Limited Indoor Air Quality Assessment and Sampling Report

November 1, 2022 Fairfield Roger Ludlowe High School 785 Unquowa Road, Fairfield CT

Fairfield Public Schools

Fairfield, Connecticut

November 2022



59 Elm Street, Suite 500 New Haven, CT 06510



November 23, 2022

Mr. Angelus Papageorge Executive Director of Operations Fairfield Public Schools 501 Kings Highway East, Suite 210 Fairfield, CT 06825

RE: Limited Indoor Air Quality Assessment and Sampling Fairfield Roger Ludlowe High School 785 Unquowa Road, Fairfield, CT Fuss & O'Neill Project No. 20211081.A20

Dear Mr. Papageorge:

Enclosed please find the report for the limited indoor air quality assessment and sampling conducted in rooms 107, 108, 109, 110, 115 and 112 within the Fairfield Roger Ludlowe High School located at 785 Unquowa Road, Fairfield, Connecticut (the "Site"). The work was conducted for the Fairfield Public Schools (the "Client").

The services were performed on November 1, 2022, by a Fuss & O'Neill, Inc. representative and included a limited indoor air quality assessment and bio-aerosol sampling for the presence of fungi. The work was performed in accordance with our written agreement dated October 6, 2022.

If you have any questions regarding the enclosed report, please do not hesitate to contact me at (860) 783-4751. Thank you for this opportunity to have served your environmental needs.

Sincerely,

Elmer Mype 1

Eduardo Miguel Marques Senior Environmental Analyst

www.fando.com

59 Elm Street, Suite 500 New Haven, CT

> 800.286.2469 f 860.533.5143

06510 † 203.374.3748

California Connecticut Maine Massachusetts New Hampshire Rhode Island Vermont EMM/nw

Enclosure



Table of Contents

Limited Indoor Air Quality Assessment and Sampling Report Fairfield Roger Ludlowe High School 785 Unquowa Road, Fairfield, Connecticut Fairfield Public Schools

1	Intro	Introduction and Background1						
2	Building Description							
3	Sco	pe of Testing and Methodology	1					
	3.1	Temperature and Relative Humidity	2					
	3.2	Carbon Dioxide (CO ₂)	2					
	3.3	Carbon Monoxide (CO)	2					
	3.4	Bio-Aerosol (Quantitative Spore Count) Air Sampling	3					
		3.4.1 Introduction	3					
		3.4.2 Air Sampling	3					
		3.4.3 Quantitative Spore Count Method	3					
		3.4.4 Interpretation of Results	4					
	3.5	Surface (Swab) Sampling	4					
	3.6	Moisture Meter Testing	4					
4	Obs	ervations	5					
5	Resu	ults	6					
	5.1	Temperature and Relative Humidity	6					
	5.2	Carbon Dioxide	6					
	5.3	Carbon Monoxide	6					
	5.4	Bio-Aerosol (Quantitative Spore Count) Air Sampling	6					
	5.5	Surface (Swab) Sampling	7					
	5.6	Moisture Meter Testing	7					
6	Con	clusions and Recommendations	7					
	6.1	Conclusions	7					
	6.2	Recommendations	8					





Table of Contents

Limited Indoor Air Quality Assessment and Sampling Report Fairfield Roger Ludlowe High School 785 Unquowa Road, Fairfield, Connecticut Fairfield Public Schools

Appendices

End of Report

APPENDIX A	LIMITATIONS
APPENDIX B	SITE DIAGRAM
APPENDIX C	INSTRUMENTATION LIST
APPENDIX D	DATA SHEET FOR TEMPERATURE, RELATIVE HUMIDITY, CARBON
	MONOXIDE AND CARBON DIOXIDE
APPENDIX E	QUANTITATIVE SPORE COUNT LABORATORY REPORT AND CHAIN
	OF CUSTODY FORM
APPENDIX F	DIRECT MICROSCOPIC EXAMINATION LABORATORY REPORT AND
	CHAIN OF CUSTODY FORM
APPENDIX G	SITE PHOTOGRAPHS





1 Introduction and Background

Fuss & O'Neill, Inc. (Fuss & O'Neill) was retained to conduct a limited indoor air quality (IAQ) assessment and sampling at the rooms 107, 108, 109, 110, 115 and 112 within the Fairfield Roger Ludlowe High School located at 785 Unquowa Road, Fairfield, Connecticut (the "Site"). The purpose of this assessment was to provide data regarding potential IAQ concerns at the Site. The work was conducted for Fairfield Public Schools (the "Client") in accordance with our written agreement dated October 6, 2022, and is subject to the limitations included in *Appendix A*.

Fuss & O'Neill's Senior Environmental Technician, Ms. Sandra Guzman, conducted the assessment and sampling on November 1, 2022.

2 **Building Description**

The Fairfield Ludlowe High School is a four-story building, reportedly constructed in 1949. Building additions were reportedly constructed in 1959, 1978, and 1998. In 2004, the Site underwent renovations when the school was converted from a middle school to the current high school. The building is heated with gas-fired hot water and air handlers for the ventilation and air conditioning are located at roof level.

