



HYGIENETECH

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November 28, 2007

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

Document No. 20710005.6

Attention: David Gau

Regarding: Limited Fungal Growth Exposure Assessment Survey
First Floor Day Care
450 N Street, Sacramento, California

Dear Mr. Gau:

On October 19, 2007, Wesley B. Frey, Industrial Hygienist, with Hygiene Technologies International, Inc. (HygieneTech), visited the California State Board of Equalization building located at the above-referenced address for the purpose of conducting a limited fungal growth exposure assessment survey in the first floor Day Care facility. The survey findings, along with the analytical data, conclusions, recommendations, and a discussion of the recently recorded observations, appear below.

The Day Care was located on the first floor and occupied at the time of the survey. Typical furnishings, appliances, and personal effects were observed in the various interior areas inspected including toys, tables, chairs, and kitchen and bathroom fixtures.

Upon visual inspection, evidence of water intrusion was apparent in various areas of the nursery. Specifically, water-related staining was observed on ceiling tiles in the kitchen, central hallway, and the Toddler Room. Water-related staining was also observed on the western portion of the Day Care on vertical metal window jambs in the Preschool Room, the room immediately south of the main entrance door, and the Toddler Room. Odors characteristic of fungal growth, however, were not evident in the inspected areas at the time of the survey.

An Extech Instrument hygro-thermometer was used to record air temperatures and relative humidity data within and outside of the structure. Relative humidity data were recorded in the interior areas at levels ranging from 50.4 to 58.8 percent during the survey period. Note that HygieneTech recommends that the relative humidity in buildings not exceed 50 percent in order to limit the potential for fungal growth.

Fungi (including yeasts, molds, rusts, smuts, and mushrooms) are types of organisms that thrive in moist environments. Fungi are usually filamentous, spore-bearing organisms devoid of chlorophyll that require water and organic compounds for energy and carbon. The majority of fungi are saprophytes in soil and water, where they primarily decompose plant material. Under some circumstances if the relative humidity in an occupied space exceeds 50 percent, and particularly if it exceeds 60 to 70 percent, carbon-containing materials (including cellulosic materials and food dust) may absorb enough moisture to support microbial growth. During amplification, substrate degradation products and metabolic



byproduct gases, including volatile organic compounds, such as ethyl alcohol and aldehydes, are produced. Some of those compounds produce odors that are characteristic of fungal growth and therefore they are commonly associated with excess humidity and microbial growth contamination.

Historical data indicate that indoor spore levels usually average 30 to 80 percent of the outdoor spore level at the time of sampling, with the same general distribution of spore types. Filtered or conditioned air may average five to 15 percent of the outdoor spore level at the time of sampling. Note that these relative values are intended to be used as guidelines, since they are affected by many factors such as outside air intake rates and general dilution of the indoor air as a result of opened windows and exterior doors.

At the time of the survey, air samples were collected for total (viable and nonviable) fungi analyses using a Zefon brand Bio-Pump™ equipped with Allergenco-D™ cassettes. Air samples for viable fungi were collected using a Gast brand high volume air-sampling pump equipped with an Aerotech 6™ Single Stage Bioaerosol Sampler. Viable fungal spores were impacted onto suitable growth media (malt extract agar) and incubated prior to enumeration of colony-forming units per agar plate. All such 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. The airborne fungi analytical data with supporting and background information appear in the enclosed tables.

The airborne viable fungi data in Table 20710005-2 showed common fungi types outdoors such as *Acremonium*, *Aspergillus niger*, *Aureobasidium*, *Cladosporium*, non-sporulating fungi, *Penicillium*, and *Rhizopus*. The colony types detected indoors included mostly common fungi such as *Aspergillus niger*, *Aureobasidium*, *Cladosporium*, non-sporulating fungi, *Penicillium*, and yeasts. However, note that a somewhat above-background level of *Aspergillus niger* was detected in the western portion of the Toddler Room, which suggests that some degree of mold growth involving that species may have occurred at sometime in the past.

As presented in Table 20710005-4, the airborne total spore count data showed common spore types outdoors such as *Alternaria*, ascospores, basidiospores, *Cladosporium*, *Oidium*, colorless spores typical of *Penicillium* and *Aspergillus* species, rusts, and smuts, with *Cladosporium* predominating. In the nursery interior, the data showed airborne concentrations of common fungal spores that were below the levels recorded outdoors and were therefore considered unremarkable.

By observation and upon review of the analytical data, HygieneTech has concluded that additional fungal growth assessment is necessary in the Day Care in an attempt to identify any potential fungal growth reservoirs, particularly in the Toddler Room. Note, however, that the recorded data do not represent conditions that are expected to pose a health hazard to occupants above that posed by the outside environment where exposures to airborne and surface-borne fungi are known to exist.

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. 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.

