(8)

# CONSULTATION REPORT

for

State of Connecticut
Department of Revenue Services
25 Sigourney Street
Hartford, CT 06106

## SITE VISITED

Department of Revenue Services
25 Sigourney Street
Hartford, CT 06106

## Submitted By:

State of Connecticut Department of Labor
Division of Occupational Safety and Health
38 Wolcott Hill Road
Wethersfield, CT 06109

# SUMMARY

## PURPOSE

A specific industrial hygiene consultation visit was made in response to a request from Mr. Mark Thibedeau, business manager for the State of Connecticut Department of Revenue Services, to evaluate employee exposure to the possible presence of dust mites and biological contaminants in the workplace. The three areas of specific concern were the Public Services Unit on the 17th Floor, the Income Tax Compliance Unit on the 17th Floor, and a workstation located on the 14th Floor.

An opening conference was held on January 12, 2000 with Mr. Thibedeau to discuss the scope of the survey and to reiterate the employer's rights and responsibilities, especially to correct imminent danger or serious hazards. Mr. Thibedeau informed this consultant that the request for microbial and dust mite sampling was made in response to a recommendation made by CONN-OSHA in a previous health consultation. He also indicated that there was an on-going indoor air quality investigation being conducted by the UCONN Health Center.

Following the opening conference, this consultant conducted a walk-through of the areas included in the consultation. Staff had expressed concerns about the air quality in the building, specifically with regard to recurrent water leaks in the building. Employees have complained of symptoms such as burning eyes, sneezing, and sinus problems. There have also been reported cases of skin rashes. Mr. Thibedeau indicated that there have been additional complaints on the 17th Floor since the previous consultation. He also indicated that there was one employee on the 14th Floor who had to be moved from her workstation due to adverse symptoms she experienced at the workstation.

## CONCLUSIONS

### Summary of Monitoring Data

Monitoring of substances commonly evaluated to assess indoor air quality was conducted. The sampling strategy utilized included carbon dioxide, carbon monoxide, temperature and relative humidity. None of the substances evaluated resulted in concentrations exceeding limits found in the State of Connecticut Department of Labor, Division of Occupational Safety and Health (CONN-OSHA) regulations. The results are detailed in the Monitoring Report section.

Vacuum sampling for dust mites was conducted in several locations due to management concerns about dust mite infestation. A review of the results indicates that an active mite infestation problem was not evident on the day of the consultation visit. Mold mites were found in four of the samples collected. Additionally, a great deal of mite fecal material was found on the sample collected from the upholstered chair located in the 14th Floor workstation.

Environmental sampling for molds and fungi was also conducted. Quantities of fungal spores were found to be higher outdoors than indoors in all of the sample locations. Certain species of mold were detected inside the building which were not detected in the outside sample, possibly suggesting that there may be a potential sources of fungal contamination in areas inside the building. The results are detailed in the Monitoring Report section.

## RECOMMENDATIONS

- The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) guideline #62-1989, entitled "Ventilation for Acceptable Indoor Air Quality" recommends that at least 20 cubic feet per minute per person of outdoor air be supplied to an office-type area. Damper settings should be checked and/or adjusted to allow for at least 20 cubic feet per person of outdoor

air. Management should ensure that outdoor air supply dampers and room air vents are maintained at the appropriate settings. It is also a good practice to provide additional dilution ventilation during renovation activities.

- Establish a preventive maintenance program for the ventilation system. Ensure that the fans are operating according to specifications and that filters are changed regularly. Use the most efficient filters that your ventilation system will allow.

- Since there have been problems with roof leaks and window leaks in the building, initiate a roof and window inspection, maintenance and repair program to prevent future water leakage. Conditions causing water leaks and moisture problems in the building should be corrected. Ensure that there is adequate drainage of the roof.

- Eliminate or control all known and potential sources of microbial contaminants by prompt cleanup and repair of all areas where water collection and leakage has occurred including floors, AC cooling coils and pans, reservoirs of stagnant water, and filters. Good ventilation practices can also help in preventing the build-up of biological particles.

- Remove and discard water damaged carpeting and other porous organic materials that may be contaminated (e.g. damp insulation, damp moldy wall plaster, etc.). They are potential reservoirs for microorganisms. Disinfection is rarely effective for porous material. Clean and disinfect non-porous surfaces where microbial growth has occurred with detergent, chlorine-generating slimicides or other biocides. Cleaning should always be done with adequate ventilation.

