

# **Phase 1 Mold Inspection Report**

**Somerville Fire and Police Department  
220 Washington Street  
Somerville, MA 02143**

**January 23, 2007**





Environmental & Engineering Associates, Inc.

January 23, 2006

Stephen L. D'Angelo Esq.  
D'Angelo & Hashem, LLC  
439 Union Street, Bldg 2 Suite 107  
Lawrence, MA 01843

RE: **City of Somerville Fire /Police Facility, 220 Washington Street, Somerville, MA 02143**

Dear Attorney D'Angelo,


Please find attached Boston Environmental & Engineering Associates, Inc.'s (**Boston Environmental**) Mold Assessment of the referenced property. As noted in the body of this report, testing was conducted within industry sampling and testing margins of error at the time and place of the inspections only. Additionally, it is important to understand that there are no Federal EPA or Massachusetts DEP Standards established for mold contamination in the air or on surfaces. The Massachusetts Department of Health (MDH), however, has established guidelines advising that any visible mold be remediated. **However, most experts advocate remediating mold in residences and work areas when the mold levels measured in the indoor air are notably higher than the baseline outside air and/or when the distribution of mold types found indoors are substantially different than collected in the baseline/outside air sample (typically, the mold levels in healthy living or work spaces range from 20 to 80 percent of the outside baseline mold level and reflect approximately the same distribution of types as found in the baseline/outside air sample). A substantial increase of one or two spore types that are inconsistent with and non-reflective of the baseline/outside distribution of spore types is usually indicative of an indoor reservoir of mold growth.**

Additionally, when air testing indicates the mold inside the residence or work place exceeds 2,000 spores per cubic meter (or colony forming units per cubic meter [cfu/m<sup>3</sup>]), and the outside air measurements are low, remediation is usually recommended. When mold levels in the inside air exceed 1,000 spores per cubic meter (or cfu/m<sup>3</sup>), Boston Environmental looks carefully at the total building environment, the mold types present and the background (outside air) mold levels and in many instances recommends mold abatement of the contaminated area/s. Air sampling of wall and ceiling cavities and surface sampling of suspect areas is conducted to assist in identifying locations of mold reservoirs and sources of aerosolized mold. It should be noted that mold testing conducted in residences and work spaces always indicate the presence of some mold, the levels of which will vary in magnitude depending on the levels of mold present in the outside air. As noted above, however, one expects mold levels in the inside air to be less than or no greater than the levels found in the outside air.

Thus, Boston Environmental evaluates all laboratory test results against these generally accepted industry and MDH guidelines, considers exposure time, mold types, locations where mold is encountered and the general environment when making recommendations regarding the need for additional testing, remediation, simple ventilation of the areas in question, etc. Following Massachusetts Department of Health (MDH) guidelines, Boston Environmental always recommends remediating visible surface mold.

If you have any questions, please contact us.

Sincerely,  
Boston Environmental & Engineering Associates, Inc.

  
Herschel Clopper, PhD, ChE, CMC, Senior Associate

## 1.0 EXECUTIVE SUMMARY

On December 13, 2005 Boston Environmental & Engineering Associates, Inc. (Boston Environmental) visited the facilities of the combined City of Somerville combined Fire and Police facility, at 220 Washington Street, Somerville, MA 02143 (site) to determine if past flooding in the basement and evidence of water staining from what appeared to be roof leaks may have resulted in mold contamination of the facility. Additionally, the client requested that tests be conducted to determine if petroleum related contaminants from vehicle exhausts from the underground garage, may have impacted the air of the office areas in the building above the garage. The client, Stephen D'Angelo, an attorney representing the Somerville Police and Fire Department Unions, reported that police and fire personnel have complained of high numbers of illnesses and fatalities in this facility, which they believe have been caused by mold and hydrocarbon contamination in the building's air...

The results of Boston Environmental's mold survey shows evidence of elevated levels of Stachybotrys, Penicillium, Aspergillus, and Cladosporium mold in the air of one office area. Stachybotrys was also found in surface samples in several locations along with elevated levels of Penicillium and Aspergillus. A carpet sample collected from the Division Commander Office indicated a total mold and yeast level at 246,000 colony forming units per gram (cfu/gm) of dust. These values indicate the presence of mold reservoirs and amplification sites in the facility, that requires professional remediation.

Tests conducted for Total Petroleum Hydrocarbons (TPH), collected from auxiliary air filters fitted into the HVAC return registers, indicated the presence of elevated levels of TPH particulates in the air. These particulates, when submitted to chromatographic testing were fingerprinted as "best matches motor oil." Each of the three samples tested indicated levels above 12,000 ppm (mg/Kg). The most probable cause of this contamination is intrusion of vehicle exhaust from the underground garage into the office and lobby spaces in the upper levels of the building. Boston Environmental recommends that the garage area ceiling be sealed to prevent exhaust gases from permeating the office areas above and a suitable high volume building exhaust system be installed in the garage to efficiently and effectively remove vehicle exhaust gases.

