



# HYGIENETECH

Hygiene Technologies International, Inc.

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May 5, 2010

State of California  
Board of Equalization  
450 N Street  
Sacramento, California 94279

Document No. 21004001.2

Attention: David Gau

Regarding: 3<sup>rd</sup> Floor Cubicle 38 Area

Dear Mr. Gau:

On April 26, 2010, Wesley B. Frey, Industrial Hygienist, with Hygiene Technologies International, Inc., (HygieneTech), visited the Cubicle 38 area on the north side of the 3<sup>rd</sup> floor in order to respond to a request by representatives of the State of California Board of Equalization (BOE) to investigate an employee concern regarding poor indoor air quality at that location. The survey findings, along with the analytical data, conclusions, and recommendations appear below.

On the survey date, air samples were collected for total (viable and nonviable) fungi analyses using a Zefon brand Bio-Pump™ equipped with Air-O-Cell® cassettes. The samples were subsequently analyzed for fungi (including yeasts, molds, rusts, smuts, and mushrooms) by trained and experienced microbiologists at a laboratory accredited by the American Industrial Hygiene Association (AIHA) and that successfully participates in the AIHA Environmental Microbiology Proficiency Analytical Testing (EMPAT) Program. Direct-reading air measurements for volatile organic compounds (VOCs) were also recorded in and around Cubicle 38 using a RAE Systems, Inc. Mini-RAE 2000 photoionization detector, which is capable of detecting a wide variety of unsaturated hydrocarbons at airborne concentrations ranging from 0.1 to 10,000 parts per million (ppm). Prior to the survey, this instrument was calibrated using a 100-ppm isobutylene gas standard. The airborne fungi assessment analytical and airborne VOC data with supporting and background information appear in the enclosed table.

As presented in Table 21004001-17, the airborne spore count data recorded showed mostly fungal spore types outdoors such as *Alternaria*, ascospores, basidiospores, *Chaetomium*, *Cladosporium*, colorless spores typical of *Penicillium* and *Aspergillus* species, rusts, and smuts, with basidiospores predominating. Within Cubicle 38, the data showed a low airborne concentration of basidiospores that was well below the level detected outdoors, and the overall datum within the tested area was also well below the overall datum recorded outdoors. These data are considered unremarkable and are not believed to pose a health risk beyond that posed by the outdoor environment where exposures to airborne fungi are expected.

As presented in Table 21004001-18, VOCs were not detected at or above the instrument detection limit of 0.1 ppm. Because these data were recorded at stationary locations at approximate breathing zone height, the results are expected to represent building occupant *exposure* potentials for those persons occupying or passing through the areas monitored. These data were well below the surrogate Cal-OSHA PELs that are



often used for comparative purposes regarding VOC exposures, such as those for gasoline, hexane, and varnish makers and painters (VM&P) naphtha.

Be advised that the data provided in this report only represent limited fungal growth and exposure potentials that existed at the time the survey was performed and at the precise sample locations indicated, the latter of which were selected based on the available background information provided. Any complaints of “stuffy air” should be forwarded to the appropriate building maintenance personnel in order for them to determine if the HVAC system in that area is operating optimally. Note that fungal growth and exposure potentials may change due to changes in environmental conditions (such as those caused by water intrusion), use of mechanical systems, or other factors. Also be advised that additional fungal growth may exist at one or more locations in the structure that were not specifically assessed during the survey.

If you have any comments or questions regarding the information contained in this correspondence, please feel free to contact our offices directly at (310) 370-8370.

Sincerely,

**HYGIENE TECHNOLOGIES INTERNATIONAL, INC.**

A handwritten signature in black ink, appearing to read 'Kenny Hsi', is written over a solid horizontal line.

Kenny K. Hsi, CIH  
Technical Director

# HYGIENE TECHNOLOGIES INTERNATIONAL, INC.

# APPENDIX A



CLIENT: State of California  
Board of Equalization  
450 N Street  
Sacramento, California 94279

