

NOAA-SSMC-3 Health Unit

Survey November '99

Microbiological Sampling Report

For

National Oceanic & Atmospheric Administration

Sampling Conducted at the Health Unit of Building SSMC-3

On November 8 - 9, 1999

Interagency Agreement #: D8H00CO31200

Task: 9903

December 15, 1999

Prepared by

US Public Health Service

Division of Federal Occupational Health

Bethesda Central Office

Executive Summary

At the request of the National Oceanic & Atmospheric Administration (NOAA), personnel from Federal Occupational Health (FOH) collected surface swab and vacuum plenum dust samples from the Health Unit at Building SSMC-3, located at 1315 East-West Highway, Silver Spring, Maryland. The objective of investigation was to determine the extent of *Stachybotrys chartarum* (SC) contamination in this Health Unit in order to develop cleaning protocols for the Unit and ultimately re-open the space for occupancy.

Eight swabs were collected from the Health Unit: one from each supply diffuser surface. Seven plenum dust samples were collected from the Health Unit. One control plenum dust sample was also collected from the corridor in front of the Print Shop.

One of eight swabs showed the presence of *Stachybotrys chartarum*. This fungus was also detected from all plenum dust samples collected from this Health Unit, except the one collected from Room 3538. *Stachybotrys chartarum* was not detected from the control sample collected near the Print Shop.

INTRODUCTION

At the request of the National Oceanic & Atmospheric Administration (NOAA), Federal Occupational Health (FOH) conducted a microbiological sampling at the Health Unit of Building SSMC-3, located at 1315 East-West Highway, Silver Spring, Maryland. A swab sample was collected from each supply diffuser surfaces. Vacuum dust samples were collected from the return plenum. Sampling in the Health Unit was conducted in the evening of November 8, 1999. A control vacuum plenum dust sample was collected on November 9, 1999, from the corridor in front of the Print Shop. The objective of this investigation was to determine the extent of *Stachybotrys chartarum* (SC) contamination in the Health Unit in order to develop cleaning protocols for this Health Unit and ultimately re-open the facility.

EVALUATION METHODOLOGY

Field Sampling

Sterilized swabs (Culturette^â) were used to wipe surfaces of each supply diffuser (11 or 14 in²) after removal of the grills. Vacuum dust samples were collected from each area (Attachment A). Randomly selected ceiling tiles in each area were removed. Plenum areas were visually inspected and no water damage was observed. Dust, which had accumulated in the plenum, was collected with a High Efficiency Particulate Air (HEPA) vacuum equipped with a special “sock” device. For each sampling area, surfaces of at least five ceiling tile areas were vacuumed and composited as one sample. All samples collected were express mailed to FOH’s Environmental Microbiology Laboratory (EML) in Philadelphia, Pennsylvania for analysis.

Laboratory Procedures

Upon receipt, each swab sample was suspended in sterile distilled water, diluted serially, and inoculated onto agar plates. Two media were used for retrieving fungi: 2% malt extract agar (MEA) for general fungi and cellulose Czapek agar (CCA) for cellulose-loving fungi such as *Stachybotrys*. At least three dilution series were used for each sample. Each dust sample was sieved through a 250 mm sieve. The fine dusts retrieved were then weighed and followed the aforementioned dilution plating for fungal analysis.

All plates were incubated in a 25°C incubator. They were examined every other day for up to 10 days to ensure full recovery of fungi. Fungal identification was based on colony morphology, spores and conidia formation. Total fungal colonies formed on each MEA plate and SC on CCA plates were counted and recorded. Fungal levels in swab and dust samples were presented as colony forming units (CFUs) per square inch (CFU/in²), and CFUs per gram of fine dust (CFU/g), respectively.

RESULTS AND DISCUSSION

The laboratory analytical report #NOAA-00-5R is presented in Attachment B.

Fungal levels detected from swab samples collected from supply diffusers were low, and ranged from below the limit of detection of 4 CFU/in² up to 11 CFU/in². *Stachybotrys chartarum* was detected from one location in Room 3517.

