

Scientific Air Solution



airPHX Companies
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McLean, VA 22101

October 23 2019

Pre and In-Treatment Air and Surface Report – University [REDACTED] ATR

A. Summary – Air Samples

Pre and in-treatment air samples results given below.

Sample Date	Treatment	Number of samples	Location	Average (cfu/m ³)	Range	Standard Deviation	% Reduction
08/21/19	Pre	14	Various	838	0/1,500	398.8	-
10/10/19	In			71	0/133	43.3	91.5
08/21/19	Pre	2	Hydro	650	567/733	83.3	-
10/10/19	In			283	267/300	16.7	56.5
08/21/19	Pre	2	Exterior	2,767	2,667/2,867	100.0	-
10/10/19	In			2,783	2,667/2,900	116.7	+ 0.6

Background

All air samples were taken via the MB-1 air sampler, 30 liters per sample throughout the various locations given above with results normalized to colony forming units per cubic meter of air (cfu/m³).

Given below are the airborne organisms found in the above locations for this **pre-treatment** sampling, excluding the outside samples.

Species	Raw Count	Species	Raw Count
<i>Penicillium, aspergillus types</i>	3,700	<i>Penicillium purpurogenum</i>	705
<i>Aspergillus fumigatus</i>	2,050	<i>Basidiospores spp</i>	635
<i>Penicillium purpurogenum</i>	1,516	<i>Absidia, spp</i>	420
<i>Cladosporium sphaerospermum</i>	850	<i>Mortierella, spp</i>	300

Noted below are the airborne organisms found in the above locations for this **in-treatment** sampling, excluding the outside samples.

Species	Raw Count	Species	Raw Count
<i>Penicillium, aspergillus types</i>	515	<i>Penicillium purpurogenum</i>	95
<i>Aspergillus fumigatus</i>	467	<i>Firmicutes spp</i>	< 5
<i>Penicillium brevicompactum</i>	355	<i>Absidia spp</i>	< 5
<i>Penicillium purpurogenum</i>	126	<i>Ulocladium chartarum</i>	< 5

08/21/19 - Pre-treatment bioburden in the above locations are somewhat > 300 cfu/m³ which is not acceptable and needs corrective action.

10/10/19 - In-treatment results shows **91.5% decrease** in bioburden and now are < 100 cfu/m³ is considered **clean and acceptable**, per the Target Air Quality Guide.

- The hydro sampled areas are out of the direct airPHX treatment area has seen the “halo effect” from the treatment area showing **56.5% reduction**.

Observations

The exterior air samples ranged from **2,667 to 2,900 cfu/m³** and reveals that most of the bioburden is attributed to the outside air. The airPHX units are having a noticeable impact on reducing the bioburden.

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Target Air Quality

Air quality scale for workplaces, public buildings, schools, and homes are as follows:

- $< 100 \text{ cfu/m}^3$ is considered **clean and acceptable**.
- $100 \text{ to } 300 \text{ cfu/m}^3$ is **marginal**.
- $> 300 \text{ cfu/m}^3$ is **not acceptable** and needs corrective action.

In most cases, air quality $< 100 \text{ cfu/m}^3$ has shown a decrease in the overall bioburden and odors.

Predominant Microorganisms

Although the predominant organisms noted in this report are fungi, previous testing results show bacteria, viruses and protozoa are eliminated as effectively as fungi. The reactive oxygen species (ROS) generated is effective on gram +, gram – bacteria, protozoa, spores and viruses.

B. Summary – Surface Contact Swabs

Pre and in-treatment surface (swab) samples results given below.

Sample Date	Treatment	Number of samples	Location	Average (cfu/cm ²)	Range	Standard Deviation	% Reduction
08/21/19	Pre	7	Various	42.4	28.5/75.0	16.2	-
10/10/19	In			1.8	1.0/4.3	1.2	95.8
08/21/19	Pre	1	Neg. Control	0	0/0	-	-
10/10/19	In			0	0/0	-	-

08/21/19 - Pre-treatment contact swab results from the various locations are sizeably $> 5 \text{ cfu/cm}^2$ which is considered not acceptable and needs corrective action.

