

What is wastewater testing?

Wastewater testing is a method of sampling untreated sewage and testing for the presence of infectious disease. Samples of wastewater are periodically collected from a location within a sewer system before reaching a treatment facility. This approach, which measures the health of a specific population, has a proven record to track community shedding of viruses such as polio, hepatitis A, and norovirus. This approach to measuring community health has been successfully applied locally and internationally for detecting SARS-CoV-2, the virus that causes COVID-19.

Why test wastewater for SARS-CoV-2?

Recent research indicates signature SARS-CoV-2 virus concentrations found in wastewater tend to increase before individuals in the community show signs or symptoms of COVID-19. This can help to provide an early warning of an increase in the number of infected people within a specific community often before they seek treatment. Wastewater observation works because infected people may start shedding virus in their stool a few days before they show any symptoms of disease or even if they never show symptoms.

Wastewater testing is increasingly being used to understand the spread of COVID-19 in specific communities. The Centers for Disease Control and Prevention (CDC) and the US Department of Health and Human Services (HHS), in collaboration with agencies throughout the federal government, initiated a National Wastewater Surveillance System in response to the COVID-19 pandemic.

More information on that effort and additional background information on wastewater surveillance is available at: <https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/wastewater-surveillance.html>

How frequently are you sampling and testing, and what is the process?

Wastewater is sampled once a week on three University of Maine campuses – Orono, Fort Kent, and the USM Gorham campus. A representative sewage sample is collected over a 24-hour-period to provide a composite sample. After collection, each sample is tested by a laboratory for the presence of SARS-CoV-2. The test uses a reverse transcription polymerase chain reaction (RT-qPCR) process that detects specific genetic markers from the SARS-CoV-2 virus. The samples sent for testing receive flow from campus buildings, including dormitories, as well as teaching, research, and administrative buildings. By testing weekly, we can track changes in the amount of virus over time.

Who does the testing?

UMaine associate professor of microbiology Dr. Robert Wheeler analyzes the wastewater samples from all three campuses using the IDEXX Wastewater Testing Kit, which relies upon the RT-qPCR process that detects specific genetic markers from the SARS-CoV-2 virus.

When we began testing wastewater in August, we partnered with CES, Inc., a Bangor-based engineering, environmental sciences and survey firm founded in 1978 by two classmates from the University of Maine, to collect wastewater for the fall semester. Initially, CES collected the samples on our campuses, then sent them to an environmental genetic testing laboratory for analysis. As of October 2020, the sample analysis was moved into Dr. Wheeler's lab, although CES continues to collect wastewater samples on University of Maine System campuses.

How long does it take to get the results back?

The current turnaround time is approximately three days from the time we start to collect a sample to the time we get the result. The University of Maine System moved sample analysis to Dr. Wheeler's lab in order to facilitate faster processing.

Given the delay in getting results, doesn't that mean the infected people will have time to spread COVID-19 before you become aware of it? Will you be able to respond in time to stop the spread?

Remember that physical distancing, symptom checking, face-covering requirements, and enhanced cleaning on campus are already responses in place to stop or contain the spread of the virus. Identifying an increase in SARS-CoV-2 virus in wastewater can be used to trigger additional measures such as more individual testing, increased cleaning, or other measures to limit the spread.

Who is interpreting the results?

The [University of Maine System Scientific Advisory Board](#) and Wastewater Testing Group work closely with officials from each campus to interpret the results and determine what actions, if any, are needed. The Scientific Advisory Board is made up of UMaine and USM faculty members and provides evidence-based information on the COVID-19 pandemic and serves as an expert resource to inform University of Maine System planning efforts. The Wastewater Testing Group includes additional faculty members with experience in wastewater and other types of environmental analysis, as well as representatives from Facilities Management and campus Incident Commanders.

If you find virus in the wastewater, what does that mean in terms of infections on campus?

The limit of detection is 5,000 virus equivalents per liter (vE/L), which means that anything below this level is not as certain as values above due to the way the RT-qPCR test works. Finding the virus in the wastewater indicates that it is present on campus. If levels are above the limit of detection and increase from week to week or day to day, this could mean that there are more SARS-CoV2-infected people on campus. Again, it is not possible to identify infected individuals through this type of testing because the sample comes from many people, but it can help us see overall infection trends and target our response.

What actions will you take if you find virus in the wastewater?

Wastewater testing serves as an early warning system that will allow campus Incident Commanders to increase their alert levels and may trigger additional actions such as increased testing of people on-campus who do not show any symptoms of infection. These results will be monitored by the Wastewater Testing Group, in conjunction with Incident Commanders, the Scientific Advisory Board, and the Safe Return Committee to determine what resources are necessary to take additional actions to prevent sustained community spread of COVID-19.

How is wastewater testing information released to the public?

Results are announced weekly as part of the University of Maine System's regular COVID reporting and posted online at <https://www.maine.edu/together/>.

Why aren't you testing the wastewater on all University of Maine campuses?

Wastewater testing requires a strategy to be able to measure a specifically defined population. In reviewing all University of Maine campuses, we found specific campus sewer systems are not set up in a way to facilitate sampling of campus wastewater before it mixes with wastewater from the surrounding communities. Sampling of these systems would produce results that would not be specific to a campus community. This would make the information less useful to monitor a campus community's health. We are exploring the possibility of expanding sampling and testing to other campuses where we can identify ways to appropriately isolate wastewater streams that would help us get an accurate picture of results specific to that campus community.

Do you test wastewater anywhere else?

We are working with the Town of Orono to test municipal wastewater collected once per week from the town's sewer and wastewater facility, which includes contributions from the UMaine campus and also the off-campus housing complexes where UMaine students live.

The cities of [Augusta](#) and [Portland](#) also have been conducting wastewater testing at their central wastewater treatment facilities, which would include any contribution from the campuses located in those cities.

What are the limitations of wastewater testing?

Wastewater testing cannot specifically define the number of infected people in a community. Different people are known to shed virus at different rates. Some people may not shed virus into wastewater at all. In addition, wastewater testing results are influenced by other flows into the wastewater system such as rainwater, wash water, and water associated with other campus processes.

Wastewater testing cannot identify any single person with a case of COVID-19. However, wastewater testing provides an insight into the health of a community. When measured

frequently and carefully interpreted, the information can be a tool alert us to unknown infections before they spread throughout a community.

Some other universities conducting wastewater testing:

Utah State:

<https://www.usu.edu/today/story/usu-will-analyze-campus-wastewater-for-signs-of-coronavirus>

Colorado University - Boulder:

<https://www.colorado.edu/today/2020/08/27/how-sampling-campus-wastewater-aims-keep-covid-19-check>

University of Arizona:

<https://west.arizona.edu/news/2020/08/west-monitors-wastewater-keep-campus-safe>

Syracuse University:

<https://news.syr.edu/blog/2020/06/04/155521/>

Virginia Tech:

<https://vtnews.vt.edu/articles/2020/09/researchers-expand-wastewater-testing.html>

UConn:

<https://today.uconn.edu/2020/08/storrs-campus-reopens-uconn-scientist-will-watching-wastewater/>