

## AiroCide PPT™ Air Quality-Improvement™ Systems

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*AiroCide PPT™* contains the same NASA-developed *AiroCide™ Air Quality-Improvement™* technology that is used in a variety of *AiroCide* product lines. In addition to serving the perishable preservation and food safety industry, the *AiroCide* technology is has been developed to kill/remove/eliminate airborne pathogenic and non-pathogenic microorganisms in vegetative and spore states (bacteria, mold & fungi, viruses and dust mites), allergens, odors and harmful volatile organic compounds (VOC's ) in air in a variety of commercial, government, and residential market applications including the medical healthcare industry (*AiroCide* is listed as an FDA Class II Medical Device).

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### Summary:

A clinical study of the AiroCide PPT airborne pathogen killing technology was conducted in the tomato cooler of a large produce wholesale company. The data supports the hypothesis that airborne mold and bacteria levels would be lowered after 24 hours, and lowered further after 48 hours, of continuous operation of the AiroCide PPT system. The results show airborne mold **reduction** inside the cooler of 54% in 24 hours and 62% in 48 hours. Airborne bacteria in the same cooler decreased 75% in 24 hours and 100% in 48 hours.

### Conditions

The tomato cooler used in this study is 19,500 ft<sup>3</sup>. The temperature in the cooler at the time of the tests was 55° F on days #'s 1 and 2 and 48° F on day #3. Relative humidity ranged from 60-70% throughout the test period. Inventory levels were 60% on day # 1, 40% on day #2, and 90% on day #3 of testing.

A humidity control system was operating in the tomato cooler throughout the test period. All cooler doors were open during the course of the day, with plastic air strips containing the environment of each individual cooler. No interruptions occurred during the times air samples were taken.

### Protocol

The study was conducted during three days which exhibited normal business activity. On day # 1 of testing (December 3, 2003) two (2) air samples were taken inside the tomato cooler and one (1) sample was taken in the main warehouse (outside of the tomato cooler) for comparison. These samples were taken before the AiroCide PPT systems were turned on to establish a baseline. The two (2) air samples taken inside the tomato cooler were averaged to determine the overall mold and bacteria count in the cooler.

On day # 2 of testing (December 4, 2003) the same three (3) samples above were taken after two AiroCide system (ACS-100) were operating in the tomato cooler for 24 hours.

On day # 3 of testing (December 5, 2003) the same three (3) samples above were taken after two AiroCide system (ACS-100) were operating in the tomato cooler for 48 hours.

Air samples were taken with a slit air sampler (similar to the Anderson N6 sampler) on 15 x 100 mm plastic petri dishes, in accordance with the general protocols and procedures established by the Indoor Air Quality Association (IAQA) and the National Industrial Hygienists Association. Each

of the three (3) stations were sampled using one (1) Potato Dextrose Agar plate (mold/fungal growth media) and one (1) Rose Bengal Agar plate (bacteria growth media). All agar plates were exposed to 28.3 l/m of air for 3 minutes.

All airborne mold and bacteria in this study were measured in colony forming units (CFU) per cubic meter of air. A CFU is any unit of a given organism that has the ability to multiply and form a colony, or reproduce.

**Results:**

The tables below show airborne mold **reduction** inside the cooler of 54% in 24 hours and 62% in 48 hours. Airborne bacteria in the same cooler **decreased** 75% in 24 hours and 100% in 48 hours. These results are significant compared to airborne mold and bacteria levels outside the cooler which **increased** by 59% and 228% respectively in the same 48-hour period.

Airborne Mold & Bacteria Reduction in a Tomato Cooler

**Mold**

	12/3/03	12/4/03		12/5/03	
	Baseline CFU/m <sup>3</sup>	Active On 24 hrs. CFU/m <sup>3</sup>	Change % (From Baseline)	Active On 48 hrs. CFU/m <sup>3</sup>	Change % (From Baseline)
<b>Tomato Cooler</b>	719	329	-54%	271	-62%
<b>Main Warehouse</b>	1,319	1,390	+ 5%	2,097	+ 59%

**Bacteria**

	12/3/03	12/4/03		12/5/03	
	Baseline CFU/m <sup>3</sup>	Active On 24 hrs. CFU/m <sup>3</sup>	Change % (From Baseline)	Active On 48 hrs. CFU/m <sup>3</sup>	Change % (From Baseline)
<b>Tomato Cooler</b>	235	71	-75%	<12 <sup>1</sup>	-100%
<b>Main Warehouse</b>	57	141	+ 247%	130	+ 228%

<sup>1</sup> An Aerotech Laboratories, Inc. report states that <12 CFU/m<sup>3</sup> represents zero (0) pathogen detection, or a 100% reduction.

Copies of tests mentioned in this paper can be obtained by writing KesAir, Research & Development, 3625 Kennesaw N. Ind. Pkwy., Kennesaw, GA 30144.

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