- Clean areas where mold mites or fecal material were found by using a vacuum cleaner equipped with a high-efficiency particulate air (HEPA) filter, by steam cleaning the carpeting and upholstered chairs, or by using a low toxicity miticide.

- Ensure good housekeeping practices are maintained in the building. Regular vacuum cleaning of carpets and upholstered furniture can help prevent the accumulation of dust on surfaces. Also, adequate ventilation should be maintained in the building.

## DISCUSSION - Facility Walk-through

An on-site industrial hygiene consultation visit was made in response to a request from the business manager of the Department of Revenue Services to evaluate employee exposure to the possible presence of dust mites and biological contaminants in the workplace. The three specific areas of concern were the Public Services Unit on the 17th Floor, the Income Tax Compliance Unit on the 17th Floor, and one workstation located in a corner of the 14th Floor.

The agency occupies a fourteen-story building constructed of concrete, brick, and masonry. The agency has occupied this location since 1994.

Workstations were located in cubicles with partitions. Most of the workstations consisted of a desk, an upholstered chair, and general office equipment. Flooring in the office spaces consisted of carpeting, the ceiling was composed of ceiling tiles, and the walls were constructed of masonry and wallboard.

The building has had recurrent water leaks for several years. There have been both roof leaks and window leaks. Some of the perimeter walls have had water damage. Carpeting in some areas has also been wet. A roof coping project was conducted to correct the primary cause of the water leaks. This consultant was informed that the project has been completed.

At the closing conference, the Recommendations and Monitoring Data sections of this report were discussed with the director of finance and operations. Abatement dates for the alleged serious violations were also discussed and agreed upon.

## NOTICE OF OBLIGATION

As you know, we are required to notify the State of Connecticut, Department of Labor, Division of Occupational Safety and Health (enforcement branch of CONN-OSHA) if serious hazards are not corrected within the agreed-upon time. Extensions may be granted if you encounter difficulties completing correction within these time frames, but we must receive your request for an extension in writing before the correction due date.

The following information is required when an extension is requested:

1. The item number(s) for which an extension is desired.
2. Identify all steps taken to achieve compliance during the agreed upon abatement period, including the date(s) of these steps.
3. The additional abatement time necessary in order to achieve compliance.
4. The reasons why an extension is necessary (unavailability of material, equipment, help, etc.).
5. Identify all available interim or temporary measures being taken to safeguard employees from the hazards.
6. Any additional information you believe may be helpful to this office in considering your request for an extension.

(A Request for Extension form has been enclosed for your convenience.)

Although we are not required to notify CONN-OSHA enforcement branch if other-than-serious hazards are not corrected, these hazards could result in injury to your employees. Moreover, your company would be subject to citations for them in the event of a CONN-OSHA enforcement inspection.

Please inform this office of the corrective steps you have taken and of their dates, together with adequate supporting documentation, e.g., drawings or photographs of corrected conditions, purchase/work orders related to abatement actions, air sampling results, etc.

**It imperative that the appropriate corrective actions are taken to eliminate employee exposure to safety and/or health hazards and that this office receive the above required information.**

Please mail or FAX attachment B - Employer Report of Action Taken, completed to show corrective actions taken, along with the requested documentation. Our FAX number is: (860) 566-6916.

In the event of a CONN-OSHA enforcement inspection, it is important to remember that the Compliance Officer is not legally bound by the consultant's advice or by the consultant's failure to point out a specific hazard. You may, but are not required to, furnish a copy of this report to the Compliance Officer, who may use it to determine your good faith efforts toward safety and health and reduce any proposed penalties. You are, however, required to furnish any employee exposure data from this report as required by 31-372-101- 1910.1020.

Savita Trivedi, Occupational Hygienist

# Attachments

## A - Safety and Health Hazards Found

Each hazard identified during this consultation is categorized and described, and recommendations are given for its correction. Hazards are in order of standard number within categories, not necessarily in order of importance.

Hazards could be in any of the following categories:

IMMINENT DANGERS are hazards that can reasonably be expected to cause death or serious physical harm immediately or before this written report is received. Any such hazards would have been corrected immediately, and no correction dates or space for correction method would appear in A - Report of Hazards Found.

