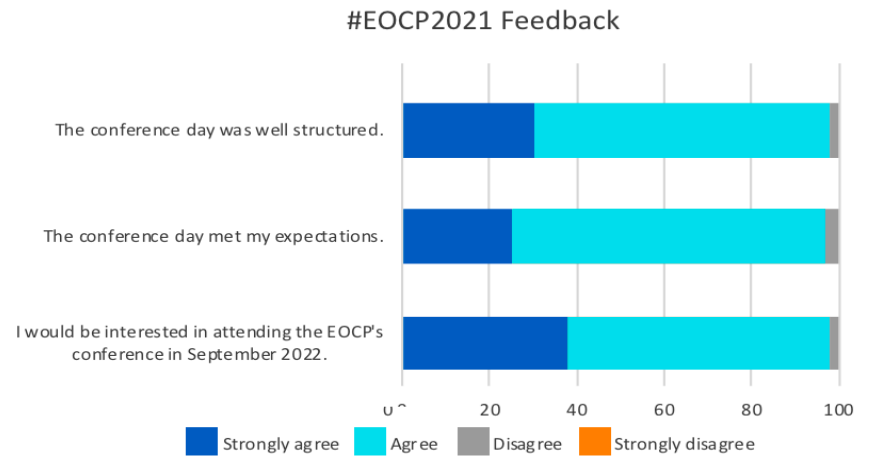
We thought for sure that this year's conference would be a hybrid conference, but that was not to be. What we have been fortunate with though is that the EOCP team and the AV team now had experience with running virtual events, and there were very few glitches.

It appears that our delegates valued the conference as well, judging by their feedback (right).

Furthermore, whilst 98% of the delegates said they strongly agree/agree to attending the EOCP's conference in 2022, 64% said they would prefer to attend in person, and we hope that this will be feasible.

A hugely massive shout-out to our sponsors who have been so generous in their support of #EOCP2021 – we could not offer such a full conference without them!

Planning for #EOCP2022 is already underway, and the conference theme is 'Respond – Recover – Thrive'. We certainly hope that the conference in 2022 will have a large in-person component as we miss seeing you all!



'Operator Profile' continued from page 2

viewed as competent until deemed otherwise, whereas I am expected to prove my competency first. It's actually an aspect that I've come to enjoy though, but I think it is because I'm a bit cheeky and I love a challenge. Physically I'm not always able to complete tasks in a conventional way, but with a little creativity and creative thinking I can always find a way.

Can you speak of any highlights in the past year? The work that I do has always felt important and valuable, but that was definitely confirmed when it felt like the world shut down, and we never skipped a beat. Every day we were still needed, the work we do is essential. It was extra validation in the fact that we are an important day to day part of our community's health and well being.

What advice do you have on how to have a successful career as an Operator? Being an Operator is more than learning the trade, it is also about how you present yourself; it is the first thing people notice about you. I have tested for myself and proven that showing up every day being pleasant, positive, willing to accept feedback and adapt to change will give you opportunities to succeed even faster than just work ethic and certifications. If you can manage to get a handle on them all, you will be unstoppable.

What do you do when you're not working? I drive for Uber, oh no wait... I'm a sports mom, I have an almost teenage son who plays AAA baseball and football so most days after work I race home to pick him up to drive him somewhere in the Fraser Valley to play something.

What else can you tell us about working as an Environmental Operator? It's a great opportunity that can take you down countless paths with an ability to easily change direction if you want to try another role. Becoming an Operator doesn't give you qualifications for one specific job, it opens a door to opportunities and the chance to find your place.

Whom would you recognize as a mentor? I'm incredibly fortunate, I don't have one specific person that has provided me with the majority of my advice and guidance. I have had series of superintendents and managers who saw qualities and potential in me, that I likely would have never recognized on my own. Tom Steward, Dave Lundberg, Kyle Simpson, and Dylan Stewart have given me opportunities, encouraged me to push boundaries, challenge myself, and successfully overcome things I never would have never considered. From them I learned that having people who have, without hesitation, such confidence in your abilities and judgement, give you everything you need to believe in yourself.

Anything else you would like to add? Me being an Operator has helped me with a secure career at The City of Langley. My coworkers are my friends, I feel like I belong. I have found myself in a place that I can't imagine my work being anywhere but here.

