

Greentech Pure Air HEPA Active Plus Pro

Objectives:

An infield evaluation of the Pure Air HEPA Active + Pro freestanding unit combined with a MERV 10 pleated HVAC filter as to measurable efficacy and overall impact to indoor air quality in a typical commercial setting.

Location:

1501 Lehigh St. testing suite

Project start: 10/25/21 to 10/29/21

Conducted by: Keith Roe, CIE/CMC, Advanced IAQ Solutions, Inc

Testing Environment:

Room 203 is a two-room finished commercial suite of about 1240 sq.ft. with painted drywall ceilings and walls, used carpeting and a suspended ceiling. The area has a dedicated HVAC system with a 4 ton capacity which could provide approx. 9 air turns per hour in a continuously operating mode. The conditioned air is circulated through 9 ceiling mounted air supply grilles and 2 return air grilles, one in each area. The economizer was set at about a 10% fresh air factor. The testing was conducted in the main room of 1,068 sq.ft./9414 cu.ft. The connecting door to the smaller office space was open bringing the total sq.ft. to 1,344 / 10,758 cu.ft. The forced air HVAC system was operating as to a thermostat setting of 70 degrees during the study. The thermostat was programmed for a dual operation providing heat or AC, as needed, to maintain the desired temperature range. Two new 20" x 30" x 2" MERV 10 pleated filters were installed in the RTU (roof top unit) prior to the study. NOTE: During this study, the HVAC RTU unit was functioning approx. 40% of the time to maintain the thermostat setting. That would equal about 3.6 air turns per hour.

Location of the HEPA + Pro unit:

Days 1 to 2- The unit was placed on the floor within 3 feet of the sampling table on the low/med fan speed setting. This setting provided 115 cfm of purified air as validated by the Engineering department at Greentech. This is similar to the MOLEKULE PRO unit previously tested or similar lower volume units.

Days 3 to 5- Medium-high fan setting- The unit was located in the center of the 1240 sq.ft. testing room within 20' of the testing table and 10' to the ceiling mounted return register. The fan setting providing 230 cfm of continuous purified air was selected, providing approximately 1.3 air changes per hour.

Definitions of Technology:

The HEPA + Pro combines active and passive technologies. The main features are listed below.

-Three technologies:

1. Photocatalytic Oxidation (PCO)
2. Bipolar Ionization (BPI)
3. ODOGard Treated HEPA filter

-Adjustable fan speeds

- Multiple Purification Modes (manual, Auto, Night)



Testing Preparation:

Prior to the testing, the room was vacuumed using a HEPA filtered vacuum, and all horizontal surfaces were wiped clean. VOC sources from two scented liquid cleaners, 2 ounces of Simple Green and Citrus Cleaner that both contain Limonene and 2 oz. of liquid formaldehyde were introduced into the room environment from (4) saturated sponges that remained exposed to the indoor environment during the 5-day period. Also (3) MEA agar Petri dishes newly inoculated with multiple ubiquitous molds and (3) TSA agar petri dishes newly inoculated with multiple ubiquitous bacteria were left exposed inside the room during the testing.



Testing Sequence

Day 2 to 3- After the first set of samples were taken and baseline IAQ monitoring was performed, the Pro unit was set on low/medium fan speed operating continuously at 115 cfm. approx. 3' from the testing table for this period.

Day 3 to 5- The Pro unit was operated continuously at 230 cfm, the med/high fan speed setting, approx. 20' from the testing table in the center of the room.



Sampling/Monitoring Protocols Used:

1. Spore Trap Mold Testing:

150 liter air samples were taken before the installation day 1, day 2, then on day 3 (at the new fan setting 3), and at the end of the testing (day 5) in room 203, in the adjacent hallway (indoor control) and outside (outside control). These samples were analyzed by AEML Labs using Microscopy for total spore count identified by each mold genus. (See Addendum A, pg. 1,2 for further testing details). It is standard protocol to take both an indoor control and outdoor control when performing spore trap testing to serve as a comparison to the indoor testing environment. The adjacent hallway served as the indoor control with a separate HVAC operating system using a MERV 8 filter. These control samples provide information as to the environmental bias affecting the testing space.

2. Particle Impactor Sampling:

These air samples were taken daily within the room 203, on days 1, 3 and 5 in the same locations in the center of the room. These samples were sealed, refrigerated and submitted to Focus Labs within 1 hour for incubation, culture and identification of total detectable *viable* mold spores that are capable of reproduction given the necessary moisture and growth host. The lab followed ISO 14698, protocol 023. (See Addendum A, pg. 3 for further sampling details)

3. Surface Sampling: Swab sample method

These surface samples were taken simultaneously with the viable air samples on days 1,3 and 5. The dusty surface of the return air register was sampled for 4 sq.in. using a sterile Stuart transport swab. These swabs were sealed and refrigerated and submitted to Focus Labs within 1 hour. They were incubated and analyzed for total CFU (colony forming units) for both mild and bacteria. The lab followed ISO 14698, protocol 023. (Further details in Addendum A, pg. 4)

4. TO-15-Summa type VOC sampling

This testing method allows the identification of parts per trillion of certain volatile organic compounds and look at unknown compounds and make tentative identifications if newly formed compounds are present. This test was performed prior to the testing and on days 3 and 5 of the testing representing a 24-hour time period between each sampling. (Further detail in Addendum A, pg. 5,6,7)

5. TVOC (Total Volatile Organic Compounds) and Formaldehyde (HCHO) gas monitoring:

Using a newly calibrated TemTop model LKC-1000 a laser multi-functional detector with a high precision electrochemical sensor that can transform the concentration of pollutants in the air into visual data, readings were taken daily during the project. The TVOC reading that this unit provides is representative of multiple airborne compounds that were present simultaneously and are reported in mg/m³ allowing low levels to be detected and reported. A VOC PID meter was used to report the VOC levels present in ppm.

HCHO (formaldehyde), Formaldehyde is the most common aldehyde in the environment. The natural background concentration is < 1 ug/m³ with a mean average of about 0.5 ug/me. Also, a common indoor contaminant used in many products and disinfectants.

Levels were also monitored daily, and the readings are part of the integrated results and are reported separately but part of the components reported by the TemTop Meter. These total results were





reported in mg/m³. (Milligram per cubic meter) providing very low detection levels.

Also, each day a new passive sampler badge containing silica gel coated with 2,4 dinitrophenylhydrazine was exposed for 24 hours to the indoor environment within 20' of the sampling table. Each sampler was sealed and sent to EMSL Analytical Labs for analysis using NIOSH method 2016 for quantitative analysis of formaldehyde content to quantitatively define the airborne concentration in the room. The detection limits for this passive method is 0.002 mg/m³. (see Appendix A, pg. 11)

6. **PM2.5, PM10.0**

These are inhalable particle matter (PM) not a single pollutant, but a mixture of many chemical species. It is a complex mixture of solids and aerosols comprised of small droplets of liquid, dry solid fragments, and solid cores with liquid coatings. Those with a diameter of 10 microns or less (PM10) are inhalable into the lungs and can induce adverse Health effects. *Fine* particle matter is defined as particles that are 2.5 microns or less in diameter and comprises a portion of the PM10. These levels are regulated by an OSHO standard of exposure in the workplace. These were measured daily using a calibrated TemTop model LKC-1000 laser detector with a high precision electrochemical sensor.