Boston Environmental also recommends the entire HVAC system be cleaned and sterilized by a competent duct cleaning company.

## 2.0 INTRODUCTION

At the request of Mr. Stephen D'Angelo (client), the attorney representing the City of Somerville Police and Fire Department Union, on December 15, 2005, Boston Environmental & Engineering Associates, Inc. (Boston Environmental) conducted mold assessments of the Police and Fire Department facility at 220 Washington Street, Somerville, MA 02143. The client expressed concerns that a large number of Police and Fire personnel who have worked in the building had suffered health problems, which he felt resulted from mold or other indoor air contaminants in the facility. He further stated that there was evidence of water staining from a leaky roof and flooding in the basement that might have caused mold contamination and that exhaust fumes from the basement garage had penetrated the upper levels of the building. Since there were no vehicles in the garage during this survey, there were no tests conducted to measure petroleum contamination in the air.

### 2.1 Scope of Work

Boston Environmental conducted a survey of the building, which included a visual inspection with several police and fire personnel, of the garage, basement rooms and areas adjoining the garage; and upper level areas including the lobby and offices and rooms on the upper levels of the building. Following the visual inspection, a testing plan was established, to evaluate the facility for potential mold contamination. The plan included collection of viable air samples (culturable Petri dish) and non-viable methodology air samples (spore trap) from potentially impacted areas in the facility, together with baseline viable and non-viable methodology samples collected from the outside air for comparison of mold content. The methods employed to obtain viable samples was the Anderson N6 Single Stage Viable Impactor fitted with Petri dishes treated with Malt Extract Agar (MEA) and Zefon Air-O-Cell<sup>®</sup> spore traps for non-viable methodology samples mold. The Zefon Air-O-Cell<sup>®</sup> spore traps were also used to collect wall cavity samples. Viable surface samples were collected from suspect areas with HealthLink<sup>®</sup> TransPorter<sup>™</sup> sterile transport swabs. The Viable Carpet sample was collected with a .45µ +5.0 µ TEM Cassettes. Additionally, two, 1" X 1" samples were cut from each of three fiberglass air filters removed from three HVAC returns for bulk mold sample tests and for Total Petroleum Hydrocarbon Tests.

### 2.2 Limitations

The inspection conducted as part of this Mold Assessment was within industry sampling and testing margins of error at the time and place of the inspections only. Conditions that can result in mold growth and the presence and viability of mold colonies can change very rapidly. This study does not purport or attempt to estimate potential changes with time. Any statements and conclusions made regarding the future potential of mold propagation assume no change in environmental conditions, except as associated with average seasonal variations. Additionally, it must be emphasized that the conclusions and recommendations in this report are based on analysis of the samples collected. Client limitations on testing limit the scope of the investigation to the areas tested.

### **3.0 SITE DESCRIPTION**

#### **3.1 General Setting**

The Subject Property is a 2-1/2 story steel-framed brick building built over an under-building, garage . The facility is heated by a gas fired HVAC system located on an upper level above the facility's offices. The basement level of the building houses a garage and a no-longer used fireman's bunk room area, which includes several rooms, an open kitchen area and a large room where recovered bicycles are stored. The garage houses police and fire vehicles, fire engines and includes a vent system for venting vehicle exhaust. The first floor includes a lobby/police reception desk area with a floor-to-second-floor-ceiling, open atrium and police offices, training rooms and a gym. The second floor includes the open atrium space from the first floor, offices and a utility room housing the HVAC system.

#### **3.1 Building Interior and Building Condition**

The overall impression of this building is one of disrepair and poor maintenance. Water Stains were in evidence in the ceiling tiles in the lobby foyer and in many offices. Additionally ceiling, tiles were missing in some location. Several rooms in the presently unused basement bunk area adjoining the garage were flooded by water from a plumbing leak in a kitchen area on this level. Past evidence of water remediation was apparent where room wall panels at the floor level to about 2 feet above the floor had been removed to enhance drying of wall cavities. There was extensive paint peeling evident, ceiling panels missing, and water stained or otherwise soiled ceiling panels. Visible mold like growth was in evidence on many walls ceiling tiles, between walls around windows, on basement kitchen cabinets and other surfaces. The bunk area rooms were strewn with debris (broken chips of gypsum, etc.) and casually stored and overflowing file boxes, cartons, wood planks, plastic bags etc. Overall building housekeeping was poor. Rooms on the upper floors were in much better condition but in several there was evidence of mold like growth on walls and ceiling panels. Several ceiling HVAC returns had fiberglass filters mounted between the register and duct and these were black with soot-like, or possibly mold like deposits.

