Scientific Air Solutions

Air PHX Companies
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McLean, VA 22101

October 24, 2019

Pre and In-Treatment Air and Surface Report – [redacted] **ICU**

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
07/25/19	Pre	19	Various ICU	279	167/567	101.6	-
10/16/19	In			**18**	**0/67**	**19.8**	**93.6**
07/25/19	Pre	2	Exterior	2,800	2,700/2,900	100.0	-
10/16/19	In			**2,883**	**2,800/2,967**	**83.3**	**+ 2.9**

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 the findings of the types of airborne organisms found in the sampled locations, not including the outside samples, during this **pre-treatment** sampling.

Species	Raw Count	Species	Raw Count
Aspergillus fumigatus	1,250	*Penicillium brevicompactum*	572
Penicillium, aspergillus types	1,010	*Mortierella, spp*	350
Penicillium purpurogenum	885	*Basidiospores spp*	260
Cladosporium sphaerospermum	798	*Staphylococcus spp*	175

Noted below are the findings of the types of airborne organisms found in the sampled locations, not including the outside samples, during this **in-treatment** sampling.

Species	Raw Count	Species	Raw Count
Aspergillus fumigatus	195	*Penicillium brevicompactum*	< 5
Penicillium, aspergillus types	103	*Mortierella, spp*	< 5
Penicillium purpurogenum	35	*Basidiospores spp*	< 5
Cladosporium sphaerospermum	< 5	*Staphylococcus spp*	< 5

07/25/19 - Pre-treatment bioburden in the above locations average 100 to 300 cfu/m^3 which is marginal, per the Target Contact Surface Quality guide below.

10/16/19 - In-treatment samples show a **93.6% reduction** in the bioburden and now are **< 100 cfu/m^3** which is considered **clean and acceptable**.

Observations
Outside air samples ranged from **2,700** to **2,967 cfu/m^3** exhibits that an amount of the bioburden is coming from the outside air.

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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
07/25/19	Pre	10	Various	56	15/100	24.5	-
10/16/19	In			**1.5**	**0.5/2.6**	**0.6**	**97.3**
07/25/19	Pre	1	Negative Control	0	0/0	-	-
10/16/19	In			0	0/0	-	-

Pre-treatment contact swab results in all the various locations are considerably **> 10 cfu/cm^2** which is **not acceptable** and needs corrective action, per the Target Contact Surface Quality guide below.

In-treatment contact swab results show a **97.3% reduction** in the sampled locations and are now **< 5 cfu/cm^2** which is 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, air quality < 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
[redacted] ICU
10/16/19 Pre-treatment Air Sample Results - CFU/m^3

[redacted] ICU - 10-16-19 - In-Treatment											
Plate Lot No.	Air Sample Location	Air Sample Location	Liters of Air	Raw Count	Corrected Count	CFU/m3					
850	Ctrl	Unopened	0	0	0	0					
846		1	30	1	1	33					
842		2	30	0	0	0					
838		3	30	0	0	0					
834		4	30	1	1	33					
86		5	30	1	1	33					
87		6	30	2	2	67					
88		7	30	0	0	0					
89		8	30	0	0	0					
1402		9	30	1	1	33					
1403		10	30	0	0	0					
92		11	30	1	1	33					
93		12	30	1	1	33					
94		13	30	1	1	33					
95		14	30	1	1	33					
2291		15	30	0	0	0					
2292		16	30	0	0	0					
2293		17	30	0	0	0					
2294		18	30	0	0	0	Avg	18	High	67	
2295		19	30	0	0	0	Low	0	SD	19.8	
2296	1	EXT	30	73	89	2,967	Avg	2,883	High	2,967	
2297	2	EXT	30	70	84	2,800	Low	2,800	SD	83.3	
					Total Adjusted Raw Count	183					
					Total CFU/m3	333					

Table #1, continued
[redacted] ICU
07/25/19 Pre-treatment Air Sample Results - CFU/m^3

