EMLab P&K
A TestAmerica Company

Report for:

Ms. Ann Skeate
Ideal Environmental Engineering, Inc.
2904 Tractor Lane
Bloomington, IL 61704

Regarding: Project: 20810A-Urbana SD 116- Wiley Elem; Urbana SD 116- Wiley Elem School
EML ID: 1699009

Approved by:

[redacted]

Lab Manager
Francina Thadigiri

Dates of Analysis:
Spore trap analysis: 03-24-2017

Service SOPs: Spore trap analysis (EM-MY-S-1038)
AIHA-LAP, LLC accredited service, Lab ID #176641

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 items tested.

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.

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.

EMLab P&K
1815 West Diehl Road, Suite 800, Naperville, IL 60563
(866) 871-1984 Fax (856) 334-1040 www.emlab.com

Client: Ideal Environmental Engineering, Inc.
C/O: Ms. Ann Skeate
Re: 20810A-Urbana SD 116- Wiley Elem; Urbana SD 116- Wiley Elem School

Date of Submittal: 03-23-2017
Date of Receipt: 03-24-2017
Date of Report: 03-24-2017

SPORE TRAP REPORT: NON-VIABLE METHODOLOGY

Location:	R01: Rm 28		RZZ: Outside Rm 28	
Comments (see below)	None		None	
Lab ID-Version‡:	7918620-1		7918621-1	
Analysis Date:	03/24/2017		03/24/2017	
	raw ct.	spores/m3	raw ct.	spores/m3
Alternaria			1	7
Ascospores			7	190
Basidiospores	1	27	11	290
Chaetomium				
Cladosporium	1	27	4	110
Epicoccum			2	13
Myrothecium				
Nigrospora				
Other brown			1	7
Other colorless				
Penicillium/Aspergillus types†	2	53	5	130
Pithomyces	2	13		
Pyricularia			2	13
Rusts				
Smuts, Periconia, Myxomycetes			2	13
Stachybotrys				
Stemphylium				
Torula				
Ulocladium				
Zygomycetes				
Background debris (1-4+)††	2+		3+	
Hyphal fragments/m3	< 7		7	
Pollen/m3	< 7		20	
Skin cells (1-4+)	1+		< 1+	
Sample volume (liters)	150		150	
§ TOTAL SPORES/m3		120		770

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/m^3 divided by the raw count, expressed in spores/m^3. The limit of detection is the analytical sensitivity (in spores/m^3) 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.

EMLab P&K
1815 West Diehl Road, Suite 800, Naperville, IL 60563
(866) 871-1984 Fax (856) 334-1040 www.emlab.com

Client: Ideal Environmental Engineering, Inc.
C/O: Ms. Ann Skeate
Re: 20810A-Urbana SD 116- Wiley Elem; Urbana SD 116- Wiley Elem School

Date of Submittal: 03-23-2017
Date of Receipt: 03-24-2017
Date of Report: 03-24-2017

