

Weitzman Group Testing Protocols

Objectives:

An infield evaluation of the GTE PTAC unit as to measurable results and overall impact to indoor air quality. More specifically the reduction of surface mold growth within the PTAC unit and resultant viable spore count within the room and on the PTAC surface. The rooms have an operating PTAC unit for the source of heating, cooling and minimal fresh air. These older units have been the source of advanced mold growth and require continual cleaning efforts to control mold growth. Some rooms have continuously operating Dehumidifiers to lower indoor relative humidity levels.

Location:

DeSales University – Duchantal dorm, rooms 104 and 121.

Project start: April 30th to May 17th, 2021.

Conducted by: Keith Roe, CIE/CMC, Advanced IAQ Solutions, Inc and observed by Dennis Rasley, Dir. of Occupational safety and Health.

Testing Environments:

Room 104 is a single occupancy room approx. 220 sq.ft. with attached bathroom. The room also has a functioning freestanding dehumidifier. The PTAC unit was set to operate at a temperature of around 72 degrees F. The PTAC unit was inspected and found to be moderately soiled with an impacted metal mesh prefilter. This filter was removed and cleaned by Mr. Rasley to allow proper air flow into the PTAC unit. The door to the bathroom and hallway typically remains closed.

Room 121 is a similarly sized room that is vacant and the PTAC was set to run continuously. This prefilter was a fiber filter that was also impacted and also cleaned to allow proper air flow. No other parts of the PTAC unit were cleaned or sanitized.

Location of the GTE PTAC units:

These units were installed easily plugged into the adjacent wall outlet and located out of sight below the prefilter directly below the fan and coil so that the unit was bathed in the AOP emissions via the conditioned air flow. The air stream out of the top of the unit was tested using a Lutron UVC Light Meter UVC-254SD UVC and no detectable UVC emission was occurring into the room.



Definitions of Technology:

The GTE PTAC unit contains ARC (Active Radiant Catalysis) which is the GTE proprietary form of UVC-PCO. That is the use of a broad-spectrum UV lamp that is encased in a quad-metallic catalyst containing 15x the exposure surface than similar UVC devices. This produces continuous air/ surface disinfectant with purifying hydroxyl emissions through a continuous AOP (advanced oxidation process). Combined with BPI technology, negative ions are also produced in a continuous streaming process through the PTAC air flow and into the indoor environment. This creates an electrostatic charge to the harmful particulates, causing them to drop out of the breathing space.

Testing Protocol Menu

1. Spore Trap Mold Testing:

150 liter air samples were taken before the installation and at the end of the testing period in the test subject rooms, in the adjacent hallway and outside. These samples were analyzed by AEML Labs for total spore count identified by each mold genus. (see Addendum A for further details).

2. Particle Impactor Sampling:

These air samples were taken in the same locations and submitted to EMSL Analytical for culture and identification of *viable* mold spores that are capable of reproduction given the necessary moisture and growth host. This is a primary source of the sporal matter being into released into the indoor environment. (see Addendum A for further details)

3. Surface Sampling: Swab sample method

These surface samples were taken before and after the installation, swabbed on the base of the AC coils and bottom of the blower fan housing from a 4 sq.in. infected surface using a sterile Stuart transport swab. These were analyzed for viable mold spores identified by genus and species at EMSL Analytical. (further detail in Addendum A)

4. 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 each day as Keith visited with Dennis as he supervised the project. The TVOC reading that this unit provides is representative of multiple airborne compounds that were present simultaneously.

The HCHO (formaldehyde), a common indoor contaminant used in many products and disinfectants, was also monitored and the readings are part of the integrated results and are reported separately. These total results were reported in mg/m³. (milligram per cubic meter) providing very low detection levels.

5. 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 using a calibrated TemTop model LKC-1000 laser detector with a high precision electrochemical sensor.

6. Respirable (dust) Particle Counts:

Airborne particle sizes are measured in microns. Usually 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, 5.0 and 10.0 microns were measured before, during and upon completion of the project.

Findings:

1. Spore Trap Test Results

Reference AEML report # 318397, dated 4/30/21.

These air samples were taken prior to the installation of the GTE PTAC unit.

Sample #314716, the outside spore total was reported for that day at 1,107 s/m³.