Watch the EOCP's Operator video featuring Sonia at https://tinyurl.com/4y5n6md8

WHO'S ON THE MOVE

Marc Forcier

CWP CWWP, Chief Operator, Peachland Water Treatment Facility

What was your first job? I was hired as a lifeguard at the Hinton community pool during high school. Unbeknownst to me at the time, the attraction between water and me was emerging in an obscure fashion.

What was your path to becoming an Operator? By chance and circumstance of finding myself in the right place at the right time. I was working as a laboratory technician at the Hinton Pulp Mill and was asked to provide relief to the water treatment plant Operators at the same facility. I gladly accepted the task eager to learn more about the process. Fortunately, that fine institution gave me ample opportunities over the next 7 years in a relief capacity to accumulate hours, earn CEUs and prepare for exams via preparation and training courses. After obtaining my Water Treatment Level II certificate in the aforementioned fashion, I moved and began a full time Operator position at the Seymour Capilano Filtration Plant with Metro Vancouver.

How did you pivot from your last position to your current one? My recent move came from both necessity and a wonderful opportunity. I was struggling with certain dynamics at work and my mental health was suffering. At this low point while I was stuck waiting for a light at the end of the tunnel, an amazing colleague, my family and friends nudged me towards the idea of a new position and amelioration. A fantastic and challenging - in a good manner - position had opened up which I was happy and grateful to accept.

What advice would you give to someone who is currently an Operator or considering becoming one? We are essential service providers, providing safe drinking water at all times without interruption. Find a workplace that recognises this and you for all the unseen good we do. A place where your goals, beliefs, and worth align. We work tirelessly every day, on shifts, on nights, and on call, devoting a large portion of our lives to the betterment of all. Ensure you are rewarded for your efforts and appreciated. While we maintain the health of the public, environment, and ourselves, don't be afraid to ask questions and learn, for it is in the best interest of all. Operations is a broad field with many dynamic components that not one single person can be expertly versed in. Each process and system has its own nuances and quirks that can only be appreciated and understood with time. Encourage growth, promotion, and communication. If something doesn't sound or look correct, speak up! Start from a good place and stand up for yourself, others, and the ecosystem. Don't tolerate friction in the name of progress and make sure that your energy is not wasted. At the very least, you can always learn from any situation and then make strides towards improvement.

What are some of your goals in your new position? We have the pleasure of operating a new plant, so the goals are many. There is a lot to be done when starting up a new process and fortunately we have an exemplary staff team along with other water treatment plants and their Operators in the Okanagan Valley. They have already contributed time and effort via visits, ideas, and past experiences to help with the goals of launching such a critical piece of infrastructure. The most important goal of highest priority is to develop a safe, inclusive, and transparent workplace and team while delivering drinking water of superior quality every day to the public, while also minimizing the impact to our environment at a fiscally responsible pace. We will implement and introduce over the near future an asset management and preventative maintenance program, critical spare inventory, safety programs, process modifications and expansions, safe operating and emergency response procedures in addition to open lines of dialogue and communication with our regulatory agencies. The ultimate goal is to be a finely tuned, well oiled, rock solid, and unwavering in any circumstance or condition process. A stalwart institution similar to the fine water treatment plants that surround us.

'Who's on the move' continued on page 13

MATH FOR WASTEWATER

Solving for the Food to Microorganism Ratio (F–M Ratio)

By Chris Kerman, AScT PO CWWP

The Food to Microorganism Ratio calculation is a way to determine how much oxygen depleting waste (BOD_5 or Food) was available compared to the concentration of bugs (Microorganisms) in your secondary treatment process. As we all know every wastewater treatment plant is a bit different. A range of F-M results will tend to give your plant good secondary effluent quality. If you operate outside of this range at either end the effluent quality will be poor. That means if you don't have enough biomass or if you have too much biomass compared to the available food in your process floc formation will suffer and your effluent will have more TSS than if the plant was operating inside the desired range for its F-M. A low F-M tends to produce desirable results. For this example, our plant found that 0.20 to 0.50 kg/day of BOD_5 per kg of MLVSS produced the best secondary effluent quality.