7. **Respirable (dust) Particle Counts:**

Airborne particle sizes are measured in microns. Particle size is designated as the average diameter in microns. Particles less than 10 microns in diameter can get deep into your lungs and some may even pass into your bloodstream. Smaller particles (1-3 microns) diffuse deeply into your lungs tissue, depositing in the alveoli by a number of mechanisms including diffusion, sedimentation and electrostatic effects. Using a recently calibrated Extech VPC300 Video Particle Counter, **particle** sizes 0.3,0.5,1.0,2.5 and 10.0 were monitored daily during the study.

8. **Activated Oxygen (O₃)**

Using an Aeroqual portable ozone monitor, the ozone levels were monitored daily and were able to be reported at levels from 1 to 100 ppb. A data log function was also engaged. The current TLV TWA is .1 ppm.

9. **Odor Intensity**

Using a portable Kanomax OMX-ADM intensity monitor, the levels were monitored daily over the 5-day period. The meter will show a numeric value between 1 to 999.

10. **RH% and Temperature**

These environmental factors were monitored to determine if there was a discernible impact in the overall performance of the equipment when significant fluctuations of these factors occur.

11. **Carbon Dioxide- Co₂ levels**

Co₂ is a colorless, odorless, incombustible gas that forms during respiration, combustion and organic composition. It occurs naturally in the earth's atmosphere. Elevated indoor levels are often a result of poor fresh air ventilation creating a stale air environment that is prone to promote airborne diseases and viruses. The most commonly referenced standard is the ASHRAE standard 62.10 2015 defining a desired indoor level as < 1000 ppm. However recent research has defined that at < than 800 ppm for best disease transmission prevention. Levels above 5000 ppm cause illness and detrimental health effects.

NOTE: Levels <800ppm are reported to minimize the transmission of airborne viruses and diseases.



Findings:

1. Mold Spore Trap Test Results

Reference AEML report 347034, dated 10/25/21 (initial sampling)

These air samples were taken prior to the operation of the wall unit and filtered fan.

Sample #33146980, the *outside* spore total was reported for that day at a typical seasonal level of 4,833 s/m³. (spores /cubic meter)

Sample #3314 Room 203 was reported at 96,887 s/m³. *A high induced mold spore count.*

Sample # 33147090 (inside control) hallway was reported at 1,067 s/m³.

Reference AEML report # 347036, dated 10/26/21 (day 2)

These air samples were taken the 2nd day of the project after 24 hours of continuous operation in the Low/medium fan speed, 3' from the sampling table.

Sample # 33147063, Room 203 was reported at 7 s/m³, > **a 99.999% reduction from the initial level after 24 hours.**

Sample # 33147338, Hallway was reported at 53 s/m³, a 95% decline from the initial level with no unit operating.

Reference AEML report # 344640, dated 10/27/21 – 3rd day of testing

These air samples were taken after the unit fan setting was increased to med/high at 230 cfm of air delivery Rate at 1.3 ac/hr. approx. 20' from the sampling table.

Sample # 394004, outside was reported at 1,460 s/m³.

Sample # 394005, room 203 was reported at 2,480 s/m³, a reduction of > **97.4% from the initial level.**

Sample # 394001, Hallway was reported at 147/m³, a 2.8x increase from previous level, a 86.2% reduction from the initial level.

Reference AEML report # 347040, dated 10/29/21- 5th day of testing.

Sample # 33147349- outside was reported at 27 s/m³.

Sample # 33147362- Room 203 was reported at 20 s/m³ a **99.2% reduction from day 3 and > 99.999% from the initial levels.**

Sample # 33146979- hallway was reported at 27 s/m³, an 81.6% reduction from day 3 and 62.2% reduction overall.

Overview:

*A MERV 10 rated filter would provide a > 95% arrestance level for the average size of mold spores reported. Within 24 hours a reduction of 99.999% was achieved at .6 air changes per hour and approx. 3.6 air changes per hour from the HVAC system operating at reduced air flow due to moderate temperatures. At the higher fan setting at approx. 1.3 ac/hr., the reduction in the full space was also > 99.999%. **This would suggest that this unit's combined technology contributed a 4-5% additional reduction factor.***

IAQ Standards: *There are no set standards for airborne mold exposure, but a combination of several factors compiled by multiple agencies are frequently referenced (see addendum A, pg. 8) The reported mold spore levels in room 203 by day 6 were below those stated Guidelines.*

2. Particle Impactor Air Sampling

Reference: FOCUS Labs

Air Sample Results

Test Reference number 213941, dated 25-Oct-2021

A total of 58 cfu (colony forming units) of viable mold was reported.

A total of 142 cfu of airborne viable bacteria was reported.

Test Reference number: 214012, dated 27-Oct-2021- after low/ med fan speed.

A total of 25 cfu of viable mold was reported, a reduction of 57%.

A total of 8 cfu of viable bacteria was reported, a reduction > 94.4%.

Test Reference number: 213971, dated 29-Oct-2021- after med/high fan setting

A total of 1 cfu of viable mold was reported, mold was decreased overall by > 99.9%

A total of 0 cfu of viable bacteria was reported, a decrease > 99.9%

OVERVIEW:

The reduction of the airborne mold spores and bacteria would be a result of the combined technology and HEPA filter beyond a 95% reduction possible with A MERV 10 HVAC filter.

Surface (swab) Sampling Results

NOTE: These samples were taken from previously untested register surface in the room, the main return register grille which would best reflect the impact of the combined technologies tested.

Test Reference number 213937, dated 25-Oct-2021.

A total number 170 cfu of viable surface molds were reported.

A total number > 25,000 cfu of viable surface bacteria were reported, an extremely elevated level.

Test Reference number 214009, dated 27-Oct-2021- after low/med fan settings.

A total number of 100 cfu viable surface mold was reported, a decrease of 41.%

A total number of > 20,500 viable surface bacteria was reported, an 18% decrease over 2 days.

Test Reference number 213976, dated 29-Oct-2021- med/high fan setting

A total number of 200 cfu of mold was reported on this day, a 17.6% increase from the initial levels.

A total number of 300 cfu of bacteria was reported, a > 99.9% reduction from the initial.

OVERVIEW:

On Day 2, Oct. 26th, the indoor RH% was 83.3% which would support continued amplification of microbials on the cooler register surface, which would become the first condensing surface at that level of surface AW (water activity) .

