



BSW Group LLC  
7823 Village Drive  
Knoxville, TN 37919

December 29, 2018

## Pre and In-Treatment Air and Surface Report – [REDACTED] School

### A. Summary – Air Samples

Pre and In-treatment air samples results given below.

Sample Date	Number of samples	Location	Average (cfu/m <sup>3</sup> )	Range	Standard Deviation	Percent Reduction
09/27/18	2	[REDACTED] Basement	6,017	5,867/6,167	150.0	-
12/14/18	4		233	133/333	74.5	96.1
09/27/18	1	[REDACTED] Dorm First Floor Not treated	5,067	5,056/5,067	-	-
12/14/18	2		3,333	3,100/3,567	233.3	34.2
09/27/18	2	[REDACTED] Weight Room	4,933	4,433/5,433	500.0	-
12/14/18	3		133	100/167	27.2	97.3
09/27/18	1	Exterior, original	2,800	2,800/2,800	-	-
10/10/18	6	Exterior [REDACTED]	3,539	3,200/3,867	235.2	-
12/14/18	6		3,533	3,200/3,867	222.8	0.2

### 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<sup>3</sup>).

Given below are the finding of the types of airborne organisms found in the above locations excluding the exterior samples during this **pre-treatment** sampling.

Species	Raw Count	Species	Raw Count
<i>Penicillium, aspergillus types</i>	8,750	<i>Penicillium purpurogenum</i>	2,975
<i>Penicillium purpurogenum</i>	6,350	<i>Mortierella, spp</i>	1,898
<i>Cladosporium sphaerospermum</i>	4,955	<i>Basidiospores spp</i>	905
<i>Aspergillus fumigatus</i>	3,810	<i>Absidia, spp</i>	885

Shown below are the finding of the types of airborne organisms found in the above locations excluding the exterior samples during this **in-treatment** sampling.

Species	Raw Count	Species	Raw Count
<i>Penicillium, aspergillus types</i>	2,355	<i>Penicillium purpurogenum</i>	750
<i>Penicillium purpurogenum</i>	1,975	<i>Mortierella, spp</i>	599
<i>Cladosporium sphaerospermum</i>	1,071	<i>Basidiospores spp</i>	410
<i>Aspergillus fumigatus</i>	835	<i>Absidia, spp</i>	< 10

**In-treatment 12/14/18** bioburden in the sampled rooms show a **96.1%** and **97.3%** reduction respectively and now are in the 100 to 300 cfu/m<sup>3</sup> is **marginal** category of the Target Air Quality see below.

- Note that the non-treated First Floor area recorded a **34.2%** reduction from the air intrusion into that space from the basement treated area.
- Prolonged use of the airPHX system will continue to reduce the bioburden as seen with these in-treatment results

# Scientific Air Solutions



Pre-treatment 09/27/18, bioburden in the sampled rooms are considerably above  $> 300 \text{ cfu/m}^3$ , which is not acceptable and needs corrective action.

## Observations

Outside air samples remain high still ranging from **3,200** to **3,867 cfu/m<sup>3</sup>** which now show the airPHX system is reducing the bioburden in these areas. Currently most of the bioburden is coming from the exterior air and not generated inside these rooms as previously seen.

## 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  $300 \text{ cfu/m}^3$  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.

## B. Summary – Surface Contact Swabs

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

Sample Date	Number of samples	Location	Average (cfu/cm <sup>2</sup> )	Range	Standard Deviation	Percent Reduction
09/27/18	2	[REDACTED] Basement	832.5	795/870	150.0	-
12/14/18	3		38.7	33/45	4.9	95.4
09/27/18	2	[REDACTED] Dorm First Floor Not treated	190.0	175/205	15.0	-
12/14/18			150.5	125/176	25.5	20.8
09/27/18	4	[REDACTED] Weight Room	618.8	455/750	110.3	-
12/14/18			33.0	28/41	4.9	94.7
09/27/18	1	Negative control	0	0/0	-	-
12/14/18			0	0/0	-	-

**In-treatment 12/14/18** results give a **reduction** of **94.7%** and **95.7%** respectively, which is still in the  $> 10 \text{ cfu/cm}^2$ , is considered **not acceptable** and needs corrective action, additional exposure time is needed.

