Fact Sheet

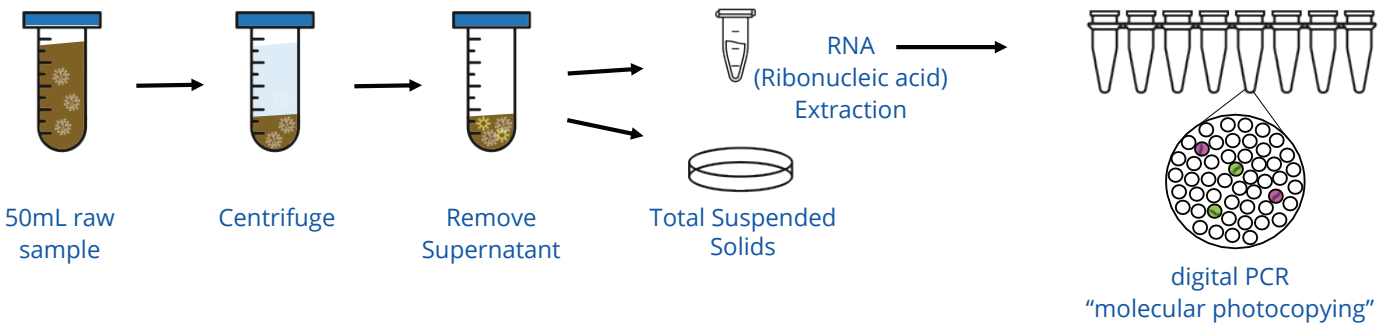
Metropolitan Water Reclamation District of Greater Chicago

January 19, 2021

Sewage surveillance: Detecting COVID-19

The Metropolitan Water Reclamation District of Greater Chicago (MWRD) remains committed to gaining a better understanding of the spread of the COVID-19 virus (SARS-CoV-2), while protecting the public health of the region. The MWRD is participating in numerous studies to help researchers gain a retrospective understanding of how COVID-19 spread in communities might be detected in sewers. Each day, the MWRD transforms an average of 1.47 billion gallons of water at seven water reclamation plants (WRPs) across an 882-square-mile area covering the majority of Cook County while managing stormwater to ensure the region's wastewater is cleaned and that public health and the environment are protected.

The MWRD's Monitoring and Research Department is currently collecting samples from six WRPs to support studies on sewage surveillance monitoring for COVID-19 and tracking its spread in the Chicago area. The risk of transmission of the virus through wastewater is low, but traces of viral RNA sampled in the water offer insight. An effective way to conduct COVID-19 monitoring is through community-level targeted monitoring of wastewater samples. Targeted monitoring can effectively survey communities for potential spread and hot spots and give public health agencies an edge in evaluating the presence of the virus and implementing additional strategies. The MWRD does not own local sewers that would allow it to conduct a detailed surveillance at the local community level, but the agency can collect wastewater samples flowing into its treatment plants via local sewers and the MWRD's intercepting sewers. The MWRD maintains the best quality control in sample collection to ensure reliable data production and assists with data interpretation and timely use of data to warn public health departments of possible outbreaks. The MWRD has assisted researchers to assess different sampling frequency and methods for concentration and quantification of virus genetic particles in samples.



Samples are shipped or transported locally to research partners where they perform the analysis steps, such as centrifuge, extraction, and polymerase chain reaction (PCR). The wastewater samples provided by the MWRD have helped researchers detect virus genetic particles at a higher concentration in solid samples than in liquid samples. (Image provided by Marlene Wolf, Stanford University)

Sewage surveillance studies

Research partners: Stanford University and University of Michigan. **Funder:** National Science Foundation (NSF). Since March 2020, the MWRD has been collecting and freezing samples each week and shipping them to researchers at Stanford University along with metadata associated with the samples and sewershed information about the MWRD's WRPs. Researchers are developing methodologies for detecting genetic markers of the COVID-19 virus in sewage resulting from feces shedding from symptomatic and asymptomatic patients at a community scale and using the data generated to develop models to predict the prevalence of COVID-19 in the community. The MWRD's samples are taken from both influent (raw sewage) and primary sludge solids at Stickney WRP. In the spring of 2020, samples from six WRPs were collected. This study also includes 49 wastewater treatment utilities across the United States.

Research partners: Argonne National Laboratory (Argonne), Northwestern University (NU), and the University of Illinois at Chicago (UIC). **Funder:** Walder Foundation. Beginning in October 2020, the MWRD started providing raw sewage and final effluent samples each week from the Calumet, Stickney, and O'Brien WRPs along with information about the MWRD's WRPs and collection system. There are goals to sample more frequently than weekly. Researchers have developed sampling and testing procedures and logistics among collaborators for the study titled: "Tracking SARS-CoV-2 in Chicago Area Waterways and nearshore Lake Michigan." The Argonne/UIC/NU team will then analyze samples, evaluate data and communicate findings to the local public health departments.

Project partner: AquaVitas LLC. **Funder:** U.S. Department of Health & Human Services (HHS). In December 2020, the MWRD's Stickney, Calumet, O'Brien, Kirie and Egan WRPs were approved to participate in a national sewage surveillance study with the HHS that includes approximately 100 wastewater treatment plants and covers about 10 percent of the population (approximately 36 million people) in Phase 1. Phase 1 of the study includes sampling, analysis, and uploading the analytical data twice per week for six weeks. An optional Phase 2 test will include additional sampling from approximately 320 wastewater treatment plants covering about 30 percent of the population for another 9 weeks. All seven of the MWRD's WRPs, including Hanover Park and Lemont, were accepted in January 2021 to participate in Phase 2 of the study.

Additional studies: The MWRD's scientists communicate regularly with the Illinois Water Environment Association (IWEA), the Illinois Association of Wastewater Agencies (IAWA), Water Research Foundation (WRF), the Water Environment Federation (WEF) and National Association of Clean Water Agencies (NACWA) to learn more about COVID-19, sewage surveillance, wastewater and biosolids analysis. The MWRD has also engaged with the U.S. Center for Disease Control (CDC), the Council for State and Territorial Epidemiologists and U.S. Environmental Protection Agency (EPA) on the potential of national wastewater surveillance programs and stands ready to be called on for additional research. The MWRD follows the guidelines of the CDC and Illinois Department of Public Health (IDPH) and consults with local agencies like the Chicago Department of Public Health and Cook County Department of Public Health on how to best utilize sewage surveillance data. In September 2020, the MWRD signed a letter of support to the California Association of Sanitation Agencies for requesting funding support for sewage surveillance for COVID-19 from several non-profit organizations.

Monitoring the water environment

The MWRD's Monitoring and Research Department employs 291 staff members, including many talented and essential lab technicians who sample and test the region's water and wastewater and ensure water quality meets the highest standards. At any given time, the MWRD encounters unpredictable and unique situations. COVID-19 is no exception. Monitoring and Research staff analyze groundwater, organic compounds and both wastewater entering the WRPs (influent) and clean water discharged from the WRPs (effluent) and shares its water quality analysis at mwrd.org/reports. The MWRD also collects monthly river water samples at 28 locations throughout Cook County. They then return these samples to the lab, where they analyze the water for dozens of chemical and biological constituents. The MWRD also operates continuous monitors, which collect hourly dissolved oxygen levels, specific conductance measurements, and temperature readings at 22 locations throughout the waterways in the MWRD service area.