

Appalachian State Waste Water Testing for SARS-Co-V2

The purpose of this project is to establish and carry out waste water SARS-Co-V2 testing at Appalachian State University as part of the NC Wastewater Pathogen Research Network. Waste water samples will be collected from selected residence halls on Appalachian State campus and tested for SARS-Co-V2. In the initial phase of the project, samples will be collected, heat treated to inactivate any live SARS-Co-V2, and shipped to University of North Carolina-Chapel Hill, Institute of Marine Sciences for detection and quantification of SARS-Co-V2. In the second phase of the project, methods will be established for detection and quantification of SARS-Co-V2 in waste water samples on site at Appalachian State University. The expected outcome of the project is to establish capacity for waste water testing at Appalachian State University to contribute to broader efforts on SARS-Co-V2 surveillance and tracking in North Carolina.

Project period: October 20, 2020 – December 30, 2020

Project Personnel: PI: Dr. Jenna Valley, two lab technicians, personnel for sampling

Budget:

Personnel (salary and fringe)	\$15,000
Supplies, consumables, shipping	\$15,000
Equipment (Digital PCR)	\$99,352.13
Total	\$129,352.13

Appalachian State Waste Water Testing for SARS-CoV-2

PIs: Drs Rachel T. Noble (UNC Chapel Hill, Institute of Marine Sciences), Ece Karatan

(Appalachian State University), and Jenna Valley (Appalachian State University)

INTRODUCTION: The novel coronavirus referred to as SARS-CoV-2 causes severe respiratory distress, therefore its label as a SARS-like virus (Severe Acute Respiratory Syndrome). The actual disease that SARS-CoV-2 causes is referred to as COVID19 (Coronavirus Infectious Disease 19). COVID-19 is caused by this member of the family “Coronaviridae” within the genus *Betacoronavirus*. Importantly, this group of viruses causes extensive known respiratory distress in the form of the “common cold” as coronaviruses and rhinoviruses combined cause the majority of this disease outcome. Coronaviruses are positive-sense single-stranded RNA viruses, which makes them evolutionarily and biochemically similar to other similar viruses such as norovirus, and human immunodeficiency virus (HIV). SARS-CoV-2 is contagious in humans and is the causative agent of a major pandemic outbreak that initiated in the Wuhan Region of China. A major issue has emerged with clinical testing, because both symptomatic and asymptomatic individuals can carry the virus and shed it to infect others. Many new tests are approved and being used, but the need for a large-scale, aggregate tracking approach remains high as we move forward into understanding the ramifications of specific mitigation and social distancing guidelines. It was noted early in the pandemic that quantification of the SARS-CoV-2 RNA in wastewater was a key step in conducting wastewater-based epidemiology (WBE, e.g. Medema et al. 2020). It has already been shown that the tools for quantification, if conducted at a high level of technical molecular proficiency are accurate for understanding the dynamics of the pandemic and its trends. In particular in this project the focus will be on applications of field wastewater testing (away from centralized wastewater treatment plants) that is focused at access points that are specific to specific locations such as dormitories. While the team has already demonstrated proficiency with working at the municipal wastewater scale, the combined ability to work at the localized building, office, dormitory scale offers a unique contribution toward pandemic management.

The purpose of this project is to establish and carry out localized wastewater SARS-CoV-2 testing at Appalachian State University. Wastewater samples will be collected from manhole access points in laterals and mainstem locations for selected residence halls on Appalachian State campus and tested for SARS-CoV-2 targets N1 and N2. In the initial phase of the project, samples will be collected in the field, heat-pasteurized to inactivate SARS-CoV-2 and shipped to University of North Carolina-Chapel Hill, Institute of Marine Sciences for detection and quantification of SARS-CoV-2.

For the first phase of the project, sampling will occur for 5 weeks with 8 dormitory locations being sampled twice in each week, for a total of 90 samples to be collected. In the process of sample collection and analysis, approaches currently used for wastewater influent will be optimized and validated in relation to recovery, extraction efficiency, and sample pooling. Protocols and concepts will be shared with App State University to envision their broader monitoring capabilities for the future. In the second phase of the project, methods will be established for detection and quantification of SARS-CoV-2 in waste water samples on site at Appalachian State University. The expected outcome of the project is to establish capacity for wastewater testing at Appalachian State University to contribute to broader efforts on SARS-CoV-2 surveillance and tracking in North Carolina.

Project period: October 20, 2020 – December 30, 2020

Total Award Amount: \$159,352.13

Project Personnel: PI: Dr. Rachel T. Noble, UNC Chapel Hill Institute of Marine Sciences

Supplies, consumables, shipping	\$30,000.00
Total	\$30,000.00

Project Personnel: PI: Dr. Jenna Valley, Appalachian State University, two lab technicians (TBN), personnel for sampling

Budget:

Personnel (salary and fringe)	\$15,000
Supplies, consumables, shipping	\$15,000
Equipment (Digital PCR)	\$99,352.13
Total	\$129,352.13