MoldRANGE™, Local Climate; Extended Outdoor Comparison

Outdoor Location: RZZ, Outside Rm 28

Fungi Identified	Outdoor data	Typical Outdoor Data for: March in Illinois† EMLab Local Climate code¹ B Annual Temp, B Elev., A Rain, B Temp. Range (n‡=20)						Typical Outdoor Data for: The entire year in Illinois† EMLab Local Climate code¹ B Annual Temp, B Elev., A Rain, B Temp. Range (n‡=185)					
Project zip code 61801	spores/m3	very low	low	med	high	very high	freq %	very low	low	med	high	very high	freq %
Generally able to grow indoors*													
Alternaria	7	-	-	-	-	-	30	9	13	67	230	480	69
Bipolaris/Drechslera group	-	-	-	-	-	-	< 5	-	-	-	-	-	9
Chaetomium	-	-	-	-	-	-	< 5	-	-	-	-	-	4
Cladosporium	110	-	-	-	-	-	55	110	310	900	4,300	11,000	90
Curvularia	-	-	-	-	-	-	5	7	7	13	20	48	15
Epicoccum	13	-	-	-	-	-	30	7	13	27	180	290	56
Nigrospora	-	-	-	-	-	-	15	7	13	27	170	300	30
Other brown	7	-	-	-	-	-	15	7	7	13	27	33	17
Penicillium/Aspergillus types	130	-	-	-	-	-	40	27	53	100	320	680	46
Pithomyces	-	-	-	-	-	-	5	7	13	27	67	150	30
Stachybotrys	-	-	-	-	-	-	5	-	-	-	-	-	< 1
Torula	-	-	-	-	-	-	5	-	-	-	-	-	10
Seldom found growing indoors**													
Ascospores	190	-	-	-	-	-	45	53	110	360	1,600	2,900	79
Basidiospores	290	-	-	-	-	-	65	53	110	770	3,400	5,300	89
Pyricularia	13	-	-	-	-	-	< 5	-	-	-	-	-	2
Rusts	-	-	-	-	-	-	10	7	7	13	53	73	29
Smuts, Periconia, Myxomycetes	13	-	-	-	-	-	20	7	13	40	100	170	59
§ TOTAL SPORES/m3	770												

¹EMLab Local Climate codes are a climate classification scheme for statewide geographic areas. The MoldRANGE™ Local Climate report uses the sampling location zip code to identify the EMLab Local Climate code in that area. Using information available from the NOAA weather database, the EMLab Local Climate code sharpens the precision of the MoldRANGE™reporting system, providing more reliable estimates of the range and average concentrations of the different airborne fungal spore types for each region. Additional information on the EMLab Local Climate code system can be found on the last page of this report.

†The Typical Outdoor Data represents the typical outdoor spore levels across the state for the time period and EMLab Local Climate code indicated. The last column represents the frequency of occurrence. The very low, low, med, high, and very high values represent the 10, 20, 50, 80, and 90 percentile values of the spore type when it is detected. For example, if the frequency of occurrence is 63% and the low value is 53, it would mean that the given spore type is detected 63% of the time and, when detected, 20% of the time it is present in levels above the detection limit and below 53 spores/m3. These values are updated periodically and if not enough data is available to make a statistically meaningful assessment, it is indicated with a dash.

‡ n is the sample size used to calculate the MoldRANGE™ Local Climate data summarized in the table.

* The spores in this category are generally capable of growing on wet building materials in addition to growing outdoors. Building related growth is dependent upon the fungal type, moisture level, type of material, and other factors. *Cladosporium* is one of the predominant spore types worldwide and is frequently present in high numbers. *Penicillium/Aspergillus* species colonize both outdoor and indoor wet surfaces rapidly and are very easily dispersed. Other genera are usually present in lesser numbers.

** These fungi are generally not found growing on wet building materials. For example, the rusts and smuts are obligate plant pathogens. However, in each group there are notable exceptions. For example, agents of wood decay are members of the basidiomycetes and high counts of a single morphological type of basidiospore on an inside sample should be considered significant.

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

EMLab P&K
1815 West Diehl Road, Suite 800, Naperville, IL 60563
(866) 871-1984 Fax (856) 334-1040 www.emlab.com

Client: Ideal Environmental Engineering, Inc.
C/O: Ms. Ann Skeate
Re: 20810A-Urbana SD 116- Wiley Elem; Urbana SD 116- Wiley Elem School

Date of Submittal: 03-23-2017
Date of Receipt: 03-24-2017
Date of Report: 03-24-2017

Understanding EMLab Local Climate Codes

Outdoor airborne spore concentrations are strongly influenced by climate and weather patterns, often resulting in pronounced seasonal and diurnal cycles (Burge 1995). The seasonal climatic changes directly affect the growth cycle of plants, thereby influencing fungal growth, spore maturation, and release cycles. By evaluating outdoor spore concentrations across similar climatic zones rather than for the state as a whole, it is possible to provide a more representative estimate of typical outdoor spore levels and frequency of occurrence for different airborne fungal spore types in a given area.

