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Case Studies

Divine Mercy School Study – AEGIS

Year:

2010

Authors:

Dean Swift (Research Director)

By:

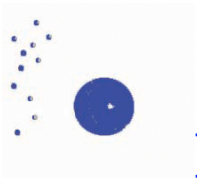
Biolenia Laboratories

Location:

Divine Mercy School,

Ontario,

Canada



BIOLENNIA LABORATORIES

Divine Mercy School Study – Aegis 2010

A. INTRODUCTION:

This study was designed to test the ability of Aegis Microbe Shield Technology to reduce the number of total bacteria found on selected surfaces in an elementary school under regular conditions.

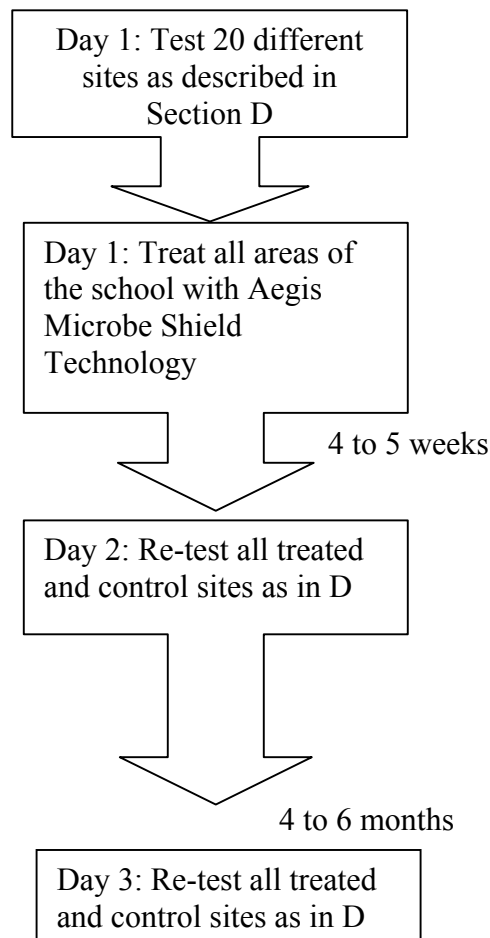
B. OBJECTIVE:

To measure the number of Total Heterotrophic Bacteria on various surfaces before and after the application of Aegis Microbe Shield Technology.

C. EXPERIMENTAL DESIGN:

The tests include twenty different surfaces in Divine Mercy Elementary School. The study flow diagram is summarized in Figure 1, details are described below.

Figure 1: Study Flow diagram



Areas sampled and sites selection:

The sites sampled were randomly selected. Areas that are prone to direct contact with users were included and different types of materials were chosen (e.g. plastic, stainless steel, wood and cement block). Treatment was applied to a number of sites in order to assess the action of the sanitizing agent.

Areas of 100 cm² (measured by a template) were identified in an effort to standardize the areas tested. In some cases where irregular surfaces were swabbed (e.g. handles, buttons) the object was placed in the centre of the template and all visible areas inside the template were swabbed. Special care was taken to identify each surface swabbed so that approximately the same areas could be covered before and after application of the Aegis agent.

Treatment:

Within a few days of carrying out the initial sampling, Aegis Treatment was applied to several surfaces in the school. Description of each site tested is attached with photos.

Testing intervals:

Testing was performed 30 days after treatment (Recall Day 2), on all selected sites using the same method as on Day 1. The school was subject to regular custodial cleaning during this period.

D. MATERIALS AND METHODS

The methodology involved in the performance of this study follows the principles outlined by the United States Pharmacopeia and the American Public Health Association for Microbiological Monitoring of Surfaces. Details are described below:

Swab contact method

Sampling procedure:

The swab contact method was used to sample each site: A sterile swab was taken out of its pouch aseptically by grasping the end of the stick with sterile gloves. After placing the template in the selected area, a vial containing 5 ml of Letheen Broth (PH= 7.0 +/- 0.2 at 25°C) was opened to moisten the swab head removing the excess moisture by pressing against the walls of the tube. The swabs were rubbed against the selected area thoroughly 3 times, reversing directions between strokes. After swabbing the area, the swab head was positioned inside the liquid and the vial shaken by striking the palm of the hand for 10 seconds. All samples were then placed in a refrigerated container and analyzed within 3 hours.

