Marsh Grammar School – Room 107 (and adjacent hallway)

Indoor Air Quality Assessment

Methuen Public Schools

9 Branch Street, Methuen, MA 01844

Prepared by:

SLR International Corporation

2 Commerce Drive, Suite 110, Bedford, New Hampshire, 03110

SLR Project No.: 144.021306.00001

December 12, 2024

Limitations

The services described in this work product were performed in accordance with generally accepted professional consulting principles and practices. No other representations or warranties, expressed or implied, are made. These services were performed consistent with our agreement with our client. This work product is intended solely for the use and information of our client unless otherwise noted. Any reliance on this work product by a third party is at such party's sole risk.

Opinions and recommendations contained in this work product are based on conditions that existed at the time the services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. The data reported and the findings, observations, and conclusions expressed are limited by the scope of work. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this work product.

No investigation can be thorough enough to exclude the presence of hazardous materials at a given site. If hazardous conditions have not been identified during the assessment, such a finding should not therefore be construed as a guarantee of the absence of such materials on the site, but rather as the result of the services performed within the scope, practical limitations, and cost of the work performed.

Environmental conditions that are not apparent may exist at the site. Our professional opinions are based in part on interpretation of data from a limited number of discrete sampling locations and therefore may not be representative of the actual overall site environmental conditions.

The passage of time, manifestation of latent conditions, or occurrence of future events may require further study at the site, analysis of the data, and/or reevaluation of the findings, observations, and conclusions in the work product.

This work product presents professional opinions and findings of a scientific and technical nature. The work product shall not be construed to offer legal opinion or representations as to the requirements of, nor the compliance with, environmental laws rules, regulations, or policies of federal, state or local governmental agencies.

This report, which presents our findings, shall not be used as a bid document/work plan, or in place of a work plan, for conducting any abatement activities.

The observations described in this report were made under the conditions stated herein. The conclusions presented in the reports were based solely upon the services described therein and not on scientific tasks or procedures beyond the proposed scope of services.

The conclusions and recommendations contained in this report are based on environmental sampling and visual observations (not including inaccessible areas) and were arrived at in accordance with generally accepted standards of industrial hygiene practice. No other warranty, express or implied, is made.

Where sample analyses were conducted by an outside laboratory, SLR has relied upon the data provided and has not conducted an independent evaluation of the reliability of this data.

Only the areas mentioned within this report were assessed.

Indoor Air Quality Assessment of Marsh Grammar School – Room 107 (and adjacent hallway)

Prepared for:

Methuen Public Schools
9 Branch Street, Methuen, MA 01844

This document has been prepared by SLR International Corporation (SLR). The material and data in this report were prepared under the supervision and direction of the undersigned.

Sincerely,

SLR International Corporation

Ryan D. Rouillard, M.S., IH, CRMI
Principal, Building Sciences

Keith Allard, CHST
Associate Building Sciences Specialist

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Appendix A Fungal Analytical Laboratory Report and Chains of Custody

Acronyms and Abbreviations

ACM	Asbestos Containing Material
AFFF	aqueous film-forming foam
ASTM	American Society for Testing and Materials
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAP	Corrective Action Plan
CFR	Code of Federal Regulations
COC	chain of custody
cy	cubic yards
LBP	Lead Based Paint
MDL	method detection limit
µg/Kg	microgram per kilogram
µg/L	microgram per liter
mg/Kg	milligrams per kilogram
mg/L	milligrams per liter
MRL	method reporting limit
ND	not detected
NIMS	National Incident Management System
PCM	Phase Contrast Microscopy
pfc	per cubic feet
PID	photoionization detector
PLM	Polarized Light Microscopy
PPE	personal protective equipment
ppm	parts per million
QA	quality assurance
QAR	quality assurance review
QC	quality control
RCRA	Resource Conservation and Recovery Act
SLR	SLR International Corporation
TCLP	toxicity characteristics leaching procedure
TEM	Transmission electron microscopy
µg/L	micrograms per liter
µg/kg	micrograms per kilogram
USEPA	U.S. Environmental Protection Agency

1.0 Introduction

SLR International Corporation (SLR) is pleased to present the results of the Indoor Air Quality Assessment conducted at the Marsh Grammar School (Site) on December 10, 2024. More specifically, only Room 107 and adjacent hallway (Project Areas) was assessed. Mr. Bruce Stella accompanied SLR to the project areas.

1.1 Scope of Services

The scope of services for this project included:

- General IAQ indicator measurements that include carbon dioxide (CO_2), temperature (°F), and relative humidity (%) at indoor and outdoor locations.
- Collection of mold-in-air samples for lab analysis.
- Preparation of a written report describing sampling methods and the results of the limited IAQ assessment.

