Blossom Chemicals 81 Melbourne Road Riverstone NSW 2765

Laboratory Summary Report

Report Title

Summary of Independent Testing work Carried out on SAN-AIR$_{tm}$ product

Abstract

In the absence of a suitable test for airborne microorganisms standards we commissioned an independent laboratory to set up a method to replicate a room being supplied with air from an air handling system. The test method established a baseline and challenged this baseline by adding a known quantity of organisms and measuring the quantity collected over time, with or without our sanitiser present.
The results show a remarkable effectiveness achievable with our current product.
The following is an accurate summary of the procedure.

NOTE: This Laboratory Summary Report is a reproduction of following reports, copies of which are available on request.

1. **AMS 0606604 - BACTERIA Efficacy**
2. **AMS 0710795/2 – FUNGICIDAL Efficacy**
3. **AMS 0710795/1 – SPORICIDAL Efficacy**
4. **Chemsil CAW/M/0908/C/003 – BACTERIA Efficacy**
5. **Chemsil CAW/M/0210/C/04 – FUNGICIDAL Efficacy**

This material supplied for this test is sold under the trade names of

- **SAN-AIR$_{tm}$,**
- **TRADE SAN-AIR$_{tm}$,**
- **MouldAromagel,**
- **Essentially Natural**
- **Fallon Solutions**
- **Air Clean**

and in previous times Melaklean, Clean AIR Sanitiser

See separate reports for UNSW independent study and AMS Viricidal studies

Prepared and signed by: D. MASSAIOLI, BSc.

Document revisions

Original Date:	**30/8/2010**	**AMS reports**
Revised :	**15/9/2010**	**Chemsil reports**
Revised :	**10/10/2013**	**UNSW results added**
Revised :	**22/1/2019**	**Correction of omissions in detail**

LIST OF INDICATOR ORGANISMS USED IN THESE INDEPENDENT TESTS.

These species are used by Commercial Laboratories and Research organisations to represent the broader set of organisms. The criteria is these results are representative of how the product being tested will work

Bacteria

1. Micrococcus Luteus
2. Staphylococcus Capitis
3. Staphylococcus Hominis
4. Escherichia Coli
5. Staphylococcus Aureus
6. Pseudomonas Aeruginosa

Fungicidal Activity

1. Trichophyton mentagrophytes spores ATCC9533

Sporicidal Activity

1. Bacillus Subtilis ATCC 19659

Mould Efficacy Challenge

1. Apergillus Niger

This is an electronic Copy for controlled/restricted distribution.

AMS 0606604 - BACTERIA

Anti-microbial properties of sample product in killing environmental bacteria

METHOD

Followed International Standard Methodology as guided by Independent Laboratory.
Reported by AMS 0606604

INTRODUCTION

There are no standards available that can be used to carry out these tests. The European Medical Council is working on some guidelines for test methods, but these are not available yet.
Australian Standards require no more than certain maximum level of Bacteria and Mould be present in the air stream of an air conditioning supply.

This level is 1000 CFU per Mt Cube of Air maximum.
CFU stands for Colony Forming Unit, and it is a world wide standard reference for counting microbial cultures.

In a typical environment seen as clean, these levels are found to be below 1000 CFU. As air borne counts approach 2000 CFU this is associated with a few of the building occupants experiencing some form of mild respiratory illness.
As the airborne count surpasses 3000 CFU, then the building occupants experience a high level of respiratory discomfort, with many finding they pick up some respiratory infection and/or asthma.

There is no plan at the moment to make organism specific claims on the product. However it is useful to collect information on how effectively the product works.

CRITERIA BEHIND METHODOLOGY

The study was made using a purpose built chamber, where air is made to circulate using an appropriate fan, to simulate a room situation. The chamber used is 72 litres in volume.

Three bacteria were collected from routine building environmental samples, grown separately and then pooled to form a mixture to be used for this test. THESE BACTERIA ARE TYPICAL OF THE MIX FOUND IN AIR CONDITIONING FILTERS.
The sanitiser was placed in this chamber overnight, allowing the fan to run air over the opened packaging. This was found to make the content of sanitiser in the chamber quite uniform.
The bacteria innoculum was introduced in the chamber as an aerosol particle form. This is designed to reproduce the airborne presentation of bacteria in a normal situation.

METHOD

The consulting laboratory we contracted carried out its own validation of the test method.
They validated the recovery rate for the bacteria mix without exposure to the sanitiser.
Then they validated the time required to obtain adequate and steady concentration of product in the test chamber.

The third step involved validating the recovery rate of the bacteria mix in the presence of the sanitiser, as well as the performance of the impaction plate collection method in the presence of the sanitiser alone. Each test was repeated 10 times and the resulting average is what is reported here.