TABLE 21004001-17  
AIRBORNE TOTAL FUNGI RESULTS  
3<sup>RD</sup> FLOOR  
SACRAMENTO, CALIFORNIA  
APRIL 26, 2010

### Results reported in spores per cubic meter of air (spores/M<sup>3</sup>)

SAMPLE NUMBER	21004001-17 TM01WF	21004001-17 TM02OUTWF		
SAMPLING LOCATION/ACTIVITIES	3 <sup>rd</sup> Floor; Column N19 area; Cubicle 38; about center; approximately five feet above floor/Normal office activities	Outdoors; about 25 feet west of building; on parking structure roof; about five feet above ground/Normal outdoor activities	This column intentionally left blank	This column intentionally left blank
START/STOP	13:52:00/13:57:00	14:13:00/14:18:00		
SAMPLE TIME	5 minutes	5 minutes		
Alternaria		13		
Arthrinium				
Ascospores		480		
Aureobasidium				
Basidiospores	53	1,800		
Bipolaris/Drechslera group				
Botrytis				
Chaetomium		13		
Cladosporium		530		
Curvularia				
Other brown				
Other colorless				
Penicillium/Aspergillus types		110		
Pithomyces				
Rusts		27		
Smuts (Periconia, Myxomycetes)		40		
Stachybotrys				
Stemphylium				
Torula				
Trichocladium				
Ulocladium				
Zygomycetes				
Hyphal Fragments	<13	<13		
Background Particulate*	3+	2+		
<b>TOTAL**</b>	53	3,000		

\*Background Particulate is an indication of the amount of non-biological particulate matter present on the slide and is graded (from least to greatest) as 1+ to 4+.

\*\*Note that all reported counts have been rounded to no more than two significant figures based on the sampling and analytical methods used, and therefore the total count may not equal the sum of the individual counts in a column.

# HYGIENE TECHNOLOGIES INTERNATIONAL, INC.

## APPENDIX A



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TABLE 21004001-18  
DIRECT-READING RESULTS  
3<sup>RD</sup> FLOOR  
SACRAMENTO, CALIFORNIA  
APRIL 26, 2010

LOCATION/SITE ACTIVITIES	SAMPLE TIME	CONTAMINANT	RESULTS (ppm)	COMMENTS
Cubicle 38 and immediate surrounding areas; approximately five feet above floor/Sampling activities only	14:00/14:05	Volatile Organic Compounds	Average: <0.1 Peak: <0.1	N/A

### LEGEND

ND: Not detected  
<: Less than

N/A: Not applicable  
ppm: Parts per million



Report for:

**Mr. Wesley Frey, Mr. Larry Sandhu**  
**Hygiene Technologies International, Inc.: Northern California**  
3625 Del Amo Boulevard, Suite 180  
Torrance, CA 90503-8370

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Regarding: Project: 21004001-17  
EML ID: 653433

Approved by:

Lab Manager  
Malcolm Moody

Dates of Analysis:  
Spore trap analysis: 04-29-2010

Service SOPs: Spore trap analysis (I100000)

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For clarity, we report the number of significant digits as calculated; but, due to the nature of this type of biological data, the number of significant digits that is used for interpretation should generally be one or two. 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 corrections of results is not a standard practice. 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.

Document Number: 200091 - Revision Number: 5

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Client: Hygiene Technologies International, Inc.:  
Northern California  
C/O: Mr. Wesley Frey, Mr. Larry Sandhu  
Re: 21004001-17

Date of Sampling: 04-26-2010  
Date of Receipt: 04-29-2010  
Date of Report: 04-29-2010

**SPORE TRAP REPORT: NON-VIABLE METHODOLOGY**

Location:	21004001-17-TM01WF		21004001-17-TM02OUTWF	
Comments (see below)	A		A	
Lab ID-Version‡:	2896761-1		2896762-1	
	raw ct.	spores/m3	raw ct.	spores/m3
Alternaria			1	13
Arthrinium				
Ascospores*			9	480
Aureobasidium				
Basidiospores*	1	53	34	1,800
Bipolaris/Drechslera group				
Botrytis				
Chaetomium			1	13
Cladosporium			10	530
Curvularia				
Epicoccum				
Fusarium				
Myrothecium				
Nigrospora				
Other colorless				
Penicillium/Aspergillus types†			2	110
Pithomyces				
Rusts*			2	27
Smuts*, Periconia, Myxomycetes*			3	40
Stachybotrys				
Stemphylium				
Torula				
Ulocladium				
Zygomycetes				
Background debris (1-4+)††	3+		2+	
Hyphal fragments/m3	< 13		< 13	
Pollen/m3	13		27	
Skin cells (1-4+)	1+		< 1+	
Sample volume (liters)	75		75	
<b>§ TOTAL SPORES/m3</b>		<b>53</b>		<b>3,000</b>

Comments: A) Analysis of replicate sample is delayed.

\* Most of these spore types are not seen with culturable methods (Andersen sampling), although some may appear as non-sporulating fungi. Most of the basidiospores are "mushroom" spores while the rusts and smuts are plant pathogens.

† 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 Limit of Detection is the product of a raw count of 1 and 100 divided by the percent read. The analytical sensitivity (counts/m3) is the product of the Limit of Detection and 1000 divided by the sample volume.

‡ 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.