SERIOUS HAZARDS can cause an accident or health hazard exposure resulting in death or serious physical harm. Each such hazard has been assigned a mutually agreed-upon date by which correction is to be completed.

OTHER-THAN-SERIOUS HAZARDS lack the potential for causing serious physical harm, but could have a direct impact on employee safety and health. We encourage you to correct these hazards and notify us of the action taken.

REGULATORY HAZARDS reflect violations of CONN-OSHA posting requirements, recordkeeping requirements, and reporting requirements as found in 29 CFR 1903 and 1904 and adopted by the State of Connecticut. No abatement dates have been set, but we request notification of their correction.

| | | | | | |
|---|---|---|---|---|---|
| Item Number | 1 | Instance | A | Correction Due Date | May 15, 2000 |
| Hazards Type | Serious | | | | |

Condition: A place of employment was not kept clean to the extent that the nature of the work allowed. A great deal of mite fecal material was found on a sample collected from the upholstered chair located in a 14th Floor workstation.

Location: 14th Floor - Penny Ross's Cubicle

Potential Effects: Asthma, rhinitis, and/or atopic dermatitis from exposure to mite allergens.

Standard: 29 CFR 1910.141(a)(3)(i)

Recommended Action: Clean the upholstered chair and surrounding area by using a vacuum cleaner equipped with a high-efficiency particulate air (HEPA) filter, by steam cleaning the carpeting and upholstered chair, or by using a low toxicity miticide.

# B - Employer Report of Action Taken

From: **Department of Revenue Services**
**25 Sigourney Street**
**Hartford, CT 06106**

Consultant: Savita Trivedi

Visit Number: **501578231**

Date of Survey: **1/12/00**

| Item Number | 1 | Hazard Type | Serious | Standard | 1910.141(a)(3)(i) |
|---|---|---|---|---|---|
| Instance | A | Correction Due Date | May 15, 2000 | Date Corrected | |
| Describe Corrective Action Taken | | | | | |
| | | | | | |
| Action Taken to Prevent Recurrence | | | | | |
| | | | | | |

## C - Safety and Health Program Management

The following are the basic elements of an effective employee safety and health program.

- MANAGEMENT LEADERSHIP AND EMPLOYEE INVOLVEMENT assigns safety and health responsibility and authority to supervisors and employees and hold them accountable. It includes policy formulation; program review; and encouragement of employee involvement.

- WORKSITE ANALYSIS identifies current and potential hazards. It includes a thorough baseline survey, to review work processes and individual potential hazards; management of change (to deal with facilities; equipment; and the physical, economic and regulatory environment); job hazard analysis (written safe operating procedures for major tasks); a self-inspection program, using checklists to determine whether facilities and equipment are hazardous, and pairing inspectors to facilitate employee training and participation and to increase the possibility that new observers will find overlooked conditions; a system for reporting hazards; accident and incident investigation; and analysis of injuries and illnesses.

- HAZARD PREVENTION AND CONTROL. Prevention consists of regular maintenance and housekeeping; emergency planning and preparation; first aid; ready access to emergency care; when required, medical surveillance; and, at the employer's option preventive healthcare (e.g., group health insurance, smoking cessation, and wellness programs). Control includes guards, enclosures, locks, protective equipment, safe work procedures (the result of job hazard analysis), and administrative placement of personnel so as to minimize hazards.

- TRAINING of all personnel, from managers through supervisors to employees, about the hazards they may be exposed to, and their identification, prevention, and control. Managers and supervisors also need training in program management (e.g., enforcing rules, conducting drills). Training can demonstrate management leadership and facilitate employee involvement.

In assessing program effectiveness, a consultant looks first at written materials (e.g., statement of purpose, goals and objectives, emergency plan) for clarity, completeness, and currency, then for evidence that the written materials have been effectively implemented.

### Safety and Health Program Management, with Employee Involvement

A safe and healthful workplace depends on effective management, to involve line workers, supervisors and managers in ensuring that hazards are identified and that effective physical and administrative protections are established and maintained.

The following observations page may help you avoid the recurrence of the hazards and other findings noted during the survey, and prevent the occurrence of other hazards.