1.2 Standard of Care

This IAQ testing was conducted at the Site and was based on information provided to SLR relating to building conditions and occupant complaints. SLR did not attempt to identify every potential exposure or hazard present in the rooms of the subject building.

This testing was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the same locale. The results expressed in this report are based on conditions observed during our investigation. Many factors, such as weather conditions, building occupancy, ventilation patterns, and seasonal variations in fungal/ bacterial concentrations or local sources of volatile chemicals, can affect the conditions observed. The information contained in this report should not be relied upon to represent conditions that existed prior to this assessment. SLR does not warrant the services of regulatory agencies, laboratories, or other third parties supplying information that may have been used in the preparation of this report.

1.3 Reliance

The report has been prepared on behalf of and exclusively for use by the Methuen Public Schools for specific application to its project, as discussed. No other individual or entity may rely on this report without written permission of SLR and the Methuen Public Schools. Reliance on this report by the Methuen Public Schools and all authorized parties will be subject to the key understandings and limitations stated in the proposal, this report, and SLR's Agreement for Services. The limitation of liability defined in SLR's Agreement for Services is the aggregate limit of SLR's liability to the Methuen Public Schools and all relying parties.

2.0 Field Activities

SLR's December 10, 2024 inspection of the Project Area, by reasonable means, focused on the client-reported complaints. Mr. Bruce Stella provided background information of the Project Area, access to various building locations to be assessed and building maintenance work. SLR conducted sampling and measurements associated with the Project Area.

2.1 Temperature, Relative Humidity, and Carbon Dioxide

Survey measurements were made for ventilation and general IAQ indicators (CO_2, temperature, and relative humidity). The air quality measurements were taken using a digital AZ 7755 Temp. RH. CO_2 meter and was calibrated prior to use.

According to the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standard 62.1-2022, Ventilation for Acceptable Indoor Air Quality, the indoor to outdoor differential concentrations of CO_2 should not be greater than 700 parts per million (ppm).

Indoor air temperature and relative humidity are physical conditions important to the perception of comfort. ASHRAE Standard 55-2017, Thermal Environmental Conditions for Human Occupancy, recommends a temperature range between 68- and 82-degrees Fahrenheit (°F) with relative humidity levels ranging between 30 and 50 percent for persons working at sedentary to moderately elevated physical activity levels.

2.2 Mold Sampling

No state or federal exposure limits have been established for fungal aerosols. Currently, no regulatory standards or medically based threshold limit or dose-response relationships have been established for exposure to airborne or surface concentrations of mold spores. SLR relies upon experience, professional judgment, current scientific literature, guidelines, and recommendations made by professional organizations and experts, and statistical methods in interpreting mold sampling results.

High variability in airborne fungal spore concentrations can exist in different geographic locations, during different seasons and weather patterns, and over the course of a given day. As a general rule, indoor air fungal spore concentrations in a heating, ventilating, and air-conditioning (HVAC) supplied building are typically less than, but qualitatively similar to, fungal spore concentrations found in the outside environment.

The total fungal air samples were collected on Air-O-Cell air cassettes. The Air-O-Cell cassette is a unique sampling device designed for the rapid collection and analysis of a wide range of airborne particles including fungal spores. A total of three (3) Air-O-Cell samples were collected; one (1) from the outdoors and two (1) from the interior (1 from Room 107 and 1 from the adjacent hallway).

Samples were shipped under chain of custody to EMSL Analytical, Inc. (EMSL) for microscopic analysis. EMSL is accredited by the AIHA® Laboratory Accreditation Programs, LLC under the Environmental Microbiology Laboratory Accreditation Program. Samples are analyzed via Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods MICRO-SOP-201, ASTM D7391). The results are reported as total amount seen, meaning they include both viable and nonviable fungal spores. Unfortunately, this technique does not allow for the differentiation between Aspergillus and Penicillium spores because they are morphologically identical. Additionally, the technique does not allow for cultivation or the identification of spores to the species level, except in a few cases. The laboratory analytical report is included in Appendix A.

3.0 Findings

This section includes the findings and a discussion of our sampling and air testing.

3.1 Temperature, Relative Humidity, and Carbon Dioxide

The outdoor temperature, relative humidity, and CO^2 concentrations were measured in the parking lot, approximately 100 feet from the entrance. Readings were collected in the Project Areas along with comparative readings in an adjacent hallway. The concentrations were measured at different locations and times as noted below.

Direct Reading Measurements

Location	Time	Temperature (°F)	Relative Humidity (%)	CO^2 (PPM)
Outdoor	0649	31.0	83.9	470
Room 107	0704	63.8	26.5	502
Common Hallway	0713	64.9	26.9	522

3.2 Mold Results

The Air-O-Cell sample results for total mold spore counts ranged from 20 spores per cubic meter (spores/M^3) in the hallway and Room 107 respectively. The samples collected from the Project Areas would be considered as acceptable levels.