Plating swab rinse solutions:

Upon arrival at the laboratory samples were assigned a unique number. Each sample was vortexed for 10 seconds, 5 ml (all) of the rinsing solution were dispensed into 100 mL of Sterile water, filtered through 0.22 um filters and incubated in sterile petri dishes containing Standard Plate Count Agar. All plates were incubated for 72 +/- 2hrs at 30 - 35 °C. The number of total heterotrophic bacteria on each sample was determined by the number of colony forming units on each plate.

Controls:

-Lethen broth (in vials) sterility control: One un-inoculated vial containing 5 ml of rinsing solution was processed with each set of samples.

-Swabs sterility control: One unused sterile swab was processed with each set of samples.

-Tryptone Soya Broth: One un-inoculated plate was incubated along with the inoculated plates to ensure sterility of the media.

-Media viability Controls: The ability of Lethen agar and Tryptone Soya Broth to recuperate aerobic bacteria was tested after preparing each media lot as per Micrylium's Standard Operating Procedures.

Good Laboratory Procedures:

Good laboratory procedures inherent to the performance of this study (e.g. media preparation) are described in a detailed series of SOPs maintained at Biolennia Laboratories.

Personnel and Testing Facilities:

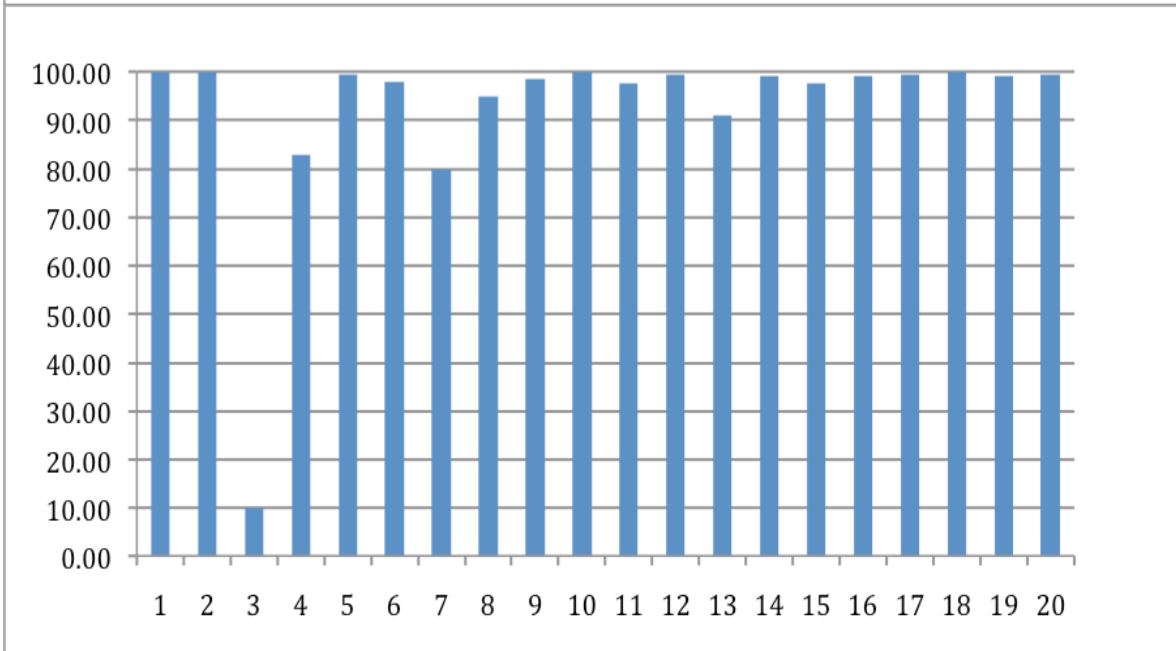
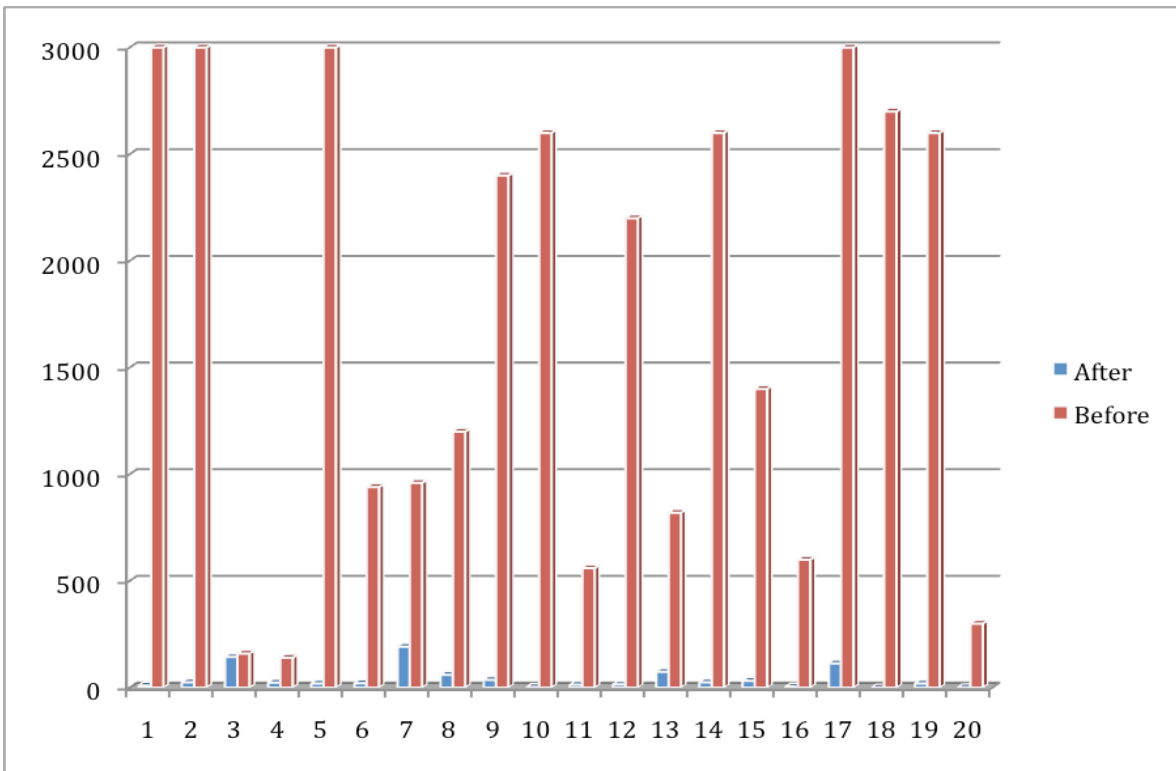
The study director for this project was Dean Swift BSc. B.Ed. Cert. Tox. Resumes for technical personnel are maintained and available upon request. The Microbiology study was conducted at Biolennia Laboratories, 5000 M, Dufferin Street, Toronto, ON, M3H5T5