The contract laboratory which carried our tests, has experience in setting up these type of tests in relation to air conditioning equipment.

They are called Applied Microbiology Sciences, and are based in Silverwater, Sydney. They are TGA accredited

INDICATOR TEST ORGANISMS

7. Micrococcus Luteus
8. Staphylococcus Capitis
9. Staphylococcus Hominis

THESE BACTERIA ARE TYPICAL OF THE MIX FOUND IN AIR CONDITIONING FILTERS.

CONTACT TIME

30 minutes

TEST TEMPERATURE

Ambient (19 to 24 degrees Celcius)

BACTERIA MIX

Approximately 1000 CFU of mixed organisms from table above. The mix consisted as close as measurable to 33.3 % of each organism. These bacteria mixed where dispersed in the chamber as aerosol particles about 3um in diameter.

RESULTS

The following table is a summary of the % of organisms surviving in the test chamber after 30 minutes, with and without sanitiser treatment.

Contact Time (minutes)	**CFU recovery Average**	**% reduction Average**
30 no treatment	342	Not applicable
30 with Sanitiser treatment	151	55.50%

Loss from SANAIR pack over 16 hours exposure into the chamber : 0.191 gram average

Therefore loss of bacteria as shown in table above, over 30 minutes is equivalent to exposure to

<u>0.191 grams X0.5 =</u> 0.005 gram equivalent to 5 milligram of sanitiser or 0.8 parts per million of sanitiser

CONCLUSION

Exposure of bacteria to the sanitiser product generates a significant decrease in the population of the bacteria in the test chamber.

The 55.5% average result from a stream of ten repeat tests is a significant statistical change and indicates the sanitiser can be expected to cause around 55% of the bacteria population present to be killed for every half hour of exposure to the sanitiser.

As an example only, if one started with 1000 CFU, then after 30 minutes of exposure in a controlled environment one would have 450 CFU left. After a further 30 minutes of exposure one should have 247.5 CFU left and so on.

In a real life environment we find that significant decrease results can be achieved in 24 hours in moderately contaminated environments, whilst heavy contamination is reduced in longer timeframes, up to a week.

AMS 0710795/2 – FUNGICIDAL Efficacy

2. Anti-fungal properties of sample product, using Trichophyton mentagrophytes spores ATCC9533

METHOD

Followed International Standard Methodology as guided by Independent Laboratory.
Reported by AMS 0710795/2

INTRODUCTION

There are no standards available that can be used to carry out these tests. The European Medical Council is working on some guidelines for test methods, but these are not available yet.
Australian Standards require no more than certain maximum level of Bacteria and Mould be present in the air stream of an air conditioning supply.

This level is 1000 CFU per Mt Cube of Air maximum.
CFU stands for Colony Forming Unit, and it is a world wide standard reference for counting microbial cultures.

In a typical environment seen as clean, these levels are found to be below 1000 CFU. As air borne counts approach 2000 CFU this is associated with a few of the building occupants experiencing some form of mild respiratory illness.
As the airborne count surpasses 3000 CFU, then the building occupants experience a high level of respiratory discomfort, with many finding they pick up some respiratory infection and/or asthma.

CRITERIA BEHIND METHODOLOGY

The study was done following methodology described under TGA Order 54/54A for disinfectant challenge testing
A typical environmental mould was selected by the testing laboratory. The test was time based to measure what number of organisms survived.
The criteria for this challenge is that if the product controls this organisms then it will control all other fungi.

METHOD

The consulting laboratory we contracted carried out its own validation of the test method.
They validated the recovery rate for the bacteria mix without exposure to the sanitiser.

The contract laboratory which carried our tests, has experience in setting up these type of tests in relation to air conditioning equipment.
They are called Applied Microbiology Sciences, and are based in Silverwater, Sydney. They are TGA accredited

RESULT

The Independent laboratory conclusion is “Disinfectant… has successfully demonstrated fungicidal activity ”
Sporicidal efficacy of sample product.

AMS 0710795/1 – SPORICIDAL Efficacy

Using Bacillus Subtilis ATCC 19659

METHOD

Followed International Standard Methodology as guided by Independent Laboratory.
Reported by AMS 0710795/1

INTRODUCTION

There are no standards available that can be used to carry out these tests. The European Medical Council is working on some guidelines for test methods, but these are not available yet.
Australian Standards require no more than certain maximum level of Bacteria and Mould be present in the air stream of an air conditioning supply.

This level is 1000 CFU per Mt Cube of Air maximum.
CFU stands for Colony Forming Unit, and it is a world wide standard reference for counting microbial cultures.