- As seen with the air samples the non-treated First Floor area recorded a **20.8%** reduction from the air intrusion into that space from the basement treated area.
- Continued use of the airPHX system will further reduce the bioburden in these areas.

Pre-treatment 09/27/18 contact swab results in the various locations are significantly  $> 10 \text{ cfu/cm}^2$ , which is not acceptable and needs corrective action.

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

In most cases, surface quality  $< 5 \text{ cfu/cm}^2$  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,

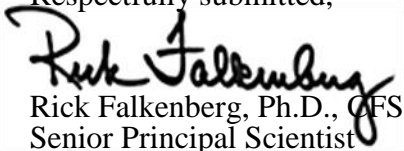
  
Rick Falkenberg, Ph.D., QFS  
Senior Principal Scientist



Table #1

**████████ School**  
12/14/18 In-treatment Air Sample Results - CFU/m<sup>3</sup>

In-treatment 12/14/18						
Plate Lot No.	Air Sample Location	Air Sample Location	Liters of Air	Raw Count	Corrected Count	CFU/m <sup>3</sup>
N/A	Ctrl	Unopened	0	0	0	0
N/A	1	████████ Basement	30	6	6	200
N/A	2		30	8	8	267
N/A	3		30	10	10	333
N/A	4		30	4	4	133
N/A	1	Dorm 1st Floor, Not Treated Area	30	85	107	3,567
N/A	2		30	76	93	3,100
N/A	1	████████ Weight Room	30	4	4	133
N/A	2		30	3	3	100
N/A	3		30	5	5	167
N/A	1	████████ 1 Ext	30	80	99	3,300
N/A	2	████████ 2 Ext	30	86	109	3,633
N/A	3	████████ 1 Ext	30	90	116	3,867
N/A	4	████████ 2 Ext	30	78	96	3,200
N/A	5	████████ Ext	30	85	107	3,567
3479	6	████████ Ext	30	86	109	3,633

Avg	233	High	333
Low	133	SD	74.5
Avg	3,333	High	3,567
Low	3,100	SD	233.3
Avg	133	High	167
Low	100	SD	27.2
Avg	3,533	High	3,867
Low	3,200	SD	222.8

Total Adjusted Raw Count **876**  
Total CFU/m<sup>3</sup> **8,000**

Table #1

**████████ School**  
10/29/18 Pre-treatment Air Sample Results - CFU/m<sup>3</sup>, Updated with Outside Samples

Pre-treatment 09/27/18						
Plate Lot No.	Air Sample Location	Air Sample Location	Liters of Air	Raw Count	Corrected Count	CFU/m <sup>3</sup>
34	Ctrl	Unopened	0	0	0	0
2976	1	████████ Basement	30	125	185	6,167
2975	2		30	121	176	5,867
2974	1	████████ 1st Floor	30	110	152	5,067
2970	3	████████ Weight Room	30	100	133	4,433
2969	4		30	115	163	5,433
N/A	1	████████ Ext	30	82	103	3,433
N/A	2	████████ Ext	30	78	96	3,200
N/A	1	████████ 1	30	89	114	3,800
N/A	2	████████ 2	30	85	107	3,567
N/A	3	████████ 3	30	81	101	3,367
N/A	4	████████ 4	30	90	116	3,867
3479	Original	EXT	30	70	84	2,800

Avg	6,017	High	6,167
Low	5,867	SD	150.0
Avg	4,933	High	5,433
Low	4,433	SD	500.0
Avg	3,539	High	3,867
Low	3,200	SD	235.2
Avg	2,800	High	2,800
Low	2,800	SD	0.0