The EMLab Local Climate code system is a novel and patent pending classification system that uses data from the NOAA - National Oceanic and Atmospheric Administration database to define unique climate regions by state. The following local climate variables, for each statewide zip code, are obtained from NOAA and assigned a letter code of A (above the statewide average for that variable) or B (below the statewide average for that variable):

1. Annual High Temperature
2. Elevation
3. Rainfall/Precipitation
4. Monthly Temperature Range

The result is a 4-character code assigned to each statewide zip code, referred to as the Local Climate Code. Below are some examples of decoded Local Climate Codes:

AAAA = Above avg. Annual High Temperature, Above avg. Elevation, Above avg. Rainfall/Precipitation, Above avg. Monthly Temperature Range
AABB = Above avg. Annual High Temperature, Above avg. Elevation, Below avg. Rainfall/Precipitation, Below avg. Monthly Temperature Range
BBAA = Below avg. Annual High Temperature, Below avg. Elevation, Above avg. Rainfall/Precipitation, Above avg. Monthly Temperature Range

The actual outdoor air sample data from matching local climate codes in each state are then compiled in a manner relating typical spore concentrations and frequency of occurrence.

The NOAA local climate variables were selected by mapping data points from a subset of approximately 145,000 weather and geographic database entries to over 80,000 outdoor spore trap samples with known zip codes and assessing them using orthogonal array experimental design techniques. The results were then compared to the typical ranges of spore types found when grouping zip codes using the Koppen-Geiger climatic classification system; a commonly used climatic system that provides an objective numerical definition in terms of climatic elements such as temperature, rainfall, and other seasonal characteristics . The EMLab Local Climate codes showed improved granularity and refinement of the zip code groupings, implying a better representation of the expected range of spore types to be found within an individual zip code.

The values on this report were calculated by obtaining the four variables listed above from the over 585 million data points of weather and geographic information available in the NOAA database, and determining the frequencies and percentile values of spore types by utilizing over 180,000 EMLab P&K outdoor spore trap samples with known zip codes.

This report groups statewide zip codes in relation to these EMLab Local Climate codes and summarizes MoldRANGE™ data by month and year within each EMLab Local Climate code.

References:

Burge, Harriet, A. Bioaerosols: Boca Raton: Lewis Publishers, pp. 163-171, 1995.

EMLab P&K
1815 West Diehl Road, Suite 800, Naperville, IL 60563
(866) 871-1984 Fax (856) 334-1040 www.emlab.com

Client: Ideal Environmental Engineering, Inc.
C/O: Ms. Ann Skeate
Re: 20810A-Urbana SD 116- Wiley Elem; Urbana SD 116- Wiley Elem School

Date of Submittal: 03-23-2017
Date of Receipt: 03-24-2017
Date of Report: 03-24-2017

MoldSTAT™: Supplementary Statistical Spore Trap Report

Outdoor Summary: RZZ: Outside Rm 28

Species detected	Outdoor sample spores/m3 (<100 / 1K / 10K / >100K)	Typical outdoor ranges (North America)	Freq. %
Alternaria	7	7 - 35 - 530	44
Ascospores	190	13 - 210 - 6,400	77
Basidiospores	290	13 - 440 - 24,000	91
Cladosporium	110	27 - 480 - 9,800	90
Epicoccum	13	7 - 27 - 360	24
Other brown	7	7 - 20 - 130	25
Penicillium/Aspergillus types	130	13 - 170 - 2,600	67
Pyricularia	13	7 - 13 - 300	4
Smuts, Periconia, Myxomycetes	13	7 - 53 - 910	64
Total	770		

The "Typical outdoor ranges" and "Freq. %" columns show the typical low, medium, and high spore counts per cubic meter and the frequency of occurrence for the given spore type. The low, medium, and high values represent the 2.5, 50, and 97.5 percentile values when the spore type is detected. For example, if the low value is 53 and the frequency of occurence is 63%, it would mean that we typically detect the given spore type on 63 percent of all outdoor samples and, when detected, 2.5% of the time it is present in levels below 53 spores/m3.

