

**AQUAPULSE  
SYSTEMS**

**Your One Stop Solutions for Air & Water Disinfection**

**(888) 239 – 4447**

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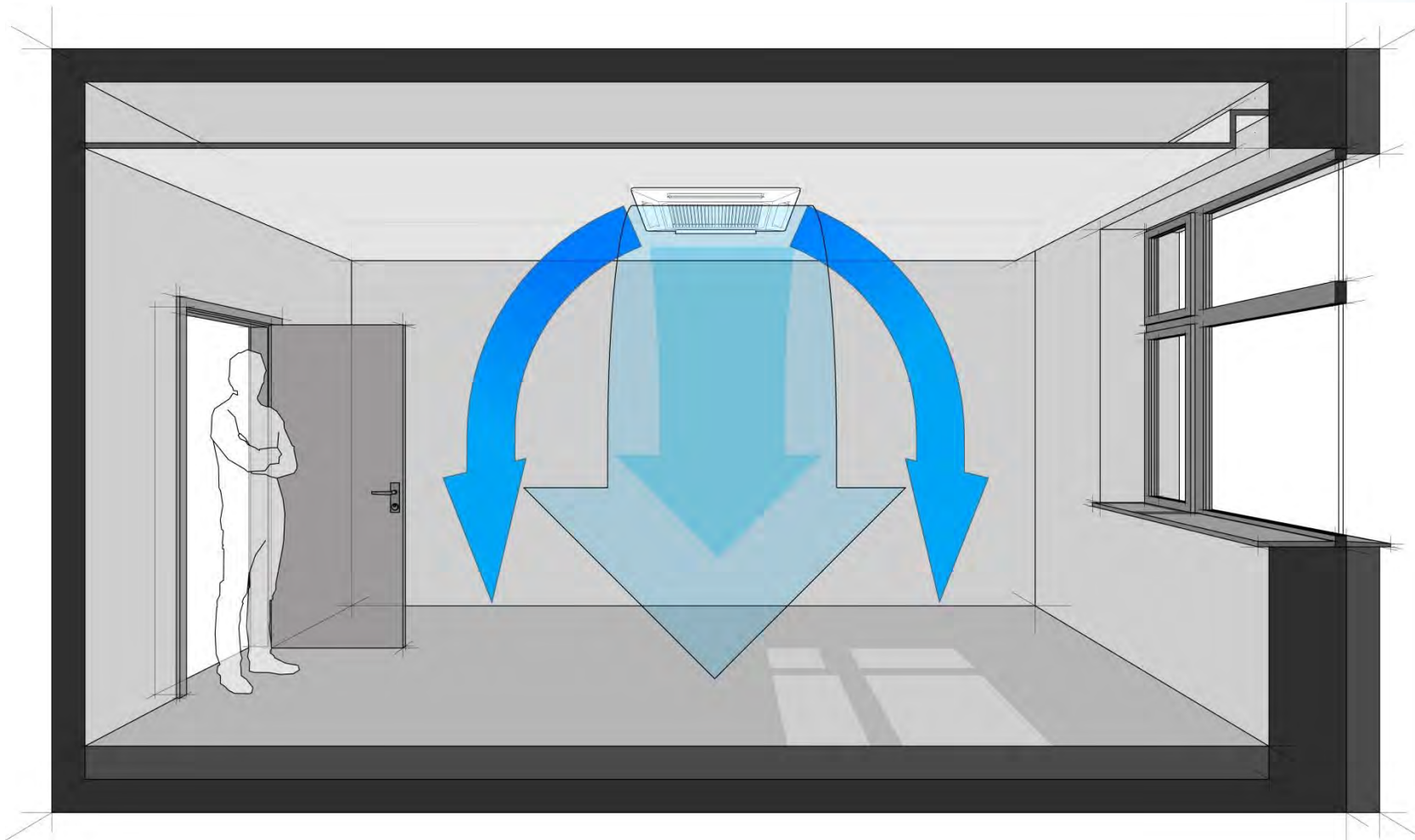


**Air Oasis**

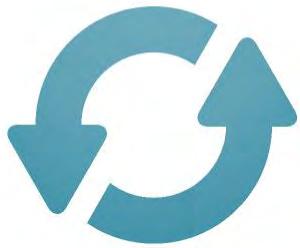
**Food Safety & Shelf Life**

# Proactive Sanitization

Catalytic Molecules are **dispersed** throughout a building while occupied by people.



# Primary Competitive **Advantages**



24/7 **continuous**  
**proactive protection**



Verified **safe** for  
constant use around  
people



Active sanitization of  
air and **surfaces**

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Air Oasis technology  
**proactively** sanitizes air  
and **surfaces** throughout a  
building **during use 24/7**

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## Constant Sanitization

Simply plugging in one of our room Air Sanitizers can achieve significant 24/7 reductions of airborne AND surface based viruses and bacteria.

Versatile product options scalable from the smallest room to the largest air handler. We have product solutions for any room, building or vehicle. Plug and play options as well as those installed in the HVAC systems.



## MERS Surface Kill Rates

MICROBAC labs found Middle East Respiratory Syndrome Coronavirus (MERS) found 99.998% reduction on surfaces after 4 hours. Cytotoxicity control showed no cytotoxicity observed in 4 out of 4 wells

Contact Times	Mean Reduction (3 replicates)
1 hour	99.582%
2 hours	99.984%
4 hours	99.998%

## Airborne H1N1

MICROBAC labs found Influenza A Virus (H1N1), strain: A/PR/8/34 titrated by 50% tissue culture infectious dose (TCID50) endpoint assay using MDCK cells. All of the controls met the criteria for a valid test. 99.99% reduction of airborne H1N1 in 20 minutes.

Contact Times	Mean Reduction (3 replicates)
20 minutes	99.99%





Intertek

MICROBAC

RTI  
INTERNATIONAL



CMA Testing  
and Certification  
Laboratories  
廠商會檢定中心



北里大学  
KITASATO UNIVERSITY

KTR KOREA TESTING &  
RESEARCH INSTITUTE

Methodist  
HEALTH SYSTEM



MGM RESORTS  
INTERNATIONAL



CAESARS  
ENTERTAINMENT

SAFeway



Disney  
CRUISE LINE



BURJ KHALIFA

## Proven Worldwide

15+ years of University & Laboratory Testing, over ten thousand homes, and trusted by globally recognized brands ranging from the tallest building in the world to pro sports teams and hospitals. More than 1 Billion Cubic Feet of air is currently sanitized every hour using Hypoallergenic Air technology.


## Abstract #3552

“Blood, Human cell culture and plant cells were exposed to the (Air Oasis) AO chamber.”

“AO chamber and UV chamber with the same duration we found no anomalies with the AO Chamber.”

“...they are safe to use”



A woman with long brown hair, wearing a light grey sweater and dark trousers, is standing in a supermarket. She is looking down at a meat display case. A shopping cart filled with various items, including a red bag and some produce, is in the foreground. The background is a brightly lit supermarket aisle with warm orange lighting.

**Air and Surface Safety:** fight airborne and surface based dangerous bacteria **constantly**, including salmonella and listeria, even on meat carving stations and on meat surfaces.

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Air Oasis has undergone over 8  
years of University and field  
studies to prove **safety** and  
**effectiveness**

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**Air Quality & Shelf Life Extensions:** Premium air quality for customers and produce. Remove a broad spectrum of VOCs, spoilage microorganisms, and ethylene gas.



# Advantages vs. Common Technologies

	Filters Carbon and HEPA	UV Light	Misters	Ozone Generators	Purifier In-room filter & fan	PCO	Air Oasis AHPCO & Bi-Polar
In-Room Surfaces			✓	✓			✓
HVAC Surfaces		✓	✓	✓		✓	✓
In-Room Air			✓	✓	✓	✓	✓
HVAC Air	✓	✓	✓	✓		✓	✓
Safe In-Room	✓	No human exposure	Rooms must be evacuated first	Can produce unsafe levels	✓	✓	✓
Fine Particulates	✓				✓		✓
24/7 Use	✓	✓			✓	✓	✓
Easy Installation		✓			✓	✓	✓
Low Maintenance						✓	✓
Low Power							✓
Long life Molecules							✓
Proactive Sanitization Proactive cleaning of Air and Surfaces			✓	✓			✓

# Replicating Nature Indoors

## Step #1

### Catalytic Molecules are created from water vapor

UVC light destroys germs as they pass by. Oxidizing Catalytic Molecules are then formed from water vapor when the UVC rays excite the AHPCO nanometal Catalyst. Bi-Polar does not have a UV light but splits water vapor in the ambient air into Polarized Catalytic Molecules which are **proactively** dispersed throughout the ambient air.

## Step #2

### Bacteria, Viruses, VOCs & Other Pollutants are Destroyed

Catalytic Molecules actively seek out pollutants and break them apart at a molecular level. Contaminants are neutralized as they are destroyed. Oxidizing Catalytic Molecules are more effective at neutralizing VOCs, while Polarized Catalytic Molecules have a clustering effect that is extremely effective at causing particulates to become heavy and drop out of the air.

## Step #3

### Harmless By-products of Water Vapor

Catalytic Molecules and Contaminates are converted into harmless water vapor and the cycle repeats, thereby reducing additional contaminants.

This is the same natural process that happens in earth's atmosphere. Complex organisms like humans, plants, and animals have antioxidants to thrive in our atmosphere... viruses, molds, bacteria, and VOCs do not.



# Two Proprietary Technologies

## Similar Mode of Action

### AHPCO®

Advanced Hydrated Photo Catalytic Oxidation



### Bi-Polar®





Texas Christian University (TCU) TCU Recreation Center (1 Floor 35,000 CFM) case study illustrates **Proactive Sanitization** perfectly. While in use by students, surface ATP tests were taken to show before and after.



# TCU Case Study Results:

Surfaces Tested	Before	After	Reduction
Hair Dryer	142	44	69%
Sink	691	79	89%
Bench	693	375	46%
Locker #90	1572	144	91%
Shower Curtain	537	47	91%
Inner Door Handle	1517	224	85%
Vending Machine	132	52	61%
Drinking Fountain	2255	290	87%
Foosball Table	1041	573	45%
Ping Pong Table	757	538	29%

*\*Excludes 2 outliers that appeared to have been recently recontaminated*

69%

Average Surface  
Reduction **while in use** by  
students



**Proactive Sanitization** is also illustrated well by a case study in Italy at a large cheese factory. Surface and Air samples were collected before and after Air Oasis.



## Air (petri) Sample Results

Contaminant Type	Before Count	After Count	Percentage Reduction
Bacteria Colonies at 30°C	2,400	200	-91.67%
Molds & Yeast	131,000	43,000	-67.18%

## Cheese Surface Sample Results

Contaminant Type	Before Count	After Count	Percentage Reduction
Bacteria Colonies at 30°C	3.7	1.1	-70.27%
Molds	8,000	630	-92.13%
Yeast	35	1.9	-94.57%

85%

Average **Surface**  
Reduction on Cheese  
during aging

# Recent Case Studies:

**Surface of meat:** A multi-billion dollar Meat Processor recently conducted a test which found 30% reductions of Aerobic Colony Count (ACC) on hard to reach raw meat surfaces (femur, aitch bone, etc.), and 69- 90% on easier to reach raw meat surfaces.



# Recent Case Studies:

**Hard Surfaces:** A Grocery chain with over 150 locations found Air Oasis to be far more effective than bleach alone (99+% bacteria reductions on all 5 tested surfaces).



# Recent Case Studies:



**Shelf Life:** Air Oasis's distributor in Australia put a variety of fresh produce and food in 3 separate side by side chambers. One chamber had Air Oasis' Bi-Polar, the 2<sup>nd</sup> had no equipment, and the 3rd had a competing IAQ technology. A tripod was used to take pictures daily for 9 days (Full daily images available on dropbox).

**After 9 days, the results speak for themselves:**



**With Bi-Polar**



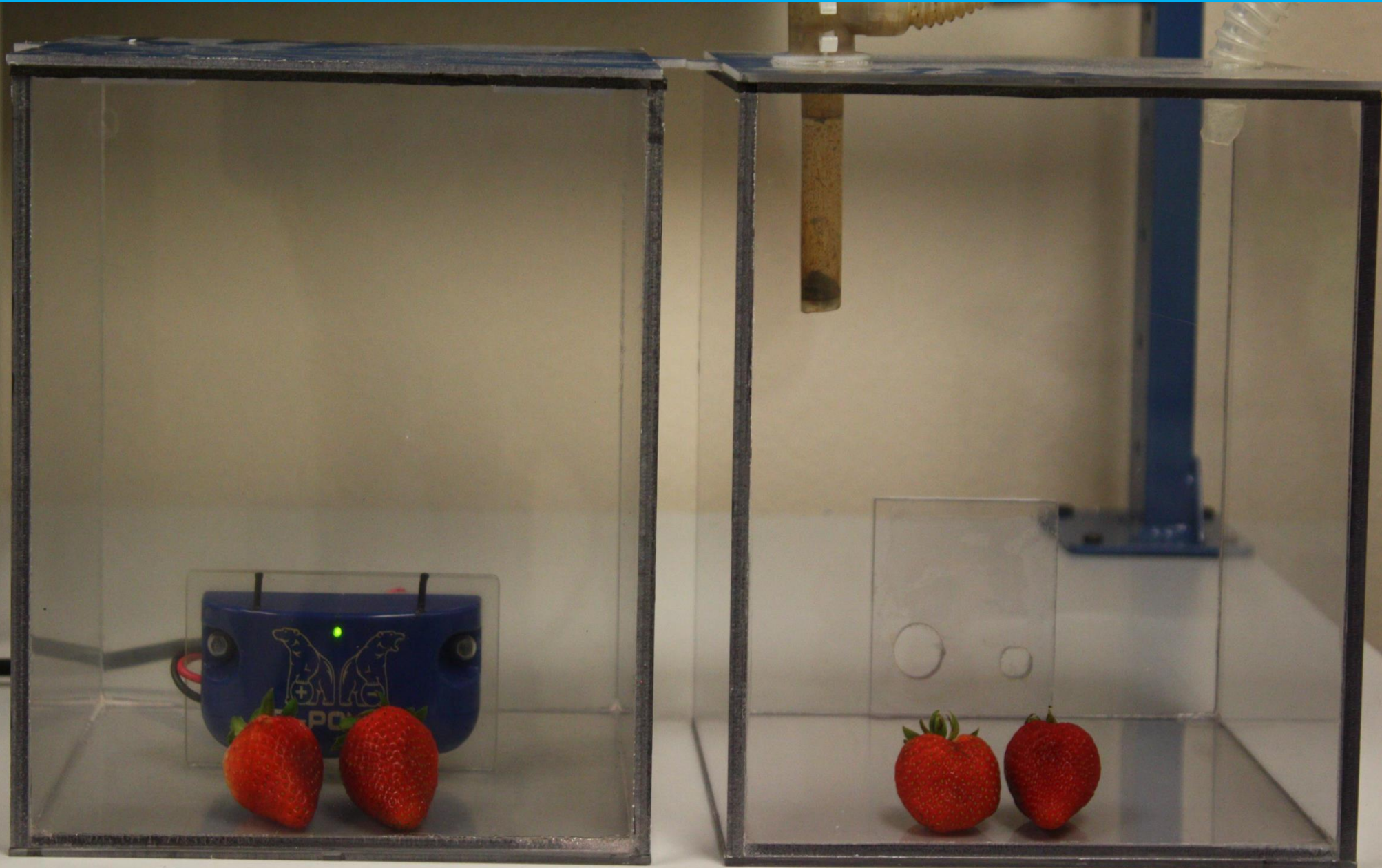
**No technology**



**Competing Technology**

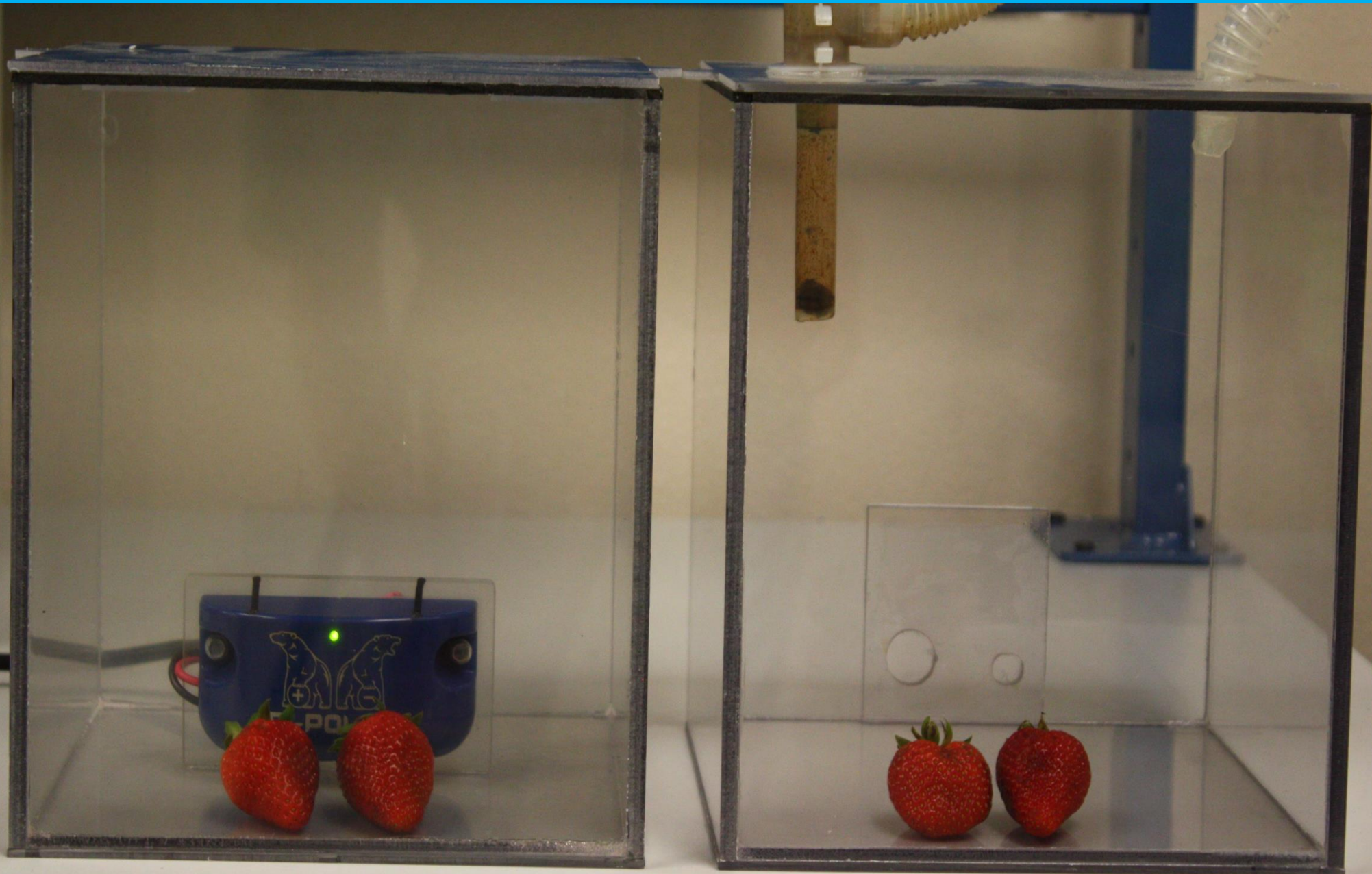
# Air Oasis **Strawberry Shelf Life Trial**

