Scientific Air Solution

airPHX Companies
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November 24, 2019

Pre and In-Treatment Air and Surface Report – **University [redacted] – Athletic Training**

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
09/27/19	Pre	11	Various	427	267/633	104.3	-
11/08/19	In			**39**	**0/100**	**39.7**	**90.9**
09/27/19	Pre	2	Hallway	667	633/700	33.3	-
11/08/19	In			**117**	**100/133**	**16.7**	**82.5**
09/27/19	Pre	2	Hydro	483	400/567	83.3	-
11/08/19	In			**467**	**400/533**	**66.7**	**3.4**
09/27/19	Pre	2	Exterior	2,167	2,100/2,233	66.7	-
11/08/19	In			**2,100**	**2,033/2,167**	**66.7**	**3.1**

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/m^3).

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
Penicillium, aspergillus types	2,150	*Cladosporium sphaerospermum*	675
Penicillium brevicompactum	1,350	*Ulocladium chartarum*	525
Aspergillus fumigatus	895	*Absidia spp*	410
Penicillium purpurogenum	775	*Firmicutes spp*	220

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
Penicillium, aspergillus types	660	*Cladosporium sphaerospermum*	< 5
Penicillium brevicompactum	425	*Ulocladium chartarum*	< 5
Aspergillus fumigatus	390	*Absidia spp*	< 5
Penicillium purpurogenum	125	*Firmicutes spp*	< 5

09/27/19 - Pre-treatment bioburden in the above locations are > 300 cfu/m^3 which is not acceptable and needs corrective action.

11/08/19 - In-treatment results show an **90.9% decrease** from the 09/27/19 pre-treatment samples and now are < 100 cfu/m^3 which is considered **clean and acceptable**.

- The **Hallway** area which is out of the direct airPHX treatment area has seen the "halo effect" from the treatment area and is showing an **82.5% reduction** from the 09/27/19 pre-treatment samples.
- The **Hydro** area is further secluded and does see a **3.4% reduction** also seen as a slight "halo effect" from the treatment area.

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Observations
The exterior air samples ranged from **2,033** to **2,233 cfu/m^3** 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.

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

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

In most cases, air quality **< 100 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
09/27/19	Pre	10	Various	56.2	29.0/125.0	33.0	-
11/08/19	In			**1.8**	**0.8/4.5**	**1.3**	**96.8**
09/27/19	Pre	1	Negative Control	0	0/0	-	-
11/08/19	In			0	0/0	-	-

09/27/19 - Pre-treatment contact swab results from the various locations are considerably > 5 cfu/cm^2 which is considered not acceptable and needs corrective action.

11/08/19 - In-treatment contact swab results reveal a **96.8% reduction** from the pre-treatment samples from the same locations which are now < 5 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 cfu/cm^2 is considered **clean and acceptable**.
- 5 to 10 cfu/cm^2 is considered **marginal**.
- > 10 cfu/cm^2 is considered **not acceptable** and needs corrective action.

In most cases, surface swabs **< 5 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] – Athletic Training
11/08/19 In-treatment Air Sample Results - CFU/m^3

In-treatment 11/08/2019 - [redacted] - Athletic Training											
Plate Lot No.	Air Sample Location	Air Sample Location	Liters of Air	Raw Count	Corrected Count	CFU/m3					
250	Ctrl	Unopened	0	0	0	0					
249	1	ATR	30	2	2	67					
248	2	ATR	30	3	3	100					
187	3	ATR	30	2	2	67					
191	4	ATR	30	3	3	100					
247	5	ATR	30	0	0	0					
195	6	ATR	30	0	0	0					
246	7	ATR	30	2	2	67					
254	8	ATR	30	0	0	0					
253	9	ATR	30	0	0	0					
252	10	ATR	30	0	0	0	Avg	39	High	100	
240	11	ATR	30	1	1	33	Low	0	SD	39.7	
243	12	Hallway	30	4	4	133	Avg	117	High	133	
245	12A	Hallway	30	3	3	100	Low	100	SD	16.7	
259	13	Hydro	30	12	12	400	Avg	467	High	533	
258	14	Hydro	30	15	16	533	Low	400	SD	66.7	
3241	1	Exterior	30	53	61	2,033	Avg	2,100	High	2,167	
3235	2	Exterior	30	56	65	2,167	Low	2,033	SD	66.7	
					Total Adjusted Raw Count	20					
					Total CFU/m3	1,600					

