LRC Indoor Testing and Research
140 Iowa Lane, Suite 102
Cary, NC 27511
(919) 342-4936

Certificate of Laboratory Analysis

Non-Viable Spore Trap Analysis

Dare County Schools
Ian Adams
3020 S. Wrightsville Avenue
Nags Head, NC

Project #: **23-2212**
Project Location: Maintenance Shop
Bus Garage

Project Type: IAQ
PO/Claim #:

Table 1: Non-Viable Air Samples

Date Collected:	11/9/23	11/9/23	11/9/23	11/9/23	11/9/23
	1	2	3	4	5
Spore Identification	**Maintenance-Front Office**	**Maintenance-Rear Break Room**	**Bus Garage-shop office**	**Bus Garage-Parts**	**Bus Garage-2nd Floor office**
Cladosporium	387	120	120	160	107
Ascospores	40	40	13	40	40
Basidiospores[2]	80	40	27	40	40
Smuts, *Periconia* , Myxomycetes[4]	147	53	160	80	173
Penicillium/Aspergillus Group[1]	67	53	67	107	107
Hyphal Elements[3]	53	93	93	93	120
Alternaria	27	27	13	13	-
Curvularia	93	67	67	53	80
Epicoccum	40	-	27	13	40
Cercospora	13	-	-	-	-
Arthrinium	-	-	-	-	-
Clear Brown	-	-	-	-	-
Colorless	-	-	-	-	-
Trichocladium	-	-	-	-	13
Unidentified	27	13	27	13	13
Ulocladium	27	13	-	-	-
Torula	13	-	-	-	13
Pithomyces	13	-	-	-	-
Rust[5]	13	-	13	-	-
Drechslera/Bipolaris	27	13	13	13	40
Tetraploa	-	-	-	-	-
Chaetomium	-	-	-	-	-
Stachybotrys	-	-	-	-	-
	-	-	-	-	-
Total Spores/m^3	**1067**	**533**	**640**	**627**	**787**
Particulate Level	**moderate-heavy**	**moderate**	**moderate-heavy**	**moderate-heavy**	**moderate**
Date Analyzed:	**11/18/23**	**11/18/23**	**11/18/23**	**11/18/23**	**11/18/23**

Analyzed by: Cathy A. Richmond, B.S.

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Project Location: Maintenance Shop
Bus Garage

Project Type: IAQ
PO/Claim #:

Table 1: Non-Viable Air Samples

Date Collected:	11/9/23
Spore Identification	6
	Outdoor Air
Cladosporium	2720
Ascospores	427
Basidiospores[2]	320
Smuts, *Periconia* , Myxomycetes[4]	480
Penicillium/Aspergillus Group[1]	533
Hyphal Elements[3]	160
Alternaria	160
Curvularia	747
Epicoccum	160
Cercospora	213
Arthrinium	-
Clear Brown	-
Colorless	-
Trichocladium	-
Unidentified	-
Ulocladium	-
Torula	-
Pithomyces	-
Rust[5]	160
Drechslera/Bipolaris	107
Tetraploa	-
Chaetomium	-
Stachybotrys	-
	-
Total Spores/m^3	**6187**
Particulate Level	**moderate**
Date Analyzed:	**11/18/23**

Analyzed by: Cathy A. Richmond, B.S.

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Project #: **23-2212**
Project Location: Maintenance Shop
Bus Garage

Project Type: IAQ
PO/Claim #:

Sample Number:	1	**Volume (L):**	75
Sample Location:	Maintenance-Front Office	**Percentage of Slide Read:**	100.0%
Date Collected:	11/9/23	**Detection Limit:**	13.33
Test Requested:	Non-viable spore trap analysis	**Particulate Level:**	moderate-heavy
Date Analyzed:	11/18/23	**Notes:**	_