## Day 1



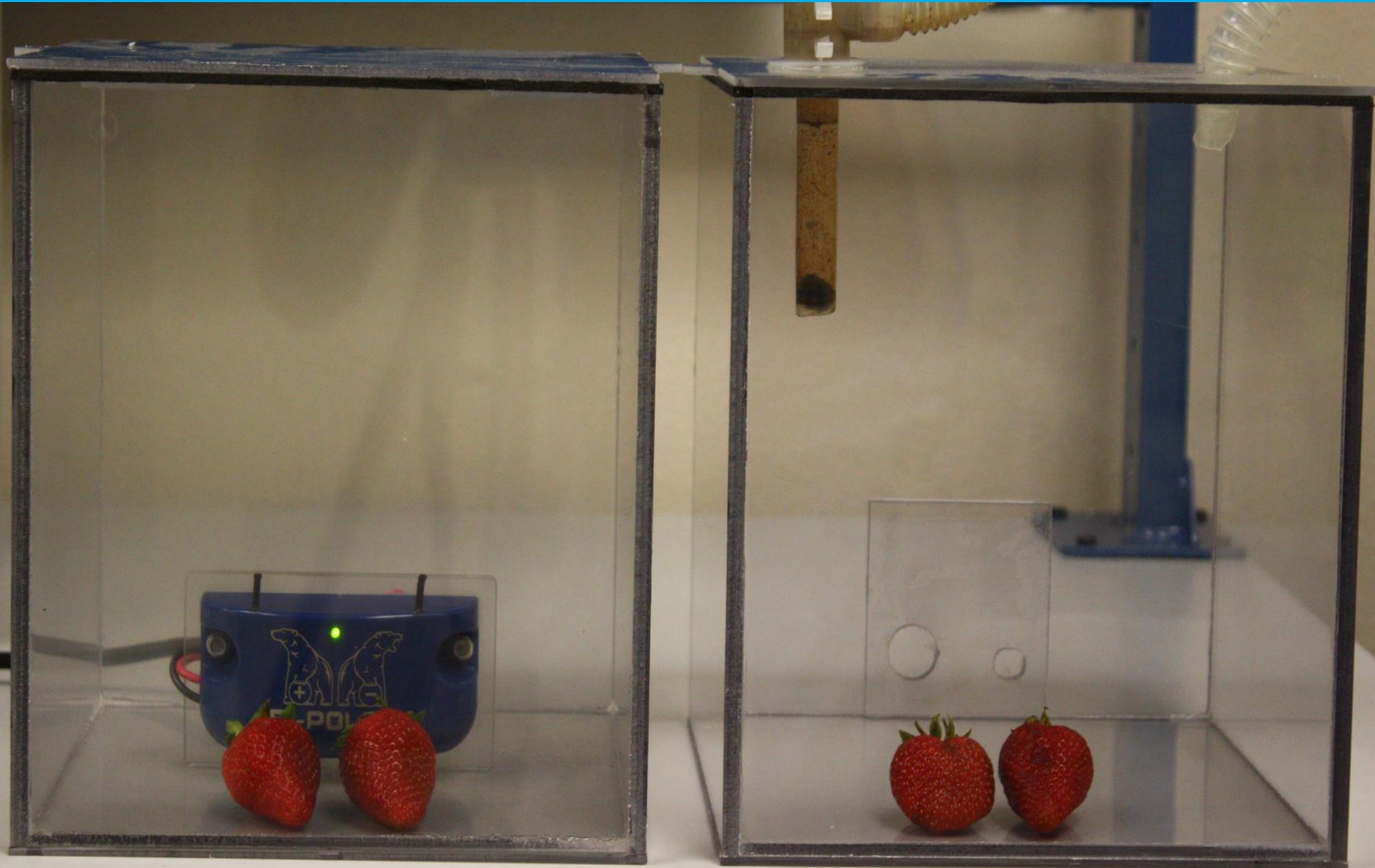
# Air Oasis **Strawberry Shelf Life Trial**

## Day 2



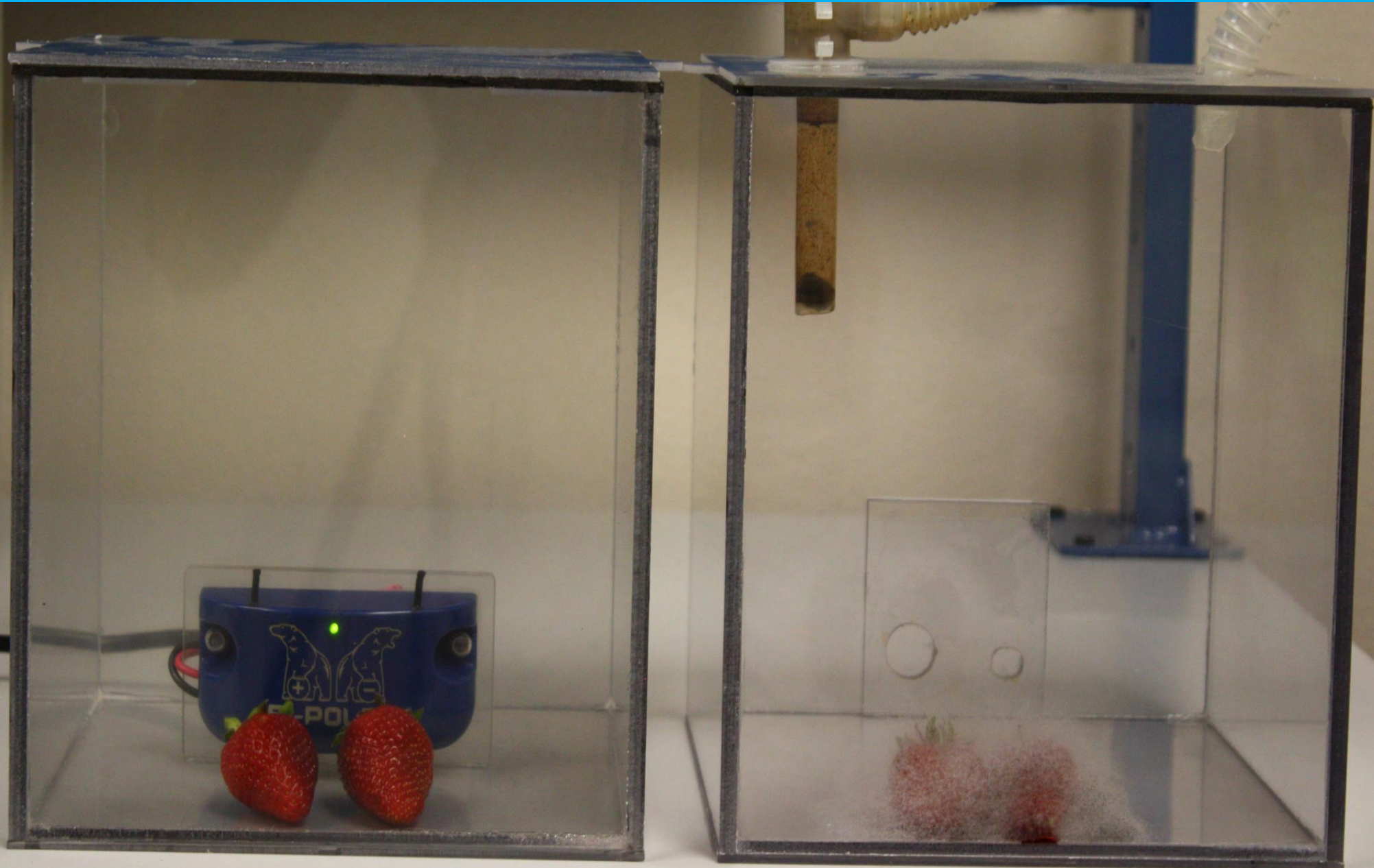
# Air Oasis **Strawberry Shelf Life Trial**

## Day 3



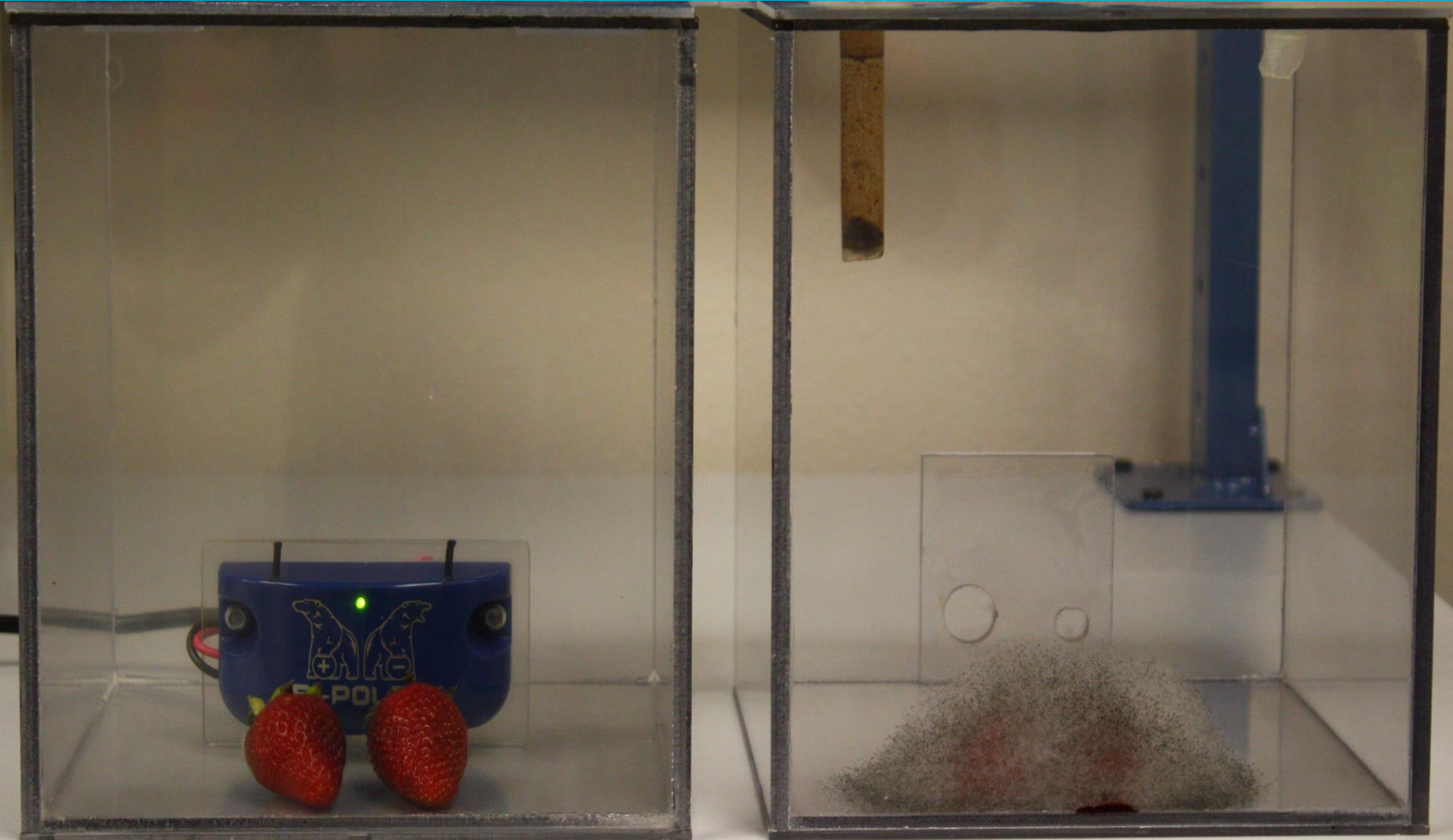
# Air Oasis **Strawberry Shelf Life Trial**

## Day 4



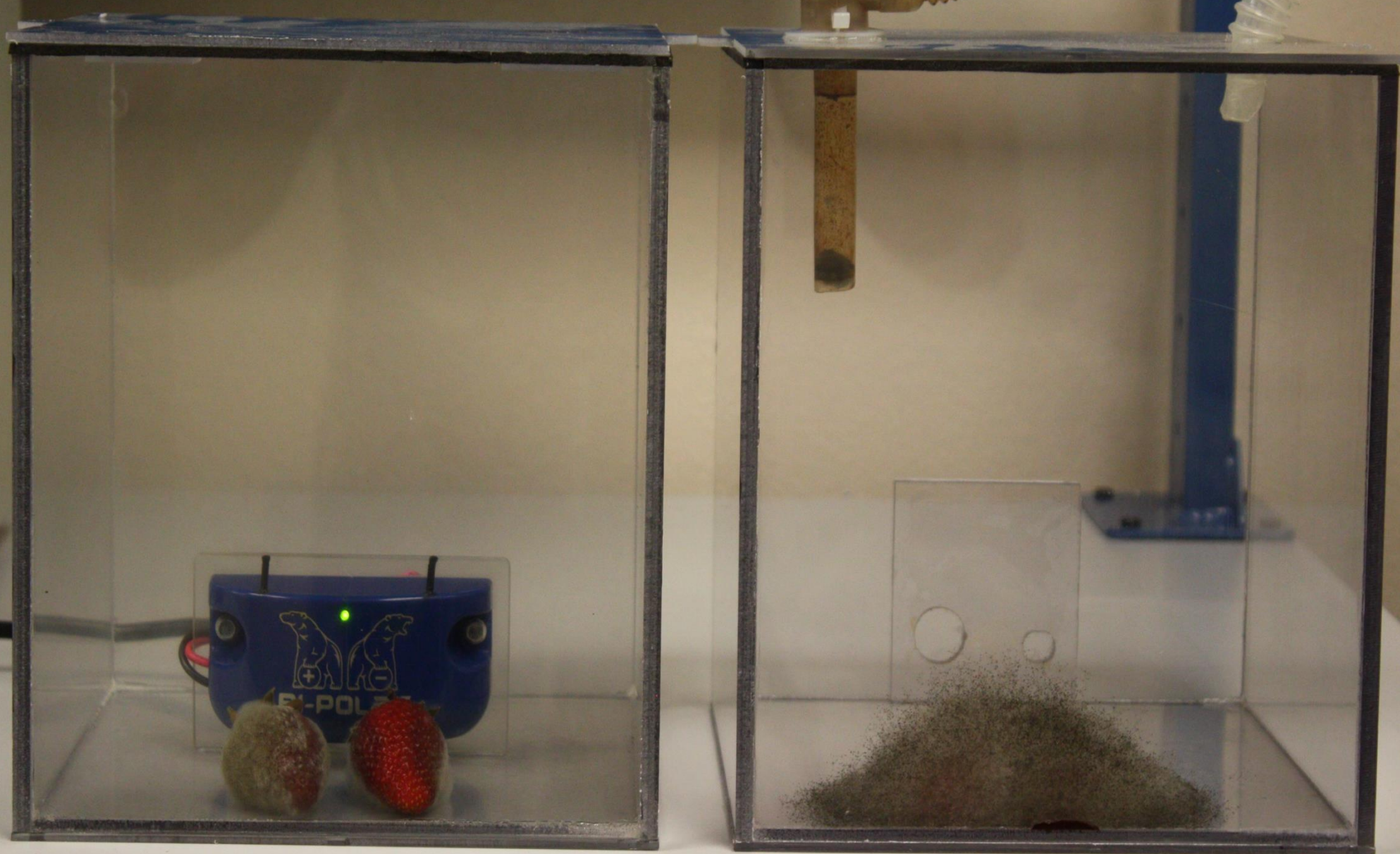
# Air Oasis **Strawberry Shelf Life Trial**

## **Day 5 (Friday)**



# Air Oasis **Strawberry Shelf Life Trial**

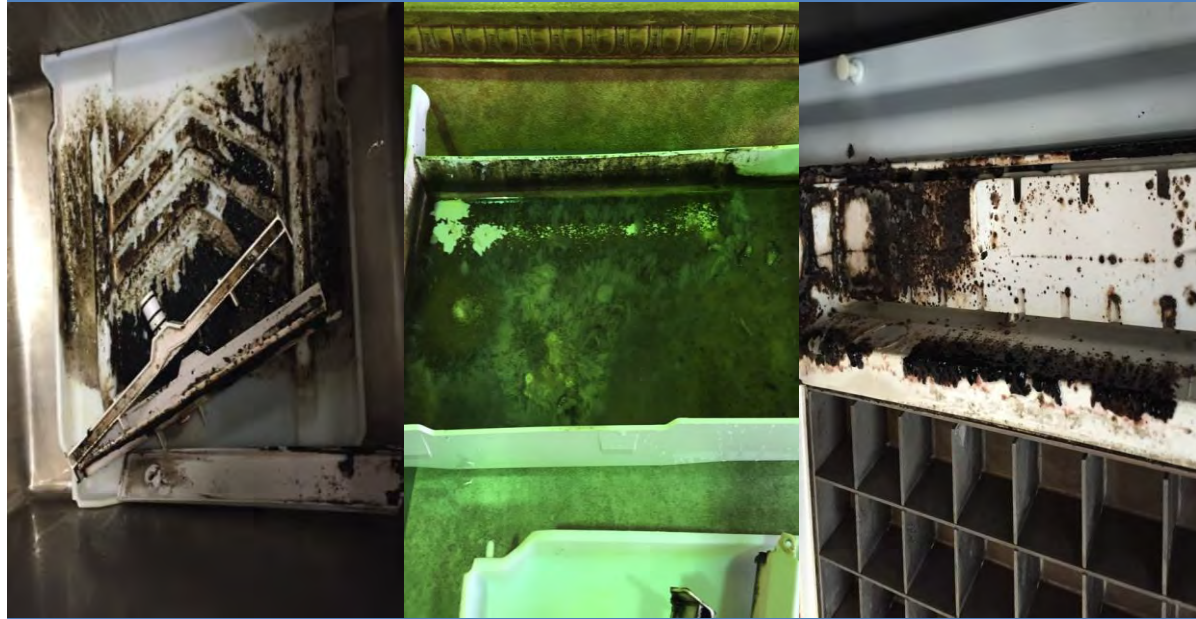
## **Day 8** (Monday)



# Recent Case Studies:

**Ice Machine:** A Texas restaurant part of one of the top 3 largest fast food chains in the world is currently testing Bi-Polar in their ice machine. After testing and normal decontamination by a trained professional, Bi-Polar was installed to reduce future biofilm growth. Almost complete reduction in ice machine contamination after Bi-Polar was installed. More results will follow as provided.