Table #1, continued
University [redacted] – Athletic Training
09/27/19 Pre-treatment Air Sample Results - CFU/m^3

Pre-treatment 09/27/2019 - [redacted] - Athletic Training											
Plate Lot No.	Air Sample Location	Air Sample Location	Liters of Air	Raw Count	Corrected Count	CFU/m3					
409	Ctrl	Unopened	0	0	0	0					
405	1	ATR	30	10	10	333					
401	2	ATR	30	12	12	400					
397	3	ATR	30	16	17	567					
393	4	ATR	30	12	12	400					
389	5	ATR	30	13	13	433					
385	6	ATR	30	12	12	400					
381	7	ATR	30	10	10	333					
377	8	ATR	30	8	8	267					
3237	9	ATR	30	12	12	400					
3238	10	ATR	30	18	19	633	Avg	427	High	633	
3239	11	ATR	30	15	16	533	Low	267	SD	104.3	
3240	12	Hallway	30	20	21	700	Avg	667	High	700	
3236	12B	Hallway	30	18	19	633	Low	633	SD	33.3	
373	13	Hydro	30	12	12	400	Avg	483	High	567	
3234	14	Hydro	30	16	17	567	Low	400	SD	83.3	
3241	1	Exterior	30	55	63	2,100	Avg	2,167	High	2,233	
3235	2	Exterior	30	58	67	2,233	Low	2,100	SD	66.7	
					Total Adjusted Raw Count	181					
					Total CFU/m3	7,000					

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Table #2

University [redacted] – Athletic Training

11/08/19 In-treatment Surface Sample Results – CFU/cm^2

In-treatment 11/08/2019 - [redacted] - Athletic Training									
Room	Swab Number	Surface Swab Sample Location	10x10x10 cm	Raw Count	CFU/cm2				
N/A	CTRL	Swab not removed from container	0	0	0				
Surface	1	End training rail	10x10x10	95	1.0				
Surface	2	Rower back end	10x10x10	210	2.1				
Surface	3	Dyantron face, station #8	10x10x10	100	1.0				
Surface	4	Check-in counter	10x10x10	105	1.1				
Surface	5	Hydro door handle/face of door	10x10x10	80	0.8				
Surface	6	Floor leading into hydro room	10x10x10	100	1.0				
Surface	7	Table in ortho room	10x10x10	310	3.1	Avg	1.8	Max	4.5
Surface	8	Keyboard and handle in [redacted]ffice	10x10x10	450	4.5	Min	0.8	SD	1.26

Total Adjusted Raw Count	1,450
Total CFU/cm2	15

Table #2, continued

University [redacted] – Athletic Training

09/27/19 Pre-treatment Surface Sample Results – CFU/cm^2

Pre-treatment 09/27/2019 - [redacted] - Athletic Training									
Room	Swab Number	Surface Swab Sample Location	10x10x10 cm	Raw Count	CFU/cm2				
N/A	CTRL	Swab not removed from container	0	0	0				
Surface	1	End training rail	10x10x10	3,500	35.0				
Surface	2	Rower back end	10x10x10	7,500	75.0				
Surface	3	Dyantron face, station #8	10x10x10	3,650	36.5				
Surface	4	Check-in counter	10x10x10	3,410	34.1				
Surface	5	Hydro door handle/face of door	10x10x10	2,900	29.0				
Surface	6	Floor leading into hydro room	10x10x10	2,950	29.5				
Surface	7	Table in ortho room	10x10x10	8,520	85.2	Avg	56.2	Max	125.0
Surface	8	Keyboard and handle in [redacted]ffice	10x10x10	12,500	125.0	Min	29.0	SD	32.99