The dust sample collected from ceiling plenum in front of the Print Shop had a fungal level of 5,200 CFU/g with *Penicillium* as the predominant fungal genus, followed by *Cladosporium* (Table 1). *Stachybotrys chartarum* was not detected from this control sample.

Fungal levels in dust collected from the Health Unit plenum were at 10³ – 10⁴ CFU/g (Table 1). *Penicillium* and

Aspergillus were the predominant fungi recovered from these samples. *Stachybotrys chartarum* was detected from every sample except for the one collected from Room 3538.

Stachybotrys chartarum had been detected previously from various samples in this Health Unit. Although visual inspections of this Health Unit did not reveal any obvious water incursion or water-damaged materials, *Stachybotrys chartarum* was detected from most plenum dust samples collected. Results suggest that *Stachybotrys chartarum* detected in the Health Unit did not originate there.

The ceiling plenum in this building serves as a return air plenum for the HVAC system. According to the available floor plan, two mechanical rooms (#1 and #2) are located on this floor. On the West half of the floor, air returns from occupied spaces to the plenum and eventually to mechanical room #1 (located across the corridor from the Health Unit). Therefore, *Stachybotrys chartarum* spores detected in the Health Unit can originate from anywhere on the west side of the third floor within the return air pathway. A mechanical engineer's inspection and review of the heating, ventilation, and air-conditioning (HVAC) system of this building is necessary to verify possible pathway(s) above the ceiling plenum and in occupied spaces. Further investigation of areas affected by water incursion is also recommended to identify sources of *Stachybotrys chartarum*. If fungal sources are identified, an engineering investigation into the cause of water intrusion, and eventual remediation of the contaminated areas is necessary.

Table 1. Fungal levels on vacuum plenum dust samples collected from different areas in the Health Unit (HU), SSMC-3, on November 8 – 9, 1999.

ID	Location/ Room #	Total Fungal Levels (CFU/g of fine dust)	Asp-Pen* (%)	Cla* (%)	SC**
B01	HU, 3517	6.4 x 10 ⁴	81	6	+
B02	HU, 3525	6.8 x 10 ³	82	6	+
B03	HU, 3538	2.5 x 10 ³	52	35	-
B04	HU, 3537	1.4 x 10 ⁴	46	40	+
B05	HU, 3516, 3523, 3531	6.0 x 10 ⁴	53	20	+
B06	HU, 3500	1.6 x 10 ⁴	46	39	+
B07	HU, 3502	8.0 x 10 ³	70	0	+
B08	In front of Print Shop	5.2 x 10 ³	67	33	-

*Asp-Pen = [(*Aspergillus* levels + *Penicillium* levels) / total fungal level] *100.

*Cla = (*Cladosporium* levels / total fungal levels) *100.

** SC: "+" *Stachybotrys chartarum* was detected on MEA or CCA plates.

"-" *Stachybotrys chartarum* was not detected on MEA and CCA plates.

CONCLUSIONS

- Fungal levels on surfaces of supply diffusers were low.
- *Stachybotrys chartarum* was detected from one of eight swabs sample collected from room 3517.
- *Penicillium* and *Aspergillus* were the predominant fungi recovered from plenum dust collected in the Health Unit while *Penicillium* was the predominant fungi from the control sample.
- Fungal levels in plenum dust in the Health Unit were at $10^3 - 10^4$ CFU/g levels, while control sample showed a level of 5.2×10^3 CFU/g.
- *Stachybotrys chartarum* was not detected from the control plenum sample and one sample collected from the Health Unit plenum (room 3538). However, this fungus was detected from all other plenum dust samples collected from the Health Unit.

