A Clean Air Zone, Inc. (CAZ) White Paper

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An Advanced Biological Air Cleaning System for the Residential Market

Summary Clean Air Zone biological air cleaning systems are ideal for homes in dealing with **mold**, pathogens, and Volatile Organic Compounds such as formaldehyde.

Introduction

Indoor air pollution has been linked to asthma, allergies, autoimmune disease and a variety of health related issues. The most common pollutants that affect occupants of residential properties are volatile organic compounds or VOCs, and **mold**. The source of VOCs are variable and often related to a home's age. For example, new construction contains many building materials that off-gas VOCs, like carpet, paint, and flooring. Older homes are most affected by chemicals stored and used in the home like cleaners, pesticides and fuels.

All homes will have some **mold** present in the air. However, the **mold spores** in a healthy home are in low concentrations and the types of **mold** present are similar to those occurring immediately outside the home. Some of the spores enter the home through normal heating and air conditioning. Others enter through open windows and doors. **Mold** becomes an issue for home owners if a water intrusion event occurs, like a leaking pipe or roof, or if the humidity levels in the home become elevated above 65%. If leaks are not stopped and wet surfaces dried completely, **mold spores** will germinate, colonize surfaces, and replicate rapidly, producing copious amounts of airborne spores. Elevated airborne **mold spores**, in the home, lead to a variety of health issues that may be as mild as spring allergies or severe as a lung infection. Children, adults over 55, and immunocompromised individuals are most susceptible. Although, continuous exposure to elevated indoor **mold** may sensitize healthy adults who have never had a previous **mold** allergy.

Problem Statement

Current residential air cleaning technologies require expensive, specialized filters to remove airborne **mold** and VOCs from a home. Depending on the level of indoor pollution filters must be changed every 1-3 months. The cost of replacement filters is high and increases with the size of the air cleaning system. A small 10' x 10' bedroom air cleaner may cost a home owner $300 to $500 per year to maintain. The larger the air cleaning system the more costly the filters.

Previous Options

HEPA filtration has been the most common method used to remove **mold** and bacteria and some viruses from indoor air. However, HEPA filters cannot remove VOCs. Activated carbon or charcoal filters are required to remove VOCs. To remove both **mold** and VOCs, current home air cleaning technology requires 3 filters. The first filter is a pre-filter that catches large particles like fibers and large dust particles. Directly in-line, behind the pre-filter, is an activated carbon or charcoal filter for VOC's, followed by a HEPA filter for **mold**, microbes and small particles like smoke. The filters are placed in a mechanical box that pulls indoor air through the filters in order to clean the air. Frequent pre-filter changes are required to increase the life of the HEPA filter, which is the costliest of the filters. The frequency of charcoal filter changes depends directly on the amount of VOCs in the air. A room off-gassing new paint may require 2-3 changes per month until the off-gassing subsides. HEPA filters are changed too many times per year on average.

CAZ Solution

Clean Air Zone, Inc. (CAZ) has developed a filterless biological air cleansing systems that captures and destroys VOCs and noxious microbes and **mold** from residential homes. Two models are currently available for residential market. The CAZ-100B and the CAZ-85M. Each model is a self-contained, filterless unit that may be placed throughout the home. Inside every CAZ system, natural ionization technology is combined with the recycling power of beneficial bacteria and enzymes. A water flow system, similar to a natural waterfall, creates an ionization zone that scrubs contaminants from the air. The trapped

contaminants flow into a digestion reservoir. Inside the digestion reservoir, **CAZ Solution** rapidly degrades **mold** and VOCs into harmless end products. **CAZ Solution** is CAZ's patented beneficial bacteria and enzyme mixture. **CAZ Solution** contains environmentally friendly bacteria that function in nature to degrade complex biological and chemicals substrates into simple elements and nutrients.

