

Can you afford to ignore your indoor air quality?

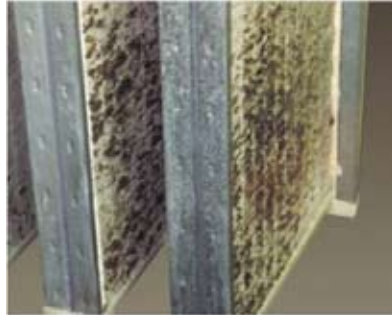
The Costs:

- EPA estimates \$60 billion in direct and indirect costs due to airborne-related illness.
- Asthma, which can be triggered by either indoor or outdoor air pollution, annually accounts for an estimated three million lost workdays for adults and 10.1 million lost school days in children. Asthma costs our nation \$12.7 billion in health care costs annually¹.
- Various sources estimate that between 2 million and 4 million nosocomial infections occur annually, resulting in 20,000 to 80,000 fatalities. The cost of nosocomial infections (hospital acquired) in the United States is estimated to be about \$4 billion to \$5 billion annually².
- According to the American College of Allergists, 50% of all illnesses are either caused or aggravated by polluted indoor air³.

Is my workplace safe?

1. Heselbarth, Rob. Improving indoor air quality. *Residential Design and Build*, June 2006.
2. Kowalski, WJ. (2006)
3. Somersall, Allan. Fresh Air for Life: How to Win Your Unseen War Against Indoor Air Pollution. Natural Wellness Group, 2006.
4. Holcatova, I., Bencko, V., & Binek, B. (1993). Indoor air microbial contamination in the operating theatre and intensive care units of the surgery clinic. *Proceedings of Indoor Air '93*, Helsinki, Finland.

Is Filtration Enough?



- HVAC systems must be properly maintained to promote indoor air quality. If this is not done, ventilation systems can become a source of contamination or become clogged and reduce or eliminate air flow. Humidification and dehumidification systems must be kept clean to prevent the growth of harmful bacteria and fungi.

Introduction to Conversion

- The most powerful advanced oxidation systems are based on the generation of hydroxyl radicals.
- Hydroxyls convert and breakdown biological contaminants at a molecular level.
- Hydroxyls oxidize and convert these contaminants into benign CO₂ and H₂O.
- In odor reduction applications, hydroxyl radicals accelerate the breakdown of most volatile organic compounds (VOCs) by destroying the molecular bonds.

Benefits of GAP Conversion Process

- Dual lamp functions - as an energy source and coil illumination.



- Efficient control of energy distribution and residence time.
- Self-renewing catalyst.

Typical Airborne Contaminants

- Levels of airborne microbes are not routinely checked in hospitals: however, a variety of studies have indicated that the air in hospital area rarely, if ever sterile⁴.
- MRSA has been found in air samples collected in single-patient rooms and has been isolated from sinks, floors, and bed sheets. MRSA recirculation in air is enhanced by activity in rooms, including changing of bed sheets⁵.

5. Kowalski, W., PE, PhD. (2008). Air-Treatment Systems for Controlling Hospital-Acquired Infections. *HPAC Engineering*, April 2008.
6. ASHRAE Standard 62.1-2007, *Forward*
7. Gandara, A., Mota, L., Flores, C., Perez, H. R., Green, C. F., Gibbs, S. G. (2006) Isolation of *Staphylococcus aureus* and Antibiotic-Resistant *Staphylococcus aureus* from Residential Indoor Bioaerosols. *Environmental Health Perspectives*, (1859 - 1864) 114:12:2006

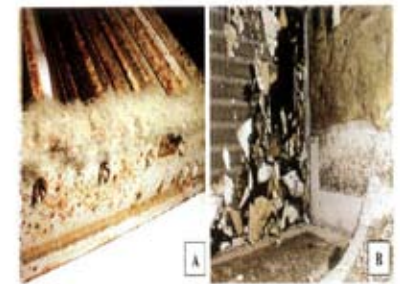
Conforms to codes, now what?

- In the (ASHRAE) 2004 edition, the standard modified the IAQ Procedure to...modify the Ventilation Rate Procedure, changing...the minimum outdoor airflow rates...⁶

What is in your outdoor air?