Total Adjusted Raw Count	44,930
Total CFU/cm2	449

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Table #3
University [redacted] – Athletic Training
11/08/2019- In-treatment Air Sample Pictures

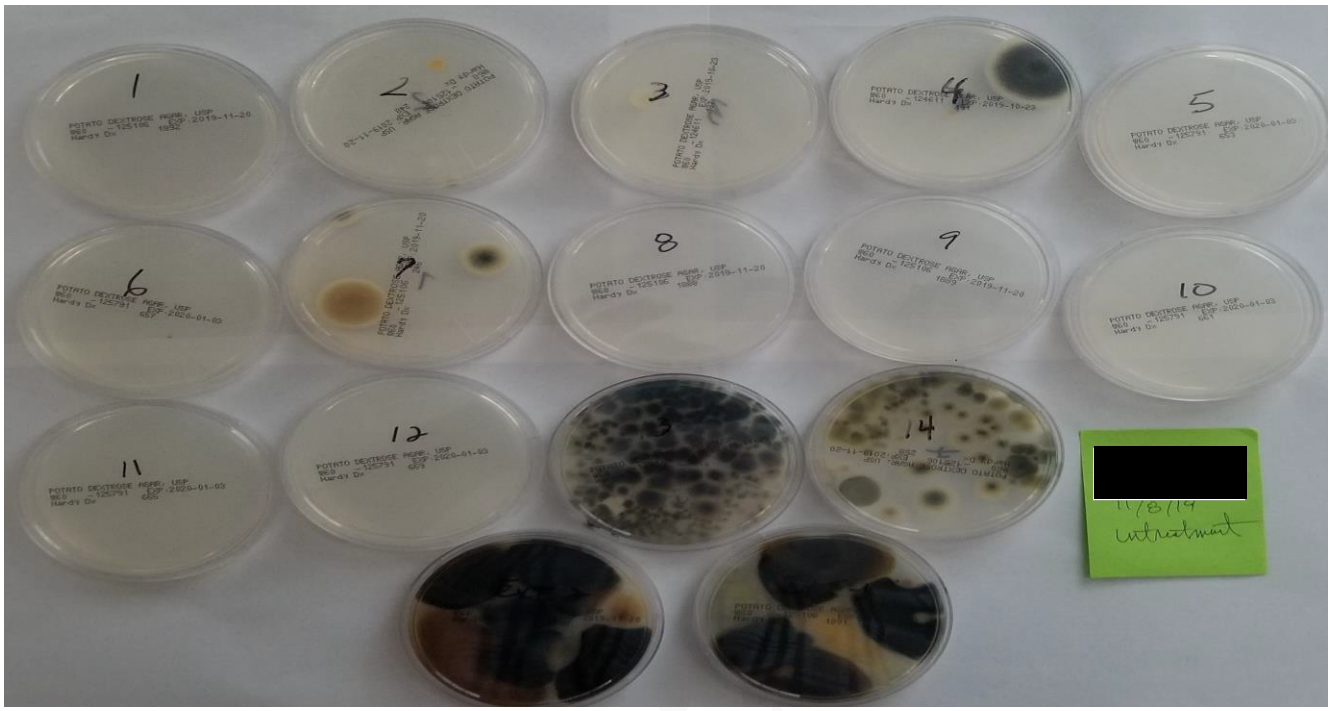

Table #3, continued
University [redacted] – Athletic Training
09/27/2019 - Pre-treatment Air Sample Pictures