## D - Training Provided by Consultant

The consultant provided informal training for management and staff regarding indoor air quality. The CONN-OSHA Air Contaminants Standard, 1910.1000; the guideline developed by the American Society of Heating, Refrigerating, Air-Conditioning Engineers, Inc. (ASHRAE) entitled "Ventilation for Acceptable Indoor Air Quality, ASHRAE 62-1989"; and the guideline produced by the National Institute for Occupational Safety and Health (NIOSH) entitled "Guidance for Indoor Air Quality Investigations" were discussed. The guidelines discuss methods used to evaluate general ventilation in the workplace, detail the recommended quantity of fresh air which should be supplied to various facilities, and identify potential air contaminants which could be found in indoor environments. A brief discussion regarding dust mites was also conducted. Symptoms associated with dust mite allergies were discussed.

# E - Monitoring Report

On January 12, 2000, carbon dioxide readings were taken in the three identified locations to evaluate whether adequate quantities of fresh outdoor air were being introduced into the building. A "TSI Q-Trak IAQ Monitor, Model 8551" was used to evaluate temperature, relative humidity, carbon monoxide, and carbon dioxide levels in those areas. The $CO_2$/CO Analyzer was calibrated before and after use with 1000 parts per million (ppm) $CO_2$ and 100 ppm CO span gases respectively.

Results of carbon dioxide, carbon monoxide, temperature, and relative humidity readings taken in those locations are summarized in Table I.

Table I. Carbon Dioxide, Carbon Monoxide, Temperature, & Relative Humidity Air Sampling Results
Approximately 3 Feet Above Floor Level

| Location of Reading | Time | Carbon Dioxide (ppm[1]) | Carbon Monoxide (ppm) | Temperature (°F) | Relative Humidity (%) |
|---|---|---|---|---|---|
| Outdoor Ambient | 1:45 pm | 397 | 0 | 46.8 | 25.8 |
| 17th Floor Public Services Unit | 10:20 am | 738 | 0 | 74.5 | 25.0 |
| 17th Floor Income Tax Compliance | 12:55 pm | 658 | 0 | 72.8 | 23.1 |
| 14th Floor Penny Ross's Cubicle | 1:15 pm | 626 | 0 | 75.1 | 21.4 |

(1) = parts per million parts of air

The carbon monoxide and carbon dioxide results indicated in Table I are below the respective permissible exposure limits of 35 ppm and 10,000 ppm as 8-hour time weighted averages established in Conn-OSHA Standard 1910.1000.

The following rationale explains why carbon dioxide gas concentrations were monitored to help evaluate indoor air quality. It is excerpted from Guidelines for Indoor Air Quality, published by the National Institute for Occupational Safety and Health (NIOSH):

> Carbon dioxide ($CO_2$) is a normal constituent of exhaled breath and, if monitored, can be used as a screening technique to evaluate whether adequate quantities of fresh outdoor air are being introduced into a building or work area. The outdoor, ambient concentration of $CO_2$ is normally 250-350 ppm. Usually the $CO_2$ level is higher inside than outside, even in buildings with few complaints about indoor air quality. However, if indoor $CO_2$ concentrations are more than 1,000 ppm (3 to 4 times the outside level), there is probably a problem of inadequate ventilation and complaints such as headaches, fatigue, and eye and throat irritation are frequently found to be prevalent. The $CO_2$ concentration itself is not responsible for the complaints. However, a high concentration of $CO_2$ may indicate that other contaminants in the building may also be increased and could be responsible for occupant complaints.

On the day of the consultation visit, carbon dioxide levels were found to be below 1000 ppm, the level below which the comfort criteria is likely to be satisfied.

On January 12, 2000, samples for dust mite were collected from several locations due to management concerns about dust mite infestation. Samples were collected on paper filters using 2 minute vacuum sampling. A "Nilfisk GS 80" vacuum cleaner equipped with a high efficiency particulate air (HEPA) filter was used for sample collection. Vacuum samples were collected from upholstered chairs and/or carpeting in each sample location. The samples were sent to the Entomology Division of the Connecticut Agricultural Experiment Station for analysis. Results of the analysis are listed in Table II.

A review of Table II indicates that an active mite infestation problem was not evident in the locations sampled on the day of the consultation. However, mold mites were found in four of the samples collected and a great deal of mite fecal material was found on the sample collected from the upholstered chair located in the 14th Floor workstation. The fecal material collected could not be attributed to any specific mite species.

