



**INDOOR AIR QUALITY
INVESTIGATIVE SERVICES**

Commercial Indoor Air Assessment Report

For Flagler Sheriff's Office
901 E. Moody Blvd.
Bunnell FL.

Date: December 12, 2017



Note: This report is not a protocol report for remediation. A separate protocol report can be obtained on request once it is determined that it is required.

Board Certified Indoor Environmentalist Consultant, ACAC
Board Certified Master Inspector, Internachi
Certified Indoor Air Quality Specialist, ESA, IEAQC & Internachi
Certified Allergen Specialist, ESA
Certified FLIR Thermographer, Level 1
Certified Ventilation Inspector, NADCA
Mold Assessor, License No. MRSA-420, Florida Department of Business &
Professional Regulation
Licensed Home Inspector, HI-213



H2H INDOOR AIR SOLUTIONS, LLC

Date: December 12, 2017

Richard J Van Dort
President-H2H Indoor Air Solutions, LLC

Dear Mr.Dickson,

Thank you for placing your confidence in H2H Indoor Air Solutions. Please note your job number and the accompanying services we have provided in this report. This report is the result of a walk through, visual survey and an on-site measurement of the parameters described in this report. The results only apply to those rooms or spaces that were tested and that are specifically described during the course of this assessment. Information provided in this document is provided 'as is' without warranty of any kind, either expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.

Facility Code:

- F1: Empty dwelling
- F2: Occupied commercial office dwelling
- F3: Occupied commercial hotel
- F4: Occupied commercial condominium
- F5: Occupied medical facility

Scope:

H2H Assurance Services, hereby called H2H, is pleased to submit this Indoor Air Assessment Report for the above referenced location. The objective was to determine if significant air contaminants were present at the property. Based on our visual observations, measurements conducted, test samples taken (if deemed necessary), and the report from an accredited lab this report (if taken) will identify the necessity for H2H to recommend remediation or equipment to neutralize any issues discovered.

Table of Contents

Sections:

- I. **Site Observations**
 - a. Clients area of concern
 - b. Specific site observations
- II. **Understanding Indoor Air Issues & testing performed in this report**
- III. **Equipment specifications and use on job**
- IV. **Testing Definitions & Onsite Measurements Results**
- V. **Air Particulate Matter**
- VI. **Mold:**
 - a. Understanding Mold and Mold spores
 - b. How testing is normally performed
 - c. Lab Report Interpretation, genus testing results from lab.
 - d. Interpreting genus mold levels & the effect they may produce
 - e. ATP Testing, onsite testing
 - f. PCR/DNA species testing & report
 - g. Mycotoxin testing & report
 - h. Standard mold spores & the effect they may produce
 - i. Your health
- VII. **HVAC System**
 - a. Pictures
 - b. Filtration
- VIII. **Combustion Gas Byproducts**
- IX. **Indoor Air Pollutants (VOC'S)**
- X. **Indoor Allergens** (From vacuum samples)
- XI. **Conclusion**
 - j. Investigation
 - k. Limitations
 - l. Immediacy & Occupancy of Property
- XII. **Inspection Agreement**

I. Site Observations

Weather at the time of inspection:

Temperature: < 70 F >70F >80F >90F

Humidity: <60% >60% >65% >70% >75% >80% >85%

Dew Point Temperature: <60F >60F >65F >70F >75F >80F

a. Clients Areas of Concern:

The current building was renovated 2 years ago. The building was taken down to the structural members. An older building next store remained and was removed less than a year ago. Both buildings had reported bat problems. The room in question is room 129. Three inhabitants out of 7 of this room are experiencing skin rashes. All three have been to Doctors and the general consensus is that they are experiencing an allergic reaction. The other inhabitants have not had a problem. Sgt. Taylor was first to have an issue. In an interview she mentioned she did not have a problem before she moved into her office. She has recently moved out of the space but has not gotten any better. She did have a extended period when she went away on a conference for the duration of about a week and got better. Det. Annie Concord was next to experience a rash about a month after Sgt. Taylor. She also has a respiratory issue as well. Finally Nicole Thomas also developed a rash and has the problem about 3-4 weeks prior to this interview.

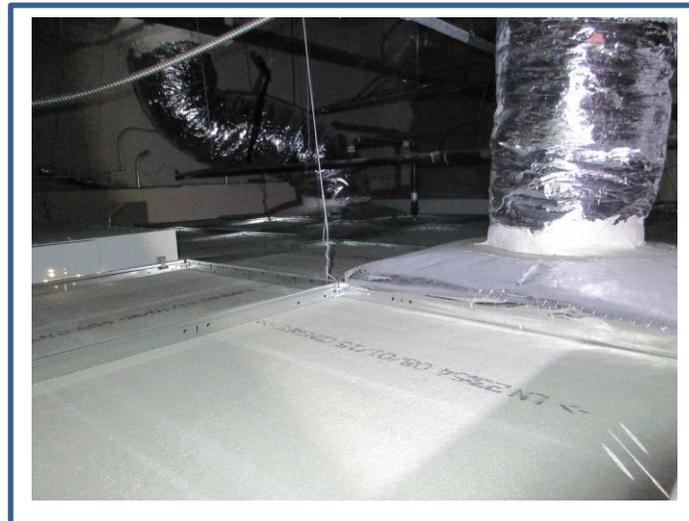
H2H formulated a testing protocol to include visual investigation and air and surface testing to identify the air quality in the room. In addition the IT room was tested to use it as a control since both rooms have their air supplied by AHU-2. AH2 will also be inspected for the proper operation.

b. Specific Site Observations:

Pictures:



Comment: Room 129 on the surface was clean with no visual evidence of any unusual bio evidence.



Comment: The area above the drop ceiling was clean and not reveal any abnormalities.



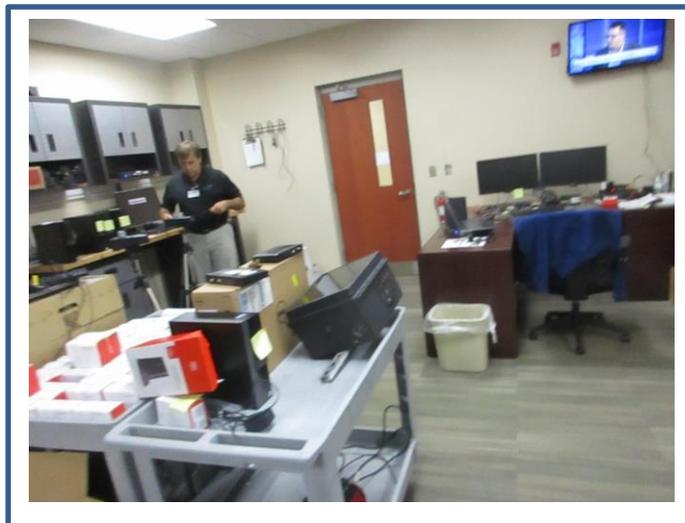
Comment: The VAV box was seal and was in good conditon



Comment: The pressure in the room was neutral



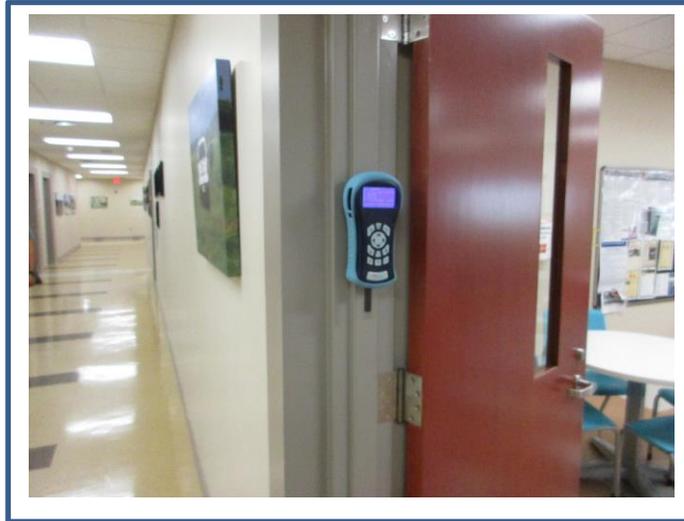
Comment: The Co2 was a little high with no one in the room. Temperature was 67 F, RH% was in normal range at 60% and the dew point temperature was acceptable t 52.7F. The formaldehyde levels were acceptable at 126 parts per billion.



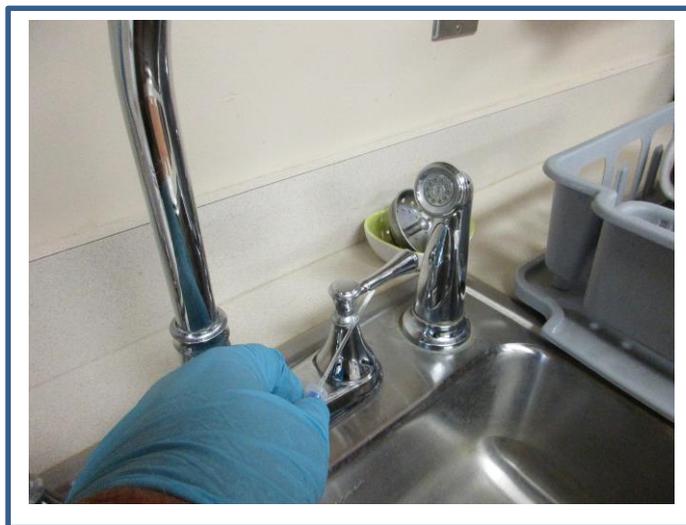
Comment: The IT room was used a control comparison. The Co2 was higher at 945 ppm because there were 3 individuals in the space at the time of testing. (See later comments on fresh air intake) Temperature was 71 F and the RH% was 56.8 with the Dew point at 52.9F. All within normal ranges. The formaldehyde was considerably lower at 65 ppb.



Readings in the IT room



Comment: The hallway outside the break room showed Co2 levels slightly lower than 129 with simliar temperatures, RH% and dew point levels. The formaldehyde levels were equal to the It room.



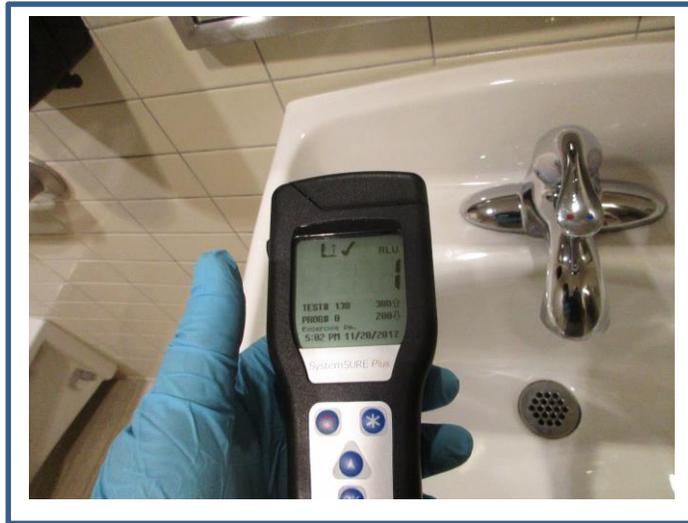
Comment: An ATP bacteria test was performed. In areas in and around the sink.



Comment: An acceptable level should be at 100 RLU's or lower. This area failed at 296 which is unclean



Comment: The womans room was also tested with the ATP.



Comment: The womans room tested at 0-1 which is clean



Comment: A borescope was used to inspect the wall cavity in 129. It was very hard to see any issues but we did note the wall is well insulated and it is block with and outside EIFS covering.



Comment: The overall building was tested for pressure by the sheriffs office.



Comment: The building is slightly positive but well under the specified range of .5" w.c.

II. Understanding Indoor Issues

- a. **Indoor Science:** The study of indoor air quality is a relatively new phenomenon. It has come to light as more is known about how outdoor air pollution affects the human condition. Indoor air actually can have a significant affect as most people spend more time indoors than outdoors. It is a complex study because of the numerous variables that enter into the equation. The World Health Organization estimated that more than 30 percent of commercial buildings have significant problems. Unfortunately there is not a tremendous amount of data available for indoor air issues. One of the best sources is the EPA.

Adverse conditions can cause not only health issues but it can impact productivity and building maintenance costs. Because everyone's immune system is different the indoor air quality can affect everyone in a unique way. It is difficult to assign standards or even guidelines to set acceptable versus unacceptable levels of pollutants in the house or workplace.

- b. **Odor Investigations:** Nuisance odors are a complex subjective issue. A person's perception of odor is related to the human olfactory system. To confuse the issue, there is a distinct lack of odor regulations, and those are very vague. The EPA defaults to the state level for nuisance odors, and most states defer to the country or local level.

Testing can consist of several different methods. Unfortunately there is not one definitive test that handles everything.

- c. **Testing done in this report:** (T.A.T means turnaround time from lab only, H2H reports normally 1-2 days after depending on complexity.)

☒ **Temperature, humidity and moisture:** Tests onsite conditions that are conducive to mold problems.

☒ **Room Air Summary:** Test indoor space for hourly and total air supply.

☒ **Air Particulate matter:** Test indoor quality vs. outdoor air for particles, on site testing performed.