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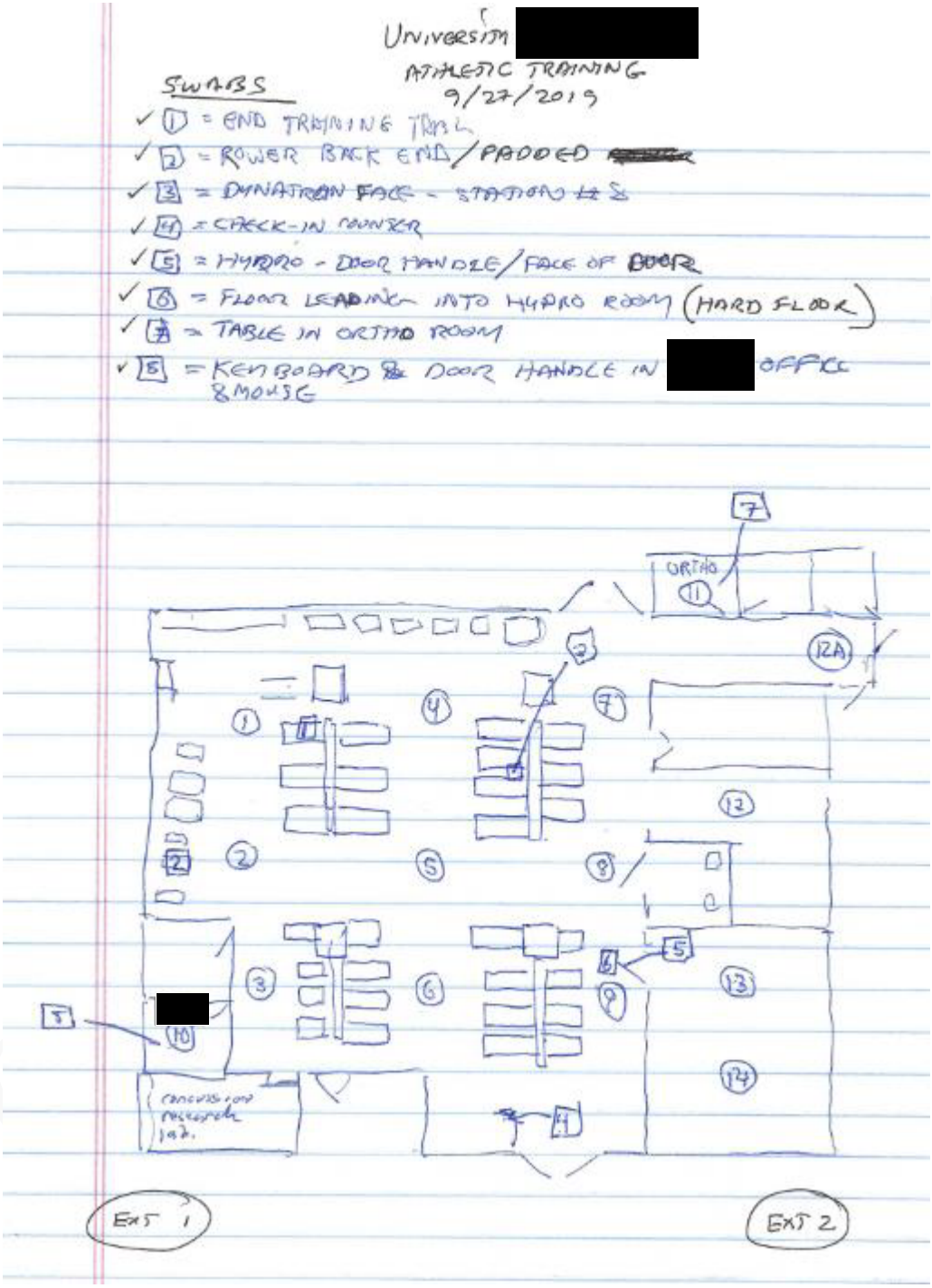
Table #4

University [redacted] – Athletic Training

11/08/19 and 09/27/2019 Pre and In-treatment Air and Surface Swab Locations



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