Total Adjusted Raw Count **1,530**  
Total CFU/m<sup>3</sup> **26,967**



Table #2  
**██████████ School**  
 12/14/18 In-treatment Surface Sample Results – CFU/cm<sup>2</sup>

In-treatment 12/14/18					
Room	Swab Number	Surface Swab Sample Location	10x10x10 cm	Raw Count	CFU/cm <sup>2</sup>
N/A	CTRL	Control swab	0	0	0
BCBS	1	██████████ Basement, table, shelf, coke machine	10x10x10	4,500	45.0
BCBS	2		10x10x10	3,300	33.0
BCBS	3		10x10x10	3,800	38.0
BCBS	1	Dorm First Floor, Not treated floor	10x10x10	12,500	125.0
BCBS	2		10x10x10	17,600	176.0
BCBS	1	██████████ Weight Room, door facing handle, weight bar and bench	10x10x10	3,200	32.0
BCBS	2		10x10x10	2,800	28.0
BCBS	3		10x10x10	4,100	41.0
BCBS	4		10x10x10	3,100	31.0

Avg	38.7	Max	45.0
Min	33.0	SD	4.92

Avg	150.5	Max	176.0
Min	125.0	SD	25.50

Avg	33.0	Max	41.0
Min	28.0	SD	4.85

Total Adjusted Raw Count	54,900
Total CFU/cm <sup>2</sup>	549

Table #2  
**██████████ School**  
 09/27/18 Pre-treatment Surface Sample Results – CFU/cm<sup>2</sup>

Pre-treatment 09/27/18					
Room	Swab Number	Surface Swab Sample Location	10x10x10 cm	Raw Count	CFU/cm <sup>2</sup>
N/A	CTRL	Control swab	0	0	0
BCBS	1	██████████ Basement	10x10x10	87,000	870.0
BCBS	2		10x10x10	79,500	795.0
BCBS	1	Dorm 1st Floor	10x10x10	17,500	175.0
BCBS	2		10x10x10	20,500	205.0
BCBS	1	██████████ Weight Room	10x10x10	45,500	455.0
BCBS	2		10x10x10	68,000	680.0
BCBS	3		10x10x10	75,000	750.0
BCBS	4		10x10x10	59,000	590.0