NOTE:

No pathogenic mold or bacteria or viruses were introduced for safety reasons. These viable molds and bacteria are comprised of ubiquitous species introduced into the space initially and kept exposed to the indoor ambient air during the 5-day period. *The lower RH% from day 3 to 5 in this 5 day period would not readily support continued viability of these microbials, but there is no known way to calculate the natural reduction of the viability of these microbials in this relative humidity.*

4. TO-15 TVOC results

Reference EMSL report # 492100645 dated 10/25/21, the TVOC level reported at that time with this collection method was comprised of 9 separate compounds totaling 260 ug/m³. The primary compound identified was Ethanol reported at 170 ug/m³.

Reference EMSL report # 4921100603, dated 10/27/21, the TVOC level reported was comprised of only 6 separate compounds totaling 70 ug/m³. Ethanol was the primary compound at 41 ug/m³.

There were no new compounds reported and no unknown compounds.

This was an overall reduction of 73% for that 48 hour period, in the lower fan settings.





Reference EMSL report # 4921 10/29/21, the TVOC level reported was 49 ug/m³ comprised of 6 compounds. no new compounds were reported. The day 5 level was a further decrease of 30% over the 48 hour period, a 71% decrease over the 5 day period.

NOTE: No individual compounds reported on day 5 exceeded any established STEL or TLV standards. There are no regulatory standards for TVOC's but < 300 ug/m³ is classified as a low level, unlikely that any VOC source is present. These results were achieved with VOC sources present. (see Addendum A, pg.10)

5. TVOC and HCHO reading results:

Electrochemical sensor results:

On 10/25/21, the TVOC readings in room 203 were reported at a somewhat elevated level of .721ppm / 3.77 mg/m³. compared to the outdoor level reported at 0.021 ppm and .11 mg/m³. The indoor hallway at .021 ppm / .27 mg/m³. This condition in Room 203 would be best described as "detectable odor may be present, irritation or discomfort possible in sensitive persons".

On 10/26/21 after operating for 24 hours at the lower fan setting, the levels in Room 203 at the lower fan speed 3' from the unit were reduced to .021 ppm / .04 mg/m³. Hallway levels decreased about 50%.

Outside levels also decreased. This was a reduction > 99.9% in 24 hours.

On 10/27/21, the levels in room 203 after the Pro unit was moved into the center of the room on the higher fan setting, the TVOC was still recorded at .021 ppm/.04 mg/m³. and remained at that level for the duration of the study. This was below the outside levels and the hallway and at an untypical low, sustained level for the interior of a functioning building.

NOTE: TVOC levels that are below 0.07 ppm are classified as a "no effect" level as it pertains to irritability or discomfort. (see Addendum A, pg.5)

On 10/25/21, the HCHO level (formaldehyde) in room 203 was reported at 1.18 mg/m³ or .301 ppm compared to .06 mg/m³ or .003 ppm in the hallway and .02 mg/m³ or .003 ppm outside using the electrochemical meter measurement.

On 10/26/21, after 24 hours at the lowered fan setting, the HCHO levels in room 203 were reported by the electrochemical sensors at .01 mg/m³ or .003 ppm. a > 99.9% reduction in 24 hours. This level was equal to or less than the outside levels.

From 10/26 to 10/29, with the unit placed in the center of the room on the higher fan setting of 230 cfm, the levels were sustained at this lower level. This reflected an > 99.9% sustained reduction.

Passive Sampler badge Results:

EMSL report # 282102960

Day 1 - 17.0 ug/m³. 0.58 ppm

Day 2- .063 ug/m³, 0.0022 ppm

Day 3- .37 ug/m³, 0.013 ppm

Day 4- 0.50 ug/m³, 0.017ppm

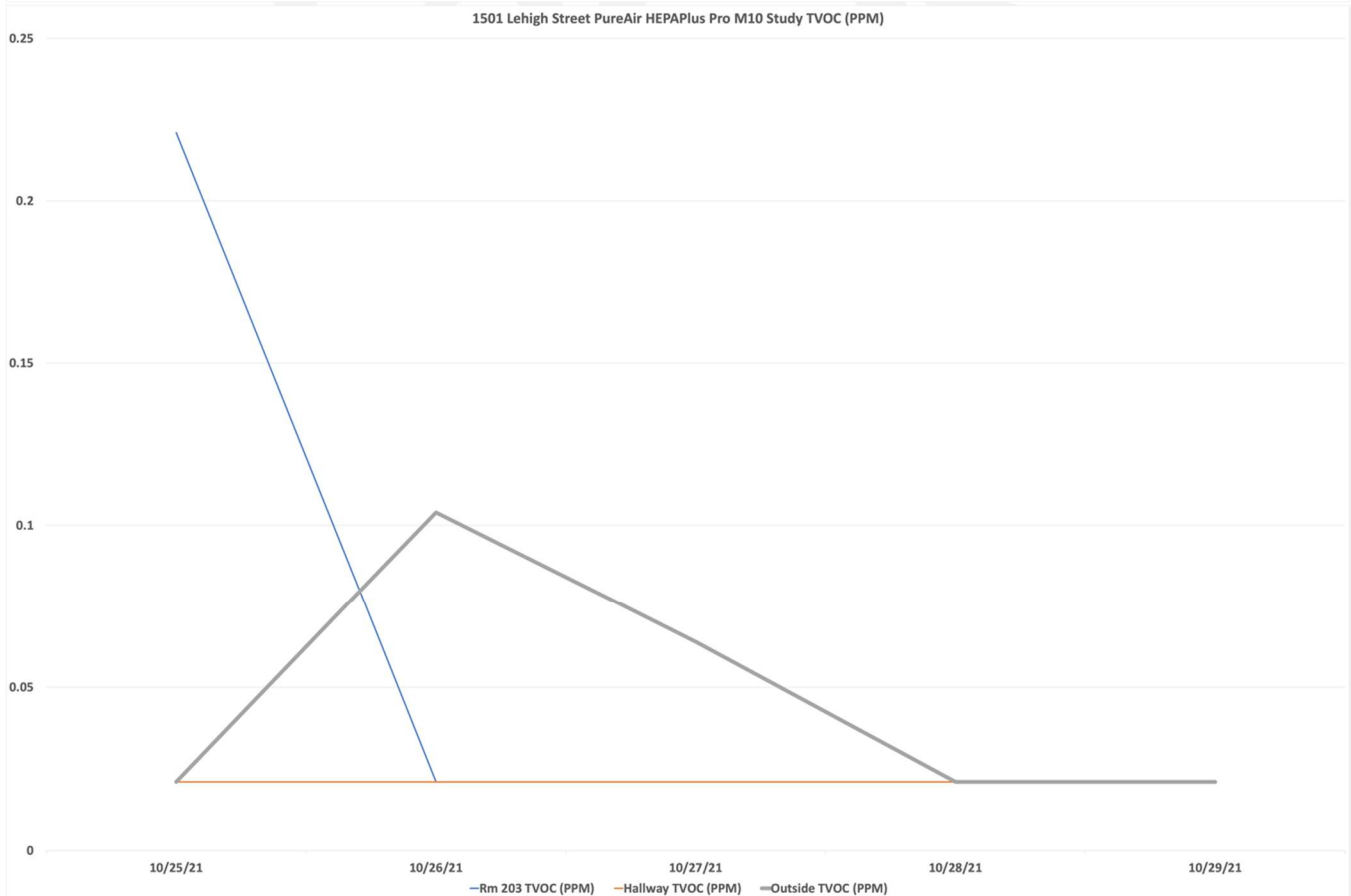
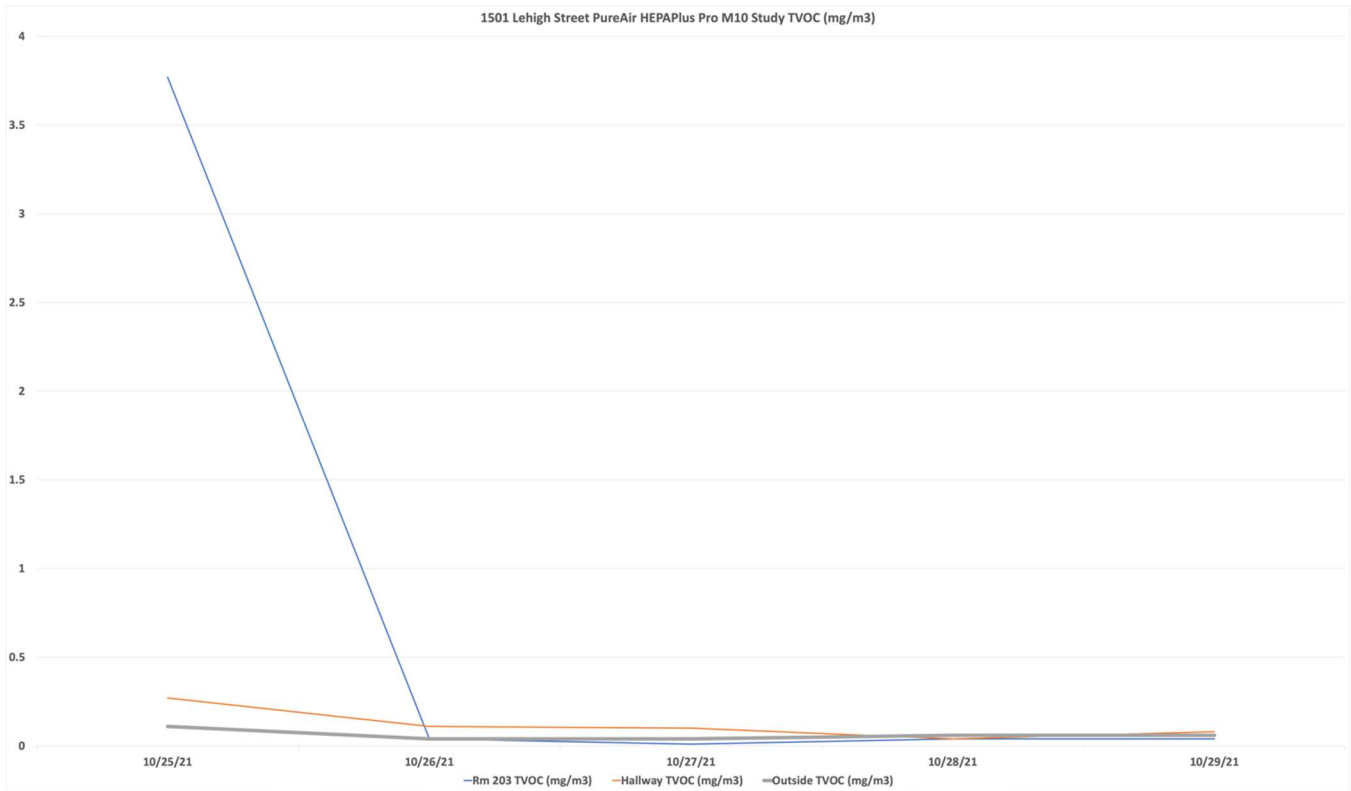
Day 5 - < 0.05 ug/m³, < 0.0017 ppm