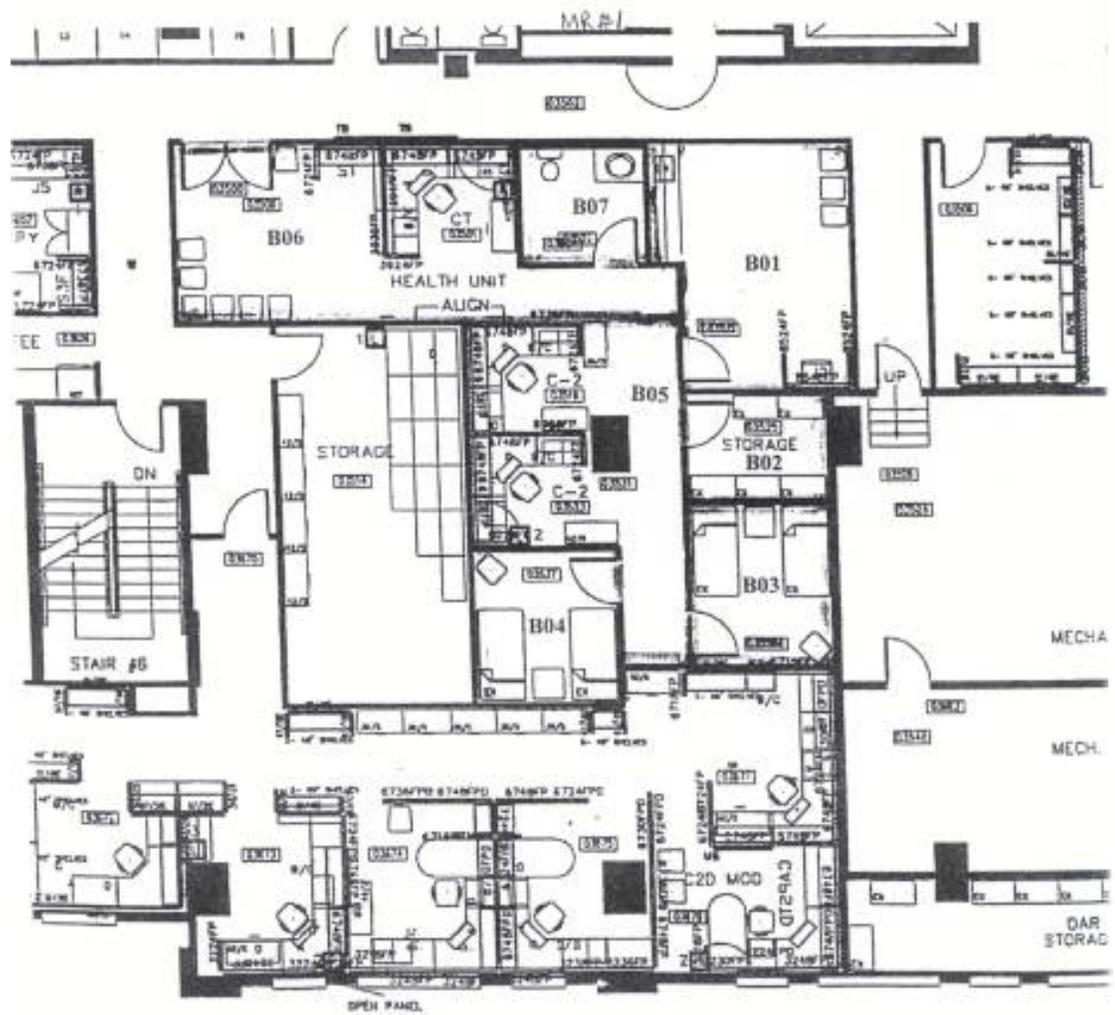
RECOMMENDATIONS

- Conduct periodic surveillance in the Health Unit to detect any water damage on building materials.
- Implement an emergency water intrusion protocol to adequately manage unexpected water intrusion problems to prevent fungal proliferation.
- Consult a mechanical engineer familiar with the heating, ventilation, and air-conditioning (HVAC) system to determine the pathway(s) of air movement in the plenum and occupied spaces.
- Consult a structural engineer to determine the causes of water incursion in SSMC-3.
- Correct structural deficiencies causing water incursion.
- Remove sources of fungal proliferation, and remediate surrounding areas.

ATTACHMENT A

Vacuum plenum dust sampling locations in the Health Unit of SSMC-3 on November 8, 1999.

