

Health Canada as of Feb 28, 2020 warns
“Canadians need to be prepared”



Presents

“OUTBREAK PREPAREDNESS in Transit”

AEGIS PUBLIC TRANSIT
Antimicrobial Evaluation
February 2020

Prepared by
Protect Technologies INC
In Partnership with



February 2020

(Transit is confidential at this time)



INTRODUCTION

A route of transmission of common infections is through contact with surfaces contaminated with infectious microorganisms (pathogens) (Boone and Gerba, 2007). Contamination occurs by settling of droplets from coughs and sneezes onto surfaces, and by touching of surfaces with hands contaminated with pathogens. The pathogens then contaminate the hands of the next person who touches the same surface, and when they bring their hands to their eyes, nose, or mouth infection can result. Public transportation systems create an environment in which large numbers of persons on a daily basis share space and interact with surfaces found within system vehicles. A recent study in the United Kingdom demonstrated an increase of respiratory infections (colds and flus) to persons if they had ridden in a bus or streetcar in the previous five days (Troko et al., 2011).

The immediate reaction in the face of an outbreak is to step up cleaning protocols and application of disinfectants. The use of disinfectants alone has been proven to be inadequate. Surfaces, to be properly disinfected, require the use of the right chemical, the right concentration, the right dwell time, and finally the right application technique. Often one or more of these steps are missed or inadequately applied. Even when all of these steps have been adhered to; disinfectants have been proven to have no durable effect. No durable effect means that the surface can be re-contaminated as easily and quickly as by the next person touching it.

An increase in cleaning efforts are in fact necessary and commended, however, an incomplete solution. Stated clearly, clean does not mean germ free.

Similar to the SARS outbreak of 2003; the “Coronavirus can spread on contaminated surfaces, experts warn” in a headline pulled from the NY Times on January 30th, 2020. This kind of media messaging further elevates the public’s concern regarding heavily trafficked areas such as public transit. The Coronavirus infection rate in China has passed 75,000 people and transit has been identified as one of the major transmission vectors. Dr. Anthony Fauci, director of the US National Institute of Allergy and Infectious Diseases, told CNN he thinks “we are clearly at the brink” of a coronavirus pandemic... when you get countries like Japan and South Korea that have these cases that are person to person to person without any real ability to point to where it came from, that’s the makings of a pandemic... And if you have multiple countries like that, then the horse is out the barn. And it’s going to be very difficult to prevent more cases from coming here to our own country.”

AEGIS Microbe Shield

The AEGIS Microbe Shield, forms a durable chemical bond upon application and remains chemically attached to the surface on which it is applied. It functions by electrostatically and



physically interrupting the bacterial or viral cell membrane and preventing its ability to survive on a protected surface. The AEGIS Microbe Shield destroys any organism with a cell membrane upon contact and will continue to do so until the physical surface has been removed through repeated wear. One can think of the bound antimicrobial like a sword that is capable of repeated use. In comparison, a conventional antimicrobial treatment is more like a gun with limited ammunition. Since a bound antimicrobial is fixed to the surface it continually operates at full strength.

The AEGIS Microbe Shield is registered by health Canada under the PMRA (Pest Management Regulatory Agency) and the US Environmental Protection Agency for use on most hard and soft surfaces. AEGIS provides a long-lasting defence to control the growth and survival of microbes on just about any surface. The modified surface will retain antimicrobial activity for an extended period of time, even after repeated cleanings. Customer experience to date has demonstrated reduced cleaning effort and chemical is required to clean treated surfaces (Winnipeg Transit, 10 bus, 6 month trial)).

AEGIS IS EFFECTIVE AGAINST ALL BACTERIA and many viruses which have a cell membrane. We are going forward with specific Coronavirus testing at this time however the results are not available at the time of this quote. Urgency in the public and customer desire for preparedness dictate that this challenge be addressed in the shortest term possible.

Public Transit APPLICATION EVALUATION - INTRODUCTION:

This study was designed to test the ability of Aegis Microbe Shield Technology to reduce the number of total bacteria found on the inside surfaces of public transportation vehicles under regular “in-use” conditions.

AEGIS Microbe Shield was applied by Certified applicators on February 7, 2020 to a public transit train using spray and wipes formats. Application followed existing cleaning protocols.

Measurement was taken Feb 21, 2020, Therefore, treatment was performed 14 days prior to ATP testing.

On Date of Measurement, two trains returned to their base facility following normal runs. The vehicles arrived within an hour of each other. Bacterial measurements were taken on the treated trains and compared to equivalent test sites on an untreated train (Control).

OBJECTIVE:

To measure the number of Total Heterotrophic Bacteria on various surfaces of a Public transit train treated with Aegis Microbe Shield Technology compared to an untreated train car to validate whether Aegis treatment could reduce the bacterial burden on high touch, high risk



surfaces with the goal of extending protection against bacterial contamination between typical cleaning and disinfection.

EXPERIMENTAL DESIGN:

The tests include 50 Evaluation sites, 25 different “mirror” surfaces on two public transit trains.

METHOD:

The study was completed on both AEGIS treated and non-treated trains (two weeks following AEGIS application). Testing was completed between 2am and 4am Feb 21, 2020 on two trains arriving from normal runs. Neither train had been cleaned on return. All testing was conducted while existing cleaning and disinfection protocols were deployed. There was no change to existing cleaning and sanitizing protocols during this study.

