



Consulting Results for

上海虹桥国际学校

上海市长宁区伊犁南路 218 号

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概要

室内空气检测（根据 GB/T18883-2002）

- 总体而言，所有检测的参数（TVOC，甲醛，和苯）都在国家标准 GB/T 18883-2002 的规定限值以内。从监管的角度来说，检测区域是可以在上述情况下安全使用的。
 - 通过新风系统或开启门窗保持日常的通风
 - 运行带有活性炭滤网的空气净化器以过滤室内颗粒物和 VOCs，并且定期更换净化器的滤网
 - 考虑安装室内空气监测设备来测量室内空气污染物（PM2.5, CO₂, TVOC, 温度和湿度）的实时水平

室内 TVOC 和 CO₂ 监测

- 在上课时间段，L418 教室内的 CO₂ 浓度水平高于国家标准 GB/T18883-2002 (1000 ppm) 和国际 LEED 指导要求(800 ppm) 的限值，可能是由于监测期间该教室内新风供应不足，或新风系统没有开启所导致的。
- 其他监测点的 CO₂ 浓度水平和所有监测点的 TVOC 浓度水平都在标准限值以内。

霉菌检测

- 根据欧盟霉菌暴露安全标准，B1 层剧院内的霉菌孢子浓度处于低-中水平。室内样品主要由担子孢子和枝孢属孢子——两种常见于室外的霉菌种类所构成。
- 因为室内外采集地样品中孢子种类和占比都十分类似，室内孢子的主要来源应是室外引入。
 - 保持日常清洁。建议使用带有 HEPA 滤网的吸尘器
 - 控制室内湿度——若室内相对湿度持续高于 55%，考虑使用除湿机或空调的除湿功能。

尘螨检测

- 两种主要的尘螨过敏原，屋尘螨（Der p 1）和粉尘螨（Der f 1），测得的室内浓度水平处于低致敏性。

材料铅检测

- 在三个教室的墙面涂料中均未检测出铅。
- 尽管涂料中的铅低于实验方法的检测限，墙上脱落的涂料可能导致墙体中释放出粉尘颗粒，使得室内颗粒物浓度升高。
 - 修理教室中有缺口的墙面
 - 运行带有 HEPA 滤网的空气净化器以降低室内颗粒物的浓度水平

项目背景

概况

上海虹桥国际学校 (HQIS) 在今年暑假期间对 B2 层的部分区域进行了改造。由于开学以后有学生和家长抱怨装修区域的气味，学校在九月份终止了改造并封锁了该区域。出于对学校学生以及教职工的健康考虑，虹桥国际学校希望通过 PureLiving，一个独立的第三方机构，进行专业的实验室检测来诊断室内污染水平。检测分为四部分，分别是室内空气质量，霉菌，尘螨，以及材料铅检测。

客户目标:

- (1) 确认室内空气污染物水平是否在国家推荐性标准 GB/T 18883-2002 规定限值以内
- (2) 确认剧场内空气中霉菌孢子的数量水平
- (3) 确认 L118 和 L210 教室中尘螨的水平
- (4) 确认墙面涂料中的铅含量是否符合美国 CPSC 规定的限值
- (5) 对发现的任何室内空气问题进行分析并提出相应改进建议及措施

现场条件

- 学校在暑假时对校内部分区域进行了装修改造，改造已在九月份停止——距离此次环境检测约有 3 个月
- 室外条件：
 - 中雨，21C°，相对湿度 86%.
- 室内条件：
 - 测试房间/区域在检测时无人使用
 - 平均温度 22C°，平均相对湿度 70%
 - 大部分门窗在检测前已关闭至少 12 小时(GB/T 18883-2002 标准要求空间至少密闭 12 小时)。但是，B1 层有一扇在体育馆附近、通向琴房区域的门在检测时处于半开启状态
 - 空调系统在检测时处于关闭状态
 - 新风系统在检测时正常开启
 - 落地式空气净化器在检测时处于正常开启状态

空气质量检测及结果

1. 实验室检测结果（根据 GB/T 18883-2002）

检测点位	房间名称	描述	总挥发性有机化合物	甲醛	苯	二氧化碳	相对湿度	温度	备注
		单位	mg/m³	mg/m³	mg/m³	ppm	%	°C	
		检出限	0.0005	0.006	0.05	1	1	1	
1	大餐厅	B1	0.0480	-	-	-	-	-	新风系统正常开启； 移动式空气净化器正常开启； 空调未开启
2	前厅	B2	0.0378	0.009	<0.05	573	-	-	
3	体育馆		0.0454	0.010	<0.05	559	-	-	
4	剧场	B1	0.1060	0.011	<0.05	-	77	20	
5	小餐厅		0.0258	0.014	<0.05	-	-	-	
6	艺术教室		0.1680	0.024	<0.05	-	74	21	
7	咖啡厅		0.1160	-	-	-	-	-	
8	行政办公室		0.1340	-	-	-	-	-	
9	118教室	1F	0.0719	0.016	-	-	70	22	新风系统正常开启； 移动式空气净化器正常开启； 空调未开启
10	126教室		0.0273	0.019	-	-	-	-	
11	图书馆		0.1140	0.041	<0.05	-	63	22	
12	210前2楼走廊		0.0171	-	-	-	-	-	
13	216教室	2F	0.0242	0.030	<0.05	-	70	21	
14	221教室		0.0317	0.018	-	-	-	-	
15	305办公室		0.0556	0.032	<0.05	-	69	23	
16	307教室		0.0663	0.030	<0.05	-	-	-	
17	328教室	3F	0.0291	0.026	-	-	71	22	
18	402实验室		0.0816	0.054	<0.05	-	68	21	
19	407教室		0.0303	0.019	<0.05	-	68	22	
20	418教室		0.0708	0.033	<0.05	-	-	-	
室内均值			0.0650	0.024	<0.05	566	70	22	
	国家标准 (GB/T 18883-2002)		≤0.6	≤0.10	≤0.11	≤1000	40-80	N/A	

室内空气检测方法和计划 – 根据现场实际情况，制定以下检测计划：

- 取样项目根据国家标准 GB/T 18883-2002 要求设定检测参数，为存在于室内新建或装修的常见污染物。具体取样项目为：TVOC（总挥发性有机化合物），甲醛，和苯
- 共设置 20 个检测点位（详见附录 B）：
 - B2 层设有 2 个点位（前厅、体育馆）
 - B1 层设有 4 个点位（餐厅、剧场、艺术教室）
 - 1 层设有 4 个点位（咖啡厅、行政办公室、教室）
 - 2 层设有 4 个点位（图书馆、走廊、教室）
 - 3 层设有 3 个点位（教师办公室、教室）
 - 4 层设有 3 个点位（实验室、教室）

室内空气检测结果及分析

- TVOC – 所有检测点位均未超标
 - 室内 TVOC 的平均浓度为 0.065 mg/m³，是国家 GB/T 18883-2002 标准限值 (0.60 mg/m³) 的 11%。
 - B1 层艺术教室内检测到的 TVOC 浓度最高 (0.168 mg/m³)，是国家标准 GB/T 18883-2002 标准限值 (0.6 mg/m³) 的 28%。这个教室内测得较高的 TVOC 浓度可能是由于颜料和其他画画工具以及装修材料中释放的 VOCs 共同作用。
- 甲醛 – 所有检测点位均未超标
 - 室内甲醛的平均浓度为 0.024 mg/m³，是国家 GB/T 18883-2002 标准限值 (0.10 mg/m³) 的 24%。
- 苯 – 所有检测点位均未超标
 - 所有点位的苯浓度低于实验方法检出限 (0.05 mg/m³)。.