Mr. David Gau
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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 K. Hsi", written over a horizontal line.

Kenny K. Hsi, CIH
Technical Director

A handwritten signature in black ink, appearing to read "Brian P. Daly", written over a horizontal line.

Brian P. Daly, CIH, PE
President

HYGIENE TECHNOLOGIES INTERNATIONAL, INC.

APPENDIX A



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

TABLE 20710005-2
AIRBORNE VIABLE FUNGI RESULTS
DAY CARE
450 N STREET
SACRAMENTO, CALIFORNIA
OCTOBER 19, 2007

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Results reported in colony forming units per cubic meter of air (CFU/M³)

SAMPLE NUMBER	20710005-VM301OUT	20710005-VM302	20710005-VM303	20710005-VM304
SAMPLING LOCATION/ACTIVITIES	Outdoors; about 20 feet north of building; approximately five feet above ground/Normal outdoor activities	Reception area hall; about center; approximately five feet above floor/Normal day care activities	Preschool Room; southwestern corner; about center; approximately five feet above floor/Normal day care activities	Preschool Room; northeastern corner; about center; approximately five feet above floor/Normal day care activities
START/STOP	15:16:20/15:18:20	15:31:00/15:33:00	15:39:00/15:41:00	15:50:00/15:52:00
SAMPLE TIME	2 minutes	2 minutes	2 minutes	2 minutes
Acremonium	18			
Alternaria				
Aspergillus flavus				
Aspergillus niger	18	53		
Aspergillus other				
Aspergillus versicolor				
Aureobasidium	18	18		
Beauveria				
Bipolaris/Drechslera group				
Botrytis				
Chaetomium				
Cladosporium	2,580	724	53	159
Curvularia				
Epicoccum				
Fusarium				
Memnoniella				
Myrothecium				
Non-sporulating fungi	18	35	18	
Others				
Paecilomyces				
Penicillium	35	18	35	
Phoma/coelomycetes				
Sporobolomyces				
Stachybotrys chartarum (atra)				
Trichoderma				
Ulocladium				
Yeasts		18		18
TOTAL	2,687	866	106	177

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**TABLE 20710005-2
AIRBORNE VIABLE FUNGI RESULTS
DAY CARE
450 N STREET
SACRAMENTO, CALIFORNIA
OCTOBER 19, 2007**

Page 2

Results reported in colony forming units per cubic meter of air (CFU/M³)

SAMPLE NUMBER	20710005-VM305	20710005-VM306	20710005-VM307	20710005-VM308
SAMPLING LOCATION/ACTIVITIES	Kitchen; about center; approximately five feet above floor/Normal day care activities	Hallway to Toddler Room; about center; approximately five feet above floor/Normal day care activities	Toddler Room; eastern end; about center; approximately five feet above floor/Normal day care activities	Toddler Room; western end; about center; approximately five feet above floor/Normal day care activities
START/STOP	15:57:00/15:59:00	16:05:00/16:07:00	16:16:00/16:18:00	16:24:00/16:26:00
SAMPLE TIME	2 minutes	2 minutes	2 minutes	2 minutes
Acremonium				
Alternaria				
Aspergillus flavus				
Aspergillus niger	18	88	53	247
Aspergillus other				
Aspergillus versicolor				
Aureobasidium				
Beauveria				
Bipolaris/Drechslera group				
Botrytis				
Chaetomium				
Cladosporium	141	106	106	106
Curvularia				
Epicoccum				
Fusarium				
Memnoniella				
Myrothecium				
Non-sporulating fungi		18	18	
Others				
Paecilomyces				
Penicillium	18	18	35	
Phoma/coelomycetes				
Sporobolomyces				
Stachybotrys chartarum (atra)				
Torula herbarum				
Trichoderma				
Ulocladium				
Yeasts				
TOTAL	177	230	212	353

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DAY CARE
450 N STREET
SACRAMENTO, CALIFORNIA
OCTOBER 19, 2007

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Results reported in colony forming units per cubic meter of air (CFU/M³)

SAMPLE NUMBER	20710005-VM309OUT			
SAMPLING LOCATION/ACTIVITIES	Outdoors; about 20 inches north of building; approximately five feet above ground/Normal outdoor activities	This column intentionally left blank	This column intentionally left blank	This column intentionally left blank
START/STOP	16:34:00/16:36:00			
SAMPLE TIME	2 minutes			
Acremonium				
Alternaria				
Aspergillus flavus				
Aspergillus niger				
Aspergillus other				
Aspergillus versicolor				
Aureobasidium				
Beauveria				
Bipolaris/Drechslera group				
Botrytis				
Chaetomium				
Cladosporium	2,670			
Curvularia				
Epicoccum				
Fusarium				
Memnoniella				
Myrothecium				
Non-sporulating fungi	35			
Others				
Paecilomyces				
Penicillium	18			
Phoma/coelomycetes				
Stachybotrys chartarum (atra)				
Rhizopus	18			
Trichoderma				
Ulocladium				
Yeasts				
TOTAL	2,741			

