EMLab P&K
6000 Shoreline Ct, Ste 205, So. San Francisco, CA 94080
(866) 888-6653 Fax (623) 780-7695 www.emlab.com

Client: EMLab P&K (QA)
C/O: Mr. Quality Control
Re: Sample Report

Date of Sampling: 01-11-2013
Date of Receipt: 01-11-2013
Date of Report: 08-23-2013

MoldRANGE™, California Climate: Extended Outdoor Comparison (Patent Pending)

Outdoor Location: 1, Outside Reference

Fungi Identified	Outdoor data	Typical Outdoor Data for: January in California† Köppen-Geiger climate code[1] "Csbn" Mediterranean/summer fog (n‡=260)						Typical Outdoor Data for: The entire year in California† Köppen-Geiger climate code[1] "Csbn" Mediterranean/summer fog (n‡=3092)					
Project zip code 94080	spores/m3	very low	low	med	high	very high	freq %	very low	low	med	high	very high	freq %
Generally able to grow indoors*													
Alternaria	13	7	13	13	27	27	17	7	13	13	40	53	30
Bipolaris/Drechslera group	-	-	-	-	-	-	3	7	8	13	13	40	4
Chaetomium	-	-	-	-	-	-	5	7	13	13	27	40	10
Cladosporium	1,200	53	110	370	910	1,300	94	110	160	480	1,400	2,600	96
Curvularia	-	-	-	-	-	-	< 1	7	7	13	13	27	1
Epicoccum	13	7	7	13	14	27	8	7	13	13	35	53	10
Fusarium	13	-	-	-	-	-	< 1	-	-	-	-	-	< 1
Nigrospora	-	-	-	-	-	-	6	7	13	13	27	40	6
Penicillium/Aspergillus types	640	53	110	270	770	1,300	85	53	80	210	640	1,100	84
Stachybotrys	-	-	-	-	-	-	2	7	13	13	35	53	2
Torula	-	-	-	-	-	-	7	7	13	13	27	53	9
Ulocladium	13	-	-	-	-	-	3	7	7	13	13	27	3
Seldom found growing indoors**													
Ascospores	320	53	110	270	910	1,400	90	53	53	210	640	1,200	81
Basidiospores	750	270	490	1,600	4,900	8,800	98	110	160	530	2,300	5,000	97
Botrytis	27	13	13	27	53	160	20	13	13	27	53	110	24
Pyricularia	13	-	-	-	-	-	< 1	-	-	-	-	-	< 1
Rusts	13	-	-	-	-	-	7	10	13	13	40	67	24
Smuts, Periconia, Myxomycetes	40	13	13	27	67	93	55	13	13	27	67	110	54
§ TOTAL SPORES/m3	3,000												

[1]Köppen-Geiger climate codes are based upon a climate classification scheme for large geographic areas. The "MoldRANGE, California Climate" report uses the sampling location zipcode to identify the Köppen-Geiger climate code in that area. Because California has such diverse climates, this approach 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 Köppen-Geiger climate classification system can be found on the last page of this report.

†The Typical Outdoor Data represents the typical outdoor spore levels across North America for the time period and 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 enough data is not available to make a statistically meaningful assessment, it is indicated with a dash.

‡ n is the sample size used to calculate the MoldRange, California 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
6000 Shoreline Ct, Ste 205, So. San Francisco, CA 94080
(866) 888-6653 Fax (623) 780-7695 www.emlab.com

Client: EMLab P&K (QA)
C/O: Mr. Quality Control
Re: Sample Report

Date of Sampling: 01-11-2013
Date of Receipt: 01-11-2013
Date of Report: 08-23-2013

Understanding Köppen-Geiger Climate Codes

Outdoor airborne fungal 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 cycles of plants, thereby influencing fungal growth, spore maturation and release cycles. By evaluating outdoor spore concentration across similar climatic zones, rather than for the state as a whole, it is possible to provide a more precise and reliable estimate of typical outdoor spore levels and the frequency of occurrence for different airborne fungal spore types in a given area.

A widely used system for classifying climate was developed in the late nineteenth century by the climatologist Wladimir Köppen. He later collaborated with another climatologist Rudolf Geiger in making modifications to his original system. As new climatic data has become available other individuals have submitted revisions and modifications to this system which are commonly referred to as modified Köppen-Geiger climate classification systems.

The Köppen-Geiger climate classification system is a widely used system that provides an objective numerical definition of climate types in terms of climatic elements such as temperature, rainfall, and other seasonal characteristics. The modified Köppen-Geiger climate classification system adopted here includes 6 major climate categories designated by a capital letter:

- A Tropical
- B Dry
- C Mediterranean (Temperate)
- D Continental (Temperate)
- E Polar
- H Timberline

In order to represent the main climatic types, additional letter designations are added. Except for the Dry climates and Polar climates the second letter refers to rainfall regime. The second letter for Dry climates differentiates Dry Steppe climates from Dry Desert climates. The second letter for Polar climates differentiates Polar Tundra climates from Polar Ice climates. For all 6 major climate categories the third letter refers to temperature characteristics, and the fourth to special features of the climate.

California is unique in that it has a more diverse array of climate types than any other state. Based upon data mapped by the California Department of Fish and Game (2003), California displays 11 distinct climate types as defined by a modified Köppen-Geiger climate classification system:

- BSh Semi-arid, steppe hot
- BSk Semi-arid, steppe
- BSkn Semi-arid, steppe w/summer fog
- BWh Arid low latitude desert hot
- BWk Arid mid latitude desert
- Csa Mediterranean/hot summer
- Csb Mediterranean/cool summer
- Csbn Mediterranean/summer fog
- Dsb Cool continental/dry summer
- Dsc Cold winter/dry summer
- H Highland/Timberline

This report groups California zip codes in relation to these climate codes and summarizes the MoldRANGE™ data by month and by year within each climate code.

REFERENCES

California Department of Fish and Game, Atlas of the Biodiversity of California, p. 15, 2003.
Burge, Harriet A. Bioaerosols. Boca Raton: Lewis Publishers, pp. 163-171, 1995.