

NOAA-SSMC-2 Health Unit

Survey October '99

FINAL REPORT

Microbiological Sampling Report

for

National Oceanic & Atmospheric Administration

Samplings Conducted at the Health Unit of Building SSMC-2

On October 21 and 25, 1999

Interagency Agreement #: D8H00CO31200

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Prepared by

US Public Health Service

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Executive Summary

At the request of the National Oceanic & Atmospheric Administration (NOAA), Federal Occupational Health (FOH) performed supervision of cleaning and microbiological sampling at the Health Unit of Building SSMC-2, located at 1325 East-West Highway, Silver Spring, Maryland. Andersen air, surface swab and contact plate samples were collected from the Health Unit and the adjacent two offices before and after the cleaning. Sampling was performed by R. Pickett of NOAA and field personnel from FOH. Pre-cleaning sampling was collected on October 21, 1999. A thorough cleaning was then conducted in the Health Unit during the weekend of October 22 – 24, 1999. Post-cleaning sampling was conducted the morning of October 25, 1999. The objective of these samplings was to determine the effectiveness of the cleaning.

Thirty-two (32) air, 80 contact plate, and 51 swab samples were collected on each sampling date. Four fiberglass insulation bulk samples were also collected from the supply diffusers while disassembled for swab sampling.

The following are results from the cleaning and sampling:

- *Stachybotrys chartarum* was not detected from any air samples collected.
- Mean airborne fungal levels were lower than those of outdoors at each sampling date.
- Fungi detected indoors were similar to those of outdoors, with *Cladosporium* and *Alternaria* as dominant on October 21 and Basidiomycetes and *Cladosporium* on October 25, 1999.
- Besides common outdoor airborne fungi, *Penicillium* and *Aspergillus* (*Aspergillus niger* included) were the predominant fungi recovered from surface samples before the cleaning.

- *Stachybotrys chartarum* was detected from fiberglass insulation collected from the supply diffuser of room 9331 during pre-cleaning sampling.
- *Stachybotrys chartarum* was detected from one swab sample collected from the surface of the return trougher in room 9300 before cleaning.
- No *Stachybotrys chartarum* was detected from any samples collected after cleaning of this facility.
- In general, the cleaning conducted during the weekend of October 22 – 24, 1999, was effective for the remove of potential biocontaminants.

INTRODUCTION

At the request of the National Oceanic & Atmospheric Administration (NOAA), Federal Occupational Health (FOH) performed supervision of cleaning and microbiological samplings at the Health Unit of Building SSMC-2, located at 1325 East-West Highway, Silver Spring, Maryland. Andersen air, surface swab and contact plate samples were collected from the Health Unit and the adjacent two rooms before and after the cleaning. Sampling was performed by R. Pickett and field personnel from FOH. Pre-cleaning sampling was conducted on October 21, 1999. Then a thorough cleaning of the Health Unit was conducted during the weekend of October 22 – 24, 1999. Post-cleaning sampling was performed in the morning of October 25, 1999. The sampling objective was to determine the effectiveness of the cleaning.

EVALUATION METHODOLOGY

Cleaning of the Health Unit

The cleaning protocol developed by FOH on October 12, 1999 was followed (Attachment A). Cleaning of the Health Unit began at 7:00 PM on Friday, October 22, 1999. The crew began by thoroughly High Efficiency Particulate Air (HEPA) vacuuming all ceiling tiles. The covers from light fixtures and diffuser grills were removed and cleaned with a 10% bleach solution followed by a clean water rinse. The light frames and diffusers were cleaned by the same method before covers and grills were put back in place. Ceiling cleaning was completed at approximately 11 PM.

Dust generated from ceiling cleaning was allowed to settle for about a 20-hour period. At approximately 6:30 PM on Saturday, October 23, cleaning of walls, furniture, equipment, and floors was done using a 10% bleach solution followed by a clean water rinse. All upholstered furniture and carpet were HEPA-vacuumed, as was the exterior of all storage boxes. The crew started at the top of each room, working their way down, doing the floors last. Where possible, equipment and furnishings were moved away from walls so that cleaning could be done behind and underneath. Systems furniture was not moved. Cleaning was completed

at approximately 12:30 AM.

