

Scientific Air Solution



airPHX Companies
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November 13 2019

Pre and In-Treatment Air and Surface Report – University ██████ – Football 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
08/15/19	Pre	13	Various	367	33/633	165.9	-
11/05/19	In			49	0/100	36.1	86.6
08/15/19	Pre	2	Hydro	350	333/367	16.7	-
11/05/19	In			117	100/133	16.7	66.6
08/15/19	Pre	2	Exterior	1,633	1,600/1,667	33.3	-
11/05/19	In			1,617	1,567/1,667	50.0	1.0

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 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>	1,150	<i>Cladosporium sphaerospermum</i>	625
<i>Penicillium brevicompactum</i>	1,005	<i>Ulocladium chartarum</i>	532
<i>Aspergillus fumigatus</i>	906	<i>Absidia spp</i>	329
<i>Penicillium purpurogenum</i>	715	<i>Firmicutes spp</i>	205

Noted below are 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>	322	<i>Cladosporium sphaerospermum</i>	< 5
<i>Penicillium brevicompactum</i>	240	<i>Ulocladium chartarum</i>	< 5
<i>Aspergillus fumigatus</i>	210	<i>Absidia spp</i>	< 5
<i>Penicillium purpurogenum</i>	95	<i>Firmicutes spp</i>	< 5

08/15/19 - Pre-treatment bioburden in the above locations are > 300 cfu/m³ which is not acceptable and needs corrective action.

11/11/19 - In-treatment results show an **86.6% decrease** from the 08/15/19 pre-treatment samples and now are < 100 cfu/m³ which is considered **clean and acceptable**.

- The Hydro area which is out of the direct airPHX treatment area has seen the “halo effect” from the treatment area and is showing a **66.6% reduction** from the 08/15/19 pre-treatment samples.

Observations

The exterior air samples ranged from **1,576 to 1,667 cfu/m³** and reveals that most of the bioburden is attributed to the outside air. The airPHX unit is 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 to 300 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
08/15/19	Pre	10	Various	58.8	26.5/95.0	23.0	-
11/05/19	In			3.8	3.0/4.5	0.60	93.5
08/15/19	Pre	1	Negative Control	0	0/0	-	-
11/05/19	In			0	0/0	-	-

08/15/19 - Pre-treatment contact swab results from the various locations are considerably $> 5 \text{ cfu/cm}^2$ which is considered not acceptable and needs corrective action.

11/05/19 - In-treatment contact swab results reveal a 93.5% reduction from the Pre-treatment samples from the same locations which are now $< 5 \text{ cfu/cm}^2$ and are considered **clean and acceptable**.

Target Contact Surface Quality

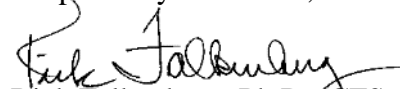
Contact surface quality scale for workplaces, public buildings, schools, and homes are as follows:

- $< 5 \text{ cfu/cm}^2$ is considered **clean and acceptable**.
- 5 to 10 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] – Football ATR
11/05/19 In-treatment Air Sample Results - CFU/m³

In-treatment 11/05/2019 [REDACTED] ATF						
Plate Lot No.	Air Sample Location	Air Sample Location	Liters of Air	Raw Count	Corrected Count	CFU/m ³
2755	Ctrl	Unopened	0	0	0	0
2763	1	ATR	30	2	2	67
2771	2	ATR	30	3	3	100
2779	3	ATR	30	1	1	33
2787	4	ATR	30	0	0	0
2317	5	ATR	30	0	0	0
2795	6	ATR	30	2	2	67
2308	7	ATR	30	1	1	33
2309	8	ATR	30	1	1	33
2310	9	ATR	30	1	1	33
2311	10	ATR	30	2	2	67
2312	11	ATR	30	3	3	100
2313	12	ATR	30	3	3	100
2314	13	ATR	30	0	0	0
2315	14	Hydro	30	4	4	133
2316	15	Hydro	30	3	3	100
1890	17	Exterior	30	42	47	1,567
1891	18	Exterior	30	45	50	1,667

