

Moisture and Fungal Growth Assessment Report

City of Burien Community Center Annex
425 SW 144th St
Burien, King, Washington

January 15, 2020
Terracon Project No. 81207008



Prepared for:
MENG Analysis
Seattle, Washington

Prepared by:
Terracon Consultants, Inc.
Mountlake Terrace, Washington

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January 15, 2020

MENG Analysis
2001 Western Avenue, Suite 200
Seattle, Washington 98121

Attn: Ms. Sarah Partap

RE: Moisture and Fungal Growth Assessment
Burien Community Center Annex
14700 6th Avenue SW
Burien, Washington 98166
Terracon Project No. 81187154

Dear Ms. Partap

Terracon Consultants, Inc. (Terracon) is pleased to submit the enclosed Moisture and Fungal Growth Assessment report for the above-referenced site. This assessment was performed in accordance with Terracon Proposal P81207008, dated January 9, 2020. The sampling was performed on January 10, 2020.

Terracon Consultants, Inc. appreciates the opportunity to be of service to MENG Analysis. If you have any questions regarding this report, please contact the undersigned at 425-771-3304.

Sincerely,
Terracon Consultants, Inc.

Scott R. Parker
Project Manager

Kathie Lavaty, CIH, CSP
Senior Industrial Hygienist



TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 EXECUTIVE SUMMARY 1

3.0 BUILDING DESCRIPTION 1

4.0 REGULATIONS 2

5.0 INVESTIGATION CRITERIA AND METHODS 2

 5.1 Visual Inspection and Moisture Testing 2

 5.2 Airborne Fungal Aerosol Sampling 2

6.0 RESULTS 3

 6.1 Visual Inspection 3

 6.2 Airborne Fungal Aerosol Sampling 3

7.0 CONCLUSIONS and recommendations 4

8.0 GENERAL COMMENTS 6

APPENDICES

- Appendix A - Spore Trap Sampling Laboratory Analysis Report
- Appendix B - Assessment Diagram & Spore Trap Sampling Locations

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425 SW 144th Street
Burien, Washington 98166
Terracon Project No. 81207008
January 15, 2020

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) is pleased to present this report for the moisture and fungal growth assessment conducted on January 10, 2020, at the above referenced site. Our report presents project information, assessment and sampling methodology and results, and conclusions.

The moisture and fungal growth assessment was conducted to assist the client in determining the presence of areas of elevated moisture and suspect fungal growth (SFG).

2.0 EXECUTIVE SUMMARY

A moisture and fungal growth assessment was conducted for Burien Community Center Annex at 425 SW Street in Burien, Washington, on January 10, 2020. The annex site is a community center for the City of Burien encompassing approximately 300,000 square feet which is occupied by several community groups.

Indoor airborne fungal aerosol sampling results indicate the presence of at least one fungal growth reservoir in the North Building at the facility. Suspect visible fungal growth (SFG) was identified on gypsum wallboard (GWB) ceiling surfaces located beneath damaged glued-on ceiling tiles in Room N16 and the hallway areas immediately adjacent to Room N16, which are in proximity to the location where elevated indoor fungal aerosol concentrations were identified. No elevated indoor fungal aerosol concentrations were identified in the South Building.

One area of active moisture intrusion into the South Building was identified in Room S9 (kitchen area), where water from an apparent roof leak was dripping from the ceiling in the southwest area of the room, resulting in an accumulation of water on the floor.

Previously moisture impacted ceiling tiles were identified in several locations throughout the North and South Buildings (based on staining), but there was not elevated moisture present at these locations indicative of an ongoing moisture intrusion issue.

3.0 BUILDING DESCRIPTION

The project area consists of two buildings that together are approximately 300,000 sf. The original structure was constructed in 1948 with multiple renovations and additions taking place over the years. The structure on the northern side of the property is a community

center annex featuring classrooms, daycare, and a donations office. Heating in the building is provided by a radiator system heated via a boiler in the basement.

4.0 REGULATIONS

There are no Washington State or Federal exposure limits established for fungal aerosols. There are currently no regulatory standards or medically based threshold limits or dose-response relationships for exposure to airborne or surface concentrations of mold spores. Terracon 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.

5.0 INVESTIGATION CRITERIA AND METHODS

5.1 Visual Inspection and Moisture Testing

Terracon conducted a limited assessment of building materials throughout the interiors of the North and South Buildings at the Burien Community Center Annex for SFG, and visible evidence of moisture intrusion. Moisture testing was performed to determine whether elevated moisture was present in building materials located in the assessment area.