Indoor Samples

Location: R01: Rm 28

% of outdoor total spores/m3	Friedman chi-square* (indoor variation)	Agreement ratio** (indoor/outdoor)	Spearman rank correlation*** (indoor/outdoor)	MoldSCORE**** (indoor/outdoor)
Result: 15%	dF: N/A Result: N/A Critical value: N/A Inside Similar: N/A	Result: 0.4615	dF: 10 Result: 0.4939 Critical value: 0.5515 Outside Similar: No	Score: 107 Result: Low

Species Detected	Spores/m3 (<100 / 1K / 10K / >100K)
Basidiospores	27
Cladosporium	27
Penicillium/Aspergillus types	53
Pithomyces	13
Total	120

* The Friedman chi-square statistic is a non-parametric test that examines variation in a set of data (in this case, all indoor spore counts). The null hypothesis (H0) being tested is that there is no meaningful difference in the data for all indoor locations. The alternative hypothesis (used if the test disproves the null hypothesis) is that there is a difference between the indoor locations. The null hypothesis is rejected when the result of the test is greater than the critical value. The critical value that is displayed is based on the degrees of freedom (dF) of the test and a significance level of 0.05.

** An agreement ratio is a simple method for assessing the similarity of two samples (in this case the indoor sample and the outdoor summary) based on the spore types present. A score of one indicates that the types detected in one location are the same as that in the other. A score of zero indicates that none of the types detected indoors are present outdoors. Typically, an agreement of 0.8 or higher is considered high.

EMLab P&K
1815 West Diehl Road, Suite 800, Naperville, IL 60563
(866) 871-1984 Fax (856) 334-1040 www.emlab.com

Client: Ideal Environmental Engineering, Inc.
C/O: Ms. Ann Skeate
Re: 20810A-Urbana SD 116- Wiley Elem; Urbana SD 116- Wiley Elem School

Date of Submittal: 03-23-2017
Date of Receipt: 03-24-2017
Date of Report: 03-24-2017

