Centers for Disease Control and Prevention

Travelers' Health

# Traveler-based Genomic Surveillance for Early Detection of New SARS-CoV-2 Variants

**What's New in TGS:** In preparation for fall/winter respiratory season, TGS launched a nasal sampling multipathogen pilot, which will test for Flu A/B, RSV, SARS-CoV-2, and other respiratory pathogens.

MMWR Notes from the Field on TGS's use of genomic sequencing to track the emergence of new and potentially significant SARS-CoV-2 variants like BA.2.86.



The Traveler-based Genomic Surveillance program (TGS), led by CDC's Travelers' Health Branch, is a public-private partnership that plays an important role in U.S. national biosecurity through its two major goals:

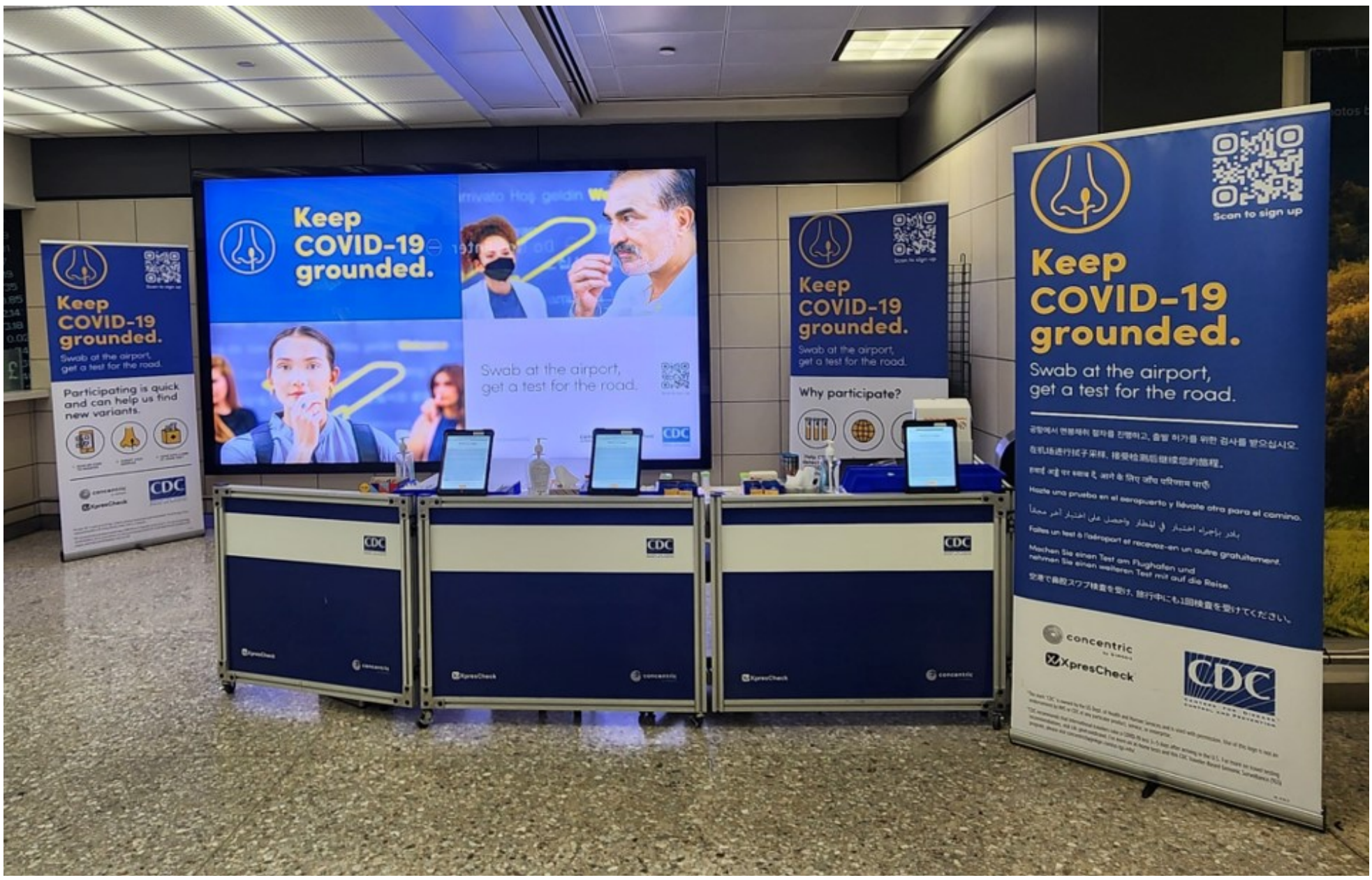
1. early detection of new SARS-CoV-2 variants and other pathogens and
2. filling in gaps in global biosurveillance.