Avg	832.5	Max	870.0
Min	795.0	SD	37.50

Avg	190.0	Max	205.0
Min	175.0	SD	15.00

Avg	618.8	Max	750.0
Min	455.0	SD	110.25

Total Adjusted Raw Count	452,000
Total CFU/cm <sup>2</sup>	4,520

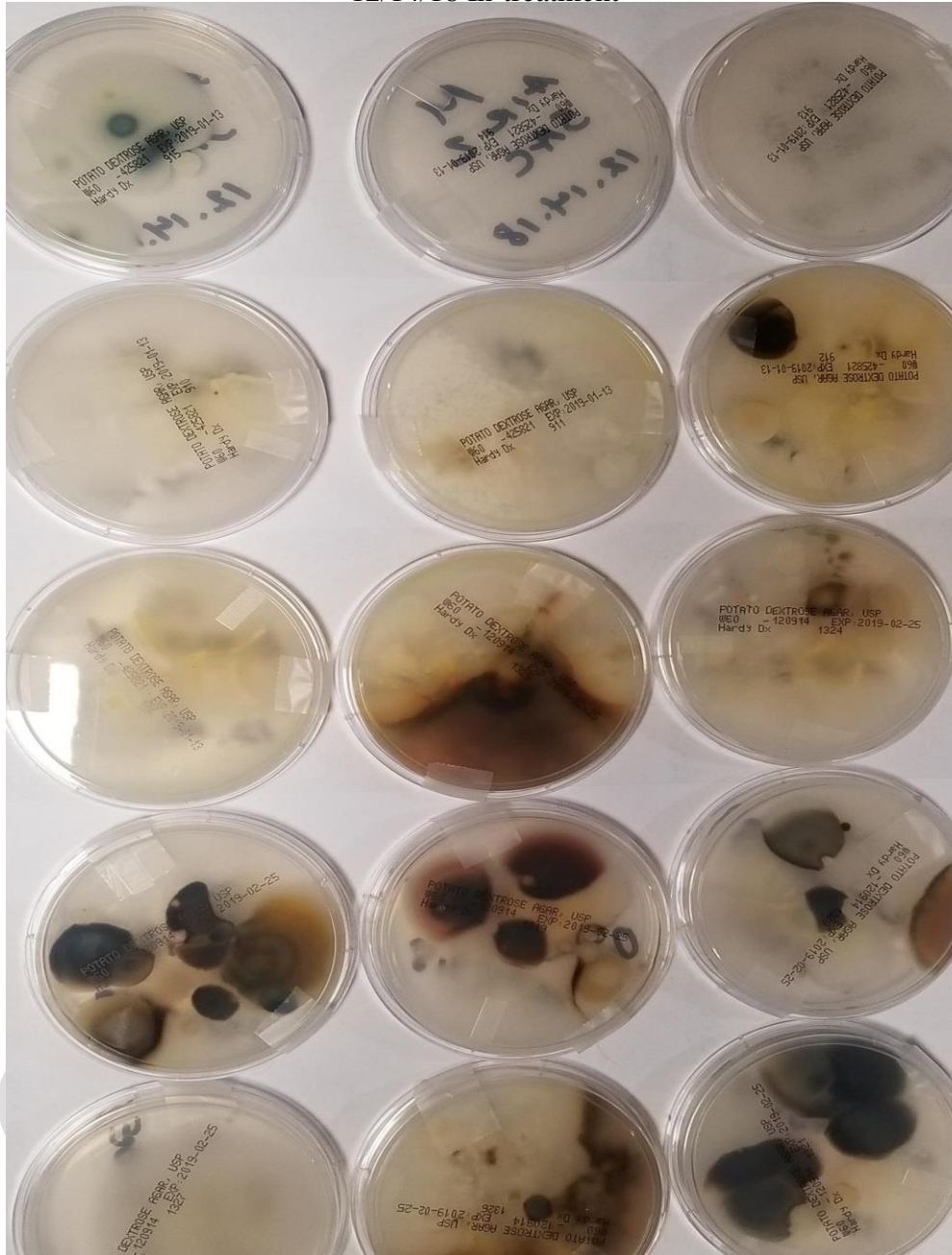


Table #3

██████████ School

Air Sample Pictures, updated Exterior Samples

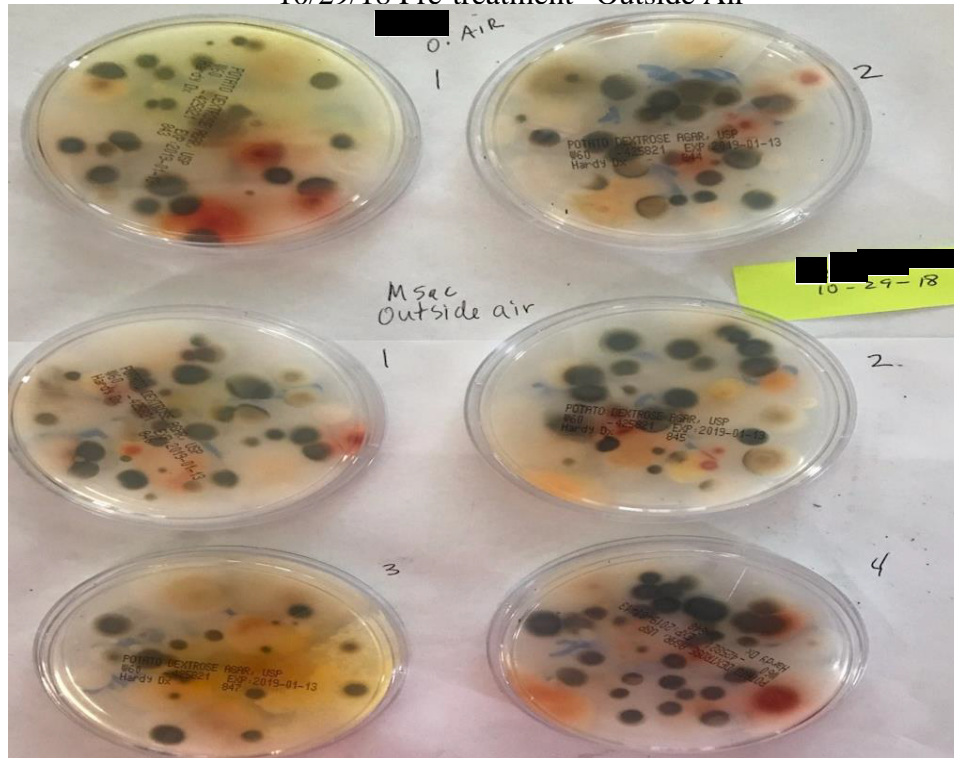
12/14/18 In-treatment







10/29/18 Pre-treatment - Outside Air



