



## ADVANCED OXIDATION TEST RESULTS 2000-2015

RGF first developed its Advanced Oxidation Technology over 20 years ago. Over 1 million RGF Cells are in use around the world. RGF has licensed its technology to many Fortune 500 companies for use in the medical, food, military, residential, commercial, marine, hospitality and government, etc. RGF cells in various products have been tested and/or approved or registered by:

- ETL, TUV, EU, CSA
- Chinese Government
- European Union
- U.S. Military
- Japanese Government (TV commercials)
- USDA & FSIS
- Electric Power Research Institute
- Canadian Government

In addition, RGF cells have been specified in the Norovirus & MRSA protection plan of America's largest restaurant chains, hotel chains, theme parks, cruise lines, public schools and hospitals. The following is a summary of some of the testing and studies performed by third party independent labs and universities. RGF products are not medical devices and no medical claims are made.

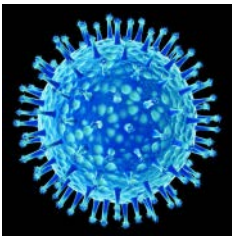
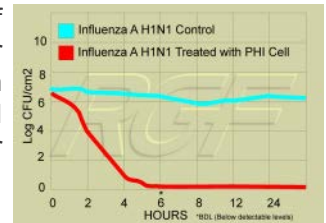


### H1N1 (Swine Flu)

Kansas State University has completed preliminary testing on RGF's Photohydroionization (PHI-Cell<sup>®</sup>) and Reflective Electromagnetic Energy (REME<sup>®</sup> Cell) technologies with **99+% inactivation of H1N1 Swine Flu on a stainless steel surface**. Further tests are scheduled. 2009 H1N1 (referred to as "swine flu" early on) is a new influenza virus causing illness in people. This new virus was first detected in people in the United States in April 2009. This virus is spreading from person-to-person worldwide. On June 11, 2009, the World Health Organization (WHO) signaled that a pandemic of 2009 H1N1 flu was underway. Spread of 2009 H1N1 virus is thought to occur

in the same way that seasonal flu spreads. Flu viruses are spread mainly from person to person through coughing or sneezing by people with influenza. Sometimes people may become infected by touching items – such as a surface or object – with flu viruses on it and then touching their mouth or nose.

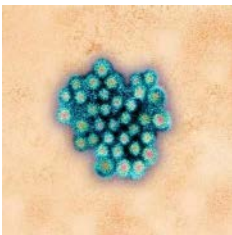
Tested by Kansas State University Inactivation Rate **99+%**



### Avian influenza (Bird Flu)

Avian influenza is an infection caused by avian (bird) influenza (flu) viruses. These influenza viruses occur naturally among birds. Of the few avian influenza viruses that have crossed the species barrier to infect humans, H5N1 has had the largest number of detected cases of severe disease and death in humans. Source CDC Center for Disease Control and Prevention

Tested by Kansas State University Inactivation Rate **99+%**

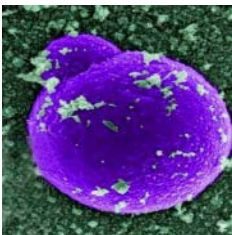
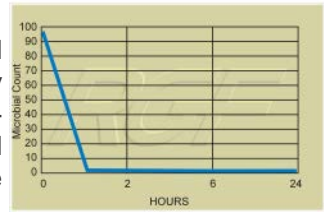


### Norwalk Virus

Noroviruses are a group of related, single-stranded RNA, nonenveloped viruses that cause acute gastroenteritis in humans. Noroviruses are highly contagious and as few as 10 viral particles may be sufficient to infect an individual. 50% of all food-borne outbreaks of gastroenteritis can be attributed to noroviruses. Chicago schools realized a 20% improvement in attendance after installing RGF's PHI Technology. Source: CDC Centers for Disease Control and Prevention

Source: CDC Centers for Disease Control and Prevention

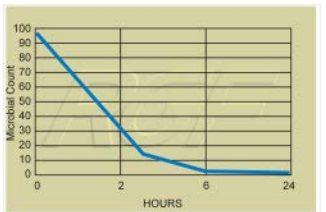
Tested by Midwest Research Institute Inactivation Rate **99+%**

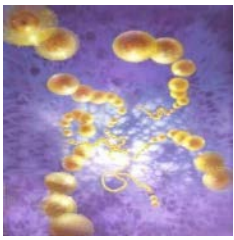


### Methicillin Resistant *Staphylococcus aureus*

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a type of bacteria that is resistant to certain antibiotics. These antibiotics include methicillin and other more common antibiotics such as oxacillin, penicillin and amoxicillin. RGF participated, along with a major hospital, in a two year study evaluating PHI Technology which resulted in a 33.4% reduction in infections. Source: CDC Centers for Disease Control and Prevention

Tested by Kansas State University Inactivation Rate **99+%**





### ***Streptococcus Sp.***

Group A *Streptococcal* (strep) infections are caused by group A *streptococcus*, a bacterium responsible for a variety of health problems.