The laboratory analytical report is presented in Appendix A.

3.3 Visual Observations

SLR did not observe abnormal discoloration associated the building materials within the Project Areas.

Please see section 4.0 Closure for recommendations for this section and others above.

4.0 Closure

The air quality conditions within the Project Area are within acceptable ranges.

SLR recommends the following for the Project Aresa:

- Perform regular building/HVAC inspections and maintenance as scheduled.
- Fix any leaky plumbing and leaks in the building envelope (*i.e.,* roof, foundation, doors, windows, etc.) as soon as possible.
- Watch for condensation and wet spots. Fix source(s) of moisture problem(s) as soon as possible.
- Prevent moisture due to condensation by increasing surface temperature or reducing the moisture level in air (humidity). To increase surface temperature, insulate or increase air circulation. To reduce the moisture level in air, repair leaks, increase ventilation (if outside air is cold and dry), or dehumidify (if outdoor air is warm and humid).
- Keep heating, ventilation, and air conditioning (HVAC) drip pans clean, flowing properly, and unobstructed.
- Maintain low indoor humidity, below 60% relative humidity (RH), ideally 30 – 50%, if possible.
- Clean and dry wet or damp spots within 48 hours.
- Don't let foundations stay wet. Provide drainage and slope the ground away from the foundation.

Additionally, prior to any disturbance of suspect asbestos containing materials (ACM), sampling must be conducted (or the material must be assumed to be ACM), for materials not already sampled, before any demolition/renovation activities

Appendix A Fungal Analytical Laboratory Report and Chains of Custody

Marsh Grammar School – Room 107 (and adjacent hallway) (and adjacent hallway)

Indoor Air Quality Assessment

Methuen Public Schools

SLR Project No.: 144.021306.00001

December 12, 2024

EMSL Analytical, Inc.

5 Constitution Way, Unit A Woburn, MA 01801

Tel/Fax: (781) 933-8411 / (781) 933-8412

http://www.EMSL.com / bostonlab@emsl.com

EMSL Order: 132407299
Customer ID: MMAC42
Customer PO:
Project ID:

Attention: Keith Allard
SLR International Corporation
2 Commerce Drive, Suite 110
Bedford, NH 03110

Phone: (603) 289-1951
Fax:
Collected Date: 12/10/2024
Received Date: 12/11/2024 10:30 AM
Analyzed Date: 12/12/2024

Project: 144.021304.00001 - Marsh

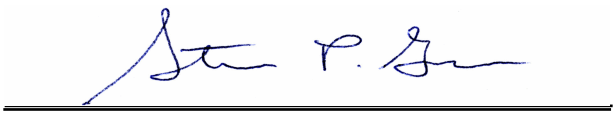
Test Report:Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods MICRO-SOP-201, ASTM D7391)

Lab Sample Number:	132407299-0001			132407299-0002			132407299-0003		
Client Sample ID:	01			02			03		
Volume (L):	150			150			150		
Sample Location:	Outdoor			Hallway at Room 107			Room 107		
Spore Types	**Raw Count†**	**Count/m³**	**% of Total**	**Raw Count†**	**Count/m³**	**% of Total**	**Raw Count†**	**Count/m³**	**% of Total**
Alternaria (Ulocladium)	-	-	-	-	-	-	-	-	-
Ascospores	-	-	-	-	-	-	-	-	-
Aspergillus/Penicillium++	5	100	50	1	20	100	-	-	-
Basidiospores	4	80	40	-	-	-	-	-	-
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium++	-	-	-	-	-	-	-	-	-
Cladosporium	-	-	-	-	-	-	1	20	100
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium++	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	1	20	10	-	-	-	-	-	-
Pithomyces++	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Total Fungi	**10**	**200**	**100**	**1**	**20**	**100**	**1**	**20**	**100**
Hyphal Fragment	1	20	-	1	7*	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	21	-	-	21	-	-	21	-
Analyt. Sensitivity 300x	-	7*	-	-	7*	-	-	7*	-
Skin Fragments (1-4)	-	1	-	-	1	-	-	1	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	1	-	-	1	-	-	1	-

† Due to method stopping rules, extrapolated raw counts are reported in parenthesis.

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

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



Steve Grise, Laboratory Manager
or other Approved Signatory

Initial report from: 12/12/2024 10:14 AM

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

OrderID: 132407299

EMSL ANALYTICAL, INC.
TESTING LABS • PRODUCTS • TRAINING

Microbiology Chain of Custody Form

EMSL Order Number / Lab Use Only

132407299

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077

PHONE: (800) 220-3675
EMAIL: CinnMicroLab@emsl.com

If Bill-To is the same as Report-To leave this section blank. Third-party billing requires written authorization.