### **4.0 DATA TABULATION AND ANALYSIS**

The viable mold (culturable Petri dish) air tests conducted for this Mold Assessment utilized the Anderson N6 Single Stage Impactor fitted with a Petri dish treated with Malt Extract Agar (MEA) for collecting samples to be cultured and grown in a temperature and humidity controlled incubator. Non-viable air tests utilized Zefon Air-O-Cell<sup>®</sup> spore traps to collect samples on adhesive glass slides that underwent direct microscope examination. This test simply counts total spores by genus and species and cannot distinguish between viable and non-viable spores. Although both testing protocols collect culturable and non-culturable mold spores, the Petri dish used in the Anderson Impactor provides nutrient and environmental conditions conducive to propagating the growth of those spores that remain viable. As the spore grows and flowers, its size increases immensely facilitating easy identification of mold types, some of which are too small and too similar in appearance to be identified one from another under microscopic examination. These culture growths have limitations in that they primarily identify viable mold types and frequently miss many of the non-viable types collected on the Petri dish. Additionally, since viable spores flower during culturing, fast-growing mold types can sometimes crowd out slow-growing types that are neither seen nor counted.

Conversely, the spore traps collect both viable and non-viable spores for direct examination under a high-powered microscope. These spores, range in size from **one (1) to five (5) microns** (0.00004 to 0.0002 inches) in diameter, and are so small it is impossible in most cases to distinguish some mold types, one from another. As noted above, as microscopic particles, these spores cannot be distinguished as viable or non-viable mold types. This test does, however, allow the combined total of both viable and non-viable mold spores to be counted under the microscope.

The distinction between spores of *Penicillium* and *Aspergillus* in samples **collected by spore traps**, for example, has always been problematic as both produce morphologically similar spores (i.e., they look the same under a microscope). That is why these spores are often clumped together as “*Penicillium/Aspergillus type spores*” in laboratory reports, and also in Boston Environmental’s mold report to its’ clients. Other types of mold spores also appear similar to *Penicillium* and *Aspergillus* spores and are consequently included in the “*Penicillium/Aspergillus type spores*” category on laboratory reports including those belonging to genera (mold families) such as *Paecilomyces* and certain species of *Acremonium* just to name a few. Thus, both culturable samples and spore trap samples are best collected to adequately characterize the mold levels in a contaminated site.

Lastly, it is important to note the Pathogenicity and Clinical Significance of **non-viable** versus **viable** mold spores. **Viable** mold spores are **active living organisms**, which have the potential to propagate and to produce allergenic, pathenogenic and toxic symptoms in humans, consistent with the characteristics of a specific mold species. **Non-viable** mold spores are **dormant** (effectively dead), can no longer propagate, but are of the same genetic make-up as the **viable** spore of the same species and thus can produce the same health effects as the **viable** spore.

The Total Petroleum Hydrocarbon samplea were collected from 2 inch X 2-inch samples cut from fiberglass filters removed from HVAC returns. These samples were sent to Geolabs, Braintree MA, where they were digested to remove the extractable petroleum analytes, which were then read on an HP Agilent HP Gas Chromatograph.

#### 4.1 Sampling Conditions

This survey was conducted on a clear day with conditions inside the facility ranging from 6-10% RH @ temperatures ranging from 67-70°F. Outside conditions were 45% RH and 18 °F/.

4.2 Tables

**Table I: Somerville - FPD MOLD TESTS 12/13/2005**

BEEA Code>	Total Viable & Non-Viable Mold Tests							Viable Mold Tests					
	Zefon Spore Trap Data in spores/m3							Petri Dish Culture Data in cfu/m3					
	6238-1	6238-2	6238-3	6238-4	6238-5	6238-6	6238-13	H6348-7	H6348-8	H6348-9	H6348-10	H6348-11	H6348-12
Identified Mold	Blank - QC	Outside Baseline	Basement - Bike Room	Office Div Commdr	Ex-Aux office	Training Room	Office wall Div Commdr	Blank - QC	Outside Baseline	Basement - Bike Room	Office Div Commdr	Ex-Aux office	Training Room
Penicillium/Aspergillus types		200	53	53	560	53	533						
Aspergillus versicolor												94	
Penicillium											12	1,350	
Alternaria					13								
Botrytis					53	13							
Chaetomium			27										
Cladosporium			53		160	107	533		12	12		860	
non-sporulating										12			
Stachybotrys					2,030								
Synecephalastrum												12	
Yeasts									12				
<b>Totals</b>	<b>N/A</b>	<b>200</b>	<b>133</b>	<b>53</b>	<b>2,816</b>	<b>173</b>	<b>1,066</b>	<b>N/A</b>	<b>24</b>	<b>24</b>	<b>12</b>	<b>2,316</b>	<b>&lt;12</b>
Ascospores*													
Basidiospores*		53											
Rusts*													
Smuts, Periconia, Myxomycetes*					13								
<b>Grand Totals</b>	<b>N/A</b>	<b>253</b>	<b>133</b>	<b>53</b>	<b>2,829</b>	<b>173</b>	<b>1,066</b>						

Indicates cell with no reportable data  
 Indicates cells where test data was collected in a different format from adjoining table

\* These fungi are generally not found growing inside or on wet building materials

Background Debris	None	2+	3+	2+	2+	2+	>4+
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-> Background debris rated from low (1+) to high (4+).

