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## How risky is riding BART during the pandemic?

It's probably safer than you think, according to medical professionals — and could become safer in the future, if technologies the transit agency is testing now pan out.

By John Metcalfe, Aug. 26, 2020, 12:15 p.m.



Masks are mandated on BART and there is a daily “fogging” routine that has BART workers, equipped with backpacks and hose guns reminiscent of ‘Ghostbusters,’ misting train interiors with electrostatic disinfectant. Photo: Pete Rosos

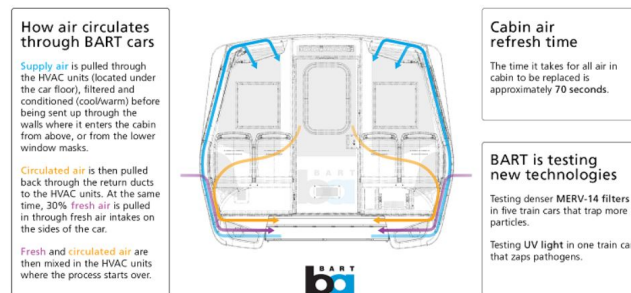
How risky is riding BART during the pandemic? It's probably safer than you think, according to medical professionals — and could become safer in the future, if technologies the transit agency is testing now pan out.

This month, BART piloted a project to outfit five of its train cars with dense filters capable of trapping coronavirus. It also installed a UV light inside the HVAC unit of one car to zap flowing air with radiation. These experiments come on top of a mask mandate and a daily “fogging” routine that has BART workers, equipped with backpacks and hose guns reminiscent of *Ghostbusters*, misting train interiors with electrostatic disinfectant.

The agency hopes these measures will lure commuters back to BART, which has suffered a major ridership and revenue hit due to COVID-19.

“BART’s doing everything we can given the restraints we have to try to make the interiors of the cars as comfortable and safe as possible,” said Ben Holland, manager of vehicle systems engineering. “And we just ask our public to reconsider or consider riding BART to their destination.”

### What are you breathing when you step into a BART train?



How air circulation works on BART. Image: Courtesy BART

Well, 30% of the air comes in fresh from outside through intake vents on the sides of cars. The fresh air is mixed with the bulk of air that's constantly recirculated via HVAC systems on the underside of the cars. It takes just over a minute for the air in a car to get completely recirculated, according to the agency.

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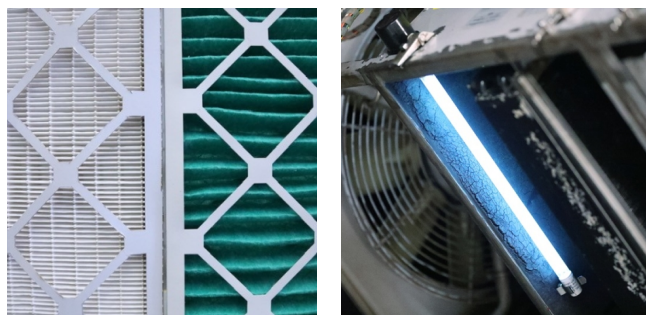
The cars use filters to eliminate benign or nasty particles floating around in the recirculated air. Today

those filters are rated MERV-8, [a level that traps](#) most mold spores, hair-spray particles, and dust from “pudding mix,” which believe it or not is a substance listed on MERV filtration rankings. The cars in the pilot project are using MERV-14 filters, which are typically seen in hospital settings and can snare contaminants as small as coronavirus particles. MERV-14s also stop all forms of bacteria, most cigarette smoke, and droplet nuclei — aka the stuff that comes out of your face when you sneeze.

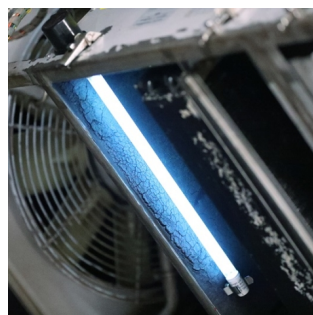
The public response to BART’s pilot has been... interesting.

“All we really want to know,” [said one Twitter user](#), “is how long will it take for the new system to filter a fart out of the car.” To its credit BART has proven ready to answer these tough questions, [responding](#) it’d take roughly 70 seconds or “maybe longer if you laid a real monster of a fart or sharted yourself.”

For commuters trapped in someone’s Dutch oven in the Transbay Tube, this sadly might be Fake News. According to industrial supplier Grainger, you’d need [at least a MERV-17 filter](#) to eliminate such unpleasant odors. (For whatever it’s worth, farts are behind one COVID-19 conspiracy theory arguing that if masks don’t stop butt smells, they don’t stop the virus. It’s been [debunked on Snopes](#).)



New filter on left, old filter on right.



UV light installed under a BART car. Photos: Maria J. Avila/BART

BART does not intend to study how much pathogens the MERV-14s catch.