The visual evaluation was conducted in general accordance with guidelines published by the United States Environmental Protection Agency (*Indoor Air Quality Building Education and Assessment Model (I-BEAM)*, EPA Reference Number 402-C-01-001, December 2002), the American Conference of Governmental Industrial Hygienist (*Bioaerosols; Assessment and Control*, 1999), American Standard Test Methods (*Standard Guide for Assessment of Fungal Growth in Buildings*, ASTM D7338-14). The indoor environment was evaluated for visual evidence of moisture intrusion and visible fungal growth. Destructive sampling or removal of building materials to evaluate inside impacted wall cavities was not within the scope of work for the project.

A Protimeter Surveymaster combination surface/pin-style moisture meter was used to measure moisture levels in building materials including plaster, gypsum wallboard (GWB), acoustic ceiling tiles, and accessible wood framing and sheathing materials.

5.2 Airborne Fungal Aerosol Sampling

Total non-viable (non-culturable) fungal spore trap samples were collected using Air-O-Cell® sampling cassettes and a Zefon Bio-Pump®, at a flow rate of fifteen (15) liters per minute for five (5) minutes. Air-O-Cell® sampling cassettes were collected at representative indoor and outdoor sample locations (Table 1). After air sample collection, the sample cassettes were delivered under chain-of-custody (COC) protocol to EMLab P&K, accredited by the American Industrial Hygiene Association (AIHA®) Laboratory Accreditation Programs, LLC under the Environmental Microbiology Laboratory Accreditation Program (EMLAP). The

results are reported as total fungal spore concentrations per cubic meter of air (spores/m³). The laboratory analytical report is included in Appendix A.

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 rule, indoor air fungal spore concentrations in an HVAC-supplied building are typically less than, but qualitatively similar to, fungal spore concentrations found in the outside environment.

Terracon collected a total of 4 air samples to assess air quality with respect to fungal particulate. Samples were collected as follows, and indicated on the Spore Trap Sample Location Diagram in Appendix B:

- Two outside control samples were collected for comparison with indoor results.
- One sample was collected in the Hallway N34 in the North Building.
- One sample was collected in the Hallway S16 in the South Building.

Indoor fungal spore air sampling results were compared to outdoor sample results to determine if elevated concentrations existed indoors during the assessment.

6.0 RESULTS

6.1 Visual Inspection

The area of concern includes the interior of the North and South Buildings located at North and South Buildings at the Burien Community Center Annex. Interior finishes include plaster and gypsum wallboard on walls and ceilings; acoustic ceiling tile; and vinyl floor tile. Terracon observed water leaking from the ceiling and collecting on the floor of Room S9 in the South Building. The water source was apparently a leak in the roof of the South Building, which was inaccessible for inspection at the time of the assessment due to weather conditions and roof access.

Terracon also observed the presence of acoustic ceiling tile with evidence of previous moisture damage in locations throughout the North and South Buildings (staining). No remaining elevated moisture was noted at these locations. The locations where moisture damaged ceiling tiles were identified are noted on the Assessment Diagram included in Appendix B.

6.2 Airborne Fungal Aerosol Sampling

The total fungal spore concentrations reported for the interior sample collected in the North Building were higher than those reported at the outdoor location. The total fungal spore concentrations reported for the interior sample collected in the South Building were lower

than those reported at the outdoor location. The total fungal spore concentrations outdoors ranged from 160 spores/m³ to 53 spores/m³ for both samples. The indoor concentrations were 210 spores/m³ and 110 spores/m³ in the North and South Buildings, respectively.

The types of fungal spores identified in indoor air were generally similar to those found in outdoor air. The statistical analysis¹ provided by the laboratory (EMLab P&K MoldSCORE) indicated a high likelihood that the spores found indoors originated from outdoor sources.

A summary of the fungal testing results is presented in Table 1 below. See the laboratory reports in Appendix A for additional information. Appendix B includes drawings indicating locations where spore trap air samples were collected.

Table 1 – Spore Trap Sampling Results (Spores/m³) – Burien Community Center Annex

Location:	011020-ST-01: Outside control	011020-ST-02: North Building	011020-ST-03: South Building	011020-ST-04: Outside Control
Basidiospores	53			53
Penicillium/Aspergillus types	110	210	110	
§ TOTAL FUNGAL SPORES	160	210	110	53
Hyphal fragments			13	

7.0 CONCLUSIONS AND RECOMMENDATIONS

The visual assessment and air sampling results suggest the presence of an indoor source of fungal growth in the North Building at the time of the investigation. The types of fungal spores identified in indoor air were generally similar to those found in outdoor air. The statistical analysis provided by the laboratory indicated a likelihood that the spores found indoors originated from outdoor sources, but visual confirmation of SFG indicates the possible presence of an ongoing interior fungal reservoir.