**60-90** days since physical cleaning **without** Bi-Polar

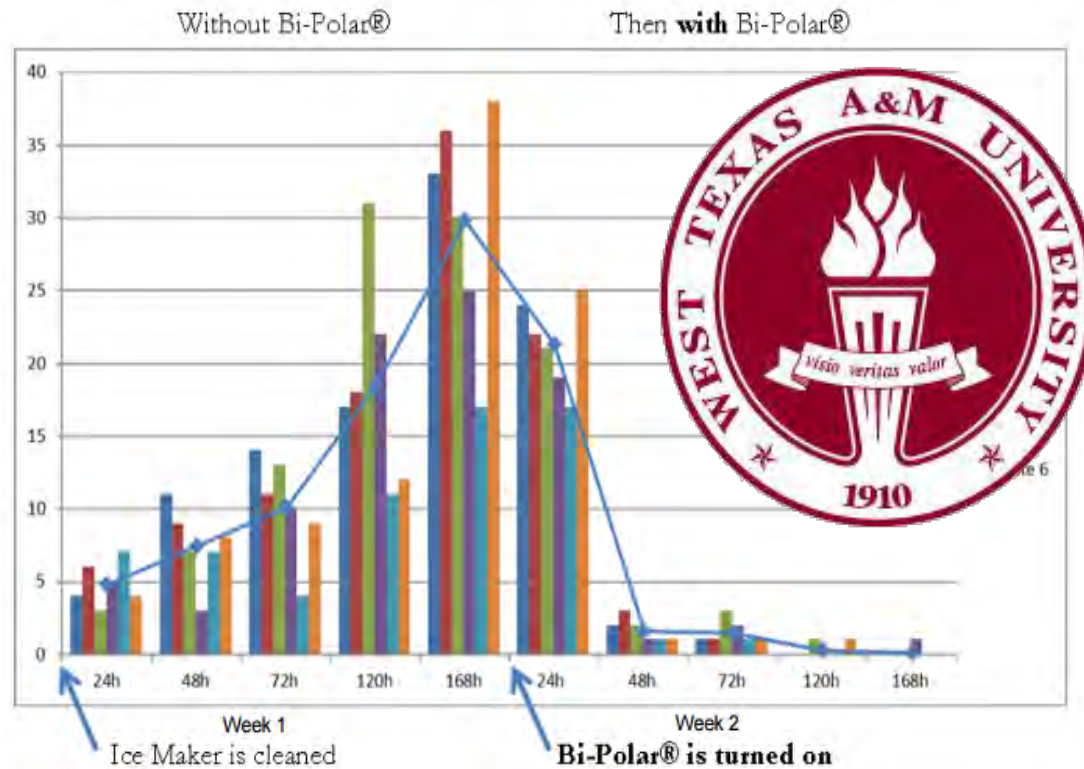


**150** days (so far) since physical cleaning **with** Bi-Polar



# Recent Case Studies:

**Ice Machine:** West Texas A&M University conducted a formal test on Bi-Polar in an ice machine. Results cleared showed significant reductions in “bacteria, molds, slime molds and cyanobacteria” in the ice machine even when installed in a dirty machine without physical cleaning. The Ice Maker was cleaned at the beginning of the trial and left running for 1 week without the Bi-Polar Technology. At the end of the first week, without physical cleaning, the Bi-Polar was turned on in the same Ice Maker.



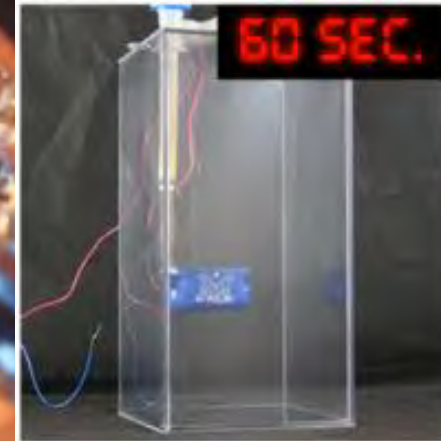
# Recent Case Studies:

**IAQ in Crowded areas:** Air Oasis technology is used in busy public transportation in China. Air samples after using Air Oasis now qualified for Excellent Air Quality for HCHO (46-77.5% reductions) and TVOC (66-82% reductions). Bacteria control was Excellent prior to the trial but still saw 22% reductions while in use. Case study from Tung Chung Terminus.



# Recent Case Studies:

**Particulate Control:** Air Oasis is widely used around the world in casinos, smoky bars, or even after fires to remove smoke. Wanted to see just how effective the Bi-Polar was at clearing out cigar smoke, so we built an airtight cigar smoke chamber. The results speak for themselves:





## Dozens of Hospitals



Air Oasis has proven powerful enough to be used in **industrial exhaust**  
in factories and even sewage treatment exhaust

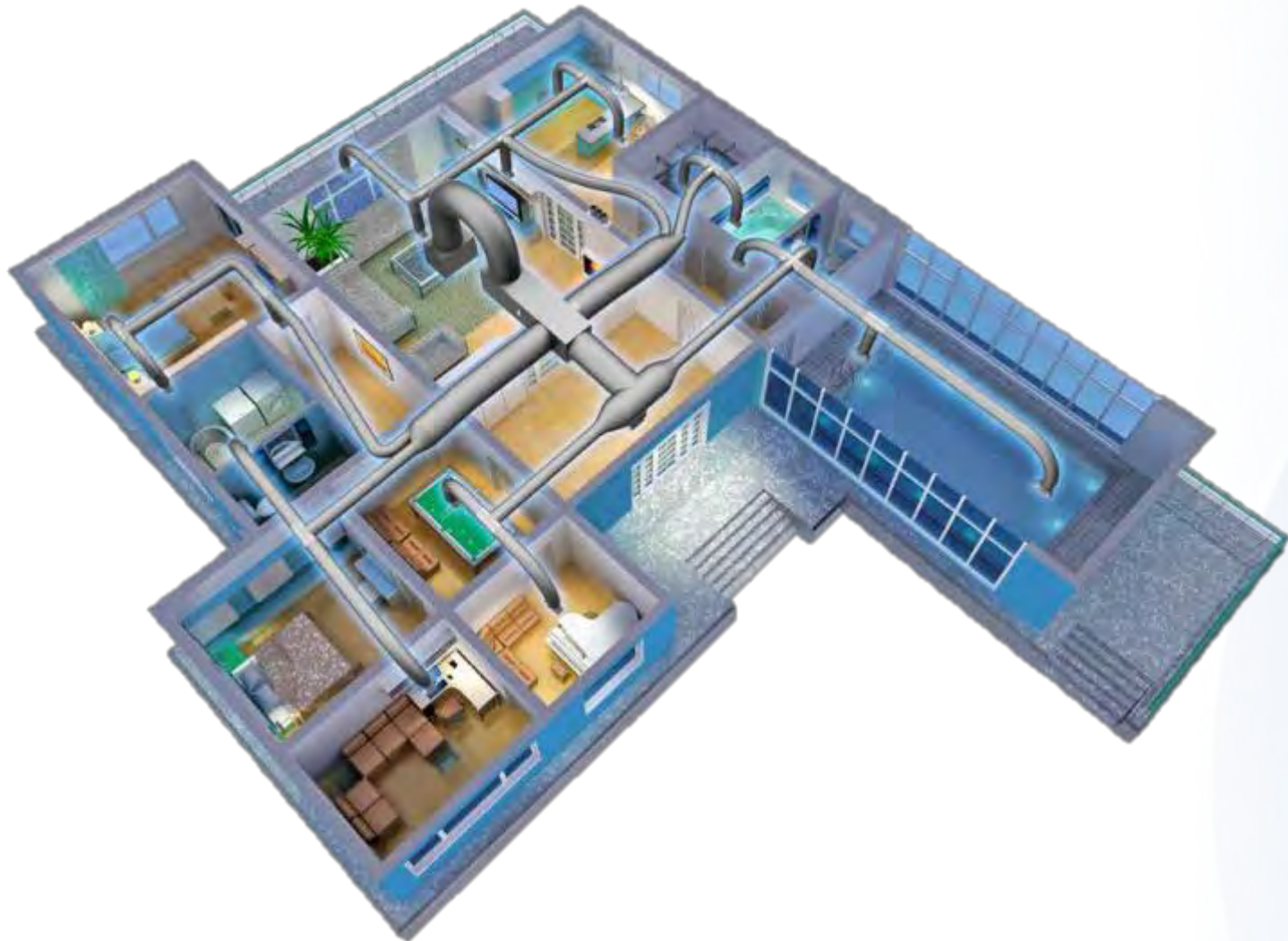





## Notable Commercial Client Examples



Air Oasis can transform any building HVAC System into an Air and Surface Sanitizer





Air Oasis cleans the **indoor air**....so you need less **outdoor air**.

Learn how Air Oasis **saves you energy**.

# Energy Savings



## System Efficiency

HVAC equipment with dirty evaporator coils can use up to **35%** more energy than those with clean coils. Air Oasis suppression of biofilms on coil surfaces will reduce fan energy use by decreasing air-side resistance. Coil pressure drop is reduced and, therefore, airflow is restored (Witham 2005). Because heat transfer is also restored, this combination can result in energy savings (Leve-tin et al. 2001), with significant payback (ASHRAE , Montgomery and Baker 2006)



## Reduced Makeup Air

By reducing VOC presence in the indoor air, the need to (1) pump in, (2) filter, (3) cool/heat, and (4) circulate makeup air is greatly reduced resulting in large energy savings. ASHRAE Standard 62.1 IAQ Procedure. The Dubai International Airport found external makeup air could be cut by 50% without compromising the carbon dioxide concentration criterion after installation extensive IAQ systems. The indicated energy savings was estimated to recover the cost of the equipment in about one year. In addition to VOCs, Air Oasis tests in professional racecar garages have shown a net reduction in CO<sub>2</sub> by at least 30%

# Cost Savings



## Reduced Maintenance

Air Oasis minimizes the need for abrasive, inefficient, and labor intensive traditional HVAC cleaning because Air Oasis effectively achieves near total elimination of Mold, Fungi, Bacteria, and the Biofilm (protective matrix of polymers for mold and bacteria) (Kowalski 2006 and geesey, 1982). Air Oasis greatly reduces the (1) strain on the HVAC system during peak hours, (2) need for routine maintenance, and (3) frequency of filter changes extending HVAC equipment lifespan through 24/7 non-abrasive cleaning.



## Increased Capacity

Studies show that dirty evaporator coils can reduce cooling capacity by 30%. Air Oasis can increase heat transfer coefficient and reduce degrade of AC system performance over time. Air Oasis reduces coil fouling. Coil fouling can increase coil pressure drop resulting in reduced airflow/heat transfer from coil fins and lessens the work capacity a system can perform (Montgomery and Baker 2006)

# Professor (Dr.) N. Ghosh

Ph.D., MAAAI, West Texas A&M University

“Evaluations on safety of the air purifier showed no side effect on human cell cultures. Indoor aeroallergens such as, mold spores, airborne bacteria and animal dander reduced significantly on using the Air Oasis air purifiers and thereby improved the indoor air quality leading to the alleviation of the breathing ailments.”

“As such, **I know of no other technology available** that produces the high level of pathogen abatement as AIR OASIS air purification units.”





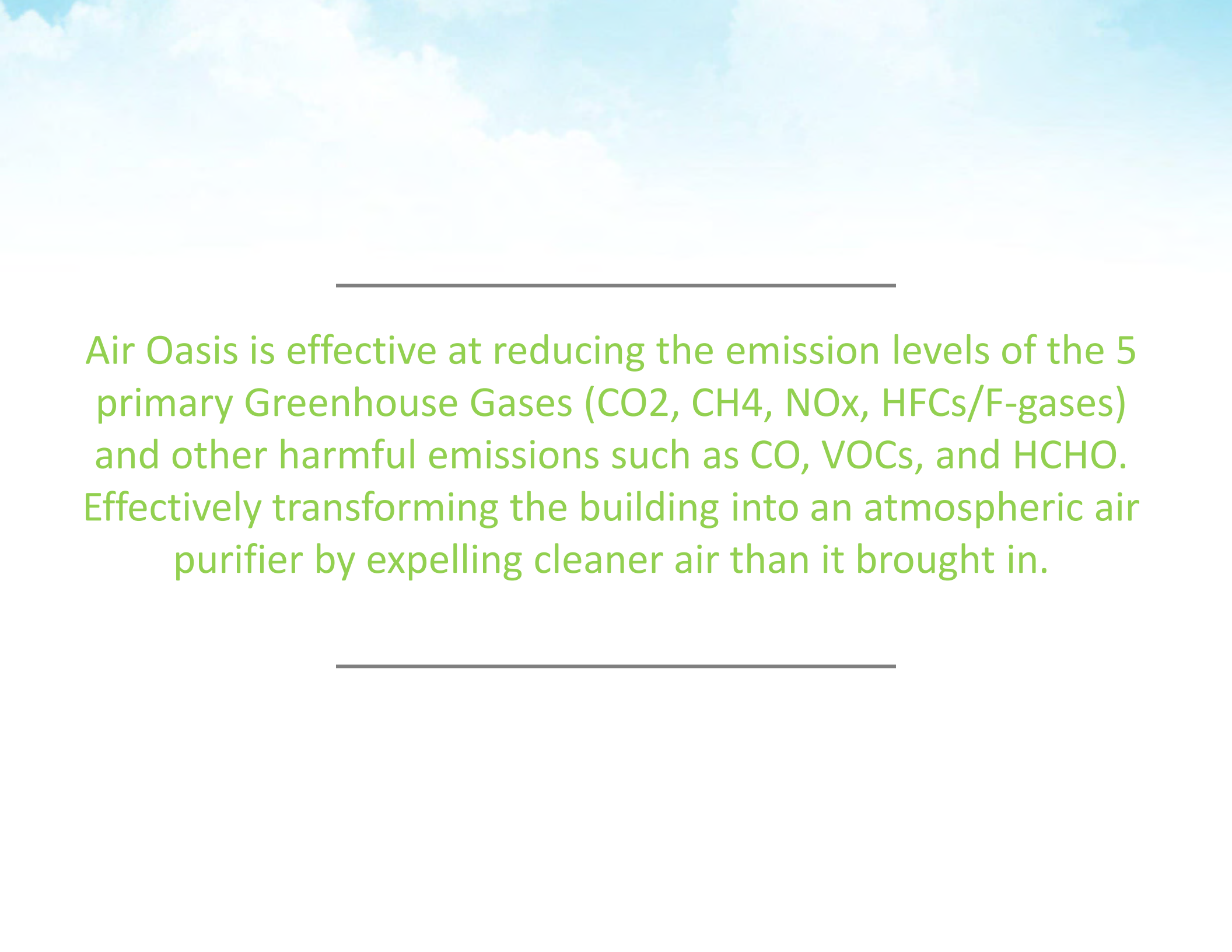
## NASA Origins

More than 20 years after NASA put the first man on the moon, they began to prepare for future manned missions into deep space. It was theorized that future astronauts would be able to grow their own food, if NASA could eliminate the ethylene gas that causes fruits and vegetables to ripen quickly.

NASA developed a technology using a titanium dioxide catalyst in conjunction with UV lamps called PhotoCatalytic Oxidation (PCO) to do just that. Dr. Weijia Zhou, along with The Wisconsin Center for Space Automation and Robotics, developed a device known as the Astroculture™ plant growth unit.

This unit was used to successfully grow potatoes during a 1995 shuttle mission which lead to the first facility being used to grow plants on the International Space Station. The success of this technology on the International Space Station led to the development of a PCO device on Earth capable of safely and efficiently killing: Bacillus anthraci (anthrax), Dust mites, Molds, Viruses, Bacteria, Influenza A (flu), Escherichia coli, Staphylococcus aureas (Staph), Streptococcus pyogenes, and Mycoplasma pneumonia (NASA, 2002).

Air Oasis has greatly improved the original PCO technology with our proprietary nanotechnology making it more accessible for commercial uses, and more effective



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Air Oasis is effective at reducing the emission levels of the 5 primary Greenhouse Gases (CO<sub>2</sub>, CH<sub>4</sub>, NO<sub>x</sub>, HFCs/F-gases) and other harmful emissions such as CO, VOCs, and HCHO. Effectively transforming the building into an atmospheric air purifier by expelling cleaner air than it brought in.

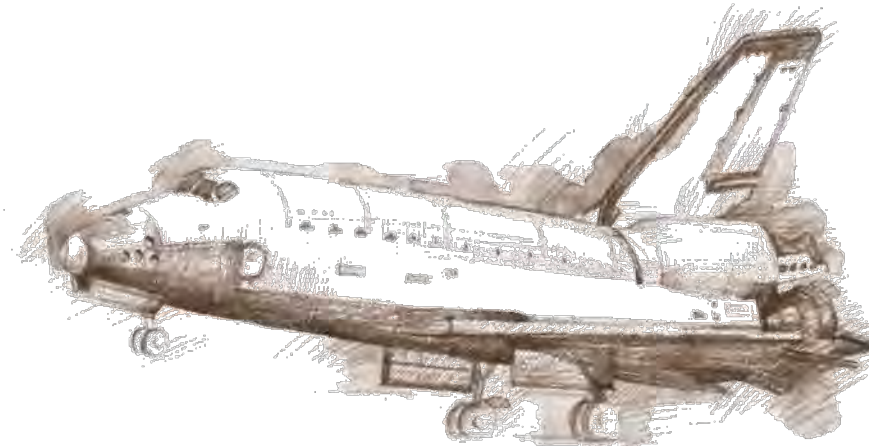
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# AHPCO®

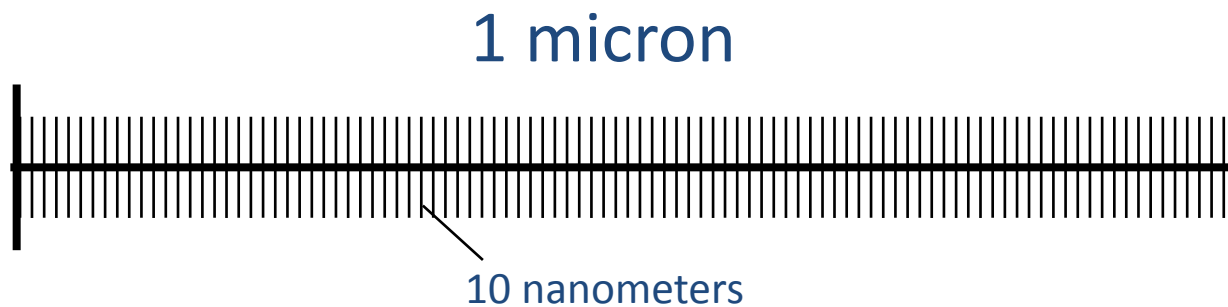
## Advanced Hydrated PhotoCatalytic Oxidation

Air Oasis' proprietary nanotechnology has 4 Critical Advantages:

1. Combines  $\text{TiO}_2$  with 5 other proprietary metal blends including gold, rhodium and silver creating a **superior catalyst** that produces unique Catalytic Molecules able to travel great distances safely and sanitize surfaces
2. Adds **two unique hydrating agents** to attract more hydrogen, creating an abundance of Catalytic Molecules
3. Dramatically increased surface area of the catalytic molecules, and therefore increased kinetic rate of reaction, by utilizing **NANO metal catalysts**.
4. Our **proprietary LongLife+™** technology is a specialty coating applied to all of our germicidal lamp products, eliminating the common problem of accelerated depreciation associated with higher intensity lamps.