Spore Identification	Count	Results	Units	Percentage
Cladosporium	29	387	spores/m^3	36%
Ascospores	3	40	spores/m^3	4%
Basidiospores	6	80	spores/m^3	8%
Smuts, *Periconia* , Myxomycetes	11	147	spores/m^3	14%
Penicillium/Aspergillus Group	5	67	spores/m^3	6%
Hyphal Elements	4	53	spores/m^3	5%
Alternaria	2	27	spores/m^3	3%
Curvularia	7	93	spores/m^3	9%
Epicoccum	3	40	spores/m^3	4%
Cercospora	1	13	spores/m^3	1%
Arthrinium		-	spores/m^3	-
Clear Brown		-	spores/m^3	-
Colorless		-	spores/m^3	-
Trichocladium		-	spores/m^3	-
Unidentified	2	27	spores/m^3	3%
Ulocladium	2	27	spores/m^3	3%
Torula	1	13	spores/m^3	1%
Pithomyces	1	13	spores/m^3	1%
Rust	1	13	spores/m^3	1%
Drechslera/Bipolaris	2	27	spores/m^3	3%
Tetraploa		-	spores/m^3	-
Chaetomium		-	spores/m^3	-
Stachybotrys		-	spores/m^3	-
		-	spores/m^3	-
Total Spores	**80**	**1067**	**spores/m^3**	

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Project #: **23-2212**
Project Location: Maintenance Shop
Bus Garage

Project Type: IAQ
PO/Claim #:

Sample Number:	2	**Volume (L):**	75
Sample Location:	Maintenance-Rear Break Room	**Percentage of Slide Read:**	100.0%
Date Collected:	11/9/23	**Detection Limit:**	13.33
Test Requested:	Non-viable spore trap analysis	**Particulate Level:**	moderate
Date Analyzed:	11/18/23	**Notes:**	_

Spore Identification	Count	Results	Units	Percentage
Cladosporium	9	120	spores/m^3	23%
Ascospores	3	40	spores/m^3	8%
Basidiospores	3	40	spores/m^3	8%
Smuts, *Periconia* , Myxomycetes	4	53	spores/m^3	10%
Penicillium/Aspergillus Group	4	53	spores/m^3	10%
Hyphal Elements	7	93	spores/m^3	18%
Alternaria	2	27	spores/m^3	5%
Curvularia	5	67	spores/m^3	13%
Epicoccum		-	spores/m^3	-
Cercospora		-	spores/m^3	-
Arthrinium		-	spores/m^3	-
Clear Brown		-	spores/m^3	-
Colorless		-	spores/m^3	-
Trichocladium		-	spores/m^3	-
Unidentified	1	13	spores/m^3	3%
Ulocladium	1	13	spores/m^3	3%
Torula		-	spores/m^3	-
Pithomyces		-	spores/m^3	-
Rust		-	spores/m^3	-
Drechslera/Bipolaris	1	13	spores/m^3	3%
Tetraploa		-	spores/m^3	-
Chaetomium		-	spores/m^3	-
Stachybotrys		-	spores/m^3	-
		-	spores/m^3	-
Total Spores	**40**	**533**	**spores/m^3**	

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Project #: **23-2212**
Project Location: Maintenance Shop
Bus Garage

Project Type: IAQ
PO/Claim #:

Sample Number: 3
Sample Location: Bus Garage-shop office
Date Collected: 11/9/23
Test Requested: Non-viable spore trap analysis
Date Analyzed: 11/18/23

Volume (L): 75
Percentage of Slide Read: 100.0%
Detection Limit: 13.33
Particulate Level: moderate-heavy
Notes: _

Spore Identification	Count	Results	Units	Percentage
Cladosporium	9	120	spores/m^3	19%
Ascospores	1	13	spores/m^3	2%
Basidiospores	2	27	spores/m^3	4%
Smuts, *Periconia* , Myxomycetes	12	160	spores/m^3	25%
Penicillium/Aspergillus Group	5	67	spores/m^3	10%
Hyphal Elements	7	93	spores/m^3	15%
Alternaria	1	13	spores/m^3	2%
Curvularia	5	67	spores/m^3	10%
Epicoccum	2	27	spores/m^3	4%
Cercospora		-	spores/m^3	-
Arthrinium		-	spores/m^3	-
Clear Brown		-	spores/m^3	-
Colorless		-	spores/m^3	-
Trichocladium		-	spores/m^3	-
Unidentified	2	27	spores/m^3	4%
Ulocladium		-	spores/m^3	-
Torula		-	spores/m^3	-
Pithomyces		-	spores/m^3	-
Rust	1	13	spores/m^3	2%
Drechslera/Bipolaris	1	13	spores/m^3	2%
Tetraploa		-	spores/m^3	-
Chaetomium		-	spores/m^3	-
Stachybotrys		-	spores/m^3	-
		-	spores/m^3	-
Total Spores	**48**	**640**	**spores/m^3**	