Counts with 4+ should be regarded as

minimal counts and may be undercounted

**BOLD Red Numerals indicate mold levels of concern**

**Table II: Somerville - FPD MOLD TESTS 12/13/2005**

Direct Microscopic Examination Mold Growth Data From Surface Swabs, Dust or Bulk Samples At Identified Locations in colony forming units/unit (See table at end)											
BEEA Code>	H6348-14	H6348-15	H6348-16	H6348-17	H6348-18	H6348-19	H6348-20	H6348-21	H6348-22	H6348-23	H6348-24
Identified Mold	Div Comm office Carpet Dust	Basement- bike room Swab	div commd office wall Swab	Ex- Aux office wall Swab	Training Room Sill Swab	2nd FL nr Rm 220 Swab	Basement - A/C return Swab	Basement - A/C supply Swab	Commdr office A/C return Swab	2nd Fl A/C room return Swab	A/C return filter; ex gym Bulk
Acremonium											
Alternaria											
Aureobasidium											
Basidiospores											
Brown Hyphae with no associated spores, ID unknown					<1+						
Chaetomium											
Cladosporium							<1+				1+
Colorless spores typical of Penicillium / Aspergillus					2+						
Fusarium											
Other Colorless, ID unknown											
Stachybotrys				2+	<1+	2+					
Torula											
Ulocladium											
Unknown											
<b>Miscellaneous Spores**</b>	<b>Very Few</b>	<b>Very Few</b>	<b>Very Few</b>	<b>Very Few</b>	<b>Few</b>	<b>Very Few</b>	<b>Few</b>	<b>Very Few</b>	<b>Very Few</b>	<b>Variety</b>	<b>Wide Variety</b>
<b>Other Comments</b>	v.few Chaetomium detected	v.few brown hyphae; ID unknown	None	None	None	None	V.few Chaetomium spores detected	None	v.few brown hyphae; ID unknown	None	moderate amts of basidiospores detected
<b>Background Debris or Description††</b>	<b>Dust</b>	<b>Moderate</b>	<b>Light</b>	<b>Scant</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Scant</b>	<b>Moderate</b>	<b>Scant</b>	<b>Heavy</b>	<b>Dust</b>
<b>General Impression</b>	<b>Mold growth in vicinity</b>	<b>Mold growth in vicinity</b>	<b>Normal Trapping</b>	<b>Mold growth in vicinity</b>	<b>Mold growth in vicinity</b>	<b>Mold growth in vicinity</b>	<b>Mold growth in vicinity</b>	<b>Minimal Mold Growth</b>	<b>Normal Trapping</b>	<b>Mold growth in vicinity</b>	<b>Mold growth in vicinity</b>

### Mold/Fungal Growth Rating Details

<b>Growth Rating</b>	Quantities of molds indicating growth are listed in the in the MOLD/FUNGAL GROWTH section. Judgement is used in determining the amount of growth present in the sample. For example, if only one portion of the sample has evidence of heavy growth, then it will receive a rating of heavy growth even though, strictly speaking, on a percentage basis of the entire sample, the amount of growth is low.	
	<b>Swab/Tape/Dust/Wipe sample</b>	<b>Bulk Sample</b>
< 1+ (Very Light Growth)	Evidence of very light growth observed on the sample as indicated by spores of one type seen with underlying mycelial and/or with their sporulating structures found in less than 10% of the microscopic fields examined.	Areas of very light growth detected by the presence of spores of one type seen with underlying mycelial and/or with their sporulating structures in the bulk sample.
1+ (Light Growth)	Evidence of light growth observed on the sample as indicated by spores of one type seen with underlying mycelial and/or with their sporulating structures found in 10 to 25% of the microscopic fields examined.	Areas of light growth detected by the presence of spores of one type seen with underlying mycelial and/or with their sporulating structures in the bulk sample.
2+ (Moderate Growth)	Evidence of moderate growth observed on the sample as indicated by spores of one type seen with underlying mycelial and/or with their sporulating structures found in 26 to 50% of the microscopic fields examined.	Areas of moderate growth detected by the presence of spores of one type seen with underlying mycelial and/or with their sporulating structures in the bulk sample.
3+ (Heavy Growth)	Evidence of heavy growth observed on the sample as indicated by spores of one type seen with underlying mycelial and/or with their sporulating structures found in 51 to 75% of the microscopic fields examined.	Areas of heavy growth detected by the presence of spores of one type seen with underlying mycelial and/or with their sporulating structures in the bulk sample.
4+ (Very Heavy Growth)	Evidence of very heavy growth observed on the sample as indicated by spores of one type seen with underlying mycelial and/or with their sporulating structures found to be nearly confluent in the majority of the microscopic fields examined.	Areas of very heavy growth detected by the presence of spores of one type seen with underlying mycelial and/or with their sporulating structures in the bulk sample.