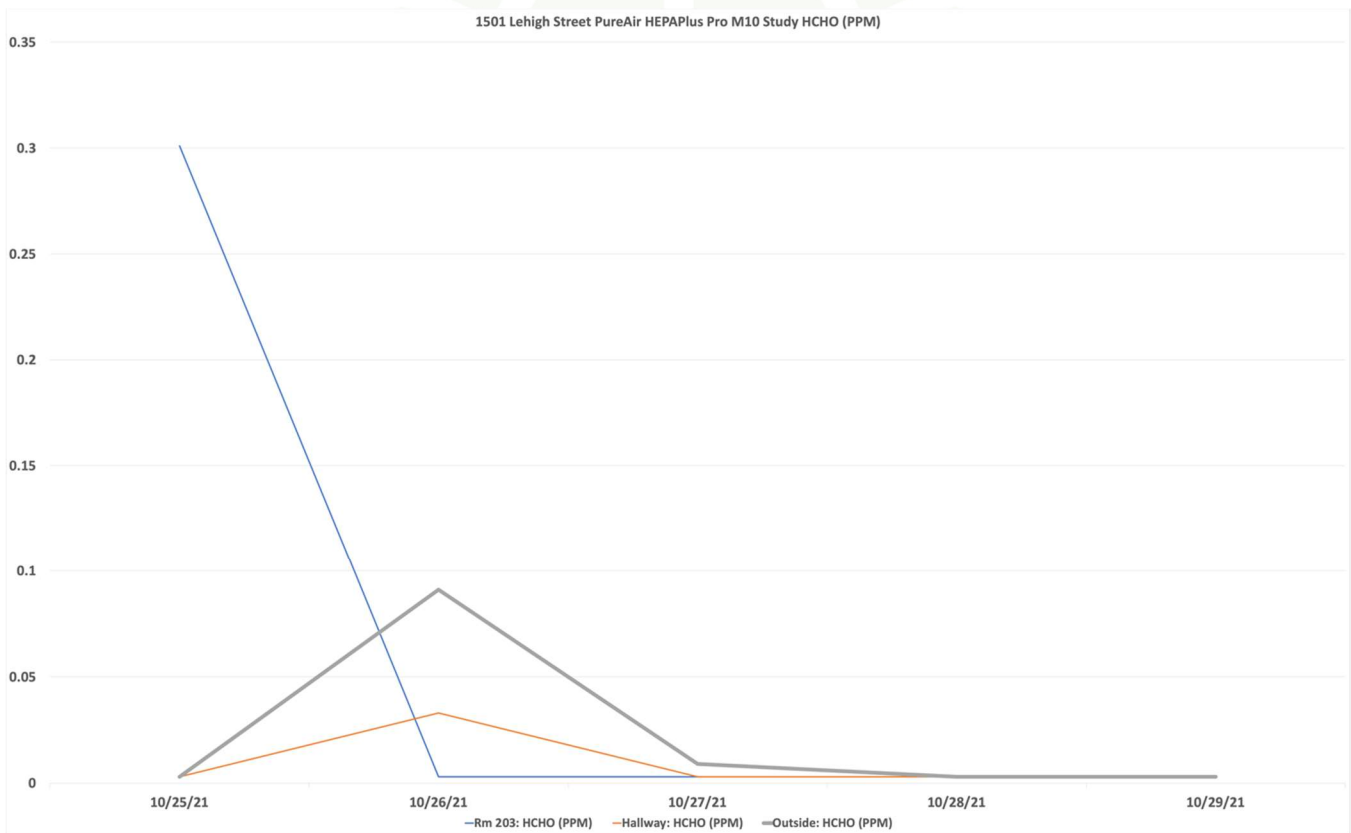
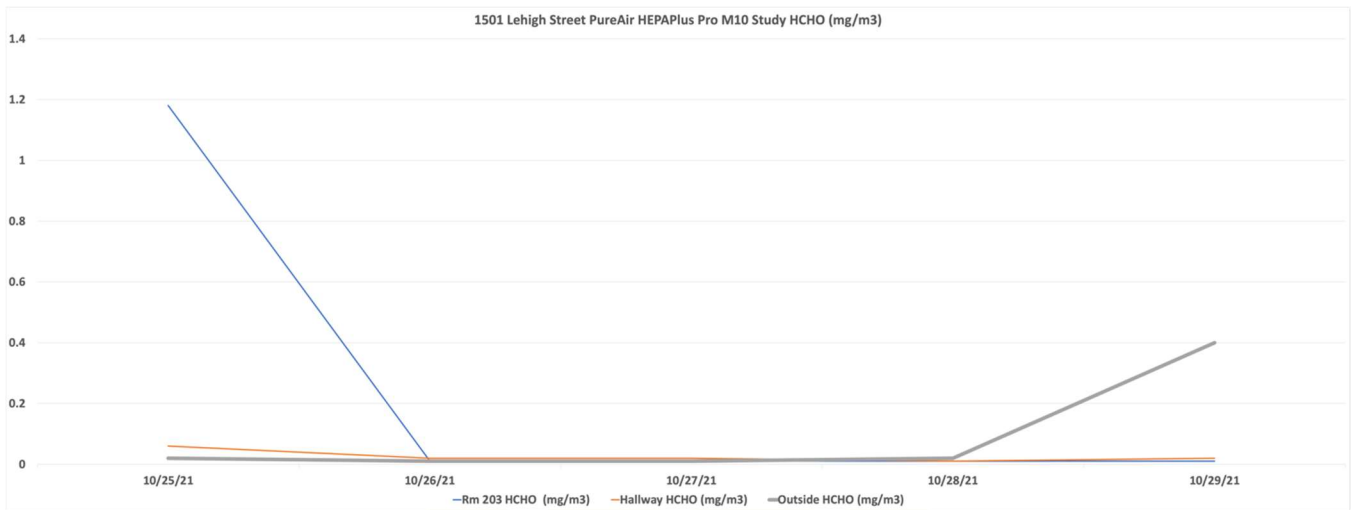
This represented a > 99.9% reduction within 24 hours in Rm. 203 using the passive badge collection method. This level of reduction was sustained.

NOTE: Natural background levels are < 1 ug/m³ and average .5 ug/m³. Current TLV is 2 ppm.

Formaldehyde is quickly photo-oxidized in Carbon Dioxide. It also reacts very quickly with hydroxyl radicals to give formic acid. The half life is estimated to be about one hour depending on environmental conditions.









6. PM 2.5/PM 10.0

On 25 Oct-2021 The PM levels inside Rm. 203 were reported for 10.7 ug (micrograms) for PM 2.5, for 10.0 PM at 16.1 ug. Higher than the hallway but lower than outside.

On 26 Oct-2021 under the lower fan setting, the levels inside Rm. 203 had significantly decreased to 2.1 and 2.1 respectively **about a 80% decrease at PM2.5 and 87% at PM10.0**, now lower than outside and slightly higher than the hallway with no continuing PM source.

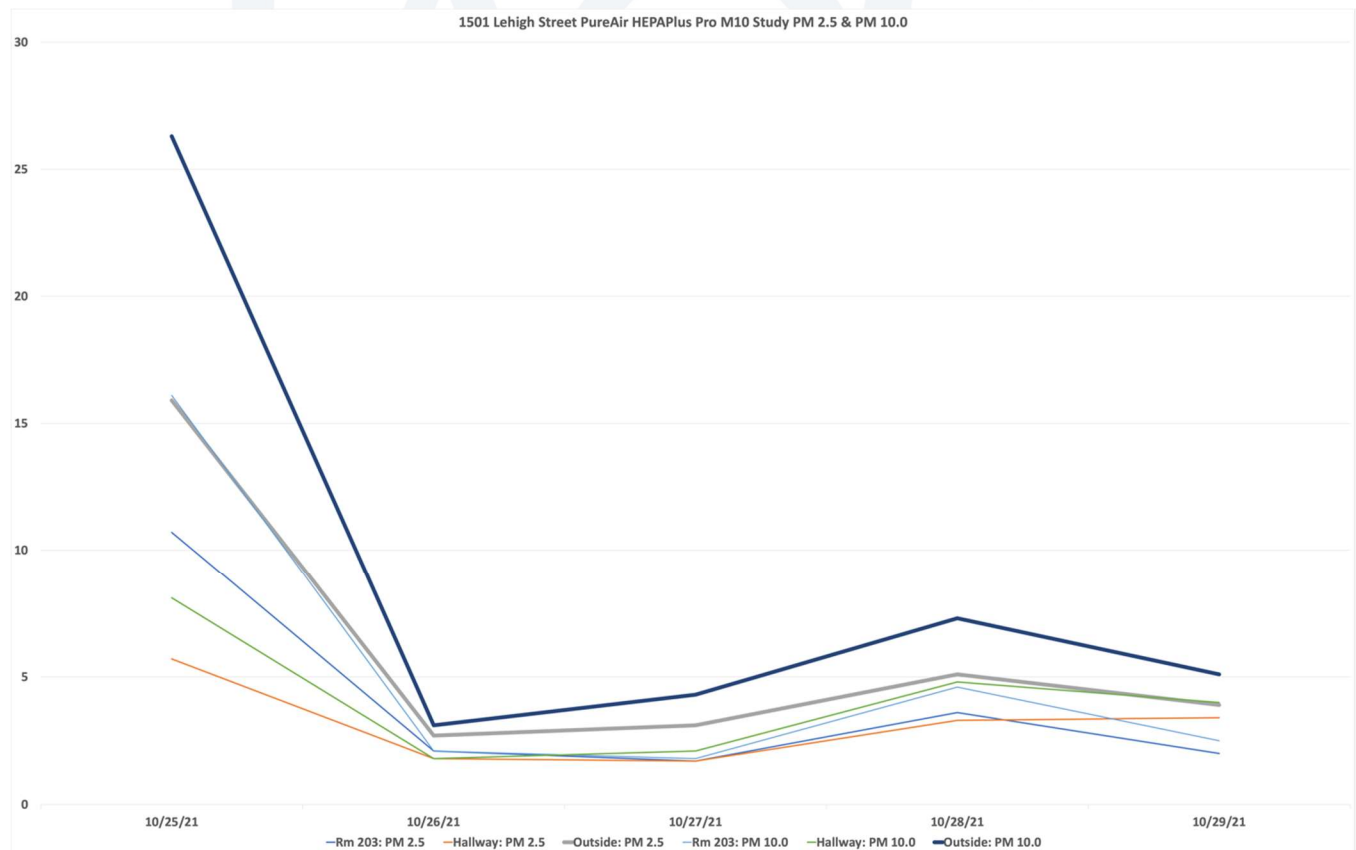
On 10/27/21 with the unit centered in the room operating on the 230 cfm fan setting, the **levels again decreased to 1.7 and 1.8 respectively while hallway and outside levels increased.**