Sample # 314686, Room 104 at 60 s/m³ or 5.4% of the total outside.

Samples 314696, 314701, Room 121 and the hallway were reported at 160 s/m³ or 14.4% of the outdoor total.

Reference AEML report # 320749, dated 5/17/21

These air samples were taken the last day of the project.

Sample # 314693, the outside spore count was reported on that day at 3,947 s/m³.

Sample # 314690, Room 104 was reported at 0 s/m³.

Sample # 314692, Room 121 was reported at 87 s/m³ or at 0.2% of the outside control, a reduction of 73 s/m³ or 46% to initial spore level.

Sample # 314683, hallway was reported at 133 s/m³ compared to 160 s/m³ initially. A reduction of only 27 s/m³ or only 17% in the untreated space.

2. Particle impactor sampling Results

Reference EMSL report # 372106495, dated taken on 4/30/21

Sample 0001- Outside, the outside mold count was reported at 714 CFU/M³ (colony forming units per cubic meter of air) on that day, comprised of 7 different fungal types.

Sample # 0002- Room 104, was reported at 287 CFU/M³ with 13 different mold species reported as viable.

Sample # 0003, Room 121, was reported at 434 s/m³ with 11 different viable fungal species present.

Sample # 0004- Hallway, was reported at 357 CFU/m³ with 10 different viable species present.





Reference EMSI report # 372107508, date taken on 5/17/21

No outside sample was available that day due to rainfall.

Sample # 0003, room 104, was reported at only 21 CFU/m³, with only 3 different fungal species.

A reduction of 266 CFU/M³ or 72% from the initial levels.

Sample # 0004- Room 121, was reported at 147 CFU/m³ with only 2 different species of viable fungi available. *A reduction of 287 CFU/m³ or 67% from the initial levels.*

Sample # 0005- Hallway, was reported at 49 CFU/m³. *A reduction of 308 CFU/m³ or 72%.*

3. Surface sample Results:

Reference EMSL report # 372106495, dated 4/30/21

Sample S1, Room 104 PTAC (coil surface), was reported to contain 150 CFU/sq.in of 4 different viable fungal species on the surface.

Sample S2, Room 104 room surface. No viable fungal species were reported in that sample that was taken on the top of the bathroom doorway

Sample S3, Room 121 PTAC (coil surface), was reported to contain 225 CFU/sq.in. of 3 different viable species of Fungi.

Sample S4, Room 121 surface, was reported to contain 50 CFU/sq.in. of 2 different viable fungal species.

Reference EMSL report # 372107508

NOTE: No additional samples were taken of the room surfaces since initial levels were either nonexistent or below expected environmental levels. The rooms receive a regular housekeeping regimen.

Sample # 0001, Room 104 PTAC unit sample was reported to have 0 viable fungal species remaining. This sample was taken from an infected area adjacent to where the initial sample was taken.

Sample 0002- Room 121 PTAC unit sample was reported to have 0 viable fungal species remaining.