The visual assessment and air sampling results did not suggest the presence of an indoor source of fungal growth in the South Building at the time of the investigation.

¹ MoldSCORE™ is a specialized method for examining air sampling data. It is a score between 100 and 300, with 100 indicating a greater likelihood that the airborne indoor spores originated from the outside, and 300 indicating a greater likelihood that they originated from an inside source. The Result displayed is based on the numeric score given and will be either Low, Medium, or High, indicating a low, medium, or high likelihood that the spores detected originated from an indoor source. EMLab P&K reserves the right to, and may at anytime, modify or change the MoldScore algorithm without notice.

Removal of remaining materials with VFG should be performed to minimize the potential for spread of fungal growth to adjacent materials. A number of guidance documents for addressing moisture intrusion in buildings have been written, including:

- New York City Department of Health & Mental Hygiene Bureau of Environmental & Occupational Disease Epidemiology, (*Guidelines on Assessment and Remediation of Fungi in Indoor Environments, January 2002*)
- United States Centers for Disease Control, National Center for Environmental Health (*Prevention and Remediation Strategies for the Control and Removal of Fungal Growth, last reviewed: July 13, 2009*).
- *Fungal Contamination in Buildings: A Guide to Recognition and Management* (Health Canada, 1995).
- *Control of Moisture Problems Affecting Biological Indoor Air Quality* (Flannigan and Morey, 1996).
- *Bioaerosols: Assessment and Control* (American Conference of Government Industrial Hygienists [ACGIH], 1999).
- *Guidelines on Assessment and Remediation of Fungi in Indoor Environments* CDC-pdf (NYCDOH, 2000).
- *Mold Remediation in Schools and Commercial Buildings* External (U.S. EPA, 2001).
- *Report of the Microbial Growth Task Force* (The American Industrial Hygiene Association, 2001).

These documents agree on the following:

- Mold should not be allowed to colonize materials and furnishings in buildings.
- The underlying moisture condition supporting mold growth should be identified and eliminated.
- The International Society of Indoor Air Quality and Climate (ISIAQ) and ACGIH guidelines discuss moisture dynamics, identifying problematic moisture or remediating moisture problems.
- U.S. EPA guidelines contain specific recommendations for a variety of water-damaged materials.
- The best way to remediate problematic mold growth is to remove it from materials that can be effectively cleaned and to discard materials that cannot be cleaned or are otherwise damaged.

One area of potential active moisture intrusion into the South Building was identified in Room S9 (kitchen area), where water from an apparent roof leak was dripping from the ceiling in the southwest area of the room. Further assessment of the roof conditions and integrity, as well as destructive assessment from the interior of the structure, are recommended to determine conclusively the source of moisture intrusion and appropriate remediation methods.

Previously moisture impacted ceiling tiles were identified in several locations throughout the North and South Buildings, but elevated moisture was not present at these locations indicative of an ongoing moisture intrusion issue.

8.0 GENERAL COMMENTS

This moisture and fungal growth assessment 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, findings, conclusions, and recommendations expressed in this report are based on conditions observed during our inspection of the building. The information contained in this report is relevant to the dates on which this inspection was performed and should not be relied upon to represent conditions at a later date.

This report has been prepared on behalf of and exclusively for use by MENG Analysis

Contractors, consultants or others reviewing this report must draw their own conclusions regarding further investigation or remediation deemed necessary. Terracon does not warrant the work of regulatory agencies, laboratories or other third parties supplying information which may have been used in the preparation of this report. No warranty, express or implied is made.

APPENDIX A


SPORE TRAP SAMPLING LABORATORY ANALYSIS REPORT

Report for:

Mr. John McCaslin, Scott Parker
Terracon Consultants, Inc. - Seattle
21905 64th Avenue W, Suite 100
Mountlake Terrace, WA 98043

Regarding: Project: 81207008; Burien Community Building
EML ID: 2331789

Approved by:



Technical Manager
Justin Ford

Dates of Analysis:

Spore trap analysis: 01-13-2020

Service SOPs: Spore trap analysis (EM-MY-S-1038)
AIHA-LAP, LLC accredited service, Lab ID #178599

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. Due to the nature of the analyses performed, field blank correction of results is not applied. The results relate only to the samples as received. Sample air volume is supplied by the client.

Eurofins EMLab P&K ("the Company") shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.

Eurofins EMLab P&K's LabServe® reporting system includes automated fail-safes to ensure that all AIHA-LAP, LLC quality requirements are met and notifications are added to reports when any quality steps remain pending.

