

# Airline / Commercial Building Bioterrorism Solution

By Dr. James Marsden, Ronald G. Fink and Walter Ellis

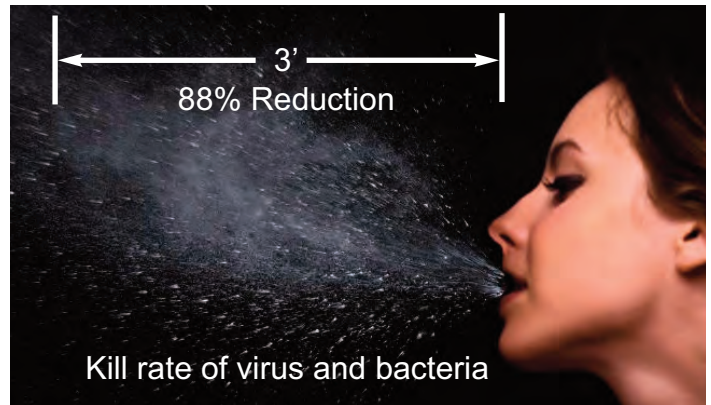
In theory, a terrorist could aspirate a virus easily on an airliner, in a terminal or any commercial building simply by placing a virus in a small hand activated asperator readily available at any drugstore or by re-using an over the counter nasal spray bottle. No one would know until the next day after they have traveled and spread the virus. This is how worldwide pandemics can get started. This concept was discovered by Sandia National Labs while working with RGF Environmental Group on a homeland security project for a potential terrorist bio attack on an airliner.

The solution is to kill the virus at the source before it reaches another person. The problem was how do you do that? RGF Environmental Group has been working with Advanced Oxidation technology since the mid-1980s. RGF's Photohydroionization or PHI™ technology looked promising as having the ability to kill an airborne virus, from a sneeze or asperator, within three feet. The next problem was how do you validate the results? The validation had to be in a bio test chamber and had to be repeatable. Now, how do you duplicate a sneeze? No two people sneeze alike or not even the same person could duplicate his or her own sneeze. A high-tech sneeze/aspiration machine was needed. Of course, there was no such thing, so RGF developed one. When you sneeze, you evacuate one lung of air volume. You expel about one gram of fluid at about 100 miles per hour. RGF invented and built the world's first sneeze/aspiration machine with controls for volume, fluid and speed. Now it



**The World's first Sneeze Machine**

was possible to duplicate a sneeze/aspiration allowing a repeatable method of testing the effectiveness of RGF's Advanced Oxidation technologies.



A PHI Cell® creates an airborne plasma, which is distributed through the HVAC (heating ventilation & air conditioning) system basically consisting of friendly oxidizers. Friendly being those found in nature that return to oxygen and water after they oxidize, such as hydroperoxides. The process is like misting the air with an atomized or very fine mist of hydrogen peroxide. A series of tests were conducted by Kansas State University, who also works closely with Sandia National Labs. The first results were outstanding with a kill rate of 78% of a sneeze at three feet. A more advanced cell was later developed by RGF, REME® or Reflective Electro-Magnetic Energy, that ionized the Advanced Oxidation plasma making it far more effective on a broader scope of contaminants. REME® sneeze results showed 88% reductions.



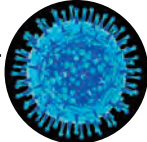
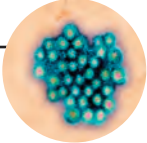
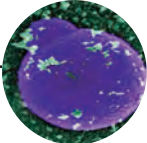
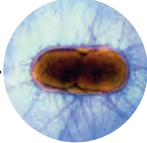
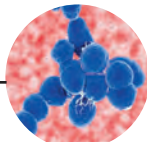
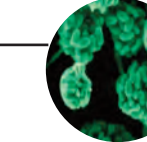
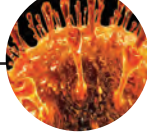
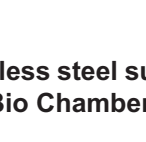


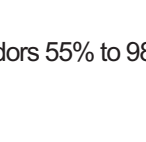
During the SARS scare a few years ago, the Chinese Government installed PHI™ Advanced Oxidation Cells in city buses and subways after determining it killed the deadly

SARS virus. A Chinese manufacturer licensed PHI™ Technology for use on China's buses and subways.

