



FRIENDS OF **SMART**



SMART POSITION PAPER



SMART AND COVID-19



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Friends of SMART Position Paper

October, 2021

SMART has done a commendable job of implementing technology and protocols to protect both passengers and crew.¹ But will it be enough to lure riders back to the rails during--and after--the pandemic? Infection by direct contact can occur when infected hosts are in close proximity to a susceptible population. But infected hosts can transmit the disease without direct contact. Many microorganisms, including viruses, can remain infectious outside their hosts for prolonged periods of time, and this can lead to infections by indirect paths. For example, a surface can become contaminated by deposited infectious droplets and eventually cause the infection of susceptible hosts coming into contact with it.

1. Cleaning Protocols

As depicted in the following figure, Interior surfaces of each SMART train are cleaned twice daily.



Figure 1. Cleaning Protocols and Enhanced Sanitation Methods

2. Air Purification

¹ "SMART Response Measures."

https://sonomamarintrain.org/sites/default/files/Board/COC%20Documents/COVID-19_Response_Presentation.pdf, December 16, 2020; "Covid-19 Information."

<https://sonomamarintrain.org/Covid-19>.



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Public health agencies have reported that the primary mode of transmission for COVID-19 is through respiratory droplets or aerosols from an infectious person. Aerosols may linger in the air for a period of time or settle on surfaces. Numerous studies on transmission pathways have been conducted; several are cited in a companion Position Paper to this one.²

As a second line of defense against airborne pathogens, SMART has installed UV sterilizers to the HVAC systems aboard the trains. These systems break down the DNA within pathogens to keep them from growing, effectively killing them. Air filter upgrades have been completed for the entire fleet and are replaced during periodic maintenance.

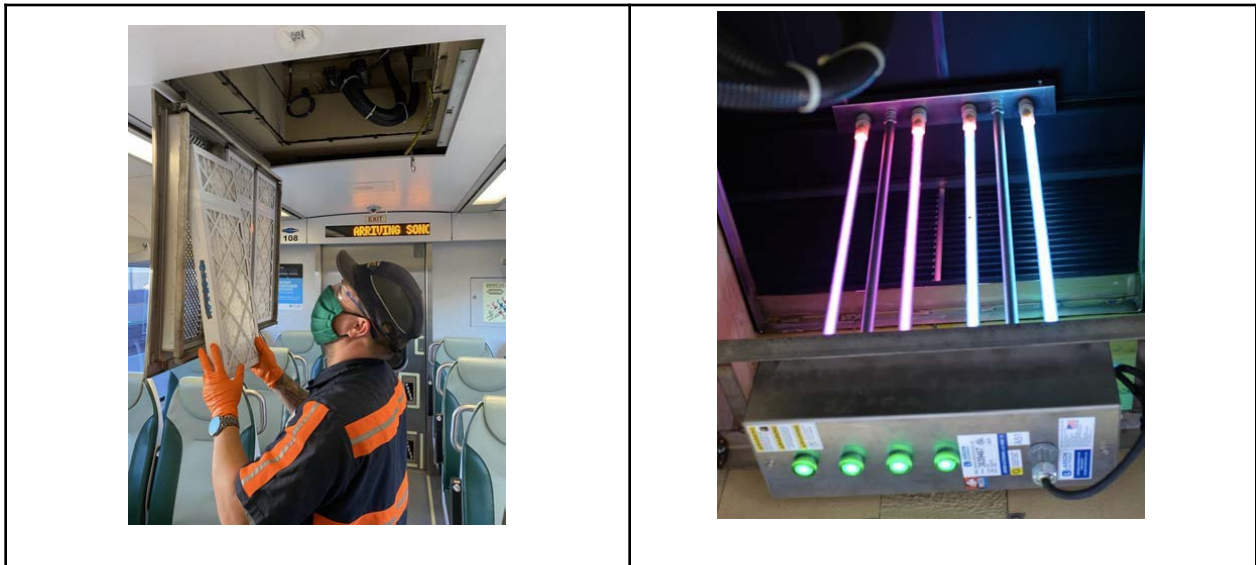


Figure 2. (L): Air Filter Upgrade; (R): UV Sterilizer

² “Ridership Recovery.” Friends of SMART Position Paper, July 2021.



