AEGIS Antimicrobial Evaluation

Niagara Transit Buses - Report

6 Month Evaluation

In Partnership with

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Prepared By

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OBJECTIVE:

Using ATP meter, determine current performance of the antimicrobial AEGIS at minimizing surface growth at 6 months post application.

Process

To measure the number of Total Heterotrophic microbes on various Niagara Transit buses treated with Aegis Microbe Shield Technology. We compared to recent Metrolinx trains 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.

The buses tested were located at the Niagara facility.

Background

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.

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)).

Objective

Protect Technologies have been asked for 6 month testing with a full report generated.

EXPERIMENTAL DESIGN:

Test four buses located at the main facility following regular operation

AREAS SAMPLED AND SITE SELECTION

Sites will be selected for being high touch and at high risk of cross contamination.. The control was Metrolinx train testing previously completed (average reading for similar sites used) (pre-treatment baseline in Niagara was not completed). Test sites selected will include different types of materials were chosen (e.g. plastic, wood, stainless steel, vinyl, textile). Test sites were randomly selected. Testing will be conducted by Colin Dickey, Protect Technologies and witnessed and recorded by an identified Niagara transit person (Zoran).

MATERIALS AND METHODS

An ATP meter was used to 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.

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. These limits are based on food facility measures. Expectations of cleanliness on transit are not the same, as such we are using 30 as a warning and 50 as a fail.

Test Results

	Bus #1808 (returned from active service and cleaned)	Bus #2192 (returned from active service and cleaned)	Bus #1935 (returned from active service and cleaned)	Bus #2678 (returned from active service, not cleaned)	Metrolinx Baseline
Steering Wheel	27	14	43	23	NA
Entrance Stanchion	3	2	10	7	200
Exit Stanchion	5	7	3	13	169
Hand Hold	4	9	2	10	93
Grab Bar	2	6	7	14	145

Comments

- All vehicles leaving the Niagara station are leaving well within ATP target range
- Vehicles returning from active service (bus 2678) were also within acceptable limits
- Both rider and driver are objects of protection, as the steering wheel was elevated, it may make sense to increase cleaning frequency and or retreat with AEGIS.
- It may make sense for driver jockeys in the facility to wear gloves during movement of vehicles back into “go lane” as even cleaned buses so far have higher levels than other surfaces. It is important to note the higher levels are just slightly above target.

Conclusions

At six months post application AEGIS microbe shield is performing as expected as measured by ATP measurement.