The breakthrough in the RGF Advanced Oxidation technologies 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: oxygen molecules, water vapor and energy (electro magnetic). REME® also has the ability to super charge these hydroper-

oxides or ionize them into Ionized-Hydro-Peroxides™. Ionized-Hydro-Peroxides™ are very effective at destroying harmful microbes in the air and on surfaces. 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 typically the case in VOC's and odors). The amount of hydroperoxides required to accomplish this task in a conditioned space is below the level that is constantly in our outside air. The Advanced Oxidation technology has brought the oxidants found in the outside air into the indoor conditioned air. One of the best features of Ionized-Hydro-Peroxides™ is that as they settle out of the air, they disinfect surfaces. This was validated in a Kansas State University Bio Chamber on stainless steel surfaces, resulting in a 99+% kill on numerous viruses

**Partial List of University Test Results**

- Avian Influenza (Bird Flu)\* 
- Norwalk Virus\* 
- Pseudomonas Sp.\* 
- MRSA Bacteria\* 
- Listeria\* 
- E.coli\* 
- Staph\* 
- Strep\* 
- Stachybotrys chartarum\* 
- Candida\* 
- H1N1 Swine Flu\* 

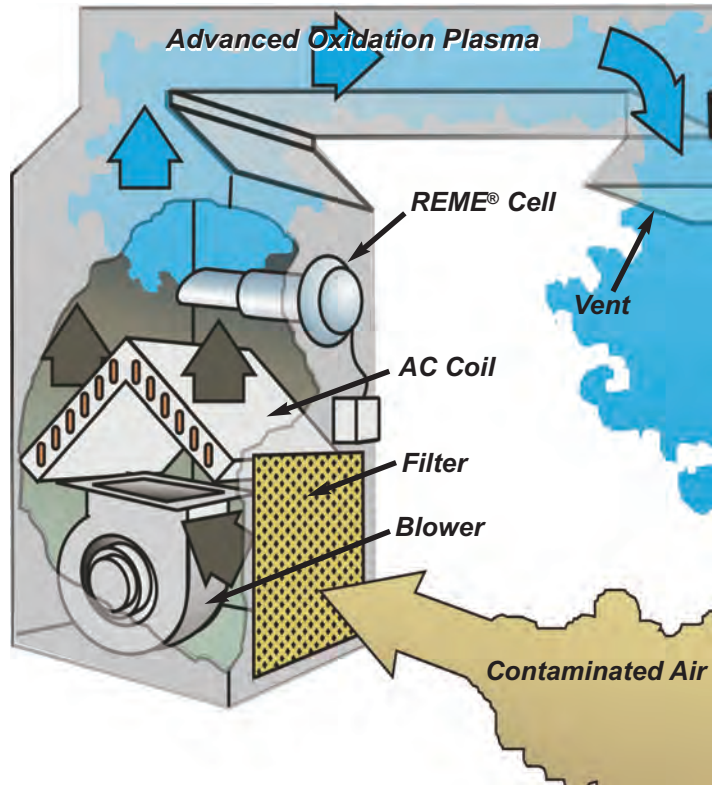
**\* 99+% reduction on stainless steel surface in a Kansas State University Class II Bio Chamber**

**In addition:**

- Formaldehyde 99+%
- Mold 97% to 98%
- Hydrogen Sulfide 80%
- Odors - pet, chemicals and human biological odors 55% to 98%
- Smoke 70%
- Particulate – ISO-Class 3

and bacteria.

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 25 years, RGF has more than one million Advanced Oxidation products which have been used successfully worldwide without a safety problem.



**Typical Installation in HVAC system**

**Authors:**

**Dr. James Marsden** Regents Professor at Kansas State University, who has conducted research on Advanced Oxidation Technology for the past 15 years. He has authored numerous articles and holds many patents

**Ron Fink** President, CEO, Founder of RGF Environmental Group, Inc. Mr. Fink holds a BSME and has been active in Nuclear Weapon detection for the DIA Defense Intelligence Agency and Nuclear Power Industry. He holds numerous patents and authored over 70 articles.

RGF Environmental Group, Inc. founded in 1985 manufactures over 500 products involving Advanced Oxidation Technology.

**Walter Ellis** Vice President Research & Development, RGF Environmental Group. BS Degree in Biology & Marine Biology. Mr. Ellis is a specialist in Advanced Oxidation. He has authored several published technical papers and has numerous patents.