### Miscellaneous Spores

Slides/specimens are examined for the presence of mold spores and pollen, noting the quantities and distribution of spore types found. A designation of 'normal trapping' is made when a mix of spore types is present with the same general distribution as is usually found outdoors. In other words, the biological component of the sample surface is like that found everywhere. Types of spores present would include basidiospores (mushroom spores), myxomycetes (slime molds), plant pathogens such as ascospores, rusts and smuts, and a mix of saprophytic genera with no particular spore type predominating. Many of these spore types would not be found growing indoors on building materials since many plant pathogens require living plants for growth, and mushrooms require compost, leaf duff of various types, or associations with roots of certain trees, etc. Due to these factors, when a mix of spores seen include these types as well as pollen, the rational source is the outside air, rather than indoor mold growth. The numbers of miscellaneous spores seen are graded and described as shown below as none, very few, few, variety, and wide variety.

<b>None</b>	<b>Very Few</b>	<b>Few</b>	<b>Variety</b>	<b>Wide Variety</b>
No spores detected	Very few spores detected	A few spores detected	Many spores containing a variety of different genera detected	Many spores containing a wide variety of different genera detected

**Table III: Somerville - FPD MOLD TESTS 12/13/2005**

Identified Mold	Div Comm office Carpet CFU's/gram Dust	Basement- bike room CFU's/sq.in. Swab	div commd office wall CFU's/sq.in. Swab	Ex- Aux office wall CFU's/sq.in. Swab	Training Room Sill CFU's/sq.in. Swab	2nd FL nr Rm 220 CFU's/sq.in. Swab	Basement - A/C return CFU's/sq.in. Swab	Basement - A/C supply CFU's/sq.in. Swab	Commdr office A/C return CFU's/sq.in. Swab	2nd Fl A/C room return CFU's/sq.in. Swab	A/C return filter; ex gym Bulk CFU's/sq.in.
Aspergillus clavatus											100
Aspergillus flavus											1,900
Aspergillus niger	6,900						25		2.5		2,200
Aspergillus ustus	3,400										
Aspergillus versicolor						3,600	300		2.5	2.5	
Aureobasidium					25		25				
Cladosporium	83,000						50				
Non-Sporulating Fungi	690		2.5		10		5		2.5	2.5	20.0
Penicillium	62,000		2.5	25	25	50	280		2.5	2.5	3,700
Phoma/coelomycetes					230						
Rhizopus	340										10
Stachybotrys				110,000	50	1,200					
Trichoderma									2.5		20
Ulocladium	6,900				75	25					100
Unknown					880						
Yeasts	83,000	2.5	2.5				25				
<b>Totals</b>	<b>246,230</b>	<b>2.5</b>	<b>7.5</b>	<b>110,025</b>	<b>1,295</b>	<b>4,875</b>	<b>710</b>	<b>&lt;2.5</b>	<b>12.5</b>	<b>7.5</b>	<b>8,050</b>

\* These fungi are generally not found growing inside or on wet building materials

**Bold Red Numerals indicate mold levels of concern**

TPH Fingerprint	HVAC filter Training Room mg/KG	HVAC Filter Hallway ex Training Rm Mg/Kg	HVAC Filter Ex Gym mg/Kg
Motor Oil	14,900	12,900	14,300
Total Petroleum Hydrocarbon/sample	14,900	12,900	14,300
Sample chromatogram best matches motor oil			

### 4.3 Interpretation of Data

Table I above lists non-viable methodology test data from air samples collected in spore traps at various locations in the facility. When compared to the baseline samples collected in the outside air, these samples indicate elevated levels of *Stachybotrys* in the then-unused Auxiliary Police Office on the first level. Additionally, an air sample collected from the wall cavity of the Division commander indicated the presence of *Penicillium/Aspergillus* types and *Cladosporium*. These values are indicated in red on the table. Viable mold samples collected and incubated on Petri Dishes indicated elevated levels of *Penicillium* and *Cladosporium* in the Auxiliary Police Office, when compared to baseline outside air samples

Non-viable methodology surface and bulk samples listed in Table II indicated elevated levels of *Stachybotrys* on wall surfaces in the unused Auxiliary Police room and Room 220 on the second floor. Elevated levels of *Penicillium /Aspergillus* like mold were found on windowsill surface of the Training Room along with a low level of *Stachybotrys*