3 Scope of Testing and Methodology

The scope of work included moisture, visual and olfactory assessments in select areas of the Site building where IAQ concerns were reported. The assessment also included real-time measurements for typical IAQ indicators and comparison to recognized guidelines.

Based in information provided by the Client, a faculty member has expressed concerns related to indoor air quality in room 107. The Client also requested rooms 108, 109, 110, 115 be included in the assessment as areas of concern. Room 112 (non-complaint area) was also evaluated for comparison purposes. Refer to *Appendix B* for the site diagram.

Test parameters included measurement of temperature, relative humidity (RH), carbon monoxide (CO), carbon dioxide (CO₂), and moisture.

Measurements were obtained using a TSI Veloci-Calc IAQ Meter, AP Buck BioAire Sampling Pump with Air-O-CellTM Cassettes and Delmhorst Moisture Meter.

Refer to *Appendix C* for a complete instrumentation list and corresponding calibration information used in conducting this assessment.



fUSS&O'NEILL

3.1 Temperature and Relative Humidity

Temperature and relative humidity levels are indicators of thermal comfort. The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) recommends that wintertime indoor temperature be maintained between 68°F and 74°F and summertime indoor temperature be maintained between 73°F and 79°F. ASHRAE also recommends that humidity be maintained in the range of 30% to 60%. Humidity below this range may cause stress through the drying of mucous membranes and skin. Humidity above this range may promote the growth of fungi spores with resultant contamination of the building and/or ventilation system.

According to its Standard 55-2020, Thermal Environmental Conditions for Human Occupancy, ASHRAE has defined the operative temperature (68°F to 79°F) as that temperature range at which at least 80% of the sedentary or near sedentary occupants will find the environment thermally acceptable.

3.2 Carbon Dioxide (CO₂)

Carbon dioxide (CO₂) is a product of human respiration. CO₂ concentrations in a building are used as a primary indicator of outside air exchange. CO₂ at very high concentrations (e.g., greater than 5,000 parts per million [ppm]) can pose a health risk. However, in most buildings, concentrations rarely rise to these levels and CO₂ at the concentrations commonly identified in buildings is not a direct health risk. At the activity levels in typical office buildings, steady CO₂ concentrations of about 700 ppm above outdoor air measurements indicate an outdoor air ventilation rate of about 15 cubic feet per minute (cfm) per person. CO₂ concentrations in outdoor air typically range from 300 to 500 ppm.

ASHRAE Standard 62.1-2022, Ventilation for Acceptable Indoor Air Quality, suggests an indoor CO_2 concentration of up to 1,000 to 1,200 ppm in spaces housing sedentary people is acceptable and an indicator of adequate outside air exchange.

3.3 Carbon Monoxide (CO)

Carbon monoxide (CO) is a colorless and odorless toxic gas that most often occurs as a by-product of incomplete hydrocarbon fuel combustion. The most likely sources of CO are from incomplete hydrocarbon fuel combustion inside a building, and from air intakes placed in, at, or near parking garages or street level that may entrain automotive exhaust gases into the air handling system. Back drafts from boiler flues may also provide a pathway for CO infiltration. In absence of any formal IAQ standard, Fuss & O'Neill uses the more conservative National Ambient Air Quality Standard (NAAQS) of 9 ppm for CO. The Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) for carbon monoxide is 50 ppm, as an eight-hour time-weighted-average (8-hr. TWA).





3.4 Bio-Aerosol (Quantitative Spore Count) Air Sampling

3.4.1 Introduction

Air-dispersed fungal particles are common in indoor and outdoor environments. The particles can include spores (air-disseminated "seeds" of fungi), yeasts, and other particles. The particles of many fungi can produce allergic reactions in susceptible members of the population.

The possible sources for the growth of fungi are varied and numerous, including stagnant water, watersoaked building materials (i.e., ceiling tiles, drywall, carpets, etc.), soiled ducting and filters in air handling units, and plants and landscaping inside a building.

3.4.2 Air Sampling

Air samples are collected for Quantitative Spore Count (QSC) analysis, representing concentrations of both viable and non-viable spores, as the latter can also have an influence on occupants as well as viable spores.

For the purposes of this assessment, a total of six interior air samples were collected from the areas listed below:

- Room 107
- Room 108
- Room 109
- Room 110
- Room 115
- Room 112 (non-complaint area)

In addition to the interior locations listed above, two air samples (pre-assessment and post-assessment) were collected from an exterior location to provide ambient data. The ambient air samples and the air sample from Room 112 were collected as controls for the type and amount of particulate gathered in the interior samples.

3.4.3 Quantitative Spore Count Method

Air samples are collected on Air-O-CellTM brand cassettes at 15.0 liters per minute (lpm) for ten minutes each. Vacuum is provided by a Buck BioAire Sampling pump specific for bio-aerosol sampling and calibrated on site with the associated calibrated rotometer. Particulate impacted onto the adhesive strip in the cassette is visually examined by microscope by a properly trained analyst to determine the quantitative spore count of the sample.





The collected samples were submitted for laboratory analysis to EMSL Analytical, Inc. (EMSL) of Cinnaminson, New Jersey (NJ). EMSL is an American Industrial Hygiene Association (AIHA) accredited laboratory for Environmental Microbiology.