[redacted] ICU - 07-25-19 - Pre-Treatment											
Plate Lot No.	Air Sample Location	Air Sample Location	Liters of Air	Raw Count	Corrected Count	CFU/m3					
862	Ctrl	Unopened	0	0	0	0					
1394		1	30	8	8	267					
1395		2	30	6	6	200					
1396		3	30	10	10	333					
1397		4	30	12	12	400					
1398		5	30	9	9	300					
1399		6	30	13	13	433					
1400		7	30	6	6	200					
1401		8	30	8	8	267					
1402		9	30	6	6	200					
1403		10	30	5	5	167					
1339		11	30	16	17	567					
1606		12	30	10	10	333					
1607		13	30	8	8	267					
1608		14	30	10	10	333					
1609		15	30	6	6	200					
1610		16	30	5	5	167					
1611		17	30	7	7	233					
1612		18	30	8	8	267	Avg	279	High	567	
1613		19	30	5	5	167	Low	167	SD	101.6	
861	1	EXT	30	68	81	2,700	Avg	2,800	High	2,900	
860	2	EXT	30	72	87	2,900	Low	2,700	SD	100.0	
					Total Adjusted Raw Count	327					
					Total CFU/m3	5,300					

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Table #2
[redacted] ICU
10/16/19 Pre-treatment Surface Sample Results – CFU/cm^2

[redacted] ICU - 07-25-19 - Pre-Treatment										
Room	Swab Number	Surface Swab Sample Location	10x10x10 cm	Raw Count	CFU/cm2					
N/A	CTRL	Control swab	0	0	0					
ICU	1	Computer workstation counter	10x10x10	95	1.0					
ICU	2	Handrail under [redacted]	10x10x10	135	1.4					
ICU	3	Kronos touchpad	10x10x10	50	0.5					
ICU	4	WOW - computer = x18737	10x10x10	145	1.5					
ICU	5	Staff RR door handle	10x10x10	210	2.1					
ICU	6	Sink counter top right side	10x10x10	175	1.8					
ICU	7	Counter under left computer	10x10x10	100	1.0					
ICU	8	Phone on wall	10x10x10	125	1.3					
ICU	9	Nures station counter left computer	10x10x10	255	2.6	Avg	1.5	Max	2.6	
ICU	10	Family bathroom entry floor	10x10x10	175	1.8	Min	0.5	SD	0.6	

Total Adjusted Raw Count	1,465
Total CFU/cm2	15

Table #2, continued
[redacted] ICU
07/25/19 Pre-treatment Surface Sample Results – CFU/cm^2

[redacted] ICU - 07-25-19 - Pre-Treatment										
Room	Swab Number	Surface Swab Sample Location	10x10x10 cm	Raw Count	CFU/cm2					
N/A	CTRL	Control swab	0	0	0					
ICU	1	Computer workstation counter	10x10x10	2,500	25					
ICU	2	Handrail under [redacted]	10x10x10	4,200	42					
ICU	3	Kronos touchpad	10x10x10	1,500	15					
ICU	4	WOW - computer = x18737	10x10x10	5,600	56					
ICU	5	Staff RR door handle	10x10x10	8,500	85					
ICU	6	Sink counter top right side	10x10x10	7,100	71					
ICU	7	Counter under left computer	10x10x10	5,600	56					
ICU	8	Phone on wall	10x10x10	6,500	65					
ICU	9	Nures station counter left computer	10x10x10	10,000	100	Avg	56	Max	100	
ICU	10	Family bathroom entry floor	10x10x10	4,800	48	Min	15	SD	24.5	