Table III lists viable bulk dust and surface mold test, which were cultured on Petri Dishes. These tests show highly elevated levels (totaling 246,230 colony forming units per gm of dust) of a seven different mold types including *Stachybotrys* along with a high level of Yeast (yeast is not a mold but a member of the fungus kingdom to which some individuals are allergic) in the dust of the Division Commanders office carpet. The then-unoccupied Auxiliary Police office indicated high levels of *Stachybotrys* mold on the window-side wall. A sample of the fiberglass filter placed over a hall way HVAC return register also showed elevated levels of multiple mold types totally 8,050 cfu. Several other rooms in the building also indicated elevated levels of surface mold as did the basement HVAC return register surface swab (all shown in red on Table III)

Table IV lists the results of chromatograph tests conducted on the fiberglass filter removed from the HVAC return registers in the Training room, in the corridor outside the gym, and in the corridor outside the Training room. These filters each indicated the presence of petroleum hydrocarbons at levels ranging from 12,900 to 14,900 mg/Kg (parts per million). This contaminant was further characterized as best matching the chromatographic peak for motor oil. Boston Environmental was informed by the tour guide that these filters had been replaced less than a month previously.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

***Based on Boston Environmental's December 15, 2005 tests and observations of the City of Somerville combined Police and Fire facility at 220 Washington Street, Somerville MA, it is Boston Environmental's professional opinion that there is evidence of mold contamination on surfaces, carpets, and HVAC ducts in the facility and in the air of one or more offices. The primary mold types present are Aspergillus, Cladosporium, Penicillium, and Stachybotrys. The most likely cause of this mold is the multiple water events that have impacted the facility, including roof leaks, plumbing leaks, window leaks, window AC condenser leaks, etc., that allowed organic building construction materials to remain wetted.***

***This mold contamination is at levels that require professional mold remediation. Boston Environmental recommends that all visible mold be removed, the carpets be dry-steam cleaned (carpets must be bone dry within 24 hours), the cavities above the dropped ceilings and the rooms and***

*offices in building be remediated for mold. Walls with visible mold on the surfaces should be removed and the cavities behind the walls treated for mold. The dropped ceiling panels should be replaced.*

*Air filters removed from three of three HVAC return registers in rooms and corridors of the facility's first and second floor were contaminated with petroleum hydrocarbon particulates, at levels above 12,000 ppm. The most likely cause of this contamination is from vehicle exhaust from the under-building garage. These particulates were characterized, as being most closely matched to motor oil. Boston Environmental recommends that the building's HVAC system, including ducts, fans and coil be thoroughly cleaned and sterilized by a professional duct cleaning company, to remove potential petroleum hydrocarbon particulates and mold contamination. Boston Environmental also recommends that the garage area ceiling be sealed to prevent exhaust gases from permeating the office and lobby areas above and a suitable high volume garage exhaust system be installed to efficiently and effectively remove vehicle exhaust gases.*

*Additionally, the water leaks in the roof, around windows and the various plumbing leaks must be repaired to prevent the re-occurrence of mold, after mold remediation has been completed*

## 6.0 CERTIFICATION

Boston Environmental & Engineering Associates, Inc. and its employees do not have financial or other interests in the subject property.

Sincerely,  
Boston Environmental & Engineering Associates, Inc.



Herschel Clopper, PhD, ChE, CMC, Senior Associate

Senior Associate



Gene Marckini, ChE, PE, CMC, CMR  
President

# DESCRIPTION OF MOLD GENUS AND SPECIES FOUND AT SITE

## *CHARACTERISTICS OF MOLD CONTAMINANTS*

**Allergenic** molds are normally not dangerous to humans in low amounts, but they can cause allergic or asthmatic symptoms. Generally, these types of molds can be abated safely with the use of gloves and a disposable particulate-removing respirator.

**Mycotoxic** molds can cause serious health problems in humans and animals. These range from short-term irritation to immunosuppression, to cancer and even death. If toxic molds are identified, it is suggested that you seek advice from an Industrial Hygienist or other mold professional for guidance. The average homeowner should NOT attempt the abatement of these types of molds.

**Pathogenic** molds can cause serious health effects in persons with suppressed immune systems, those taking chemotherapy, and those with HIV/AIDS, or autoimmunity disorders. If any pathogenic molds are identified, it is suggested that you seek advice from an Industrial Hygienist or other mold professional. The average homeowner should NOT attempt the abatement of this type of molds.

**Hyphae & hyphal** elements are single, unidentifiable fragments of mold. Although they might not be traceable to a specific mold species, these fragments can be responsible for allergic reactions in some people and may indicate previous or current growth. **Ascospores and Basidiospores** are clusters of spores that may not be easily identified as a specific species, but may represent a mold problem in the property.

**Alternaria** (*all-tur-nair'-ee-uh*) – common allergen / contaminant / opportunistic pathogen, one of the most common molds found world wide in soil and on plants and can commonly be found indoors (frequently appearing black on window frames). It is an important airborne allergen and common agent for hay fever, asthma, and other allergy related symptoms.