室内空气检测结论及建议

- 总体而言，所有检测的参数（TVOC，甲醛，和苯）都在国家标准 GB/T 18883-2002 的规定限值以内。从监管的角度来说，检测区域是可以在上述情况下安全使用的。
- 我们建议采取以下措施以维持室内空气污染物处于较低水平：
 - 保持日常通风
 - i. 在室外 PM 浓度水平较低时，开启窗户/房门以增加自然通风
 - ii. 持续开启新风系统以加大换气量，尤其是在 B2 和 B1 层。根据生产商的指引定期清洁/更换新风系统的滤网
 - 运行带有活性炭滤网的空气净化器以过滤室内颗粒物和 VOCs，并且定期更换净化器的滤网。
 - 考虑安装室内空气监测设备来测量室内空气污染物（PM2.5, CO₂, TVOC, 温度和湿度）的实时水平。

2. 空气监测结果

TVOC 监测结果——B1 大餐厅和 B2 体育馆

● B2 Gym ● B1 Large Cafeteria

(GMT+08:00 Asia/Shanghai)

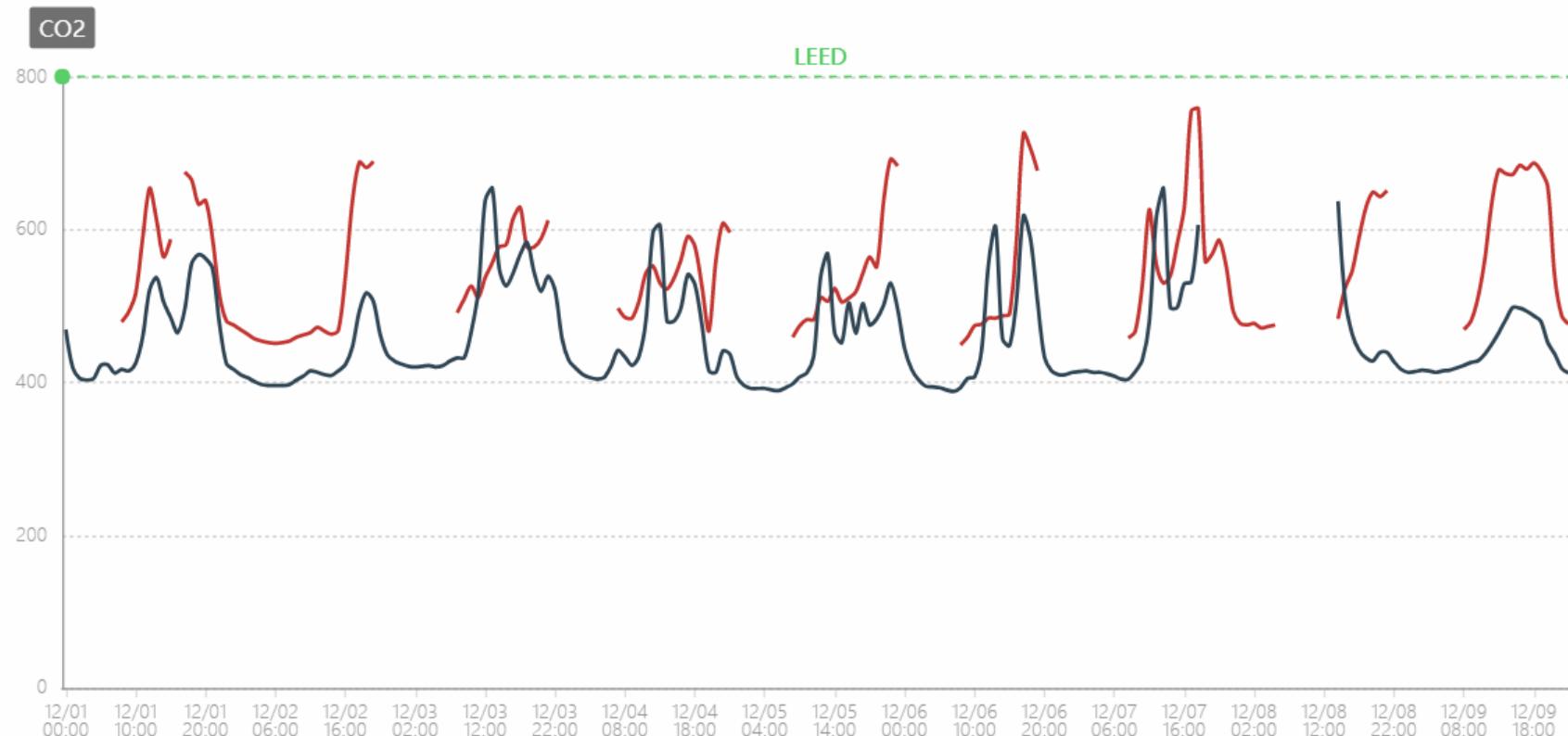


- 第一轮的空气监测分别在 B1 层大餐厅和 B2 层体育馆中进行。总体而言，体育馆和大餐厅的 TVOC 浓度水平均在国家标准 GB/T 18883-2002 规定限值 (0.6 mg/m³) 和国际 LEED 指导要求 (0.5 mg/m³) 的范围以内。
- 餐厅内的 TVOC 的浓度峰值通常出现于饭点，说明食物和人员活动可能是室内 VOCs 的主要来源。体育馆内 TVOC 的浓度峰值通常出现于放学后，可能是由于放学后学生的活动。
- 图中的数据缺失可能是由于电路中断或网络中断导致的。

CO₂ 监测结果——B1 大餐厅和B2 体育馆

● B2 Gym ● B1 Large Cafeteria

(GMT+08:00 Asia/Shangl

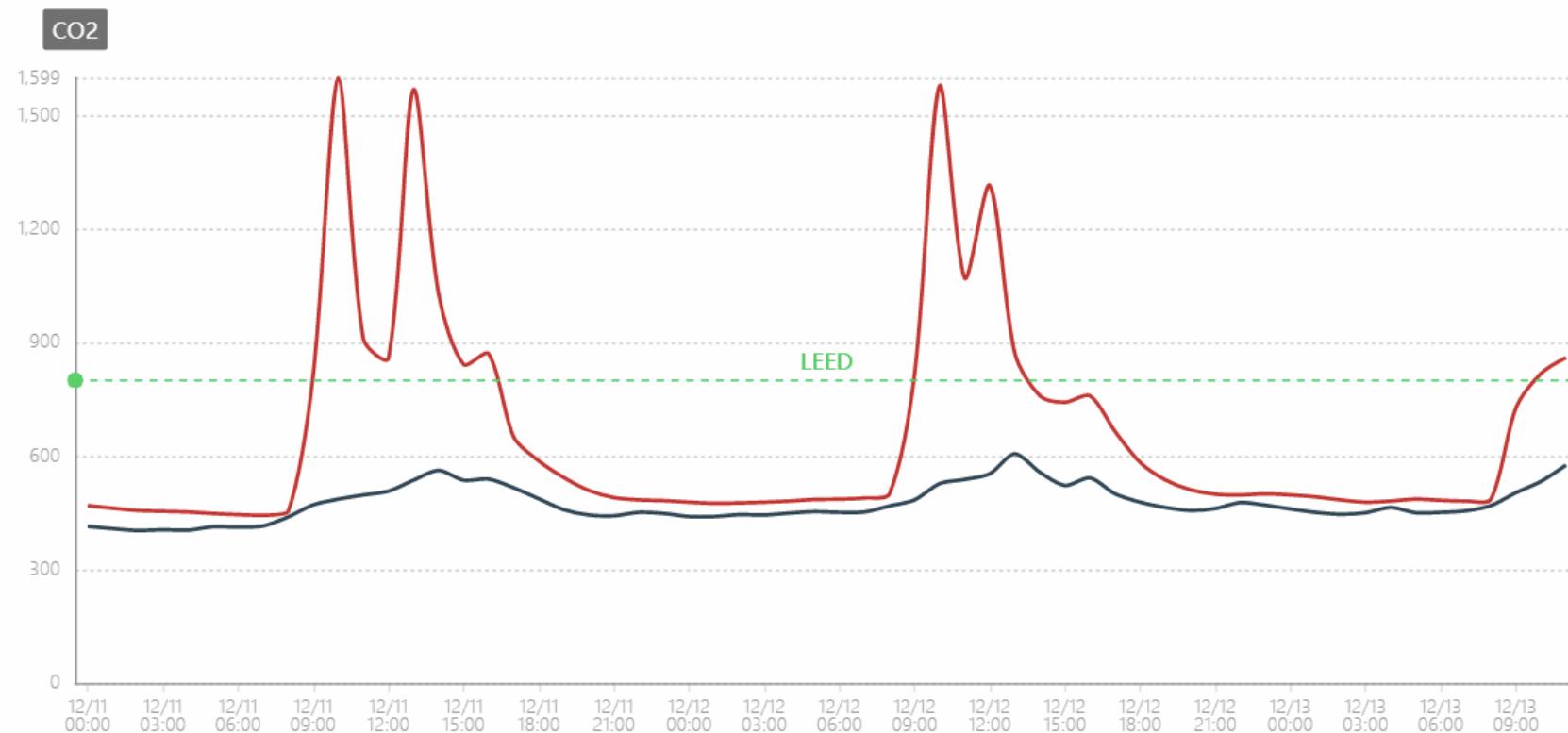


- 总体来说，在整个监测时间段内，餐厅内和体育馆内的 CO₂ 浓度均低于国家标准 GB/T 18883-2002 的规定限值（1000 ppm）和国际 LEED 指导要求（800 ppm），说明学校如今配备的新风系统可以给地下两层的区域提供足够的新风。
- B1 层大餐厅区域的 CO₂ 浓度峰值主要出现在中午午饭时间，B2 层体育馆中 CO₂ 的浓度峰值主要出现在下午场地被占用的时间段。