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Project #: **23-2212**
Project Location: Maintenance Shop
Bus Garage

Project Type: IAQ
PO/Claim #:

Sample Number: 4
Sample Location: Bus Garage-Parts
Date Collected: 11/9/23
Test Requested: Non-viable spore trap analysis
Date Analyzed: 11/18/23

Volume (L): 75
Percentage of Slide Read: 100.0%
Detection Limit: 13.33
Particulate Level: moderate-heavy
Notes: _

Spore Identification	Count	Results	Units	Percentage
Cladosporium	12	160	spores/m^3	26%
Ascospores	3	40	spores/m^3	6%
Basidiospores	3	40	spores/m^3	6%
Smuts, *Periconia* , Myxomycetes	6	80	spores/m^3	13%
Penicillium/Aspergillus Group	8	107	spores/m^3	17%
Hyphal Elements	7	93	spores/m^3	15%
Alternaria	1	13	spores/m^3	2%
Curvularia	4	53	spores/m^3	9%
Epicoccum	1	13	spores/m^3	2%
Cercospora		-	spores/m^3	-
Arthrinium		-	spores/m^3	-
Clear Brown		-	spores/m^3	-
Colorless		-	spores/m^3	-
Trichocladium		-	spores/m^3	-
Unidentified	1	13	spores/m^3	2%
Ulocladium		-	spores/m^3	-
Torula		-	spores/m^3	-
Pithomyces		-	spores/m^3	-
Rust		-	spores/m^3	-
Drechslera/Bipolaris	1	13	spores/m^3	2%
Tetraploa		-	spores/m^3	-
Chaetomium		-	spores/m^3	-
Stachybotrys		-	spores/m^3	-
		-	spores/m^3	-
Total Spores	**47**	**627**	**spores/m^3**	

Analyzed by: Cathy A. Richmond, B.S.

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Bus Garage

Project Type: IAQ
PO/Claim #:

Sample Number: 5
Sample Location: Bus Garage-2nd Floor office
Date Collected: 11/9/23
Test Requested: Non-viable spore trap analysis
Date Analyzed: 11/18/23

Volume (L): 75
Percentage of Slide Read: 100.0%
Detection Limit: 13.33
Particulate Level: moderate
Notes: _

Spore Identification	Count	Results	Units	Percentage
Cladosporium	8	107	spores/m^3	14%
Ascospores	3	40	spores/m^3	5%
Basidiospores	3	40	spores/m^3	5%
Smuts, *Periconia* , Myxomycetes	13	173	spores/m^3	22%
Penicillium/Aspergillus Group	8	107	spores/m^3	14%
Hyphal Elements	9	120	spores/m^3	15%
Alternaria		-	spores/m^3	-
Curvularia	6	80	spores/m^3	10%
Epicoccum	3	40	spores/m^3	5%
Cercospora		-	spores/m^3	-
Arthrinium		-	spores/m^3	-
Clear Brown		-	spores/m^3	-
Colorless		-	spores/m^3	-
Trichocladium	1	13	spores/m^3	2%
Unidentified	1	13	spores/m^3	2%
Ulocladium		-	spores/m^3	-
Torula	1	13	spores/m^3	2%
Pithomyces		-	spores/m^3	-
Rust		-	spores/m^3	-
Drechslera/Bipolaris	3	40	spores/m^3	5%
Tetraploa		-	spores/m^3	-
Chaetomium		-	spores/m^3	-
Stachybotrys		-	spores/m^3	-
		-	spores/m^3	-
Total Spores	**59**	**787**	**spores/m^3**	

Analyzed by: Cathy A. Richmond, B.S.