A variety of testing has been conducted on the CAZ system and **CAZ Solution** by third party laboratories. VOC testing has shown that the system captures and degrades many household chemicals including formaldehyde, which is common in many building materials and furniture. **CAZ Solution** has been shown to break down a variety of household pesticides like Ethion and Diazinon. Testing has also shown that **CAZ Solution** degrades carbon monoxide and sulfur dioxide gas.

The CAZ technology is **extremely efficient** at capturing and destroying harmful **molds**, bacteria and viruses. The system efficiently removed high concentrations Aspergillus and Penicillium **mold** spores from the air. Laboratory tests with contagious flu viruses and infectious bacteria like MRSA and tuberculosis bacteria (Mycobacterium) were destroyed within hours by the **CAZ Solution**. This Solution not only kills **mold** and microbes, but does so by degrading the microbes' DNA.

Summary CAZ biological air cleaning systems are ideal for homes in dealing with **mold**, pathogens, and Volatile Organic Compounds such as formaldehyde.

Laboratory tests confirm CAZ Solution kill microbes by destroying their DNA.

Citations

Assured Bio Labs, LLC. (2017). Experimental Briefing: Rapid Degradation of Clostridium difficile, Candida albicans, Mycobacterium tuberculosis, and Influenza B/Lee/40.

Assured Bio Labs, LLC. (2017). Experimental Briefing: Rapid Degradation of Legionella pneumophila and the H1N1 Flu Virus in **CAZ** Solution.

Assured Bio Labs, LLC. (2017). **CAZ Solution** Degradation of Methicillin-resistant Staphylococcus aureus (MRSA).

Assured Bio Labs, LLC. (2019). Experimental trials conclude that the CAZ-100B System is 99.99% effective at removing Airborne **Mold** Spores.

Cummings, K. J., J. Cox-Ganser, et al. (2008). "Health effects of exposure to water-damaged New Orleans homes six months after hurricanes Katrina and Rita." American Journal of Public Health **98**(5): 869-875.

Day, Gregory. Aircraft Cabin Bleed Air Contaminants: a Review, DOT/FAA/AM-15/20, 2015.

Golden, Robert. (2011). Identifying an indoor air exposure limit for formaldehyde considering both irritation and cancer hazards, Critical Reviews in Toxicology,2011;41(8):672-721.

Haugland, R. A., M. Varma, et al. (2004). "Quantitative PCR Analysis of Selected Aspergillus, Penicillium and Paecilomyces Species." Systematic and Applied Microbiology **27**(2): 198-210.

Haugland, R. A., N. Brinkman, et al. (2002). "Evaluation of rapid DNA extraction methods for the quantitative detection of fungi using real-time PCR analysis." Journal of Microbiological Methods **50**(3): 319-323.

Jones, Byron, W. et al., the Nature of Particulates in Aircraft Bleed Air Resulting from Oil Contamination.

Vesper, S., C. McKinstry, et al. (2007). "Development of an environmental relative **mold**iness index for US homes." Journal of Occupational and Environmental Medicine **49**(8): 829-833.

Liao, C. M., W. C. Luo, et al. (2004). "Temporal/seasonal variations of size-dependent airborne fungi indoor/outdoor relationships for a wind-induced naturally ventilated airspace." Atmospheric Environment **38**(26): 4415-4419.

Macher, J., Ed. (1999). Bioaerosols : Assessment and Control. Cincinnati OH, ACGIH

Park, J.-H. and J. M. Cox-Ganser (2011). "**Mold** exposure and respiratory health in damp indoor environments." Frontiers in bioscience (Elite edition) **3**: 757-771.

Sobek, E. A. (2011). **Mold** Analytical Practice in **Mold** Identification and Solutions, Including Measurements and Sampling. Sick Building and Related Illness: Prevention and Remediation of **Mold** Contamination. W. Goldstein. Boca Raton, FL Taylor & Francis Group.

Zanni Sara, et al., Abatement and bio-digestion of airborne contamination in precision mechanics. Department of Civil, Chemical, Environmental and Materials Engineering, Terracini Street 28, 40131 Bologna, Italy. Work supported by U-Earth.