**Aspergillus** (*as-per-jill-us*) – allergen / contaminant / opportunistic pathogen, commonly found in the environment around the world. It comprises approximately 200 species and can appear almost any color. Though commonly found on cultures, tape-lifts, and air samples, its spores are indistinguishable from *Pencillium* on non-cultured samples (like tape-lifts and air-o-cells) unless the conidiophore is present. Health effects vary by species, but many species are reported to be allergenic. Some species produce toxins that might have significant health effects in humans. *Aspergillus* is one of the most infectious of molds, but infections are not common in normal immune systems. In immuno-compromised individuals, however, the disease *Aspergillosis* is a very significant and potentially deadly health concern.

## **DESCRIPTION OF MOLD GENUS AND SPECIES FOUND AT SITE (Continued)**

**Aureobasidium** (*are-ee-oh-buh-syd'-ee-um*) - contaminant / opportunistic pathogen, found worldwide as a cosmopolitan, Dematiaceous fungus commonly isolated from plant debris, soil, wood, textiles, and indoor air environment, rarely associated with human disease but reported to be allergenic. It is disseminated as a wet spore in water droplets and by the wind when dried out. Allergenic reactions include common Type I allergies (hay fever, asthma,). Type III hypersensitivity pneumonitis: Humidifier fever and Sauna taker's lung. Potential Opportunist or Pathogens include rare reports of isolates from skin lesions, keratitis, spleen abscess in a lymphoma patient and blood isolate from a leukemic patient. Indoor growth areas are widespread, where moisture accumulates, especially bathrooms and kitchens, on shower curtains, tile grout, window sills, textiles, liquid waste materials.

**Basidiospores** (*bah-sid-ee-oh'-spores*) - allergen / contaminant, a general class of spore formed on a structure known as a basidium, characteristic of the Basidiomycete class (that includes rusts, smuts and mushrooms). This category is commonly found in outdoor air samples. Many species are reported to be allergenic and some species are associated with dry rot in wood. **Elevated airborne concentrations indoors might be indicative of water damage or too high of humidity.**

**Botrytis** (*bow-try-tus*) – contaminant, parasitic on plants and fruits. Rarely involved in human infection, but it is reported to be allergenic.

**Chaetomium** (*k--toe-me-um*) - contaminant, rarely involved in systemic and cutaneous disease and sometimes reported to be allergenic. Some species can produce toxins, and there is some research interest on whether these toxins can cause cancer. Primary IAQ importance is currently related to that it will grow in the same conditions as *Stachybotrys* (wet cellulose) and amplified amounts in indoor air could be a warning that conditions do exist for *Stachybotrys* growth. Many times on damp sheetrock paper, colonies of *Chaetomium* and *Stachybotrys* will be growing on top of one another or side by side (this can also be an important consideration when doing tape lifts of sheetrock because most of the time the colonies are not distinguishable by the naked eye – the small area that is sampled might be a pure colony of just *Chaetomium* even though numerous colonies of *Stachybotrys* might exist.)

**Cladosporium** (*clad-oh-spore-ee-um*) – common allergen / contaminant / very rarely pathogenic, found everywhere, many times the most common and numerous mold found in outdoor air. Indoor concentrations are usually not as high, but it is an important airborne allergen and common agent for hay fever, asthma, and other allergy related symptoms. It can thrive in various indoor environments, appearing light green to black (the black mold on air vent grills is usually *Cladosporium*)

**Dematiaceous (Brown) mold** (*dim-ah-tie-ay-shush*) – a very generic morphological description used for various brown molds (mainly on tape-lifts) that cannot be identified because of undistinguishable spores \ structures or because of too much environmental damage to the mold structures. This identification generally excludes many of the common toxic and more infectious molds found indoors, but on some occasions when the mold is very weathered or damaged, this category could potentially include mold from *Alternaria*, *Epicoccum*, *Ulocladium* or others.

**Non-Sporulating\* Fungi**– These are organisms that have not sporulated under the culture conditions provided. Most never sporulate in culture. Some represent non-sporulating colonies of common fungi (*Cladosporium*, *Alternaria* and even *Aspergillus*). These are not particularly problematic but they can cause allergic reactions in sensitized individuals.

## **DESCRIPTION OF MOLD GENUS AND SPECIES FOUND AT SITE (Continued)**

\*Sporulating-able to reproduce by producing and launching spores; somewhat akin to a Dandelion whose seed are carried on air currents to a location if fertile and moist will allow propagation.

**Penicillium** (*pen-uh-sill'-ee-um*) - contaminant / opportunistic pathogen, one of the most common genera found worldwide in soil and decaying vegetation and indoors in dust, food, and various building materials. Common bread mold is a species of Penicillium. Spores usually cannot be distinguished from Aspergillus on non-cultured samples (like tape-lifts and air-o-cells). It is reported to be allergenic, to cause certain infections in compromised individuals, and some species do produce toxins unhealthy to humans.