10/10/19 - In-treatment results show a **95.8% reduction** from the various locations are now $< 5 \text{ cfu/cm}^2$ and considered **clean and acceptable**, per the Target Contact Swab Quality guide.

Target Contact Surface Quality

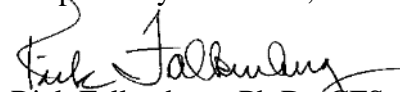
Contact surface quality scale for workplaces, public buildings, schools, and homes are as follows:

- $< 5 \text{ cfu/cm}^2$ is considered **clean and acceptable**.
- $5 \text{ to } 10 \text{ cfu/cm}^2$ is considered **marginal**.
- $> 10 \text{ cfu/cm}^2$ is considered **not acceptable** and needs corrective action.

In most cases, surface swabs $< 5 \text{ cfu/cm}^2$ has shown a decrease in the overall bioburden and odors.

Please contact me if there are questions or if further information is needed.

Respectfully submitted,


Rick Falkenberg, Ph.D., CFS
Senior Principal Scientist

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Table #1
University [REDACTED] ATR
10/10/19 In-treatment Air Sample Results - CFU/m³

In-treatment 10/10/2019 U [REDACTED] ATF						
Plate Lot No.	Air Sample Location	Air Sample Location	Liters of Air	Raw Count	Corrected Count	CFU/m ³
2181	Ctrl	Unopened	0	0	0	0
2182	1		30	4	4	133
2183	2		30	3	3	100
2184	3		30	4	4	133
2185	4	Turf	30	1	1	33
2186	5		30	0	0	0
2187	6		30	1	1	33
2188	7		30	2	2	67
2189	8		30	3	3	100
2201	9		30	0	0	0
2202	10	[REDACTED] office	30	1	1	33
2205	13	Hall	30	3	3	100
2206	14	Hall	30	3	3	100
2207	15	Hall	30	3	3	100
2208	16	Exam	30	2	2	67
2203	11	Hydro	30	9	9	300
2204	12	Hydro	30	8	8	267
2694	17	Exterior	30	69	80	2,667
3001	18	Exterior	30	72	87	2,900

Avg 71 High 133

Low 0 SD 43.4

Avg 283 High 300

Low 267 SD 16.7

Avg 2,783 High 2,900

Low 2,667 SD 116.7

Total Adjusted Raw Count 30

Total CFU/m³ 1,567

Table #1, continue
University [REDACTED] ATR
08/21/19 Pre-treatment Air Sample Results - CFU/m³

Pre-treatment 08/21/2019 U [REDACTED] ATF						
Plate Lot No.	Air Sample Location	Air Sample Location	Liters of Air	Raw Count	Corrected Count	CFU/m ³
2181	Ctrl	Unopened	0	0	0	0
2182	1		30	27	29	967
2183	2		30	22	23	767
2184	3		30	25	27	900
2185	4	Turf	30	30	32	1,067
2186	5		30	26	28	933
2187	6		30	23	24	800
2188	7		30	27	29	967
2189	8		30	41	45	1,500
2201	9		30	23	24	800
2202	10	[REDACTED] office	30	12	12	400
2205	13	Hall	30	27	29	967
2206	14	Hall	30	19	20	667
2207	15	Hall	30	11	11	367
2208	16	Exam	30	18	19	633
2203	11	Hydro	30	21	22	733
2204	12	Hydro	30	16	17	567
2694	17	Exterior	30	75	80	2,667
3001	18	Exterior	30	71	86	2,867

Avg 838 High 1,500

Low 367 SD 273.4

Avg 650 High 733

Low 567 SD 83.3

Avg 2,767 High 2,867

Low 2,667 SD 100.0

Total Adjusted Raw Count 352

Total CFU/m³ 13,033

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Table #2
University [REDACTED] ATR
10/10/19 In-treatment Surface Sample Results – CFU/cm²

