UNITED SAFETY
& SURVIVABILITY CORPORATION™

ENHANCING PUBLIC TRANSIT SAFETY

2024

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CLEAN AIR IS EQUITY FOR EMPLOYEES AND COMMUTERS

> *"The breath you release doesn't just dissipate into the air; it becomes the next person's intake."*

Take a deep breath, because what you're about to learn will make you reconsider every inhale and exhale you take.

Breathing, an involuntary action we do to survive, becomes a startling revelation in confined spaces like buses and rail cars. Imagine this: the breath you release doesn't just dissipate into the air; it becomes the next person's intake, circulating potential pathogens long before any filtration system can intercept them. Think about it–contaminants expelled at the front of a vehicle silently make their way through rows of unsuspecting passengers, all before entering the supposed safety net of the HVAC system.

As a technician working on the front lines of operations at SEPTA in Philadelphia, one of my primary duties was maintaining HVAC systems on our RTS II bus fleet. There were many tasks associated with routine HVAC maintenance but one of them was changing the interior evaporator filtration and cleaning the evaporator core. Anyone performing this task on a city transit bus can speak to the buildup of dust, pollen and particulate matter on these filters even with frequent maintenance intervals. This begs the question, what does a standard or even enhanced air filtration capture, and what gets recirculated back into the occupied interior space in buses and rail cars? The answer is more than we would like to acknowledge.

In the wake of the COVID-19 pandemic and the growing concern over airborne viruses and bacteria, it has become crucial to prioritize the health and safety of passengers using public transit buses and rail cars. While most commercial buildings are equipped with advanced air treatment systems, specifications for public transportation vehicles have often overlooked this aspect.

This article aims to shed light on the significance of providing interior air treatment for public transit and will explore three options to combat viral and bacterial pathogens: containment through filtration, passive treatments using UV lighting, ionizers, or PCO technology, and active treatment through Photo Hydro Ionization (PHI) technology. Additionally, I address the emerging threats associated with fentanyl use and vaping on buses and trains, and how the combined use of Photo Hydro Ionization and bi-polar ionization can mitigate both viral and bacterial pathogens while effectively removing harmful particulate matter.

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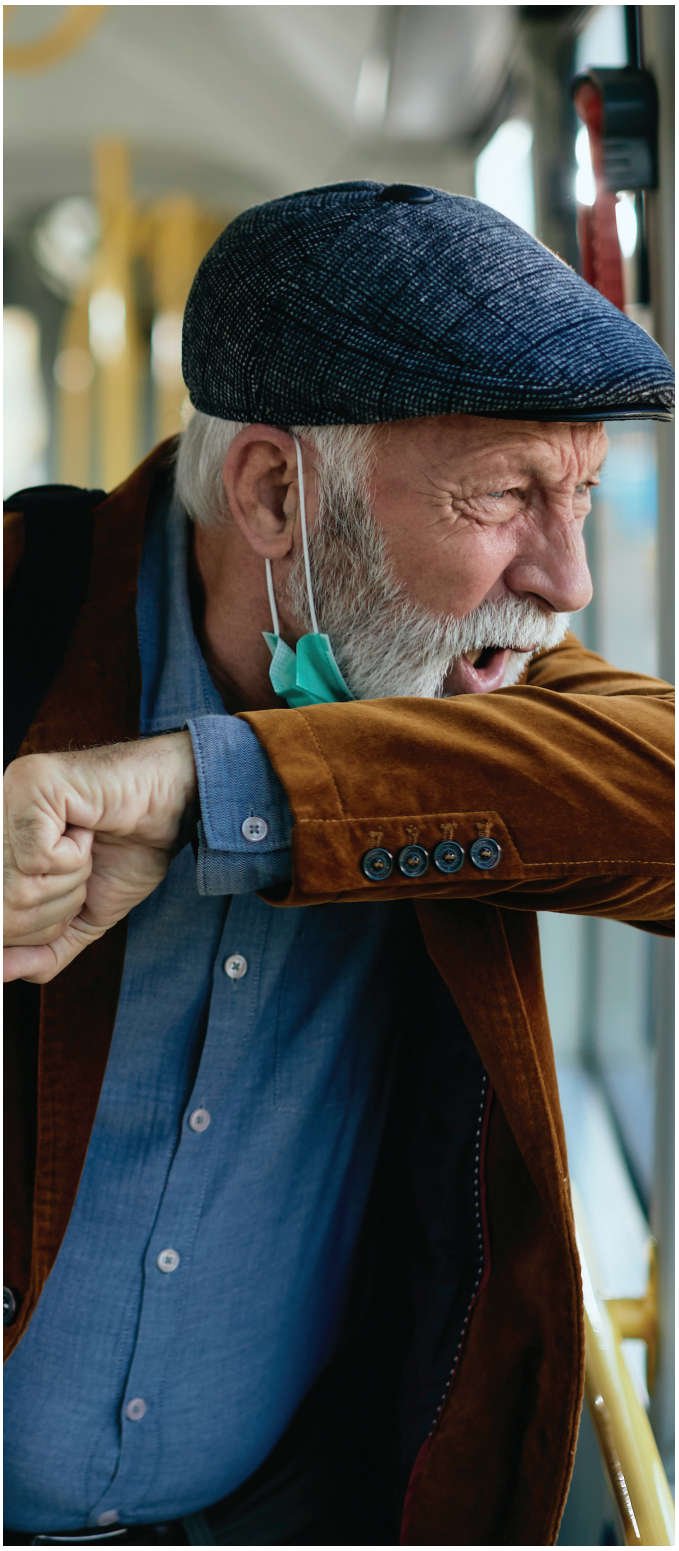
THREE OPTIONS RANGING FROM TRAP TO TREAT