## Overview

U.S. airports are visited by more than 1 billion travelers each year.

Travelers are an important population to consider when tracking new and emerging infectious diseases because they move from place to place quickly and can spread pathogens across borders.

Strategic biosurveillance at airports enables timely detection of SARS-CoV-2 variants and other pathogens of public health importance.




TGS testing station located at D.C.'s Dulles International Airport.

## Program Impact

- **Provides an early warning system** to detect emerging infectious threats in near real time.

  TGS detected numerous Omicron variants up to 6 weeks before they were reported globally, including: BA.2, BA.3, BQ.1, BQ1.1, XBB, CH.1.1, XBC.1.6, BQ.1.2.2

- **Quickly provides information to public health authorities and samples to US federal laboratories**, helping to control disease outbreaks before they cause widespread impact.

  TGS is the Nation's second-largest contributor to SARS-CoV-2 genomic sequences.

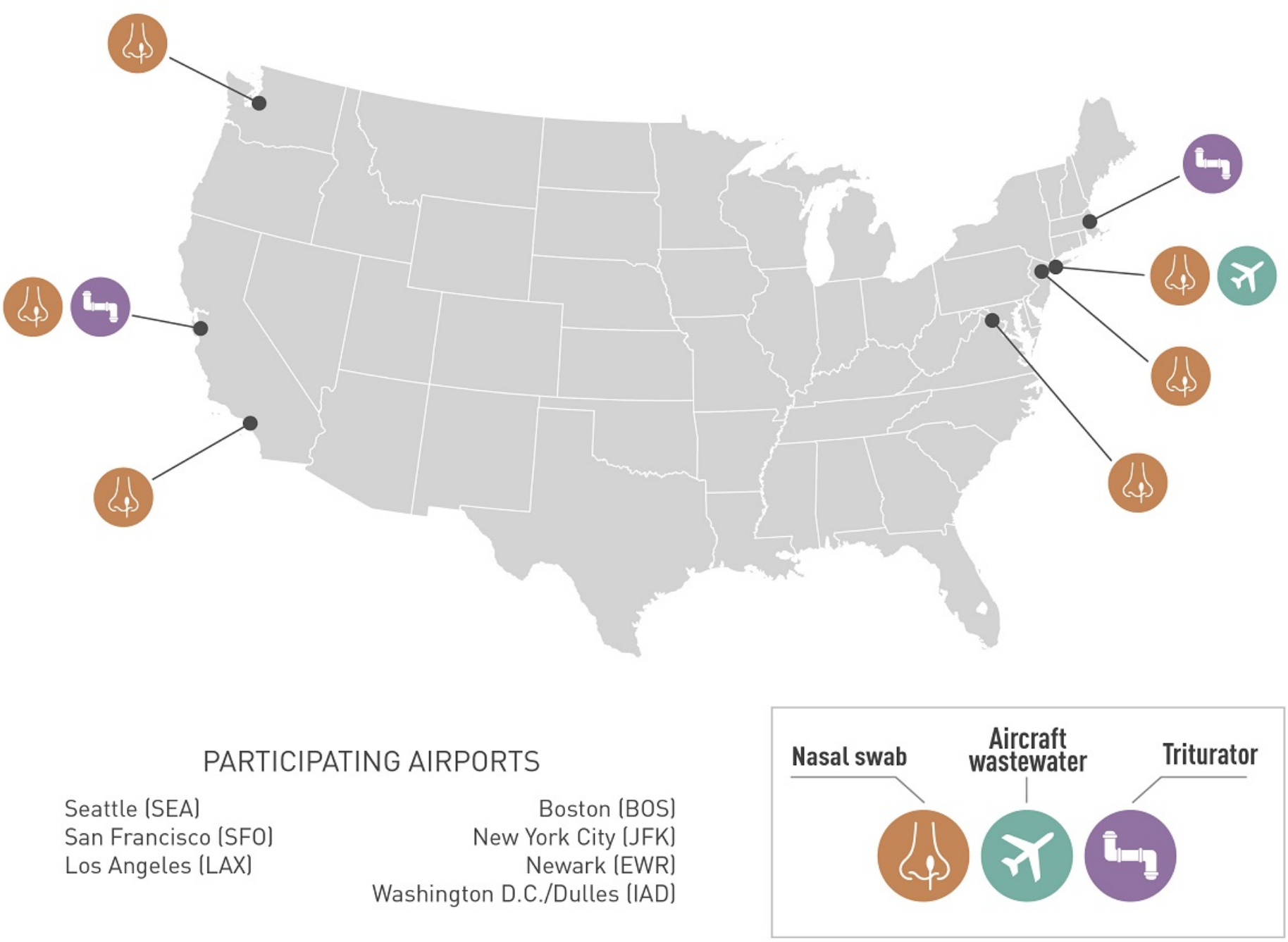
- **Fills gaps in global surveillance when testing and sequencing data are not available.**