In-treatment 10/10/2019 U [REDACTED] ATR					
Room	Swab Number	Surface Swab Sample Location	10x10x10 cm	Raw Count	CFU/cm ²
N/A	CTRL	Swab not removed from container	0	0	0
Surface	1	Turf - 1st hash	10x10x10	105	1.1
Surface	2	End training table	10x10x10	310	3.1
Surface	3	Midde counter	10x10x10	425	4.3
Surface	4	[REDACTED] desk	10x10x10	115	1.2
Surface	5	Exam table #1	10x10x10	110	1.1
Surface	6	Taping table	10x10x10	95	1.0
Surface	7	Turf #2 last hash	10x10x10	98	1.0

Avg 1.8 Max 4.3
Min 1.0 SD 1.23

Total Adjusted Raw Count 1,258
Total CFU/cm² 13

Table #2, continued
University [REDACTED] ATR
08/21/19 Pre-treatment Surface Sample Results – CFU/cm²

Pre-treatment 08/21/2019 U [REDACTED] ATR					
Room	Swab Number	Surface Swab Sample Location	10x10x10 cm	Raw Count	CFU/cm ²
N/A	CTRL	Swab not removed from container	0	0	0
Surface	1	Turf - 1st hash	10x10x10	3,500	35.0
Surface	2	End training table	10x10x10	5,850	58.5
Surface	3	Midde counter	10x10x10	7,500	75.0
Surface	4	[REDACTED] desk	10x10x10	3,650	36.5
Surface	5	Exam table #1	10x10x10	3,410	34.1
Surface	6	Taping table	10x10x10	2,850	28.5
Surface	7	Turf #2 last hash	10x10x10	2,950	29.5