CO₂ 监测结果——L305 教职工办公室和 L418 教室

● L418 ● L305

(GMT+08:00 Asia/Shang



- 在上课时间段，L418 教室的 CO₂ 浓度高于国家标准 GB/T 18883-2002 的规定限值（1000 ppm）和国际 LEED 指导要求（800 ppm）。这可能是由于监测期间新风供应不足，或是新风系统没有开启所导致的。
- 教职工办公室内的 CO₂ 浓度在整个监测过程中均低于 600ppm，在国家和国际标准规定限制以内。

霉菌检测及结果



AccuScience™ Analysis Report

Analysis: AccuScience Premium Level 3 Fungal Spore Count™

Client: PureLiving China

Shanghai, China

Contact: Yan, Peijia

Project ID: Shanghai Hong Qiao International School

Date Sampled: 12/2/2018

QLab, 256 Bridge St, Metuchen, NJ 08840

info@qlabusa.com www.QLABusa.com

AIHA EMPAT Lab ID: 178794

QLab Job No.: ME181204-05

Date Received: 12/4/2018

Date Analyzed: 12/7/2018

Date Reported: 12/7/2018

Reviewed by: WT

Approved by: Wei-Chih Tang, Ph.D., Lab Director

Lab Sample No.	ME181204-05(1)			ME181204-05(2)		
Sample ID	1			2		
Sample Location	Outdoor			B1 - Theatre		
Sample Type (Device)	Air (Allergenco-D)			Air (Allergenco-D)		
Air Volume	75 L			75 L		
Total Concentration (counts/m³)**	3,500 cts/m³			370 cts/m³		
Mycologix Profile Group 1, 2 & 3	cts/smp*	counts/m³	%	cts/smp*	counts/m³	%
1. Common Dominant Spores	DL = 53; LQL = 1100 cts/m³			DL = 53; LQL = 1100 cts/m³		
Ascospores, non-specified (O)	8	110	3			
Basidiospores (O,I)	125	1,700	49	19	250	67
Cladosporium, Group HM (O)						
Aspergillus/Penicillium-like, DOT (O)						
#Cluster-Chain-Loose Spore Profile**						
Cladosporium, Group C (O,I)	91	1,200	35	8	110	29
Cladosporium, Group S (I)						
Aspergillus/Penicillium-like (I,O)						
** Cluster-Chain-Loose Spore Profile**						
Cluster(s)						
2. Indoor Hydrophilic Fungi[#]	DL = 13; LQL = 270 cts/m³			DL = 13; LQL = 270 cts/m³		
Stachybotrys (I)						
Chaetomium (I)						
Ulocladium (I)						
Memnoniella (I)						
Trichoderma (I)						
Scopulariopsis (I)						
3. Others	DL = 13; LQL = 270 cts/m³			DL = 13; LQL = 270 cts/m³		
Hyphal fragment (O,I)	2	27	<1			
Alternaria (O,I)	17	230	7			
Cercospora (O)	1	13	<1			
Curvularia (O,I)						
Drechslera/Bipolaris-like (O)						
Epicoccum (O)						
Fusarium (O,I)						
Myxomycetes/Smuts/Periconia (O,I)	2	27	<1			
Nigrospora (O)	4	53	2			
Pithomyces (O)						
Rusts (O)	7	93	3			
Unknown (O,I)	1	13	<1	1	13	3
Skin Cells Rating	Trace			Trace		
Debris Rating	3 (26 - 75%)			2 (6 - 25%)		
Note						

*: cts/smp: counts per sample. **: All concentrations are rounded to two digits of significant figures. Total concentrations/percentages may not be equal to the sum of individual concentrations/percentages due to rounding. #: Water-loving indoor fungi (min Aw ≥ 0.89). Absence of hydrophilic fungi does not exclude the possibility of a water damage history. DL: detection limit (analytical sensitivity). LQL: Lower quantitation limit = 20 x DL. Upper quantitation limit depends on sample conditions. ## Asp/Pen-like spores: Loose: 1 to 2 spores; Chain: 3 to 9 spores; Cluster: 10 spores or more. O: Mostly outdoor origin with rare exceptions; I: Mostly indoor origin with rare exceptions. Distinct Outdoor Type (DOT): Distinct outdoor Asp/Pen spores that can be easily differentiated from indoor Asp/Pen spores. DOT is specific to the batch of samples collected at the same time and cannot be used for other batches.



AccuScience™
Analysis Report

Analysis: AccuScience Premium Level 3 Fungal Spore Count™
Client: PureLiving China
Shanghai, China
Contact: Yan, Peijia
Project ID: Shanghai Hong Qiao International School
Date Sampled: 12/2/2018

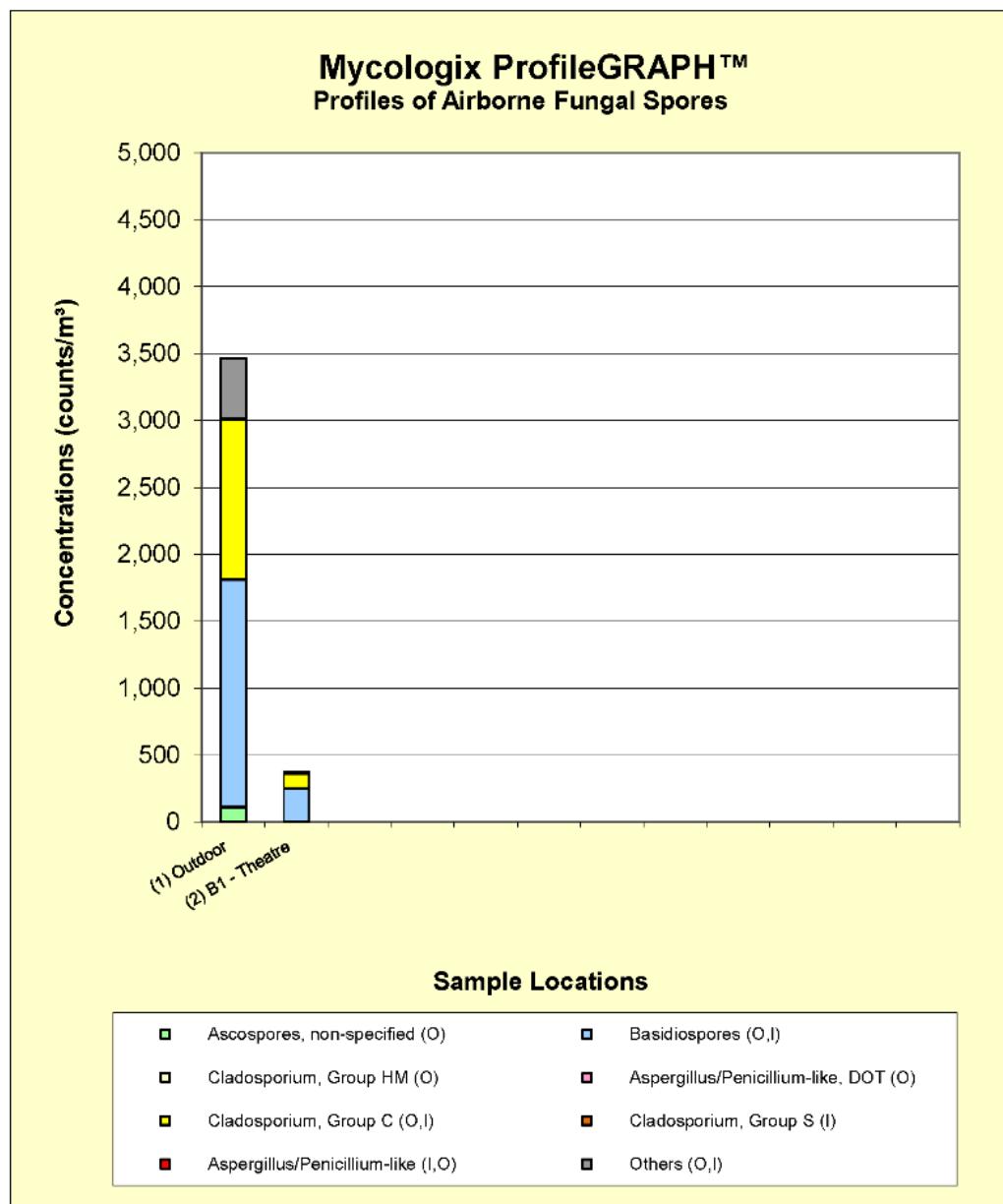
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AIHA EMPAT Lab ID: 178794

QLab Job No.: ME181204-05
Date Received: 12/4/2018
Date Analyzed: 12/7/2018
Date Reported: 12/7/2018

Reviewed by: WT

Approved by: Wei-Chih Tang, Ph.D., Lab Director

Please see original data for complete interpretation.



