

SEWAGE SURVEILLANCE FOR CORONAVIRUS UNIVERSITY OF ARIZONA WEST CENTER ANALYSIS FACT SHEET

With advanced laboratory capabilities and expertise in Coronavirus research, WEST is able to perform coronavirus sewage surveillance for any interested Wastewater Treatment Plant (WWTP). Such monitoring will provide insight into the presence of COVID-19 in a community regardless of whether or not infected individuals show symptoms of the disease. Additionally, monitoring of wastewater will quantify any potential risk of infection to wastewater treatment workers.

OVERVIEW

- In the provided service, WWTPs collect samples of sewage, treated effluent, or combined sewer overflow. Samples are then sent to WEST Center for analysis.
- Samples will be assayed by qPCR for Coronavirus. The U.S. Centers for Disease Control and Prevention has developed a reverse transcription real time polymerase chain reaction assay (RT-qPCR) assay for detection of SARS-CoV-2. Using this method, the data can be used to determine:
 - 1) When and if the new coronavirus enters a metropolitan area.
 - 2) The concentration that can be expected in the untreated wastewater and potential risk to wastewater treatment workers.
 - 3) Removal of the virus by the treatment process.
- The molecular method (qPCR) will be used to provide initial presence/absence information on Coronavirus. Detection of N2, the low copy number RNA target, provides information on concentration. The presence of N2 indicates higher levels of the virus or viral nucleic acid in the wastewater.
- WEST Center has both the cell culture/cell lines and Coronavirus controls (Coronavirus 229E) to determine viability. If no Coronavirus is present, no further testing is necessary. If Coronavirus is detected, infectivity may be determined via cell culture, and positive cell culture samples confirmed by an additional qPCR test (additional service request/fee)

SAMPLING & ANALYSIS SCHEDULE

- WEST Center laboratories remain open. However, social distancing affects laboratory operations and scheduling of analysis.
- WEST can receive up to 5 samples per participant week, preferably on Tuesdays & Thursdays.

SAMPLING PROTOCOL

The University of Arizona (U of A) SOP to recover and concentrate viruses is as follows:

1. For wastewater samples (<1L), prepare for collection in a 0.5 to 1.0L- sterile polypropylene bottle [Additional 1.0L bottle(s) required if requesting field blank and/or matrix spike. Duplicate bottle of sample material if matrix spike; distilled water transferred to sterile bottle at time of collection for field blank].
2. Collect samples wearing gloves and fill the bottle within two inches of the top.
3. Recap the bottle and seal the cap by wrapping with duct tape or parafilm paper.
4. Label the bottle with sample location, type and date.

5. Place the bottle in two Ziploc bags (doubled up layer).
6. Place the sample in an ice chest with ice packs.
7. If the sample has been recently collected there is no need to freeze it.
8. Please keep the sample in the fridge and ship to U of A WEST Center for next morning delivery
9. If you require sampling supplies, provide U of A with a Fedex or UPS account number for shipping of supplies. *This information will be requested in the project enrollment form.*

Ship samples to: University of Arizona - WEST Center
Attn: Dr. Walter Betancourt
2959 W Calle Agua Nueva
Tucson, AZ 85745

RESULTS

- Participating WWTP will receive test results within 2 weeks after WEST Center receives sample(s).
- Results may be combined for presentation and/or publication by U of A researchers. Results from individual sites will not be associated with specific WWTPs without prior approval.
- When possible and at a later date, sewage surveillance data will be correlated with the number of COVID-19 cases in the service area on sampling dates. Correlations may provide insight into community prediction and monitoring for the illness.

COSTS

- Untreated wastewater or secondary effluent (<2L) initial qPCR: \$350/sample
- Digestive sludge and primary sludge (Ultrafiltration): \$500/sample
- Tertiary effluent (NanoCeram filtration) plus equipment blank (EPA guidance - method 1615): \$1,140/sample
- Matrix spike analysis: \$350/sample
- Field blank analysis: \$350/sample
- Shipping of sampling materials/kits (if needed): Based on actual costs, typically \$40-\$60/shipment
- Infectivity analysis -- **Available June 2020**
 - Infectivity (viability) assay via cell culture: \$1000/sample
 - For 'Positive' cell culture samples, confirmatory PCR: \$250/sample

The UA Administrative Cost (18% of total) will be charged at time of invoicing.

For additional analyses options and pricing, contact Dr. Ian Pepper (contact info below).

RESEARCHERS

Dr. Walter Betancourt: Ph.D., Environmental Virologist with over 15 years of experience in methods for the recovery and molecular detection of human pathogenic viruses in environmental matrices.

Dr. Ian Pepper: Ph.D., Environmental Microbiologist with over 45 years of experience in wastewater treatment, land application of biosolids and fate and transport of microbial pathogens.

Dr. Charles Gerba: Ph.D., Environmental Virologist with over 45 years of experience in risk assessment and survival of viruses in environmental matrices.

CONTACTS

For technical/analysis questions:

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