Source: U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

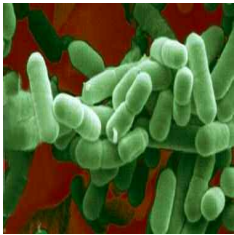
Tested by Kansas State University Inactivation Rate **96+%**



### ***Pseudomonas Sp.***

The bacterial genus *Pseudomonas* includes plant pathogenic bacteria such as *P. syringae*, the opportunistic human pathogen *P. aeruginosa*, the ubiquitous soil bacterium *P. putida*, and some species that are known to cause spoilage of unpasteurised milk and other dairy products.

Tested by Kansas State University Inactivation Rate **99+%**

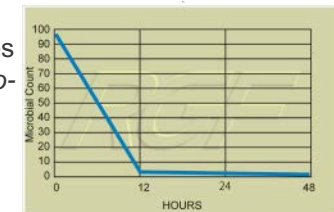


### ***Listeria***

This is a Gram-positive bacterium, motile by means of flagella. Some studies suggest that 1-10% of humans may be intestinal carriers of *L. monocytogenes*.

Source: U.S. Food and Drug Administration

Tested by Kansas State University  
Steris Labs  
KAG / Eco Labs Inactivation Rate **99+%**

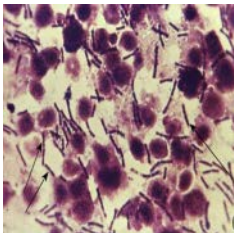
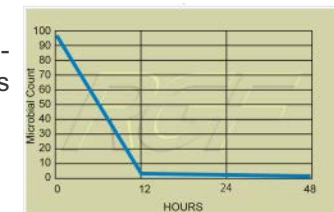


### ***Escherichia coli***

*Escherichia coli*, usually abbreviated to *E. coli*, discovered by Theodor Escherich, a German pediatrician and bacteriologist, is one of the main species of bacteria that live in the lower intestines of mammals, known as gut flora.

Source: CDC: Center for Disease Control and Prevention

Tested by Kansas State University Inactivation Rate **99+%**



### ***Bacillus Globigii***

*Bacillus globigii* lives in soils around the world and can readily be found in samplings of wind-borne dust particles. It is also known as *Bacillus subtilis*, its more modern name.

Information source: CDC Center for Disease Control and Los Alamos National Laboratory

Tested by Kansas State University Inactivation Rate **99+%**

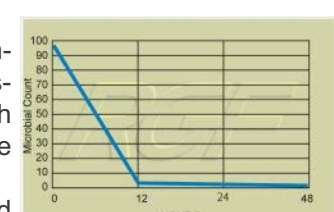


### ***Staphylococcus Aureus***

*Staphylococcus aureus*, often referred to simply as "staph," is a bacteria commonly found on the skin and in the nose of people. Person-to-person transmission is the usual form of spread and occurs through contact with secretions from infected skin lesions, nasal discharge or spread via the hands.

Information source: CDC Center for Disease Control and FDA (Food and Drug Administration)

Tested by Kansas State University Inactivation Rate **99+%**

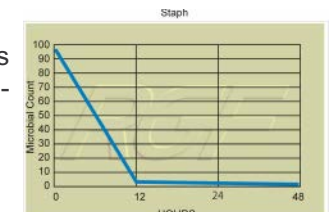


### ***Clostridium difficile (C-Diff)***

Many hospitals have been waiting for more information on C-Diff bacteria as it may be as big a problem or bigger than MRSA. Independent university studies tested RGF's REME Technology with 99% kill rate.