In order to complete the calculation, you need the results from a BOD_5 test. You need to do a MLSS test and then cook that in a furnace to collect the data for a MLVSS test results. You will also need to know the volume of your Aeration tank and the flow to the Aeration tank. Once you have all that information you will know how many kg of food you had going into the Aeration tank and you will know how many kg of microorganisms (biomass) you had in your Aeration tank to consume the food.

In my previous math question Solving for The Sludge Volume Index (SVI) I provided some basic instructions on the lab process used to run the tests. To simplify, the test method details will be omitted. YouTube has lots of videos showing lab test methods for wastewater. If you are unfamiliar with a test method, I would suggest that as a good resource.

In order to get the full biomass in your secondary process you would need to know what you have in your secondary tanks. You can find this out by checking your sludge blanket level, by getting the solids concentration of the Return Activated Sludge and then calculate the volume of secondary sludge based on the known area of the clarifier. This will not be included in the F-M Ratio calculation that follows but here is how you get those kg. Low sludge blankets will result in a negligible change in your final F-M Ratio results. If you have a circular clarifier you need to calculate the area of a circle. If you have a rectangular clarifier you need to calculate the area of a rectangle.

Area of Circle = 0.7854 X D^2 **Area of Rectangle = L X W**

The diameter of our circular clarifier is 15 m

A = 0.7854 X 15m X 15m = 0.7854 X 225 m^2 = 176.7 m^2

The Length and Width of our rectangular clarifier is 20 m and 10 m respectively.

A = 20 m X 10 m = 200 m^2

Now we need to know our sludge blanket level to get the overall volume of solids in the clarifier. The average sludge blanket level was 2.5 cm. We need to get the cm into m to get a sludge volume in m^3.

V = m^2 X m

We will now convert our cm to m by canceling out our units.

2.5 cm X $\frac{1\ m}{100\ cm}$ = 0.025 m

V for circular clarifier = 176.7 m^2 X 0.025 m = 4.42 m^3

V for rectangular clarifier = 200 m^2 X 0.025 m = 5 m^3

We want our volumes in L. 1 m^3 = 1000 L

We need to convert our m^3 to L by canceling out our units.

V for circular in L = 4.42 m^3 X $\frac{1{,}000\ L}{1\ m^3}$ = 4,420 L

V for rectangular in L = 5 m^3 X $\frac{1{,}000\ L}{1\ m^3}$ = 5,000 L

Finally, we need to collect a sample of the RAS and cook it to get the percent solids concentration. The test results came in at 1.2%. 1% solids are equal to 10,000 mg/L. That means that our sample at 1.2% solids is equal to 12,000 mg/L. The sludge sample is then fired in the furnace to find out the volatile content. The results come back at 9,000 mg/L. Finally, we need to take the known sludge volume and multiply that by our known concentration to get the kg in our secondary tank. Again, to get our results in kg we will convert by canceling out our units.

kg circular = 4,420 L X 9,000 $\frac{mg}{L}$ X $\frac{1\ g}{1{,}000\ mg}$ X $\frac{1\ kg}{1{,}000\ g}$ = 39.78 kg MLVSS

kg rectangular = 5,000 L X 9,000 $\frac{mg}{L}$ X $\frac{1\ g}{1{,}000\ mg}$ X $\frac{1\ kg}{1{,}000\ g}$ = 45 kg MLVSS

We will discuss the above information later in this example.

The formulas used to calculate the BOD_5 and MLVSS are below

BOD_5 = Initial DO mg/L – DO after 5 days mg/L X 300 mL ÷ sample volume used mL

BOD_5 = 8.67 mg/L – 3.67 mg/L = 5.00 mg/L X $\frac{300\ mL}{8\ mL}$ = 187.5 mg/L

MLVSS = Dried Solids and filter weight (from MLSS test) – Ash and filter weight (after cooking in furnace)

MLVSS = 6,137 mg/L – 4,487 mg/L = 1,650 mg/L

The formula used to calculate the F-M ratio is below

$$\frac{BOD_5 \frac{\text{kg}}{\text{day}} (\text{primary effluent})}{MLVSS\ kg\ (\text{aeration tank})}$$

(If you wanted to include the Secondary Clarifier solids inventory you would add those kg to the aeration tank kg)

'Math' continued next page

Collect the Primary flow and MLVSS data on the same day that the BOD_5 for the Primary effluent gets put on. This way all your numbers are related to that day. Once you have enough data points to trend with your final effluent TSS you can find a good operating range.