On 10/28/21 the levels **increased significantly from day 3**, recorded at 3.6 and 4.6 ug respectively. It was a very windy day reversing air pressures from outside into the room through the RTU HVAC system when the unit was not in operation. Hallway and outdoor levels had also increased by a similar amount.

On 10/29/21, **the levels in Room 203 decreased to 2.0 and 2.5 ug respectively, reduced by 87% and 84%** respectively lower than the initial levels reported and the hallway and outside. Hallway and outdoor levels decreased only slightly that day.

OVERVIEW: The PM levels were significantly reduced within 24 hours and sustained at untypically lower levels even with an outside air condition bringing in higher levels of PM on 10/28/21 using this combined technology.

NOTE: The current recommended maximum exposure level to PM2.5 is 15 ug/m3 and PM10.0 at 54 ug/m3.





7. (Respirable) Particle Dust Count Results:

On 10/25/21, the collective total of the 6 particle sizes in room 203 totaled 37,062-micron sized particles, the hallway at 12,625 and outside at 54,423. This level was recorded prior to the Pro unit and HVAC operation.

On 10/26/21, under the lower setting, the collective total in room 203 decreased to 3778, about 90. %, while hallway and outside levels decreased by a similar margin.

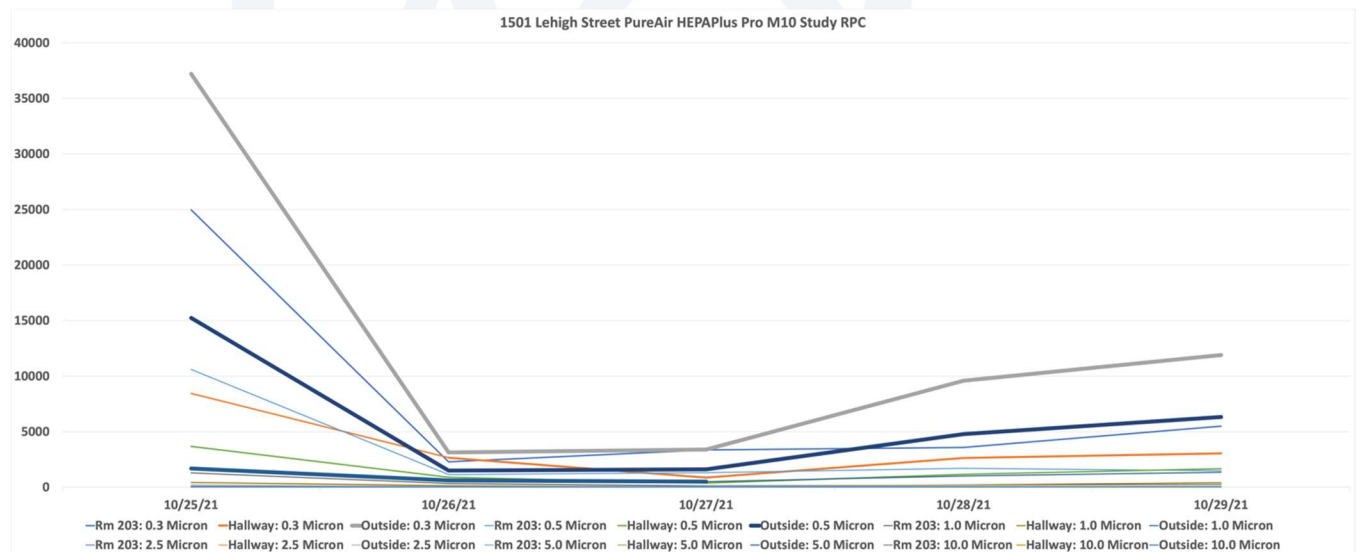
On 10/27/21 in a higher setting the overall RPC in room 203 increased slightly by about 37%, from the previous day levels, but far below the initial levels. Hallway decreased by about 67%, the outside remained about the same.

On 10/28/21, the levels in Room 203 increased by about 14%, but far below the initial levels, the hallway levels and the outside increased by about 3x.

On 10/29/21, the total particle count in Rm 203 increased by about 33% from the previous day, but far below the initial levels, the hallway increased by 22%, outside by 27%. Day 5 totals were 80% lower than the initial levels.

OVERVIEW:

The RPC counts remained reduced significantly during the term of this study even though there was some daily fluctuation to environmental levels which would be typical. Total RPC levels in Room 203 from day 2 on were classified as low.



8. Ozone (O3)

Room 203 O3 Levels ranged between 0.000 ppm.to .028 ppm over the 5-day tracking period.

Day 1- 0.000 ppm. inside (Room 203), 0.018 ppm. outside

Day 2- 0.021 ppm. inside, 0.019 ppm outside

Day 3- 0.024 ppm. inside, 0.022 ppm outside

Day 4- 0.028 ppm. inside, 0.020 ppm outside

Day 5- 0.014 ppm. inside, 0.040 ppm outside

NOTE: No ozone production was indicated. Ozone background levels are typically 25 to 40 ppb.
The current indoor TLV TWA for ozone is 0.1 ppm. Ozone has a 20 minute half life in air.

8. Odor Intensity

Daily readings were taken for odor intensity using the KANOMAX technology.

