

# High-Efficiency Air Purifier for Eliminating Mold and Bacteria in Floral Coolers

## INTRODUCTION

AiroCide photocatalytic air purifiers contain the same NASA-developed technology used in a variety of AiroCide air purifying product lines. In addition to serving the floral and perishable preservation and food safety industry, the 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 applications including the medical healthcare industry (AiroCide air purifiers are FDA Class II listed medical devices).

## SUMMARY

A clinical study of the AiroCide PPT photocatalytic air purifying technology was conducted in the Pre-cooler at Esmeralda Farms' facility in Miami, FL. The data supports the hypothesis that airborne mold and bacteria levels would be lowered after continuous operation of the AiroCide PPT air purifying system. The results show a significant reduction in airborne pathogens just 24 hours. There was an average airborne mold reduction of 95.45% after a 72-hour period and an average airborne bacteria reduction of 73.18% in the same time frame.

## PROTOCOL

The Pre-cooler where the test took place, is approximately 148,500 ft<sup>3</sup> in volume. The test period consisted of four ( 4) days of air sampling in November 2004. A baseline air sample was taken in two locations in the Pre-cooler on Tuesday, 11/9/04 without the air purifying units operating. On Wednesday, 11/10/04 all three units were turned on in the Pre-cooler and allowed to run for 24 hours. Active On samples were taken in both locations after 24, 48 and 72 hours of use, on Thursday, 11/11/04; Friday, 11/12/04 and Saturday, 11/13/04. Air samples were taken for comparison in the Main Cooler and Shipping Area.

Air samples were taken with a slit air sampler (similar to the Anderson N6 sampler) on 15 x 100 mm plastic petri dishes. All samples were cultured by Aerotech Laboratories in Phoenix, AZ, and the results were measured in colony forming units (CFU) per cubic meter of air. All agar plates were exposed to 28.3 l/m of air for 3 minutes.

## RESULT

Table 1 below shows airborne mold reduction at two sites inside the Pre-cooler of 90.83% and 99.35%, or an average of 95.45% in 72 hours. A significant reduction was realized in just 24 hours.

Table 1

	11/9/04	11/11/04	11/12/04	11/13/04	
Mold Spores	Baseline CFU/m <sup>3</sup>	24-hr CFU/m <sup>3</sup>	48-hr CFU/m <sup>3</sup>	72-hr CFU/m <sup>3</sup>	72-hr Change
Pre-Cooler Site A	131	<12	119	12	-90.83%
Pre-Cooler Site B	155	119	83	<1	-99.35%

**Average Reduction • 95.45%**

Table 2 shows airborne bacteria reduction inside the coolers of 60% and 79.83%, or an average of 73.18% in 72 hours. A significant reduction was realized in just 24 hours.

Table 2

	11/9/04	11/11/04	11/12/04	11/13/04	
Bacteria Spores	Baseline CFU/m <sup>3</sup>	24-hr CFU/m <sup>3</sup>	48-hr CFU/m <sup>3</sup>	72-hr CFU/m <sup>3</sup>	72-hr Change
Pre-Cooler Site A	60	24	95	24	-60%
Pre-Cooler Site B	119	71	345	24	-79.83%

**Average Reduction • 73.18%**

One (1) AiroCide PPTair purifier model ACS-100 is designed to clean the air in enclosed areas up to 50,000 ft<sup>3</sup> in volume (1,415 m<sup>3</sup>) under standard operating conditions. \*

One (1) AiroCide PPT air purifier model ACS-50 is designed to clean the air in enclosed areas up to 25,000 ft<sup>3</sup> in volume (707 m<sup>3</sup>) under standard operating conditions.\*

\* AiroCide PPT air purifier specification requirements may vary according to the temperature and design of enclosure as well as the sensitivity of its contents to airborne mold, bacteria and ethylene gas. In order to obtain a target airborne pathogen reduction of 90% or greater within 48 hours, KES recommends adhering to the defined specifications.

# Evaluating the Effectiveness of Airocide NASA-Developed PCO System in Eliminating Mold and Bacteria in a Flower Shop Environment

## INTRODUCTION

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## SUMMARY

Using a SAS 360 impingement air sampling machine various air samples were collected from inside and outside the main cooler located at the main facility in Phoenix, AZ and sent for analysis to the lab. Hygienas bioluminometer ATP tests were performed on different surface areas to establish a baseline on RLU counts and presence. An Airocide GCS 25 unit was installed inside the main cooler room as well as a remote-monitored Air Quality Meter (AQM) that will calibrate automatically inside the main cooler room for 7 days after installation.

All ceilings, lamps, glasses, doors, and shelving systems as well as 4 work stations were fully dusted and cleaned prior to treatment with PCO Protective Control within the inside of the main cooler room.

## CONCLUSION / RECOMMENDATION

Out of the 3-stage protocol recommended for Camelback Flower shop, stages 1 & 2 have been completed. The 30-Day Post-Installation, stage 3, of the protocol is scheduled next and baselines have been established, and in stage 3, air sampling will be performed.



LOCATION	IMPROVEMENT %	TEST TYPE	RESULT 1	RESULT 2
Small Floral Cooler Inner Cabin	95	RLU	1444	68
Front Desk Keyboard	94	RLU	2037	128
Main Cooler room inner wall panel	95	RLU	1263	58
Main Cooler room inner glass panel	94	RLU	876	52
Workstation table coppertop	95	RLU	2236	116
Small Floral Cooler Inner Cabin	26	CO2 ppm	1021	755
Main Floral Cooler Inner Cabin	86	CO2 ppm	2614	367

## RESULT

Lab results from the air samples taken, indicate what was initially suspected would be present in the cold room environment.

The lab results also confirm the presence of fungi, bacteria, and other affecting pathogens. The samples captured outside of the cold room, including the lobby, customer, and staff areas also show the presence of the same pathogens and additional strains of fungi.

After 10 days of the initial installation, air monitoring readings show positive improvements in all the protected and controlled environments.