霉菌检测计划

采样点位:

- 1 层室外——对照
- B1 层剧场——室内关注的区域

采样详情 :

- 采样空气 75L
- 采样高度大约为 2-4 英尺（日常呼吸区域）

霉菌检测结果及分析

霉菌监测结果分析:

- 空气样本表明在检测区域内的霉菌生长情况如下：

室外参照	3,500 cts/m3
B1 层剧场	低-中(370 cts/m3)

- B1 层剧院中检测到的霉菌浓度水平为 370 cts/m3，大约是室外霉菌水平的 11% (3,500 cts/m3)。根据欧盟霉菌暴露安全标准，剧院内霉菌浓度水平处于低-中。结果表明室内没有明显的霉菌生长。
- 如果霉菌孢子是从室外引入到室内的，室内外样品中各霉菌种类占比会比较接近。室外孢子中占比最高的是担子孢子以及枝孢属孢子（分别为 49% 和 35%）——室外最常见的两种菌种。B1 层剧院中这两种菌种占比与室外样品中接近，分别为 67% 和 29%，说明剧院中的霉菌可能主要来源于室外引入，而不是室内生长。

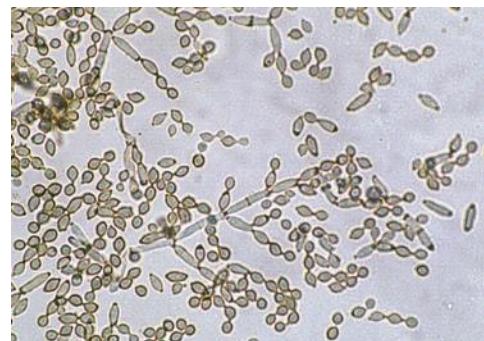
霉菌检测结论及建议

- 根据欧盟霉菌暴露安全标准，B1 层剧院内的霉菌孢子浓度处于低-中水平。因为室内外采集地样品中孢子种类和占比都十分类似，室内孢子的主要来源应是室外引入。
- 整个检测区域的室内平均相对湿度为 70%，高于 ASHRAE (美国采暖、制冷与空调工程师学会) 的建议标准范围 (30-55%)。相对湿度本身并不表现出健康威胁，但是它会助长霉菌、细菌、尘螨，以及其他过敏原的滋生，并可能因此引发哮喘及其他呼吸道过敏反应。我们建议：
 - 在室内安装湿度计来监测室内湿度水平
 - 若空气中湿度持续高于 55%，建议开启除湿机或空调的除湿功能。

- 担子孢子在室内外采集的样品中都占主导地位
 - 担子孢子常见于花园和草地。孢子在高湿度和多雨的时节大量释放。
 - 担子孢子对人类健康没有严重影响，但是可能会对一些呼吸敏感的群体有致敏性。
 - 蘑菇是一种常见的担子孢子。



- 室内及室外样品中都发现了枝孢属霉菌孢子
 - 枝孢属霉菌是最普遍存在于室内和室外的霉菌种类之一。枝孢属霉菌呈偏黑的深绿色，常生长于潮湿的表面。
 - 尽管枝孢属霉菌很少对人类有致病性，霉菌孢子可能会引起或导致哮喘或过敏反应。曾经有过个人因直接接触这些霉菌导致感染反应(呼吸道、皮肤等)的例子。



评分释义

种类	观察/测量
孢子量	<p>每立方米的孢子量。这个数据将会与室外霉菌水平做对比。室内霉菌水平通常为室外水平的 20-40%，如果高出室外霉菌水平，通常表明室内有明显的霉菌生长。</p> <p>尽管对于室内孢子量没有明确的标准，目前有两个相关的标准供我们参考。</p> <ol style="list-style-type: none"> 1. 美国室内空气质量协会培训大纲 (Baxter Etals): 当孢子的总浓度超过 10,000 / m³，说明霉菌污染在室内存在。 2. 欧盟霉菌暴露安全标准: 欧盟的房间通常使用该项霉菌水平指标。 <ol style="list-style-type: none"> a. 室内霉菌孢子量 < 50/m³ 极低 b. 室内霉菌孢子量 < 200/m³ 低 c. 室内霉菌孢子量 < 1000/m³ 中 d. 室内霉菌孢子量 < 10000/m³ 高 e. 室内霉菌孢子量 > 10000/m³ 极高

尘螨检测及结果



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Charlottesville VA, 22903
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www.inbio.com

Indoor Allergen Analysis Report
Allergen Analysis Results

InBio™ Services

Batch ID: 18-0501M

E=ELISA, M=MARIA, T=Endotoxin, Z=Enzyme

PureLiving

Kimi Shi/Peijia Yan
Jiachun 753, Building C, 3rd FL, 753 Yuyuan Rd, Changning Dist.
Shanghai, China 200050
PHONE: +86-185-6905-6735

Date Received: 12/4/2018
Date Assayed: 12/5/2018
Date Reported: 12/5/2018 4:52:27 PM

Project ID#

Der p 1 and Der f 1 results reported as microgram allergen per gram dust.

Accession:	Sample:	Major Allergens:		Cat: Fel d 1	Dog: Can f 1	Cockroach: Bla g 2
		Der p 1	Der f 1			
218-2938	1	0.054	0.064			
218-2939	2	0.059	0.347			

NES = Insufficient sample for the assay

The reporting limit is 0.012 ug/g for Der p 1 and Der f 1.

Der p 1 and Der f 1 results reported as microgram allergen per gram dust.

Accession:	Sample:	Mite Allergens:	Cat:	Dog:	Cockroach:	
		Der p 1	Der f 1	Fel d 1	Can f 1	Bla g 2
Guidelines:		The following guidelines for Dermatophagoides mite, cat, dog and cockroach allergen levels in house dust have been proposed:	MITE Group 1	CAT/DOG	Bla g 1	1,2,3,6 Bla g 2
LOW	(not sufficient to cause allergic symptoms)	< 2 µg Mite Group 1/g dust	< 0.2 µg Fel d 1 or Can f 1/g dust	< 0.10 µg Bla g 1/g dust	< 0.20 µg Bla g 2/g dust	
SIGNIFICANT	(risk for sensitization and bronchial hyperactivity)	2-10 µg Mite Group 1/g dust	8-20 µg Fel d 1 or Can f 1/g dust	0.10-0.80 µg Bla g 1/g dust	0.20-0.4 µg Bla g 2/g dust	
HIGH	(risk for acute asthmatic attack)	> 10 µg Mite Group 1/g dust	1-8 µg Fel d 1 or Can f 1/g dust	> 0.80 µg Bla g 1/g dust	> 1 µg Bla g 2/g dust	
CAT/DOG		The results of two studies have observed that increased exposure to high levels of Fel d 1 and Can f 1 have caused individuals to develop a tolerance, which means that individuals could potentially be exposed to 8-20 µg/g dust and only experience mild allergic symptoms. Individuals with less exposure to high levels of Fel d 1 and Can f 1 (1-8 µg/g dust) may experience more severe allergic symptoms.	2,4,6			
COCKROACH		Allergen exposure threshold levels for sensitization have been published in Units/g dust. Some investigators feel that any detectable level of cockroach allergen is clinically significant because its presence identifies a building in which persons who are cockroach allergic are at risk to develop symptoms because of exposure.	5,6			
1.	J. Allergy Clin Immunol 1989; 83:416-427.					
2.	Amer Rev Respir Dis 1990; 141:361-367					
3.	Amer Rev Respir Dis 1993; 147:573-578					
4.	Amer J Res Crit Care Med 1997; 155:94-98					
5.	J. Allergy Clin Immunol 1997; 100:S1-S24					
6.	Pediatric Allergy Principles and Practice 2003; 261-68					

Report reviewed and approved by:
Stephanie Filep, BS
Director of Laboratory Services



CONFIDENTIALITY NOTICE: This report may contain confidential or privileged information that is solely for the use of the intended recipient(s). If they have come to you in error you must take no action based on them, nor must you copy or communicate them to anyone. Please notify us immediately and delete this communication.