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Bus Garage

Project Type: IAQ
PO/Claim #:

Sample Number: 6
Sample Location: Outdoor Air
Date Collected: 11/9/23
Test Requested: Non-viable spore trap analysis
Date Analyzed: 11/18/23

Volume (L): 75
Percentage of Slide Read: 25.0%
Detection Limit: 53.33
Particulate Level: moderate
Notes: _

Spore Identification	Count	Results	Units	Percentage
Cladosporium	51	2720	spores/m^3	44%
Ascospores	8	427	spores/m^3	7%
Basidiospores	6	320	spores/m^3	5%
Smuts, *Periconia* , Myxomycetes	9	480	spores/m^3	8%
Penicillium/Aspergillus Group	10	533	spores/m^3	9%
Hyphal Elements	3	160	spores/m^3	3%
Alternaria	3	160	spores/m^3	3%
Curvularia	14	747	spores/m^3	12%
Epicoccum	3	160	spores/m^3	3%
Cercospora	4	213	spores/m^3	3%
Arthrinium		-	spores/m^3	-
Clear Brown		-	spores/m^3	-
Colorless		-	spores/m^3	-
Trichocladium		-	spores/m^3	-
Unidentified		-	spores/m^3	-
Ulocladium		-	spores/m^3	-
Torula		-	spores/m^3	-
Pithomyces		-	spores/m^3	-
Rust	3	160	spores/m^3	3%
Drechslera/Bipolaris	2	107	spores/m^3	2%
Tetraploa		-	spores/m^3	-
Chaetomium		-	spores/m^3	-
Stachybotrys		-	spores/m^3	-
		-	spores/m^3	-
Total Spores	**116**	**6187**	**spores/m^3**	

Analyzed by: Cathy A. Richmond, B.S.

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Project #: 23-2212

Report Information:

DETECTION LIMITS (DL) for samples are the minimum number of spores or colonies forming units that can be satisfactorily identified for each sample type.

SPORE TRAP SAMPLES: Calculations based on volume of air sampled & percentage of slide counted, i.e. DL = 1000 L / 75 L if 100% of the slide is counted.

CODE 11: Fungal content and/or particulate level on slide too heavy to identify and enumerate fungal content.

Footnotes:

1. *Penicillium/Aspergillus* group spores are characterized by their small size, round to ovoid shape, being unicellular and usually colorless to lightly pigmented. There are numerous genera of fungi whose spore morphology is similar to that of the *Penicillium/Aspergillus* type. Several common examples would be *Acremonium, Paecilomyces,* and *Trichoderma* . Although the majority of spores placed in this group are *Penicillium* , *Aspergillus* , or a combination of both, these are not the only two possibilities.
2. Basidiospores are primarily transported indoors from outdoor sources and rarely grow indoors. A high basidiospore count indoors can be indicative of a wood decay problem or wet soil, and should be verified if and an outdoor source of the spores is not present.
3. Hyphae are the tubular filaments of fungi. Hyphae can fragment and become airborne much like spores and are potentially allergenic.
4. The Smut, *Periconia,* Myxomycete group is a group composed of three different types of organisms whose spores have similar morphologies. Smuts are plant pathogens, *Periconia* is a relatively uncommon mold indoors, and Myxomycetes are not fungi, but slime molds. Although these organisms do not typically proliferate indoors, their spores are potentially allergenic.
5. Rusts are plant pathogens. These fungi do not typically grow indoors unless an infected plant is present. Rust spores are potentially allergenic.

Chain of Custody available on request

Direct Microscopic Exam Reporting:

We use a 400x-600x magnification microscope.

Reporting Quantification Levels are as follows:

Reporting Level	Quantitative Description
Occasional	1-10 per square inch
Few	11-100 per square inch
Moderate	101-1000 per square inch
Numerous	More than 1,000 per square inch

Submitted By Analyst: Cathy A. Richmond, BS

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