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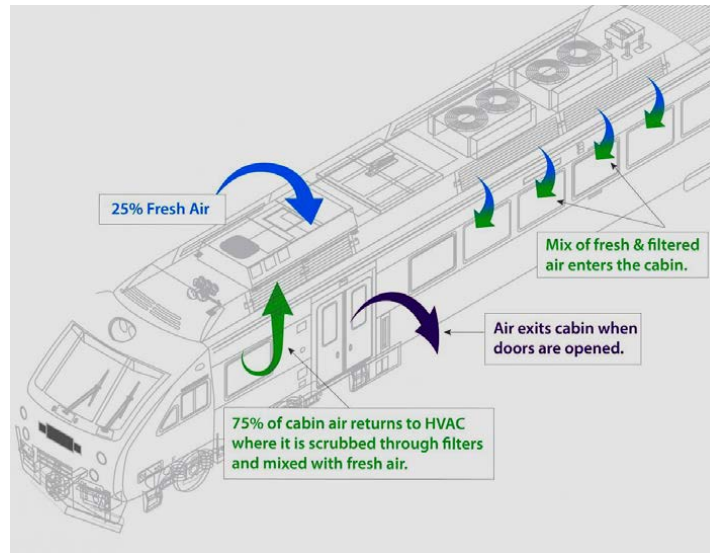


Figure 3. Airflow on Board the SMART Trains

3. Passengers are required to wear a facial covering on board the Train



Figure 4. Passengers are required to wear a facial covering while on board SMART trains and at station platforms, per local public health orders for Marin and Sonoma counties, and guidance from the Centers for Disease Control (CDC).



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4. Social Distancing

SMART has implemented best practices for social distancing, as outlined on the SMART web site.³

What More Can be Done?

The first thing that comes to mind is requiring that all crew members be vaccinated. Given the ongoing difficulty that SMART has experienced in hiring train operators, it is understandable that SMART would be reluctant to impose additional mandates on employees. But we believe that the benefit to public safety and ridership recovery more than offsets any negative impact.

Studies have demonstrated that HEPA + UV can sterilize the air; and increased circulation can replace inside air with fresh outside air. But how do we convince the public that they are safe on board SMART trains? How effective are the protocols that SMART has adopted? In spite of a decline in public trust in science, it remains our belief that scientific studies offer the most convincing evidence that can be provided to the public on this topic.

Surfaces can be tested after cleaning, and NIH & CDC mask guidelines can be followed. The probability of airborne transmission of an infectious disease can be determined by conducting epidemiological studies and/or by analyzing the microbiological content of air samples.⁴

Proving that the air sterilization technologies in the roof of the rail cars actually protect passengers and crew riding in seats would be the final “proof of the pudding.” It is one thing to monitor the efficacy of UV light to kill Covid pathogens;

³ “SMART Social Distancing.” <https://sonomamarintrain.org/SocialDistancing>.

⁴ Daniel Verreault, Sylvain Moineau, and Caroline Duchaine: “Methods for Sampling of Airborne Viruses”. *Microbiology and Molecular Biology Reviews* Vol. 72, No. 3. 26 December 2020. <https://journals.asm.org/doi/10.1128/membr.00002-08?permanently=true&>



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but quite another to *show* that the air that passengers actually inhale is also sanitized. is the most difficult of analysis problems.

Fortunately, scientific and technological advances made *as a result of the pandemic* now provide means for accomplishing that very thing. Researchers in South Korea have developed a technology that **enables immediate detection of specific airborne viruses in the field**. The integrated sampling/monitoring platform uses a disposable kit to easily collect and detect airborne viruses on-site, in the air. The disposable virus sampling/monitoring kit is similar to the pregnancy test kit and enables completion of both sampling and diagnosing on airborne viruses within 50 minutes on-site (10 to 30 minutes of sampling and 20 minutes of diagnosis) without requiring a separate cleaning or separation process.⁵ A team at Rutgers University demonstrated that a “safe surrogate” for the Novel SARS-COV2 virus can be used for sampling.⁶ Thus the air sanitization system in the SMART DMUs can be tested without risk to the operators, and the results advertised to the public.