4. TVOC and HCHO reading results:

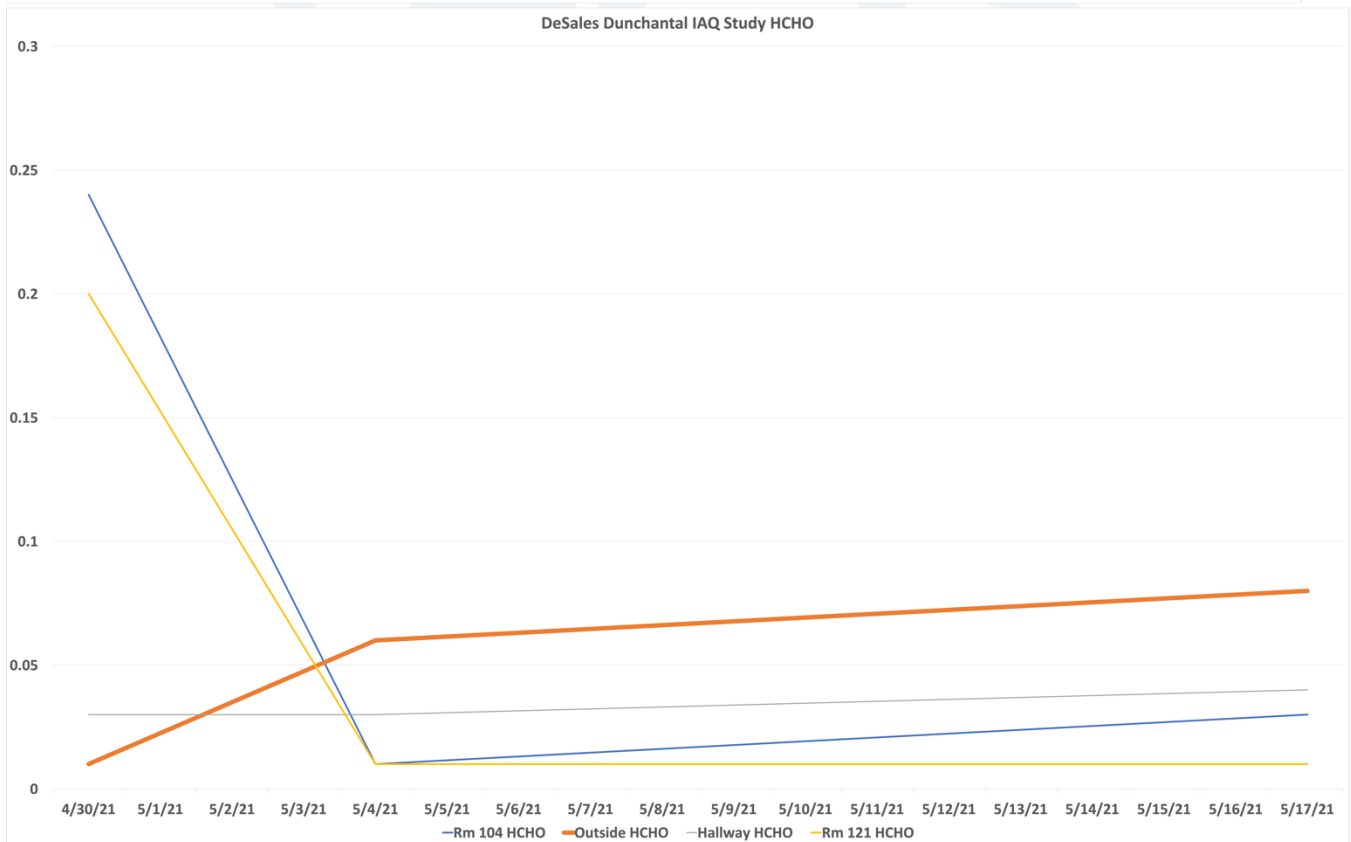
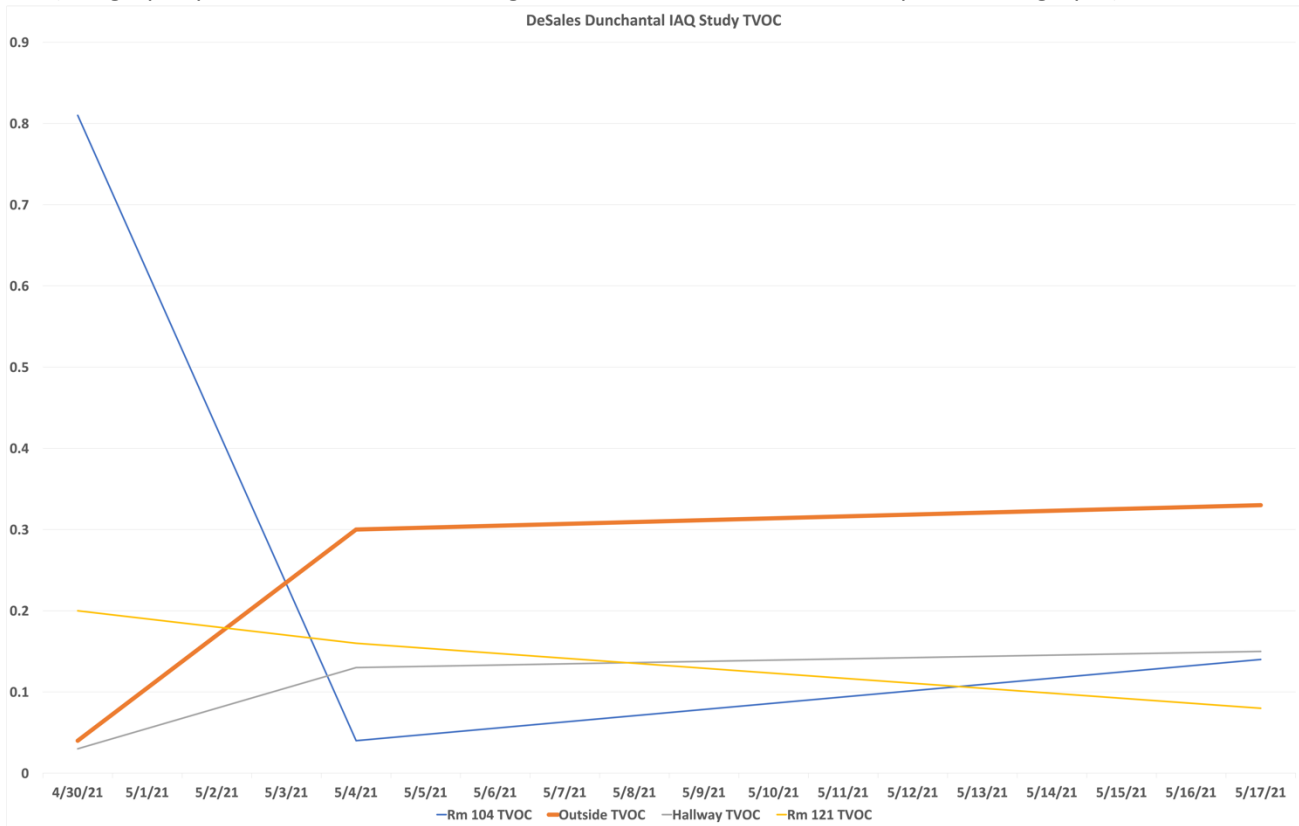
On 4/30/21, the TVOC and HCHO readings in both rooms exceeded the outside control sample levels by approximately 20 times. The hallway levels also exceeded the outside control.