E. RESULTS:

The following tables and graphs summarize the results obtained for the enumeration of Total Heterotrophic Bacteria on various surfaces around the school before and after treatment with Aegis Microbe Shield Technology.

Table 1: Results for the enumeration of Total Heterotrophic Bacteria on various school surfaces

Site Number	Description	Total Heterotrophic Bacteria (cfu/sample)	
		1/2/2010 Prior to Treatment	3/3/10 Post-Treatment
1	Front Entrance Handicap	14400	10
2	Principal's Door	19000	25
3	Exit A	160	144
4	Soap handle Boys' Washroom	140	24
5	Room 218 Keyboard	3600	20
6	Room 218 Desk 1	940	21
7	Room 218 Desk 2	960	192
8	Room 217 Mat	1200	61
9	Phones - common	2400	37
10	Phone - office	2600	3
11	Kindergarten desk	560	14
12	Kindergarten Play Stove	2200	15
13	Gym Bench	820	74
14	Stair C Handrail	2600	25
15	Stair C Door	1400	33
16	Computer Lab Keyboard	600	5
17	Science Counter	15600	114
18	Boys' Toilet Seat	2700	<1
19	Drinking Fountain	2600	20
20	Wall outside Room 105	300	2



Graph 1. Before/After representation, excluding large initial counts to preserve scale.
 Graph 2. Percentage Reduction Basis Presentation
 Note: Site 3 had only 160 colonies at time of initial testing and these counts were reduced by 10%.
 The same site was retested 2 weeks later at 11 AM after recess.
 Only 9 colonies were identified when retested, yielding 94.37% reduction.