Total Adjusted Raw Count	56,300
Total CFU/cm2	563

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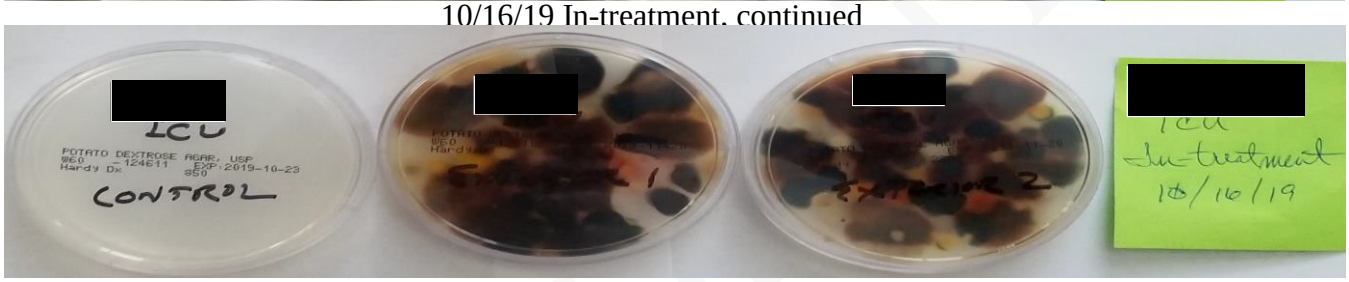
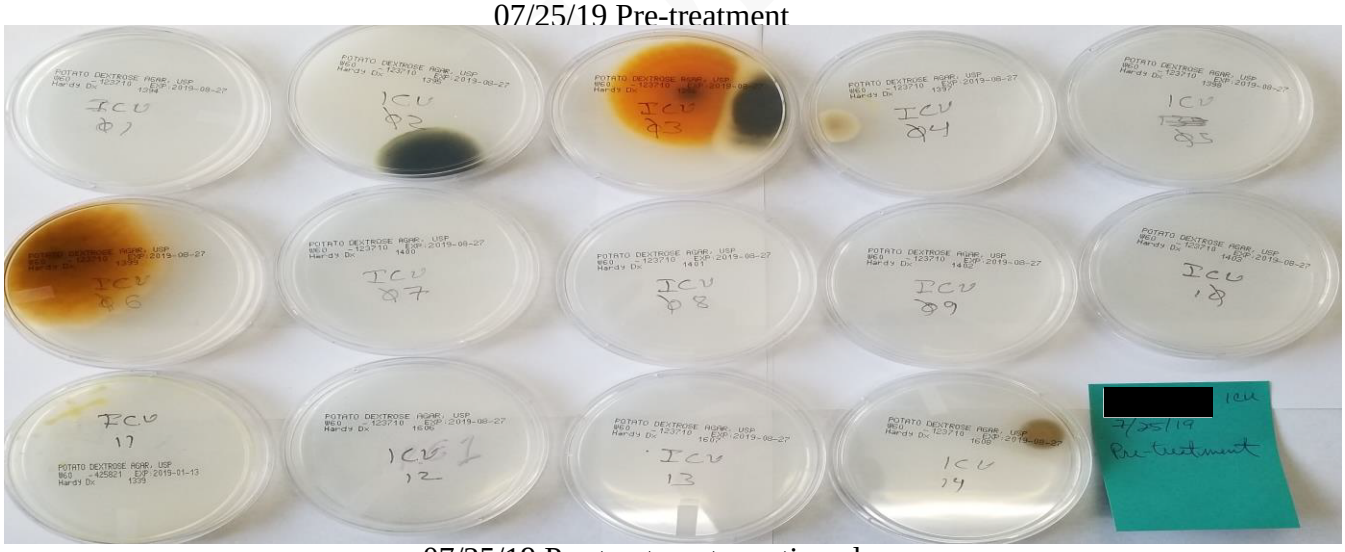
Table #3
[redacted] ICU - Air Sample Pictures

10/16/19 In-treatment

10/16/19 In-treatment, continued



07/25/19 Pre-treatment



07/25/19 Pre-treatment, continued

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Table #4
10/16/19 In-treatment and 07/25/19 - [redacted] ICU - Air and Contact Sample Location Map