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**MoldRANGE™: Extended Outdoor Comparison****Outdoor Location: 21004001-17-TM02OUTWF**

Fungi Identified	Outdoor data	Typical Outdoor Data by Date†				Typical Outdoor Data by Location‡			
		Month: April				State: CA			
	spores/m3	low	med	high	freq %	low	med	high	freq %
<b>Generally able to grow indoors*</b>									
Alternaria	13	7	27	210	42	7	27	230	56
Bipolaris/Drechslera group	-	7	13	140	11	7	13	130	13
Chaetomium	13	7	13	120	12	7	13	120	20
Cladosporium	530	27	290	4,200	90	53	610	7,100	97
Curvularia	-	7	13	230	7	7	13	230	7
Nigrospora	-	7	13	98	8	7	13	170	8
Penicillium/Aspergillus types	110	13	160	1,500	71	33	210	2,400	85
Stachybotrys	-	7	13	600	3	7	13	270	5
Torula	-	7	13	170	10	7	13	150	12
<b>Seldom found growing indoors**</b>									
Ascospores	480	13	110	2,900	74	13	110	2,000	70
Basidiospores	1,800	13	210	5,800	88	13	210	8,200	93
Rusts	27	7	13	250	20	7	13	260	27
Smuts, Periconia, Myxomycetes	40	7	33	430	58	8	40	510	69
<b>§ TOTAL SPORES/m3</b>	3,000								

† The Typical Outdoor Data by Date represents the typical outdoor spore levels across North America for the month indicated. The last column represents the frequency of occurrence. The low, medium, and high values represent the 2.5, 50, and 97.5 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, 2.5% 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.

‡ The Typical Outdoor Data by Location represents the typical outdoor spore levels for the region indicated for the entire year. As with the Typical Outdoor Data by Date, the four columns represent the frequency of occurrence and the typical low, medium, and high concentration values for the spore type indicated. These values are updated periodically, and if enough data is not available to make a statistically meaningful assessment, it is indicated with a dash.

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

\*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.

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 data" 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. In addition, EMLab P&K may not have received and tested a representative number of samples for every region or time period. EMLab P&K hereby disclaims any liability for any and all direct, indirect, punitive, incidental, special or consequential damages arising out of the use or interpretation of the data contained in, or any actions taken or omitted in reliance upon, this report.

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Date of Sampling: 04-26-2010  
 Date of Receipt: 04-29-2010  
 Date of Report: 04-29-2010

**MoldSTAT™: Supplementary Statistical Spore Trap Report**

**Outdoor Summary: 21004001-17-TM02OUTWF:**

Species detected	Outdoor sample spores/m3				Typical outdoor ranges (North America)	Freq. %
	<100	1K	10K	>100K		
Alternaria				13	7 - 27 - 410	50
Ascospores				480	13 - 160 - 4,700	76
Basidiospores				1,800	13 - 320 - 17,000	91
Chaetomium				13	7 - 13 - 150	12
Cladosporium				530	27 - 480 - 9,100	93
Penicillium/Aspergillus types				110	20 - 200 - 2,500	77
Rusts				27	7 - 17 - 320	22
Smuts, Periconia, Myxomycetes				40	7 - 40 - 870	68
<b>Total</b>				3,027		

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 occurrence 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: 21004001-17-TM01WF**

% of outdoor total spores/m3	Friedman chi-square* (indoor variation)	Agreement ratio** (indoor/outdoor)	Spearman rank correlation*** (indoor/outdoor)	MoldSCORE**** (indoor/outdoor)	
Result: 1%	dF: N/A Result: N/A Critical value: N/A Inside Similar: N/A	Result: 0.2222	dF: 8 Result: 0.6726 Critical value: 0.6190 Outside Similar: Yes	Score: 102 Result: Low	
Species Detected		Spores/m3			
		<100	1K	10K	>100K
	Basidiospores				53
	<b>Total</b>				53

\* 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.

\*\*\* 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.

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**MoldSTAT™: Supplementary Statistical Spore Trap Report**

\*\*\*\* 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.

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.



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### **MoldSCORE™: Spore Trap Report**

\*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.

†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.

††Most of these spore types are not seen with culturable methods (Anderson sampling), although some may appear as non-sporulating fungi. Most of the basidiospores are "mushroom" spores.

‡Rated on a scale from 100 to 300. A rating less than 150 is low and indicates a low probability of spores originating inside. A rating greater than 250 is high and indicates a high probability that the spores originated from inside, presumably from indoor mold growth. A rating between 150 and 250 indicates a moderate likelihood of indoor fungal growth. MoldSCORE is NOT intended for wall cavity samples. It is intended for ambient air samples in residences. Using the analysis on other samples (like wall cavity samples) will lead to misleading results.

