The Water and Wastewater Lab's COVID-19 Update

Waterborne Infectious Disease Outbreak Control (WIDOC) subcommittee
Disinfection and Public Health Committee
What the water lab needs to know

- Background
- COVID-19 virus nomenclature
- Multiple shedding routes
- Detected by molecular methods or cell culture
- Its RNA has been found in body secretions, wastewater and surface water
- Many unknowns remain
Why do we think wastewater treatment is effective?

**Inactivation requirements**
Treatment plants were designed using QMRA and process performance data with non-enveloped enteric viruses, which are more or equally resistant to disinfection than coronaviruses (Wigginton and Boehm, 2020).

**Conventional treatments**
Conventional oxidation (e.g., hypochlorite, PAA) and UV irradiation should be effective at inactivating coronaviruses (CDC, 2020). Large single stranded RNA makes coronavirus very susceptible to UVC (Wigginton and Boehm, 2020).

**PROCESS DESIGN**

**COLLECTION SYSTEMS**
Survival of infective virus unknown
COVID-19 virus RNA is present in feces but it remains unclear whether infective virus is present. WEF, CDC and WHO believe that wastewater is not a significant route of transmission.

**MULTI-BARRIER APPROACH**
Primary and Secondary
Every stage of treatment, retention or dilution controls additional microorganisms (Sano et al., 2016)

**DISINFECTION**

**MONITORING**
Traditional Parameters
Monitoring parameters like E. coli, UVT and total free chlorine are predictive of process efficacy (Wang et al., 2005; Gundy et al., 2009; Bibby et al. 2017).
Risk to our laboratory staff
Hazard assessment
How much COVID-19 virus is present and infective?

Exposure assessment
How much contact with infective COVID-19 virus would the worker have (frequency, route, duration of exposure)?

Mitigating risk
- Safe work plans, SOPs and hazard assessments for routine and non-routine tasks
- PPE use and maintenance
- Cleaning your space
- Standard hygiene practices as per CDC/OSHA

Highest potential of virus survival:
- Collection system samples (drainage or By-law samples)
- Stormwater or CSO samples
- Raw (or primary influent) samples

Highest risk activities:
Potential of splash (known effect)
- Sample homogenization or blending
- Subsampling
- Microscopy (wet mounts)

Potential of bioaerosols (unknown effect)
- Vacuum filtration
- Vortexing without caps

Potential of fomite contact
- Sample receiving
- Lab benches, surfaces, chairs, keyboards
- Shared instruments
- Lab coats and PPE
How to Stay COVID-19 Free at the WRFF

- **SEWAGE IS FILTHY**
  - Good hygiene and PPE protect workers from most infections

- **WASH YOUR HANDS WELL**
  - With soap and water for 20 seconds or sanitizer with at least 60% alcohol

- **DO NOT TOUCH YOUR FACE**
  - Do not touch eyes, mouth, nose or cuts when handling sewage

- **WEAR PROPER PPE**
  - Make sure you wear waterproof gloves and rubber boots

- **CLEAN DIRTY SURFACES**
  - Clean frequently touched surfaces with 70% ethanol or 0.5% chlorine

- **HAZARD ASSESSMENTS**
  - Consider biological hazards before performing a task

- **REMOVE DIRTY CLOTHES**
  - Soiled clothes should be removed before eating or leaving work

- **EAT IN CLEAN AREAS**
  - Eat, smoke or chew gum in designated clean areas

- **COVER SORES AND CUTS**
  - Use clean, dry bandages to cover cuts, wounds and sores

- **WASH HANDS**
  - After handling sewage, before eating, before and after toilet use

- **FLUSH EYES WITH WATER**
  - If sewage splashes in your eyes, flush with clean water

- **LAUNDER WITH CHLORINE**
  - Launder work clothes at the end of the day with 0.05% chlorine