1 CONTAINMENT THROUGH FILTRATION

Air filtration systems have been the standard in public transit vehicles and provide a basic level of protection for the containment of viral and bacterial pathogens. High-efficiency particulate air (HEPA) filters are widely used in commercial buildings, capable of trapping finer particles, however, HEPA filters are expensive requiring more frequent replacements to maintain ventilation. Most traditional transit HVAC systems wouldn't be able to run HEPA filters without substantial modification.

✓ PRO

Standard MERV filtration is common, relatively inexpensive, and easy to maintain.

✗ CON

Limited Efficacy. Sub-micron, air-borne particles will not be trapped using filtration and will be re-circulated into the occupied space. Moving from standard to higher rated filters will increase noise and diminish air flow resulting in fewer air changes. HEPA filters will often require system modifications (more powerful blowers/redesign).

2 PASSIVE TREATMENT TECHNOLOGY

Passive treatment technologies include UV Lighting, Ionizers, and PCO Technology

Passive air treatment methods provide continuous purification without requiring human intervention. Ultraviolet (UV) lighting, when installed within the ventilation system, can deactivate harmful microorganisms, including viruses and bacteria, by disrupting their DNA. Ionizers are agglomeration devices which create opposing energy ions in the air, attracting airborne particles to each other making them larger/heavier or easier to filter. Photocatalytic oxidation (PCO) technology employs a combination of UV light and a catalyst to produce highly reactive oxidants that destroy pollutants. These passive treatments act as an additional layer of defense, working in tandem with filtration systems to enhance air quality within public transit vehicles.

✓ PRO

Easy to install and Maintain and Effective in low air velocity applications.

✗ CON

Marginally effective in HVAC applications with high air circulation rates. For example, a UV bulb or PCO device will require time and proximity to be effective in neutralizing pathogens. Bus and Rail HVAC systems generally have high air circulation to maintain interior temperatures. These systems do not permit enough time for passive treatment to be effective. Particle agglomeration also has the potential to aggravate infectious spread prior to filtration or grounding.

3 ACTIVE TREATMENT TECHNOLOGY

Photo Hydro Ionization (PHI) Technology Active air treatment methods go beyond filtration and passive measures to actively reduce pathogens in the air within the occupied space. PHI technology utilizes a UV light against a quad metallic catalyst to produce large numbers of airborne hydrogen peroxide molecules that neutralize bacteria, viruses, and volatile organic compounds (VOCs) in the occupied space. These active systems are designed to operate continuously, significantly reducing the concentration of harmful substances and minimizing the risk of airborne transmission. PHI technology has proven to be effective in occupied spaces with limited physical distancing, making it ideal for mass transportation environments.

✓ PRO

Dynamically treats air and surface within an occupied space while the vehicle is in service. Easy to install and maintain.

✗ CON

Higher initial investment.

ADDRESSING EMERGING THREATS

FENTANYL USE AND VAPING

Public transit vehicles have also faced emerging threats due to fentanyl use and vaping. Fentanyl, a potent opioid, poses risks to both users and those who may inadvertently encounter secondary airborne content. Vaping, on the other hand, releases harmful particulate matter and chemicals into the air, affecting both the vaper and the surrounding individuals.