09/27/18 Pre-treatment

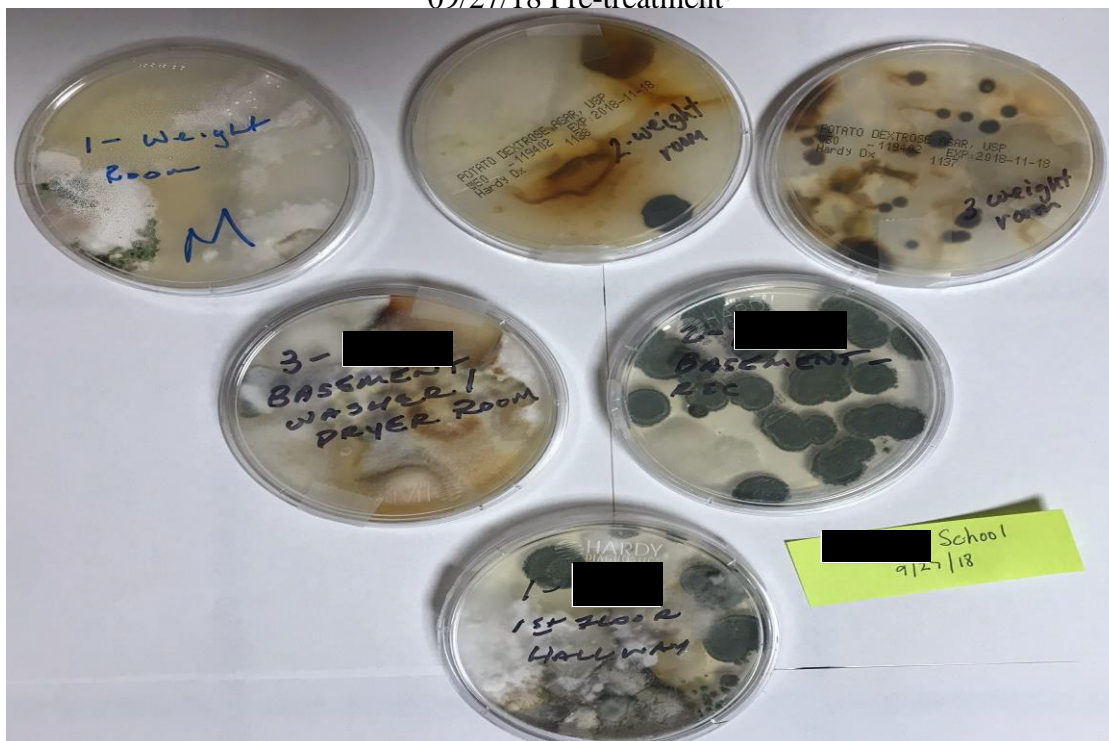




Table #4  
[redacted] School  
Air and Swab Sample Location Map

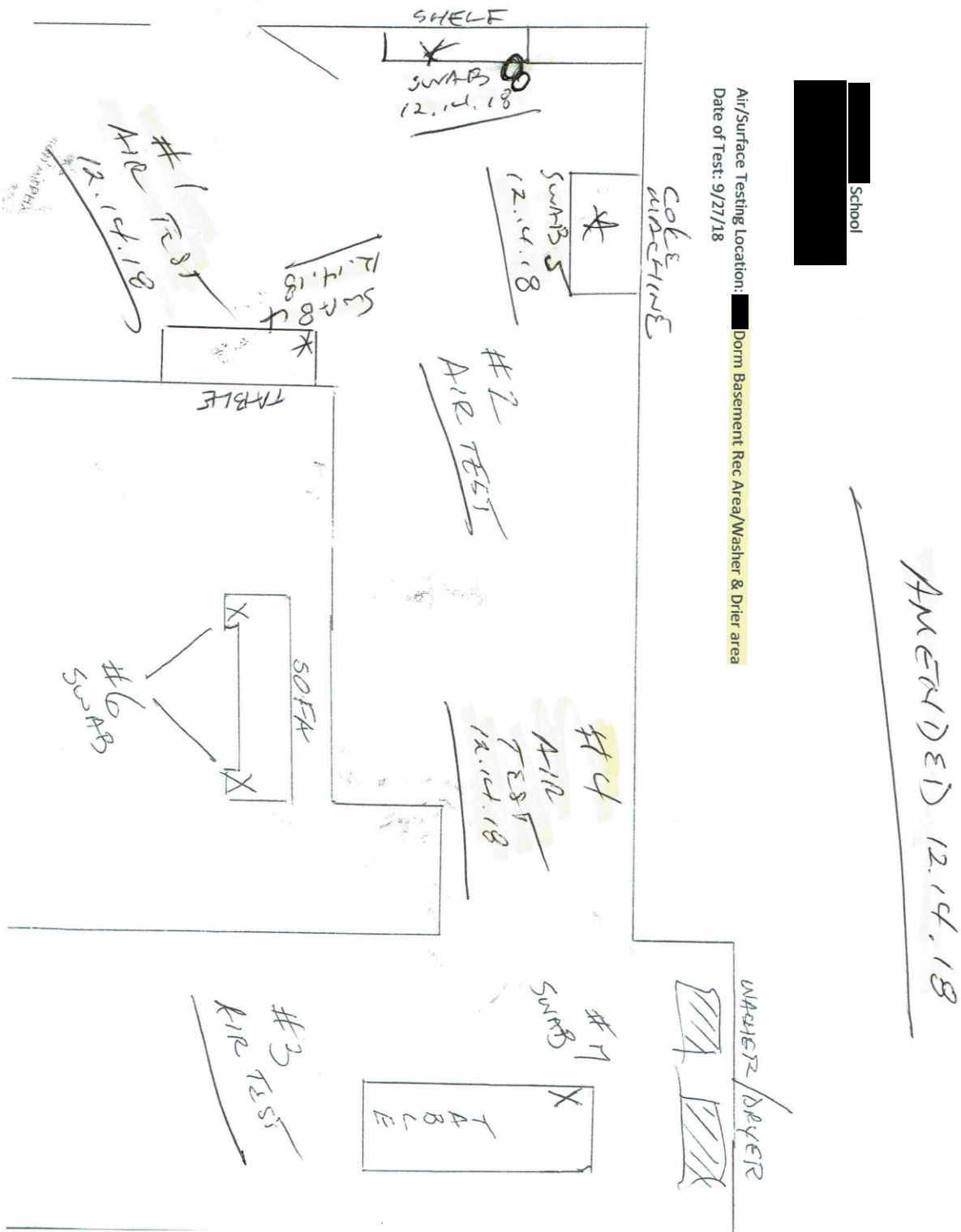