NES = Insufficient sample for the assay
The reporting limit is 0.012 ug/g for Der p 1 and Der f 1.

尘螨检测计划

1. 1 层教室 L118 – 寝具



2. 2 层教室 L210 – 小地毯



尘螨检测结果及分析

尘螨过敏原	Der p 1	Der f 1
1层教室 L118	低 (0.054 ug 尘螨/g 灰尘)	低 (0.064 ug 尘螨/g 灰尘)
2层教室 L210	低 (0.059 ug 尘螨/g 灰尘)	低 (0.347 ug 尘螨/g 灰尘)
标准	0.2 ug/g	0.2 ug/g

- 两种主要的尘螨过敏原, Der p 1¹ 和 Der f 1², 测得的室内浓度水平处于低致敏性。

¹ [Der p 1](#) (*Dermatophagoides pteronyssinus*; common name: European house dust mite)

² [Der f 1](#) (*Dermatophagoides farinae*; common name: American house dust mite)

关于尘螨:

- 尘螨对人类的健康影响通常是由尘螨肠道中所含的强消化酶引起的过敏反应。常见的症状包括气喘，过敏性鼻炎和哮喘。
- 若尘螨不受控制地生长，可能引起特应性皮炎和表皮屏障损伤。
- 免疫系统受损的患者可能会因尘螨感染而遭受更严重的影响，受影响的患者可以使用免疫疗法。
- 利用不同空气净化设备和空调管道清洁等方法对螨虫的防治效果不明显。化学喷雾剂在处理家具时也没有很好的效果，因为它们不会渗透到家具里，也不会深入到螨虫的洞穴里。

常规建议:

- 如果为厚重的窗帘，请更换百叶窗或轻质棉布。
- 用木制，塑料或乙烯基家具替换布艺家具。尽可能减少地毯在教室内的使用。
- 在进行吸尘清洁时，使用一次性口罩。最好使用带有2层微滤袋的吸尘器，以防止过敏原从吸尘器转移到空气中。
- 冷冻或高温都可以杀死螨虫。例如，将毛绒玩具放在冰箱中过夜是有效的，但在此之后必须清洗它们以进一步去除过敏原。在干燥炎热的天气晾晒地毯也可以帮助杀死螨虫。每月定期在地毯上使用杀螨剂（含3-5%苯甲酸苄酯）也是一种有效控制地毯尘螨的方法。

材料铅检测及结果

Test Report

Report No. A2180238429101

Applicant SHANGHAI HONG QIAO INTERNATIONAL SCHOOL
Address 218 SOUTH YI LI ROAD, CHANGNING DISTRICT, SHANGHAI, CHINA

The following sample(s) and sample information was/were submitted and identified by/on the behalf of the client

No.	Sample Name(s)
001	B109 Art Room
002	L118 Classroom
003	L210 Classroom

Sample Received Date Dec. 4, 2018
Testing Period Dec. 4, 2018 to Dec. 6, 2018

Test Requested As specified by client, to test Lead(Pb) in the submitted sample(s).

Test Method/Test Result(s) Please refer to the following page(s).

Tested by

Xiang Qing Jiang

Reviewed by

sha chen

Approved by

Lin Zhang

Date

Dec. 6, 2018

Lin Zhang
Technical Manager

No. R311141796

Centre Testing International (Ningbo) Co.,Ltd.

1-2F, Eastern Factory, No.76, Jinghua Road, High-Tech Zone, Ningbo, Zhejiang, China

Test Report

Report No. A2180238429101

Test Method

Tested Item(s)	Test Method	Measured Equipment(s)
Lead(Pb)	Refer to EPA 3052:1996 & EPA 6010D:2014	ICP-OES

Test Result(s)

Tested Item(s)	Result			MDL
	001	002	003	
Lead (Pb)	N.D.	N.D.	N.D.	2 mg/kg

Tested Sample/Part Description

- 001 White solid
- 002 White solid([Tested as a whole])[▽]
- 003 White solid([Tested as a whole])[▽]

Remark: The sample(s) had been dissolved totally tested for Lead.

[▽]=The sample(s) was tested as a whole, because it's impossible to disassemble or separate it by current equipment and technology.The result(s) shown on this report may be different from the content of any homogeneous material.

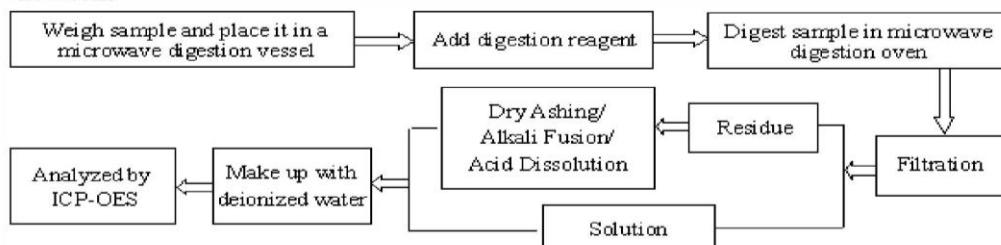
-MDL = Method Detection Limit

-N.D. = Not Detected (<MDL)

-mg/kg = ppm = parts per million



Test Process



材料铅检测方案

实验室检测方法:

EPA 6010D 方法– 2014 (ICP—OES: 电感耦合等离子体—光发射光谱法)

参考标准:

美国联邦政府根据消费者产品安全委员会 (CPSC) 的要求规定了油漆涂料及类似表面图层中铅的含量。法案可参考在 2008 年消费者产品安全改进法案 ([CPSIA](#)) 的 101 部分(公共法 110-314), 被 H.R. 2715 修改后的 公法 112-28 (2011 年 8 月 12 日), 以及 [16 CFR part 1303](#).

材料铅结果及分析

材料中的铅鉴定

检测点位	物品	铅含量(PPM)	标准(PPM)
1	涂料中的铅 – B109 艺术教室	ND	90 (CPSC)
2	涂料中的铅 – L118 教室	ND	90 (CPSC)
3	涂料中的铅 – L210 教室	ND	90 (CPSC)

*“ND”代表未检出, 说明材料中铅的水平低于实验分析方法能检测到的最低水平。

材料铅结论及建议

1. 在三个教室的墙面涂料中均未检测出铅。
2. 尽管涂料中的铅低于实验方法的检测限, 墙上脱落的涂料可能导致墙体中释放出粉尘颗粒, 使得室内颗粒物浓度升高。
3. 我们建议 :
 - a) 修理教室中有缺口的墙面
 - b) 运行带有 HEPA 滤网的空气净化器以减少室内颗粒物的浓度水平

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About Us

PureLiving (www.purelivingchina.com) is China's leading indoor environmental health and safety consulting firm focused on advising clients on air and water quality, mold, asbestos, and lead exposure issues. In addition to independent, government-certified testing, we also interpret results based on rigorous international standards and provide independent recommendations and solutions tailored to our clients' budgets and needs. We understand that in a market where standards may be low and test results can be purchased, credibility and trust is everything. With offices in Beijing, Chengdu, Shanghai, Suzhou, and Hong Kong, we have completed over 6,000 residential and commercial projects throughout China and the quality of our reports and high level of professional service has been lauded by clients and reviewers in The Wall Street Journal, CNN, and The Guardian. In addition to our residential business, we have assisted corporate customers from small startups through Fortune 500 multinational companies.