Avg 42.4 Max 75.0
Min 28.5 SD 16.21

Total Adjusted Raw Count 29,710
Total CFU/cm² 297



Table #3
University [REDACTED] ATR
10/10/2019 In-treatment Air Sample Pictures

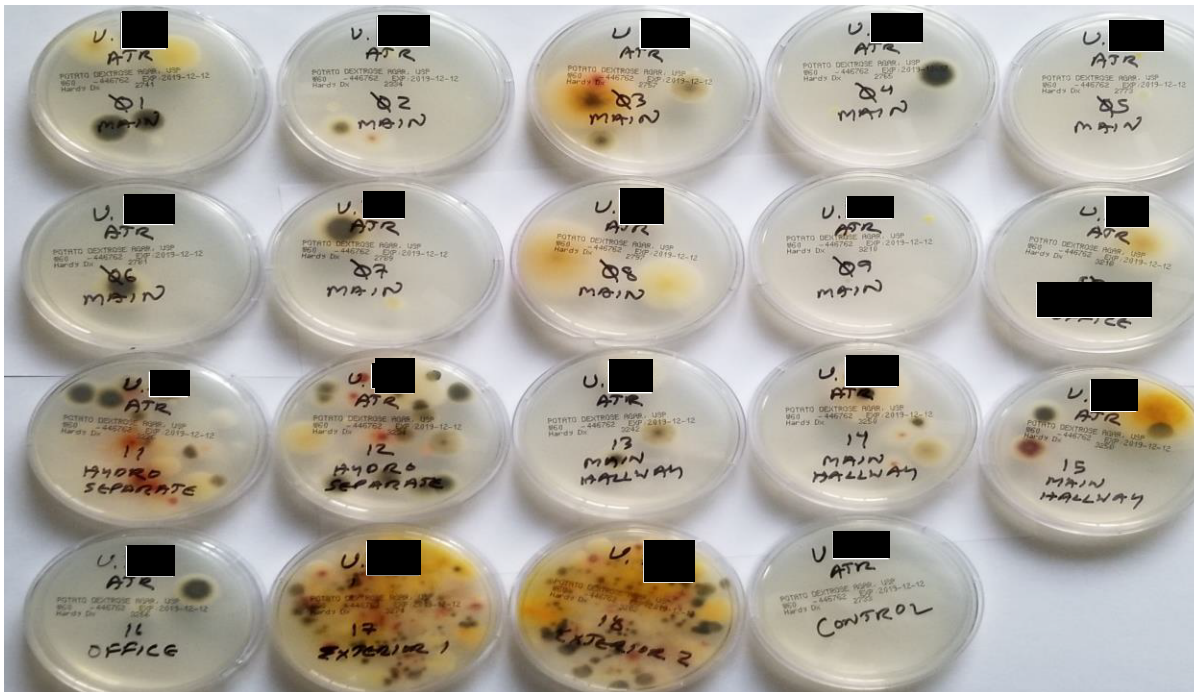
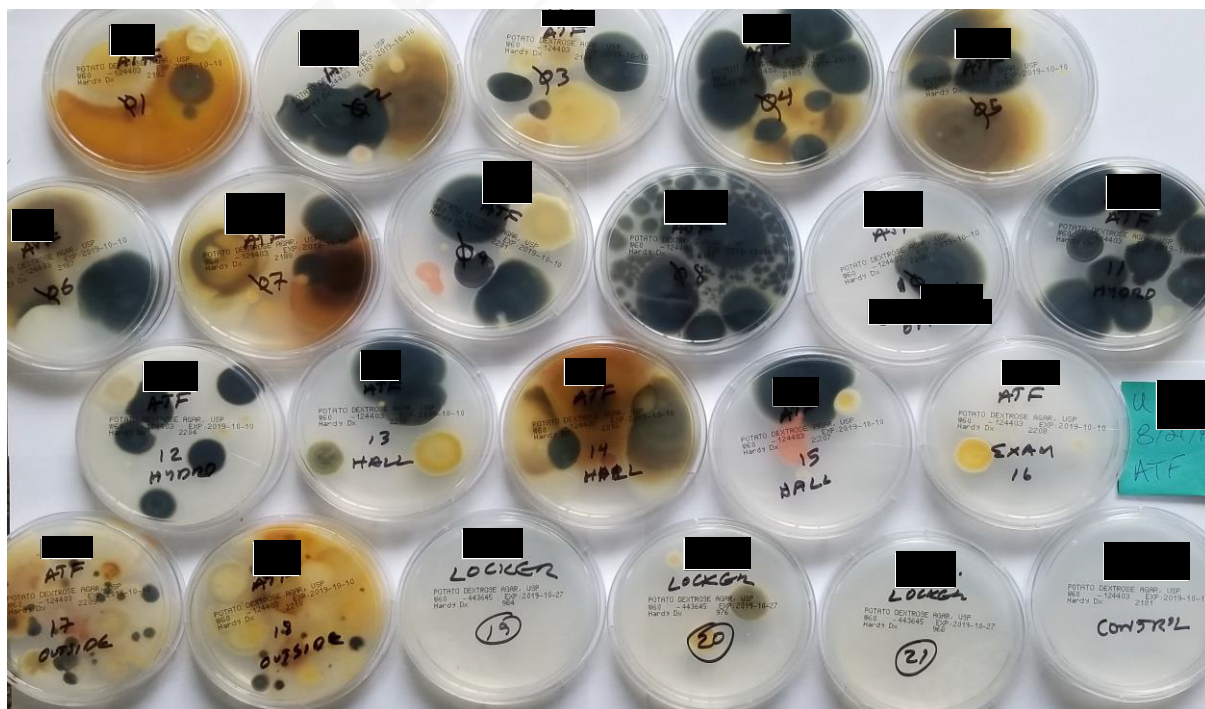


Table #3, continued
University [REDACTED] ATR
08/21/2019 Pre-treatment Air Sample Pictures



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Table #4
University [REDACTED] ATR
10/10/19 and 08/21/19 Pre and in-treatment Air and Surface Swab Locations

