

## Questions and Answers from OMWA COVID-10 Webinar

1. Are there any specific recommendations for the collection systems and operators? Specifically addressing pump maintenance, system blockages etc. ...The presentation states that workers should not enter manholes unless “critical”. Please elaborate. ...The recommendation is to currently not enter into manholes. As sewer flushing can create a mist would it be safe to say this practice should also not be completed unless essential, and that if required, operators wear suitable PPE?

We do not have evidence that sewage is COVID19-free. On the contrary, cases have been documented where the virus has been found in stool samples from infected individuals. Therefore, work around sewage conveyance and equipment must follow all standard precautions as if the virus is present. If the work is non-essential (for example, setting a flow meter in a manhole or in a lift station), then that activity should not be done. Essential work may include failures in the system such as a pump failure at lift station (causing a backup that could get into someone’s home) or a CSO that is overflowing causing sewage discharge to a receiving stream. During such work, all precautionary measures with respect to PPE and other protective measures (disinfecting handrails, for instance), and such should be done. It should be noted that because agitation of waters occurs in sewers, manholes and in treatment plants, there is the possibility that an active virus could find its way onto surfaces outside the water environment (like handrails, steps, doors, etc.) and here again, the obvious precautions of disinfecting those surfaces frequently should be practiced.

2. We have staff that need to go into wells to clean screens in wastewater- what specific PPE do you recommend, what type of mask or face shield... What type of masks?... I am still wondering about masks specifically- what type of mask are sufficient to prevent exposure especially in wet wells when sewage is flowing and aerosolized. the answer is still not clear.

N95 respirators and surgical masks (face masks) can reduce transmission of COVID-19 when used properly. Further, eye protection should be worn. A coverall could help to prevent transmission by clothing. Disinfecting footwear could also help prevent transmission. Gloves could be worn or sufficient washing of hands (20 seconds, front, back and between fingers) and avoiding touching the face should be practiced. See <https://www.fda.gov/medical-devices/personal-protective-equipment-infection-control/n95-respirators-and-surgical-masks-face-masks>

3. We have an Extended Aeration Plant that is totally enclosed. With Covid-19, what precaution do the Operators have to take?

The recommendation is PPE to prevent transmission of airborne droplets or settled droplets to their face or hands (e.g. gloves, face shields or masks and goggles/eye protection if face shields are not available). Review webinar for recommendations on how to apply and use face masks. Changing of all PPE and clothing when leaving the site, as well as washing hands. Washing down of commonly touched surfaces with at least soap and water or other disinfectant between staff.

4. Are there measurements of any infectious virus in the air in wastewater treatment plants? Any research showing operators have great rates of infection? We should emphasize that there is no evidence of transmission by aerosols generated by people. Aerosol transmission has not been demonstrated by the epidemiology. This is quite different from droplet transmission; droplets land on surfaces; aerosols flow with the air are dilute.

We are not aware of research related to infectious COVID-19 in the air at wastewater treatment plants, and these statements are correct – there is no evidence or documented cases of transmission by aerosols or otherwise at wastewater treatment plants.

5. Most PPE is not available for purchase as it is in extremely short supply (Masks, gloves etc.). Hospitals are prioritized for supply of these products.

Unfortunately that is true. In the absence of PPE, social distancing, covering coughs/sneezes, staying home when ill, frequent handwashing, and avoiding touching ones face are recommended. A company in Ontario may be mass producing face shields. <https://www.cbc.ca/news/canada/kitchener-waterloo/inksmith-covid-19-face-shield-mask-health-1.5507989>

6. What about the effectiveness of Virus Removal via Ozone? Ozone is a much more powerful oxidant than UV and Chlorine.

It is expected that COVID-19 will be more susceptible to ozone than other human viruses. This is reviewed in the Health Canada guidelines for drinking water on enteric viruses.

7. Please confirm that chloramination (standard wastewater chlorination approach) can still be effective and protective of public health despite being less effective than free chlorine. For example, the CT of most systems ranges from 100 to 500 mg/L-min depending upon the current flow rates.

As shown in the webinar, a literature summary by Tchobanoglous et al. (2003) found that a chloramine CT of 300-400 is generally estimated to be effective for the inactivation of 2-log (99%) of viruses. Wastewater disinfection is typically designed and operated to meet effluent criteria with respect to bacteria or *E. coli* limits.

8. The whitepaper indicates a dose of between 40 - 199 mJ/cm<sup>2</sup> can inactivate adenoviruses. while 44 mJ/cm<sup>2</sup> can inactivate poliovirus etc. Would you say that 44 mJ/cm<sup>2</sup> is an appropriate UV dose in order to inactivate the coronavirus.

These values were pulled from the Health Canada guidelines for drinking water on enteric viruses – which includes a literature summary of peer-reviewed studies on the susceptibility of enteric viruses to various water treatment processes. It is expected that COVID-19 is not more resistant to disinfection processes practiced at drinking water treatment plants than other human viruses based on its structure and two inactivation studies which compared other coronaviruses to common indicators for pathogen inactivation (cited in the webinar). Therefore, if a system is designed to achieve 4-log inactivation of viruses, it is expected that this level of inactivation (or more) would be achieved for COVID-19 when the process is operated and monitored as designed and approved.