F. CONCLUSION:

In this study we determined that the treatment of school surfaces with Aegis Microbe Shield Technology resulted in generally a 2 to 3 log₁₀ reduction in the number of recoverable Heterotrophic Bacteria.

Of special note, the two highest areas of contamination were the Front Entrance Handicap button and the principal's office door. These were colonized to a higher than expected level and treatment reduced the numbers dramatically.

The reduction on Exit A was not great, but given that the initial contamination was only 160 colonies it is still significant. We returned to the site last week and tested the first three sites again and counted 16, 3 and 9 colonies respectively, this illustrating continuous antimicrobial effect.

The most interesting observation was the variety of both bacterial and fungal species found in the initial sampling. On retest, the numbers were significantly lower, but fungal species were almost totally eliminated and the variety of bacterial species found was limited.

Given that disease often requires as few as 50 organisms to initiate, reductions of 10x to 1000x as found in this study indicate a benefit to the children and staff.

**Dean Swift
Research Director
March 24, 2010**

Case Study

Port Charlotte High School – A Case Study

Year:

1991 (Revised 2005)

Authors:

AEGIS Environmental Management Inc., Midland, Michigan, USA

Location:

Port Charlotte High School, (Public School)

Florida,

USA



Port Charlotte High School - A Case Study

Problem

Four of ten buildings at the Port Charlotte High School campus in Port Charlotte, Florida were plagued by musty odors and widespread fungal growth. Excessive mold and mildew levels in these buildings is also believed to have caused

numerous health related complaints from teachers and staff. The symptoms included frequent headaches, eye irritation, and upper respiratory ailments that subsided when away from the school.

Application Requirements

Find a method to effectively control airborne microbial contamination and the sources of that contamination in the facility on a long term basis. Any procedure or treatment must be cost-effective, and

essentially odorless and non-toxic to humans. It must be a durable solution which is compatible with normal housekeeping procedures in the school.

Solution

The ÆGIS™ Antimicrobial Program.

Solution Method and Results

The four problem buildings at Port Charlotte High school were single story, block buildings which were constructed in 1980. Ever since construction, mold growth had been a significant problem. Also since the time of construction, there were high moisture levels in the buildings. Indoor relative humidities average 80% in the four buildings. The HVAC system for the buildings was oversized and not able to provide proper moisture control.

A microbiological analysis of the four school buildings in June, 1991, showed that each had high levels of airborne fungal exposure for the occupants. Mold was present at

greater than 430 Colony Forming Units (CFU) per cubic meter of air.

ÆGIS Environmental Management presented its solutions to school officials in July. Treat all carpeting, ceilings and walls with ÆGIS™ Antimicrobial to eliminate microbial reservoirs and control airborne fungal levels.

Treatment was completed in August. Post-treatment tests showed that the airborne fungal exposure levels was reduced by an average of 80.5%, with average airborne mold levels of 80 CFU of fungi per cubic meter of air in each of the buildings



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Case Study

Port Charlotte High School Library – A Case Study

Year:

1991 (Revised 2005)

Authors:

AEGIS Environmental Management Inc., Midland, Michigan, USA

Location:

Port Charlotte High School, (Public School)

Florida,

USA



Port Charlotte High School Library - A Case Study

MOLD CONTAMINATED LIBRARY BOOKS SAVED FROM REPLACEMENT

Problem

Mold had infested approximately 10,000 library books at the Port Charlotte High School in Port Charlotte, Florida. On three occasions, the books had to be cleaned, wiped with dilute bleach solution, dried, and re-cataloged. Despite these efforts, mold and mildew always returned - sometimes in just a few



weeks. The problem became so severe that students and library staff began to complain of respiratory illnesses and other symptoms typical of "Sick Building Syndrome." Replacement of the books seemed to be the only way to correct the problem.

Application Requirements

Determine whether or not it was possible to avoid costly replacement of the thousands of contaminated books in the Port Charlotte High School library, and secondly, to provide a lasting solution to the severe airborne microbial contamination problem in the library itself. Any procedure

or treatment must be cost-effective and, because of the daily presence of students and staff in the library and the regular handling of the books, it must also be odorless and essentially non-toxic to humans.

Solution

The ÆGIS Microbe Shield™ Program.