A major source of mite allergens is the mite feces which can elicit an allergic response in certain individuals. Symptoms associated with mite allergy include rhinitis, atopic dermatitis, and asthma.

Mold mites are mites that live on mold. They tend to be found in wet areas and on fungal material. *Tyrophagus putrescentiae* belongs to the order Astigmata in the subclass Acari. As is the case with most acarid mites, its development takes place most readily when the water content in the air is high. *Tyrophagus putrescentiae* has been known as a pest of fungal cultures. Studies have reported it as rearing on Aspergillus species. Studies have also shown that it can complete its development on species of mold belonging to the genera Eurotium and Penicillium.

Table II. Dust Mite Speciation and Quantitation

| Sampling Location | Identification Results |
|---|---|
| 17th Floor<br>Public Services Unit<br>Tammy OMary's Cubicle<br>Upholstered Chair | mold mite<br>Acaridae: Acari<br>*Tyrophagus putrescentiae*<br>1 female |
| 17th Floor<br>Public Services Unit<br>Tammy OMary's Cubicle<br>Carpeting | mold mite<br>Acaridae: Acari<br>*Tyrophagus putrescentiae*<br>1 male |
| 17th Floor<br>Public Services Unit<br>Vickey Marshall's<br>Upholstered Chair & Floor | no arthropod found |
| 17th Floor<br>Public Services Unit<br>James Schweppe's Office<br>Upholstered Chair | no arthropod found |
| 17th Floor<br>Income Tax Compliance<br>John Hutcheson's Cubicle<br>Upholstered Chair | no arthropod found |
| 17th Floor<br>Income Tax Compliance<br>Ana Donate's Cubicle<br>Upholstered Chair | mite[1] |
| 17th Floor<br>Income Tax Compliance<br>Pamela Thomson's Cubicle<br>Upholstered Chair | no arthropod found |
| 14th Floor<br>Penny Ross's Cubicle<br>Upholstered Chair | mite fecal material<br>(a great deal of fecal material) |
| 14th Floor<br>Penny Ross's Cubicle<br>Carpeting | mold mite<br>Acaridae: Acari<br>*Tyrophagus putrescentiae*<br>1 female |

[1] poor conditions of the sample did not allow for speciation of the mite

On January 12, 2000 biological sampling was performed for molds and fungi due to management concerns about mold spores, fungi and mildew. General environmental air sampling was performed using a "Graseby-Andersen Model 10-709 N-6 1AFCM" single stage viable impactor sampler at an approximate air flow rate of one cubic foot of air per minute onto a standard petri dish filled with "Sabouraud's Dextrose Agar" for three minutes. The samples were sent to the State of Connecticut Department of Health, Mycology Section for analysis. Analysis was performed by enumeration and classification of the incubated colonies. Biological materials which are unable to produce identifiable colonies and/or spores are counted and included as either non-septate hyphae or as Mycelia sterilia. Analysis is expressed as colony forming units per cubic meter of air (CFU/M3). Results of the sampling are listed in Table III.

Table III. Fungal Speciation and Quantitation

| Sampling Location | Total Colony Forming Units per Cubic Meter of Air (CFU/M3) | Type & Number of Colony Forming Units per Cubic Meter of Air (CFU/M3) |
|---|---|---|
| Outdoor Ambient | 140 | 58 Cladosporium Species<br>47 Mycelia Sterilia<br>35 Penicillium Species |
| 17th Floor<br>Public Services Unit | 35 | 23 Rhodotorula Species<br>12 Triterachium Species |
| 17th Floor<br>Income Tax Compliance | 12 | 12 Rhodotorula Species |
| 14th Floor<br>Penny Ross's Cubicle | Negative for Fungus Elements | No Pathogenic Fungi Found |

According to "OSHA Instruction TED-1.15", outdoor spore levels may range from 1000-100,000 colony forming units per cubic meter of air (CFU/M3). Contamination indicators are 1000 viable CFU/M3, 1,000,000 fungi per gram of dust or material, or 100,000 bacteria or fungi per milliliter of stagnant water or slime. Levels in excess of the above do not necessarily imply that conditions are unsafe or hazardous. Rather it is the types and concentrations of airborne microorganisms which will determine the hazard to employees. Many variables affect microbial concentrations in indoor air. It should always be kept in mind that air sampling for fungi in itself may not be used to predict potential adverse health responses in an indoor environment. It is usually much easier to carry out remedial actions than to prove that a microbial agent may be responsible for a building-related illness.