III. Mold & VOC Testing:

Testing done in this report: Denotes testing performed; Testing is done in accordance of ASTM D7338-4; Standard Guide for Assessment of Fungal Growth in Buildings. In regards to water intrusion we follow ASTM E2128 Guide for evaluating water leakage of building walls.

Temperature, humidity and moisture: Tests onsite conditions that are conducive to mold problems.

Mold Testing: (T.A.T means turnaround time from lab only, H2H reports are normally 1-2 days after lab testing depending on complexity.)

Definition: Currently there are no generally accepted guidelines for fungi levels at the state or federal level. Therefore utilizing a comparison to the outdoor samples, the current condition of the affected area and previous experiences are used to draw an educated conclusion as to whether the area will be deemed necessary for remediation. Concentrations higher than the outdoors suggest a fungal excess exists indoor therefore is contributing to exasperate the problem.

Below are various kinds of testing that can be performed. The checked box are/is the one performed in this report.

1. **None-viable Genus Testing:** Identifies general level of mold, air test performed. This test which does not identify whether the mold is alive or dead. 95% of the time non-viable testing is done. This identifies the genus of the mold not the species. Genus testing identifies the “general” level of many types of mold. It does not test whether the mold is living or not. In most cases this is all that is required unless an individual knows they are susceptible to a particular species of mold then finding the species may be an important element of the test. This testing can test up to 3 cubic meters of air which generally is one room. It normally takes 5-10 minutes to do each individual test. **T.A.T verbally next day as long as the next mailer has delivered the package.**

☒ Direct surface test: Done with swab and or tape, this is a non-viable test which does not identify whether the mold is alive or dead. This test will identify the type of fungi is present so we can see if spores have been generated into the air with the Aerosol test.

- Swabs are used to when there is a visual presence of a fungi substance. It is done to identify the type of mold which in this case is usually the initial source of contamination. They are used on rougher surfaces and are generally sampled in a ½" x ½" area.
- Tape samples as swab samples are used to when there is a visual presence of a fungi substance. They are used on smoother surfaces and have a pre-designed surface area.

☒ Aerosol (Air) test: Bio-Aerosols samples are procured by the use a sampling pump and a slit impactor cassette (**Allergenco-D**) or a **VIA cassette** which contains a sticky material which traps the particulates in the air. We normally always take an Outside sample to use as a baseline against the possible contaminated room. When possible we also can take an inside non-contaminate room as a baseline as well. All samples are taken at 15 L of air for 5-30 minutes. They are immediately bagged and sent with a specific "chain of custody" for the lab to evaluate. The lab reads 100% of the slide. If spores counts on the slide are high the lab may have to estimate the spore count. Please read section IV, Interpreting Mold levels as a guide to understanding the spore counts in the lab result in Section VII. Air tests are used so a comparison clearance test can be taken to evaluate the success of the remediation. They are also used when there is no visual mold seen.

☒ VOC's (volatile organic compounds): This testing is for odors produced by chemicals that are emitted from generally building materials but can be from other sources as well. Testing equipment like TO-15, TO17 etc. can be used to identify the chemical that is producing these odors. Experience then will identify what could be causing that overage in chemical which is producing the problem.

Specific gas testing:

- Carbon dioxide**, on site test.

- Formaldehyde testing**, on site testing. (Lab testing available)

Allergen Testing

- General allergen group testing** (Cat, dog, cockroach, dust mites), normally 3 day T.A.T plus shipping.

- Indoor allergen, rats.** Normally 3 day T.A.T plus shipping

IV. Equipment Specifications and use on job: (note: equipment can vary by +/- 5% per manufacturer)

- Thermal imaging camera. Flir T360 Thermal Imaging Infrared Camera High-Temperature (320 x 240 IR Resolution) with Thermal Fusion
- Extech MO297: Pinless Moisture Psychrometer with IR Thermometer and Bluetooth for moisture, humidity, dew point and temperature testing
- Delmhorst Navigator Pro Moisture Mapping Meter, moisture, humidity, dew point and temperature testing
- MeterLink™, 8-in-1 Meter with Memory, Built-in IR Thermometer with Wireless
- Zefon Bio Pump Plus w/ Allergenco-D Posi-Tack Full Slide for 100% collection efficiency for air spore trap testing.
- Swab and or tape lift was performed because mold was seen.
- Smoke test to check for negative, neutral or positive air flow
- Outlet air check
- Kanomax Model 3887 Laser Particle Counter
- Tenma 72-10190 Particle Tester
- AQPro multi gas tester for VOC, carbon dioxide and formaldehyde testing
- TPI 775 for carbon monoxide & gas testing
- Prism analytical low flow pump of MVOC testing
- Borescope for cavity camera testing ABM-200 Air Flow & Environmental Meter

V. Testing Definitions & Onsite Measurement Results:

a. Temperature/Humidity (See table for onsite specific readings)

- i. Definition: Humidity levels are recommended to be below 60% on the inside of the house. Per the EPA the maximum humidity should be no more 60%. The Grams per pound (how dew Point is measured) should be no more than 90.
- ii. Dew Point: The dew point temperature is the temperature at which the air can no longer hold all of its water vapor, and some of the water vapor must condense into liquid water. The dew point is always lower than (or equal to) the air temperature. If the air temperature cools to the dew point, or if the dew point rises to equal the air temperature, then dew, fog or clouds begin to form. At this point where the dew point temperature equals the air temperature, the relative humidity is 100%. If there is then further cooling of the air, more water vapor must condense out as even more dew, fog, or cloud, so that the dew point temperature then falls along with the air temperature.

While relative humidity is (as its name suggests) a *relative* measure of how humid the air is, the dew point temperature is an *absolute* measure of how much water vapor is in the air. In very warm, humid conditions, the dew point temperature often reaches 75 to 77 degrees F, and sometimes exceeds 80 degrees. No matter how hot the temperature gets, a dew point temperature of (say) 75 deg. F always represents the same amount of water vapor in the air.

Per the EPA the maximum humidity should be no more 60%. The Grams per pound (how Dew Point is measured) should be no more than 90.

VI. Onsite Measurement Results: (Based on an Extech MO-297 meter)

	Temp F	Humidity %	Dew Pt. F	Condensation Outer wall	Average Wall Moisture	Average Ceiling Moisture	Average Floor Moisture	Identify Problem Area (If it exists)
		Above 60% can promote mold growth	Above 65 F can promote moisture	<5 degrees can be an issue	> 20% can be an issue	> 20% can be an issue	% Depends on material	
Room 129	67	60%	52.7F	13	7-9%	3-4%	9-10	
IT Room	69	56.8	52.9	13	8-9%	3-5%	11	

Condensation:

Condensation is the accumulation of liquid water on relatively cold surfaces. Almost all air contains water vapor, the gas phase of water composed of tiny water droplets. The molecules in the warm air are far apart from one another and allow the containment of a relatively large quantities of water vapor. As air cools, its molecules get closer together and squeeze the tiny vapor droplets closer together, as well. A critical temperature, known as the dew point, exists where these water droplets will be forced so close together that they merge into a visible liquid in a process called condensation.

Condensation Indicator is the temperature difference between the surface tested and the dew point temperature. If the number is greater than 7 the surface is **acceptable**. 5-7 the surface is reaching an **elevated**. Less than 5 the surface has **excessive** moisture.

- a. **Water & Moisture** (See table for specific onsite readings)

Definition: Moisture readings were taken on the surface as well as below the surface with a pin adapter to the meter described above.



Normal readings for sheetrock range:

- a. Extech meter: Internal and external meter from a low of less than 1% up to 16%. Normally when readings are higher than 16% the sheetrock has been compromised and is saturated with moisture to a degree.
- b. Navigator Pro (uses a deep pin system) Reading below .5 are generally acceptable. Readings at .75 are moderately wet and readings over 1.0 are wet.
- c. Condensation (See table on page 9 for specific on site readings)

Definition: The temperature differential between the surface temperature of building product and the dew point of the air. Controlling humidity and maintaining dew temperatures at least 5 degrees lower than the coolest surface is the only practical and effective solution to eliminate CMG, condensation mold growth.

VII. Air Particulate Matter

Definition: Particulate matter affects more people than any other pollutant. It consists of a complex mixture of solid and liquid particles of organic and inorganic substances suspended in the air. The particles are often identified according to their aerodynamic diameter. Comparing indoor particle counts or particle mass concentration to outdoor concentration provides information regarding the effectiveness of filtration, as well as for the potential that there are indoor sources contributing to airborne particulate matter. Many investigators have developed experience with elevated particle counts in specific particle size ranges to provide additional clues towards determining the potential sources of these particles.

EPA Research on PM*

EPA accelerated its investigations of fine particulate matter (PM_{2.5}) in 1998 to improve understanding of the potential health effects of the small particles in the outside air and to find ways to reduce risks from the air pollutant. Studies at that time had provided compelling evidence that air pollution particles were responsible for thousands of deaths and hospitalizations, as well as substantial loss of work and school days.

Research has since confirmed the links between exposure to PM_{2.5} and increases in respiratory health problems, hospitalizations and premature death. EPA's PM research also has affirmed the need for air quality standards to reduce PM in the air to protect human health. However, many questions remain about particles and why they are associated with such significant health effects.

Human Health Effects*

Inhalable particles, particularly fine particles, have the greatest demonstrated impact on human health. Their small size allows them to get deep into the lungs and from there they can reach or trigger inflammation in the lung, blood vessels or the heart, and perhaps other organs. Studies have linked PM exposure to health problems such as:

- Irritation of the airways, coughing, and difficulty breathing
- Reduced lung function
- Aggravated asthma
- Chronic bronchitis
- Irregular heartbeat
- Nonfatal heart attacks
- Some cancers

Research has found that certain populations are more vulnerable to these health effects, such as people with pre-existing heart or lung diseases, children, and older adults.

Types of PM*

Although it can be categorized in a number of ways, PM has traditionally been classified by size. In general, the smaller the particle, the stronger its potential impact on human health because it can be more easily inhaled. For this reason, EPA monitors and regulates particles in two size categories depending on their predicted penetration into the lung. These categories are:

Coarse particles (PM10)

Inhalable particles less than 10 micrometers (μm) in diameter used as a nominal surrogate for particles between 2.5 and 10 μm in diameter; found near roadways and dusty industries. Your nose can filter out 10 μm or larger.

Fine particles (PM2.5)

Inhalable particles less than 2.5 μm in diameter; generally found in smoke and haze, emitted from natural sources like forest fires and industrial combustion sources, or formed when gases react in the air. Ultrafine particles (PM0.1) are a subset of inhalable PM2.5 particles less than 0.1 μm in diameter. They are not specifically regulated but have a strong link to combustion and therefore are garnering special attention.

***Excerpt from <http://www.epa.gov/airscience/air-particulatematter.htm>**

Conclusion:

The inside air should be 75% less in fine particles inside the home vs. outside the home. H2H tests the outside and the inside air using a laser particle counter. We test on the CNT to get a comparison of .03/.05/5 micron sizes.

Particles at Site (um=microns)

This test is a comparison of the outside vs. problem area.

- Low:** <75% of outside reading
- Med.** 75%-125% of outside reading
- High:** >125% of outside reading

Location: Room 129

Particle Size	Unit measure	Outdoor Test	Low	Med.	High
.3 um	708	18400	x		
.5 um	197	1306	x		
5 um	10	14	x		

Location: IT

Particle Size	Unit measure	Outdoor Test	Low	Med.	High
.3 um	705	18400	x		
.5 um	225	1306	x		
5 um	5	14	x		

Location: Hallway

Particle Size	Unit measure	Outdoor Test	Low	Med.	High
.3 um	13,000	18400		x	
.5 um	800	1306	x		
5 um	8	14	x		

Levels observed using an IQ Air Purifier, visit www.indoorairflorida for more information and ordering.



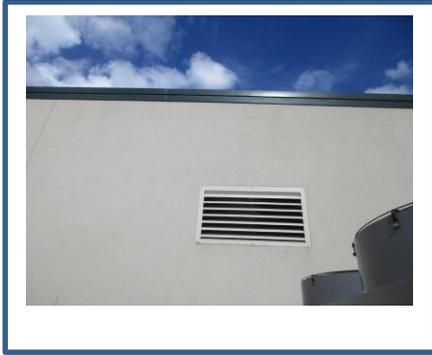
VIII. HVAC (Heating & Air Condition)

- Inspected
- Not Inspected

- i. **Air Handler:** The air handler is inspected as to whether it operates within the normal manufacturers specifications, whether the cabin, blower wheel and coil is free of dirt and or mold. A swab test is sometimes taken to see if the surfaces are clean. This can be taken using an ATP swab which provides instant results or a swab/tape lift which needs to be sent to the lab. If the return plenum can be inspected prior to the filter it will be examined as well.

- Not Inspected
 - Visually Acceptable
- Findings:





The grill in the picture is the outdoor supply



The entire system is computer controlled.



The damper in AH2 which controls the outside fresh air for room 120 and the IT room was stuck in place and is not functioning.

- ii. **Supply & Return Ducts:** The supply ducts are visually inspected and if there appears to be any substance on them they can be tested whether using an ATP swab or a swab/tape lift that can be sent to the lab for further review.

Findings Not Inspected
 Visually Acceptable

- iii. **Supply Registers:** The supply registers are checked for the proper temperature and the proper air flow. They are also inspected for how clean they are.

Findings: **Not Inspected**
 Visually Acceptable

- iv. **Return Registers:** The return registers are inspected for the proper temperature in comparison to the supply as well as their cleanliness.