MoldSTAT™: Supplementary Statistical Spore Trap Report

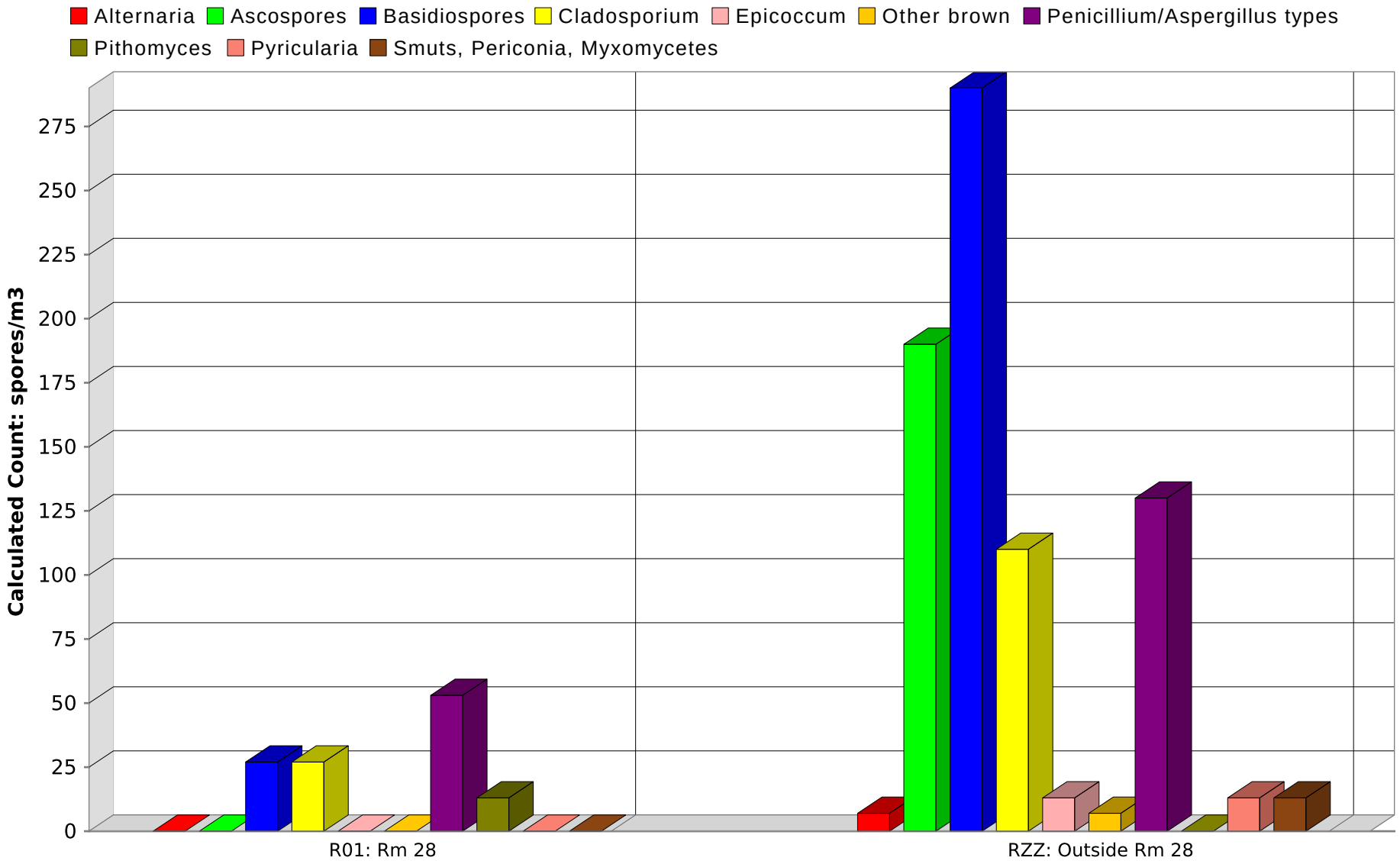
*** The Spearman rank correlation is a non-parametric test that examines correlation between two sets of data (in this case the indoor location and the outdoor summary). The null hypothesis (H0) being tested is that the indoor and outdoor samples are unrelated. The alternative hypothesis (used if the test disproves the null hypothesis) is that the samples are similar. The null hypothesis is rejected when the result of the test is greater than the critical value. The critical value that is displayed is based on the degrees of freedom (dF) of the test and a significance level of 0.05.

**** 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&Kreserves the right to, and may at anytime, modify or change the MoldScore algorithm without notice.

Interpretation of the data contained in this report is left to the client or the persons who conducted the field work. This report is provided for informational and comparative purposes only and should not be relied upon for any other purpose. "Typical outdoor ranges" are based on the results of the analysis of samples delivered to and analyzed by EMLab P&K and assumptions regarding the origins of those samples. Sampling techniques, contaminants infecting samples, unrepresentative samples and other similar or dissimilar factors may affect these results. With the statistical analysis provided, as with all statistical comparisons and analyses, false-positive and false-negative results can and do occur. EMLab P&K hereby disclaims any liability for any and all direct, indirect, punitive, incidental, special or consequential damages arising out of the data contained in, or any actions taken or omitted in reliance upon, this report.

EMLab P&K
1815 West Diehl Road, Suite 800, Naperville, IL 60563
(866) 871-1984 Fax (856) 334-1040 www.emlab.com

SPORE TRAP REPORT: NON-VIABLE METHODOLOGY



Comments:

Note: Graphical output may understate the importance of certain "marker" genera.