Field Sampling

The Health Unit was divided into ten locations for microbiological sampling (Attachment B). Table 1 summarizes various functions of each sampling location.

In each sampling location in the Health Unit, two air samples were collected from a randomly selected location, on the cart. Samples were also collected from corridors adjacent to the Health Unit and in the mechanical room. Outdoor air samples were collected near the entrance of the building. Air samples were collected with Andersen N-6 samplers at a flow rate of 28.3 L/min. Indoor samples were collected for 3 minutes and outdoor samples were collected for both one and three minutes. Two percent (2 %) malt extract agar (MEA) and cellulose Czapek agar (CCA) was used to recover general fungi and cellulose-loving fungi, respectively. Temperature and relative humidity measurements were collected from each air sampling location by a battery operated, direct readout Hygroskop^â meter.

To determine fungal burden on horizontal and vertical surfaces of the Health Unit, eight contact plate samples were collected from each sampling location. Four samples were randomly collected from the horizontal surfaces and four from randomly selected vertical surfaces. Sampling was conducted by pressing the MEA-filled Rodac^â plate against the surface of interest for five seconds.

Swab samples were collected from each supply diffuser, return trougher, and exhaust grill, by wiping a known area/length with sterile cotton swabs (Culturette^â) wetted with holding media. For supply diffusers, perimeter supply slits, and exhaust fan grills, an area of 4 in² was wiped. Sterilized swabs were used to wipe 5 inches in length of return troughers back and forth on the light fixture. The swab was then placed directly into its holder. Each holder was labeled with an identifiable number.

While disassembling the supply diffusers for wipe sampling, fiberglass insulation material was observed and collected into a Ziplock^â bag as bulk samples. These samples were collected from rooms 9303, 9315, and 9331. All samples were carried or express mailed to the Environmental Microbiology Laboratory (EML) in Philadelphia, PA for analysis. Another sample, fiberglass insulation materials collected from room 9313 on September 30, 1999, was also analyzed.

Table 1. Summaries of ten sampling locations at Health Unit of SSMC-2 on October 21 and 25, 1999.

Location #	Room #	Description / Function

1	9242	Occupational Doctor's office
2	9246	Clinical Doctor's office
3	9300	Waiting area
4	9304	Receptionist cubicle
5	9303	Treatment room
6	9313	Resting room
7	9315	Treatment room
8	9331	Resting room
9	9335	Toilet
10	Corridor	Corridor areas next to rooms 9331, 9313, & 9315

Laboratory Procedures

Upon receipt, all air and contact plate samples were incubated in a 25°C incubator. Swab samples were suspended in sterile distilled water, diluted serially, and inoculated onto MEA and CCA plates. At least three dilution series were used for each sample. Bulk samples were weighed and followed by dilution plating as described above.

All plates were incubated in a 25°C incubator, and examined every other day for up to 10 days to ensure the full recovery of fungi. Fungal identification is based on colony morphology, spore and conidia formation. Total fungal colonies formed on each MEA plate were counted and recorded. Presence of *Stachybotrys chartarum* on each CCA plate was also recorded. Fungal concentrations were presented as colony forming units (CFUs) per measuring unit. For example, fungal levels in air samples were presented as CFUs per cubic meter of air (CFU/m³). Similarly, CFU/in², CFU/plate, and CFU/g were used for swab, contact plate, and bulk samples, respectively. Fungal levels on the surface of return troughers were presented as CFU/inch in length.

RESULTS AND DISCUSSION

All microbiological laboratory reports are presented in Attachment C. Report # NOAA-99-12R contains analytical result from a bulk sample collected on September 30, 1999. Results from pre-cleaning sampling are in reports NOAA-00-1R and NOAA-00-2R. Reports NOAA-00-3R and NOAA-00-4R contain results from post-cleaning sampling.