Findings: **Not Inspected**
 Visually Acceptable

i. Filtration:

HVAC Air Filters: **Filter was a pleated filter and it was clean. Recommend a charcoal filter to remove any air contaminates for room 129.**

Filters are rated using the MERV scale which means Minimum Efficiency Rating Value. The scale is designed to represent the worst-case performance of a filter when dealing with particles in the range of 0.3 to 10 micrometers. The MERV rating is from 1 to 16. Higher MERV ratings correspond to a greater percentage of particles captured on each pass, with a MERV 16 filter capturing more than 95% of particles over the full range.

As the MERV rating goes up the air flow through the filter goes down. So to efficient of filter may block airflow in your air handler. Talk to your HVAC company to see what is the most efficient filter you can use for your system.

IX. Mold

a. Understanding Mold and Mold Spores

The IICRC S520 (Standard and reference guide for professional mold remediation) “states that mold is developed from unique, microscopic seed like structures called spores, which are not viable to the unaided eye. Spores are among the smaller particles ranging from 1-10 microns. Larger particles above 10 microns may be removed from the air stream in the upper nose (naso-pharynx area). Smaller particles approaching 1-5 microns can be readily inhaled and deliver pollutants, irritants, allergies to the lungs where they may initiate immune/allergic responses.

When spores settle on a surface under appropriate moisture and temperature conditions, they absorb water and swell to 2-3 times their original size and begin to form thread like structures known as hyphae. As the hyphae grow, they interweave to form a tangled mass known as mycelium. With continued growth, a mycelium, unlike a spore becomes visible to the naked eye. When the fungus matures, spores form within specialized structures or individually on aerial hyphae. These spores can then be carried away by air currents, moisture droplets or insects to new environments to start the reproductive cycle over again.”

Mycelium is vital for their role in decomposition of plant material. They contribute to increasing the ability of the fungi to absorb water thus exasperating the growth of the mold.

Mold Odors: Actively growing mold produces a wide range of VOC’s (volatile organic compounds). The odors are from MVOC’s or microbial volatile organic compounds that are released from active colonies digesting the organic matter on which they are growing.

The mold colonies do not have to be sporulating to release these compounds. Therefore some molds may not be producing spores at the time of the testing, however they may be present. Individual mold spores do not produce a smell.

The IICRC S520 defines mold into Condition 1, 2 and 3.

Conditions 1, 2 and 3 Mold Classifications

Condition 1

Condition one from the IICRC S520 is an indoor environment that may have settled spores, fungal fragments or traces of actual growth whose identity; location and quantity are reflective of a normal fungal ecology for a similar indoor environment.

Condition 2

The aforementioned condition 2 is an example of the spores before they start to develop into hyphae. As noted you cannot see these spores however they can affect immune deficient individuals just like pollen (see VIII Your Health, later in this document). These spores most likely were dispersed directly or indirectly from a condition 3 area and may have traces of actual growth. The quality of these spores can be a concern for some individuals and they could develop into condition 3 mold.

Condition 3A*

Condensation Mold Growth (CMG) CMG forms in the thin layer of water that condenses when high dew point air contacts cooler surfaces. The dew point of the air is loosely related to relative humidity but is specifically defined as that temperature at which the air gives up some of its moisture to a surface cooler than that temperature. This condensation occurs frequently in bathrooms on ceilings when the room is not ventilated. It also occurs on backs of closet doors, kitchen cabinets and leather surfaces.

As far as mold is concerned, mold spores contain digestive enzymes that are inactive when dry. When there is moisture, even a thin layer, spores on those surfaces are activated and start to digest even the thinnest layer of organic matter that may blow in from outdoors or been created by indoor activities. Once the mold digests enough organic matter it produces structures that search for organic material nearby. If the moisture dries up or organic matter is depleted, the mold goes dormant, waiting for more moisture. CMG is characterized by a general light pattern that is fairly uniform over and on a surface as opposed to a denser pattern that develops in the presence of considerably more moisture than the thin layer of condensation as in 3B.

Condition 3B*

Condition 3 which is visible (the mycelium) is what the layman identifies as “mold”. This type of mold activity is normally caused by a major water event like a roof leak, plumbing leak ground or storm water intruding into the outer wall. Depending on the species of mold some molds produce mycotoxins. Mycotoxins in some species can be toxic which in some cases can be harmful to humans that have an immune deficiency. These molds are what the layman identifies as “Black Mold”. The mycotoxins greatly resist decomposition so they can remain robust if not remediated correctly. Molds that have a higher level of Mycotoxins are Alternaria Aspergillus, Penicillium, S Chartarum and the highest for indoor environments is Stachybotrys.

***Note:** The A&B designations are extrapolated from IICRC-S520 and redefined to explain 3A surface mold (CMG) and from 3B mold created by considerably more moisture.

b. Types of testing performed

1. **Non-viable Genus Testing:** 95% of the time non-viable testing is done. This identifies the genus of the mold not the species. Genus testing identifies the “general” level of many types of mold. It does not test whether the mold is living or not. In most cases this is all that is required unless an individual knows they are susceptible to a particular species of mold then finding the species may be an important element of the test. It does not however identify whether the spore is alive or dead. Viable testing will identify both conditions because the mold spore is inserted into a culture so it can grow into a visual colony.

C. How testing is sampled:

Air sampling: Outdoor/Indoor (The air sampling cassette can be used for all three types of testing mentioned)

1. Definition: Currently there are no generally accepted guidelines for fungi levels therefore utilizing a comparison to the outdoor

samples, the current condition of the affected area and previous experiences are used to draw an educated conclusion as to whether the area will be deemed necessary for remediation. Concentrations higher than the outdoors suggest a fungal excess exists indoor therefore is contributing to exasperate the problem.

2. Bio-Aerosols samples are procured by the use a sampling pump and a slit impactor cassette (**Allergenco-D**) or a **VIA cassette** which contains a sticky material which traps the particulates in the air. All samples are taken at 15 L of air for 5-30 minutes. They are immediately bagged and sent with a specific “chain of custody” for the lab to evaluate. The lab reads 100% of the slide. If spores counts on the slide are high the lab may have to estimate the spore count. Please read section IV, Interpreting Mold levels as a guide to understanding the spore counts in the lab result in Section VII. Air tests are used so a comparison clearance test can be taken to evaluate the success of the remediation. They are also used when there is no visual mold seen.

X. Lab Report # 1 (Mold Genus & Particle Air Testing using optical microscopy)

This report measured the levels of “particulates in the air. As noted on the report particulates can ranged from mold spores to skin fragments. The slide picture shows the particles collect on the inspection day. Please note interpretation guidelines.

ENVIRONMENTAL ANALYSIS ASSOCIATES, Inc. - 306 5th Street, Suite 400 - Bay City, MI 48708		
AIRBORNE MOLD AND DUST ANALYSIS		
	Client Name : H2H Indoor Air Solutions	EAA Method # : DUST-A01
	Client Project # : D1D-1240	Data Page 1 of 1
	Requested by : Rich Van Dort	Project description : Flagler Sheriff
	EAA Project# : M17-0937	Date collected : n/a
		Sample received : 11/27/17
		Sample condition : Acceptable as received
Client Sample#	Sample Description / Location	General Comments
172973	Open Area	Moderate dust
AIRBORNE MOLD SPORE CONCENTRATIONS (Cts./m³) – Spore Trap Sample Analysis High mag. used 600X		
Category	Sample # ->	172973
Total Mold Spores (Cts/m³)		132
Alternaria		
Aspergillus/Penicillium		75
Pigmented Asco & Basidio		
Mix tiny, hyal Asco & Basidio		28
Botrytis		
Chaetomium		
Cladosporium		9
Curvularia		
Drechslera/Bipolaris		
Epicoocum		
Fusarium		
Nigrospora		
Oidium/Peronospora		
Pithomyces		
Rusts		
Smuts / Myxomycetes / Periconia		
Stachybotrys		
Stemphylium		
Torula		
Ulocladium		
Other Hyaline Fungi		
Other Fungi		9
Unidentified Fungi		9
Hyphae fragments		9
Algal / fern spores		
Insect parts		9
POLLEN (Total cts/m³)		2
Not specified		2
Pinus		
COMMON AEROSOLS (cts/m³)		
Skin cell fragments		753
Fiberglass fibers		2
Cellulosic / fabric fibers		57
Unidentified opaque		2100
Soil / mineral dust		9840
OTHER AEROSOLS (cts/m³)		not detected
Standard Parameters		
Vol. analyzed (m ³)-High mag - 600x:		0.106
Detect limit(Cts/m ³)-high magnification:		9.4
% sample analyzed-high magnification:		24%
Vol. analyzed(m ³)-entire sple: 150-300x:		0.450
* Detecton limit (Cts/m ³)-entire sple:		2.2
* Note: The "entire sample" detection limit applies to the "large" particle categories analyzed during the low magnification examination of the entire sample.		
Sample flow rate (lpm):		15.0
Sample trace length (mm):		14.40
Microscope field diameter (mm):		0.340

Note: Sample results are only applicable to the items or locations tested

Raw/extrapolated count data are given on a separate page. Authorized / data reviewed by :

Daniel M. Baxter

Report date: 11/29/17

doc.rev.3-10/17/16

AIRBORNE MOLD AND DUST ANALYSIS

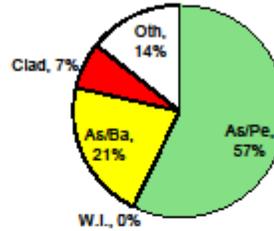
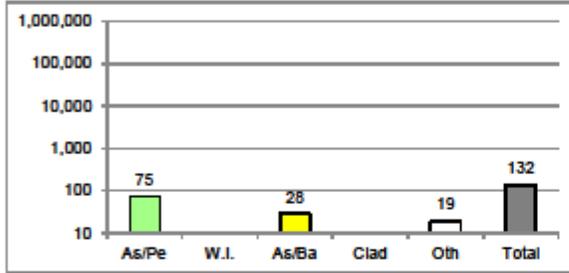


Client Name : H2H Indoor Air Solutions
 Client Project # : 01D-1240
 EAA Project#: M17-0937
 Sample # : 172973

Project : Flagler Sheriff
 Date Collected : n/a
 Description : Open Area

Graphical page 1 of 1

The following Interpretation guidelines are based on the average mold spore and aerosol concentration ranges, historically measured in indoor office, commercial, and "clean" residential environments. Residential environments experience higher variation and concentrations of certain bioaerosols. The ranges are based on publications by EAA, and 25 years experience providing analysis throughout the country from "clean" and "contaminated" residential and commercial buildings. An explanation for the interpretation of data is given in the accompanying information sheet.

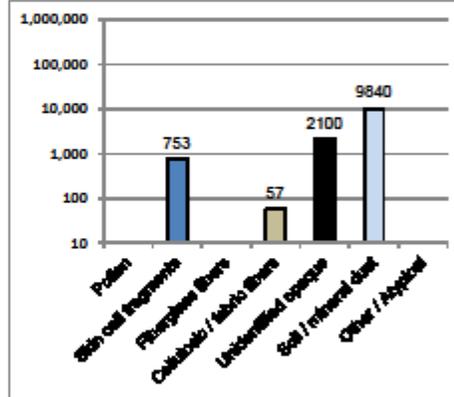


As/Pe = Aspergillus/Penicillium, W.I. = Water Indicating fungi (Stachybotrys, Chaetomium, Ulocladium), As/Ba = AscoBasidiospores, Clad = Cladosporium, Oth = Other

GENERAL AIRBORNE MOLD SPORE INTERPRETATION GUIDELINES		
Mold Spore Category	Concen. Range	Distribution Type
Total Spores	Low	Not applicable
Aspergillus/Penicillium	Low	Normal / typical
Chronic Water Indicating Fungus	Not detected	Not detected
Typical Outdoor Fungus	Low	Low Infiltration

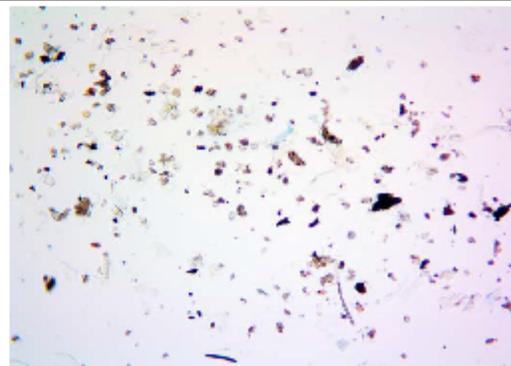
***Source refers to the possible presence of a local mold growth source
 All concentrations in particle counts per cubic meter of air (cts/m³)

OTHER AEROSOLS INTERPRETATION GUIDELINES	
Particle Category	Concen. range
Pollen	Detected
Skin cell fragments	Very low
Fiberglass fibers	Very low
Cellulosic / fabric fibers	Very low
Unidentified opaque	Low - moderate
Soil / mineral dust	Typical / low
Other / Atypical	Not detected



Specific Comments : Moderate dust

Representative photos : 300x



doc:rev.3-10/16

Lab report 2 (Specific mold genus air testing using optical microscopy)

The first page in comparison with the outside does not reflect any elevated issues. The only mold that may provide allergenic conditions is *Curvularia* but both rooms were at lower than outside levels.



EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077
 Phone/Fax: (800) 220-3875 / (856) 788-0282
<http://www.EMSL.com> / cinnmicrolab@emsl.com

Order ID: 371725839
 Customer ID: HHAS25
 Customer PO:
 Project ID:

Attn: Rich Van Dort
 H2H Assurance Services
 123 Heron Drive
 Palm Coast, FL 32137

Phone: (388) 246-2554
Fax:
Collected:
Received: 11/24/2017
Analyzed: 11/27/2017

Proj: Flagler Sheriff's Office Job #OID 1240

Test Report: Allergenco-D(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods EMSL 05-TP-003, ASTM D7391)

Lab Sample Number:	371725839-0001			371725839-0002			371725839-0003		
Client Sample ID:	172880			172872			172868		
Volume (L):	460			460			460		
Sample Location:	128 - Open Area			128 - Jennifer			Outside		
Spore Types	Raw Count	Count/m ³	% of Total	Raw Count	Count/m ³	% of Total	Raw Count	Count/m ³	% of Total
Alternaria	-	-	-	-	-	-	-	-	-
Ascospores	2	10	4.7	2	10	11.4	18	130	7.8
Aspergillus/Penicillium	2	10	4.7	1	7	8	24	170	10.2
Basidiospores	3	20	9.4	2	10	11.4	126	902	54.1
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	10	72	33.8	3	20	22.7	51	370	22.2
Curvularia	4	30	14.1	2	10	11.4	1	7	0.4
Epicoccum	-	-	-	1*	2*	2.3	-	-	-
Fusarium	-	-	-	-	-	-	1	7	0.4
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	4	30	14.1	2	10	11.4	3	20	1.2
Pithomyces	2	10	4.7	-	-	-	1	7	0.4
Rust	-	-	-	-	-	-	1*	2*	0.1
Scopulariopsis	-	-	-	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	1	7	3.3	2	10	11.4	1*	2*	0.1
Beltrania	-	-	-	-	-	-	-	-	-
Microascus	-	-	-	-	-	-	-	-	-
Nigrospora	-	-	-	-	-	-	1*	2*	0.1
Paeclomyces	3	20	9.4	-	-	-	5	40	2.4
Pestalotia/Pestalotiopsis	2*	4*	1.9	1	7	8	1	7	0.4
Spegazzinia	-	-	-	1*	2*	2.3	-	-	-
Total Fungi	33	213	100	17	88	100	234	1666	100
Hypheal Fragment	10	72	-	5	40	-	5	40	-
Insect Fragment	5	40	-	3	20	-	2	10	-
Pollen	1*	2*	-	2	10	-	-	-	-
Analyt. Sensitivity 600x	-	7	-	-	7	-	-	7	-
Analyt. Sensitivity 300x	-	2*	-	-	2*	-	-	2*	-
Skin Fragments (1-4)	-	1	-	-	1	-	-	1	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	4	-	-	4	-	-	1	-

Bipolaris++ = Bipolaris/Drechslera/Exserohilum
 Myxomycetes++ = Myxomycetes/Pariconia/Smitt

No discernable field blank was submitted with this group of samples.

Vincent Iuzzolino, M.S., Laboratory Director
 or Other Approved Signatory

High levels of background particulate can obscure spores and other particulates leading to underestimation. Background levels of 5 indicate an overloading of background particulates, prohibiting accurate detection and quantification. Present = Spores detected on overloaded samples. Results are not blank corrected unless otherwise noted. The detection limit is equal to one fungal spore, structure, pollen, fiber particle or insect fragment. ** Detectable particles found at 300X. * Detectable particles found at 600X. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ ABNA-LAP, LLC—EMLAP Lab 100194

Initial report from: 11/28/2017 08:49:07

For information on the fungi listed in this report please visit the Resources section at www.emsl.com
 Test Report SPVER3-7.30.4 Printed: 11/28/2017 08:49:07AM

Page 1 of 2

Additional testing was taken at the outlet in Jennifer's room to see if anything is entering the room from the outer wall. This came back at an acceptable level. Finally the inside control showed similar levels as room 129 therefore for this optical testing method all levels appear at normal ranges. (See threshold comments later on)



EMSL Analytical, Inc.
 200 Route 130 North Cinnaminson, NJ 08077
 Phone/Fax: (800) 220-3675 / (856) 786-0262
<http://www.EMSL.com/cinnmicrolab@emsl.com>

Order ID: 371725839
 Customer ID: HHAS25
 Customer PO:
 Project ID:

Attn: Rich Van Dort
 H2H Assurance Services
 123 Heron Drive
 Palm Coast, FL 32137
Phone: (386) 246-2554
Fax:
Collected:
Received: 11/24/2017
Analyzed: 11/27/2017
Proj: Flagler Sheriff's Office Job #OID 1240

Test Report: Allergenco-D™ Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods EMSL 05-TP-003, ASTM D7391)

Lab Sample Number:	371725838-0007			371725838-0008		
Client Sample ID:	172887			172888		
Volume (L):	76			460		
Sample Location:	129 - Outlet			Room 161 IT		
Spore Types	Raw Count	Count/m ³	% of Total	Raw Count	Count/m ³	% of Total
Alternaria	-	-	-	-	-	-
Ascospores	-	-	-	1	7	4.5
Aspergillus/Penicillium	1	40	23.5	5	40	26
Basidiospores	1	40	23.5	2	10	6.5
Bipolaris++	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-
Cladosporium	1	40	23.5	8	60	39
Curvularia	1	40	23.5	1	7	4.5
Epilcoccum	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-
Myxomycetes++	1*	10*	5.9	1	7	4.5
Pithomyces	-	-	-	-	-	-
Rust	-	-	-	-	-	-
Scopulariopsis	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	1	7	4.5
Beltrania	-	-	-	1*	2*	1.3
Microascus	-	-	-	1	7	4.5
Nigrospora	-	-	-	-	-	-
Paecilomyces	-	-	-	1	7	4.5
Pestalotia/Pestalotiopsis	-	-	-	-	-	-
Spegazzinia	-	-	-	-	-	-
Total Fungi	5	170	100	22	154	100
Hyphal Fragment	-	-	-	3	20	-
Insect Fragment	-	-	-	-	-	-
Pollen	-	-	-	1*	2*	-
Analyt. Sensitivity 600x	-	43	-	-	7	-
Analyt. Sensitivity 300x	-	13*	-	-	2*	-
Skin Fragments (1-4)	-	1	-	-	1	-
Fibrous Particulate (1-4)	-	1	-	-	1	-
Background (1-5)	-	2	-	-	3	-

Bipolaris++ = Bipolaris/Drechslera/Exserohilum
 Myxomycetes++ = Myxomycetes/Pariconia/Smut

Vincent Iuzzolino, M.S., Laboratory Director
 or Other Approved Signatory

No discernable field blank was submitted with this group of samples.

High levels of background particulate can obscure spores and other particulates leading to underestimation. Background levels of 5 indicate an overloading of background particulates, prohibiting accurate detection and quantification. Present = Spores detected on overloaded samples. Results are not blank corrected unless otherwise noted. The detection limit is equal to one fungal spore, structure, pollen, fiber particle or insect fragment. * Denotes particles found at 300X. ** denotes not detected. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ AHA-LAP, LLC-EMLAP Lab 100194

Initial report from: 11/28/2017 08:49:07

For information on the fungi listed in this report please visit the Resources section at www.emsl.com
 Test Report SPVER3-7.30.4 Printed: 11/28/2017 08:49:07AM

Page 2 of 2

Lab report 3 (Specific mold genus tape testing using optical microscopy)

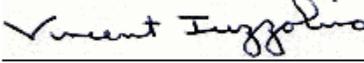
Both Ann and Jennifer's air supply were tested. A tape lift was used to check the surface of the duct.

	EMSL Analytical, Inc.		
	200 Route 130 North Cinnaminson, NJ 08077 Phone: (800) 220-3675 Fax: (856) 786-0262 Web: http://www.EMSL.com Email: cinnmicrolab@emsl.com		
Attn:	Rich Van Dort H2H Assurance Services 123 Heron Drive Palm Coast, FL 32137	EMSL Order: 371725839 Customer ID: HHAS25 Collected: Received: 11/24/2017 Analyzed: 11/27/2017	
Proj:	Flagler Sheriff's Office Job #OID 1240		

Surface Contamination ASSESSMENT Report TM Swab Samples Based on Direct Microscopic Analysis M041			
Sample Information	Sample Location	Surface Contamination Rating (Referenced in IICRC S520)	Recommended Remedial Action (Referenced in IICRC S520)
Lab Sample #: 371725839-0004 Client Sample ID:	Ann's Supply	Condition 3: Actual fungal growth	 Remediate to a Condition 1 status
Lab Sample #: 371725839-0005 Client Sample ID:	Jennifer Supply	Condition 3: Actual fungal growth	 Remediate to a Condition 1 status

Definitions (from IICRC S520 Standard)	
	Condition 1 (normal fungal ecology): an indoor environment that may have settled spores, fragments, or traces of actual growth.
	Condition 2 (settled spores): an indoor environment which is primarily contaminated with settled spores that were dispersed directly or indirectly from a Condition 3 area, and which may have traces of actual growth.
	Condition 3 (actual growth): an indoor environment contaminated with the presence of actual mold growth and associated spores. Actual growth includes growth that is active or dormant, visible or hidden.

Data provided in this report are intended to facilitate the assessment process performed by an Indoor Environmental Professional (IEP). The IEP is responsible for final data interpretation and remediation conclusions based on their assessment which may include information on the building history, an inspection, sampling, and laboratory data. Post-remediation verification testing recommended after any remediation.


Vincent Iuzzolino, M.S., Laboratory Director
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation of the data contained in this report is the responsibility of the client. Samples received in good condition unless otherwise noted.
AIHA-LAP, LLC-EMLAP Accredited #100194

Initial report from: 11/28/2017 08:49:07

This report has been prepared by EMSL Analytical, Inc. at the request of and for the exclusive use of the client named in this report. Completely read the important terms, conditions, and limitations that apply to this report.
© 2006, EMSL Analytical, Inc. All rights reserved. No part of this report may be reproduced or otherwise distributed or used without the express written consent of EMSL.
Test Report EXMold-7.36.0 Printed: 11/28/2017 08:49:07AM

Testing results indicated the presence of both chaetomium and Curvularia were found. (See attachment to this report the full lab report on this)



EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077
 Phone: (800) 220-3675 Fax: (856) 786-0262 Web: <http://www.EMSL.com> Email: cinmicrolab@emsl.com

Attn: Rich Van Dort
 H2H Assurance Services
 123 Heron Drive
 Palm Coast, FL 32137

EMSL Order: 371725839
Customer ID: HHAS25
Collected:
Received: 11/24/2017
Analyzed: 11/27/2017

Proj: Flagler Sheriff's Office Job #OID 1240

Test Report: Microscopic Examination of Fungal Spores, Fungal Structures, Hyphae, and Other Particulates from Swab Samples (EMSL Method: M041)

Lab Sample Number:	371725839-0004	371725839-0005			
Client Sample ID:	Ann's Supply	Jennifer Supply			
Sample Location:					
Spore Types	Category	Category			
Agrocybe/Coprinus	-	-	-	-	-
Altemaria	-	-	-	-	-
Ascospores	-	-	-	-	-
Aspergillus/Penicillium	-	-	-	-	-
Basidiospores	-	-	-	-	-
Bipolaris++	-	-	-	-	-
Chaetomium	-	Rare	-	-	-
Cladosporium	"Low"	"High"	-	-	-
Curvularia	-	Rare	-	-	-
Epicoccum	-	-	-	-	-
Fusarium	-	-	-	-	-
Ganoderma	-	-	-	-	-
Myxomycetes++	-	Rare	-	-	-
Paecilomyces	-	-	-	-	-
Rust	-	-	-	-	-
Scopulariopsis	-	-	-	-	-
Stachybotrys	-	-	-	-	-
Toninia	-	-	-	-	-
Ulocladium	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-
Zygomycetes	-	-	-	-	-
Tetraploia	-	Rare	-	-	-
Fibrous Particulate	Rare	Low	-	-	-
Hyphal Fragment	-	-	-	-	-
Insect Fragment	-	Rare	-	-	-
Pollen	-	Rare	-	-	-

Category: Counter area analyzed
 Rare: 1 to 10 Low: 11 to 100 Medium: 101 to 1000 High: >1000
 Bipolaris++ = Bipolaris/Oreochalara/Exserohilum Myxomycetes++ = Myxomycetes/Parlcoria/Smut
 * = Sample contains fruiting structures and/or hyphae associated with the spores.
 - = Not detected.

Vincent Iuzzolino, M.S., Laboratory Director
 or Other Approved Signatory

No discernable field blank was submitted with this group of samples.

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation of the data contained in this report is the responsibility of the client. Samples received in good condition unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ ABIA-LAP, LLC-EM LAP Accredited #100194

Initial report from: 11/28/2017 08:49:07

This report has been prepared by EMSL Analytical, Inc. at the request of and for the exclusive use of the client named in this report. Completely read the important terms, conditions, and limitations that apply to this report.

© 2006, EMSL Analytical, Inc. All rights reserved. No part of this report may be reproduced or otherwise distributed or used without the express written consent of EMSL.