To address these concerns, a combined system employing Photo Hydro Ionization and bi-polar ionization can effectively combat both viral and bacterial pathogens while simultaneously removing harmful particulate matter associated with drug use and vaping. This integrated approach provides a comprehensive solution to safeguard the health and well-being of passengers and transit staff.

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CONCLUSION

The provision of interior air treatment systems in public transit buses and rail cars is of paramount importance to mitigate the risks associated with viral and bacterial pathogens. Advanced air treatment systems have been used in commercial buildings for decades to dynamically treat air, not just trap contaminants. It's time to provide that same air quality to our bus and rail operators and our customers because everyone deserves clean air.

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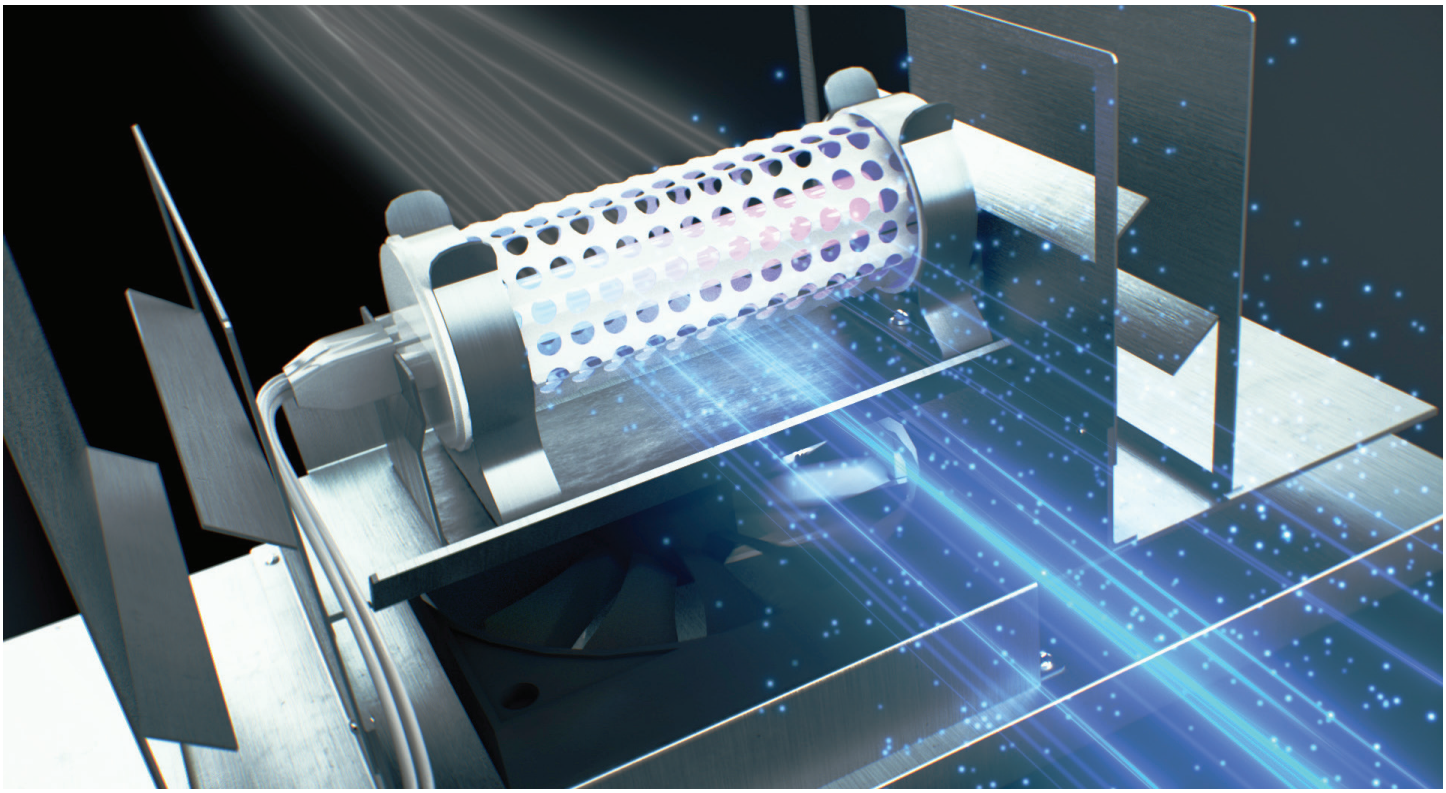

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