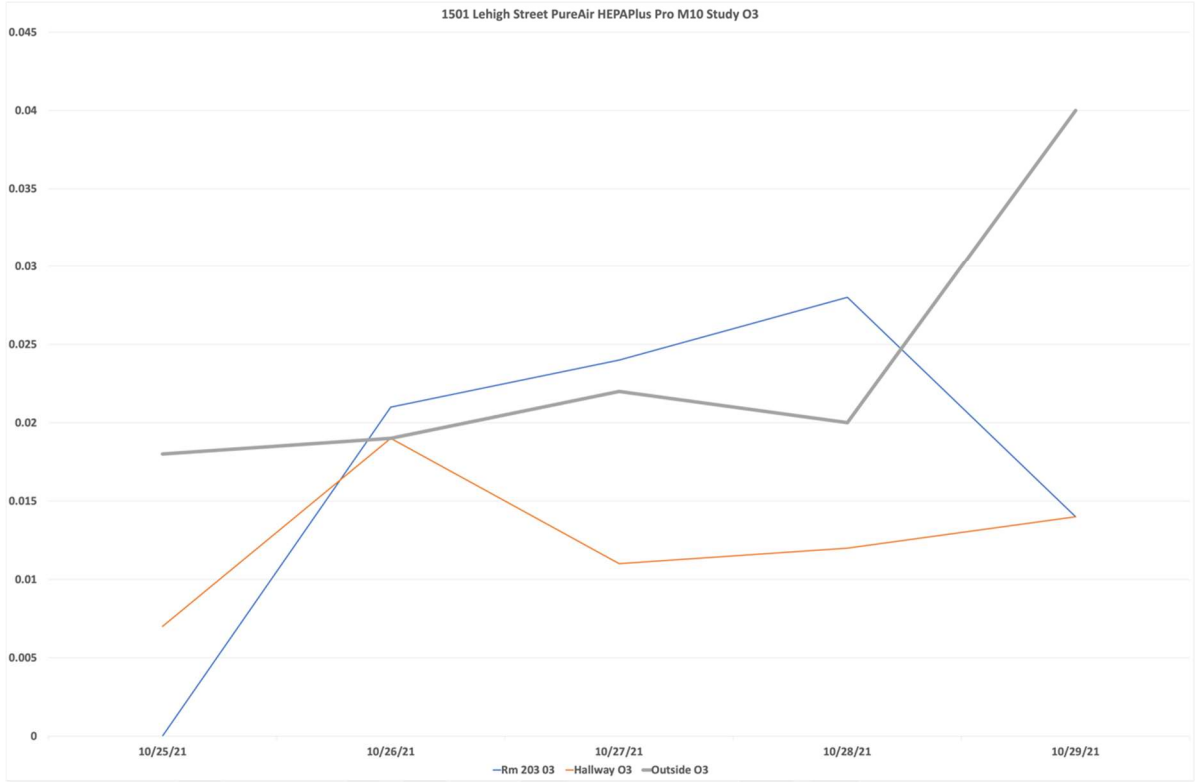
Only on Day1 was a reading of 3 registered, the remaining 4 days were at 0.

9. RH%/Temperature

Inside RH% ranged between 38.9% to 83.8% % on day 2. *This appeared to have an impact on the reduction rate of the viable microbials measured as described in 2. Particle Impactor Air Sampling.*

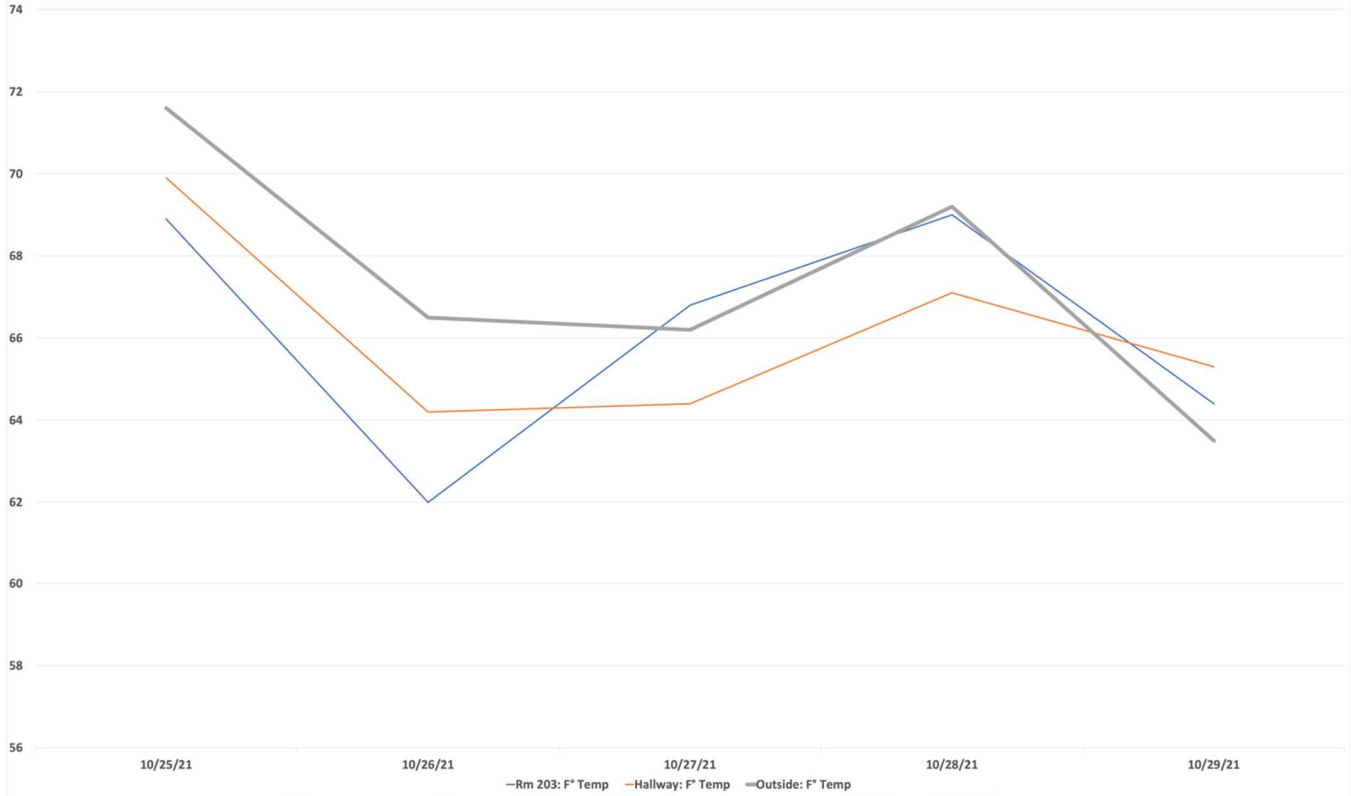
Inside Temperatures ranged between 62.0 to 69.0 degrees Fahrenheit, slighter cooler than the typical range recommended by ASHRAE. This was impacted by cooler levels outside and decreased HVAC function.