Test Report EXMold-7.36.0 Printed: 11/28/2017 08:49:07AM

Page 6 of 19

a. Interpreting Genus Mold Levels:

***ACTION BY STATE AND FEDERAL AGENCIES**

There are no mandated actions specific to molds and indoor air quality required by any state or federal agencies. The U.S. EPA Indoor Air Quality website states, "Standards or Threshold Limit Values (TLVs) for airborne concentrations of mold, or mold spores, have not been set. Currently, there are no EPA regulations or standards for airborne mold contaminants."

However, some environmental companies, industrial hygienists, and other IAQ professionals use the following arbitrary numbers for guidance in interpreting microbial survey results.

The final mold interpretation should not be based solely on numbers! Information gathered from the walk-through investigation of the area is very significant, including sources of moisture or high humidity, and signs of visible mold growth.

In air samples, it is important to consider the type and concentration of fungi indoors, as compared to outdoors or a non-complaint area. One should consider the indoor: outdoor fungal count ratio, the presence/absence of certain fungi indoors versus outdoors, the genus/species of predominant fungi indoors versus outdoors, and whether the fungi detected indoors are allergenic and/or toxigenic.

Examples of such Companies or States and their interpretation of "acceptable levels"

➤ **EMSL Laboratory** (*Accredited Florida Laboratory*)

Bioaerosol (air sample)

<250 CFU/m³ Low/Normal
250-1,000 CFU/m³ Moderate/Borderline
>1,000 CFU/m³ Active Growth/Sporulation
>5,000 CFU/m³ Very Active Growth/Sporulation

Swab/Wipe

<100 CFU/in² No Growth/Background
<10,000 CFU/in² Low/Normal Growth
>10,000-100,000 CFU/in² Moderate Growth
>100,000-1,000,000 CFU/in² Active Growth/Sporulation
>1,000,000 CFU/in² Very Active Growth/Sporulation

Definitions

CFU = Colony Forming Units

Colony = A group of hyphae with or without spores, generally of one species and potentially from one spore, cell, or propagule.

➤ **Texas Department of Health**

Acceptable total spores: < 2,000 spores per cubic meter: If “the area has been adequately remediated, provided 1/3 of the spores are Cladosporium spores, 1/3 are Aspergillus/Penicillium and 1/3 are other spores.

➤ **Regional Comparison of Mold Spore Concentrations Outdoors and Inside “Clean” and Mold Contaminated” Southern California Buildings.** Daniel Baxter, Jimmy Perkins, Charles McGhee and James Seltzer; journal of Occupational and Environmental Hygiene.

<u>Building Type</u>	<u>Total Spores</u>		<u>Aspergillus/Penicillium</u>	
	<u>Clean</u>	<u>Moldy</u>	<u>Clean</u>	<u>Moldy</u>
Residential	<1200	>1300	<750	>900
Commercial	<900	>1000	<750	>900

➤ **Hayes Microbial Lab**

Spore Estimate

Rare	Less than 10 spores
Light	10-99 spores
Moderate	100-999 spores
Heavy	1,000-9,999 spores
Very Heavy	10,000 or greater

➤ At a recent IAQ conference, Orlando 2/28/2013, Dr Joe Spurgeon PhD, past EPA Residential Initiative on Indoor Air Quality and consultant for the US Public Health Service, states that after extensive research by him, Rimkus consulting and Baxter that it appears after 1,000 spores per cubic meter mold distribution changes. Observations made were with Asp-Pen and with visual vs. no visual mold events. He also stated that the condition of the occupant needs to be factored in.

Lab report 4 (Specific mold species testing using PCR/DNA testing for 60 minutes)

This test is checking for mold species that produce mycotoxins that have been reported to be a problem for immune deficient individuals. *Chaetomium globosum* was found in room 129 however at low levels. It was also found in the tape lift taken in the air supply register is Lab Report 3.

EMSL Analytical, Inc.

200 Route 130 N, Cinnaminson, NJ 08077, Tel: 800-220-3675, Fax: 856-786-0262

www.EMSL.com, Email: Dnalab2@EMSL.com



Client: H2H Assurance Services 123 Heron Drive Palm Coast, FL 32137	EMSL Reference: 611702080
Attn: Richard Van Dort	Date Received: 11/24/2017
Project: Flagler Sheriff's Office Job #OID 1240	Date Analyzed: 11/29/2017
Location: 129-Room	Date Reported: 11/29/2017
Sample size: 15 L Air	

Rapid Detection of Molds by Quantitative PCR

EMSL Test: M100

Sample Name	Species Identification	Spores E. in Sample	Spores E./L Air
129	<i>Aspergillus flavus</i>	Not detected	Not Detected
	<i>Aspergillus fumigatus</i>	Not detected	Not Detected
	<i>Aspergillus niger</i>	Not detected	Not Detected
	<i>Aspergillus ochraceus</i>	Not detected	Not Detected
	<i>Aspergillus versicolor</i>	Not detected	Not Detected
	<i>Chaetomium globosum</i>	23	2
	<i>Mucor and Rhizopus group</i>	Not detected	Not Detected
	<i>Penicillium brevicompactum</i>	Not detected	Not Detected
	<i>Rhizopus stolonifer</i>	Not detected	Not Detected
	<i>Stachybotrys chartarum</i>	Not detected	Not Detected
	<i>Trichoderma viride</i>	Not detected	Not Detected

EMSL maintains liability limited to cost of analysis. Interpretation of the data contained in this report is the responsibility of the client. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. The above test report relates only to the items tested. EMSL bears no responsibility for sample collection activities or analytical method limitations.

Sergey Balashov, Ph.D.
PCR Laboratory Director

The same test was taken in IT to compare. A different Aspergillus species was found. This species of aspergillus also can produce mycotoxins which could be an issue for immune deficient individuals.

EMSL Analytical, Inc.

200 Route 130 N, Cinnaminson, NJ 08077, Tel: 800-220-3675, Fax: 856-786-0262

www.EMSL.com, Email: Dnalab2@EMSL.com



Client:	H2H Assurance Services 123 Heron Drive Palm Coast, FL 32137	EMSL Reference:	611702080
Attn:	Richard Van Dort	Date Received:	11/24/2017
Project:	Flagler Sheriff's Office Job #OID 1240	Date Analyzed:	11/29/2017
Location:	IT Room	Date Reported:	11/29/2017
Sample size:	15 L Air		

Rapid Detection of Molds by Quantitative PCR

EMSL Test: M100

Sample Name	Species Identification	Spores E. in Sample	Spores E./L Air
IT-1	<i>Aspergillus flavus</i>	Not detected	Not Detected
	<i>Aspergillus fumigatus</i>	Not detected	Not Detected
	<i>Aspergillus niger</i>	170	11
	<i>Aspergillus ochraceus</i>	Not detected	Not Detected
	<i>Aspergillus versicolor</i>	Not detected	Not Detected
	<i>Chaetomium globosum</i>	Not detected	Not Detected
	<i>Mucor and Rhizopus group</i>	Not detected	Not Detected
	<i>Penicillium brevicompactum</i>	Not detected	Not Detected
	<i>Rhizopus stolonifer</i>	Not detected	Not Detected
	<i>Stachybotrys chartarum</i>	Not detected	Not Detected
	<i>Trichoderma viride</i>	Not detected	Not Detected

EMSL maintains liability limited to cost of analysis. Interpretation of the data contained in this report is the responsibility of the client. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. The above test report relates only to the items tested. EMSL bears no responsibility for sample collection activities or analytical method limitations.

Sergey Balashov, Ph.D.
PCR Laboratory Director

b. Standard Mold Spores & the effect they may produce

You're Health:

PROPERTIES OF MOLDS WHICH POTENTIALLY POSE A THREAT TO HUMAN HEALTH (California Department of Health)

Molds can elicit a variety of health responses in humans. The severity of the impact depends upon the type and amount of mold present as well as the susceptibility and sensitivity of the individual experiencing mold exposure.¹³ Humans are exposed to molds via ingestion, inhalation, and skin contact with mold or mold infested material.¹⁴

Although molds are living, multiplying organisms, they do not have to be alive to cause adverse health effects.

Allergens. Due to the presence of allergens on spores, all molds studied to date have the potential to cause an allergic reaction in susceptible humans.¹⁹ Allergic reactions are from mild, transitory responses, like runny eyes, runny nose, throat irritation, coughing, and sneezing; to severe, chronic illnesses such as sinusitis and asthma.²⁰

Mycotoxins. Some molds are capable of producing *mycotoxins*, natural organic compounds that are capable of initiating a toxic response in vertebrates.²¹ Molds known to potentially produce mycotoxins and which have been isolated in infestations causing adverse health effects include certain species of *Acremonium*, *Alternaria*, *Aspergillus*, California Research Bureau, California State Library 4 *Chaetomium*, *Cladosporium*, *Fusarium*, *Paecilomyces*, *Penicillium*, *Stachybotrys*, and *Trichoderma*.²² This list is not all-inclusive.*

While a certain type of mold or mold strain type may have the genetic *potential* for producing mycotoxins, *specific environmental conditions* are believed to be needed for the mycotoxins to be produced. In other words, although a given mold might have the potential to produce mycotoxins, it will not produce them if the appropriate environmental conditions are not present. Currently, the specific conditions that cause mycotoxin production are not fully understood. The United States Environmental Protection Agency (U.S. EPA) recognizes that mycotoxins have a tendency to concentrate in fungal spores and that there is limited information currently available regarding the processes involved in fungal spore release. As a result, the agency is currently conducting research on *Stachybotrys chartarum* in an effort to determine “the environmental conditions required for sporulation, emission, aerosolization, dissemination and transport of [*Stachybotrys*] into the air.”²³

Molds are usually not a problem indoors, unless mold spores land on a wet or damp spot and begin growing. Molds have the potential to cause health

problems. Molds produce allergens (substances that can cause allergic reactions), irritants, and in some cases, potentially toxic substances (mycotoxins). Inhaling or touching mold or mold spores may cause allergic reactions in sensitive individuals. Allergic responses include hay fever-type symptoms, such as sneezing, runny nose, red eyes, and skin rash (dermatitis). Allergic reactions to mold are common. They can be immediate or delayed. Molds can also cause asthma attacks in people with asthma who are allergic to mold. In addition, mold exposure can irritate the eyes, skin, nose, throat, and lungs of both mold-allergic and non-allergic people. Symptoms other than the allergic and irritant types are not commonly reported as a result of inhaling mold. Research on mold and health effects is ongoing.

Lab report 5 (Allergens)

The lab indicated all levels were not sufficient to cause symptoms.



EMSL Analytical, Inc.
 200 Route 130 North, Cinnaminson, NJ 08077
 Phone/Fax: (800)220-3675 / (856)786-0262
<http://www.EMSL.com> cinmicrolab@emsl.com

EMSL Order #: 371726838
 Customer ID: HHA826
 Customer PO: Not Available

Attn: Rich Van Dort
 H2H Assurance Services
 123 Heron Drive
 Palm Coast, FL 32137
 Project: Flagler Sheriff's Office Job #OID 1240

Phone: 386-246-2554
 Fax: Not Available

Date Collected: Not Provided
 Date Received: 11/22/2017
 Date Analyzed: 11/27/2017

EMSL Sample #: 371725839-0006
 Client ID:
 Location: 129 Open/Jennifer

Sample Type: Bulk
 Sample Size: 71
 Sample Units: mg

Analytical Results -Indoor Allergen Analysis by MARIA®

Test Parameter	Allergens	Detection Limits	Concentrations	Allergen Risk Levels
Dust Mites Allergen	Der fl	0.012 µg/g	ND µg/g	✓
Dust Mites Allergen	Der p1	0.012 µg/g	0.013 µg/g	✓
Moose Allergen	Mus m1	0.002 µg/g	ND µg/g	✓
Rat Allergen	Rat n1	0.004 µg/g	0.12 µg/g	†
Cat Allergen	Fel d1	0.004 µg/g	0.21 µg/g	✓
Dog Allergen	Can fl	0.012 µg/g	0.08 µg/g	✓
Cockroach Allergen	Bla g2	0.098 µg/g	ND µg/g	✓

†Sufficient evidence is not available for risk levels.

Allergen Risk Levels:

- High** -Risk of acute asthmatic attack.
- Moderate** -Risk for sensitization and bronchial hyperactivity.
- Low** -Not sufficient to cause symptoms or ND (None Detected); Indicates that the amount of allergen in the sample is below the detection limits.

All samples were collected by and all sampling data was provided by the client. The results are valid only for those samples analyzed, and only for those samples collected in accordance with the appropriate methodology as determined by the client. The results herein do not denote or represent a medical or clinical diagnosis or conclusion. In the event that sample(s) were submitted in opened, used, non-sterile or otherwise adulterated condition, EMSL shall not be responsible or liable.

EMSL Analytical (Cinnaminson, NJ) is accredited by the American Industrial Hygiene Association (AIHA) in the EMLAP accreditation program for specified field(s) of Testing as documented on the scope of accreditation.

This report has been prepared by EMSL Analytical, Inc. at the request of and for the exclusive use of the client named in this report. Completely read the important terms, conditions, and limitations that apply to this report.