Customer Information

Customer ID:	MMAC42
Company Name:	SLR International Corporation
Contact Name:	Keith Allard
Street Address:	2 Commerce Drive, Suite 110
City, State, Zip:	Bedford, NH 03110
Country:	US
Phone:	603 289-1951
Email(s) for Report:	kallard@slrconsulting.com

Billing Information

Billing ID:	
Company Name:	SLR International Corporation
Billing Contact:	Keith Allard
Street Address:	2 Commerce Drive, Suite 110
City, State, Zip:	Bedford, NH 03110
Country:	US
Phone:	603 289-1951
Email(s) for Invoice:	kallard@slrconsulting.com

Project Information

Project Name/No: 144.021304.00001 - Marsh

Purchase Order:

EMSL LIMS Project ID: (If applicable, EMSL will provide)

State Samples Collected: MA

Zip Code Samples Collected:: 01844

State of Connecticut (CT) must select project location: ☐ Commercial (Taxable) ☐ Residential (Non-taxable)

Sampled By Name: Keith Allard

Sampled By Signature: K T Allard

No. of Samples in Shipment: 3

Sterile, Sodium Thiosulfate Preserved Bottle Used: ☐ Biocide Used in Source (specify)

Public Water Supply Samples: ☐ Note: All results may automatically be reported to DOH if required by State.

Turn-Around-Time (TAT) Please call ahead for large projects and/or turnaround times 6 Hours or Less. *32 Hour TAT available for select tests only; samples must be submitted by 11:30am.

☐ 3 Hour ☐ 6 Hour ☑ 24 Hour ☐ 32* Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

MICROBIOLOGY TEST CODES

M001 Air-O-Cell	**M012** *Pseudomonas aeruginosa* (P/A***)	**M115** Sewage Screen - Water (P/A***)
M030 Micro 5	**M024** *Pseudomonas aeruginosa* (MFT*)	**M116** Sewage Screen - Water (MPN**)
M041 Fungal Direct Examination	**M015** Heterotrophic Plate Count	**M117** Sewage Screen - Swab (P/A***)
M169 Pollen ID & Enumeration	**M017** Total Coliform & *E. Coli* (Colilert P/A***)	**M013** Sewage Screen - Swab (MFT*)
M280 Dust Characterization Level-1	**M018** Total Coliform & *E. Coli* (MFT*)	**M730** *Methicillin-resistant Staph, aureus* (MRSA)
M281 Dust Characterization Level-2	**M114** Total Coliform & *E. Coli Enumeration (Colilert MPN**)*	**M031** Rapid-growing non-TB *Mycobacteria* Detection & Enumeration
M005 Viable Fungi-Air Samples (Genus ID & Count)	**M019** Fecal Coliform (MFT*)	
M006 Viable Fungi-Air Samples (Includes *Penicillum, Aspergillus, Cladosporium, Stachybotrys* Species ID & Count)	**M020** Fecal *Streptococcus* (MFT*)	**M014** Endotoxin Analysis
	M029 *Enterococci* (MFT*)	**M044** Group Allergen (Cat, Dog, Cockroach, Dust Mite)
M007 Culturable Fungi-Surface Samples (Genus ID & Count)	**M129** *Enterococci* (Enterolert P/A***)	**M095** Bacteroides
M008 Culturable Fungi-Surface Samples (Includes *Penicillum, Aspergillus, Cladosporium, Stachybotrys* Species ID & Count)	**M180** Real Time qPCR-ERMI 36 Panel	**Other** - See Analytical Price Guide for Test Code
	M025 Sewage Screen - Water (MFT*)	***Legionella Analysis*** Please use EMSL *Legionella* COC
M009 Bacteria Culture Gram Stain & Count	*MFT= Membrane Filtration Technique	
M010 Bacteria Count & ID - 3 Most Prominent	**MPN = Most Probable Number	
M011 Bacteria Count & ID - 5 Most Prominent	***P/A = Presence/Absence	

Sample #	Sample Location/Description	Sample Type (Matrix)	Potable / Non-Potable (Only for Water)	Test Code	Volume/Area	Date / Time Collected	Temperature (Lab Use Only)
Example: Sample 1	Kitchen	Water	Potable	M017	1,000 ml	1/1/2021 3:30pm	
01	Outdoor	Air	NA	M001	150 L	12/10/24	
02	Hallway @ Rm 107	↓	↓	↓	↓	↓	
03	Room 107						

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

SMM 1030 (2/2)

Method of Shipment:

Sample Condition Upon Receipt: FEDEX EMSL-BOSTON DEC 11 2024

Relinquished by: K T Allard	Date/Time: 12/10/2024	Received by: efx 7915 6950 8937	Date/Time
Relinquished by:	Date/Time:	Received by:	Date/Time

Controlled Document - COC-34 Micro R13 03/02/2021

☐ AGREE TO ELECTRONIC SIGNATURE (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

Making Sustainability Happen