3.4.4 Interpretation of Results

Molds are ubiquitous in the environment. As such, there are no regulatory standards regarding exposures to mold spores or even consistent guidelines for interpreting indoor mold concentrations. Most industry sources agree that it is not possible to recommend limits for mold concentrations due to the lack of data from which the concentrations can be linked to the onset of disease. Also, airborne mold concentrations may change according to spatial and temporal variations. Numerical standards and guidelines for mold; therefore, are not likely to be available in the near future.

Without standards and guidelines, the current approach to interpretation of results of mold samples relies on comparison of indoor vs. outdoor results and complaint vs. non-complaint area results. In general, indoor airborne mold counts should be significantly lower than those on a building exterior. Airborne mold counts in non-complaint areas should be significantly lower than those in complaint areas. In addition, the genus/species identified indoors should be similar to those identified in exterior samples. However, this may not always be consistent. Occupied buildings with many entrances and operable windows may have indoor mold airborne concentrations higher than or as high as those from the exterior. Also, the concentrations of exterior mold genus/species are likely to be lower on a cold or rainy day compared to the expected concentrations on a warm, sunny day when the spores may be abundant. A situation may be considered unusual when the airborne mold concentrations in the indoor/complaint area are significantly higher than those in the exterior/non-complaint area. Interpretation of these results requires considerable professional judgment.

3.5 Surface (Swab) Sampling

Swab samples were collected from surfaces where suspect mold growth was observed. At the time of the assessment, suspect mold growth was observed in room 108 on fabric wall paneling and one surface sample was collected from this location.

Swab samples are collected using HealthLink sterile transporter swabs from an approximate two squareinch collection area. Swab samples are then analyzed by direct microscopic examination for spores and growth to determine a quantitative spore count per area of the sample. Like the air sampling method described above, direct examination identifies mold spores, but does not differentiate between viable and non-viable mold spores. Non-viable spores can be of interest with respect to health, as can viable spores. EMSL Analytical, Inc. performed the analysis.

3.6 Moisture Meter Testing

Moisture concentrations in building materials were evaluated using a Delmhorst Moisture Meter. Measurements were collected from building materials in various locations during the assessment to identify moisture concentrations in building materials which to identify potential areas of moisture intrusion as well as active water leaks.





4 Observations

On November 1, 2022, the weather was cloudy with an ambient temperature of 66°F.

Fuss & O'Neill conducted a visual assessment of the areas noted bellow:

- Room 107
 - Obvious visible suspect mold growth not observed.
 - Mold or mildew odor not observed .
 - Water staining was not observed.
 - Air handling system was operational at the time of the assessment
 - Supply diffusers and return grates displayed evidence of dust accumulation
- Room 108
 - Suspect mold growth observed on fabric wall paneling behind the door
 - Elevated moisture content was not identified in the area of suspect mold growth
 - Mold or mildew odor not observed.
 - Water staining was not observed.
 - Air handling system was operational at the time of the assessment
 - Supply diffusers and return grates displayed evidence of dust accumulation
- Room 109
 - Obvious visible suspect mold growth not observed.
 - Slight musty odor observed.
 - Water staining was not observed.
 - Air handling system was operational at the time of the assessment
 - One portable fan was observed in the room but was not operational at the time of the assessment
- Room 110
 - Obvious visible suspect mold growth not observed.
 - Slight musty odor observed.
 - Water staining was not observed.
 - Air handling system was operational at the time of the assessment
- Room 112 (Non-complaint area)
 - Obvious visible suspect mold growth not observed.
 - Mold or mildew not observed .
 - Air handling system was operational at the time of the assessment
 - Water staining observed on one of the suspended ceiling tiles.
 - Elevated moisture content was not identified in the area of suspect mold growth





5 Results

5.1 Temperature and Relative Humidity

At the time of the assessment, interior temperature measurements ranged from 73.4°F to 78°F. These measurements were within the ASHRAE recommended range of between 68°F and 79°F. Relative humidity measurements ranged from 58% to 62%. Some of these measurements were slightly above the ASHRAE recommended range of 30 to 60%. Outdoor ambient temperatures ranged from 75°F to 80°F and outdoor relative humidity measurements ranged from 64% to 66%.

Refer to *Appendix D* for the data sheet for temperature, relative humidity, carbon dioxide, carbon monoxide.

5.2 Carbon Dioxide

At the time of the assessment, the interior concentrations of carbon dioxide ranged from 438 ppm to 456 ppm. These measurements were acceptable in accordance with ASHRAE recommendations of up to 1,000 to 1,200 ppm.

5.3 Carbon Monoxide

Within the limitation of instrumental accuracy, there was no carbon monoxide detected in the building during this assessment.

5.4 Bio-Aerosol (Quantitative Spore Count) Air Sampling

Air sampling for Quantitative Spore Count (QSC) was conducted on November 1, 2022. The QSC in the ambient air samples ranged from 34,610 Count/m³ (pre-assessment sample) to 33,460 Count/m³ (post-assessment sample). The QSC in the interior air samples ranged from 610 Count/m³ to 18,560 Count/m³.

Results for the indoor air samples collected from the areas included in the assessment showed no concentrations of concern. The interior samples displayed species similar to those exhibited in the exterior samples and the identified spore types were present in concentrations similar or less than those exhibited in the exterior samples when comparing data presented the in the laboratory report.