AREAS SAMPLED AND SITE SELECTION

Sites were selected for being high touch and at high risk of cross contamination. Identical sites were chosen between control and treated cars. Sites selected included and different types of materials were chosen (e.g. plastic, stainless steel, vinyl, textile). Test sites were randomly selected. Testing was completed by Colin Dickey, Protect Technologies and witnessed and recorded by the transit Performance and Compliance Officer.

MATERIALS AND METHODS

An ATP meter was used too determine bacterial load on surfaces. ATP is the primary energy transfer molecule present in all living biological cells on Earth. ATP cannot be produced or maintained by anything but a living organism, and as such, its measurement is a direct indication of biological activity. Because the level is strictly-controlled in a living cell, ATP determination is used as an indicator of viable cell numbers. For hygiene testing the total ATP content of the sample is determined. The purpose of ATP testing is to achieve and defensibly document effective cleaning by following the principle that if biomass is not extant on critical surfaces after cleanup there is not enough medium for microbiological proliferation. Simply stated: no biological contamination, no microbial growth.

The main advantage of ATP as a biological indicator is the speed of the analysis. Unlike quantitative microbiological monitoring that requires at least several hours, quantitative biological monitoring takes only minutes from collecting the samples to obtaining the results. Results are given in real time. Here is how it works: ATP is rapidly detected by light emission through the combined use of luciferase and a luminometer. An ATP free swab is moistened with an ATP free buffer, water or extractant. The use of the extractant helps releasing ATP from the surface being sampled. Using a portable luminometer, testing the swab is usually done immediately. There are some systems where the swabs are stable for a number of hours; thereby allowing the user to complete the analysis at a workstation or laboratory.

25 sites will be tested on the “treated” car and 25 of the same sites were tested on the non-treated or “control” car. We measured colony forming units (CFU’s) using an ATP meter. The ATP meter is an industry standard for general microbial measure.

SystemSURE Plus ATP hygiene monitoring system was used to measure cleanliness of surfaces. Hygiena systems come preset with Pass and Fail limits of 10 and 30 respectively. Any score of 10 RLU or less is a Pass. Scores from 11 to 30 RLU are a Caution. Any score greater than 30 RLU is a Fail.



RESULTS:

| | | Treated | Control |
|------|---------------------|-----------------|-------------------|
| Site | Description | Treated Coach 1 | Untreated Coach 1 |
| 1 | Exit handle 1 | 11 | 39 |
| 2 | Stanchion 2 | 2 | 52 |
| 3 | head rest 1 | 5 | 20 |
| 4 | Stanchion 2 | 8 | 52 |
| 5 | Handrail 1 | 17 | 51 |
| 6 | door pad 1 | 17 | 70 |
| 7 | head rest 2 | 2 | 70 |
| 8 | Handrail 2 | 13 | 90 |
| 9 | Headrest 3 | 11 | 156 |
| 10 | seat handle 1 | 7 | 79 |
| 11 | handrail 3 | 17 | 79 |
| 12 | Exit handle 2 | 69 | 121 |
| | | Treated Coach 2 | Untreated Coach 2 |
| 13 | Armrest 1 | 13 | 15 |
| 14 | Arm rest 2 | 29 | 59 |
| 15 | Washroom grab bar | 21 | 144 |
| 16 | toilet flush button | 12 | 114 |
| 17 | head rest 4 | 0 | 7 |
| 18 | Exit handle 3 | 13 | 35 |
| 19 | seat 1 | 1 | 36 |
| 20 | handrail 4 | 74 | 293 |
| 21 | window ledge | 58 | 120 |
| 22 | Seat 2 | 3 | 114 |
| 23 | Stanchion 3 | 35 | 316 |
| 24 | Seat 2 | 0 | 122 |
| 25 | Stanchion 4 | 0 | 379 |





| DATA ANALYSIS | Treated | Control |
|---|-----------------|-------------|
| Gross results all sites by consist | 438 | 2633 |
| Pass raw number of sites | 21/25 | 3/25 |
| pass percentage | 84.00% | 12.00% |
| % Reduction | -501.14% | |

| | Treated % Pass | Control % Pass |
|--------------------------|-------------------|-------------------|
| "n" Surface Types | | |
| 11 Stanchions/handrails | 72.73% | 0.00% |
| 4 Headrest | 100.00% | 50.00% |
| 3 Seats | 100.00% | 0.00% |
| 2 Washroom | 100% | 0% |

CONCLUSION

In this study, ATP tests showed presence of living microbes 5 x higher on the un-treated than treated consist. What does this mean to the transit authority and its riders? The WHO has clearly identified high contact surfaces as a route for cross contamination. Transit, by design brings large numbers of people together, ultimately sharing space and being forced into touching common surfaces. By protecting surfaces and reducing microbial load, we can reduce the risk of cross contamination. Treatment lasts a year.

The application of the Aegis Microbe Shield represents a new level of protection against infectious microorganisms that can be offered by the transit authority to its riders. The public statement that the transit is now doing all possible to protect its riders can be claimed due to the application of the Aegis Microbe Shield. Cleaning and disinfection represented the standard of care for daily hygiene of transit interiors. When a consist is cleaned at the end of its daily service, it is made clean and ready for expected standards for public presentation. However, clean does not mean germ free. Even the daily application of approved disinfectants offer no enduring protection of riders. The very second a disinfectant dries, that surface is open to contamination by harmful microbes left behind by the very first infected person to enter that car. There is nothing existing efforts at cleaning can achieve that provide protection from cross contamination through the day. The application of the Aegis Microbe Shield represents a new level of enduring antimicrobial protection that can be offered to transit riders.