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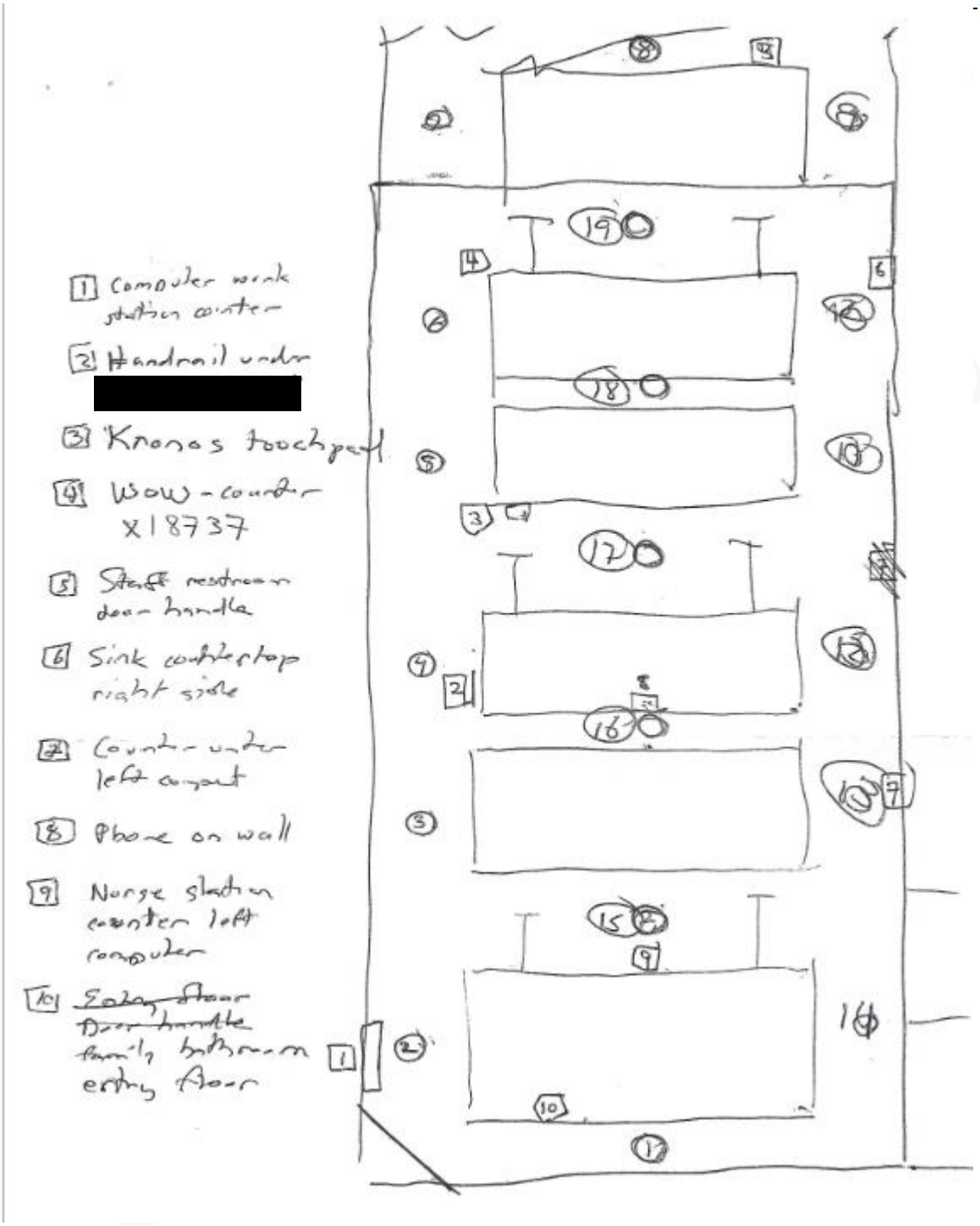

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