Refer to Appendix E for the Quantitative Spore Count laboratory report and chain of custody form.





5.5 Surface (Swab) Sampling

The results of the swab samples collected from representative areas of suspect mold growth observed on wall paneling in room 108 (behind the door) identified the spore type *Cladosporium* in low counts. This spore type was identified in the air sample collected from this area in minimal concentrations. This spore type was also observed in the exterior ambient samples in similar concentrations.

Refer to Appendix F for the Direct Microscopic Examination laboratory reports and chain of custody forms.

5.6 Moisture Meter Testing

At the time of the assessment, minimal moisture concentrations were detected on the wall paneling in room 108 where suspected mold growth was observed and in room 112 where the ceiling tile was observed to be water stained. These measurements indicate an active moisture source was not present in these areas at the time of the assessment.

6 Conclusions and Recommendations

Based on the measurements, physical walk-through, and information available at the time of this assessment, Fuss & O'Neill concludes and recommends the following:

6.1 Conclusions

Based on the measurements, sampling and visual inspection performed and information available at the time of this assessment, Fuss & O'Neill concludes and recommends the following:

- Interior temperature measurements were within the ASHRAE recommended comfort range of 68-79°F.
- Interior relative humidity measurements were primarily within the ASHRAE recommended comfort range with the exception of Rooms 109 and 110.
 - This observation can likely be attributed to elevated exterior ambient humidity at the time of the assessment.
- Interior concentrations of carbon dioxide were acceptable in accordance with ASHRAE recommendations.
- Interior concentrations of carbon monoxide were acceptable and below levels specified by the NAAQS.
- `Results for the indoor bioaerosol air samples collected from the areas included in the assessment showed no concentrations of concern.





- The interior samples displayed species similar to those exhibited in the exterior samples and the identified spore types were present in concentrations similar or less than those exhibited in the exterior samples when comparing data presented the in the laboratory report.
- The swab sample collected from the wall surface in room 108 displayed low concentrations of the spore type *Cladosporium*.
 - The spore type *Cladosporium* can grow on many substrates including textiles, woods, moist window sills, etc.
- Accumulations of dust and particulate were observed on several HVAC supply diffusers and return registers.

6.2 **Recommendations**

- Conduct targeted surface cleaning to remove identified surface growth on the fabric wall panel behind the door Room 108.
 - This work should be performed in a controlled manor by qualified professionals to prevent the potential migration of mold spores during the remediation process.
- Visually review fabric wall panels throughout the school and conduct surface cleaning as needed,
 - This may include targeted review of areas that receive minimal air flow (e.g. areas behind doors, cabinets, desks, etc.)
- Generate a plan to conduct surface cleaning of HVAC supply diffusers and return grates. General cleaning of duct vent supply/return diffusers.
- Continue regular preventative maintenance of the HVAC system, including regular filter changes/cleaning and maintenance.

Refer to Appendix G for photographs taken during the assessment.

Report prepared by Senior Environmental Technician Sandra Guzman.

Review by:

Elmin

Eduardo Miguel Marques Senior Environmental Analyst

lared D. Smith, Senior Project Manager





Appendix A

Limitations





APPENDIX A

Site: Fairfield Roger Ludlowe High School 785 Unquowa Road, Fairfield, Connecticut

- 1. This environmental report has been prepared for the exclusive use of the Fairfield Public Schools (the "Client"), and is subject to, and is issued in connection with our written agreement on October 6, 2022. Any use or reliance upon information provided in this report, without the specific written authorization of the Client and Fuss & O'Neill, Inc. (Fuss & O'Neill) shall be at the User's individual risk.
- 2. Fuss & O'Neill has obtained and relied upon information from multiple sources to form certain conclusions regarding the Site when conducting this assessment. Except as otherwise noted, no attempt has been made to verify the accuracy or completeness of such information or verify compliance by any party with federal, state or local laws or regulations.
- 3. Fuss & O'Neill has obtained and relied upon laboratory analytical results in conducting the sampling. This information was used to form conclusions regarding the types and quantities of bio-aerosols and mold at the Site. Fuss & O'Neill has not performed an independent review of the reliability of this laboratory data.
- 4. The findings, observations, and conclusions presented in this report are limited by the scope of services outlined in our Agreement dated October 6, 2022, which reflects schedule and budgetary constraints imposed by Client. Furthermore, the assessment has been conducted in accordance with generally accepted environmental practices. No other warranty, expressed or implied, is made.
- 5. The conclusions presented in this report are based solely upon information gathered by Fuss & O'Neill to date. Should further environmental or other relevant information be discovered at a later date, the Client should immediately bring the information to Fuss & O'Neill's attention. Based upon an evaluation and assessment of relevant information, Fuss & O'Neill may modify this report and its conclusions.