⁵ “Immediate Detection of Airborne Viruses – Such As COVID-19 – With a Disposable Pathogen Monitoring Kit.” Korea Institute Of Science And Technology. December 8, 2020. <https://scitechdaily.com/immediate-detection-of-airborne-viruses-such-as-covid-19-with-a-disposable-pathogen-monitoring-kit/>; “Immediate detection of airborne viruses with a disposable kit!” EurekAlert. 10 December 2020. AAAS <https://www.eurekalert.org/news-releases/768661>; Ryan O'hare, Imperial College London: “Samples from public spaces could show how coronavirus spreads through the air.” *Medical Press*, February 26 2021. <https://medicalxpress.com/news/2021-02-samples-spaces-coronavirus-air.html>; University of Surrey: “New review explores effective sampling techniques for collecting airborne viruses and ultrafine particles.” *Physics.Org* March 12, 2021. <https://phys.org/news/2021-03-explores-effective-sampling-techniques-airborne.html>.

⁶ Nirmada T Myers, Toreson T Hau, Gediminas Mandis: “Elution Efficiency of Airborne Virus Captured by the Environmental Express Vira-Pore Cassette under Various Sampling and Sample Storage Conditions”: Department of Environmental Sciences, Rutgers University. January 21, 2021.



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Some transit agencies are already going down this path. In September 2021 Toronto Transit Agency Metrolinx reported a pilot study of environmental sampling, looking for the SARS-CoV-2 virus in air and on surfaces.⁷



Hygiene Officer Brandon Nguyen tests elevator buttons.

While each of the samples won't provide an indication of infectiousness – answering the question, could you catch COVID-19 through it? – they should provide evidence if the genetic material of the virus was detected. Final results of the sampling campaign will be made available in the weeks ahead.

Most environmental samples are collected as part of research studies in hospital or health care settings. But other transit agencies are also looking at how testing can be used to help protect riders and workers. Transport for London in the UK performed regular environmental sampling on its network late last year and did not detect any SARS-CoV-2 material in any of the locations, according to Metrolinx. In 2021 Network Rail in the UK also performed air and surface sampling for the virus at four of its transit stations and found only negative results as well.

⁷ “Metrolinx begins air and surface sampling pilot project to detect virus.” Mass Transit September 24, 2021.

https://www.masstransitmag.com/safety-security/press-release/21239755/metrolinx-metrolinx-begins-air-and-surface-sampling-pilot-project-to-detect-virus?utm_source=MASS%20NewsViews%20Newsletter&utm_medium=email&utm_campaign=CPS210923055&o_eid=1946C7524989F3F&rdx.ident%5Bpull%5D=omeda%7C1946C7524989F3F.



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Metrolinx says it will continue to take public safety seriously through the pandemic. Environmental sampling for the SARS-CoV-2 virus is just one more item on a list of more than 40 measures Metrolinx has instituted since the start of the COVID-19 pandemic.

Non-Technical Procedures

1. Contact tracing might have been useful in early stages of pandemic; but it is less valuable today because of the great number of potential carriers.
2. SMART could require proof of a negative Covid test result 48 hrs or less before boarding.
3. SMART could require proof of vaccination prior to boarding. Unfortunately this might work against the objective of increased ridership.

Summary and Recommendations

SMART has implemented most of the best practices that have been adopted by transit systems worldwide and has made the information available on the SMART website. We suspect, however, that only a small portion of the public has read and understood the information. Although costly, more publicity is bound to help potential riders feel more secure.

About “doing even more,” the cheapest step would be to require proof of vaccination or a negative test result prior to boarding. The downside of such a procedure is the risk of angry confrontations.

Live testing of the air sanitizing system is the ultimate verification. Such a test probably should be conducted by a certified testing laboratory and is liable to be costly. But the results would be of great interest to transit systems worldwide and could bring SMART a lot of positive publicity. We would not be surprised if grant monies could be obtained to carry out the testing.