  TGS enrolls ~300,000 travelers per year from over 135 countries from all World Health Organization regions.

- **Prevents the spread of communicable diseases**, helping to avoid the need for border interventions and disruptions to travel and trade.

  During the December 2022 surge of COVID-19 in China, TGS was able to expand rapidly to additional airports to cover over 250 flights from China and surrounding transportation hubs to quickly gather samples and provide information on circulating variants in China.

## How it Works




US map of airports in the TGS program. Nasal swab only: Los Angeles, Newark, Seattle, Washington, DC (IAD); triturator only: Boston; nasal swab + triturator: San Francisco; nasal swab + wastewater: NYC (JFK)

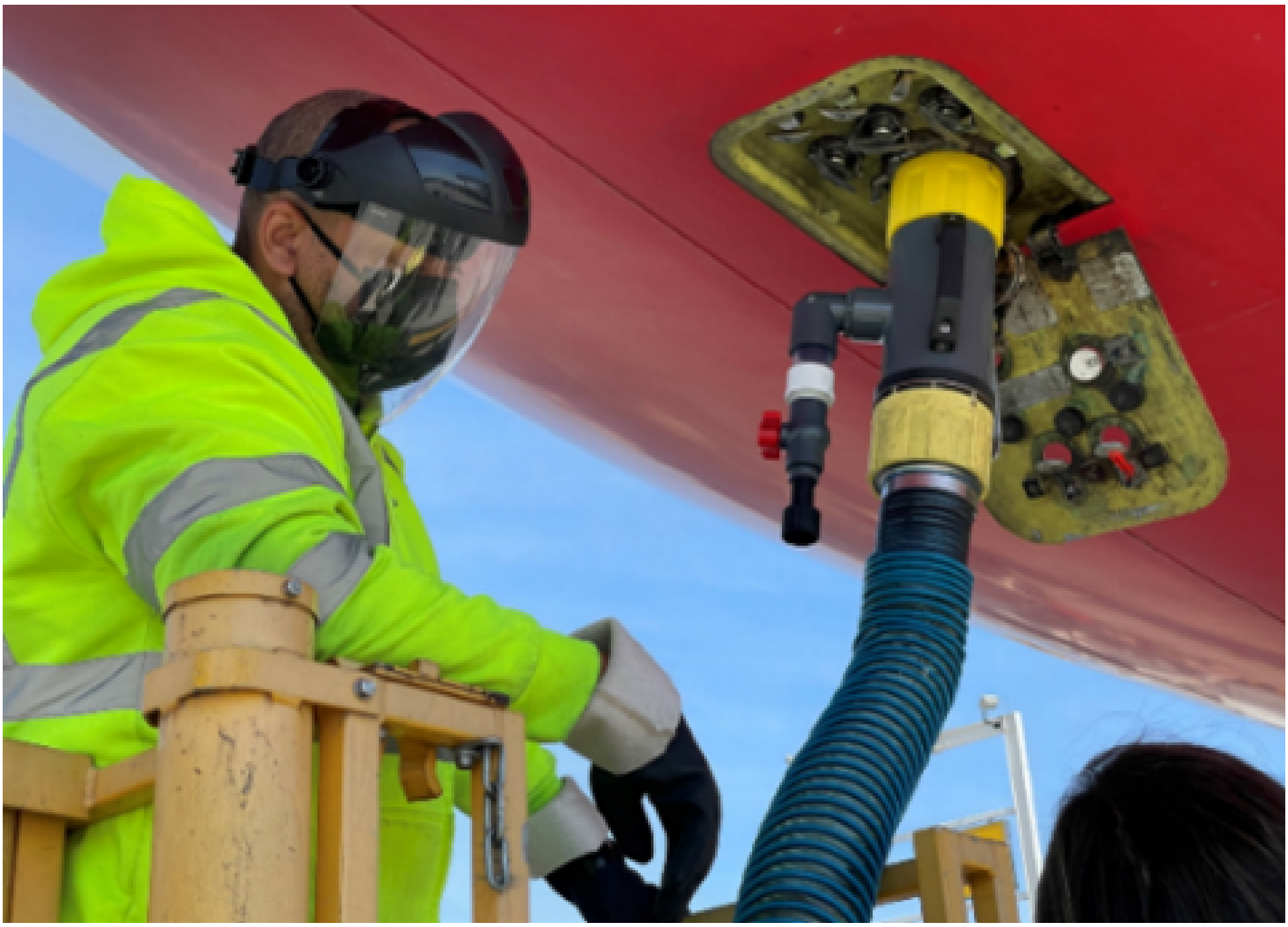
## The traveler sampling program

Individual samples collected from participating travelers provide the most granular and reliable data for detecting SARS- CoV-2 variants and other pathogens. All samples are voluntary and deidentified. Participants answer a short survey, which provides a rich meta-data to accompany these samples and inform public health decision making. Nasal samples can be transferred to CDC laboratories for further testing.

After a successful proof-of-concept project in September 2021, the program expanded and currently operates at six major US international airports.

1. International travelers arriving at participating airports volunteer to self-collect nasal swab samples.
2. Samples are shipped to a laboratory network for SARS-CoV-2 reverse transcriptase polymerase chain reaction (RT-PCR) testing.
3. Positive samples undergo whole genome sequencing to determine variants.
4. Select TGS samples are shared with CDC's laboratory where they undergo viral characterization which can provide information about a new variant's transmissibility, virulence, and response to current treatments or vaccines.