Appendix B

Site Diagram







Appendix C

Instrumentation List





Instrumentation

Measurement Parameter	Description	Calibration
Temperature, Relative Humidity,		
Carbon Dioxide & Carbon	TSI Veloci-Calc IAQ Meter (7545X)	Annually – 2022
Monoxide		
Air Sampling	AP Buck BioAire Sampling Pump with Air-O-Cell™ Cassettes	Rotameter #R12882
Moisture Content on/in Building Materials	Delmhorst Moisture Meter, Model BD-10	Factory





Appendix D

Data Sheet for Temperature, Relative Humidity, Carbon Dioxide, and Carbon Monoxide





Air Quality Parameters

CLIENT: Fairfield Public Schools

SITE ADDRESS: 785 Unquowa Road

CITY & STATE: Fairfield, CT

FUSS & O'NEILL PROJECT NO. 20211081.A20

Date: <u>11/1/2022</u> Location: <u>Fairfield Ludlowe High School</u> Page <u>1</u> of <u>1</u>

Location	Time (0000)	# of Occupants	CO ₂ (PPM)	CO (PPM)	Temp. (°F)	RH (%)
Re	commende	d Guidelines	< 1,200	< 9.0	68-79	30-60
Exterior Courtyard	14:56	N/A	442	0.0	64.8	80.4
Room 115	15:16	2	440	0.0	76.9	58
Room 107	15:34	1	456	0.0	78	54.7
Room 108	15:37	1	442	0.0	76	57.5
Room 109	16:09	1	439	0.0	73.5	61.6
Room 110	16:24	1	461	0.0	73.4	62.3
Room 112 (Area of no Concern)	16:40	1	438	0.0	74.6	60.2
Exterior Courtyard	16:54	N/A	434	0.0	66.6	75.1





Appendix E

Quantitative Spore Count Laboratory Report and Chain of Custody Form





EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077 Tel/Fax: (800) 220-3675 / (856) 786-0262 http://www.EMSL.com / cinnmicrolab@emsl.com
 EMSL Order:
 372217746

 Customer ID:
 ENVI54

 Customer PO:
 20211081.A20

 Project ID:

Attention: Eduardo Marques

Fuss & O'Neill, Inc. 146 Hartford Road Manchester, CT 06040 Phone: (860) 646-2469 Fax: Collected Date: 11/01/2022 Received Date: 11/02/2022 11:10 AM Analyzed Date: 11/03/2022

Project: 20211081.A20 / Fairfield Roger Ludlow High School, 785 Unquowa Road, Fairfield CT

Test Report:Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods MICRO-SOP-201, ASTM D7391)										
Lab Sample Number: Client Sample ID: Volume (L):	372217746-0001 110122SG-1 150			372217746-0002 110122SG-2 150			372217746-0003 110122SG-3 150			
Sample Location:	Cou	urtyard - Exteri	or	ĺ	Room 115			Room 107		
Spore Types	Raw Count	Count/M ³	% of Total	Raw Count	Count/M ³	% of Total	Raw Count	Count/M ³	% of Total	
Alternaria (Ulocladium)	-	-	-	-	-	-	-	-	-	
Ascospores	24	520	1.5	5	100	0.5	1	20	1.3	
Aspergillus/Penicillium	4	90	0.3	-	-	-	-	-	-	
Basidiospores	1540	33600	97.1	842	18400	99.1	62	1400	93.3	
Bipolaris++	-	-	-	-	-	-	-	-	-	
Chaetomium++	-	-	-	-	-	-	-	-	-	
Cladosporium	3	70	0.2	1	20	0.1	2	40	2.7	
Curvularia	-	-	-	2	40	0.2	-	-	-	
Epicoccum	-	-	-	-	-	-	-	-	-	
Fusarium++	-	-	-	-	-	-	-	-	-	
Ganoderma	15	330	1	-	-	-	2	40	2.7	
Myxomycetes++	-	-	-	-	-	-	-	-	-	
Pithomyces++	-	-	-	-	-	-	-	-	-	
Rust	-	-	-	-	-	-	-	-	-	
Scopulariopsis/Microascus	-	-	-	-	-	-	-	-	-	
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-	
Unidentifiable Spores	-	-	-	-	-	-	-	-	-	
Zygomycetes	-	-	-	-	-	-	-	-	-	
Chaetoconis	-	-	-	-	-	-	-	-	-	
Total Fungi	1586	34610	100	850	18560	100	67	1500	100	
Hyphal Fragment	1	20	-	-	-	-	-	-	-	
Insect Fragment	-	-	-	-	-	-	-	-	-	
Pollen	-	-	-	-	-	-	-	-	-	
Analyt. Sensitivity 600x	-	22	-	-	22	-	-	22	-	
Analyt. Sensitivity 300x	-	7*	-	-	7*	-	-	7*	-	
Skin Fragments (1-4)	-	1	-	-	2	-	-	2	-	
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-	
Background (1-5)	-	2	-	-	1	-	-	1	-	

++ Includes other spores with similar morphology; see EMSL's fungal glossary for each specific category.

Vincent luzzolino, M.S., Laboratory Manager or other Approved Signatory

No discernable field blank was submitted with this group of samples.