The Primary effluent flow to the Aeration tank was 15 MLD
The volume of our Aeration tanks is 3.5 ML
The Primary effluent BOD_5 was 187.5 mg/L
The MLVSS result was 1,650 mg/L

For the BOD_5 loading we will multiply the Primary effluent flow with the mg/L of BOD_5. The same goes for our Biomass, we will multiply the Aeration tank volume with our mg/L of MLVSS. We need our results to be in kg/day and kg. We will convert our units by canceling them out.

Primary effluent BOD_5 kg/day =

$$\frac{15{,}000{,}000\ \cancel{L}}{1\ Day} \times \frac{187.5\ \cancel{mg}}{1\ \cancel{L}} \times \frac{1\ \cancel{g}}{1{,}000\ \cancel{mg}} \times \frac{1\ kg}{1{,}000\ \cancel{g}} = 2{,}812.5\ kg/day$$

Biomass in Aeration Tank MLVSS kg =

$$\frac{3{,}500{,}000\ \cancel{L}}{1} \times \frac{1{,}650\ \cancel{mg}}{1\ \cancel{L}} \times \frac{1\ \cancel{g}}{1{,}000\ \cancel{mg}} \times \frac{1\ kg}{1{,}000\ \cancel{g}} = 5{,}775\ kg$$

We have 2,812.5 kg/day of BOD_5 for our biomass of 5,775 kg to consume. Let's put those in the formula and solve for the F-M Ratio

$$\text{F-M Ratio} = \frac{2{,}812.5 \frac{kg}{day} BOD_5}{5{,}775\ kg\ MLVSS} = 0.49$$

The bulk of our solids are in the aeration tank, the final F-M Ratio barely changes if you include the solids in our secondary clarifiers into the total kg of MLVSS. In this example it is a bunch of extra work to get a number that doesn't really change the F-M.

What does an operator do with this information?

First let's look at our BOD_5 results. They look a bit high for primary effluent. Is your plant influent BOD_5 higher than normal? Is there something going on in the primary tanks? Are the sludge blankets too high? Are they being hydraulically overloaded? If you can reduce the BOD_5 loading your F-M Ratio will get smaller. Maybe you can pump your sludge blanket levels down and reduce carry over? If the Primary effluent had 130mg/L of BOD_5 and we kept the same MLVSS the F-M ratio would be 0.33.

We are very close to the limit of our high range for what produces good quality effluent with the F-M being 0.49. Another way to bring the F-M Ratio down is to decrease our secondary sludge wasting to build more biomass. For instance, if we had 6,800 kg of MLVSS (1942mg/L MLVSS) our F-M ratio would be 0.40.

Until next time, Keep your pipes full of sludge and your effluent clear!

'Who's on the move' continued from page 11

What has the impact of COVID-19 been on your organization? Challenging and ever changing. We are working diligently to adapt and integrate safety measures to ensure the health of our staff and the public.

What do you do in your spare time? I am very much looking forward to the upcoming ski season and hope to put many more kilometers on my downhill and cross country sets. In the summer I enjoy camping, hiking, golfing, and gardening. Throughout all seasons I like traveling, wine tasting, and love excursions with our doggy Scout. My waistline doesn't appreciate it but I like to cook and bake which is probably why I've recently taken up Pilates. You can also catch me reading the latest version of EOCP's Operator Digest of course!

STATISTICS

1st July to 30th September 2021

EOCP
Environmental Operators Certification Program

EXAM STATISTICS

206 exams taken

77 exam sessions

FACILITIES

119 facilities re/classified

CONTINUING EDUCATION UNITS (CEUs)