Source: CDC Center for Disease Control and Prevention

Tested by Kansas State University Inactivation Rate **99+%**

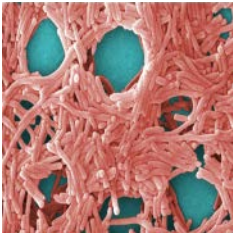




### Tuberculosis

Tuberculosis typically attacks the lungs, but can also affect other parts of the body. It is spread through the air when people with infection cough, sneeze, or otherwise transmit their saliva through the air.[2] Most infections are asymptomatic and latent, but about one in ten latent infections eventually progresses to active disease which, if left untreated, kills more than 50% of those so infected. Source: Health and Industry

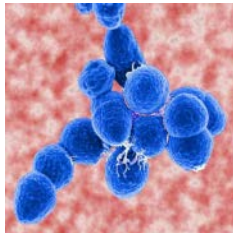
Tested by Kansas State University Inactivation Rate **99+%**



### Legionella

Legionella is common in many environments, with at least 50 species and 70 serogroups identified. The chemical composition of these side chains determine the nature of the somatic or O antigen determinants, which are essential means of serologically classifying many Gram-negative bacteria. Information source: CDC Centers for Disease Control

Tested by Kansas State University Inactivation Rate **99+%**



### Streptococcus Pneumoniae

*S. pneumoniae* is an exclusively human pathogen and is spread from person-to-person by respiratory droplets, meaning that transmission generally occurs during coughing or sneezing to others within 6 feet of the carrier. Health experts estimate that more than 10 million mild infections (throat and skin) like these occur every year.

Information source: CDC Centers for Disease Control

Tested by Kansas State University Inactivation Rate **99+%**



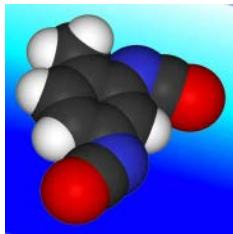
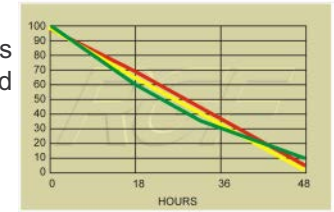
### Mold/Yeast

The purpose of this test was to evaluate the effect the RGF AOT unit has on mold/yeast bacteria (TPC). This test was performed utilizing a standard 2000 sq. ft. home and 3000 sq. ft. simulated home.

Tested by California Microbiology Center

Reduction %

**Bacteria 99%** **Mold 97- 98%** **Yeast 90+%**



### Chemical Compounds

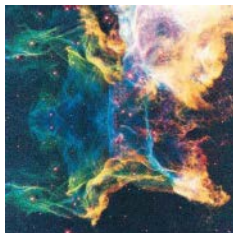
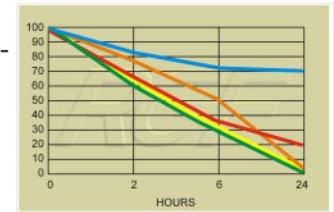
Gas Chromatograph/Mass Spectrometer test performed by Nelap Accredited Lab on airborne chemical compound reduction using RGF's AOT.

Hydrogen Sulfide - Rotten eggs Butyl Acetate - Sweet banana  
Methyl mercaptan - Rotten cabbage Methyl Metharcylne - Plastic  
Carbon Disulfide - Vegetable sulfide

Tested by GC/MS Nelap Accredited Independent Lab

Reduction %

**Hydrogen Sulfide 80%** **Methyl mercaptan 100%** **Carbon Disulfide 30%** **Butyl Acetate 100%** **Methyl Metharcylne 100%**



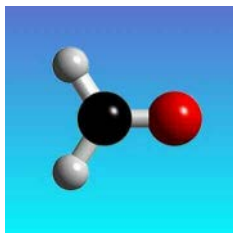
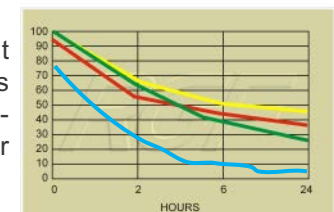
### Odors

The purpose of this test was to evaluate to what effect the RGF's AOT unit has on cleaning chemicals, pet odors, smoke and perfume odors. This test was performed utilizing two 500 cubic foot test chambers and a ten-person odor panel. The qualitative assessments of the ten-person odor panel were then used as a means to determine the odor reduction.

Tested by C&W Engineering (Independent PE Firm)

Reduction %

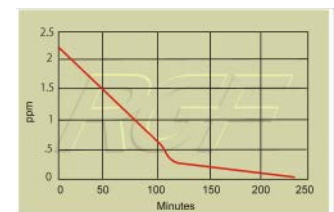
**Cleaning chemicals 55+%** **Pet odors 72%** **Perfume odors 63+%** **Smoke odors 70%**



### Formaldehyde

The purpose of this test was to evaluate the effect the RGF AOT unit has on formaldehyde.

Tests were conducted in a Class II Bio test chamber by Kansas State University





### **Electrical / Ozone / EMF**

All RGF AOP devices have been thoroughly tested for electrical safety, ozone / emf - Electro Magnetic Frequency and have passed Federal Safety Standards.