Avg 49 High 100

Low 0 SD 36.1

Avg 117 High 133

Low 100 SD 16.7

Avg 1,617 High 1,667

Low 1,567 SD 50.0

Total Adjusted Raw Count 23

Total CFU/m³ 867

Table #1, continued
University [REDACTED] – Football ATR
08/15/19 Pre-treatment Air Sample Results - CFU/m³

Pre-treatment 08/15/2019 [REDACTED] ATF						
Plate Lot No.	Air Sample Location	Air Sample Location	Liters of Air	Raw Count	Corrected Count	CFU/m ³
2755	Ctrl	Unopened	0	0	0	0
2763	1	ATR	30	10	10	333
2771	2	ATR	30	12	12	400
2779	3	ATR	30	11	11	367
2787	4	ATR	30	9	9	300
2317	5	ATR	30	15	1	33
2795	6	ATR	30	10	10	333
2308	7	ATR	30	11	11	367
2309	8	ATR	30	9	9	300
2310	9	ATR	30	13	3	100
2311	10	ATR	30	18	19	633
2312	11	ATR	30	14	14	467
2313	12	ATR	30	15	16	533
2314	13	ATR	30	17	18	600
2315	14	Hydro	30	19	11	367
2316	15	Hydro	30	18	10	333
1890	17	Exterior	30	43	48	1,600
1891	18	Exterior	30	45	50	1,667

Avg 367 High 633

Low 33 SD 165.9

Avg 350 High 367

Low 333 SD 16.7

Avg 1,633 High 1,667

Low 1,600 SD 33.3

Total Adjusted Raw Count 154

Total CFU/m³ 5,467

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Table #2

University [REDACTED] – Football ATR
11/05/19 In-treatment Surface Sample Results – CFU/cm²

In-treatment 11/05/2019 [REDACTED] ATF					
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	Front door, outside handle	10x10x10	300	3.0
Surface	2	Counter top in front of bandages outside room 171	10x10x10	410	4.1
Surface	3	Dumbbell rehab - yellow cowbells	10x10x10	320	3.2
Surface	4	Taping table	10x10x10	445	4.5
Surface	5	Equipment room counter	10x10x10	415	4.2
Surface	6	Hydro room - counter under TV	10x10x10	360	3.6
Surface	7	Room 172 A cabinet far left corner	10x10x10	355	3.6
Surface	8	Room 167 - mouse pad	10x10x10	295	3.0
Surface	9	Athletic trainer's office chair	10x10x10	420	4.2
Surface	10	Ice room - ice machine	10x10x10	450	4.5
<div> <div>Avg 3.8 Max 4.5</div> <div>Min 3.0 SD 0.56</div> </div>					

Table #2, continued

University [REDACTED] – Football ATR
08/15/19 Pre-treatment Surface Sample Results – CFU/cm²

Pre-treatment 08/15/2019 [REDACTED] ATF					
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	Front door, outside handle	10x10x10	4,100	41.0
Surface	2	Counter top in front of bandages outside room 171	10x10x10	8,500	85.0
Surface	3	Dumbbell rehab - yellow cowbells	10x10x10	3,300	33.0
Surface	4	Taping table	10x10x10	9,500	95.0
Surface	5	Equipment room counter	10x10x10	6,300	63.0
Surface	6	Hydro room - counter under TV	10x10x10	4,250	42.5
Surface	7	Room 172 A cabinet far left corner	10x10x10	4,900	49.0
Surface	8	Room 167 - mouse pad	10x10x10	2,650	26.5
Surface	9	Athletic trainer's office chair	10x10x10	6,525	65.3
Surface	10	Ice room - ice machine	10x10x10	8,750	87.5
<div> <div>Avg 58.8 Max 95.0</div> <div>Min 26.5 SD 22.95</div> </div>					



Table #3
University [REDACTED] – Football ATR
11/05/2019- In-treatment Air Sample Pictures

