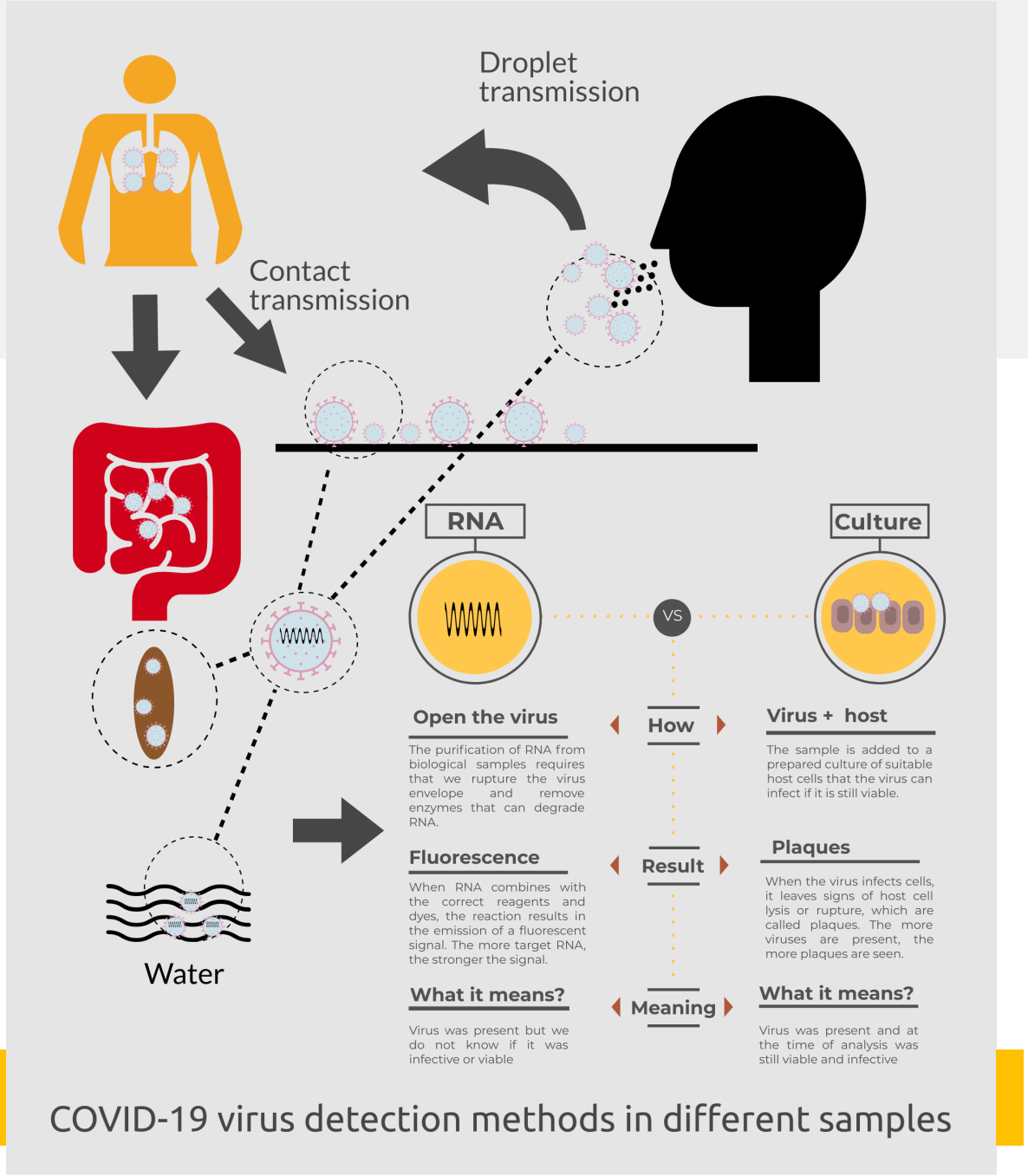
The Water and Wastewater Lab's COVID-19 Update

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



COVID-19 virus detection methods in different samples

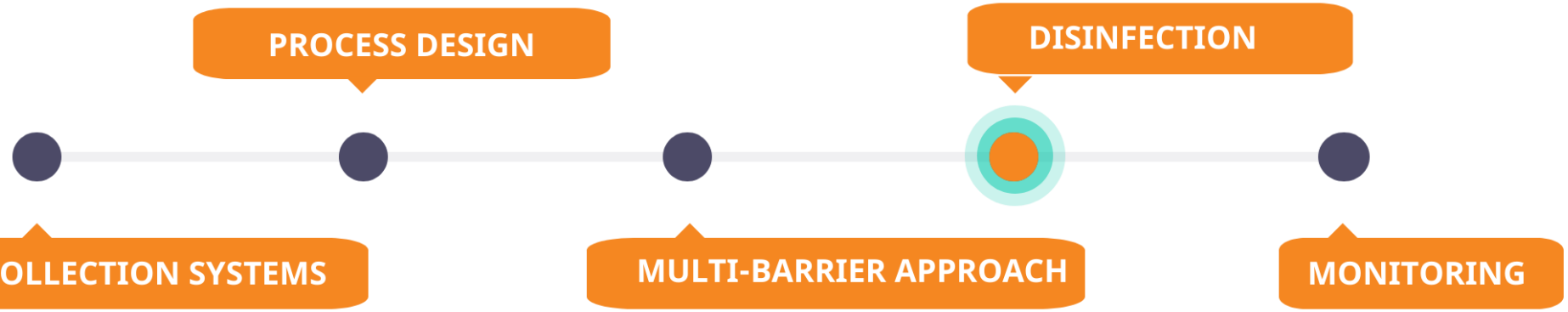
Why do we think wastewater treatment is effective?

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)



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.

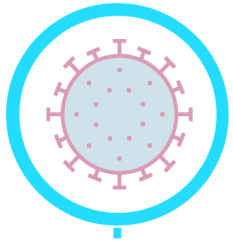
Primary and Secondary

Every stage of treatment, retention or dilution controls additional microorganisms (Sano et al., 2016)

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)?

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

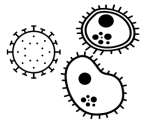
Potential of fomite contact

- Sample receiving
- Lab benches, surfaces, chairs, keyboards
- Shared instruments
- Lab coats and PPE

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

How to Stay COVID-19 Free at the WRRF



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

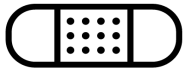
Consider biological hazards before performing a task

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

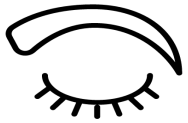


COVER SORES AND CUTS

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