**Phoma** (*fo'-mah*) – contaminant / opportunistic pathogen, found on plant material and soil. Reported to be a common allergen found indoors on painted walls (including the shower) and on a variety of other surfaces including cement, rubber, and butter. Some believe its effect on indoor air is not that significant because its spores do not travel well via air currents. Some species are linked to occasional eye, skin, and subcutaneous infections.

**Rhizopus** (*rye-zo-puss*) - contaminant / opportunistic pathogen, found in soil, decaying vegetation, and animal dung. It is reported to be allergenic, and some consider it a major allergen often linked to occupational allergy. It can cause Zygomycoses and other infections in compromised individuals.

**Smuts/Myxomycetes / Rust** / (*mix-oh'-my-seat*) – general category for commonly found genera usually associated with living and decaying plants as well as decaying wood. Sometimes can be found indoors. Some allergenic properties reported, but generally pose no health concerns to humans or animals.

**Stachybotrys** (*stack-ee-bought-ris*) contaminant, found indoors primarily on wet cellulose containing materials. It is the "toxic black mold" that has garnered much media attention. *Stachybotrys* produces mycotoxins which may lead to pathological changes in animal and human issues. These toxins may be acquired by ingestion of food products contaminated with the fungus. They can only be produced or get airborne, however, under certain environmental settings. Some species produce a potent toxin that is lethal to animals, though dose effect on humans is not clear. One species produces a toxin linked to the bleeding lung deaths of several infants. A host of other toxic reactions in humans are also linked to it, but many of these require further study. *Stachybotrys* is sometimes difficult to detect indoors because many times it will grow unseen on the back of walls or in the wall cavity with little disturbance that would cause it to be detected by routine air sampling. This is potentially also when it is of most health concern: when it covers entire wall areas and constantly produces toxins undetected. Non-cultured lab analyses (air-o-cells and tape-lifts) usually are the proper method of identification because *Stachybotrys* does not grow or compete well on most culture plate media, and it is reported that even non-viable spores can be toxigenic. It is possible that *Stachybotrys* may play a role in development of sick building syndrome, but probably only in conjunction with other factors. Until more information is available, and the role of *Stachybotrys* and its associated mycotoxins in Indoor Air Quality (IAQ) has been assessed, extreme caution should be used when dealing with it.

**Syncephalastrum** (*sin-sef-al-os-trum*) – primarily a contaminant, often found in the soil of warm, moist climates. Very rarely involved in infections. *Syncephalastrum racemosum* (monotypic) is common but comprises a small proportion of the fungal biota. This organism is widely regarded as being nonpathogenic to humans, with only a single case of a cutaneous infection reported (1980). No information is available regarding toxicity.

## DESCRIPTION OF MOLD GENUS AND SPECIES FOUND AT SITE (Continued)

Allergenicity has not been studied. May be identified on surfaces by tape lifts, tease mounts from bulk samples, and in air by culturable (Andersen) sampling. (Spores do not have distinctive morphology and would be categorized as "other colorless" on spore trap samples.) Recorded isolations are from dung and soil, primarily in tropical and subtropical areas. OSHA listed health effects for *Syncephalastrum*, include, allergen, irritant, hypersensitivity pneumonitis and dermatitis.

**Trichoderma** (*trick-oh-derm-uh*) - contaminant / opportunistic pathogen, found in soil. Can be found indoors on cellulose materials like paper and in kitchens on various ceramic items. Human infections are rare but some have been reported in immune suppressed patients. It is reported to be allergenic though some report these effects to be rare. It can produce toxins very similar to those produced by *Stachybotrys chartarum*, and because of this it is considered an important mold in IAQ investigations.

**Ulocladium** (*you-low-clay-dee-um*) - contaminant, found everywhere. Can grow indoors on various materials including paper, but requires more water than some other molds. It is reported to be a major allergen.

**Yeast** (yeest)- an unicellular, budding fungi that do not constitute a formal taxonomic group but a growth form exhibited by a range of unrelated fungi. They occur naturally and grow typically in moist environments where there is a plentiful supply of simple, soluble nutrients such as sugars and amino acids. For this reason they are common on leaf and fruit surfaces, on roots and in various types of food. With few exceptions, they are unable to degrade polymers, such as starch and cellulose, which are used by many hyphal fungi. They also occur naturally within the human body in the mouth, the gut, the vagina or, less often, on the surface of the skin. They are usually not seen in indoor environments but whenever they do occur, they are most likely due to high human activity. They primarily reproduce by budding or by binary fission and so they tend to multiply very fast in the environment. They do not get aerosolized often and when they do it is usually in clumps of many cells. */Rhodotorula/* and */Sporobolomyces/* species are usually the most common types of yeasts that occur when air samples are cultured for fungi in laboratory. A great majority of yeasts are not pathogenic but there are some such as */Cryptococcus/* species, */Candida albicans/*, etc that can be pathogenic. Yeasts have also been used for many beneficial purposes and the most commonly used yeast is */Saccharomyces/ cerevisiae/*, which is domesticated for wine, bread and beer.