Health Unit, SSMC-3
Ceiling Plenum Dust Samples
Collected on Nov. 8, 1999



ATTACHMENT B

Microbiological laboratory report

#NOAA-00-5R

USPHS DFOH ENVIRONMENTAL MICROBIOLOGY LABORATORY, PHILADELPHIA, PA

LABORATORY REPORT #NOAA-00-5R

Client agency: National Oceanic and Atmospheric Administration, Silver Spring, MD**POIS#/task #: D8H00CO31200 / 9903****Sampling dates: 11/8/99-11/9/99****Dates of inoculation: 11/9/99-11/11/99****General location: Silver Spring, MD****Specific location: SSMC-3, 3rd floor, Health Unit****Sampling techniques: Wipe, plenum dust, and bulk samplings****Medium used: Malt extract agar (MEA) and cellulose Czapek agar (CCA) for fungi****Samples submitted by: R. Pickett and J. Sobelman****Date characterization completed: 11/26/99**

(A) Wipe samples on MEA and CCA plates

Sample ID	Sampling Location	Area (in ²)	Dilution factor	Fungi on MEA @ 25°C	Presence of <i>Stachybotrys chartarum</i> *** on CCA @ 25°C
3HU1109W01	Supply diffuser @ room 3517	14	40X-MEA 10X-CCA	1. <i>Cladosporium</i> (1*) CFU/in ² = 3	Yes (1) CFU/in ² = 0.7
3HU1109W02	Supply diffuser @ room 3525	11	40X-MEA 10X-CCA	1. <i>Aspergillus niger</i> ** (1) 2. <i>Penicillium</i> (1) CFU/in ² = 7	No CFU/in ² < 1
3HU1109W03	Supply diffuser @ room 3538	11	40X-MEA 10X-CCA	No fungal growth CFU/in ² < 4	No CFU/in ² < 1
3HU1109W04	Supply diffuser @ room 3537	11	40X-MEA 10X-CCA	No fungal growth CFU/in ² < 4	No CFU/in ² < 1
3HU1109W05	Supply diffuser @ cubicle area next to room 3537	11	40X-MEA 10X-CCA	1. <i>Penicillium</i> (1) CFU/in ² = 4	No CFU/in ² < 1

Sample ID	Sampling Location	Area (in ²)	Dilution factor	Fungi on MEA @ 25°C	Presence of <i>Stachybotrys chartarum</i> *** on CCA @ 25°C

3HU1109W06	Supply diffuser @ cubicle area in front of room 3517	11	40X-MEA 10X-CCA	1. <i>Aspergillus niger</i> ** (1) 2. <i>Aureobasidium</i> (1) 3. <i>Paecilomyces</i> (1) CFU/in ² = 11	No CFU/in ² < 1
3HU1109W07	Supply diffuser @ receptionist cubicle, 3501	11	40X-MEA 10X-CCA	No fungal growth CFU/in ² < 4	No CFU/in ² < 1
3HU1109W08	Supply diffuser @ entrance, 3500	11	40X-MEA 10X-CCA	1. <i>Aureobasidium</i> (1) CFU/in ² = 4	No CFU/in ² < 1

(B) Plenum dust samples on MEA and CCA plates

Sample ID	Sampling Location	Weight (g)	Dilution factor	Fungi on MEA @ 25°C	Presence of <i>Stachybotrys chartarum</i> *** on CCA @ 25°C
3-HU-1108-B01	Treatment room 3517, dust above ceiling plenum	0.100	400X-MEA 40X-CCA	1. <i>Aspergillus niger</i> ** (9) 2. <i>Aspergillus sp.</i> (3) 3. <i>Tritirachium</i> (2) 4. <i>Aspergillus versicolor</i> *** (1) 5. <i>Cladosporium</i> (1) CFU/g = 6.4 x 10 ⁴	Yes (2) CFU/g = 800

Sample ID	Sampling Location	Weight (g)	Dilution factor	Fungi on MEA @ 25°C	Presence of <i>Stachybotrys chartarum</i> *** on CCA @ 25°C
3-HU-1108-B02	Treatment room 3525, dust above ceiling plenum	0.100	40X-MEA 40X-CCA	1. <i>Penicillium</i> (8) 2. <i>Aspergillus niger</i> ** (4) 3. <i>Aspergillus sp.</i> (2) 4. <i>Cladosporium</i> (1) 5. <i>Epicoccum</i> (1) 6. <i>Paecilomyces</i> (1) CFU/g = 6,800	Yes (4) CFU/g = 1,600