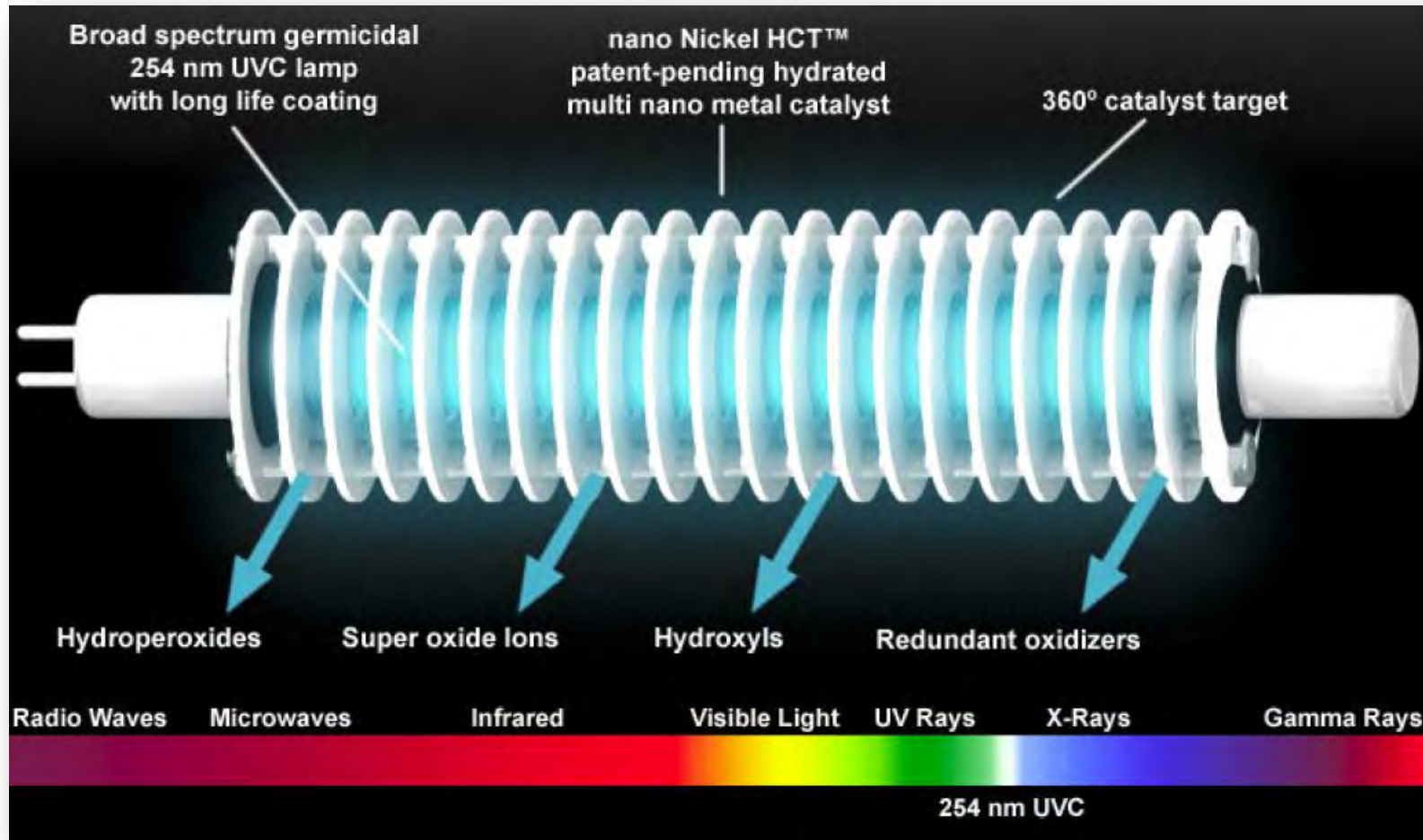
# AHPCO Advantages



Our nano catalyst particles are 10 nanometers (There are 1000 nanometers in a micron). This equates to AHPCO having up to 100 times the catalyst surface area of our competitors who use micron particles.

Air Oasis has overcome many of the old PCO technology weaknesses including incomplete oxidation, reaction rate inhibition due to humidity, mass transport issues associated with high-flow rate systems. One of the ways Air Oasis has been able to overcome these hurdles is through combining several unique, highly effective modes of action including our Bi-Polar technology.

# AHPCO Advantages



Short Distances: Air Oasis combines the effectiveness of UVC irradiation with powerful and hydroxyls (HO-) which are extremely (and ONLY) effective at short distances. Long Distances: AHPCO cells also create resilient Redundant Oxidizers, hydroperoxides (H<sub>2</sub>O<sub>2</sub>), ozonide (O<sub>3</sub>-), super oxide ions (O<sub>2</sub>-), which travel great distances via airflows. These Redundant Oxidizers can be active for an hour or more if they don't come into contact with harmful contaminants. These AHPCO molecules are attracted to and neutralize (mineralizes) all simple carbon based contaminants.

# Broad Spectrum Effectiveness

## Proven over 10 years of studies and 1,000s of installations

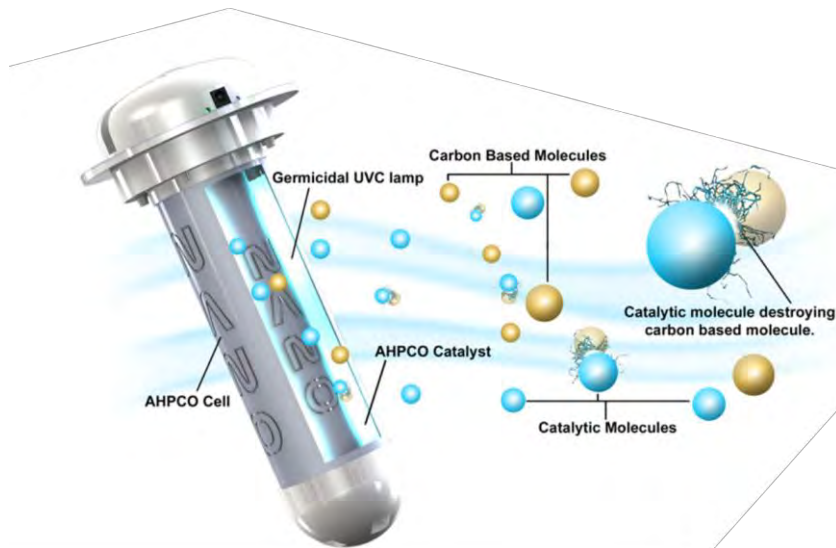
According to years of tests conducted at West Texas A&M University and elsewhere, Air Oasis has been proven to **efficiently, effectively, and economically** neutralize the following contaminants in the *air & on surfaces*:

- aeroallergens up to 99%
- mold and fungi up to 99%
- odor causing VOC's up to 99% (*85% in the first hour of use*)
- bacteria up to 99%
- viruses up to 99%
- Even multiple strains of MRSA on surfaces up to 63% in the first 24 hours (*with greater effectiveness over time*)

*Field and lab tests have also shown:*

- *Formaldehyde (HCHO) 98.5% reduction*
- *Total Bacterial Count (TBC) 82.7% reduction*
- *Respirable Suspended Particles (RSP) 35.5% reduction*
- *Ammonia (NH<sub>3</sub>) 73.3% reduction*
- *Hydrogen Sulfide (H<sub>2</sub>S) 97% reduction*

Our nano catalyst particles are 10 nanometers (There are 1000 nanometers in a micron). This equates to AHPCO having up to 100 times the catalyst surface area of our competitors who use micron particles.



Air Oasis has overcome many of the old PCO technology weaknesses including incomplete oxidation, reaction rate inhibition due to humidity, mass transport issues associated with high-flow rate systems. One of the ways Air Oasis has been able to overcome these hurdles is through combining several unique, highly effective modes of action including our Bi-Polar technology. These free radicals can destroy chemical bonds such as C-C, C-H, C-O, O-H, N-H in organic compounds and decompose organic macromolecules. This process rearranges the chemical bonds into harmless CO<sub>2</sub> and H<sub>2</sub>O (but does not increase net levels).

Additionally, these free radicals are effective at destroying the cell membrane of bacteria, solidifying the virus proteins, and forming antibacterial and antifouling coating on the surface of materials. Consequently, Air Oasis possesses strong antifouling, sterilizing and deodorizing functions

# Safety

West Texas A&M University has also tested the effect of AHPCO exposure on blood, human cell culture, and plant cells to show complete safety for people and plants while being extremely effective against harmful contaminants.

The simplest and most effective analogy is the use of hydrogen peroxide on a cut. The hydrogen peroxide kills the bacteria without harming the human tissue (the body releases antioxidants to neutralize the hydrogen peroxide).

In the same way, all complex organisms like people, pets and plants have simple defense mechanisms and are filled with antioxidants that negate the effects of Air Oasis' redundant oxidizers.

# Air Oasis is **not** a Ozone Generator

Indoor Air Quality (IAQ) solutions that only use ozone must produce larger amounts of ozone to become effective at all. These higher ozone levels can become irritating, odorous, dangerous, and degrading on equipment. These type of ozone generator solutions are failing to get the job done in several of the Vegas casinos.

Air Oasis proprietary AHPCO technology has multiple modes of action. Minimal ozone production is just a small part of the chemical reaction process that leads to the creation of hydroperoxides. When contaminants are present, there is zero danger of a buildup in ozone.

All Air Oasis solutions are intentionally designed to create less than .04 ppm in the ambient air. Many solutions will produce zero ozone. To put this into perspective you [can review](#) the up to date hourly ozone averages of our most pristine national parks in the US which range from about .017-.061 ppm today.

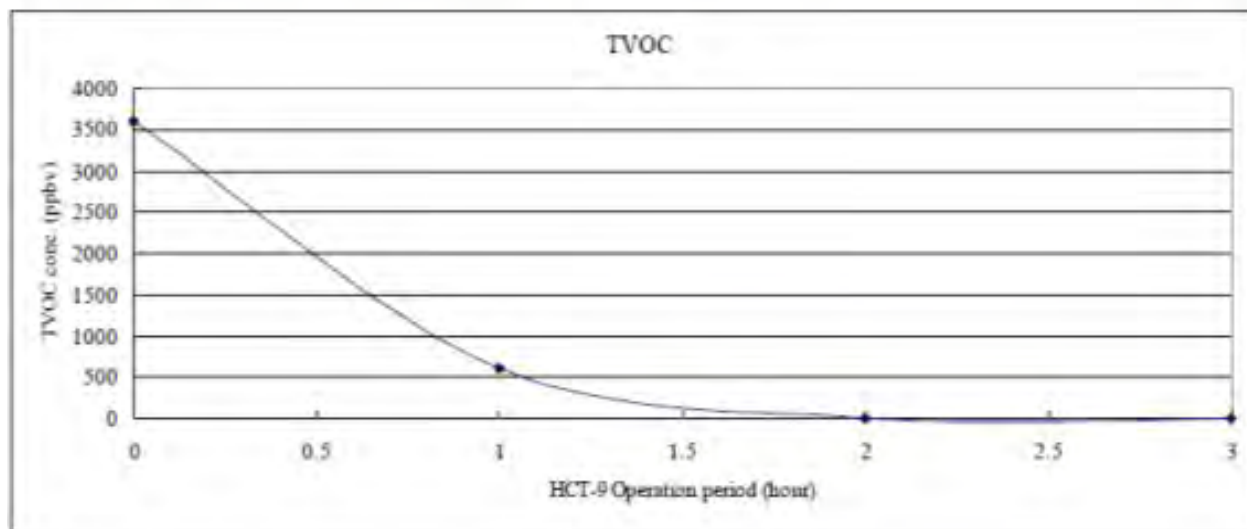
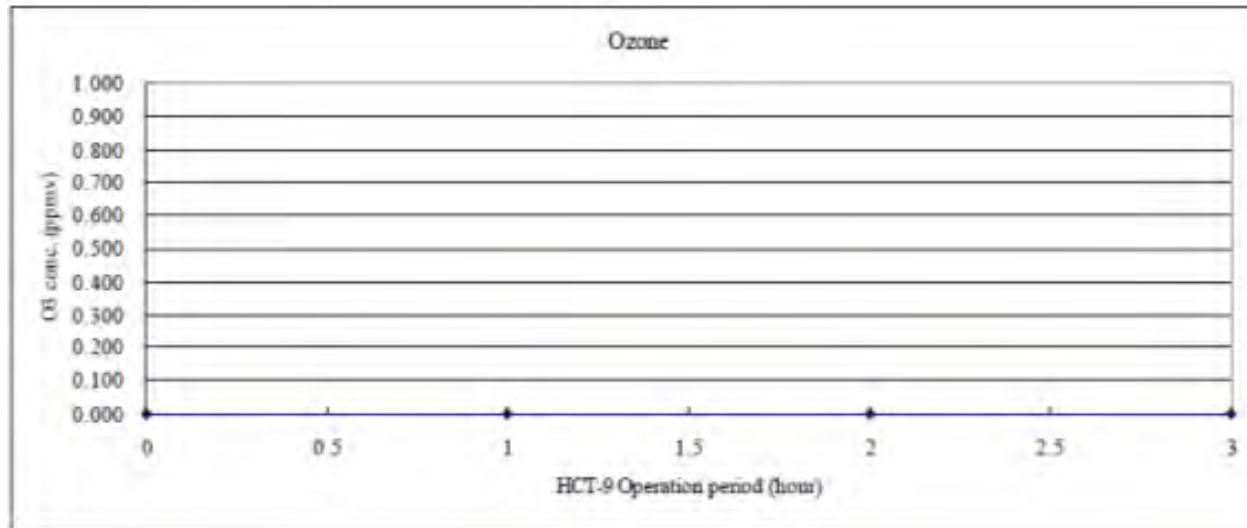
# 12 Key Studies

1. CMA's **Multi-Containment** Indoor Air Quality Report
2. West Texas A&M University's **Foodborne Pathogens** Study
3. West Texas A&M University's **Safety** Analysis of AHPCO
4. West Texas A&M University's Qualitative Assay of Indoor Air Using an Air Oasis (**Aeroallergens** and **Pollutants**)
5. Acoustics and Air Testing Laboratory Company Limited's **TVOC** and **HCHO** quality analysis in a Shopping Center
6. RTI International's **Dynamic Microbiological** Test Chamber Analysis
7. West Texas A&M University's Evaluation of **Mold** Reductions
8. LAWN Environmental Protection Ltd's analysis of Indoor **Air Quality of Buses**
9. West Texas A&M University's Evaluation of **VOC** Reductions
10. Dr. Ghosh's **CA-MRSA** analysis at Baptist Saint Anthony's Hospital (BSA) laboratory
11. West Texas A&M University's Evaluation of **VOC** reductions in 1 hour
12. Intertek's **Ozone** analysis for the California Air Resource Board

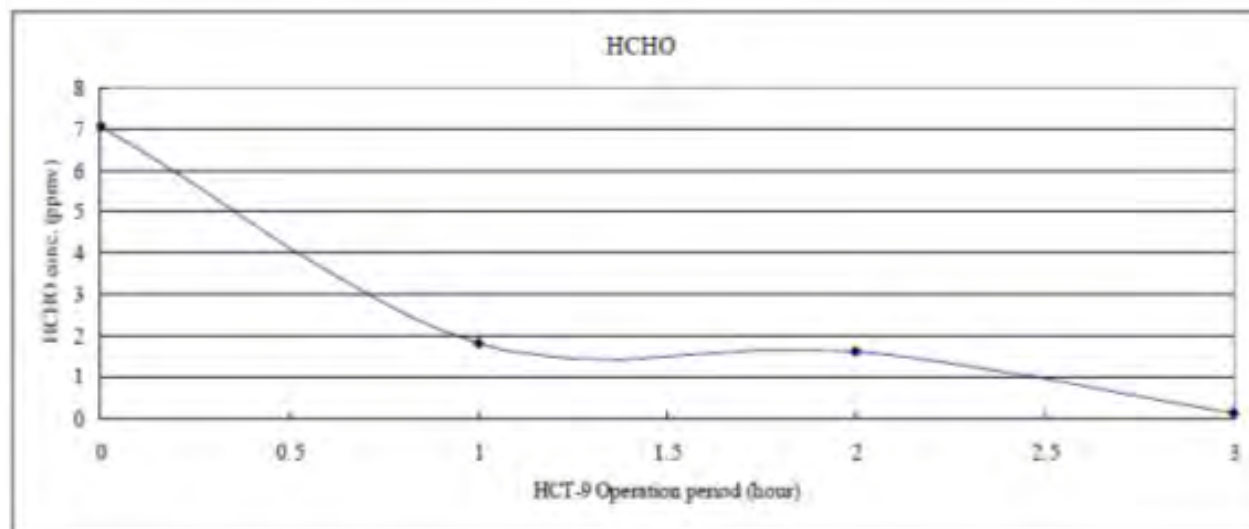
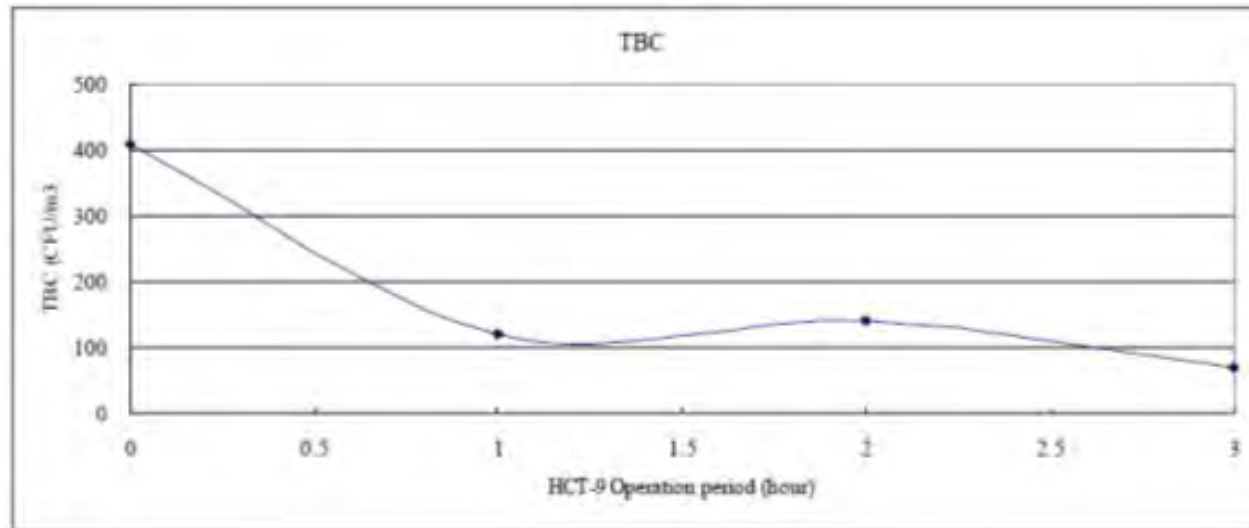
# Multi-Containment Indoor Air Quality Report