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. High levels of background particulate can obscure spores and other particulates, leading to underestimation. Background levels of 5 indicate an overloading of background particulates, prohibiting accurate detection and quantification. Present = Spores detected on overloaded samples. Results are not blank corrected unless otherwise noted. The detection limit is equal to one fungal spore, structure, pollen, fiber particel or insect fragment. *** Denotes particles found at 300X. **. Denotes not detected. Due to method stopping rules, raw counts in excess of 100 are extrapolated based on the percentage analyzed. Skin & Fibrous ratings: 1 (1-25%), 2 (26-50%), 3 (51-75%), 4 (76-100%) of the background particles. Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ AlHA-LAP, LLC-EMLAP Accredited #100194

Initial report from: 11/04/2022 09:19 AM

For information on the fungi listed in this report, please visit the Resources section at www.emsl.com MIC_M001_0002_0002 Printed: 11/04/2022 09:20 AM



EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077 Tel/Fax: (800) 220-3675 / (856) 786-0262 http://www.EMSL.com / cinnmicrolab@emsl.com
 EMSL Order:
 372217746

 Customer ID:
 ENVI54

 Customer PO:
 20211081.A20

 Project ID:

Attention: Eduardo Marques

Fuss & O'Neill, Inc. 146 Hartford Road Manchester, CT 06040 Phone: (860) 646-2469 Fax: Collected Date: 11/01/2022 Received Date: 11/02/2022 11:10 AM Analyzed Date: 11/03/2022

Project: 20211081.A20 / Fairfield Roger Ludlow High School, 785 Unquowa Road, Fairfield CT

Test Report:Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods MICRO-SOP-201, ASTM D7391)										
Lab Sample Number: Client Sample ID: Volume (L):	3	72217746-0004 110122SG-4 150		372217746-0005 110122SG-5 150			372217746-0006 110122SG-6 150			
Sample Location:		Room 108		İ	Room 109			Room 110		
Spore Types	Raw Count	Count/M ³	% of Total	Raw Count	Count/M ³	% of Total	Raw Count	Count/M ³	% of Total	
Alternaria (Ulocladium)	-	· -	-	-	-		-	-	-	
Ascospores	6	100	1.5	-	-	-	-	-	-	
Aspergillus/Penicillium	3	70	1.1	5	100	7.6	1	20	0.5	
Basidiospores	288	6280	95.9	53	1200	90.9	190	4150	99	
Bipolaris++	-	-	-	-	-	-	-	-	-	
Chaetomium++	-	-	-	-	-	-	-	-	-	
Cladosporium	3	70	1.1	-	-	-	-	-	-	
Curvularia	-	-	-	-	-	-	-	-	-	
Epicoccum	1*	7*	0.1	-	-	-	-	-	-	
Fusarium++	-	-	-	-	-	-	-	-	-	
Ganoderma	1	20	0.3	1	20	1.5	-	-	-	
Myxomycetes++	-	-	-	-	-	-	-	-	-	
Pithomyces++	-	-	-	-	-	-	-	-	-	
Rust	-	-	-	-	-	-	-	-	-	
Scopulariopsis/Microascus	-	-	-	-	-	-	-	-	-	
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-	
Unidentifiable Spores	-	-	-	-	-	-	1	20	0.5	
Zygomycetes	-	-	-	-	-	-	-	-	-	
Chaetoconis	-	-	-	-	-	-	-	-	-	
Total Fungi	302	6547	100	59	1320	100	192	4190	100	
Hyphal Fragment	-	-	-	1*	7*	-	-	-	-	
Insect Fragment	-	-	-	-	-	-	-	-	-	
Pollen	-	-	-	1	20	-	2	40	-	
Analyt. Sensitivity 600x	-	22	-	-	22	-	-	22	-	
Analyt. Sensitivity 300x	-	7*	-	-	7*	-	-	7*	-	
Skin Fragments (1-4)	-	2	-	-	1	-	-	2	-	
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-	
Background (1-5)	-	3	-	-	2	-	-	3	-	

++ Includes other spores with similar morphology; see EMSL's fungal glossary for each specific category.

Vincent luzzolino, M.S., Laboratory Manager or other Approved Signatory

No discernable field blank was submitted with this group of samples.

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. High levels of background particulate can obscure spores and other particulates, leading to underestimation. Background levels of 5 indicate an overloading of background particulates, prohibiting accurate detection and quantification. Present = Spores detected on overloaded samples. Results are not blank corrected unless otherwise noted. The detection limit is equal to one fungal spore, structure, pollen, fiber particel or insect fragment. *** Denotes particles found at 300X. **. Denotes not detected. Due to method stopping rules, raw counts in excess of 100 are extrapolated based on the percentage analyzed. Skin & Fibrous ratings: 1 (1-25%), 2 (26-50%), 3 (51-75%), 4 (76-100%) of the background particles. Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ AlHA-LAP, LLC-EMLAP Accredited #100194

Initial report from: 11/04/2022 09:19 AM

For information on the fungi listed in this report, please visit the Resources section at www.emsl.com



EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077 Tel/Fax: (800) 220-3675 / (856) 786-0262 http://www.EMSL.com / cinnmicrolab@emsl.com
 EMSL Order:
 372217746

 Customer ID:
 ENVI54

 Customer PO:
 20211081.A20

 Project ID:

Attention: Eduardo Marques

Fuss & O'Neill, Inc. 146 Hartford Road Manchester, CT 06040 Phone: (860) 646-2469 Fax: Collected Date: 11/01/2022 Received Date: 11/02/2022 11:10 AM Analyzed Date: 11/03/2022

