

# Frequently Asked Questions Regarding COVID Wastewater Surveillance

## **What is the New York Wastewater Surveillance Network?**

The New York Wastewater Surveillance Network is a collaboration between Syracuse University, SUNY ESF, SUNY Upstate, and the New York State Department of Health. The network began analyzing wastewater for SARS-CoV-2 in early March of 2020 shortly after Medema and colleagues documented the feasibility of tracking coronavirus transmission through wastewater in the Netherlands. Participating counties and wastewater treatment plants provide wastewater samples, lab analyses are conducted at contracted laboratories, and trends and maps are provided back to the county to guide response to the coronavirus pandemic. Counties that have participated include Albany, Cayuga, Cortland, Erie, Jefferson, Madison, Monroe, Oneida, Oneonta, Onondaga, Orange, Oswego, Saratoga, Steuben, and Tompkins. Other counties and municipalities have also engaged in wastewater surveillance and are being invited to join the state network.

## **Why are you measuring COVID-19/other substances in wastewater?**

Wastewater can be measured for RNA from SARS-CoV-2 for the early detection of COVID-19 and asymptomatic cases. Wastewater analysis is also an effective tool to measure drug use in the area that each sewershed covers.

## **How is wastewater surveillance used to track COVID-19?**

Wastewater epidemiology uses markers in raw wastewater to gather data on the population served by a wastewater treatment plant. Successful studies have focused on pharmaceuticals and drugs, to name a few. The disease known as COVID-19 is caused by the SARS-CoV-2 virus. Wastewater surveillance for SARS-CoV-2 is based on the knowledge that infected persons shed the viral particles in their feces. To date, all published research indicates that the virus is inactivated (it is no longer infective) as it passes through the intestines, but the RNA fragments remain and can be detected in wastewater. CDC reports no substantiated transmission of SARS-CoV-2 to humans via fecal transmission. Wastewater surveillance has appeal because a single sample can 'test' a large population, it picks up both asymptomatic and symptomatic individuals, and it detects the virus about 7 days ahead of clinical reports.

## **How will these data be collected and used?**

These data will be collected from each participating wastewater treatment plant. With more participants, we will be able to compare and measure the prevalence of SARS-CoV-2 over each area. The data will also be used to monitor trends of both reported and unreported cases via

viral concentration of SARS-CoV-2 in each sewershed. Such will be further used to make decisions regarding intervention and community guidelines.

### **Why monitor wastewater for viral gene copies?**

The increase of COVID-19 cases in communities is typically tracked by testing people with symptoms, an indicator that lags behind the actual spread of the disease. Because of this, there is a need to use early monitoring methods that estimate the disease's impact on the broader community. Research in the U.S. and elsewhere has shown that non-infectious RNA (ribonucleic acid) from the virus that causes COVID-19 (called SARS-CoV-2) can be excreted in the feces of both symptomatic and asymptomatic infected people and can be detected in wastewater as many as three to seven days before those infections lead to increases in case counts or hospitalizations. As such, monitoring raw wastewater in sewage collection systems can provide an early warning of disease increase in a community. Community and public health leaders can use this early warning information to make decisions about protective actions to help limit further spread of the disease before cases begin to occur.

### **What level of viral gene fragments can be detected in wastewater?**

When there are very low concentrations of SARS-CoV-2 RNA in the sample, or when there are considerable losses during sample processing, PCR methods cannot detect it. This "limit of detection" varies across participating laboratories due to differences in their methods but is typically around 1,000 RNA copies per liter of wastewater. Since measurements near this limit of detection have greater uncertainty and are not precise, the concentrations that can be accurately detected are slightly greater than this amount.

### **How are the gene copies measured in the wastewater?**

Wastewater samples are first processed to concentrate and isolate genetic material (RNA and DNA) that is present in the sample. Within this genetic material, RNA sequences specific to SARS-CoV-2 are then detected and quantified using a common molecular biology tool called PCR (polymerase chain reaction). During PCR, a targeted segment of the RNA (the N2 gene) is amplified (copied many times) so it can be detected by laboratory instruments and then counted. Specific methods for sample processing and PCR differ among the participating laboratories.

### **Can I compare results from one community with another?**

Comparison of the number of gene copies found between communities is discouraged due to the variability in wastewater flows and the various sources (industrial discharges or rainwater)

that can contribute to each community's wastewater flow. It is better to use the information to observe trends in the data at a location.

## **What are the protocols and standards for wastewater sampling for SARS-CoV-2 RNA?**

The development and use of standard protocols and methods for sampling and analyzing the waste are important to ensure the sample results are correct. More information on these standard protocols and methods can be found at <https://arcg.is/1PG0GPO>.