- Test was performed in a 2,000 sq. ft. warehouse using a Nano Induct to evaluate the effectiveness of the air sanitizer both before and after on the levels of Ozone (O<sub>3</sub>), Total Volatile Organic Compounds (TVOC), Total Bacterial Count (TBC), Formaldehyde (HCHO), Respiratory Suspended Particles (RSP), Ammonia (NH<sub>3</sub>) and Hydrogen Sulfide (H<sub>2</sub>S).
- **Results:** Over the course of 3 hours, the Nano Induct maintained a 0.000 ppmv of O<sub>3</sub> while dramatically reducing TVOC by greater than 99%, TBC by 82.7%, HCHO by 98.5%, RSP by 35.5%, NH<sub>3</sub> by 73.3%, and H<sub>2</sub>S by greater than 97%.
- **Location:** CMA Testing and Certification Laboratories
- **Research Team:** CMA Industrial Development Foundation Limited

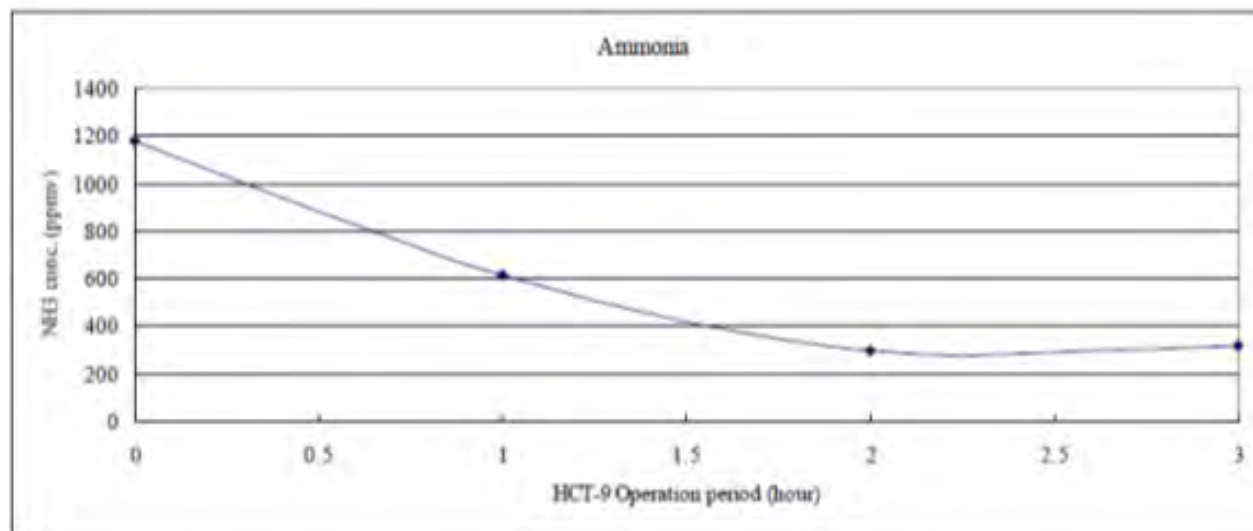
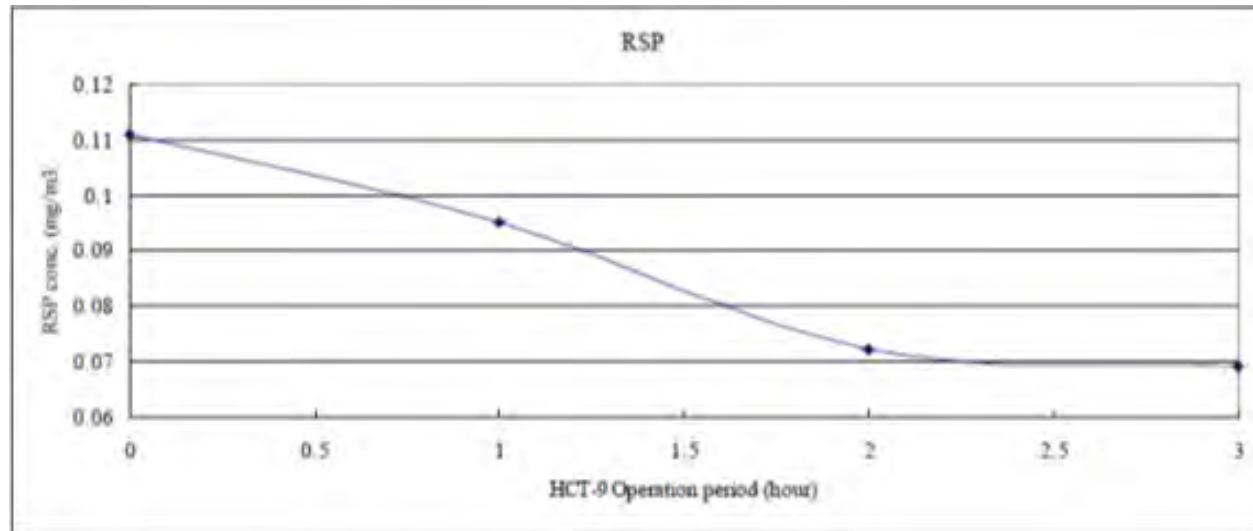
# Multi-Containment Indoor Air Quality Report



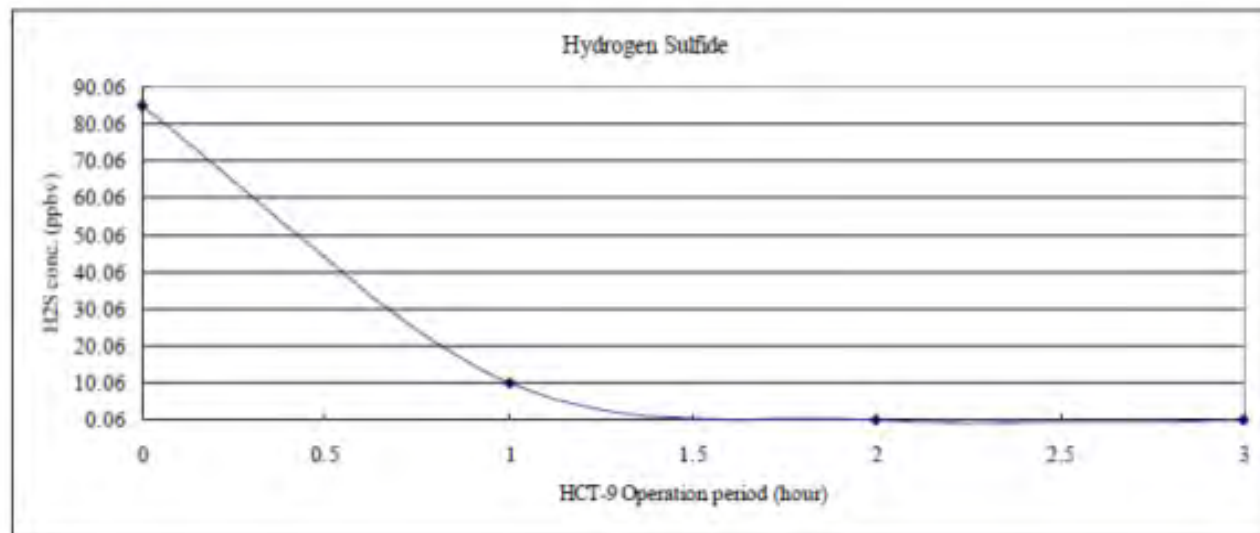
# Multi-Containment Indoor Air Quality Report



# Multi-Containment Indoor Air Quality Report



# Multi-Containment Indoor Air Quality Report



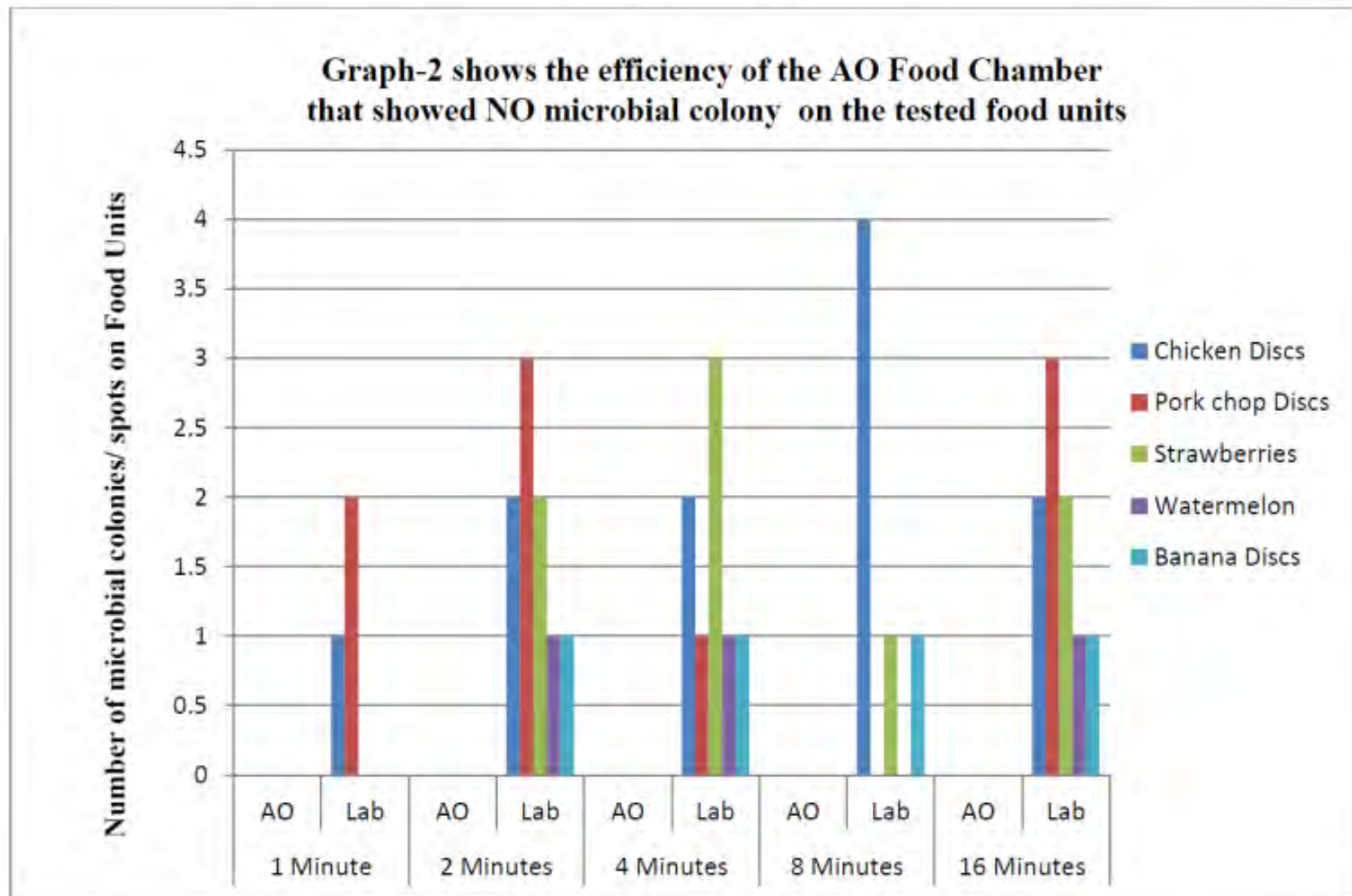
# Application of AHPCO Nanotechnology in reducing the food borne pathogens during processing

- Assessed the potential of this AHPCO technology for surface sterilization and in reducing food borne pathogens. A fiber glass chamber was built to assess and evaluate the performance of the AHPCO Technology in reducing surface contamination of various food substances, namely, meat (chicken and pork), fruits (watermelon, cantaloupe and strawberries) and vegetables.
- **Results:** The AO Food Chamber showed zero microbial colonies on the tested food units, compared to the growing concentration of microflora in all other tested areas. Additionally, swab cultures collected from the meat and other food samples showed no growth of any microbial flora on the surface of the food groups compared to all control groups which exhibited microbial growth.
- **Location:** West Texas A&M University
- **Research Team:** Professor (Dr.) N. Ghosh Ph.D., MAAAI, Griselda Estrada, David Wylie, Edward Caraway, Tiffany Grothe and Michelle Veloz

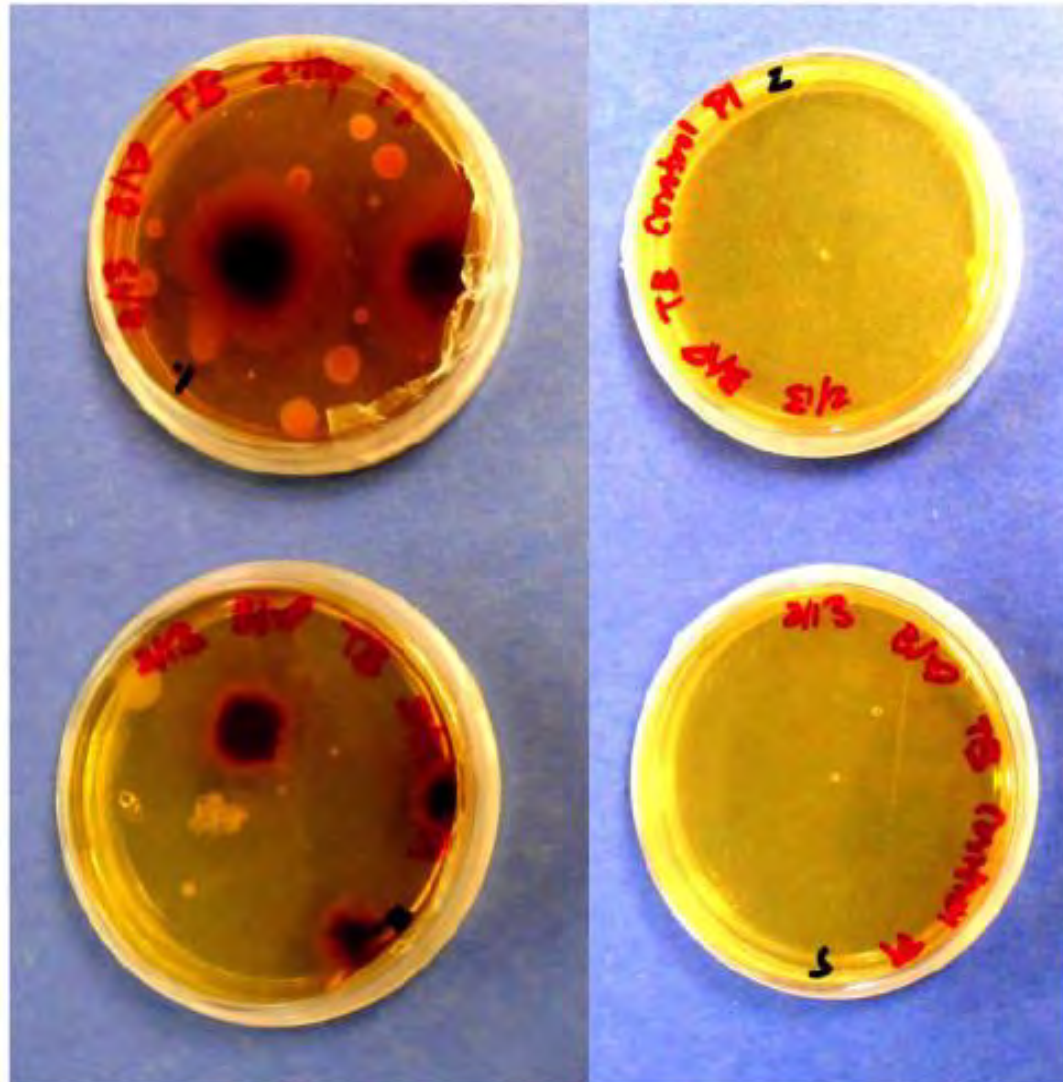
# Application of AHPCO Nanotechnology in reducing the food borne pathogens during processing



# Application of AHPCO Nanotechnology in reducing the food borne pathogens during processing



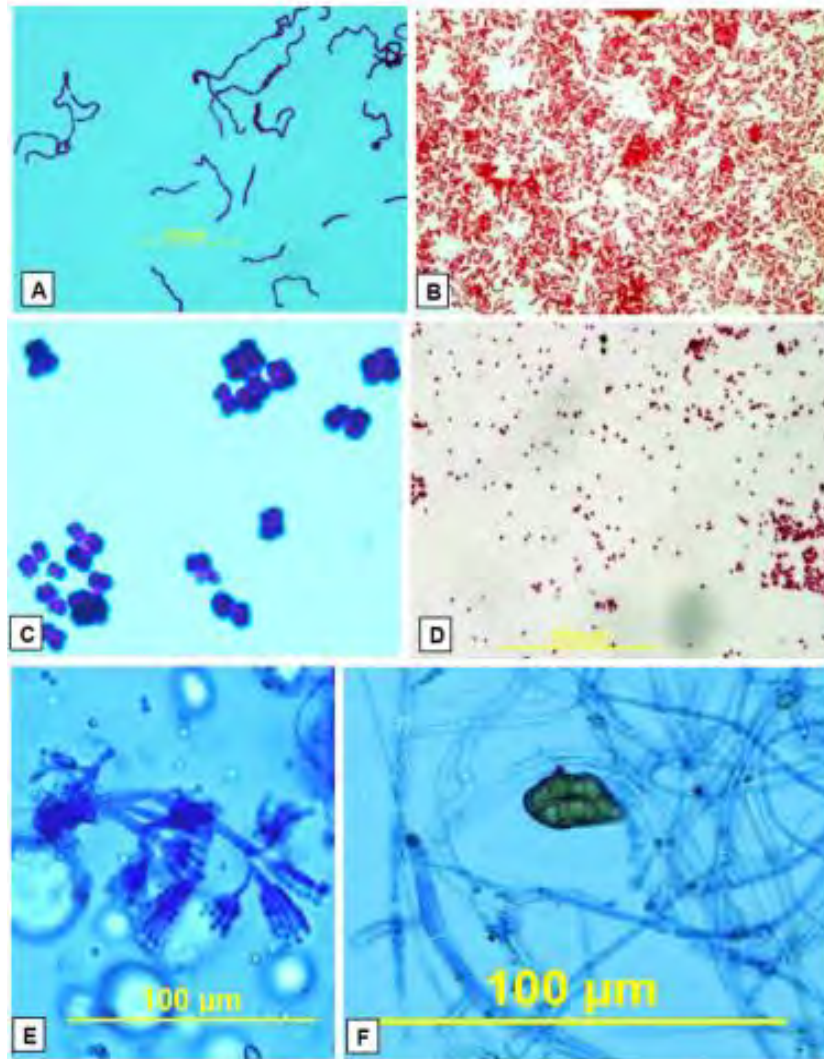
# Application of AHPCO Nanotechnology in reducing the food borne pathogens during processing