“I’m not personally planning on putting virus into the car system and trying to measure how much virus comes out the other side,” said Holland. “From a practical perspective, we know that we are going to

dramatically reduce the number and size of particles flowing through the system.”

The same goes for the new UV light. Like much of BART’s train equipment, for real-estate reasons it’s mounted inside an HVAC unit on the underside of a car – a somewhat harsh, bouncy environment. Rather, it hopes to see how the new filters hold up to the rigors of the train environment. As filters get used they get clogged, and the agency wants to measure what the pressure drop is across filters at the end of their maintenance period to see if they’re usable or need to be replaced more frequently.

“That light is in an environment it was never originally intended to be in,” said Holland. “So we want to know is, is the light surviving? Are there any issues with it?”

The device emits radiation in the UVC spectrum and isn’t visible to passengers. That’s nice because UVC light can burn skin and cause retinal damage. It can take anywhere between 30 minutes and an hour for UV radiation to completely kill coronavirus, but this is still a step in the right direction, said Lee Riley, a professor of infectious disease at UC Berkeley’s School of Public Health.

“It will certainly reduce the number of viral particles as they circulate,” said Riley, noting that medical professionals have used this technology for decades. “They did this in the old days in hospitals where there used to be a lot of [tuberculosis] patients. They would actually have these UV lights in hidden ceilings above patients’ rooms, and the air would circulate through the ceilings and the bacteria that causes TB would get killed.”

The UV apparatus on BART was made by Colorado-based Puro Lighting, which also supplied 150 similar UV devices to New York City’s MTA for [roughly \\$6,500 apiece](#). The MTA is deploying the lights in its own pilot program that has the interior of cars exposed to radiation baths during nightly shutdown periods. (The New York Times recently published [an article on what happens to viral particles on the NYC subway](#).)

BART’s decision to put the UV light inside the HVAC system is “different from the approaches being taken/being investigated by the MTA,” emailed David

Brenner, director of Columbia University's Center for Radiological Research.

"The utility of such a system depends very much on the air-recirculation rate," he said. "The faster the air can be circulated out of the train car and into the UVC/HVAC system, the better. But this means that the air is being blown past the UV lamp within the HVAC system very quickly – I would assume in less than a few seconds, or even less – so the ability to kill the virus in the air during that time may be quite limited."

If BART finds the filters and UV light can survive the rigors of the track, it might make them a feature on more trains.

"That would be my expectation, is we would expand this and it would become a normal part of the car design," said Holland. For now, though, germaphobes who want to try out the souped-up medical cars are out of luck, as the cars aren't labeled. That's OK, though, because trains don't appear to be especially dangerous environments for COVID-19.

## **BART probably less risky than going to grocery store**

BART hopes health and safety measures it is taking will lure commuters back to BART, which has suffered a major ridership and revenue hit due to COVID-19. Photo: Pete Rosos

Dean Winslow, a professor of medicine at Stanford University who specializes in infectious diseases, said taking a commuter train is "probably somewhat less risky" than going to the grocery store – provided everyone is masked-up and maintaining a six-foot distance.

"My sense is the risk is not zero from riding in a BART train, but with modern HVAC systems, a high frequency of air exchange, and combined with these filters, you're probably reducing the risk a lot," he said.

There's not much published research on riding our pandemic-times trains. But a [recent study](#) found a relatively low chance of acquiring COVID-19 on high-speed trains in China (though the risk increased the closer you got to infected people and the longer your journey).

## **Licking a BART pole is not advisable, but also not necessarily a death sentence. Will this information be enough to convince people to ride again?**

"It takes about 15 minutes – so, intimate contact – for transmission to really take place," said UC Berkeley's Riley. "That's why most of these transmissions are occurring in households, where people are in intimate contact all the time."

Passengers can purchase their own hand straps from [BART's online store](#) to minimize contact with train surfaces. It may not be necessary.

"Transmission from inanimate surfaces is extremely unlikely, whether it's a train surface, food container, clothing, etc.," said Riley. "The only way to get infected is if one's hands get contaminated and one then rubs the eyes or puts fingers in the mouth. Even then, the number of virus particles may not be sufficient to enter the lungs to cause a successful infection."

So there you have it: Licking a BART pole is not advisable, but also not necessarily a death sentence. Will this information be enough to convince people to ride again?

BART certainly could use the passenger revenue, which accounts for 65% of its operating costs. Ridership is still at a dismal 88% below normal, and the agency expects that over the next three years it'll lose close to 1 billion dollars due to the pandemic and economic recession.

The federal CARES Act is covering about 40% of that damage. But it might not be enough to keep the trains running like they used to.

“The fiscal emergency has forced deep service cuts: Service is reduced to half of normal frequency on all lines and the system is now closing 3 hours early (9

p.m. vs. midnight),” [BART said this month](#). “Without additional outside funding, service cuts could be permanent.”

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