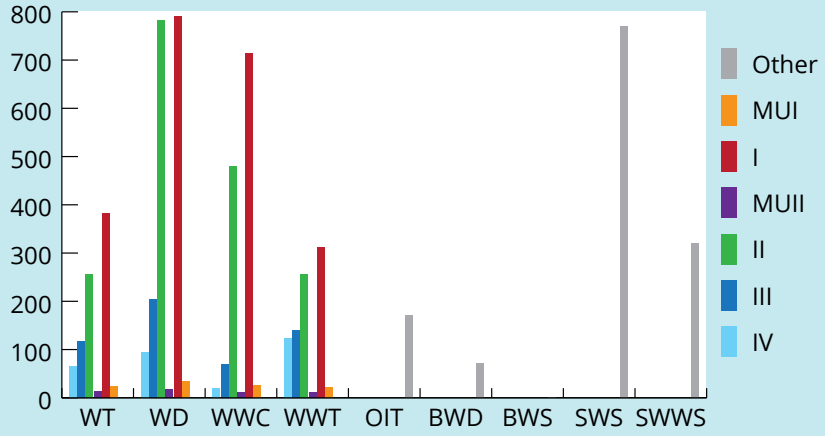
775 Operators submitted CEUs

1,324 CEUs were earned

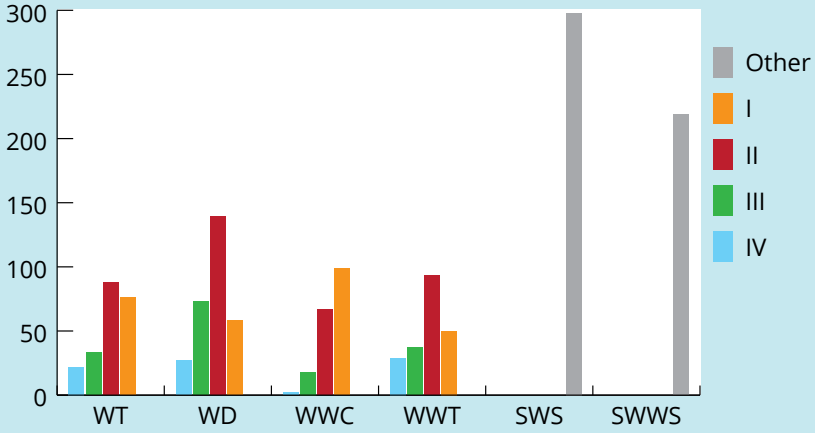
DEFINITIONS

WT	Water Treatment
WD	Water Distribution
WWC	Wastewater Collection
WWT	Wastewater Treatment
OIT	Operator In Training
BWD	Bulk Water Delivery
BWS	Bulk Water System
SWS	Small Water System
SWWS	Small Wastewater System
MU	Multi Utility

Operator Certification



Facility Classification



Two Months to Go until the end of the CEU reporting period. Please make sure to submit your course certificates before December 31, 2021. Check your Operator status by logging into your profile at https://crm.eocp.ca/ and clicking on **ACCOUNT** to see if your 2021 dues have been paid, and **CEU** under the LEARNING STATUS tab to see if your CEUs have been met.

If your CEUs have not been met for the 2018-2019 reporting period, or your 2021 dues have not been paid your status will be red flagged and you will be listed as not certified.

OPERATOR CONTINUING EDUCATION DAY

November 17, 2021 | Anvil Centre, New Westminster, BC

Earn CEUS at an interactive event for operators on equipment, techniques and processes for situations in the field.

Join us this November for education sessions, hands-on equipment demonstrations and plenty of networking opportunities in a relaxed atmosphere. The Operator Continuing Education (CEU) Day will provide you with relevant and engaging continuing education that helps fulfill your CEU requirements while connecting you with others in your field.

Programming is designed for operators from all water and wastewater disciplines from small to metro-sized facilities and all levels of experience.

REGISTRATION	RATE
BCWWA Member	$249
Non-member	$379

After attending this event, you will better understand:

- Techniques for maintenance, including disassembly, inspection and reassembly, and troubleshooting on a wide variety of water and wastewater equipment.
- Approaches for dealing with various distribution, collection and treatment problems in your system.
- Benefits and application of various types of water and wastewater treatment.
- New equipment used in the water sector.

This event is expected to provide 0.6 CEUs for Environmental Operators Certification Program (EOCP) certifications.

Register at https://bit.ly/2X2yybW by November 10, 2021!

UPGRADE YOUR SKILLS. ADVANCE YOUR CAREER.
Find more information at https://bit.ly/2X2yybW

BCWWA
BC WATER & WASTE ASSOCIATION