Project: 20211081.A20 / Fairfield Roger Ludlow High School, 785 Unquowa Road, Fairfield CT

Test Report:Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods MICRO-SOP-201, ASTM D7391)									
Lab Sample Number: Client Sample ID: Volume (L):	3	72217746-0007 110122SG-7 150		3	72217746-0008 110122SG-8 150				
Sample Location:		Room 112		Co	Courtyard - Exterior				
Spore Types	Raw Count	Count/M ³	% of Total	Raw Count	Count/M ³	% of Total	-	-	-
Alternaria (Ulocladium)	-	-	-	-	-	-	-	-	-
Ascospores	1	20	3.3	24	520	1.6	-		
Aspergillus/Penicillium	-	-	-	13	280	0.8	-		
Basidiospores	23	500	82	1490	32500	97.1	-		
Bipolaris++	-	-	-	-	-	-	-		
Chaetomium++	-	-	-	-	-	-	-		
Cladosporium	4	90	14.8	1	20	0.1	-		
Curvularia	-	-	-	-	-	-	-		
Epicoccum	-	-	-	-	-	-	-		
Fusarium++	-	-	-	-	-	-	-		
Ganoderma	-	-	-	6	100	0.3	-		
Myxomycetes++	-	-	-	-	-	-	-		
Pithomyces++	-	-	-	-	-	-	-		
Rust	-	-	-	-	-	-	-		
Scopulariopsis/Microascus	-	-	-	-	-	-	-		
Stachybotrys/Memnoniella	-	-	-	-	-	-	-		
Unidentifiable Spores	-	-	-	-	-	-	-		
Zygomycetes	-	-	-	-	-	-	-		
Chaetoconis	-	-	-	2	40	0.1	-		
Total Fungi	28	610	100	1536	33460	100	-		
Hyphal Fragment	-	-	-	-	-	-	-		
Insect Fragment	-	-	-	-	-	-	-		
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	22	-	-	22	-	-		
Analyt. Sensitivity 300x	-	7*	-	-	7*	-	-		
Skin Fragments (1-4)	-	2	-	-	1	-	-		
Fibrous Particulate (1-4)	-	1	-	-	1	-	-		
Background (1-5)	-	3	-	-	1	-	-	-	-

++ Includes other spores with similar morphology; see EMSL's fungal glossary for each specific category.

Vincent luzzolino, M.S., Laboratory Manager or other Approved Signatory

No discernable field blank was submitted with this group of samples.

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. High levels of background particulates an overloading of background particulates, prohibiting accurate detection and quantification. Present = Spores detected on overloaded samples. Results are not blank corrected unless otherwise noted. The detection limit is equal to one fungal spore, structure, pollen, fiber particules, raw counts in excess of 100 are extrapolated based on the percentage analyzed. Skin & Fibrous ratings: 1 (1-25%), 2 (26-50%), 3 (51-75%), 4 (76-100%) of the background particles. Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ AIHA-LAP, LLC-EMLAP Accredited #100194

Initial report from: 11/04/2022 09:19 AM

For information on the fungi listed in this report, please visit the Resources section at www.emsl.com MIC_M001_0002_0002 Printed: 11/04/2022 09:20 AM OrderID: 372217746 FUSS & O'NEILL

Ì

L

EMSL Customer Number ENVI54

www.fando.com

372217746

59 Elm Street - Suite 500 - New Haven, CT 06510

800-286-2469, FAX: 860-533-5143

BIO-AEROSOLS (FUNGI/BACTERIA) CHAIN OF CUSTODY FORM

Project Name: Fairfield Roger Ludlowe High School

Project Number: <u>20211081.A20</u>

Project Location: 785 Unquowa Road, Fairfield, CT

Project Manager: Eduardo Miguel Marques

		Time			Flow Rate	Volume	
Sample ID Number	Sampling Location	Start	Finish	Total	(LPM)	(Liters)	
11017256-1.	Courtyand - Exterior	14:55	15:05	10 mm.	15	150.	
11012256-2	Room 115	15:16.	15:26	10mm	ls	1.50	
1017256-3	Room 107	15:34	15:44	10 min	15	150	
10/2256-4	Room 128.	15:57	16:07	10 mins	15	150	
10/2286-5	Room 109	16:09	16:19	10 min.	15	150	
110/2256-6	Room 110	16:24	16:34	10 m.n	15	150.	
110/7256-7	Room 1/2-	16:40	16:50	10 mm	_/5	150.	
10/2286-8	Courtyard-Externor.	16:54	17:04	10mm	15	150.	
	/						
		 			2022	<u> </u>	
_			_		NOV	R	
Turnaround Time <u>48 F</u>	Hours Total Number of Samples:	(8)50	mples		-2 -2	EMS	
Based on the turnarour	nd time indicated above, analyses are due t	o Fuss & Ø'	Neill Enviro	Science on o		<u>73022</u>	
Please call the Fuss & (D'Neill EnviroScience laboratory at 860-64	46-2469 if an	alyses will be	e late.	U = U		
Email results to: <u>Lab</u>	Results@fando.com and		EM	larques@fa	ndo.com Do N	Not Mail	
Hard Copies							
Special Instructions:		<u>_</u>					
Samples Collected By	.Sandra 612man Date: 1/	101/207	2		1:50 - 1	7:15	
Samples Rec'd/Sent	By: <u>56 pman</u> Date: 11/	01/29	22.	Time:	17:301		
Samples Received By	: DC/ay h EFX Date: 1	1/2/22		_ Time:	01)		
Shipped To:	🖞 EMSL 🗌 Oti	ner					
Method of Shipment:	🕅 Fed Ex. 🗌 UPS Overnight 🗌] UPS Grou	nd	Lab Drop O	ff		
F:\P2021\1081\A20\Lab Data\NH_IAQ Sampling Form_Bio-Acrosols_2022-09-19.docx							