These conditions were rated as “unhealthy” by the calibration of the TemTop meter. **Each time additional readings were taken prior to the end of the study, both room levels had dropped more than 90% and consistently below the indoor and outdoor control levels, now classified as “healthy.”**





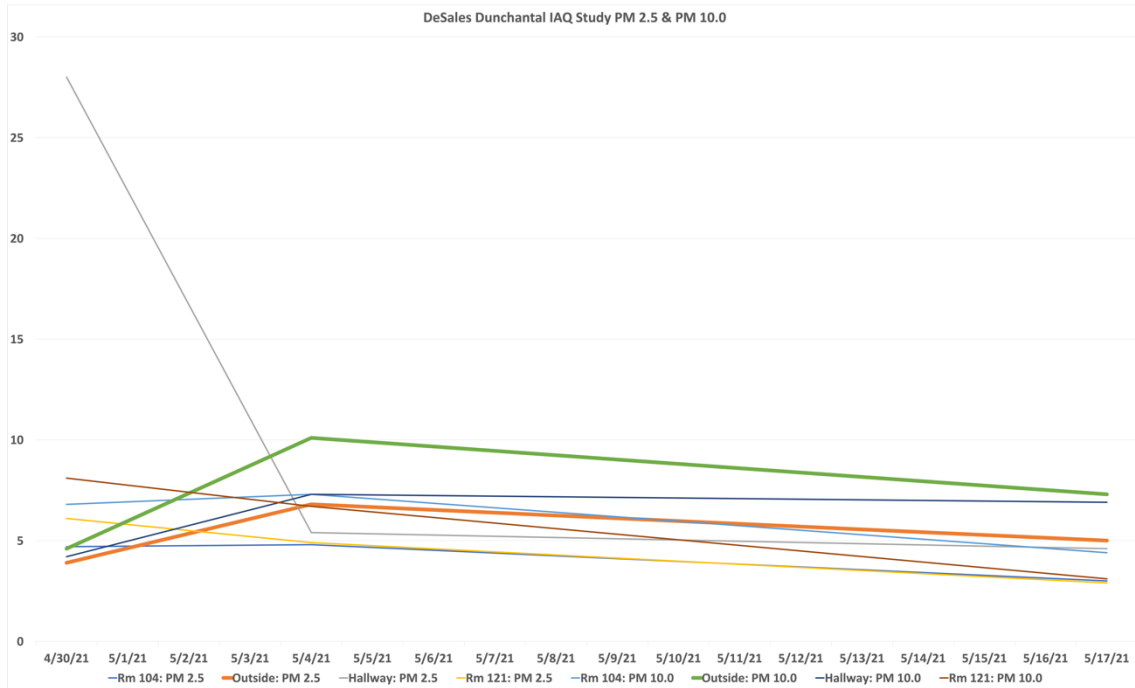
(see graphs provided, the thicker orange line is the outside control sample in each graph.)





