Frequently Asked Questions on WWSCAN Measurements of Measles RNA in Wastewater Solids

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This FAQ document is for WWSCAN Public Health and Utility partners

FAQ last updated on June 2, 2025

About Measles

What is measles?

Measles (rubeola) is a virus that causes a rash and fever at a minimum. However, it can cause serious complications in some people, especially children under 5 (CDC). Measles symptoms usually appear 7 to 14 days after contact with the virus. Anyone who is not protected against the measles is at risk. Measles is a vaccine-preventable disease, and the vaccination is typically given to children. One dose of the vaccine is 93% effective at preventing disease, and two doses are 97% effective. The measles vaccine is estimated to have prevented over 60 million deaths between 2000 and 2023. However, the global proportion of children receiving the measles vaccine decreased from 86% in 2019 to 83% in 2023 (CDC).

The measles virus is a single-stranded, negative-sense, enveloped RNA virus with a 15.9kb genome. It ranges from 100-300 nm in size.

How is measles transmitted?

Measles is a **highly contagious** virus that spreads person-to-person by contact with infected nasal or throat secretions (coughing or sneezing), by breathing the air that was breathed by someone with measles, or by touching surfaces contaminated with nasal or throat secretions of a person infected with measles (WHO). Humans are the only known host of the measles virus, meaning that animals cannot catch or transmit measles.

Data Interpretation

Why is WWSCAN measuring measles RNA in wastewater?

Previous work suggests that measles virus that sheds from an individual preferentially binds to solids in wastewater and can persist for days to weeks in wastewater (Wu et al, 2024). Research in Belgium and Canada have illustrated that measles RNA can be detected in wastewater. In Belgium, measles RNA was detected during a large, local outbreak of the disease (Rector et al, 2025). In Canada, it was detected after a vaccination campaign using an assay that detected both WT and VA measles (Tomalty et al, 2025).

What does it mean if we detect or do not detect measles in wastewater?

Detection of measles RNA in wastewater means that one or more individuals in the community contributing excretions (feces, urine, saliva, etc) to the wastewater is shedding measles RNA in

those excretions. Measles RNA can come from various sources, including measles natural infection (“wild type” or “WT”) and measles vaccination. The assay used does not detect vaccine strains of measles, and only detects wild type measles. This means that detections of measles RNA from WastewaterSCAN would only be from measles cases, not vaccinated individuals.

Methods

What are you testing for?

Measles RNA is measured in the solid phase of wastewater. Research suggests that measles RNA associates with the solids in wastewater where it can be found in higher concentrations, on a per mass basis, compared to liquid (Tomalty et al, 2025). Droplet digital reverse transcription polymerase chain reaction (ddRT-PCR) is used to measure concentrations of measlesRNA. We use a new assay that is specific to wild type measles: the “modified Roy et al.” assay. The assay targets the 3′ region of the measles N gene and only detects wild type measles and not the measles vaccine (Table 1).

Probe	CATGATGATCCAAGTAGTAGTGA
Forward Primer	AGGATGAGGCGGACCARTACTT
Reverse Primer	CRATATCTGAGATTTCCTTGTTCTC

Table 1. Modified Roy et al. assay for wild type measles.

For more information on the methods we are using please see **this Methods write up**.

Is the assay that you are using “validated”?

We have tested the sensitivity and specificity of the assay using in silico and in vitro approaches. In silico, we confirmed that the assay will detect wild type strains of measles, and the assay will not detect other targets including measle vaccine sequences. The in vitro work confirms the assay does not cross react with a broad range of respiratory targets. Please see this document for more information on assay validation.

Safety

Are there any safety concerns for operators associated with detection of measles in wastewater?

The risk of getting measles from wastewater is extremely low. Measles virus spreads through the air and close contact with an infected person. While small amounts of measles RNA may be found in urine, there is no evidence that it spreads this way.

Resources on Measles Research in Wastewater

Scientific Peer-Reviewed Publications:

- Rapid Identification of Measles Virus Vaccine Genotype by Real-Time PCR
- Multiplexed Detection, Partitioning, and Persistence of Wild-Type and Vaccine Strains of Measles, Mumps, and Rubella Viruses in Wastewater
- Detection of Measles Virus Genotype A in a Non-Endemic Wastewater Setting: Insights from Measles Wastewater and Environmental Monitoring in Canada's Capital Region
- Detection of Measles Virus Genotype D8 in Wastewater of the Brussels Capital Region, Belgium