Client: Terracon Consultants, Inc. - Seattle
C/O: Mr. John McCaslin, Scott Parker
Re: 81207008; Burien Community BuildingDate of Sampling: 01-10-2020
Date of Receipt: 01-10-2020
Date of Report: 01-13-2020**SPORE TRAP REPORT: NON-VIABLE METHODOLOGY**

Location:	011020-ST-01: O/S Control			011020-ST-02: N Bldg.		
Comments (see below)	None			None		
Lab ID-Version‡:	11098874-1			11098875-1		
Analysis Date:	01/13/2020			01/13/2020		
	raw ct.	% read	spores/m3	raw ct.	% read	spores/m3
Ascospores						
Basidiospores	1	25	53			
Botrytis						
Chaetomium						
Cladosporium						
Curvularia						
Epicoccum						
Fusarium						
Myrothecium						
Nigrospora						
Other colorless						
Penicillium/Aspergillus types†	2	25	110	4	25	210
Pithomyces						
Rusts						
Smuts, Periconia, Myxomycetes						
Stachybotrys						
Stemphylium						
Torula						
Ulocladium						
Zygomycetes						
Background debris (1-4+)††	3+			3+		
Hyphal fragments/m3	< 13			< 13		
Pollen/m3	< 13			< 13		
Skin cells (1-4+)	< 1+			< 1+		
Sample volume (liters)	75			75		
§ TOTAL SPORES/m3			160			210

Comments:

Spore types listed without a count or data entry were not detected during the course of the analysis for the respective sample, indicating a raw count of <1 spore.

† The spores of *Aspergillus* and *Penicillium* (and others such as *Acremonium*, *Paecilomyces*) are small and round with very few distinguishing characteristics. They cannot be differentiated by non-viable sampling methods. Also, some species with very small spores are easily missed, and may be undercounted.

†† Background debris indicates the amount of non-biological particulate matter present on the trace (dust in the air) and the resulting visibility for the analyst. It is rated from 1+ (low) to 4+ (high). Counts from areas with 4+ background debris should be regarded as minimal counts and may be higher than reported. It is important to account for samples volumes when evaluating dust levels.

The analytical sensitivity is the spores/m³ divided by the raw count, expressed in spores/m³. The limit of detection is the analytical sensitivity (in spores/m³) multiplied by the sample volume (in liters) divided by 1000 liters.

For more information regarding analytical sensitivity, please contact QA by calling the laboratory.

‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

§ Total Spores/m³ has been rounded to two significant figures to reflect analytical precision.

Client: Terracon Consultants, Inc. - Seattle
C/O: Mr. John McCaslin, Scott Parker
Re: 81207008; Burien Community BuildingDate of Sampling: 01-10-2020
Date of Receipt: 01-10-2020
Date of Report: 01-13-2020**SPORE TRAP REPORT: NON-VIABLE METHODOLOGY**

Location:	011020-ST-03: S Bldg.			011020-ST-04: O/S Control		
Comments (see below)	None			None		
Lab ID-Version‡:	11098876-1			11098877-1		
Analysis Date:	01/13/2020			01/13/2020		
	raw ct.	% read	spores/m3	raw ct.	% read	spores/m3
Ascospores						
Basidiospores				1	25	53
Botrytis						
Chaetomium						
Cladosporium						
Curvularia						
Epicoccum						
Fusarium						
Myrothecium						
Nigrospora						
Other colorless						
Penicillium/Aspergillus types†	2	25	110			
Pithomyces						
Rusts						
Smuts, Periconia, Myxomycetes						
Stachybotrys						
Stemphylium						
Torula						
Ulocladium						
Zygomycetes						
Background debris (1-4+)††	3+			3+		
Hyphal fragments/m3	13			< 13		
Pollen/m3	< 13			< 13		
Skin cells (1-4+)	< 1+			< 1+		
Sample volume (liters)	75			75		
§ TOTAL SPORES/m3			110			53

Comments:

Spore types listed without a count or data entry were not detected during the course of the analysis for the respective sample, indicating a raw count of <1 spore.

† The spores of *Aspergillus* and *Penicillium* (and others such as *Acremonium*, *Paecilomyces*) are small and round with very few distinguishing characteristics. They cannot be differentiated by non-viable sampling methods. Also, some species with very small spores are easily missed, and may be undercounted.

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For more information regarding analytical sensitivity, please contact QA by calling the laboratory.

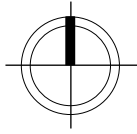
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

§ Total Spores/m³ has been rounded to two significant figures to reflect analytical precision.

APPENDIX B

ASSESSMENT DIAGRAM & SPORE TRAP SAMPLING LOCATIONS

MENG Analysis Burien Community Center Annex Mold and Moisture Assessment



NOT TO SCALE