## **What do the results mean?**

There are several factors to consider when interpreting viral data in wastewater. Because scientists are still learning about the timing and rate of shedding of the virus RNA in feces of infected people, it is only appropriate to monitor and observe the trends of viral gene copies detected in a community over time. A significant increase in viral gene copies over time is an indicator that cases may be increasing in the community. Because infected individuals can continue to shed the virus RNA in feces for 20 to 30 days after they are no longer infectious, decreases in the number of viral gene copies in wastewater might lag behind decreases in cases in a community. Trends in viral gene copies should be considered along with community case numbers and other COVID-19-related data to inform decisions about taking actions to help limit disease spread.

## **Are the New York SARS-CoV-2 wastewater results available on a website?**

Information on surveillance activities is publicly available at the New York State website: <https://storymaps.arcgis.com/stories/b30ca571e00b42779875e3eaf7577b1b>. Up to date data and results can also be viewed at the statewide dashboard at this link: <https://mbcolli.shinyapps.io/SARS2EWSP/#>

## **Can COVID-19 be transmitted through sewage, wastewater and other similar environments?**

There is no evidence that water is a transmission route for the SARS-CoV-2 virus, which causes COVID-19. RNA fragments of the virus have been detected in sewage water, but they have a low probability of being infectious particles. Therefore, the presence of the SARS-CoV-2 virus probably poses small risks of acquiring COVID-19. Nevertheless, exposure to sewage wastewater has a (proven) risk of becoming infected by other pathogens, for which professionals working with sewage wastewater already have their (normal) personal protective equipment. Therefore,

RIVM and WHO (and other health services, such as US CDC) indicate that normal protection and hygiene measures are adequate.

### **Are workers at a wastewater treatment plant at risk for COVID-19?**

Based on current research, these virus fragments are not thought to be infectious at this sample collection point. The CDC states: “Recently, ribonucleic acid (RNA) from the virus that causes COVID-19 has been found in untreated wastewater. While data are limited, there is little evidence of infectious virus in wastewater, and no information to date that anyone has become sick with COVID-19 because of exposure to wastewater. Standard practices associated with wastewater treatment plant operations should be sufficient to protect wastewater workers from the virus that causes COVID-19. These standard practices can include engineering and administrative controls, hygiene precautions, specific safe work practices, and personal protective equipment (PPE) normally required when handling untreated wastewater. No additional COVID-19-specific protections are recommended for workers involved in wastewater management, including those at wastewater treatment facilities (<https://www.cdc.gov/coronavirus/2019-ncov/faq.html#Water>).

### **How can wastewater monitoring improve public health?**

This wastewater monitoring network will help local public health agencies to:

- Identify the presence of SARS-CoV-2 in a community and provide an early warning sign of an increase in cases,
- Alert affected communities and local hospitals/public health response agencies more quickly,
- Help measure the effectiveness of public health interventions, such as face covering mandates, vaccinations, etc. by observing long term trends; and
- Monitor populations at higher risk for COVID-19, such as those in congregate living facilities, and prevent further spread in these communities through early detection.

### **What are the benefits of wastewater testing for COVID-19?**

Wastewater surveillance can provide early detection for both asymptomatic and symptomatic cases of COVID-19. Because nearly 80% of United States households utilize municipal sewer systems, the establishment of a state and nationwide wastewater surveillance network can measure the trend of COVID-19 cases in the community that contributes to a wastewater treatment plant. If tested frequently, wastewater surveillance can serve as an indicator of the burden of COVID-19 in a community at any given time. Wastewater testing for SARS-CoV-2 is also beneficial in the respect that it serves as an indicator of levels of COVID-19 separate from access to individual clinical testing and healthcare, again to help decision-makers intervene more quickly to slow the spread of disease.

## **What are some long-term benefits of wastewater surveillance?**

Wastewater surveillance enhances the ability to understand and predict the number of COVID-19 infections within the community that each wastewater treatment plant covers. This is possible by comparison of wastewater surveillance data with other measures of COVID-19, such as test positivity rates. Wastewater surveillance also lends a better awareness of factors that may be affecting disease spread. It can also be used to detect other pathogens and substances, such as influenza, antibiotic-resistant bacteria, cannabis, and other drugs. The wastewater surveillance network will be beneficial in the future, given the introduction of another pathogen with pandemic-causing potential.

## **Are there privacy concerns with wastewater surveillance?**

A major advantage of wastewater surveillance as a source of data is that it is entirely anonymous and cannot trace to individuals or households. Wastewater sampling occurs at a treatment plant or influent point which provides a sample representative of an entire community or population and does not allow for identification of individual information. This means that information on drug use, disease presence, and socioeconomics can all be obtained with no burden to individuals while protecting their anonymity.