Report Date
11/29/2017

Report Revision
RD

Revision Comments
Initial Report

Vincent Iuzzolino, M.S., Laboratory Director
 or approved EMSL Analytical, Inc. signatory



EMSL Analytical, Inc.
 200 Route 130 North, Cinnaminson, NJ 08077
 Phone/Fax: (800)220-3675 / (856)786-0262
<http://www.EMSL.com> cinmicrolab@emsl.com

EMSL Order #: 371726838
 Customer ID: HHAS26
 Customer PO: Not Available

Atn: Rich Van Dort
 H2H Assurance Services
 123 Heron Drive
 Palm Coast, FL 32137

Phone: 386-246-2554
 Fax: Not Available

Project: Flagler Sheriff's Office Job #OID 1240

Date Collected: Not Provided
 Date Received: 11/22/2017
 Date Analyzed: 11/27/2017



Guidelines to Interpretation

Allergens	µg/g											
	<-DL	<1	1	2	3	4	5	6	7	8	9	>10
Fel d1	ND	Low	Mod	Mod	Mod	Mod	Mod	Mod	Mod	High	High	High
Can f1	ND	Low	Low	Mod	Mod	Mod	Mod	Mod	Mod	Mod	Mod	High
Der p1	ND	Low	Low	Mod	Mod	Mod	Mod	Mod	Mod	Mod	Mod	High
Der f1	ND	Low	Low	Mod	Mod	Mod	Mod	Mod	Mod	Mod	Mod	High
Mus m1	ND	Low	Mod	Mod	Mod	High						

µg/m3	
Rat n1	ND <0.7 µg/m3 = Not associated with increased risk of asthma

Bla g2 †	µg/g											
	<-DL	<0.08	0.08	0.09	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
	ND	Low	Mod	Mod	Mod	Mod	Mod	Mod	High	High	High	High

† Suggested levels. Not officially established.

Note: This report and guidelines furnish information only. Whether an individual suffers allergic symptoms or not depends on his/her medical history and previous exposure.

References

- Journal of Allergy and Clinical Immunology 1989; 83:416-427
- Journal of Allergy and Clinical Immunology 1995; 96:440-456
- The American review of respiratory disease 1990; 141:361-367
- The American review of respiratory disease 1993; 147:573-578
- Environmental Health Perspectives 2002; 110:419-425
- Clinical and Experimental Allergy 1996; 26(5):537-44
- Pediatric allergy-principles and practice. Mosby Inc 2003; 201-208.

Terminology

- ELISA Enzyme-linked Immunosorbent Assay
- MARIA® Multiplex Array for Indoor Allergens
- Allergen A substance which reacts with the body's immune system to produce an allergic reaction.
- Antigen A substance, foreign to the body, which stimulates the production of antibodies by the immune system.
- Bla g2 *Blattella germanica* (Cockroach) allergen 2
- Can f1 *Canis familiaris* (Dog) allergen 1
- Der f1 *Dermatophagoides farinae* (Dust Mites) allergen 1
- Der p1 *Dermatophagoides pteronyssinus* (Dust Mites) allergen 1
- Detection Limits DL is the smallest amount of a substance, in this case antigens, which can be measured.
- Fel d1 *Felis domesticus* (Cat) allergen 1
- Mus m1 *Mus musculus* (Mouse) allergen 1
- ND None detected, if any allergens are present they are below the detection limits.
- Rat n1 *Rattus norvegicus* (Rat) allergen 1

Please visit our website at <http://www.cinmicrolab.com>
 © 2016, EMSL Analytical, Inc. All rights reserved. No part of this report may be reproduced or otherwise distributed or used without the express written consent of EMSL.

Lab Report 6 (VOC-Volatile Organic Compounds)

Conclusion is that all TVOC and MVOC (mold) are within acceptable levels comparative to 8,000 samples from various locations.



Client Sample ID: Room 129
Laboratory ID: 67505-1

Client: H2H Indoor Air Solutions
123 Heron Dr
Palm Coast, FL 32137

Report Number: 67505

Sampled By: Richard van Dort
Project: Flagler Sheriff OID 12 40
Location: 901 E Moody Blvd #129
Bunnell, FL

**Thank you for using
IAQ Commercial Survey!**
If you have questions about your report,
please contact your service provider who
performed this test.

Client Sample ID: Room 129
Sample Volume (L): 36.0
Date Sampled: 11/20/2017
Sample Type: TDT UU300
Sample Condition: Acceptable

Receive Date: 11/27/2017
Approve Date: 11/27/2017
Scan Date: 11/27/2017
Report Date: 11/29/2017

IAQ Commercial Survey™ is one of the most advanced, trusted air testing products on the market today for identifying chemical sources and active mold growth. Many indoor air quality (IAQ) issues identified by IAQ Commercial Survey can be easily remediated or eliminated. This test is an invaluable tool for improving air quality because it provides important information on potential contamination issues that cannot be detected by a visual inspection alone. Acting upon the information in this report will enable you to dramatically improve the air quality, creating a healthier environment.

Your Indoor Air Quality Report Summary

Your Indoor Air Quality Report has several sections describing different aspects of your air quality. A summary of this data is provided below, additional information and descriptions are included in the full report.

Total Volatile Organic Compounds (TVOC) Level

TVOC is a general indicator of the IAQ (see page 2).

Total VOCs 420 ng/L

Total Mold Volatile Organic Compounds (TMVOC) Level

TMVOC is an assessment of the actively growing mold (see page 3).

Total MVOCs < 3 ng/L

Contamination Index (CI) Level

The CI shows the types of air-contaminating products and materials that are present in the sampled area (see pages 7 and 8). These levels are estimates based on common home products and activities.

Building Sources

See page 7 for more detail.

N	Coatings (Paints, Varnishes, etc.)
N	PVC Cement
N	Building Materials-Toluene Based
N	Gasoline
N	Fuel Oil, Diesel Fuel, Kerosene
N	Light Hydrocarbons
N	Light Solvents

Occupant Sources

See page 8 for more detail.

N	HFCs and CFCs (Freons™)
N	Personal Care and Cleaning Products
N	Odorants and Fragrances
N	Dry Cleaning Solvents

Note: Severity levels begin at Normal or Minimal and progress through Moderate, Elevated, High and/or Severe. The color progression from green to red indicates results that are increasingly atypical and suggest potentially higher risk.



Prism Analytical Technologies, Inc., the creator of IAQ Commercial Survey, has been performing air quality assessments to industry and environmental consultants since 1995. Prism Analytical Technologies, Inc. (ID 166272) is accredited by the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC in the Industrial Hygiene accreditation program for GC/MS Field of Testing as documented by the Scope of Accreditation Certificate and associated Scope. This analysis references methods EPA TO-17 and ISO 16000-6, which fall within the Scope of Accreditation.

Total Volatile Organic Compound (TVOC) Summary

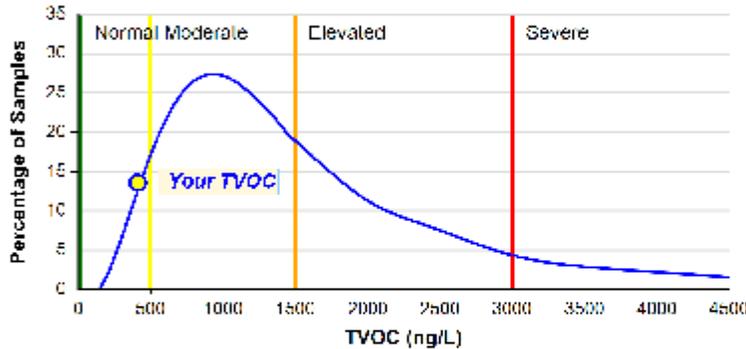
Your TVOC Level is: 420 ng/L

IAQ is acceptable for most individuals; chemically sensitive persons may require lower levels.

Your Indoor Air Quality Level (Highlighted)

Normal	Moderate	Elevated	Severe
< 500 ng/L	500 - 1500 ng/L	1500 - 3000 ng/L	> 3000 ng/L

**All IAQ Survey TVOC
Air Quality Indicator**



The average TVOC is 1900 ng/L

This chart represents the TVOC distribution of over 8,000 samples. Over 80% of these samples indicate improvements in IAQ are necessary to achieve the goal of TVOC less than 500 ng/L.

The chart above shows the TVOC levels for all locations tested using IAQ Survey. Results for this air sample are displayed on the chart as a yellow circle. The blue curved line represents the relationship between the percentage of locations (indicated on the vertical y-axis) and the TVOC level (indicated on the horizontal x-axis). The green, yellow, orange, and red vertical bars represent divisions between Normal, Moderate, Elevated, and Severe TVOC levels. As the TVOC value increases, individuals may experience aggravated health problems, and therefore, the need to address VOC issues becomes more critical. However, reductions in VOCs can be made at any level.

The U.S. federal government has not specified a TVOC limit for indoor air. However, the U.S. Green Building Council (USGBC) has recommended 500 ng/L as the upper TVOC limit. As the TVOC increases, the probability of adverse effects increases. The levels are based on observed health effects and have been determined from a combination of published journal articles (1, 2, 3) and the statistical distribution of TVOC concentrations from the IAQ Survey methodology.

The presence of chemicals in your sampled location can cause a wide range of problems, ranging from an unpleasant odor to physical symptoms (burning and irritation in the eyes, nose, and throat; headaches; nausea; nervous system effects; severe illness, etc.). In some cases, these conditions may make the location uninhabitable. Anyone with respiratory issues like asthma and allergies, as well as children, the elderly, and pregnant women are more susceptible to poor indoor air quality than healthy individuals. However, at higher TVOC levels even healthy individuals are likely to experience ill effects. The following websites can offer more information:

- US EPA [Indoor Air Quality \(IAQ\)](#)
- American Lung Association [Healthy Air at Work](#)
- World Health Organization (WHO) [Guidelines for Indoor Air Quality](#)
- Lawrence Berkeley National Laboratory [Indoor Volatile Organic Compounds \(VOCs\) and Health](#)

The Contamination Index (CI) in the next pages of this report will help guide you through determining what types of products or materials in the sampled location could be problematic for your IAQ and will provide some recommendations to help reduce or eliminate them.

1 L. Molhave, Volatile Organic Compounds, Indoor Air Quality and Health, Vol. 5, International Indoor Air Quality Conference, Toronto, Canada, 1990, p. 22 ff.
2 European Collaborative Action: Indoor Air Quality and its Impact on Man (ECA-IAQ), Report No 19 Total Volatile Organic Compounds (TVOC) in Indoor Air Quality Investigations, 1997. (from L. Molhave et al., Total Volatile Organic Compound (TVOC) in Indoor Air Quality Investigation, Indoor Air 1997; 225-240.)
3 T. Salthammer, Critical evaluation of approaches in setting indoor air quality guidelines and reference values, Chemosphere 82, 2011, 1507-1517.

Total Mold Volatile Organic Compound (TMVOC) Summary

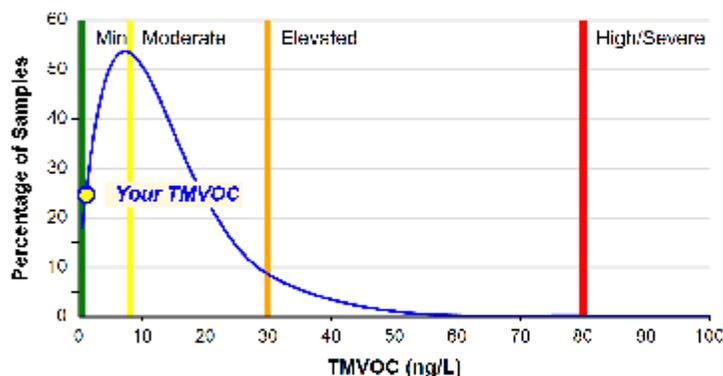
Your TMVOC Level is: < 3 ng/L

Actively growing molds may be present, but are at or below levels found in most homes and working environments.

Your Active Mold Level (Highlighted)

Minimal	Active-Moderate	Active-Elevated	Active-High	Active-Severe
< 8 ng/L	8 - 30 ng/L	30-80 ng/L	80 - 150 ng/L	150 + ng/L

**All IAQ Survey TMVOC
Active Mold Growth Indicator**



**The average TMVOC is
10 ng/L**

This chart represents the TMVOC distribution of over 8,000 samples. Approximately half the samples indicate that some active mold growth is occurring at the time of sample collection.

The chart above shows the TMVOC level for all locations tested using IAQ Survey. Results for this air sample are displayed on the chart as a yellow circle. The blue curved line represents the relationship between the percentage of locations (indicated on the vertical y-axis) and the TMVOC level (indicated on the horizontal x-axis). For example, a TMVOC of 20 ng/L is reported in ~20% of the samples. The green, yellow, orange, and red vertical bars represent divisions between Minimal, Moderate, Elevated, and High/Severe TMVOC levels.

Molds are fungi that grow in the form of multicellular filaments called hyphae that spread to form a network or colony called mycelium. There are thousands of known species of molds, although a much smaller number of mold species are commonly found in indoor environments.

Molds can affect humans and animals in their vicinity in several ways. The most commonly known aspect of molds is the spores they produce as their primary means of reproduction. Spores are released from the mature mold body and spread by air currents and on people, animals, or materials that travel from place to place. These spores can remain viable for a long time until they find a suitable environment and grow to form new colonies. In addition to spores, mycotoxins can also be released under certain situations. Mycotoxins are chemicals that are produced during certain parts of the mold life cycle and can evoke a toxic response (e.g., severe allergic reactions and respiratory irritation and exacerbation of asthma symptoms or other respiratory ailments) in humans and animals. Mycotoxins have low volatility, meaning they have relatively low concentrations in air, so contact or ingestion rather than inhalation is often the main route of exposure for these chemicals.