- ASHRAE 62.1.6.2.1 addresses outdoor air quality by particulate matter (use a MERV 6), ozone (keep under 0.16 ppm) and "other outdoor contaminants". It does not specify what should be done with other contaminants.
- Trends in (MRSA) data suggest that resistant strains were present in higher concentrations inside homes compared to outside the homes⁷.

We followed the rules...



After final filtration with HEPA filters on a VAV system in hospital X.

What do we do now?

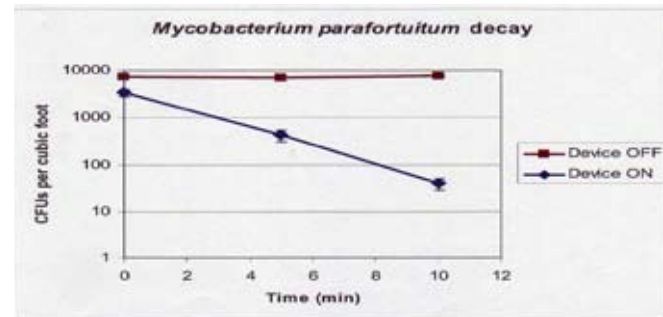
GAP CONVERSION TECHNOLOGY

Genesis Air Installations:

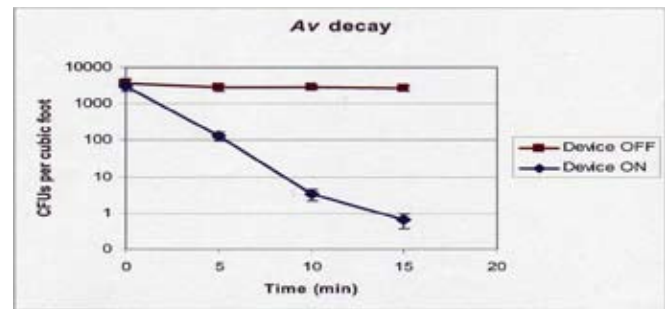
- **Federal Law Enforcement Training Center (FLETC)**
Building 28 Training and Command Center
Physical Training Building
- **Joint Reserve 914 Airlift Wing**
Fire and Crash Rescue Station
- **Goodfellow AFB**
Student Pipeline Dormitory
School Age Facility
- **El Paso VA**
Health Care Clinic & Hospital
- **Grand Junction VA Hospital**
Grand Junction, Colorado
- **Big Springs VA Hospital**
Big Spring, Texas
- **US Postal Service**
Sundown, Texas
- **Laughlin AFB**
Fuel Systems Building
PT Training Building
- **Fort Sam Houston**
Corp of Engineers Regional Office
- **Integrated Cancer Center**
El Paso, Texas
- **TTUHSC - Medical School**
El Paso, Texas
- **Medical Examiner's Office**
Lubbock, Texas
- **TTUHSC - Medical School**
Lubbock, Texas
- **University of Louisville Hospital**
Pharmacy Lab Clean Room
- **Bellevue Elementary School**
Bellevue, Nebraska
- **Bovina ISD**
- **Rice CISD**
Altair, Texas
- **Fort Bend ISD**
Fort Bend, Texas
- **Lubbock ISD**
Lubbock, Texas
- **Lamar CISD**
Fort Bend County, Texas
- **Houston ISD Browning Elementary**
Houston, Texas
- **San Francisco International Airport In Process**
San Francisco, California

Third Party Testing

U.S. Army Developmental Test Command
(Dugway Proving Ground)
RTI International
HRA Environmental
G.D. Air Testing
Prism Analytical Technologies
Quality Environmental
Eastmount Environmental Services



Mycobacterium parafotutium decay (TB Simulate)
Test Data Courtesy of RTI (2006)



Aspergillus versicolor
Test Data Courtesy of RTI (2006)

“As designed and tested the Genesis Air system was able to remove or neutralize better than 98% of the airborne material as it processed the test chamber.”
Dugway Proving Grounds Western Desert Test Center
(2006). *WDTC-TR-06-078,3.8,33.*



Corp of Engineer's Regional Office Fort Sam Houston
GAP™ Catalyst



Bellevue Elementry
Belvlevue, Nebraska