In a typical environment seen as clean, these levels are found to be below 1000 CFU. As air borne counts approach 2000 CFU this is associated with a few of the building occupants experiencing some form of mild respiratory illness.
As the airborne count surpasses 3000 CFU, then the building occupants experience a high level of respiratory discomfort, with many finding they pick up some respiratory infection and/or asthma.
it is useful to collect information on how effectively the product
works.

CRITERIA BEHIND METHODOLOGY

The test was carried out using a spore form of Bacillus Subtilis, with the timed exposure results following adapted methodology from Disinfectant test TGA Order 54/54A.

METHOD

The consulting laboratory we contracted carried out its own validation of the test method.
They validated the recovery rate for the bacteria mix without exposure to the sanitiser.
Then they validated the time required to obtain adequate and steady concentration of product in the test.
The third step involved validating the recovery rate of the mould in the presence of the sanitiser, as well as the performance of the impaction plate collection method in the presence of the sanitiser alone.

The contract laboratory which carried our tests, has experience in setting up these type of tests in relation to air conditioning equipment.
They are called Applied Microbiology Sciences, and are based in Silverwater, Sydney. They are TGA accredited

RESULT

The independent laboratory states in its report that the product used in this test has successfully demonstrated sporicidal activity at the 6 hour exposure mark.

Chemsil CAW/M/0908/C/003 – BACTERIA Efficacy

Anti-microbial properties of sample product using E Coli, Ps Aeruginosa and St Aureus (Golden Staph)

METHOD

Followed International Standard Methodology as guided by Independent Laboratory.
Reported by Chemsil CAW/M/0908/C/003

INTRODUCTION

There are no standards available that can be used to carry out these tests. The European Medical Council is working on some guidelines for test methods, but these are not available yet.
Australian Standards require no more than certain maximum level of Bacteria and Mould be present in the air stream of an air conditioning supply.
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In a typical environment seen as clean, these levels are found to be below 1000 CFU. As air borne counts approach 2000 CFU this is associated with a few of the building occupants experiencing some form of mild respiratory illness.
As the airborne count surpasses 3000 CFU, then the building occupants experience a high level of respiratory discomfort, with many finding they pick up some respiratory infection and/or asthma.
It is useful to collect information on how effectively the product works.

CRITERIA BEHIND METHODOLOGY

The methodology used is proprietary to the Independent laboratory which carried the test, and it complies with their accredited status as a testing laboratory and international standards.

METHOD

The consulting laboratory we contracted carried out its own validation of the test method.
They validated the recovery rate for the bacteria mix without exposure to the sanitiser.
Then they validated the time required to obtain adequate and steady concentration of product in the test chamber.
The third step involved validating the recovery rate of the bacteria mix in the presence of the sanitiser, as well as the performance of the impaction plate collection method in the presence of the sanitiser alone.

The contract laboratory which carried our tests, has experience in setting up these type of tests in relation to air conditioning equipment. They are accredited under the Malaysian National Laboratory Standards organization.

RESULT

On the organisms mix used, being E Coli, Ps Aeruginosa and St Aureus (Golden Staph), the % kill rate found was averaged as 28.7% at 30 minutes exposure, 83.1% after 60 minutes treatment, and 99% kill at 120 minutes exposure.

These are typically representative bacteria, indicative that the product will act on all bacteria to the same extent shown in this test.

EXAMINATION

Chemsil CAW/M/0210/C/04

Anti-Fungal properties of sample product using Apergillus Niger

METHOD

Followed International Standard Methodology as guided by Independent Laboratory.
Reported by Chemsil CAW/M/0210/C/04

INTRODUCTION

There are no standards available that can be used to carry out these tests. The European Medical Council is working on some guidelines for test methods, but these are not available yet.
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As the airborne count surpasses 3000 CFU, then the building occupants experience a high level of respiratory discomfort, with many finding they pick up some respiratory infection and/or asthma.

CRITERIA BEHIND METHODOLOGY

The methodology used is proprietary to the Independent laboratory which carried the test, and it complies with their accredited status as a testing laboratory and international standards.

METHOD

The consulting laboratory we contracted carried out its own validation of the test method.
They validated the recovery rate for the mould without exposure to the sanitiser.
Then they validated the time required to obtain adequate and steady concentration of product in the test chamber.
The third step involved validating the recovery rate of the bacteria mix in the presence of the sanitiser, as well as the performance of the impaction plate collection method in the presence of the sanitiser alone.

The contract laboratory which carried our tests, has experience in setting up these type of tests in relation to air conditioning equipment. They are accredited under the Malaysian National Laboratory Standards organization.

RESULT

The results received stated that SAN-AIR caused a 32.1% kill rate in 30 minutes of exposure, 46.4% kill rate in 60 minutes of exposure and 62.5% kill rate in 120 minutes of exposure.

This is a typical, representative and common mould, indicative that the product will act on all mould to the same extent shown in this test.