Finally, mold VOCs (MVOCs) are produced during the metabolic or digestive processes of molds and therefore can be used as an indicator of actively growing mold. When mold is in an inactive or dormant state it does not produce many MVOCs and so cannot be used as an indicator of inactive mold. There are a number of factors that can affect the production and movement of MVOCs, including but not limited to the genus/species, ventilation rates, temperature, humidity, growth surfaces, and competition from other molds. These factors make determination of the genus/species of mold very difficult so the presence of MVOCs indicates active mold growth but not the genus/species of the mold.

Total Mold Volatile Organic Compound (TMVOC) Summary

Mold can grow anywhere that satisfies four primary conditions.

1. Presence of mold spores – spores are everywhere and it is very difficult if not impossible to remove them completely.
2. Appropriate growth surface or nutrient source – molds are adaptable and can grow on almost any surface; many molds especially like cellulose-based materials (e.g., wood, drywall, insulation, cardboard, paper, carpet, etc.).
3. Appropriate temperature – although many molds grow best in warmer temperatures, given enough time mold can grow at almost any temperature condition.
4. Water – this is the most significant and most important criteria since the other conditions are too commonly available to be controlled. The consensus of most organizations with a perspective on air quality (e.g., WHO, EPA, AIHA, ASHRAE, etc.) is that controlling moisture and dampness is the only way to consistently control or limit mold growth.

Mold Sources

Since there are so many possible locations that mold can grow, it can be difficult to locate without visual indicators. However, there are some potential locations where molds are often found, as listed here.

- Air conditioning units or drain lines
- Near plumbing leaks
- Near roof or wall leaks
- Basement water intrusion from surrounding soil
- Any consistently humid area
- Near condensation around windows or any other condensation locations like exterior walls (typically where there is a temperature gradient that allows water to condense)
- Freezer/refrigerator door seals, drain lines, or drip pans; especially in summer
- Indoor plants
- Empty beverage containers and glasses, especially if left for trash or recycling without being rinsed out
- Wastebaskets and trash cans containing discarded food or wet items
- Stand pipes and traps
- Books, magazines, and newspapers if they have gotten wet or sit for a long time
- Outside mold, especially if the air intake is near the ground and landscaping near the building uses wood chips or mulch

Typically, if there is no plumbing leak, condensation, or water intrusion into the building, there will not be a mold problem. If active mold growth is indicated, the first step in fixing the problem is to find and repair the water intrusion or moisture build up.

Some new or extensively renovated buildings can have high MVOC results. Additional dampness is often introduced into a new building during the construction process (e.g., newly installed cement) and can lead to optimal mold growth conditions. Also, some building materials may have mold growth on them when they are installed due to exposure to water before installation. It is strongly recommended that new buildings or those with extensive renovation undergo a drying process to eliminate or reduce the potential for mold growth.

Total Mold Volatile Organic Compound (TMVOC) Summary

MVOC Interpretation

As described above, the TMVOC value is an assessment of the quantity of actively growing mold in the sampled location. Like TVOC, no government unit or organization has specified limits for TMVOC. The levels below describe the effects individuals exposed to these TMVOC values may experience. These levels are qualitative estimates of possible effects experienced by healthy individuals. Sensitive individuals or those with chronic or respiratory issues may experience effects at much lower levels. Mold may be visible on a surface but in an inactive state resulting in little or no production of MVOCs. Regardless of the TMVOC result if mold is visible it should be removed since molds may still produce spores or mycotoxins in an inactive state and new exposure to water or moisture can initiate new mold growth. Since MVOCs are VOCs, they can be affected by the same environmental conditions that affect other VOCs. Primarily lower temperature and higher air flow or ventilation will reduce MVOC concentrations. Any water or moisture issues should be addressed quickly to limit the potential for mold growth.

These levels were determined empirically through interaction with air quality professionals regarding the reported health effects experienced by individuals exposed to actively growing mold.

TMVOC (ng/L)	Level	Description
< 8	Minimal or Ambient	Actively growing molds may be present, but are at or below levels found in most buildings (i.e., these levels could be considered ambient or background).
8 - 30	Active - Moderate	Actively growing molds are present; individuals sensitive to molds will likely be affected. Investigate possible water or moisture sources. See Mold Sources.
30 - 80	Active - Elevated	Significant levels of actively growing molds are present; reactions or symptoms are probable. See Mold Sources
80-150	Active - High	High levels of actively growing molds are present; high probability that all occupants will be affected; take immediate action to locate and remove mold. See Mold Sources.
> 150	Active - Severe	Excessive levels of actively growing molds are present; all occupants will be affected; take immediate action to locate and remove mold. See Mold Sources.

Additional Information about Mold

* World Health Organization (WHO):
[WHO Guidelines for Indoor Air Quality – Dampness and Mold](#)

US Environmental Protection Agency (EPA):
[Molds and Moisture](#)

American Industrial Hygiene Association (AIHA)
[Position Statement on Mold and Dampness](#)

American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE):
[Limiting Indoor Mold and Dampness in Buildings](#)
(Position Documents; click on Limiting Indoor Mold and Dampness in Buildings)

Contamination Index™

The Contamination Index™ (CI) shows the types of air-contaminating products and materials that are present in the sampled area. Each CI category shows the approximate contribution of that category to the TVOC level, indicates how your location compares to thousands of other locations, and provides some suggestions about which products and materials might be the source for the VOCs. The CI is divided into two main source groups: Building Sources and Occupant Sources.

1. **Building Sources** are those that are typically part of the structure of the building and may be more difficult to reduce in the short term. Recent construction or renovation often increases the CI categories in this group to the Elevated, High, or Severe levels. VOCs from these activities often decrease substantially in the month following use or application of these products, especially if the area is flushed with air to dissipate the VOCs off gassed from the new products or materials.

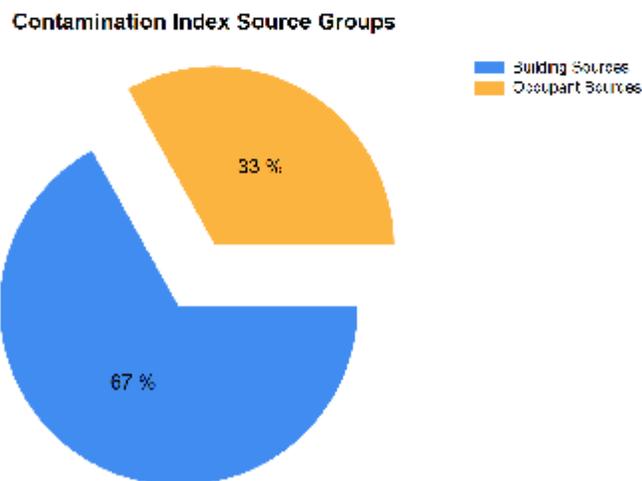
2. **Occupant Sources** are those that the occupants of the building bring into the building and can usually be more readily identified and remediated. Recent construction or renovation can often contribute to other source categories in addition to Building Sources.

It is possible for a category listed in one source group to belong to another source group. For example, the 'Coatings' category is in the Building Sources group because the largest contribution is typically the paint on the walls, but cans of paint stored in a basement or storage area could be considered part of the Occupant Sources group. Always consider all possible sources for a particular CI category.

The CI categories comprise the most common sources but other products or activities may be present that are not included in the CI. The values assigned to each category are approximations based on typical office and commercial spaces. Locations with additional or atypical sources may require additional investigation to determine the source of certain chemicals that are not accurately represented by the CI.

Since there are potentially many sources of VOCs, buildings can often be re-contaminated even after sources have been removed because new products are constantly being brought into the building. Occupants should take note of this fact, and view IAQ as a continuous improvement process.

The chart below depicts the distribution of the Contamination Index source groups. These source groups are estimates and may not indicate all of the VOCs in your air sample.



Contamination Index™ Building Sources

Use the Contamination Index (CI) below to help you find products and materials in the sampled area that may be affecting your indoor air quality. Removing or reducing these products will improve your air quality. The concentrations reported here are approximate and may not add up to the TVOC value on page 2 of this report. These categories are typically part of the structure of the building and may be more difficult to reduce in the short term. Recent construction or renovation will often cause these categories to be elevated. Increased ventilation will help to reduce VOCs from construction or renovation sources. Levels indicated as Elevated, High, or Severe should be addressed immediately, and those listed as Moderate are areas that can be improved over time.

Contamination Index Category	Estimated VOC Level (ng/L)	Severity	Source Prediction & Suggestions for VOC Reduction
Coatings (Paints, Varnishes, etc.)	120	Normal	Includes interior and exterior paints (including low- or no-VOC paints), varnishes, lacquers, some sealants, and other products that can be classified as a coating over a surface. Typically, VOCs from these products are in the 10 to 14 carbon size range and can linger for several months after application, sometimes longer. Ventilate as much as possible during and after application of any of these products. Dispose of opened but unused products and related supplies if possible or store in areas that will minimize off gassing. Additional sources include fuel oil or diesel fuel.
PVC Cement	0	Normal	PVC cement is used to join pieces of PVC pipe together, usually for plumbing.
Building Materials-Toluene Based	0	Normal	Adhesives and glues used in construction and maintenance, arts and crafts; adhesive removers; contact cement; sealants; coatings (paint, polyurethane, lacquer, thinner); automotive products, including parts cleaners. Additional sources include gasoline and other fuels.
Gasoline	21	Normal	VOCs from gasoline are typically a result of off-gassing from gas containers, small spills, and gas-powered equipment used in facilities maintenance in nearby garage or storage areas. Most vehicles in good operating condition do not emit gasoline vapors due to the tightly sealed gas tank. This category does not include exhaust emissions. Gasoline VOCs can linger on clothing after refueling at a gas station. Gasoline includes chemical compounds that are also included in the Light Solvents category.
Fuel Oil, Diesel Fuel, Kerosene	0	Normal	Typically found in garages and facilities maintenance areas. These fuels are not very volatile so they will not readily get into the air, but they can linger for a long time and produce a strong, unpleasant odor. This category does not include exhaust emissions. Additional sources include coatings such as paints, varnishes, sealants, waxes, etc.
Light Hydrocarbons	13	Normal	Building materials; aerosol cans; liquefied petroleum gas (LPG); refrigerant; natural gas; propellant; blowing agent. Includes chemical compounds such as propane, butane, and isobutane.
Light Solvents	13	Normal	Stoddard solvent; mineral spirits; some coatings (paints, varnish, enamels, etc.); wax remover; adhesives; automotive products; light oils. Typically, VOCs from these products are in the 6 to 9 carbon size range.

Building Sources

Contamination Index™ Occupant Sources

Use the Contamination Index (CI) below to help you find products and materials in the sampled area that may be affecting your indoor air quality. Removing or reducing these products will improve your air quality. The concentrations reported here are approximate and may not add up to the TVOC value on page 2 of this report. These categories are typically brought into the building by the occupants and can often be readily identified and removed or contained. Levels indicated as Elevated, High, or Severe should be addressed immediately, and those listed as Moderate are areas that can be improved over time.

Contamination Index Category	Estimated	Severity	Source Prediction & Suggestions for VOC Reduction
	VOC Level (ng/L)		
HFCs and CFCs (Freons™)	1	Normal	Most often used as refrigerants for air conditioners and refrigerator/freezers and propellants for blown-in insulation, cushions, aerosol cans, etc. Many of these chemical compounds are being phased out because of the Montreal Protocol.
Personal Care and Cleaning Products	72	Normal	Personal care products such as soap, deodorant, lotions, perfumes, hair coloring supplies, nail care supplies, oral hygiene products, etc. Cleaning agents such as surface, window, and flooring products, also restroom and antibacterial products. These products contain many VOCs that will dissipate if use is discontinued or reduced.
Odorants and Fragrances	7	Normal	Air fresheners, scented cleaning products, and scented personal care products.
Dry Cleaning Solvents	1	Normal	Typical dry-cleaning methods employ the use of carcinogenic chemicals. Dry-cleaning should be allowed to vent outside, without plastics bags, before being placed inside.

Occupant Sources

Significant VOCs

Based upon your specific air analysis, the chemical compounds listed below are significant contributors to the TVOC level reported on page 2 of your IAQ Commercial Survey Report or are indicative of specific types of products or problems. Compounds from a variety of chemical classes are represented here, although only the most common or most notable are specifically listed. These chemical compounds may come from a variety of sources as shown in the Contamination Index section of this report. Many of these chemical compounds are commonly found in office and commercial locations. However, locating and removing the source of the chemical compound is the most effective way to reduce the contribution of that chemical compound to the TVOC, which ultimately leads to improved IAQ. If removing the source is not possible, try to contain it in some way (e.g., placing the source in an air-tight container when not in use). In addition, the ventilation system in some locations may not be optimized so evaluate the ventilation system and make adjustments to increase the amount of fresh air. Filter or purify re-circulated inside air to help reduce the TVOC. Since VOCs may continue to off-gas even when the sources are stored, ventilation and air-purification methods will need to be employed continuously in order to keep the VOC levels low. The Chemical Abstracts Service (CAS) registry number after the chemical compound name in the table below is a unique identifier for that chemical compound and is often the best means to search for additional information. The two VOC levels in the table below (ng/L and ppb) are different ways of describing the same concentration, in some cases exposure limits or other information may be described using one or both of these concentration units.