Solutions Method and Results

Because of the results which had been achieved with mold and mildew contamination problems by other schools in Florida, in June, 1991 the school board turned to ÆGIS Environments to see if any solutions to the library problems existed.

ÆGIS researchers and field engineers worked closely with school officials to determine sources of contamination, methods of decontamination, and a strategy for prevention of future problems.

Carpeting in the library had become heavily contaminated with mold and was a primary suspect for the "Sick Building Syndrome" symptoms. This problem is fairly common and has been effectively controlled in

numerous buildings by the ÆGIS Microbe Shield™ Program.

Controlling fungus on the books, however, would be more challenging. Although ÆGIS™ Antimicrobial, the primary physical treatment utilized by ÆGIS, had been proven to prevent mold growth on books in the laboratory, it had never been used in the field.

ÆGIS designed and built a special apparatus for on-site treatment and drying. Proper dilution and application rates were determined, and in August treatment of the 10,000 books began.

The results have been even better than expected by the ÆGIS staff. Despite the fact that water is used as a solvent

for the antimicrobial material, none of the books were stained, warped, or otherwise adversely affected by the treatment. Long after the treatment, the books remained as clean and free of mold as when first treated.

Treatment of the carpeting and walls produced a 90.1% reduction of airborne fungal exposure levels in the library. Student and staff complaints about musty odors and respiratory illness have stopped.

ÆGIS™ Antimicrobial is the keystone of the ÆGIS Microbe Shield™ Program. It is a durable, broad-spectrum antimicrobial, which is EPA approved for application to non-food contact interior surfaces. Unlike conventional antimicrobials or biocides, which are designed to volatilize and be absorbed by organisms, ÆGIS™ Antimicrobial chemically bonds to, and literally becomes a part of, the application surface. It acts only when microorganisms come into direct contact with it.

Since the antimicrobial is not absorbed by organisms and remains a part of each application surface it, in effect,

transforms conventional construction or decorating materials into active antimicrobial surfaces which will remain effective for extended periods. In most environments, the ÆGIS Microbe Shield™ Program effectively eliminates the microbial growth sources for a minimum of twelve months. The program typically results in an initial reduction of airborne microbial contaminants, which ranges from seventy-five to ninety-five percent of pretreatment levels. Periodic testing and retreatment can maintain the reduced contaminant levels indefinitely.

The work done by ÆGIS in the Port Charlotte High School Library was somewhat experimental in nature, but has proven to be extremely successful. The combination of the unique ÆGIS technology with ÆGIS' experience in treating microbial contamination problems appears to have successfully controlled what had been a severe, costly and long lasting problem for the library.



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Case Study

Manatee Community College – A Case Study

Year:

1989 (Revised 2002)

Authors:

AEGIS Environmental Management Inc., Midland, Michigan, USA

Location:

Manatee Community College, (Public College)

Florida,

USA



Manatee Community College - A Case Study

Problem:

Students and staff had complained of headaches, sinus irritation and respiratory ailments while in the Sara Scott Harlee library on the campus of Manatee Community College in Bradenton, Florida. By early 1989, the problem was so severe that two students could not use the library and one staff member was considering a leave of absence. Their symptoms normally disappeared within a few hours of leaving

the library. Since the symptoms were typical of exposure to high levels of airborne microbial contamination, and since mold and mildew odors and growth were evident in the library, the school suspected that the quality of the environment in this 40,000 square foot building had been affected by microbial growth.

Application Requirements:

Confirm or disprove the suspicions about mold and mildew contamination problems and, if confirmed, find a method to effectively control airborne microbial contamination and the sources of that contamination in the facility on a long-

term basis. Any procedure or treatment must be cost-effective, odorless and essentially non-toxic to humans. It must be a durable solution which is compatible with normal housekeeping procedures in a library.

Solution:

The AEGIS Microbe Shield™ Program.

Solutions Method and Results:

Investigators from the Kemper Research Foundation in Milford, Ohio were called in to test the building environment. The investigators found excessive levels of airborne fungus throughout the library.

Carpeting, ceiling tiles, and books were heavily contaminated with mold. They reported that exposure to such high levels of fungi had caused similar symptoms among students and teachers in other

schools. A surface-bonding antimicrobial treatment was recommended to safely control the infestation.