Without Air  
Oasis

With Air Oasis

# Reducing the growth



*“Swab cultures collected from the meat and other food samples showed **no growth** of any microbial flora and hence **no slides could be prepared** proving thereby the efficiency of the AHPCO technology in reducing the contaminant during food processing.”*

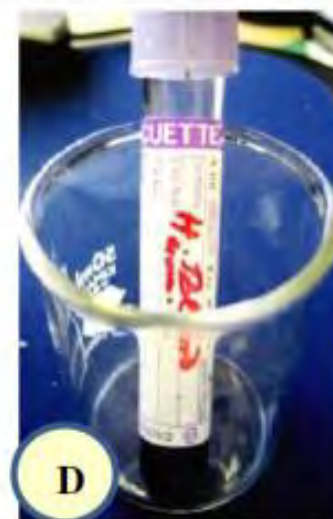
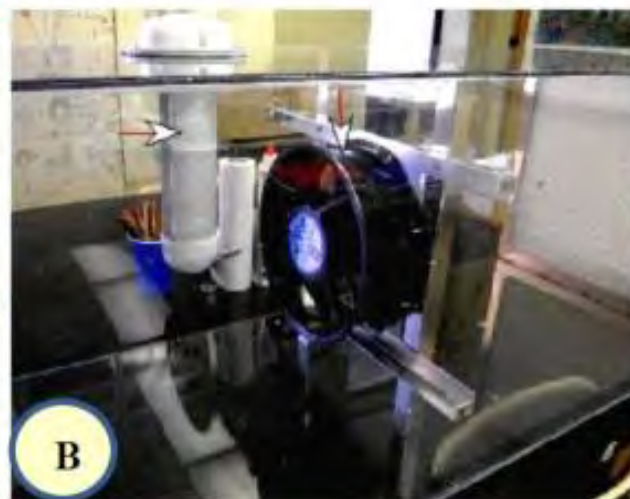
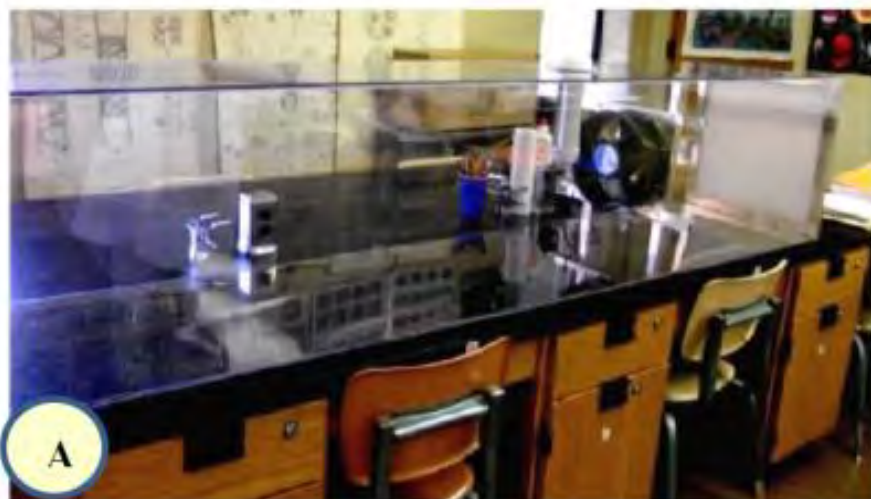
Without Air Oasis

With Air Oasis

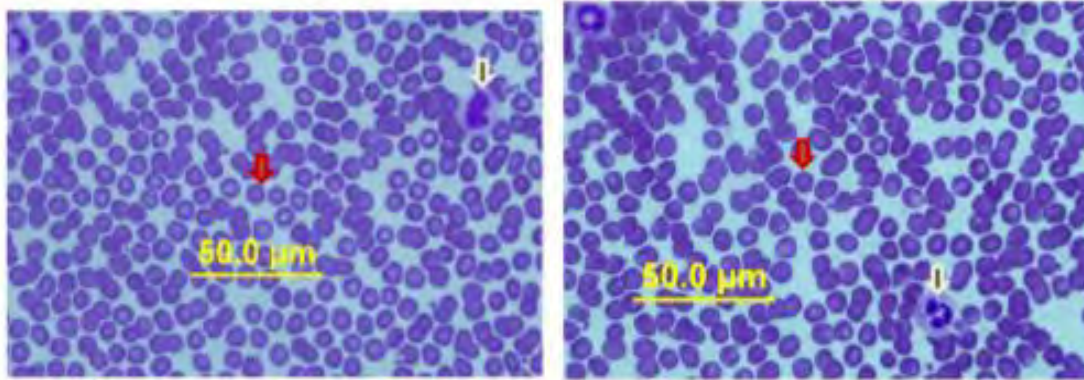
# Evaluation of Advanced Hydrated Photo Catalytic Oxidation Safety

- In this study, a number of experiments were carried out to evaluate the safety measures of the AHPCO Nanotechnology. Human blood (Fig. D), Human cell culture, and plant cells (*Allium cepa*) (Fig.C) were exposed to the AO chamber and the UV chambers to compare the exposures. The Blood samples were stained with Wright's stain.
- **Results:** Human blood samples were exposed by placing the vials inside the AO chamber. The exposure did not cause any cytological damage to the RBC and WBCs. Evaluations on safety of the air purifier showed no side effect on human cell cultures. Indoor aeroallergens such as, mold spores, airborne bacteria and animal dander reduced significantly on using the Air Oasis air purifiers and thereby improved the indoor air quality leading to the alleviation of the breathing ailment
- **Location:** Laboratories of Agriculture and Natural Sciences building of West Texas A&M University
- **Research Team:** Professor (Dr.) N. Ghosh Ph.D., MAAAI, David Wylie, Tiffany Grothe and Michelle Veloz

# Evaluation of Advanced Hydrated Photo Catalytic Oxidation Safety

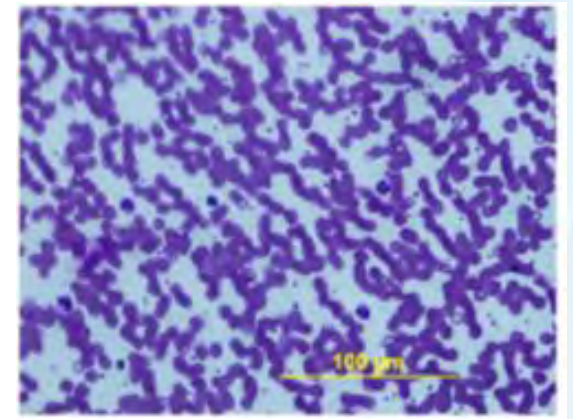


# Evaluation of Advanced Hydrated Photo Catalytic Oxidation Safety



## With Air Oasis

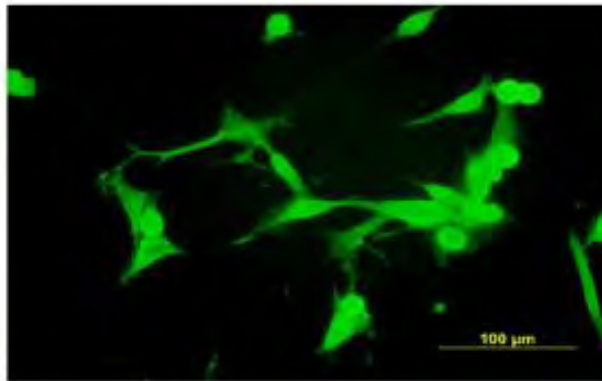
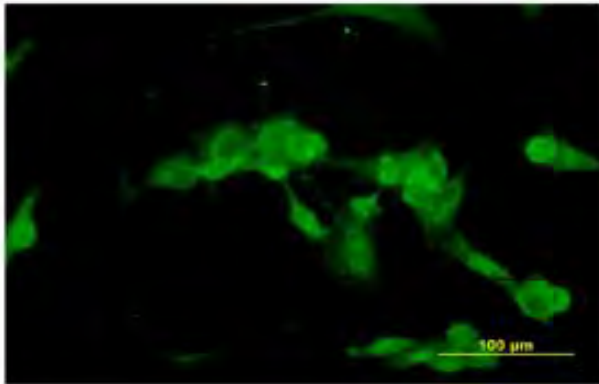
Slides E and F show **healthy** RBC and WBCs from blood sample – showing zero cytological damage from AHPCO Nano Technology



## Dangerous Direct UV

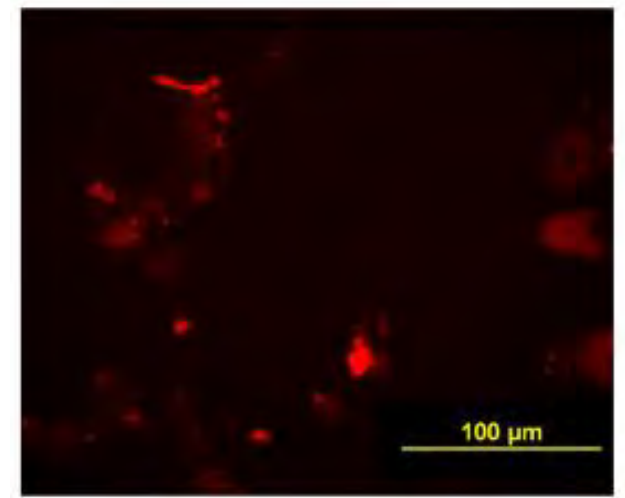
When exposed to the UV Chamber briefly the RBCs showed cytological instability with unusual elongation.

# Evaluation of Advanced Hydrated Photo Catalytic Oxidation Safety



## With Air Oasis

Slides I and J show **healthy** cell cultures exposed to AHPCO Nano Technology captured with an FITC Filter



## Dangerous Direct UV

When exposed to the UV rays cells lysed leaving residues, detected with TRITC imaging

# Qualitative Assay of Indoor Air Using an Air Oasis

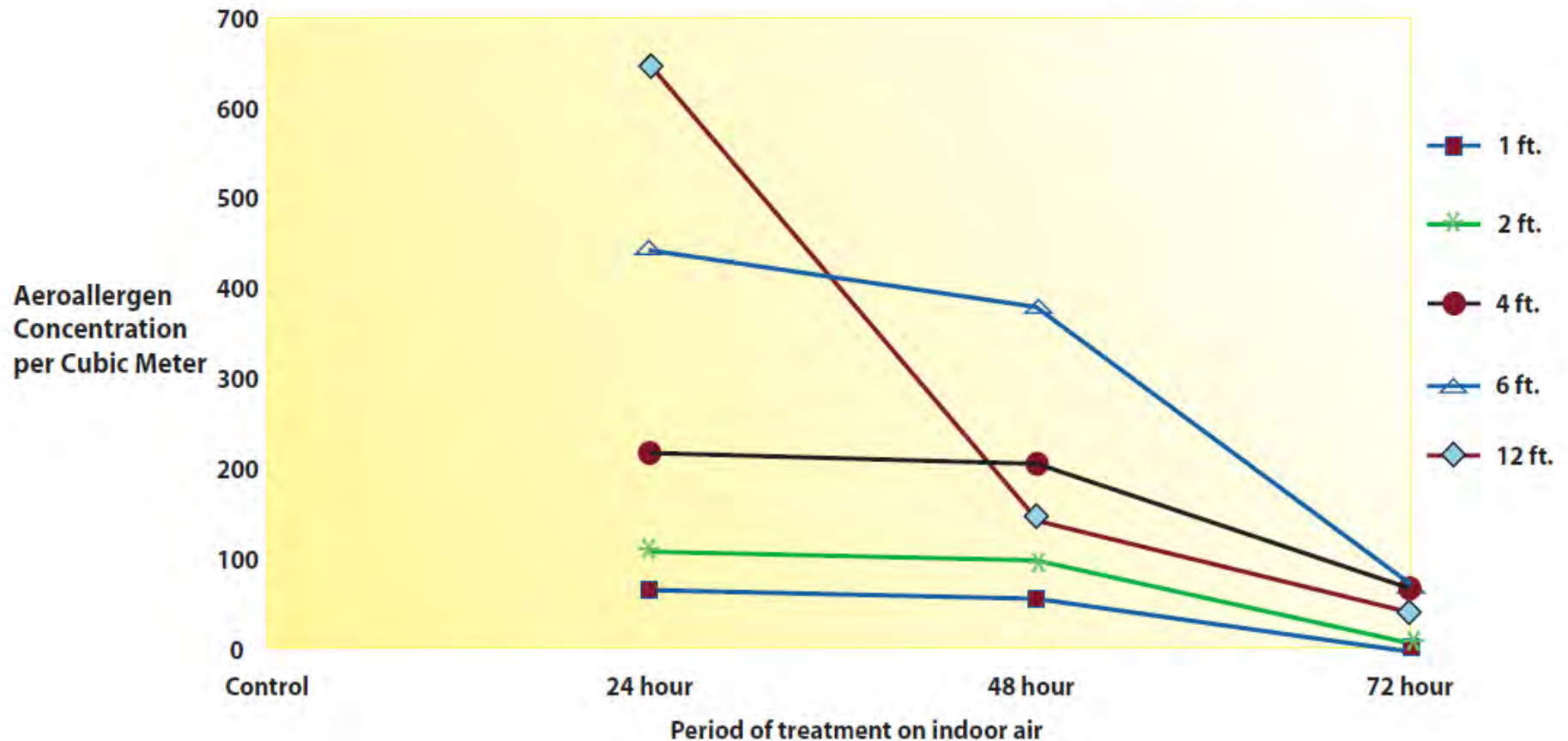
Special Reference to the Reduction of Fungal Aeroallergens and Pollutants

- The first phase of this study was aimed at analyzing the effect of an Air Oasis Air Purifier on the spore and pollen counts of allergenic taxa in the indoor air randomly sampled from different office facilities and residential buildings.
- **Results:** We found significant differences in microbial spore population in the room air before and after the treatment with Air Oasis at different intervals. After 72 hours of treatment there were almost no aeroallergens left. Additionally, after 72 hours of treatment of the indoor air with the air purifier there was almost no microflora or propagules left in the indoor air since there was no microbial colony produced on the petri-plates.
- **Location:** West Texas A&M University
- **Research Team:** Professor (Dr.) N. Ghosh Ph.D., MAAAI, Amanda Whiteside, Rupa M. Patel, and Lisa Dyer

# Qualitative Assay of Indoor Air Using an Air Oasis

## Special Reference to the Reduction of Fungal Aeroallergens and Pollutants

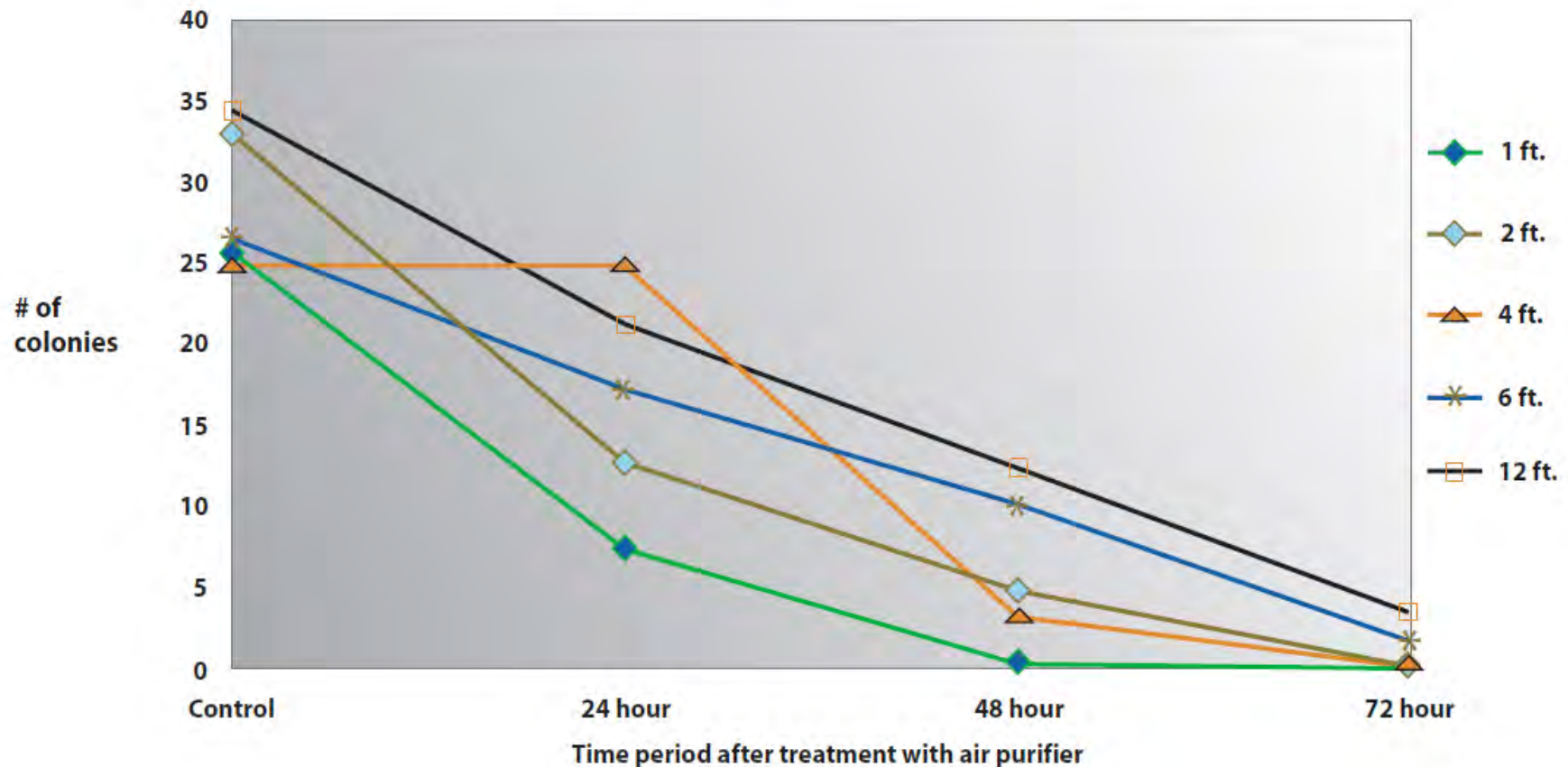
Effect of treatment of air purifier on the concentration of indoor aeroallergen concentration.