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3-HU-1108-B03	Resting room 3538, dust above ceiling plenum	0.101	40X-MEA 10X-CCA	<ol style="list-style-type: none"> 1. <i>Cladosporium</i> (22) 2. <i>Penicillium</i> (15) 3. <i>Aspergillus sp.</i> (14) 4. <i>Alternaria</i> (4) 5. <i>Aspergillus niger</i>** (3) 6. <i>Epicoccum</i> (2) 7. <i>Aureobasidium</i> (1) 8. <i>Mucor</i> (1) <p>CFU/g = 2.5 x 10⁴</p>	No CFU/g < 99
3-HU-1108-B04	Resting room 3537, dust above ceiling plenum	0.101	40X-MEA 10X-CCA	<ol style="list-style-type: none"> 1. <i>Cladosporium</i> (14) 2. <i>Penicillium</i> (10) 3. <i>Aspergillus niger</i>** (3) 4. <i>Alternaria</i> (2) 5. <i>Aspergillus fumigatus</i>** (2) 6. <i>Aureobasidium</i> (2) 7. <i>Aspergillus flavus</i>*** (1) 8. <i>Epicoccum</i> (1) <p>CFU/g = 1.4 x 10⁴</p>	Yes (1) CFU/g = 99

Sample ID	Sampling Location	Weight (g)	Dilution factor	Fungi on MEA @ 25°C	Presence of <i>Stachybotrys chartarum</i> *** on CCA @ 25°C
3-HU-1108-B05	Cubicle areas outside of rooms 3517 and 3525	0.100	400X-MEA 10X-CCA	<ol style="list-style-type: none"> 1. <i>Penicillium</i> (5) 2. <i>Cladosporium</i> (3) 3. <i>Alternaria</i> (1) 4. <i>Aspergillus fumigatus</i>** (1) 5. <i>Aspergillus niger</i>** (1) 6. <i>Aspergillus sp.</i> (1) 7. <i>Aureobasidium</i> (1) 8. <i>Paecilomyces</i> (1) 	Yes (4) CFU/g = 400

				9. Basidiomycetes (1) CFU/g = 6.0 x 10 ⁴	
3-HU-1108-B06	Entrance receptionist, 3500	0.100	40X-MEA 10X-CCA	1. <i>Cladosporium</i> (16) 2. <i>Penicillium</i> (16) 3. <i>Alternaria</i> (2) 4. <i>Aspergillus niger</i> ** (2) 5. <i>Aspergillus sp.</i> (1) 6. <i>Aureobasidium</i> (1) 7. <i>Neurospora</i> (1) 8. <i>Paecilomyces</i> (1) 9. yeast (1) CFU/g = 1.6 x 10 ⁴	Yes (2) CFU/g = 200
3-HU-1108-B07	Toilet area	0.100	40X-MEA 10X-CCA	1. <i>Aspergillus niger</i> ** (7) 2. <i>Penicillium</i> (7) 3. <i>Alternaria</i> (4) 4. <i>Aureobasidium</i> (1) 5. <i>Trichoderma</i> (1) CFU/g = 8,000	Yes (3) CFU/g = 300

Sample ID	Sampling Location	Weight (g)	Dilution factor	Fungi on MEA @ 25°C	Presence of <i>Stachybotrys chartarum</i> *** on CCA @ 25°C
3HU1109B01	In front of print shop	0.100	40X-MEA 10X-CCA	1. <i>Penicillium</i> (7) 2. <i>Cladosporium</i> (4) 3. <i>Aspergillus fumigatus</i> ** (1) 4. <i>Aspergillus sp.</i> (1) CFU/g = 5,200	No CFU/g < 100

* Colony counts.

** Opportunistic fungi.

*** Toxigenic fungi.

Characterization completed by: _____

Ling-Ling Hung, Ph.D. Microbiologist

Quality control checked by: _____ (initials)