School officials chose **ÆGIS™** Antimicrobial (formerly SYLGARD® Treatment from Dow Corning Corporation). All carpeting, ceilings, and walls were treated in July 1989. Two weeks later, tests showed that airborne fungal levels had been reduced to 10% of the pre-treatment levels. More importantly, people who had previously experienced serious problems in the library reported that it smelled “fresh” and that their symptoms and discomfort had disappeared.

After treatment, the library was re-tested every six months for three years (see chart below). The results show that fungal exposure was dramatically reduced after the initial treatment and has remained low. In addition to the positive test results, student and staff complaints have not recurred.

Although treatment of the Manatee Community College library predated the formation of **ÆGIS Environments** as a separate company, the testing work performed by the Kemper Research Foundation, the antimicrobial material utilized and the environmental management techniques applied were the basis of today’s **ÆGIS Microbe Shield™** Program. For the first time a comprehensive program was available to provide safe, long-term solutions for microbial contamination problems.

ÆGIS™ Antimicrobial is the keystone of the **ÆGIS Microbe Shield™** Program. It is a durable broad spectrum antimicrobial which is EPA approved for application to non-food contact interior surfaces. Unlike conventional antimicrobials or biocides which are designed to volatilize and be absorbed by organisms, **ÆGIS™** Antimicrobial chemically bonds to and literally becomes part of the application surface. It acts only when microorganisms come into direct contact with it.

Since the antimicrobial is not absorbed by organisms and remains a part of each application surface, it, in effect, transforms conventional construction or decorating materials into active antimicrobial surfaces which will remain effective for extended periods. In most environments, the **ÆGIS Microbe Shield™** Program effectively eliminates the microbial growth sources. This program typically results in an initial reduction of airborne microbial contaminants from pre-treatment levels which ranges from seventy-five percent to ninety-five percent. Periodic testing and retreatment can maintain the reduced contaminant levels indefinitely.

The work done by **ÆGIS** for the Manatee Community College library combined the unique **ÆGIS Microbe Shield™** Technology with comprehensive diagnostic, application and building management techniques to virtually eliminate what had been a severe and long-lasting building health problem.



Form # 9D Rev. 07/2002

Case Study

Campbell County Schools – A Case Study

Year:

1986 (Revised 2005)

Authors:

AEGIS Environmental Management Inc., Midland, Michigan, USA

Location:

Campbell County School, (Public School)

Kentucky,

USA



Campbell County Schools - A Case Study

Problem

Mold infestations had created an unhealthy environment resulting in numerous complaints about allergies and upper respiratory problems. The school board was considering transferring students to other schools. The facility had been repeatedly tested



by public health officials and consultants, various disinfectants and sanitizers had been utilized and major modifications to the air handling system had been completed - all without appreciable success.

Application Requirements

Find a method to effectively control airborne microbial contamination and the sources of that contamination in the facility on a long term basis. Any procedure or treatment must be cost-effective, and essentially odorless

and non-toxic to humans. It must be a durable solution which is compatible with normal housekeeping procedures in a school.

Solution

The ÆGIS™ Antimicrobial Program.

Solution Method and Results

Ever since the Campbell County School District in Alexandria, Kentucky opened the South Campbell County Middle School they have had a problem.

“Mold has been a never-ending problem at the school since its construction,” says Dan Sullivan, Superintendent of Schools. “During the fall term of 1985, student and staff complaints about upper respiratory ailments and mold sensitivity heightened. The Kentucky Labor Cabinet, OSHA, and NIOSH (National Institute of Occupational Safety and Health) were called in to investigate the problem. A costly renovation of the school appeared to be the only solution.”

“Over the years, we tried just about every product on the market to correct the problem,” adds Sullivan, “including eight consecutive applications of a high strength disinfectant in January, 1986. No matter what we used, the problem persisted.”

The school board contracted with Richard A. Kemper to conduct microbiological analyses of the school and then apply SYLGARD® Treatment (now ÆGIS™ Antimicrobial). At the time, Kemper was an authorized SYLGARD applicator of Dow Corning Corporation, the developer and producer of the antimicrobial material. Even though the use of an antimicrobial agent has no direct effect on allergies or other respiratory ailments caused by

mold and mildew, the Campbell County School Board felt that the number and severity of allergy symptoms would be reduced if the growth of microbes, including mold and mildew, could be significantly reduced.