A review of Table III. indicates that quantities of fungal spores were found to be higher outdoors than in the indoor sample locations. However, certain species of mold were detected inside the building which were not detected in the outside sample, possibly suggesting that there may be potential sources of fungal contamination in areas inside the building.

Spores of fungi are almost always present; however, the types and quantities of fungi vary with the time of day, weather, season, and geographical location. Typically, the quantities of fungal spores will be greater outdoors than indoors, if there is no source for fungal growth in a building. Although, similar types of fungi are found indoors as are found outdoors.

In a review article published in "Allergy" in 1979, by Susan Gravesen, she states that "spores can deposit on allergic mucosa and release symptoms or can sediment indoors with dust on places such as moist basements, poorly ventilated rooms, or window frames with condensed water." The most important allergen sources are found among the saprophytic fungi (e.g. Cladosporium, Alternaria and Aspergillus). Gravesen also states that "two common molds, Alternaria and Cladosporium, regarded as allergenic fungi, evoke allergic symptoms at estimated concentrations of 100 CFU/M3 of Alternaria spores and 300 CFU/M3 of Cladosporium spores in air."

According to the book entitled "Mould Allergy", authored by Yousef Al-Doory, the mold genera that most often produce hypersensitivity skin test reactions in allergic individuals include Alternaria, Cladosporium, Helminthosporium, Fusarium, Penicillium, Phoma, Aspergillus, Rhizopus and Mucor. Other members of Aureobasidium, fungal classes such as the Basidiomycetes, are being investigated as possible causes of fungal allergy in humans. Al-Doory also states that "Most airborne fungi are found as spores and a few as hyphal fragments. The most common airborne fungi belong to the genera Cladosporium, Alternaria, Aspergillus, Penicillium, Helminthosporium, Aureobasidium, Phoma, Nigrospora, Rhizopus, Mucor, Epicoccum, Stemphylium, Curvularia, Fusarium, Scopulariopsis, Chaetomium, Trichoderma, Streptomyces, Candida, Cryptococcus, and Rhodotorula, as well as rusts, smuts, and hyphal fragments that could belong to mycelia sterila, or other sporulating fungi."

The book entitled "Indoor Air Quality" edited by Philip J. Walsh, Ph.D. et. al, states that "Cladosporium species are by far the taxa most frequently recovered both outdoors and in domestic and other "clean" interiors during the summer in the U.S., Europe and Asia, but are always more abundant outdoors than indoors. Penicillium isolations usually dominate wintertime U.S. collections and are often considered an "indoor" fungus group, often being more abundant indoors than out. Form species of Alternaria were the most frequent indoor fungi during summer in two southwestern U.S. studies. Aspergillus isolations have predominated in only two studies, one in Taiwan and one in the U.K. However, the aspergilli are considered one of the most common groups of "indoor" fungi."

Overt contamination of domestic interiors commonly occurs when outdoor fungi flourish on indoor substrates. Water disasters may often produce abundant mold growth inside buildings and elevate spore levels. Organic material may support mold growth when moist. Damp walls may also have Cladosporium and Aureobasidium, while wet leather, cotton and paper may be covered with Penicillium and/or Aspergillus spores. Fire proofing materials, furniture, carpets and stored organic items all are foci for mold contamination. Repair work may increase spore levels (as a result of dust dispersion). House plants have also been suspected for sources of Aspergillus fumigatus. Moldy hay, when shaken, may produce large quantities of spores of Aspergillus, Penicillium and Mucor species.

Cladosporium is ubiquitous and is most frequently encountered in close proximity to beech trees, soil, paints, window frames and low drainage environments. Alternaria is often found growing with Cladosporium, and is found to release spores in dry air. Certain species of Alternaria and Cladosporium have been identified as causes of allergic rhinitis and asthma.

Penicillium may be found on almost all organic materials.

Rhodotorula is commonly found in surveys for airborne fungi and prefers moist locations such as cold mist vaporizers. Trirerachium is another mitosporic fungi.