Air Samples

Stachybotrys chartarum was not detected from any air samples collected, either on MEA or CCA plates. Mean indoor fungal levels were lower than those of outdoors at each sampling date (Table 2). Predominant fungi detected on October 21, 1999 were *Cladosporium* and *Alternaria*. Predominant fungi detected on

October 25, 1999, in a descending order, were Basidiomycetes, *Cladosporium*, *Aureobasidium*, *Aspergillus*, and *Paecilomyces*. Overall, fungi detected indoors were similar to those detected from outdoors.

Table 2. Airborne fungal levels detected indoors and outdoors on October 21 and 25, 1999, collected by Andersen N-6 samplers with malt extract agar.

Locations	Outdoors	Health Unit	Corridors Outside of Health Unit	Mechanical Room
Parameters				
Pre-Cleaning 10/21/99	159 ± 18*	13 ± 4	6 ± 6	6 ± 6
Post-Cleaning 10/25/99	183 ± 148	40 ± 5	77 ± 6	24 ± 12
Sample Number /Sampling Date	2	10	2	2

*** Mean ± standard error.**

Contact Plate Samples

Stachybotrys chartarum was not detected from any samples collected from horizontal or vertical surfaces. Mean fungal levels, for pre-cleaning sampling, on horizontal surfaces was 11 CFU/plate (Table 3). Besides the common outdoor fungi *Cladosporium* and *Alternaria*, predominant fungi detected were *Aspergillus* (*Aspergillus niger* included) and *Penicillium*. Mean fungal levels on horizontal surfaces during post-cleaning

sampling reduced to 3 CFU/plate (Table 3). Predominant fungi detected were *Chaetomium*, *Cladosporium*, *Aspergillus*, Basidiomycetes, and *Penicillium*.

Mean fungal levels on vertical surfaces were lower than those of horizontal surfaces. Mean fungal levels during pre-cleaning and post-cleaning samplings were lower than the detection limits of 1 CFU/plate (Table 3).

Table 3. Fungal levels on horizontal and vertical surfaces at the Health Unit of SSMC-2, on October 21 and 25, 1999, collected by MEA-filled contact plates.

Parameters	Pre-Cleaning (10/21/99)	Post-Cleaning (10/25/99)	Sample Number/ Sampling
Surfaces			
Horizontal Surfaces (CFU/plate)	11.3 ± 1.2*	2.8 ± 0.3	40
Vertical Surfaces (CFU/plate)	0.9 ± 0.2	0.2 ± 0.1	40

*** Mean ± standard error.**

Swab Samples

Stachybotrys chartarum was not detected from any MEA plates. However, one sample collected from the surface of return trougher at room 9300 (sample #1021W30, report NOAA-00-2R) showed the presence of *Stachybotrys chartarum* on CCA plate.

At pre-cleaning sampling, mean fungal level for return troughers, exhaust grills, and supply diffusers was 4.4 CFU/in in length, 23.7 CFU/in², and 39.1 CFU/in², respectively (Table 4). Predominant fungi detected during pre-cleaning sampling were *Penicillium*, *Aspergillus*, and *Cladosporium*. These fungi were similar to those recovered from contact plate sampling on the horizontal surfaces.

During post-cleaning sampling, fungal levels in most samples were very low. Reduction of mean fungal levels were detected on each type of surface. Average fungal levels for return troughers, exhaust grills, and supply diffusers was 0.2 CFU/in in length, 0.7 CFU/in², and 0.2 CFU/in², respectively (Table 4).

Table 4. Fungal levels on surfaces of supply diffusers, exhaust troughers, and exhaust grills at the Health Unit of SSMC-2, on October 21 and 25, 1999, collected by swab sampling.

Parameters	Pre-Cleaning (10/21/99)	Post-Cleaning (10/25/99)	Sample Number/Sampling
Surfaces			
Supply diffusers (CFU/in ²)	39.1 \pm 13.3*	0.2 \pm 0.2	33
Return troughers (CFU/inch in length)	4.4 \pm 1.1	0.2 \pm 0.1	15
Exhaust grills (CFU/in ²)	23.7 \pm 15.6	0.7 \pm 0.7	3

*** Mean \pm standard error.**

Bulk Samples

Four bulk samples were collected: one on September 30, 1999, and three on October 21, 1999. *Stachybotrys chartarum* was not detected from any of these four samples on MEA plates. Predominant fungi recovered from MEA plates were *Penicillium* and *Cladosporium*. Presence of *Stachybotrys chartarum* was detected, on CCA plates, from the sample collected from room 9331 (sample #B3-1, report NOAA-00-2R).