5. PM 2.5/PM 10.0

On 4/30/21, The PM levels inside both rooms exceeded the outdoor control sample. **Each time additional readings were taken, the particle levels in both rooms were reported significantly below the outside control level being reduced by more than 50%.**

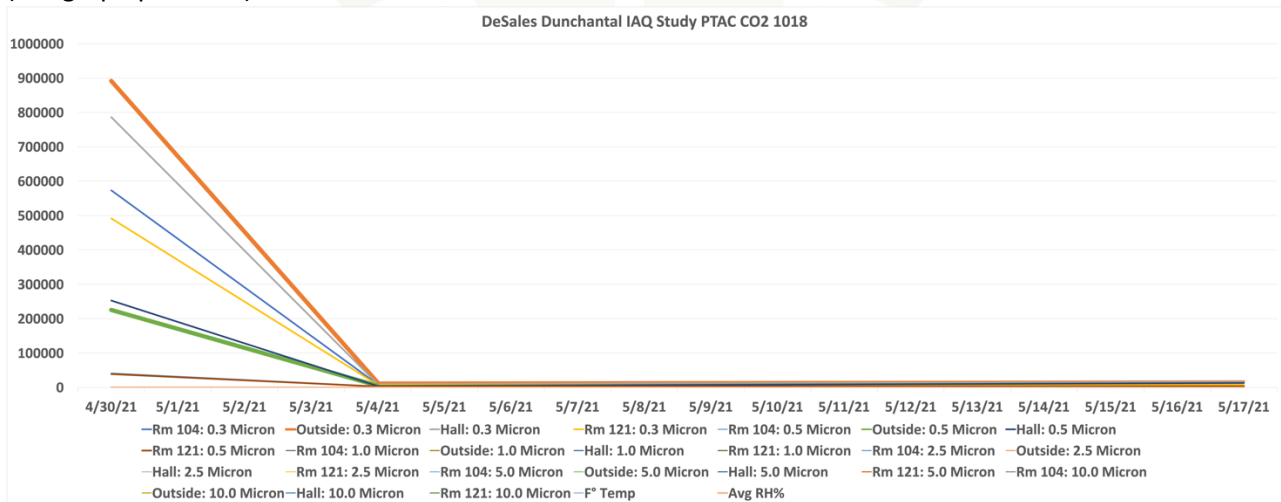


6. Respirable Dust Count Results:

On 4/30/21 it was a very windy day and RPC counts were very elevated everywhere. The collective indoor particle count totals in both rooms and hallway were below the outside levels on that day.

At both times additional readings were taken, the indoor particle counts in each room remained below outside levels but at an increased margin of approx. 50%.

(see graph provided)



Summary of Observations:

It was determined by accepted and validated testing methods and subsequent 3rd party lab analysis, that the continuous use of the GTE PTAC unit did completely remove the viability of mold spores found on the fan housing and coil surfaces of the two PTAC units. These results were the same whether the PTAC unit was operated continuously as it was in the unoccupied room or as to temperature demand in the occupied room. The total mold spore counts in each room were also significantly reduced from previous levels and in comparison to the indoor and outdoor control levels. This was based on grab samples taken on the last day of operation.

Reductions in the [PM2.5,PM10.0](#) ,HCHO and Respirable dust particles were also recorded reducing them to untypically lower levels well below any known or established exposure level.

It would be my considered opinion that this PTAC unit would serve as an effective deterrent to mold growth on and in the PTAC unit tested. This would also be expected to produce a sustained and improved overall indoor air quality within the serviced areas.

Authorized Signature
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Date submitted: 06/07/21

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