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TABLE 20710005-4
AIRBORNE TOTAL FUNGI RESULTS
DAY CARE
450 N STREET
SACRAMENTO, CALIFORNIA
OCTOBER 19, 2007

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Results reported in spores per cubic meter of air (spores/M³)

SAMPLE NUMBER	20710005-TM301OUT	20710005-TM302	20710005-TM303	20710005-TM304
SAMPLING LOCATION/ACTIVITIES	Outdoors; about 20 feet north of building; approximately five feet above ground/Normal outdoor activities	Reception area hall; about center; approximately five feet above floor/Normal day care activities	Preschool Room; southwestern corner; about center; approximately five feet above floor/Normal day care activities	Preschool Room; northeastern corner; about center; approximately five feet above floor/Normal day care activities
DATE	10-19-07	10-19-07	10-19-07	10-19-07
START/STOP	15:18:00/15:23:00	15:28:00/15:33:00	15:35:00/15:40:00	15:43:00/15:48:00
SAMPLE TIME	5 minutes	5 minutes	5 minutes	5 minutes
Alternaria	13	13	27	
Arthrinium				
Ascospores	213	107		107
Aureobasidium				
Basidiospores	1,280	160	53	267
Bipolaris/Drechslera group				
Botrytis				
Chaetomium		13		
Cladosporium	2,240	2,240	1,010	960
Curvularia				
Epicoccum				
Fusarium				
Myrothecium				
Oidium	13			
Other brown			13	13
Penicillium/Aspergillus types	267	160	107	160
Pithomyces				
Rusts	27	13		
Smuts (Periconia, Myxomycetes)	40	53	13	13
Stachybotrys				
Torula				
Ulocladium				
Hyphal fragments/m ³	53	67	53	40
Background particulates*	3+	3+	3+	3+
TOTAL**	4,093	2,759	1,223	1,520

*Background debris 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+.

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OCTOBER 19, 2007

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Results reported in spores per cubic meter of air (spores/M³)

SAMPLE NUMBER	20710005-TM305	20710005-TM306	20710005-TM307	20710005-TM308
SAMPLING LOCATION/ACTIVITIES	Kitchen; about center; approximately five feet above floor/Normal day care activities	Hallway to Toddler Room; about center; approximately five feet above floor/Normal day care activities	Toddler Room; eastern end; about center; approximately five feet above floor/Normal day care activities	Toddler Room; western end; about center; approximately five feet above floor/Normal day care activities
DATE	10-19-07	10-19-07	10-19-07	10-19-07
START/STOP	15:55:00/16:00:00	16:03:00/16:08:00	16:13:00/16:18:00	16:21:00/16:26:00
SAMPLE TIME	5 minutes	5 minutes	5 minutes	5 minutes
Alternaria				
Arthrinium				
Ascospores				
Aureobasidium				
Basidiospores		427	213	53
Bipolaris/Drechslera group			13	
Botrytis				
Chaetomium				
Cladosporium	213	960	853	693
Curvularia				
Epicoccum		27		
Fusarium				
Myrothecium				
Oidium				
Other brown				
Penicillium/Aspergillus types	53	267	320	160
Pithomyces				
Rusts		13		13
Smuts (Periconia, Myxomycetes)	13	27	40	67
Stachybotrys				
Torula				
Ulocladium				13
Hyphal fragments/m ³	13	27	13	27
Background particulates*	2+	3+	3+	3+
TOTAL**	279	1,721	1,439	999

*Background debris 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+.

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Results reported in spores per cubic meter of air (spores/M³)

SAMPLE NUMBER	20710005-TM309OUT			
SAMPLING LOCATION/ACTIVITIES	Outdoors; about 20 inches north of building; approximately five feet above ground/Normal outdoor activities	This column intentionally left blank	This column intentionally left blank	This column intentionally left blank
DATE	10-19-07			
START/STOP	16:31:00/16:36:00			
SAMPLE TIME	5 minutes			
Alternaria	107			
Arthrinium				
Ascospores	213			
Aureobasidium				
Basidiospores	1,170			
Bipolaris/Drechslera group				
Botrytis				
Chaetomium				
Cladosporium	4,750			
Curvularia				
Epicoccum				
Fusarium				
Oidium				
Penicillium/Aspergillus types	907			
Pithomyces				
Rusts	40			
Smuts (Periconia, Myxomycetes)	93			
Stachybotrys				
Torula				
Ulocladium				
Unidentified mitosporic fungi				
Hyphal fragments/m ³	27			
Background particulates*	3+			
TOTAL **	7,280			

*Background debris 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+.