附录 A：现场照片



Figure 1-2. B2 层装修区域外门缝中和 B1 层天井处测得的 TVOC 读数接近

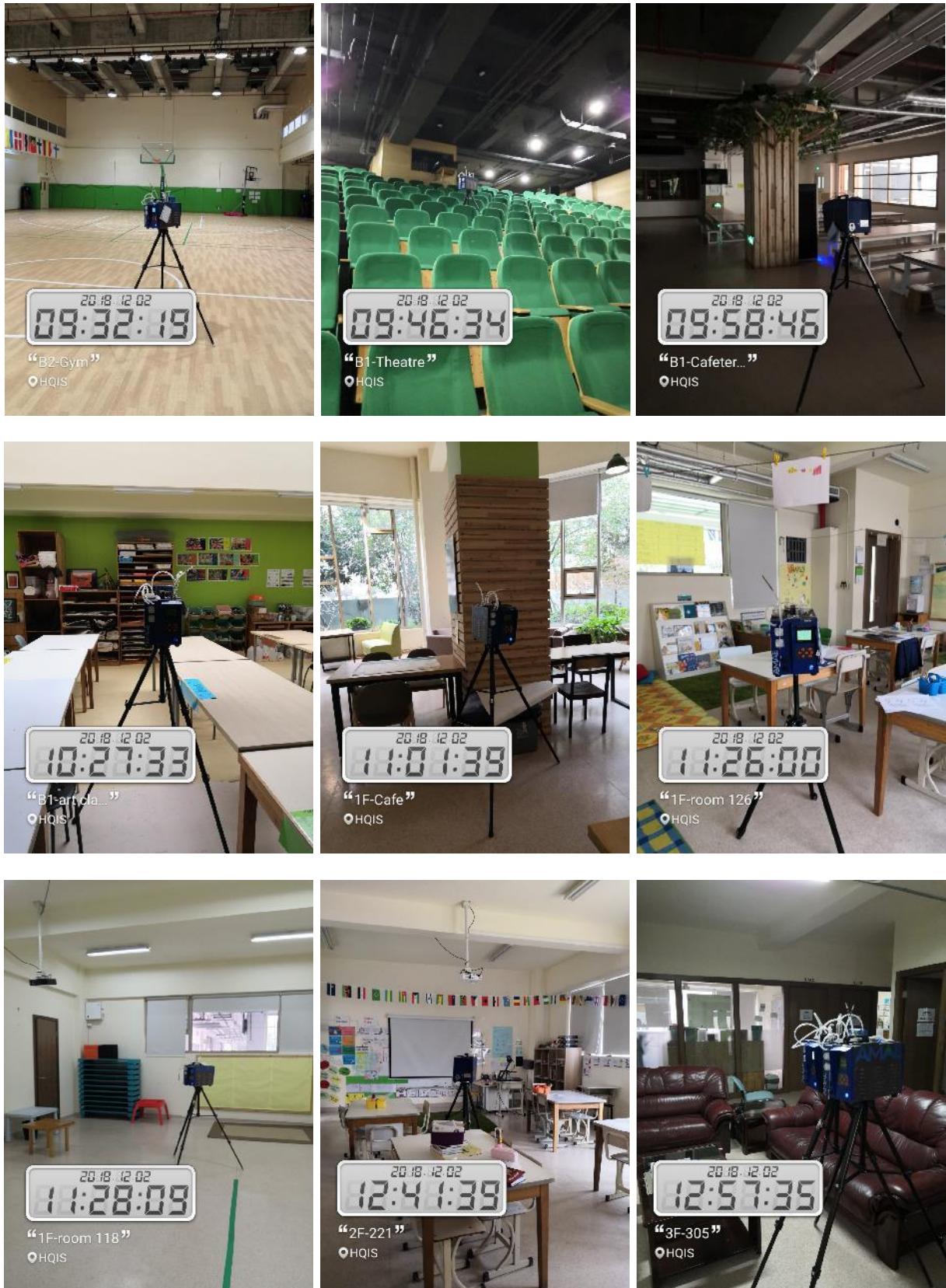


图 3-11. 根据国家标准 GB/T 18883-2002 规定对室内空气中的 VOCs、甲醛和苯进行采样



图 12-13. 检测室内 CO₂ 浓度、温度、相对湿度



图 14-15. 净化器内的滤网需要根据生产商的建议进行定期更换

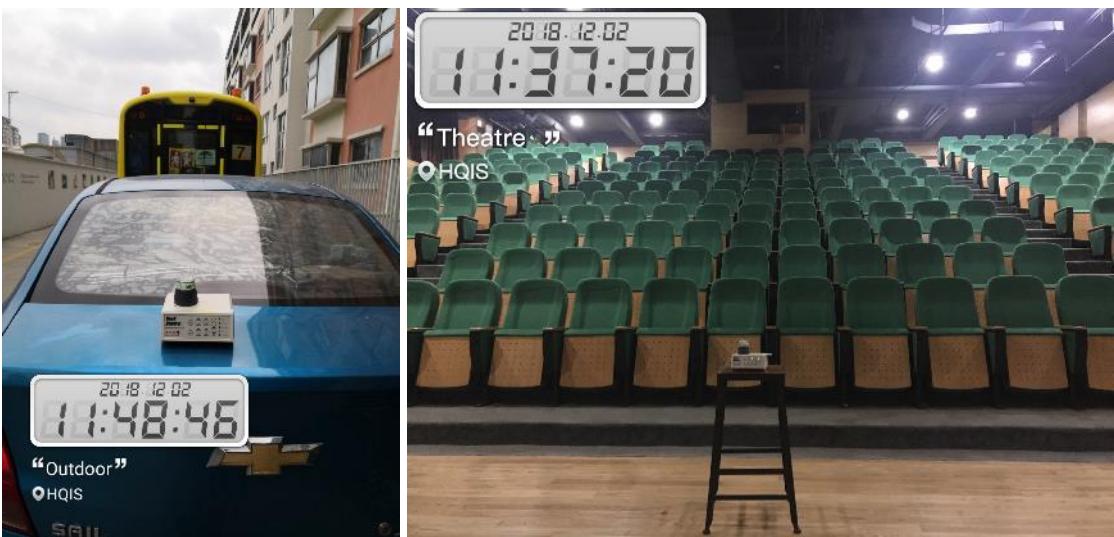


图 16-17. 空气霉菌采样



图 18-19. 尘螨采样



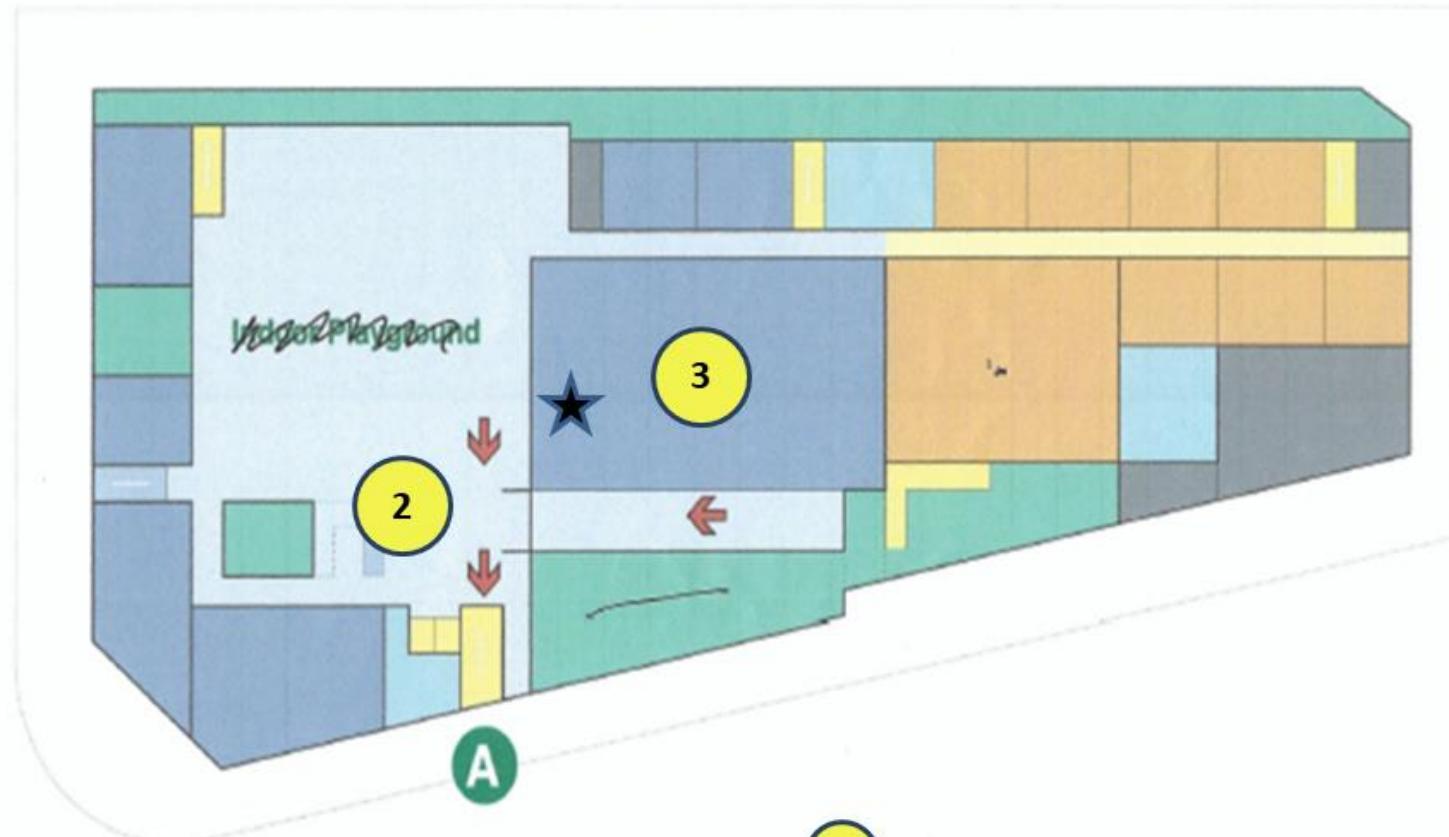
图 20. 材料铅采样



图 21-22. 墙上涂料脱落可能会导致墙体释放出颗粒物，并导致室内 PM 浓度上升

附录 B: 室内空气检测点位

Basement 2



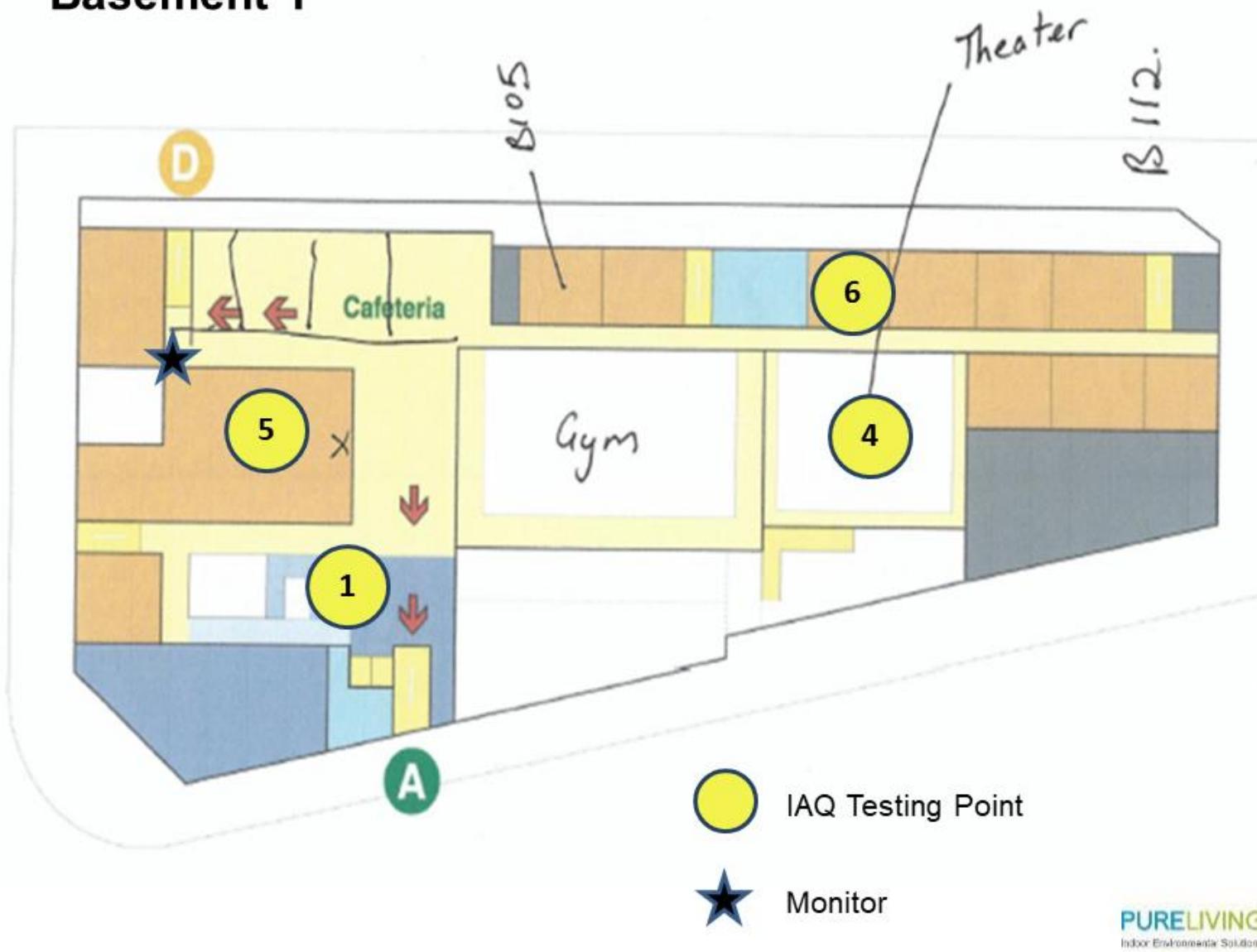
● IAQ Testing Point

★ Monitor

PURELIVING
Indoor Environmental Solutions

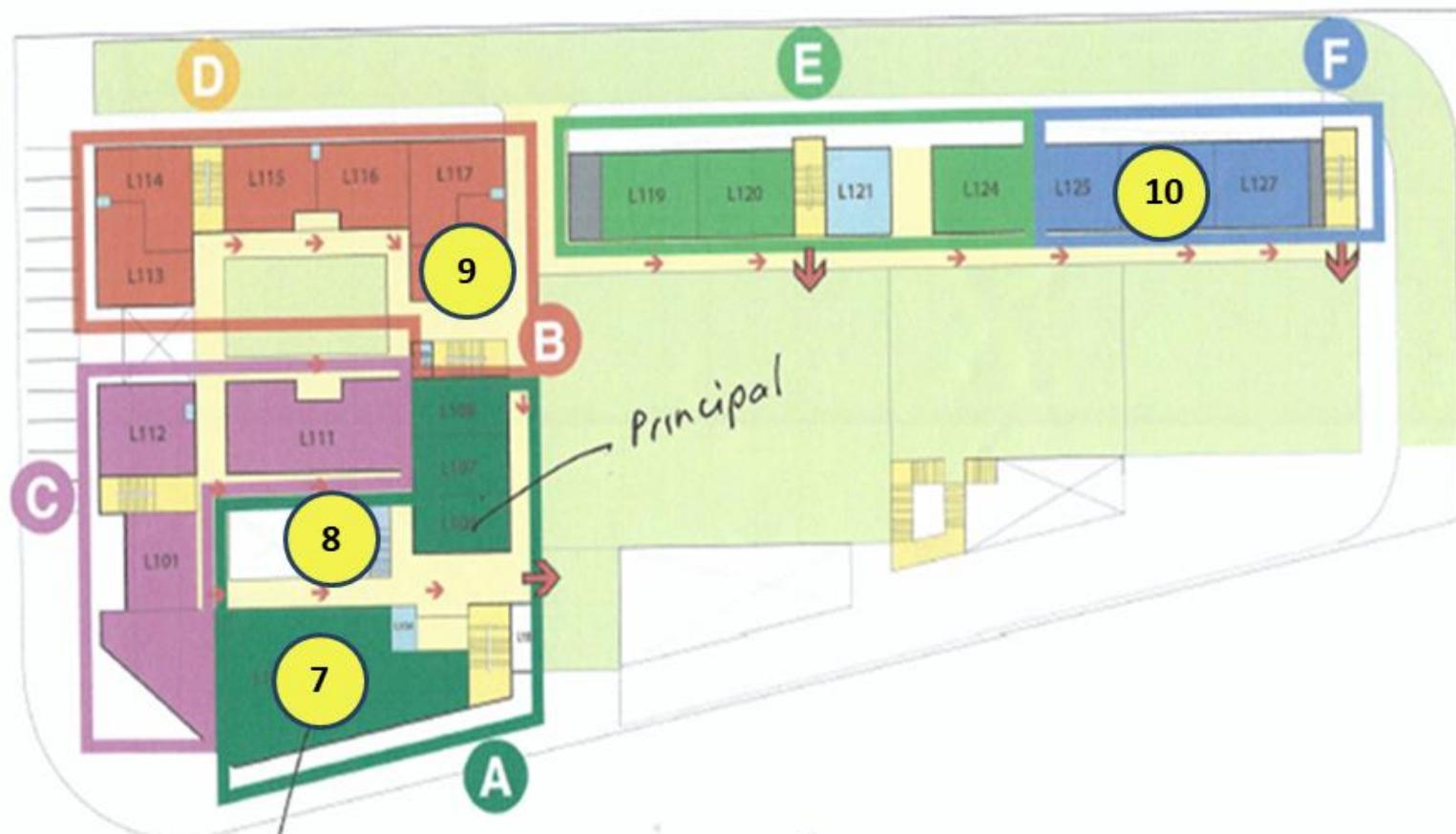
CONFIDENTIAL

Basement 1



CONFIDENTIAL

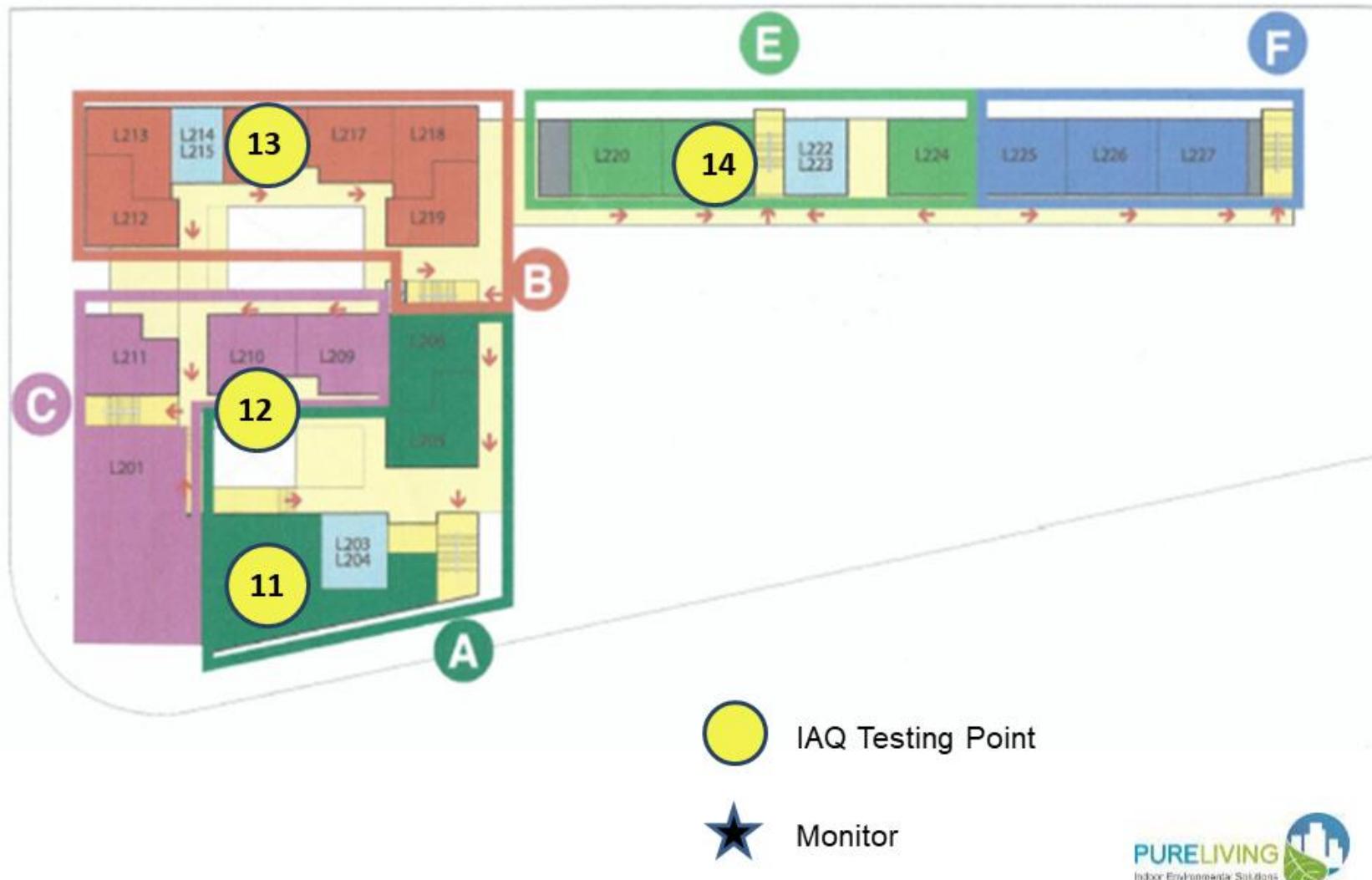
Level 1



● IAQ Testing Point

★ Monitor

Level 2



Level 3



● IAQ Testing Point

★ Monitor



Level 4



● IAQ Testing Point

★ Monitor



附录 C：霉菌介绍

Mold is the common word for any fungus that grows on food or damp building materials. It often looks like a stain and comes in a variety of colors. In nature, mold helps decompose or break-down leaves, wood and other plant debris. Molds become a problem when they grow where they are not wanted and digest materials such as our homes. In some cases, however, mold may not be visible but may have a musty odor. If allowed to grow, mold can contribute to poor indoor air quality and impact health.

Mold requires four things to grow:

- Acceptable temperature range
- Oxygen
- Food material (nearly any substance – leather, fabric, paint, cellulose, even skin oils)
- Moisture