# Qualitative Assay of Indoor Air Using an Air Oasis

## Special Reference to the Reduction of Fungal Aeroallergens and Pollutants

Effect of air purifier after different periods of exposure on the number of microbial colonies



# TVOC and HCHO Indoor Air Quality Measurement in Shopping Center

- Formaldehyde (HCHO) and Total Volatile Organic Compounds (TVOC) presence in the Miramar Shopping Center was evaluated before and after treatment using Air Oasis units to determine the system's effectiveness.
- **Results:** After treatment with Air Oasis, they found 44% reduction in HCHO and 52% reduction in TVOC after use of Air Oasis. These new levels of HCHO now qualified the shopping center for the “excellent” classification of air quality under the HKSAR Government Guidelines.
- **Location:** CMA Testing and Certification Laboratories, Miramar Shopping Center Hong Kong
- **Research Team:** Acoustics and Air Testing Laboratory Company Limited

# TVOC and HCHO Indoor Air Quality Measurement in Shopping Center

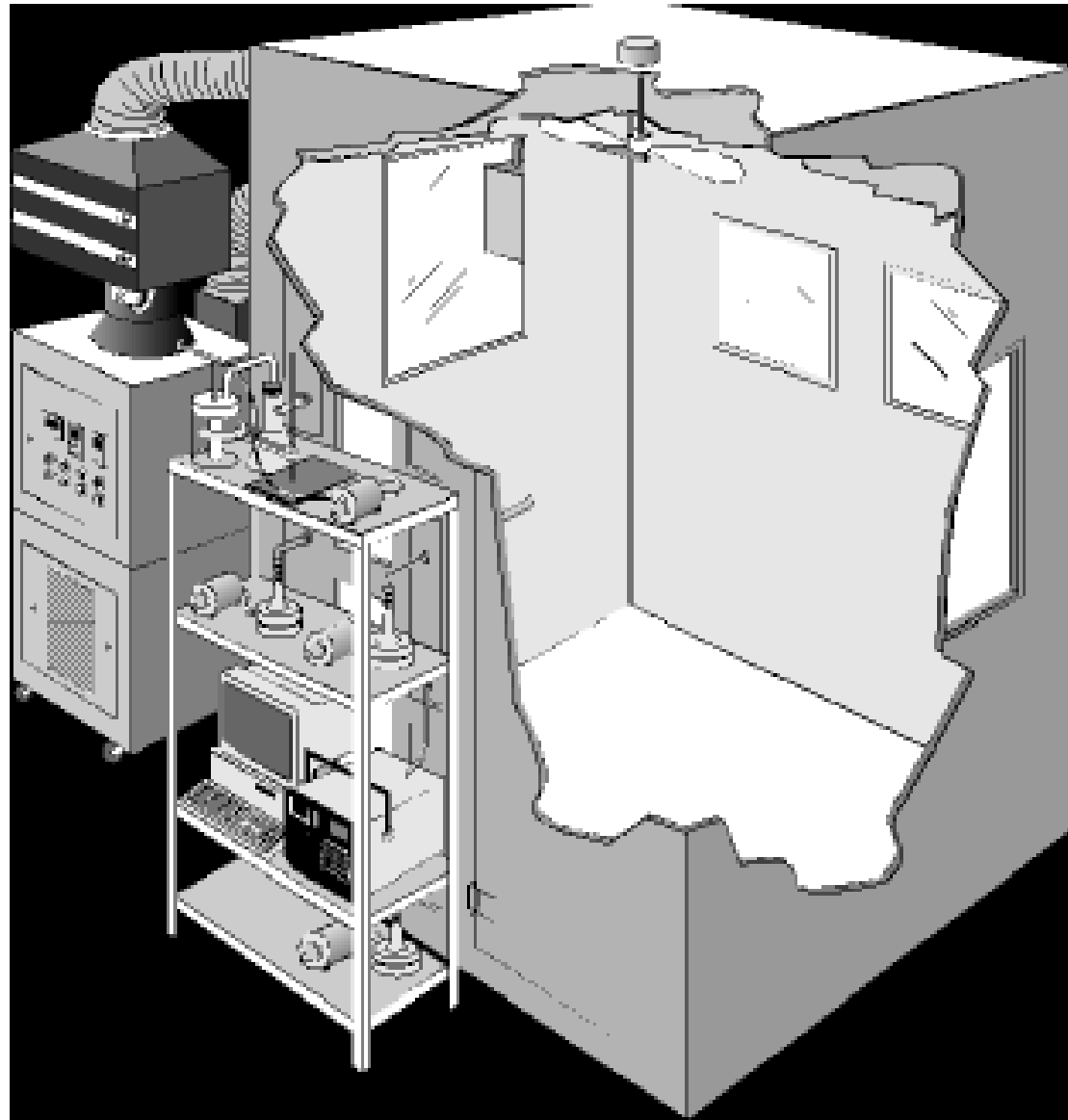


Acoustics and Air Testing Laboratory Company Limited taking samples in the Miramar Shopping Center Hong Kong

# Dynamic Microbiological Test Chamber Analysis

- The Dynamic Microbiological Test Chamber (DMTC) was used to test the effectiveness of Air Oasis against four organisms: two bacteria, and two fungi. *Staphylococcus epidermidis* is a common gram-positive human-shedding organism and was the representative vegetative bacterium. *Mycobacterium parafortuitum* was the other bacterium which belongs to the same genus as and has physical characteristics similar to *Mycobacterium tuberculosis*, the causative agent of tuberculosis. Because *Mycobacterium tuberculosis* is primarily spread from person to person in respiratory droplets, the *M. parafortuitum* bioaerosol was generated in artificial sputum to most closely simulate the coating that *Mycobacterium tuberculosis* would have in the environment when expelled by coughing. The other three organisms were generated in water. *Aspergillus versicolor* and *Penicillium chrysogenum*, the representative fungi, are frequently reported as causative agents of hypersensitivity pneumonitis and have been isolated from a number of problem buildings.
- **Results:** Air Oasis showed strong decay rates on all 4 microorganisms over the course of the 15 minute trial. The extrapolated results show that Air Oasis could efficiency clear 25,000 cubic feet of TB in a matter of hours. Even the most resilient mold present in the trial (*Mycobacterium parafortuitum*) our units would clear out the room in only a few days.
- **Location:** Center for Microbial Community Systems and Health Research
- **Research Team:** RTI International

# Dynamic Microbiological Test Chamber Analysis

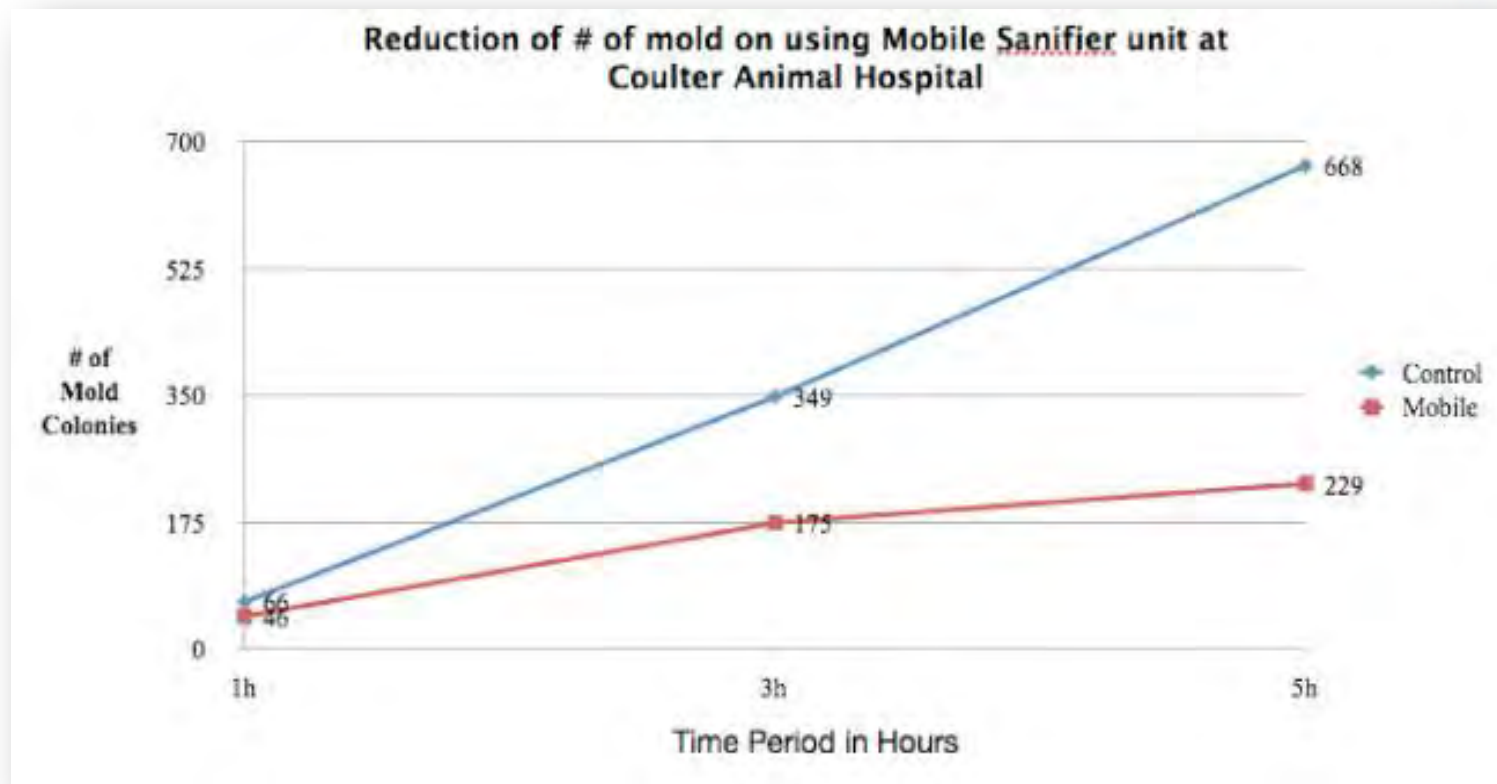


1 shows an artist's rendition of the DMTC configured for air cleaner testing. The Model NANO NT/2 RX 6000 air cleaner was positioned in the center of the chamber.

# Air Oasis Mobile Evaluation of Mold Reductions

- We have tested the efficiency of the Air Oasis Mobile Sanifier air purification unit in reducing the concentration of several indoor molds and bacteria. For this experiment we standardized the techniques adopted from the guidelines for evaluation of assessing the indoor air by American Academy of Allergy, Asthma and Immunology (AAAAI). The majority of molds isolated from the room air exposure were: conidia and hyphae from *Alternaria*, spores from *Dreschlera*, *Cladosporium* and *Stachybotrys chartarum*. The room that we used for testing at the Coulter Animal Hospital was 384 sq. ft even though the Mobile Units are designed for 175-250 sq. ft. rooms.
- **Results:** Air Oasis Mobile Sanifier air purifiers were determined to be very effective in reducing the indoor mold concentration in a room of 300 sq. ft. area. There was 65.71 % reduction in mold growth on the petri-dishes and 68.1% reduction in bacterial concentration on the slides during the testing period.
- **Location:** Coulter Animal Hospital Lab.
- **Research Team:** West Texas A&M University, Professor (Dr.) N. Ghosh Ph.D., MAAAAI

# Air Oasis Mobile Evaluation of Mold Reductions



# Indoor Air Quality of Buses Measurement Report

- Two locations within the Tung Chung Terminus, including inside a bus, was tested for Formaldehyde (HCHO) and Total Volatile Organic Compounds (TVOC) presence before and after treatment using Air Oasis units to determine the system's effectiveness.
- **Results:** After treatment with Air Oasis, in both tests HCHO moved from Good Quality to Excellent Quality through dramatic 77.5% and 46% reductions. TVOC levels before were classified as less than Good Quality in one test and Good Quality in another. Both tests moved to Excellent Quality TVOC levels with significant 82% and 66% reductions. Both tested areas were already considered Excellent Air Quality in regards to Airborne Bacteria but they too both saw 22% reductions. Good and Excellent Air Quality classifications referenced are set by the HKSAR Government Guidelines.
- **Location:** Tung Chung Terminus Hong Kong
- **Research Team:** LAWN Environmental Protection Ltd







# Indoor Air Quality of Buses Measurement Report



LAWN Environmental Protection Ltd taking air samples within one of the Tung Chung buses

# Indoor Air Quality of Buses Measurement Report

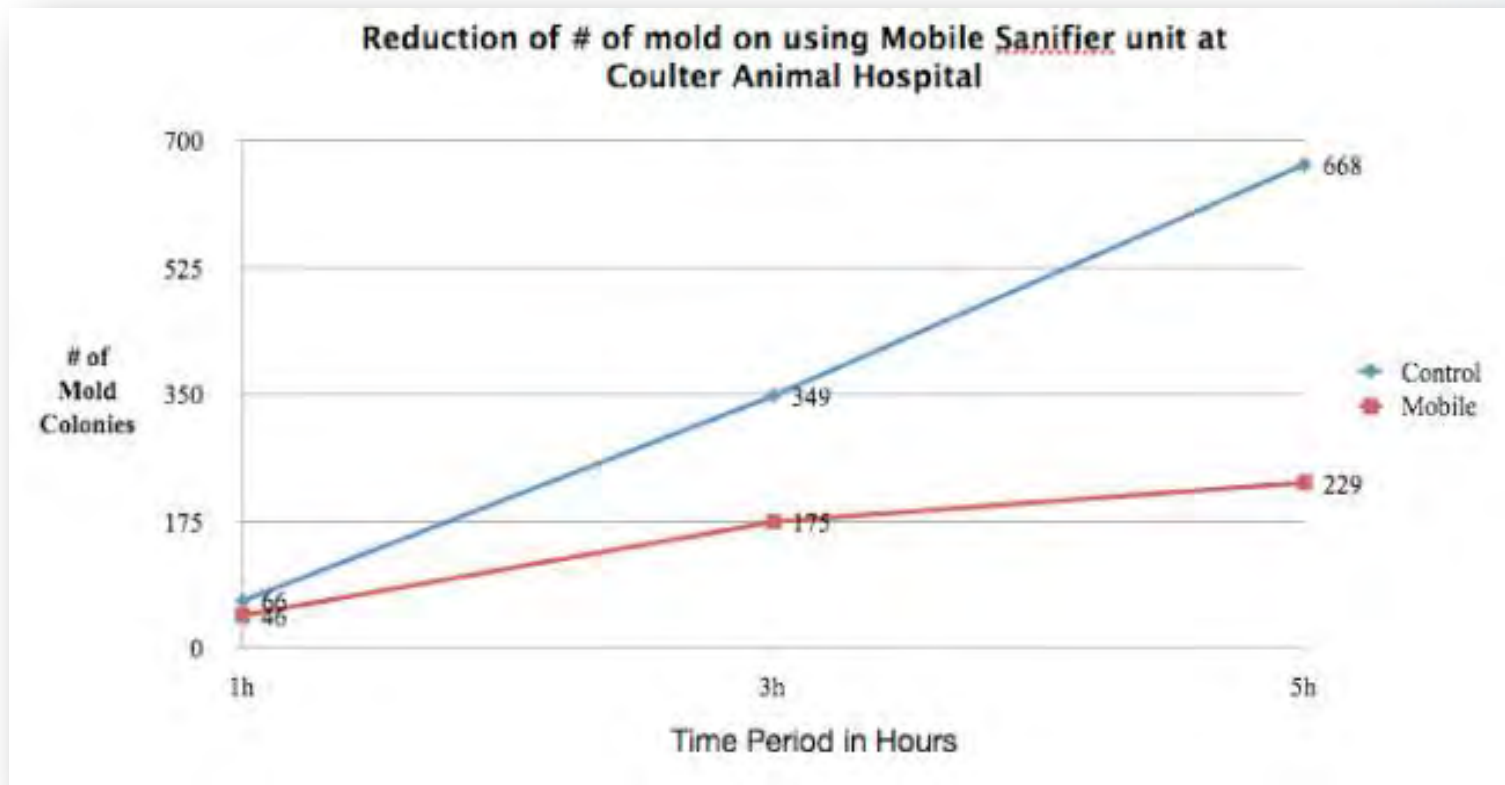
Location: Tung Chung Terminus

Parameters		HCHO	TVOC	Airborne Bacteria
Unit		$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	$\text{cfu}/\text{m}^3$
Excellent Class		< 30	< 200	< 500
Good Class		< 100	< 600	< 1,000
Location	Date			
JL 7600 (Before)	19 Dec 2011	80 	668 	144 
JL 7600 (After)	3 Feb 2012	18	116	113
KY 7214 (Before)	19 Dec 2011	54 	221 	88 
KY 7214 (After)	3 Feb 2012	29	74	69

# Air Oasis Mobile Evaluation of VOC Reductions

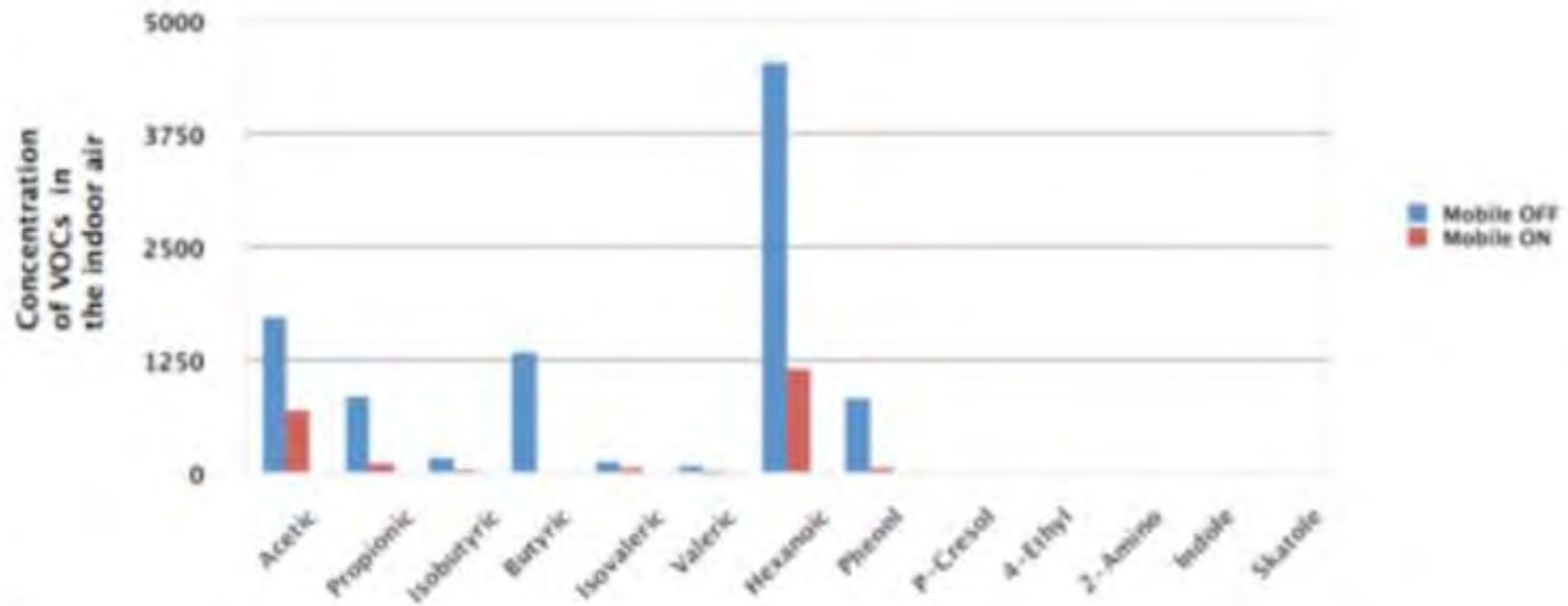
- In this experiment we have tested the efficiency of the Air Oasis mobile sanifier air purification unit in removing several Volatile Organic Compounds (VOCs), namely Acetic acid, Propionic acid, Isobutyric acid, Butyric acid, Isovaleric acid, Valeric acid, Hexanoic acid, Phenol and P cresol. We have selected these VOCs since these compounds are well known to cause bad odor and serious health hazards with varied concentrations.
- **Results:** The analyzed data showed that there was a significant reduction of VOCs ranging 30-40% in only a single hour within the designated Laboratory 384 sq. ft. room even though the Mobile Units are designed for 175-250 sq. ft. rooms.
- **Location:** West Texas A&M University Laboratory
- **Research Team:** West Texas A&M University, Professor (Dr.) N. Ghosh Ph.D., MAAAI

# Air Oasis Mobile Evaluation of VOC Reductions



Reduction of mold in animal clinic while using the Mobile 175.