Page 1 Of 1



Appendix F

Direct Microscopic Examination Laboratory Report and Chain of Custody Form



EMSL

EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077 Tel/Fax: (800) 220-3675 / (856) 786-0262 <u>http://www.EMSL.com</u> / <u>cinnmicrolab@emsl.com</u>

Attention: Eduardo Marques	Phone: (860) 646-2469
Fuss & O'Neill, Inc.	Fax:
146 Hartford Road	Collected Date: 11/01/2022
Manchester, CT 06040	Received Date: 11/02/2022
	Analyzed Date: 11/03/2022
Project: 20211081A20 / Fairfield Roger Ludlowe High	l School, 785 Unquowa Rd, Fairfield, CT

Test Report: Microscopic Examination of Fungal Spores, Fungal Structures, Hyphae, and Other Particulates from Swab Samples (EMSL Method MICRO-SOP-200)

Lab Sample Number:	372217724-0001				
Client Sample ID:	110122SwabSG01				
Sample Location:	Room 108 - Wall Paneling				
Spore Types	Category	-	-	-	-
Alternaria (Ulocladium)	Rare				
Ascospores	Rare				
Aspergillus/Penicillium	Rare				
Basidiospores	Rare				
Bipolaris++	-				
Chaetomium++	Rare				
Cladosporium	*Low*				
Curvularia	Rare				
Epicoccum	Rare				
Fusarium++	-				
Ganoderma	-				
Myxomycetes++	Low				
Pithomyces++	Rare				
Rust	-				
Scopulariopsis/Microascus	-				
Stachybotrys/Memnoniella	Rare				
Unidentifiable Spores	-				
Zygomycetes	-				
Arthrinium	Rare				
Cercospora++	Rare				
Pestalotia++	Rare				
Hyphal Fragment	Rare				
Insect Fragment	Rare				
Pollen	-				
Fibrous Particulate	Rare				

Category: Count/per area analyzed - Rare: 1 to 10 Low: 11 to 100 Medium: 101 to 1000 High: >1000

Denotes Not Detected.

++ Includes other spores with similar morphology; see EMSL's fungal glossary for each specific category. * = Sample contains fruiting structures and/or hyphae associated with the spores.

Vincent Iuzzolino, M.S., Laboratory Director or other Approved Signatory

No discernable field blank was submitted with this group of samples.

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ AIHA-LAP, LLC-EMLAP Accredited #100194

Initial report from: 11/04/2022 08:42 AM

For information on the fungi listed in this report, please visit the Resources section at www.emsl.com

Fuss & O'Neill EnviroScience EMSL Customer No. ENVI54

FUSS & O'NEILL

OrderID: 372217724

www.fando.com 800-286-2469 Fax (860) 533-5143

SAMPLING CHAIN OF CUSTODY FORM

372217724

Project Number: 20211081A20

Task #: _

Project Name: Fairfield Roger Ludlowe High School

59 Elm Street - Suite 500 - New Haven, CT 06510

Project Location: 785 Unquowa Road, Fairfield, Connecticut

Project Manager: Eduardo Miguel Marques

Sample ID Number	Sampling Location	Surface Type	Area (2 Sq. In.)
1101225 wabs6-01	Room 108 - Wall Poneling	Fabric	25910
and the second second			1
and the second second			1
		205	. Au
		187	
		ON 1	NNK
	and the second sec		AME
KA		X	NSL NSL
Identification of fungal struct Based on the turnaround time in Please call the Fuss & O'Neill la	dicated above, analyses are due to Fuss & O'Neill on or boratory at 860-646-2469 if analyses will be late.	before this date:	,
Email Results to: <u>LabResults</u> Do Not Mail Hard Copies	@fando.com and Emargues @	fando.com	
Special Instructions:			
amples Collected By: 20.	none 612man Date: 1/01/1202	Z. Time: 16:07	77 -
Samples Rec'd/Sent By:	/ Date: /	Time:	/
amples Received By: DCla	mt EFX Date: 11/2/22	Time:110	
Shipped To:	□Other		
Method of Shipment: Fed E	x. \square UPS Overnight \square UPS Ground	d Other	
F:\P2021\1081\A20\Lab Data\IAQ Sv	vab Sampling COC_Revised_2022-09-19.docx		

Page 1 Of 1



Appendix G

Site Photographs







HVAC Vent with Dust Accumulation



HVAC Vent with Dust Accumulation







Room 108 Suspect Mold Growth observed at the Wall Paneling Behind the Door



Water Staining observed on one of the Suspended Ceiling Tiles