## The airplane wastewater sampling program



Collecting wastewater from an airplane for TGS

Wastewater testing is a rapidly emerging science that can help detect outbreaks and pandemics. Community-level wastewater programs have demonstrated success in the detection of SARS-CoV-2 and other pathogens. Airplane wastewater surveillance is an effective and low-cost tool to monitor pathogens that are circulating globally and detect them early before they spread into communities. Wastewater surveillance has the added benefit of not requiring direct involvement/participation from travelers to obtain samples.

Since August 2022, CDC has conducted airplane wastewater sampling. This airplane wastewater program is currently expanding from a pilot phase to broader implementation.

1. Wastewater is collected using a custom-made collection device.
2. Wastewater samples are shipped to the laboratory for RT-PCR testing.
3. Positive samples undergo whole genome sequencing to determine variants.

## Airport triturator drain sampling program

Since April 2023, wastewater samples have been collected at SFO using an automated sampler device at the airport triturator. The triturator is a consolidation point, which captures wastewater samples from multiple flights and does not include airport terminal waste.

## Leading the Future of Disease Surveillance

The Traveler-based Genomic Surveillance program is a model of pathogen detection that can be used as an early warning system for the detection of many pathogens beyond SARS-CoV-2. Future work includes:

- Expanding to test for multiple pathogens in both the traveler and wastewater programs.
- Creating partnerships to develop a global network for aircraft wastewater surveillance.

- Enhancing surveillance capacity for global mass gathering/migration events.

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