Tested by: TUV, ETL, CSA, NEI China, RGF Labs. The Japanese Government, Electrical Power Research Institute.

Note: Many household appliances emit some ozone and emf in safe low levels such as and fluorescent lights, motors, computers, copy machines, refrigerators, blenders, electronic air filters, air conditioners, electric fans, microwave ovens, etc.

### **Sneeze Test - RGF PHI and REME**

A testing protocol concept was used which included a "Sneeze Simulation Machine" and "Sneeze" chamber. A sneeze can travel at up to 100 mph, so we had to consider lung capacity, sneeze pressure, and liquid volume to properly simulate a human sneeze. This was accomplished and the test proceeded with outstanding results. An average of 88% reduction of microbials was achieved with PHI in a double blind test, at 3 feet from the sneeze source. This is clearly not a medically supervised test or protocol. However, from a practical point, it was definitely providing some kill at the source and will provide some level of protection. When RGF developed the next generation of Advanced Oxidation Technology, REME, the same testing was performed and an average of 99% reduction of microbials was achieved in the same 3 foot distance.



Tested by: Kansas State University, inactivation 99% Simulated Sneeze Lab Test at three feet in a 250 cu ft Bio Test Chamber. An independent PE double blind study.

### **SAFETY**

It is a normal reaction to question the long term safety of any product that is effective and uses new or "breakthrough" technology. This type of question has become common as our litigious society has taught us to question things that significantly outperform existing methods or products.

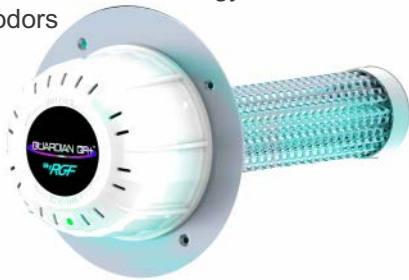
The RGF *advanced oxidation technologies* that produced the results found on the pages of this report certainly fall into the category of breakthrough technology. This is evident by its outstanding test results across the entire range of microbes.

The breakthrough in the RGF *advanced oxidation technologies* is not found in the final product (hydroperoxides) but rather in the method by which they are produced. The active ingredient created by the RGF products is a group of oxidants known as Hydroperoxides. Hydroperoxides have been a common part of our environment for over 3.5 billion years. Hydroperoxides are created in our atmosphere whenever three components are present: unstable oxygen molecules, water vapor and energy (electro magnetic).

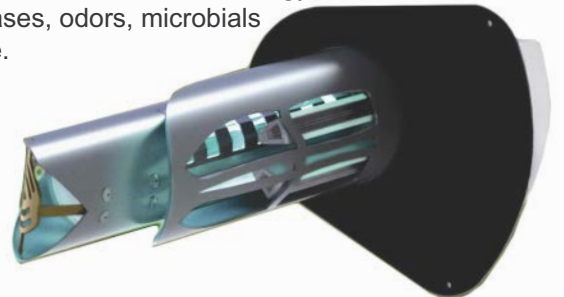
Hydroperoxides are very effective (as demonstrated by the test results in this book) at destroying harmful microbials. As oxidants, they do this by either destroying the microbe through a process known as cell lysing or by changing its molecular structure and rendering it harmless (which is the case in VOC's and odors). The amount of hydroperoxides required to accomplish this task in a conditioned space is well below the level that is constantly in our outside air. The advanced oxidation technology found in RGF's Guardian Air product family has brought the oxidants found in the outside air into the conditioned space of your home, office, business, etc.

There is no known case of hydroperoxides ever creating a health risk. Considering we have been exposed to hydroperoxides in nature since the day man stepped on the planet, it is a reasonable assumption that hydroperoxides do not constitute a health risk. Over the past 20 plus years RGF has more than 1 million Advanced Oxidation products successfully used worldwide.

**RGF Guardian Air QR+ PHI Cell®**  
An RGF Advanced Oxidation Technology  
Effective on gases, odors  
and microbials.



**RGF Guardian Air REME HALO™**  
An RGF Advanced Oxidation Technology  
Effective on gases, odors, microbials  
and particulate.



### **Disclaimer:**

All the above tests were performed on RGF Advanced Oxidation products with Advanced Oxidation Plasma of less than .02 ppm. They were conducted by independent accredited labs and university studies. They were funded and conducted by RGF's major clients to assure third party credibility. RGF products are not medical devices and no medical claims are made.

### **RGF Environmental Group, Inc.**

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