Compound	CAS	Estimated VOC Level (ng/L)	Estimated VOC Level (ppb)	Description
Ethanol	64-17-5	69	36	Cleaners, especially antiseptic wipes; personal care; consumable alcohol; some solvents; renewable gasoline component; pharmaceuticals
Pentane (C 5)	109-66-0	35	12	Aerosol propellant; blowing agent; gasoline fuel component
Dipropylene glycol	110-98-5; 106-62-7; 108-61-2	14	3	Paints and coatings; solvents; cosmetics and personal care products; fragrances; cleaners; automotive products; antifreeze
Propylene glycol	57-55-6	12	4	Automotive products, paints and coatings, sealers, caulks, cleaners, personal care products, hair products, pet care, pesticides

The notes below indicate any additional significant compounds present in this air sample or other noteworthy information.

VI. Additional AIR Quality Information

a. Room 129 Pressure

Room pressure is noted as positive or negative pressure. Positive pressure means that the air in the space is pushing outward from the room and negative means it is sucking air into the room.

Space is:

Neutral



b. Building Pressure

Room pressure is noted as positive or negative pressure. Positive pressure means that the air in the space is pushing outward from the room and negative means it is sucking air into the room.

Space is:

Slightly positive, building was designed for .5" w.c. so the system needs to be rebalanced.



c. Room Air Summary

The air flow from the supply registers were at the correct velocities



Combustion Gas Byproducts:

Gas tested	Outside Co2: 350-450ppm	Location	Level	Low ppm	Marginal ppm	Poor ppm
Co2-Carbon Dioxide		1. Room 129 2. IT 3. Hallway	788 945 649	<1,000	1000-4,000	>5,000
Notes:	Room	129 was empty		Testing should be performed with full personnel.		

Carbon dioxide (Co2) is emitted by human during normal respiration. Indoor Co2 levels can increase with the number of occupants.

VII. Indoor Air Pollutants

Pollutants	Outside	Location:	Level ppm	Low ppm	Marginal ppm	Poor ppm
Formaldehyde	0	1. Room 129	.126	<.05	.10-.3	>.3
		2. IT room	.065			
		3. Hallway	.066			
TVOC's	See Prism report			<1.0	1.0-10	>10.0
Others:						

Formaldehyde is a colorless gas with a pungent odor. It is used in the preparation of resins and is found in tobacco smoke. Inhaling can cause both short-irritant effects and long term health effects.

TVOC's or total volatile organic compounds include a very wide range of organic compounds that can be emitted from building materials and products. It is estimated that 50-300 different VOC's may be detected in the air of homes, schools, offices and commercial buildings at any given time.

Surface Contamination (ATP monitoring is a rapid testing method used by food and beverage processors to quickly assess the cleanliness of surfaces or liquid samples from such places as CIP systems. Adenosine Triphosphate (ATP) is present in all organic material and is the universal unit of energy used in all living cells. ATP is produced and/or broken down in metabolic processes in all living systems. Processes such as photosynthesis in plants, muscle contraction in humans, respiration in fungi, and fermentation in yeast are all driven by ATP. Therefore, most foods and microbial cells will contain some level of naturally occurring ATP.)

½ x ½ Swab Location	Totals	Unit of measure	Low	Medium	High
Woman's Room	1	RLU'S	<150	150-250	>250
Break room sink	296	RLU'S	<150	150-250	>250



VIII. Conclusion: The conclusion is based on visual conditions at the time of the inspection, lab testing, customer health and other variable's.

- Genus level air testing, visual inspection, odor testing and MVOC (Prism) testing did not reveal and issues indicating elevated spores. **However, the DNA/PCR testing did reveal (2) two species of mold not detected by optical microscopy either from EMSL or EAA labs. The mold species found in room 129 was Chaetomium Globosum which has known to produce a secondary metabolite called a mycotoxin. The genus tape lift also found a small level of this on the surface of the supply ductwork.** Mycotoxin testing was not performed but can be to see if its presence is in the room. Some immune deficient individuals can be affected by this mold and or mycotoxin. The IT room DNA/PCR testing did not find this mold however it did find Aspergillus Niger which also is known to produce and different mycotoxin.
- The fresh air intake damper was found to be stuck on AH-2. This would mean fresh air was not being introduced into either room. The levels of Co2 was at an acceptable range in room 129 but without any inhabitants. This could have been a problem with 6-7 people in the room at one time. Further testing would need to be done with a full room to verify.
- The overall building was designed to be at .5 positive pressure. The building was found to be a slight positive pressure not what it was designed for.
- ATP onsite testing revealed a higher bacteria level in the break room sink area.

Recommendations:

- **Fix the HVAC damper and rebalance the building system**
- **Fully remediate room 129 and the IT room for mold spores using a licensed professional remediation company. A protocol report from H2H can be written for a proper procedure if ordered.**
- **Clean and sanitize the AHU-2 and ductwork after it has been fixed using a reverse negative cleaning procedure following NADCA ACR2013 guidelines.**
- **Install a charcoal filter in AHU-2 after it has cleaned properly.**
- **Clean the break room using an approved bacteria cleaner.**
- **Retest using DNA/PCR and mycotoxin and inspect after the aforementioned is performed.**
- **Install an air purifier into room 129 that has a high grade HEPA and charcoal filter**

- A. Investigation: The investigate procedures are limited both to a specific time frame and to considering the conditions apparent while the investigation is going on. Since fungi are growing, living organisms that go through growth cycles, the findings of an investigation may not detect or locate all sites of microbial growth. Rather, the purpose of the investigation is to develop picture of the situation and the conditions within the building with regard to moisture control, moisture content of the materials and the potential for fungal growth to develop, while simultaneously identify any growth that has already developed.” (Fungal Contamination, by Hollace S. Bailey, PE,CIAQP,CIE,CMR, ©2005)
- B. Limitations: This assessment was conducted following standard practices and guidelines. Regardless of the thoroughness, it is possible that some areas containing mold growth, water damage, and/or elevated moisture content or other indicators of poor indoor air quality we inaccessible or not evident during the assessment. The findings and recommendations included represent conditions evident at the time of the assessment. Building conditions related to indoor air quality, microbial growth and moisture intrusion may be subject to change on a daily basis, particularly after water event. Therefore, the conditions observed and reported herein may not be evident in the future.
- C. Immediacy & Occupancy of Property: If the box for remediation has been filled in then H2H recommends that the affected areas be remediated as soon as possible. If health problems are being experienced, a medical doctor should be consulted concerning occupancy of the premises. **During and after remediation, until testing confirms complete remediation, the impacted areas should not be occupied or entered by anyone, except the remediation firm’s representatives. This includes cleaning staff and others who may periodically enter the impacted areas. After remediation is completed and testing shows the impacted areas are safe these areas may be entered and occupied.**

IX: Inspection Agreement

By receipt of services the following agreement is in force if the services have been performed and paid for.

H2H Assurance services evaluation and test results do not guarantee that the indoor environment is free of contaminants, gases organisms or any analytes sampled for. The customer understands that there are limitations associated with the instrumentation used associated with accuracy, precision and uncertainty. Additionally, further limitations are present as a result of sampling and measurement methods/procedures utilized in testing and measuring as well as any or all factors such as environmental and climatic conditions. The customer is aware that no destructive testing was performed and that the evaluation can only assess for conditions that are visible at the time of the evaluation.

H2H's opinions as noted in the report are based on the findings and upon our professional experience with no warranty or guarantee implied. H2H accepts no responsibility for interpretations or actions based on this report by others. The findings, results and conclusions as part of our assessment are only representative of conditions at the time of the H2H visit and do not represent conditions at other times. This report is intended for your use and your assigned representatives. Its data and content shall not be used or relied upon by other parties without prior written authorization of H2H and the client.

Notice of Claims. You understand and agree that any claim(s) or complaint(s) arising out of or related to any alleged act or omission in connection with the Inspection shall be reported to us, in writing, within ten (10) business days of discovery. Unless there is an emergency condition, you agree to allow us a reasonable period of time to investigate the claim(s) or complaint(s) by, among other things, re-inspection before you, or anyone acting on your behalf, repairs, replaces, alters or modifies the system or component that is the subject matter of the claim. You understand and agree that any failure to timely notify us and allow adequate time to investigate as stated above shall constitute a complete bar and waiver of any and all claims you may have against us related to the alleged act or omission unless otherwise prohibited by law.

Arbitration: Any dispute concerning the interpretation of this Agreement or arising from the Inspection and Report (unless based on payment of fee) shall be resolved by binding, non-appealable arbitration conducted in accordance with the rules of the American Arbitration Association, except that the parties shall mutually agree upon an Arbitrator who is familiar with the home inspection industry.

Limitations Period.

Any legal action arising from this Agreement or from the Inspection and Report, including (but not limited to) the arbitration proceeding more specifically described above, must be commenced within six (2) months from the date of the Inspection. Failure to bring such an action within this time period shall be a complete bar to any such action and a full and complete waiver of any rights or claims based thereon. This time limitation period may be shorter than provided by state law.

UNCONDITIONAL RELEASE AND LIMITATION OF LIABILITY. IT IS UNDERSTOOD AND AGREED THAT WE AND THE LAB ARE NOT INSURERS AND, THAT THE INSPECTION AND REPORT TO BE PROVIDED UNDER THIS AGREEMENT SHALL NOT BE CONSTRUED AS A GUARANTEE OR WARRANTY OF THE ADEQUACY, PERFORMANCE OR CONDITION OF ANY STRUCTURE, ITEM, OR SYSTEM AT THE SUBJECT PROPERTY. YOU HEREBY RELEASE AND EXEMPT US, THE LAB AND OUR RESPECTIVE AGENTS AND EMPLOYEES OF AND FROM ALL LIABILITY AND RESPONSIBILITY FOR THE COST OF REPAIRING OR REPLACING ANY UNREPORTED DEFECT OR DEFICIENCY AND FOR ANY CONSEQUENTIAL DAMAGE, PROPERTY DAMAGE OR PERSONAL INJURY OF ANY NATURE. IN THE EVENT THAT WE, THE LAB OR OUR RESPECTIVE AGENTS OR EMPLOYEES ARE FOUND LIABLE DUE TO BREACH OF CONTRACT, BREACH OF WARRANTY, NEGLIGENT MISREPRESENTATION, NEGLIGENT HIRING OR ANY OTHER THEORY OF LIABILITY, THEN THE CUMULATIVE AGGREGATE TOTAL LIABILITY OF US, THE LAB AND OUR RESPECTIVE AGENTS AND EMPLOYEES SHALL BE LIMITED TO A SUM EQUAL TO THE AMOUNT OF THE FEE PAID BY YOU FOR THE INSPECTION AND REPORT.

Confidentiality: You understand that the Inspection is being performed (and the Report is being prepared) for your sole, confidential and exclusive benefit and use. The Report, or any portion thereof, is not intended to benefit any person not a party to this Agreement, including (but not limited to) the seller or the real estate agent(s) involved in the real estate transaction ("third party"). If you directly or indirectly allow or cause the Report or any portion thereof to be disclosed or distributed to any third party, you agree to indemnify, defend, and hold us harmless for any claims or actions based on the Inspection or the Report brought by the third party.

The Client(s), acknowledge that Client(s) have been advised and encouraged to have the subject property tested for allergens, and that client(s) understand that the presence of certain types of allergens prevalent in construction can pose health hazards. Client(s) decline that the Inspector conducts the services recommended above. Client(s) agree to hold harmless the Inspector for any damages or responsibility for building conditions which remain undiscovered regarding the discovery of allergens

and allergen agents. Also, clients understand that cleaning specifications cannot be produced unless the above mentioned samples are collected and analyzed.

THIS INSPECTION, INSPECTION AGREEMENT AND REPORT DO NOT CONSTITUTE A WARRANTY, AN INSURANCE POLICY, OR A GUARANTEE OF ANY KIND; NOR DOES THEY SUBSTITUTE FOR ANY DISCLOSURE STATEMENT AS MAY BE REQUIRED BY LAW. By signing below, You acknowledge that You have read, understand, and agree to the terms and conditions of this agreement, including (but not limited to) the limitation of liability, arbitration clause and limitation period, and agree to pay the fee listed in the shaded box above. In addition, You acknowledge and agree that the Inspector may notify the homeowner or occupants of the Subject Property (if other than You), as well as any appropriate public agency, of any condition(s) discovered that may pose a safety or health concern.

“The investigate procedures are limited both to a specific time frame and to considering the conditions apparent while the investigation is going on. Since fungi are growing, living organisms that go through growth cycles, the findings of an investigation may not detect or locate all sites of microbial growth. Rather, the purpose of the investigation is to develop picture of the situation and the conditions within the building with regard to moisture control, moisture content of the materials and the potential for fungal growth to develop, while simultaneously identify any growth that has already developed.”
(Fungal Contamination, by Hollace S. Bailey, PE,CIAQP,CIE,CMR, ©2005)

Inspection Performed by:

- Richard J. Van Dort
- Tod Rheinholtz, I.E.P.

Inspection reviewed by:
Richard J. Van Dort
CIEC, CMI, CAS, CTI, CVI
H2H Indoor Air Solutions, LLC
Richard J. Van Dort