NOTE: *Indoor RH% at 50% is currently considered the optimum level to still minimize virus and disease transmission.*





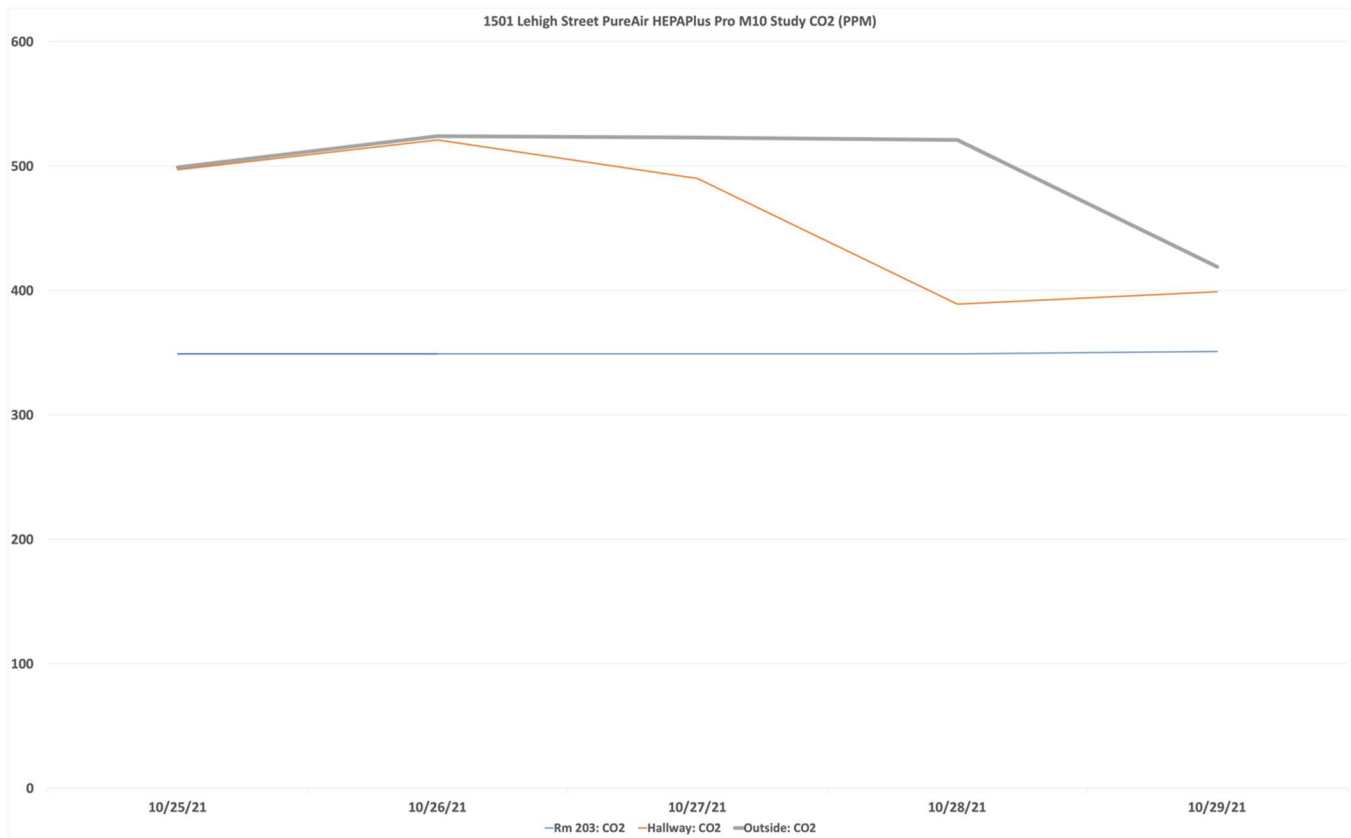
1501 Lehigh Street PureAir HEPAPlus Pro M10 Study F° Temp



10. Carbon Dioxide- Co2

Co2 levels ranged between 349 to 351 ppm during the study. These were actually below the outside levels.

NOTE: The current recommended exposure level to minimize the spread of virus and disease is < 800 ppm. Higher Co2 also serves to increase the photo oxidation process of formaldehyde.



Overview of measurable Results:

(See study text for more definitive data)

1. **Mold Spore count reduction.** In both settings an overall reduction > 99.9% was recorded. The MERV 10 HVAC filter would remove about 95% of the spore count so there appeared to be an additional efficacy from the combined technology of about 4-5% under continuous operation. The level of 7 s/m³ inside room 203 would be classified as only a trace level.
2. **Viable Mold and Bacteria.**
Airborne:
 Viable Mold was reduced by 57% on the lower setting with minimal .6 air turns per hour and >99.9% on the higher fan setting of 230 cfm. or 1.3 AT/Hr.
 Viable bacteria was reduced by 94.4% at the lower cfm rate and > 99.9% overall reduction by day 5.
Surface:
 Viable molds were reduced by 41% in the lower mode and 17.6% increase overall by day 5.
 Viable bacteria decreased by 41% in the lower mode but reduced by > 99.9% overall by day 5.
 NOTE: On day 2 the relative humidity spiked to 83.3% due to outdoor rainy weather and high winds. This caused an elevated water surface activity level on the register surface sampled that promoted mold growth. Fungi lose viability at a slower rate than bacteria due to the mycelial structure they contain.
3. **TO-15 TVOC results(Qualitative and Quantitative results)**
 In the lower mode, a 73% reduction of TVOCs was recorded. No new compounds were created. After the higher mode, the TVOC level decreased overall by 71%. That lowered level would indicate that only trace levels of airborne chemical compounds were still present.
4. **TVOC and HCHO results. (by electrochemical sensor devices)**
 In the lower mode, TVOCs were reduced by > 99.9%, HCHO > 99.9%
 These levels were maintained throughout the remainder of the study.
5. **HCHO (by passive badge collection).**
 A reduction of > 99.9% was achieved after 24 hours and the levels sustained below the typical outdoor background levels throughout the duration of the study.
6. **PM 2.5 / PM 10.0**
 A significant reduction after 24 hours was recorded between an 80 to 87% decrease respectively. That level of decrease was maintained for the duration of the study.
7. **RPC (Particle dust counts)**
 In the lower mode, a 90% reduction was recorded.
 Over the duration of the study, RPC levels fluctuated as did the control area levels, but at a lesser rate of fluctuation. .Day 5 totals were reduced by 80% from the initial and 64% lower than outside. fan speed, the levels spiked by about 4x from the previous day.
8. Ozone levels were recorded between 0.000 ppm and 0.28 ppm. These are minimal levels well below the established TLV TWA of 0.1 ppm.
9. The relative scale for odor detection was reduced to 0 from 3 in 24 hours. This is a very low odor threshold.
10. **Temperature and Relative Humidity** were both within normal ranges during the study except on day 2 where RH% spiked and temperatures dropped to 62 degrees Fahrenheit. This did impact the reduction rate of the viable microbials measured as defined in that section of this study.
11. **Carbon Dioxide levels** were normal inside during the study, between 349 to 351 ppm. These levels were below the indoor and outdoor control levels.

It is my considered opinion and observation that

Over the duration of this study, with the expected environmental fluctuations that occurred in a real time setting, the levels of contaminants and environmental factors monitored, indicate that this combined technology coupled with a MERV 10 HVAC filter at minimal air turns per hour, produced results that substantiate an overall high degree of efficacy was achieved. This high rate of efficacy was achieved within the first 24 hours of operation even at lower air turn rates. This would not be expected or typical.

PURE AIR HEPA PLUS PRO w/ MERV 10 HVAC FILTER

Authorized Signature

Keith Roe CIE/CMC

Date submitted: 11/12/21

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