# Air Oasis Mobile Evaluation of VOC Reductions

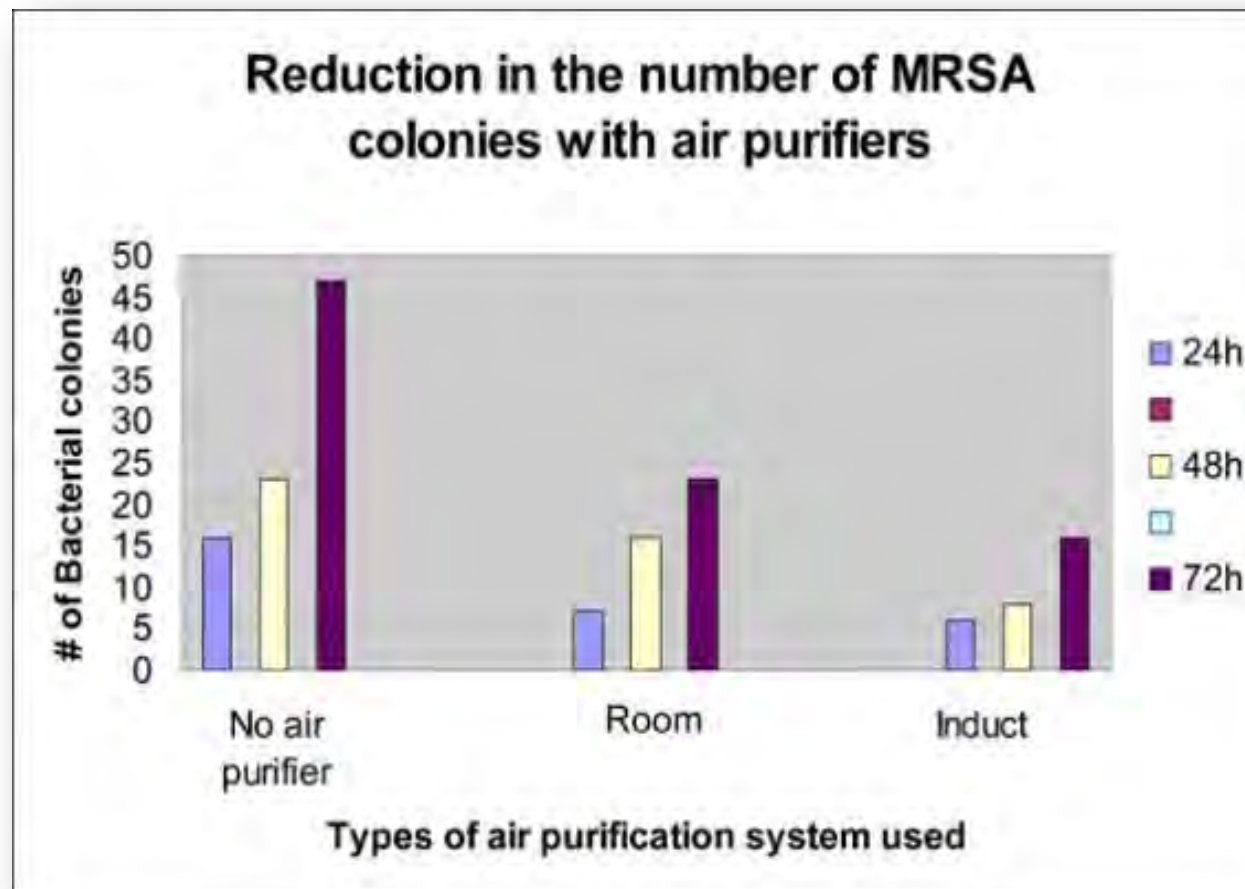


Reduction of VOCs in animal clinic while using the Mobile 175.

# Investigation on CA-MRSA isolates for eradication measures:

- The removal of bacterial pathogens from the air, especially in diseases that are transmitted by droplets like *Mycobacterium tuberculosis*, is a promising way to reduce disease transmission in the clinical healthcare setting. Specifically, this study was concentrated on the efficiency of the net reduction of bacteria in a negative pressure laboratory and the specific effect on isolates identified to be methicillin resistant *Staphylococcus aureus*, MRSA.
- **Results:** We used laboratory rooms of different sizes. In each and every case there was reduction in airborne pathogen. Additionally, the Air Oasis saw significant reductions in MRSA found on surfaces compared to the control. AO3000 saw an estimated 51% reduction in MRSA over a 72 hour period, while the Air Oasis Induct saw an estimated 65% reduction.
- **Location:** Baptist Saint Anthony's Hospital (BSA) laboratory
- **Research Team:** Professor (Dr.) N. Ghosh Ph.D., MAAAI, Cynthia Pratt, and Christian Ridner

# Investigation on CA-MRSA isolates for eradication measures:



# Investigation on CA-MRSA isolates for eradication measures:

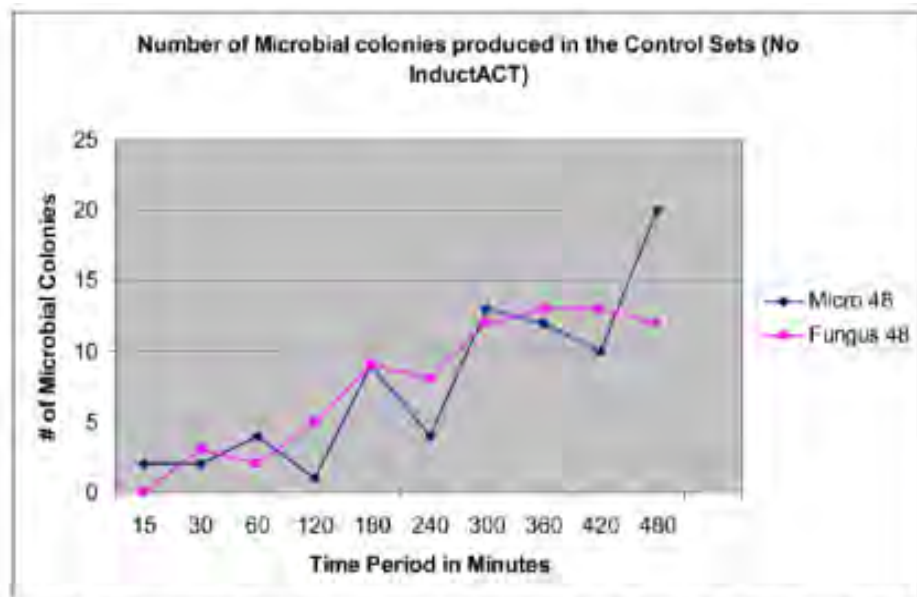


Fig 1A: Graph of initial growth rates in the micro and fungus rooms without any Induct ACT (Control).

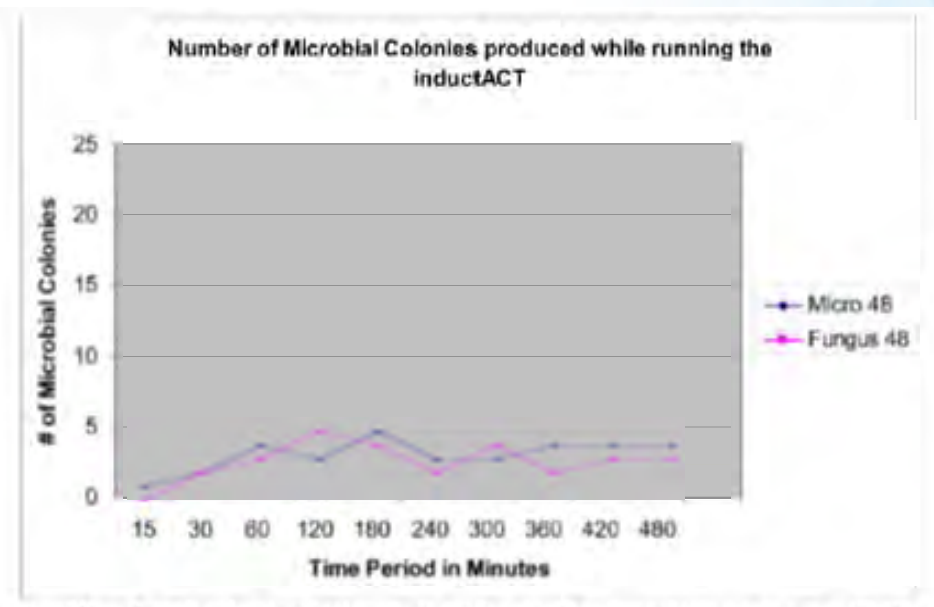


Fig 1B: Graph of microbial growth rates in the microbiology room with the Inducts running (Experimental)

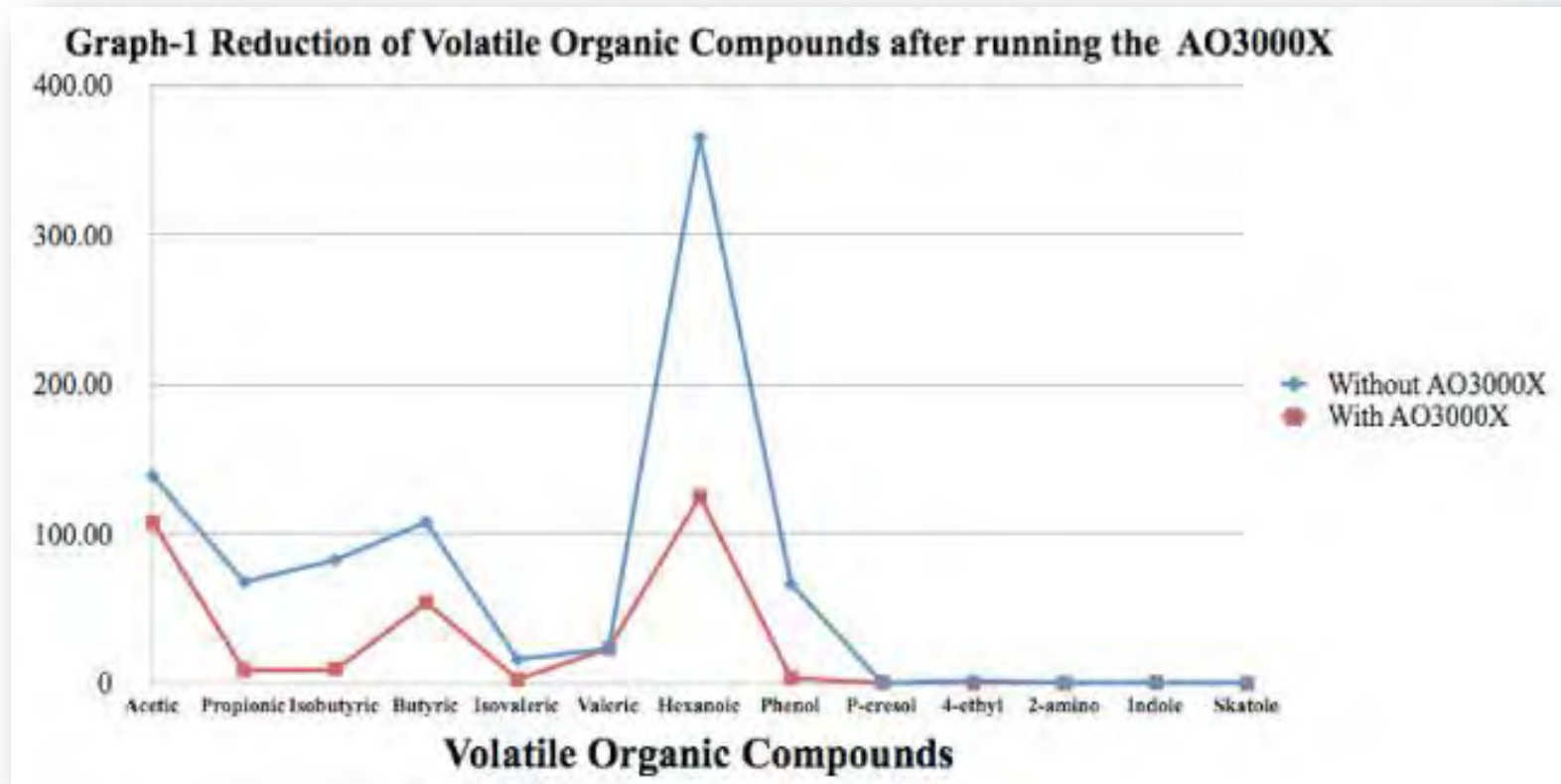
Without Air Oasis

With Air Oasis

# Air Oasis Induct and 3000X Evaluation of VOC Reductions (1 hour)

- In this experiment we have tested the efficiency of the Air Oasis 3000X sanifier air purification unit in removing several Volatile Organic Compounds (VOCs), namely Acetic acid, Propionic acid, Isobutyric acid, Butyric acid, Isovaleric acid, Valeric acid, Hexanoic acid, Phenol and Pcresol. We have selected these VOCs since these compounds are well known to cause bad odor and serious health hazards with varied concentrations.
- **Results:** it is very clear that even an hour of running the AO3000X or Induct air purifiers reduced the VOCs both in the clinic of the Coulter Animal Hospital and the ANS Lab # 306 at a significant level. The Inducts reduced the VOC levels by 85% and the 3000X reduced the VOC levels by 40-50% in only the first hour of use.
- **Location:** ANS Lab 306 and Coulter Animal Hospital Clinic
- **Team:** West Texas A&M University, Professor (Dr.) N. Ghosh Ph.D., MAAAAI

# Air Oasis Induct and 3000X Evaluation of VOC Reductions (1 hour)



Reductions of mold, bacteria and Reduction of VOCs in one hour

# Air Oasis Mobile California Air Resource Board Certification Study – Ozone

- California Air Resources Board (CARB) has the highest known standard for maximum ozone production in residential countertop air purifiers. Air Oasis's mobile device was tested by Intertek to confirm that we conform with this strict standard. Everything from a big screen TV, to a computer produces small amounts of ozone which are completely harmless.
- **Results:** On the highest setting, with virtually no containments present in the testing chamber, Air Oasis's Mobile's peak ozone production still easily passed well below the CARB standards and has been certified to produce less than 0.05ppm of ozone.
- **Location:** Intertek Laboratory
- **Team:** Intertek

# Air Oasis Mobile California Air Resource Board Certification Study – Ozone



# Air Oasis Mobile California Air Resource Board Certification Study – Ozone

## PEAK OZONE CONCENTRATIONS

<i>Location</i>		<i>With Filter(s)</i>		<i>Without Filter(s)</i>	
		<i>High</i>	<i>Low</i>	<i>High</i>	<i>Low</i>
Low Ionizer	1	0.0015	0.0048	0.0005	0.0019
	2	0.0016	0.0007	0.0007	0.0018
	3	0.0038	0.0084	0.0004	0.0022
	4	0.0005	0.0010	0.0028	0.0093
	5	0.0012	0.0042	0.0022	0.0049
Medium Ionizer	1	0.0031	0.0065	0.0009	0.0026
	2	0.0018	0.0007	0.0006	0.0018
	3	0.0038	0.0091	0.0003	0.0012
	4	0.0005	0.0009	<b>0.0040</b>	<b>0.0094</b>
	5	0.0010	0.0012	0.0028	0.0057
High Ionizer	1	0.0042	0.0093	0.0013	0.0040
	2	<b>0.0046</b>	0.0019	0.0007	0.0017
	3	0.0043	<b>0.0102</b>	0.0004	0.0019
	4	0.0006	0.0009	0.0036	0.0076
	5	0.0016	0.0014	0.0029	0.0072

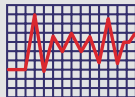


# American Made Quality

All Air Oasis units are carefully assembled by hand in our Texas Factory.

Each and every unit passes through our strict quality management system, where they are thoroughly inspected. This process ensures every customer receives the most reliable Made in the USA air purification products available.

35 Years



**AQUAPULSE  
SYSTEMS**

35 Years

**Your One Stop Solutions for Air & Water Disinfection**

**(888) 239 – 4447**

**[sopan@aquapulsesystems.com](mailto:sopan@aquapulsesystems.com)**

**[loys@aquapulsesystems.com](mailto:loys@aquapulsesystems.com)**