Of these, the only one that we can control is the last one: moisture. Washing, cooking, air humidifiers, unvented clothes dryers, condensation and leaks from the outside all produce the kind of indoor moisture that mold needs to grow. Also, poor ventilation contributes to higher humidity levels and leads to condensation, which also allows mold to grow.

Why is this a problem in China?

Despite common belief, mold does in fact grow in China! As long as oxygen, moisture, and a food source are available, mold can take root. Many foreigners are accustomed to looking for mold in walls, under carpets, and in basements. However, these are not the usual suspects in China, where the construction material of choice is cement, bare floors are common, and few people deal with a basement. Yet, the prevalence of humidifiers, abundance of rain in the spring and summer, the tightly sealed construction of new apartments, lack of insulation, and poor ventilation mean that mold still is very much a problem. The largest part of the problem is that the low attention to mold issues and incorrect remediation results in a higher degree of unwitting exposure.

What is the health impact?

In order to reproduce or when disturbed, molds release small "spores" into the air and these spores are small enough that people can actually breathe them in. These spores in turn may release microbial volatile organic compounds (MVOCs). The musty, earthy odors that you smell when you enter an area with mold are created by these MVOCs. Similar to VOCs released by manmade items and petrochemicals, MVOCs can cause adverse reactions in people. Our reaction to the spores and MVOCs is what causes illness. Mold has a probable link to a wide variety of symptoms, depending on species type and each individual's personal reaction. Common symptoms may include:

- Eye, nose and throat irritation
- Headaches
- Coughing and phlegm build-up
- Wheezing and shortness of breath
- Allergic reactions and triggering of asthma attacks

Although healthy adults may not react to mold, WHO research has found that damp and mold increases the risk of respiratory disease in children and adults by 50%³. Further, mold combined with dust mites may account for 20% of asthma prevalence⁴. At special risk are those who already have allergy sensitivities or asthma, lung disease, and also those with weakened immune systems such as the elderly, or with leukemia or AIDS.

A small number of molds produce toxins called mycotoxins. When people are exposed to mold mycotoxins they may suffer toxic effects, including fatigue, nosebleeds, nausea, headaches, and irritation to the lungs and eyes. Infants have developed bleeding in their lungs. In rare cases, most famously with what is popularly called, “toxic black mold,” mycotoxins can lead to fatalities.

In addition to the health impact, mold causes physical damage, spreads quickly, and can be very costly for homeowners if not quickly and effectively resolved.

—报告结束—

³ WHO statistics: <http://www.euro.who.int/en/what-we-do/health-topics/environmental-health/air-quality/facts-and-figures>

⁴ WHO report citing Melse and de Hollander, 2001.