9. As the virus does not replicate outside a host and is not "alive" on its own, what causes it to, for lack of a better term "die off" in the number of days it is found to last? ...What causes it to become inactivated?

Enveloped viruses can become inactivated outside of a host by several mechanisms. Damage to the viral genome (RNA or DNA) could render it unable to cause infection or reproduce; or damage to the envelope could prevent it from entering a host cell and cause infection. Damage to the genome can occur by UV light from the sun or a water treatment process. Damage to the envelope can happen from biological activity of other organisms that may see that protein/phospholipid envelope as a food source; heat or thermal inactivation; or chemical oxidation as a few examples.

10. Regarding virus survival in dechlorinated water, can this be passed between persons swimming in a lake?

The transmission of COVID-19 through water is not known. Currently, there are no known cases of transmission from water.

The information available indicates that coronaviruses may persist in fresh water similar to other human viruses or less. However, extra precautions may be warranted at this time due to the severity of this illness and the importance of minimizing transmission. Extra precaution is warranted if there is a nearby sewage discharge to a surface water.

11. I operate a lagoon system, with a filtering system at the end of the process. Wondering and assuming the wastewater would have to be quite turbulent or falling from one channel to the next to create droplets. The actual ponds would not be a hazard.

If the system is not producing droplets, then it is expected that working in the vicinity of a system of this type would be low to no risk of contracting COVID-19 from the lagoon.

12. If COVID-19 is suspected to be present in feces, and possibly at wastewater treatment plants, how can we ensure authoritative agencies (WHO, CDC, Public Health) are aware of Stantec's research findings, can validate this concern and amplify this messaging? Many municipalities take direction from these authorities and may not be able to take action if these authorities don't issue these same warnings out to the municipalities.

The research findings presented in the webinar are supported by peer-reviewed literature that are available to regulatory agencies. These findings are preliminary and the recommendations were based on a conservative approach with the goal of protecting the health of operators and the public with respect to water and wastewater treatment.

13. Is there a means to test the wastewater in our plant to determine if it is in our wastewater stream. ... How long will it take to have results of WWTP effluent tested for Covid19 and should WWTP be doing this?

We are not aware of accredited laboratories offering these services for water samples or the water industry. The molecular and cell-culture methods used in the studies cited in the whitepaper and webinar presentation could possibly be replicated. The common methods for detecting viruses in water (mentioned in the webinar) have issues with sensitivity and specificity. For example, both culture methods and molecular methods can have issues with poor detection limits, false-positives, and false-negatives. Wastewater typically has a range of substances that can interfere with these analyses and complicate isolating the virus (or genetic material) from the sample for analysis.

Molecular methods typically produce results faster than cell culture methods. For example, molecular results could be produced in a matter of hours or 1-2 days; whereas cell-culture results could require weeks or longer to observe the "plaques" (i.e. cytopathic effects) in the cell line which indicate the presence of infectious virions.

14. Should WWTP that disinfect seasonally look into starting disinfection process earlier?

This is a decision that would be made by the regulatory agency. A risk assessment could be performed on a site-specific basis by the regulatory agency to determine if this should be re-evaluated.

15. Interesting re: finding of virus in untreated wastewater. Not sure how costly and quickly can be done. But could be a useful secondary indicator of population exposure as individuals both symptomatic and asymptomatic shed the virus. An aspect in which the water/wastewater sector could help the health epidemiologists in managing these types of health events.

Yes. Analyzing the constituents of wastewater could provide clues to the behaviours of a population and ailments.

16. City Quinte West actively tests Clostridium Perfringens in its raw water source at each municipal water plant as an indicator organism for cryptosporidium. Is this a good indicator for coronavirus as well?

Correlations between COVID-19 and other human pathogens or indicators in the urban water cycle are unknown at this time.

17. How should environmental COVID-19 studies be designed?

Environmental studies that take a risk-based approach would require information on the following: 1) the load and variability of viruses entering the environment; 2) the sources of transmission; 3) the risk of being exposed to the virus; 4) the “infectious dose” (or the number of virus particles required to cause infection); 5) the persistence of the virus in the environment; and 6) the efficacy of treatment to inactivate the virus. To gather this information, a collaborative approach should be taken with both epidemiological data, laboratory experimental and surveillance data, and desk-top analyses.

18. What concentration of COVID 19 is found in municipal stormwater and are they are at dangerous levels for workers?

There is insufficient evidence to support an answer to this question at this time.

19. Can you comment on the infectivity through HVAC systems, considering retention in air (3 hours)?

This is beyond the scope of this review. The study that looked at persistence in air used experimental aerosols which are much smaller (and persist for longer in the air) than those that would typically be produced or transmitted by an infected individual.

20. Should washing and embalming of COVID-19 be avoided or prohibited to avoid the increase of the virus into sewage. Suggest these decedents be placed in waterproof body bags and interred or cremated?

Our expertise in this area are limited. It is expected that substantial changes in pH would render the virus non-infectious.

21. If you have gastrointestinal issues, ie diarrhea or vomiting do you get better before coming down with the respiratory issues or does it progress as one illness?

This is beyond the scope of this review.