Table #4  
[REDACTED] School  
Air and Swab Sample Location Map, continued

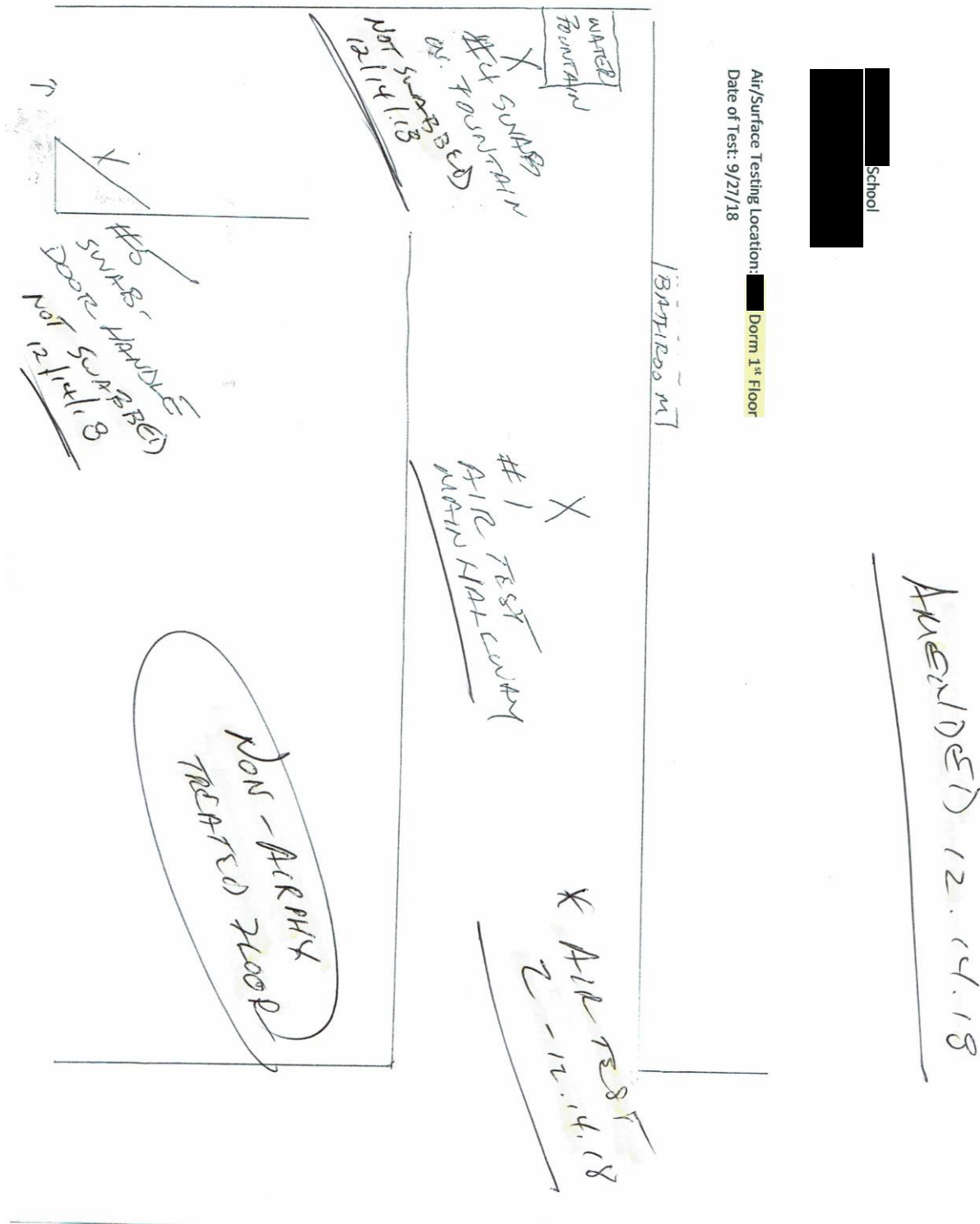






Table #4  
[REDACTED] School  
Air and Swab Sample Location Map, continued