According to Sullivan, "The results were clearly dramatic. The test results confirmed that one application of the antimicrobial eliminated our mold problem. Most importantly, in the months since it was applied, there have been no student or staff allergy complaints, and no evidence of mold growth in treated areas."

After the antimicrobial treatment was applied to the school, an immediate test showed a significant reduction in mold counts. Three months later, follow-up tests showed that the mold counts were still greatly reduced from pre-treatment levels.

Although the outdoor mold counts were extremely high during the follow-up sampling period, indoor counts remained low. Additional sampling two years later showed that the antimicrobial treatment continued to be effective.

"While an untreated building in this area should expect a dramatic increase in fungal organisms each spring, actual measured counts at the school have remained extremely low," commented ÆGIS Director of Field Operations Rick Kemper who led the diagnostic and treatment team. "So low, in fact, that students and teachers sensitive to mold have found the building a welcome alternative in which to get relief from their symptoms.

ÆGIS Antimicrobial is the keystone of the ÆGIS Antimicrobial Program. It is a durable broad spectrum antimicrobial which is EPA approved for application to non-food contact interior surfaces. Unlike conventional antimicrobials or biocides which are designed to volatilize and be absorbed by organisms, ÆGIS Antimicrobial chemically bonds to and literally becomes a part of the application surface. It acts only when microorganisms come into direct contact with it.

Since the antimicrobial is not absorbed by organisms and remains a part of each application surface, it, in effect, transforms conventional construction or decorating materials into active antimicrobial surfaces which will remain effective for extended periods. In most environments, the ÆGIS Antimicrobial Program effectively eliminates the microbial growth sources. This typically results in an initial reduction of airborne microbial contaminants from pre-treatment levels which ranges from seventy-five percent to ninety-five percent. Periodic testing and retreatment can maintain the reduced contaminant levels indefinitely.

The work done by Kemper for Campbell County Schools was one of the forerunners of the ÆGIS Antimicrobial Program. It combined Dow Corning's remarkable antimicrobial technology with comprehensive diagnostic, application and building management techniques to virtually eliminate what had been a severe and long-lasting building health problem.



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Testimonials

Crescent School

Year:

2021

Testimonial by:

Michael Fellin (Headmaster)

Location:

Crescent School, (All-boys Private School)

Toronto,

Canada

Testimonial:

[Crescent School - Surface Protection Program with AEGIS Microbe Shield on Vimeo](#)

“We’re thrilled to be partnering with this protection strategy and employing the strategy in our school as one of our layers to welcoming our boys back safely on campus. We know the boys have been out for many many months, and we have worked tirelessly over the past number of months with a variety of partners, including AEGIS, in this regard, so that we can ensure and do everything we can to leave no stone unturned to make sure that our campus is safe for our students, for our staff, and for our families. And we’re just thrilled that this service has been brought into the school and we can’t recommend it more.”

Testimonials

Branksome Hall

Year:

2021

Testimonial by:

Janet Pehlivanyan (Director, Facilities)

Location:

Branksome Hall, (Leading independent International Baccalaureate (IB) World School for girls)

Toronto,

Canada

Testimonial:

[Branksome Hall - Surface Protection Program with AEGIS Microbe Shield on Vimeo](#)

“So we were on the phone with SickKids [Hospital for Sick Children in Toronto] and talked about all the things that we were doing here at Branksome Hall. And we listened to them and heard some of their advice and asked them about AEGIS and that we were contemplating doing a spray application. And SickKids absolutely supported the AEGIS application and recommended that we proceed with it if our resources allowed us to do that.”

Testimonials

Scholars' Hall

Year:

2021

Testimonial by:

Cheryl McKee (Principal)

Location:

Scholars' Hall, St. Jude's School, (University Preparatory School)

Kitchener,

Canada

Testimonial:

[Scholars' Hall - Surface Protection Program with AEGIS Microbe Shield on Vimeo](#)

“Among the many strategies that we use at our school; we’ve updated our HVAC system, we’ve provided air purifiers for all of our classrooms, but we also have the AEGIS Microbe Shield put on our school. The security, and the safety that it provides has been very appreciative by my staff, my students, my parents and the overwhelming feedback that I have received from everyone has been incredibly positive, and very happy, and feeling very safe to be in our school with the shield on.”