CONCLUSIONS

The following are findings of the cleaning and sampling:

- *Stachybotrys chartarum* was not detected from any air samples collected.
- Mean airborne fungal levels were lower than those of outdoors at each sampling date.
- Fungi detected indoors were similar to those of outdoors, with *Cladosporium* and *Alternaria* as dominant on October 21 and Basidiomycetes and *Cladosporium* on October 25, 1999.
- Besides common outdoor airborne fungi, *Penicillium* and *Aspergillus* (*Aspergillus niger* included) were

the predominant fungi recovered from surface samples before the cleaning.

- *Stachybotrys chartarum* was detected, on CCA plate, from one fiberglass insulation bulk sample collected from the supply diffuser of room 9331 during pre-cleaning sampling.
- *Stachybotrys chartarum* was detected, on CCA plate, from one swab sample collected from the surface of return trougher in room 9300 before cleaning.
- No *Stachybotrys chartarum* was detected from any sample collected after cleaning of the facility.
- Fungal levels on various surfaces were reduced after the thorough cleaning of this Health Unit.
- In general, the cleaning conducted during the weekend of October 22 – 24, 1999, was effective for the remove of potential biocontaminants.

FINAL NOTES

Personnel from FOH conducted a visual inspection above the ceiling plenum areas of rooms 9331, 9313, and the window area of room 9300 on November 9, 1999. This is due to the detection of *Stachybotrys chartarum* in these areas during pre-cleaning sampling. No noticeable water damage was observed during this inspection.

ATTACHMENT A

Cleaning Protocol for the Health Unit of SSMC-2

(Original memorandum submitted to NOAA on October 29, 1999)

Cleaning Protocols for Health Unit at SSMC-2

This is a two-day cleaning protocol. Basically, started from top and work the way down.

DAY 1: Ceiling and diffusers

Allow dust to settle

DAY 2: Wet-wipe hard surfaces

HEPA vacuum chairs/furniture/panel/walls/floor

Wet mop vinyl floor

- Clean all supply diffusers and return air grills in the Health unit. Wet cleaning should be done using a 10% bleach solution with a detergent/surfactant added to improve wetting characteristics.
- Disposable cloths or wipes should be used to prevent spread of contaminants. Once a cloth has been used to wipe a contaminated surface, it should not be reused or rewetted from the “clean” bleach solution.
- The bleach cleaning should be followed by a clean tap water rinse.
- HEPA vacuum the ceiling tile surfaces with a high quality HEPA vacuum.
- At least 24 hours after the above cleaning has been completed, HEPA vacuum the entire office space, including wall surfaces, upholstered chairs, and fabric office panels. Each area should be vacuumed twice, in perpendicular directions to assure thorough removal of potential contaminants that may have settled after the wet cleaning process.
- Wet-wipe the hard surfaces, including file cabinets, medical cabinets, desktops, workstations, doors, beds and bed rails, with the aforementioned wet-cleaning method.
- HEPA vacuum the entire floor/carpet surfaces followed by wet mopping on vinyl floor with “clean” bleach solution followed by a clean tap water rinse.

ATTACHMENT B

Floor Plans Showing Sampling Locations in the Health Unit of SSMC-2

Floor plan of 9th floor, SSMC-2.

Highlighted areas are sampling areas
conducted on October 21 & 25, 1999.

Microbiological sampling locations (1 – 10) in the Health Unit of SSMC-2,
on October 21 & 25, 1999.

ATTACHMENT C

Microbiological Laboratory Reports

NOAA-99-12R and NOAA-00-1R to NOAA-00-4R

**All attachments can be retrieved from the Library located
on the Second Floor in SSMC 3**

OR

[Please click here to view the attachments electronically](#)