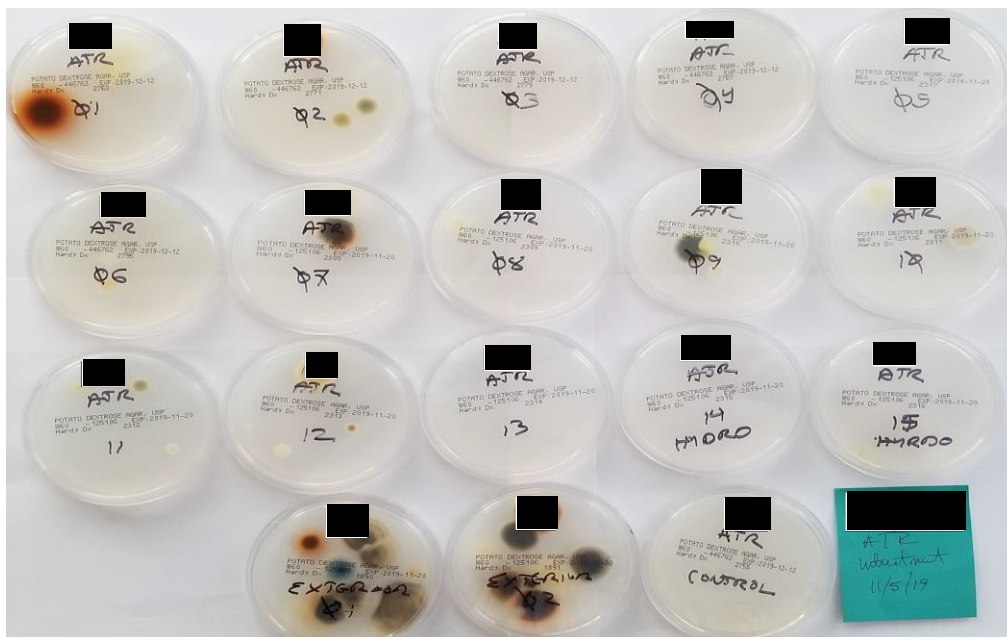
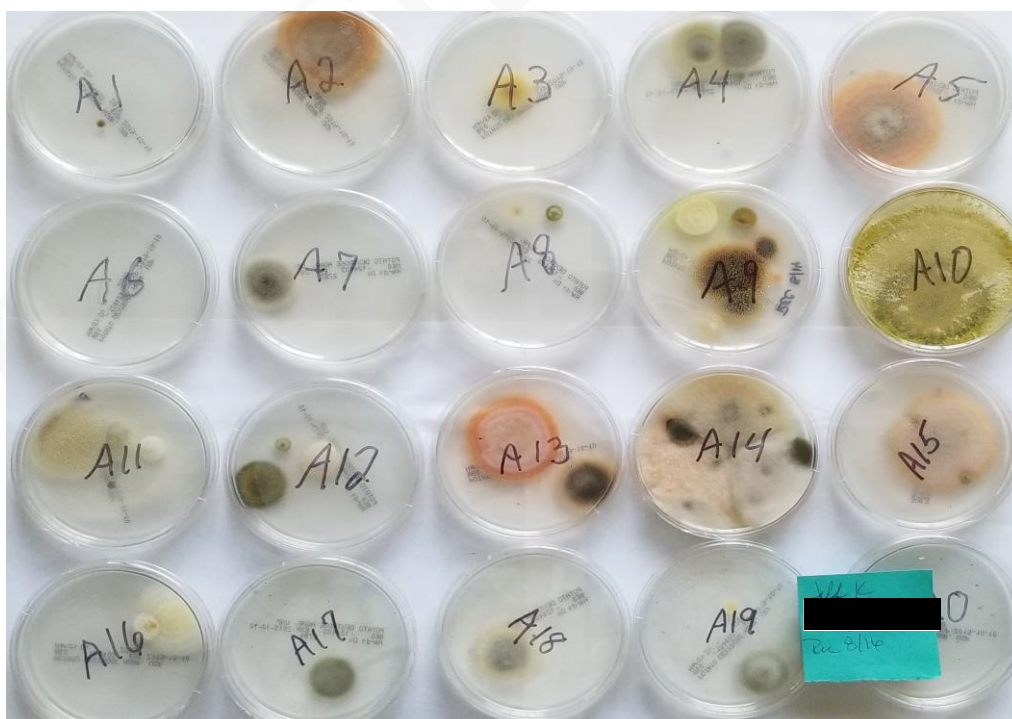


Table #3, continued
University [REDACTED] – Football ATR
08/15/2019 - Pre-treatment Air Sample Pictures



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Table #4

University [REDACTED] – Football ATR

11/05/19 and 08/15/2019 Pre and In-treatment Air and Surface Swab Locations

