MOLD SAMPLING
FINAL REPORT

For:
Saline Area Schools
7265 North Ann Arbor Street
Saline, Michigan 48176

At:
Saline Middle School
7190 North Maple Road
Saline, Michigan 48176

By:
Nova Environmental, Inc.
5300 Plymouth Rd.
Ann Arbor, Michigan 48105

Project #: CI0511/MS195

August 29, 2025

ENVIRONMENTAL, INC.
5300 PLYMOUTH ROAD
ANN ARBOR, MICHIGAN 48105
734-930-0995

INTRODUCTION/BACKGROUND

On August 27, 2025, it was decided between Mr. Rex Clary, Director of Operations for Saline Area Schools, and Nova Environmental, Inc., that Nova Representatives would return to Saline Middle School to conduct mold air sampling in the Orchestra Room after the recommendation that the room be left with dehumidifiers running for 24 hours, with an additional 24 hours of time after they are shut down.

A representative from Nova Environmental, Inc. arrived on-site on August 29, 2025, to perform the testing.

METHODS

Nova Environmental, Inc. conducted mold air sampling in the Orchestra Room and outdoors in order to determine airborne concentrations of mold and fungal spores.

INVESTIGATION SUMMARY

This section is intended to provide a general summary of the results of this IAQ Investigation.

The mold sampling demonstrated substantially higher levels of mold spores on the outdoor air than the indoor air.

AIRBORNE FUNGAL SPORE SAMPLING RESULTS

Bioaerosols are defined as materials that have been finely divided and suspending in the air (aerosol) that a biological origin or activity (bio-). Or simply, these are living or dead bacteria, mold and fungi or the spores of mold and fungi. Individuals may react to the entire bacteria, mold and fungi or its spores, or react to mycotoxins, the chemicals that the fungi produce as a by-product of their metabolism. These "biological particles" and mycotoxins can affect different people in different ways and have the potential to cause a variety of physical symptoms. Fungal air sampling can be conducted after a definite source has been identified, as a pro-active means of characterizing a building's air or to possibly eliminate a major fungal infestation as the cause of occupant complaints. Although there are no regulatory standards regarding exposures to molds, comparisons between samples can be reviewed in an attempt to determine if potential indoor mold amplification sites exist, with the results being reported a Fungal Structures/m^3. Variables such as outdoor fungal types and concentrations as well as the number and specific types of fungal organisms indoors and their potential sources, must all be considered when interpreting sample results; no one comparison or interpretation is typically appropriate.

Fungal air sampling was conducted in order to characterize the indoor fungal spore composition in the Orchestra Room. There was a total of two fungal spore samples collected within Saline Middle School. They included A01 (Orchestra Room), and A02 (Exterior). Sample A02 was collected as a control sample while sample A01 was collected in the area of concern.

As identified on the attached analytical results sheets, the sample result for A01 (Orchestra Room) total fungal counts per cubic meter (counts/m^3) was 912, while the sample result for A02 (Exterior) was 9,160 counts/m^3. The types of molds identified were the same for the indoor samples as the exterior sample. The exterior sample was substantially higher than those collected indoors.

Appendix A

FUNGAL AIR SAMPLING RESULTS

Client: Saline Area Schools

Building: Saline Middle School

Location: Orchestra Room

Project Number: CI0511/MS195

Nova Environmental, Inc.
Indoor Air Quality Data Sheet
Fungal Spore Air Sampling

Date: 08/29/2025

Nova Representative: Carol May

Outside Weather Conditions: 50s, Sunny, 91% Humidity

Sample Number	Location	Pump I.D.	Start Time	Stop Time	Sample Time (min)	Flow Rate (L/min)	Volume (L)	Notes
A01	Orchestra Room	260	7:35 AM	7:40 AM	5	14.9	74.5	DO, WC, VO
A02	Exterior	260	7:45 AM	7:50 AM	5	14.9	74.5	---

DO = Door Open, DC = Door Closed, WO = Windows Open, WC = Windows Closed, VO = Vent On, VF = Vent Off, AFL = Above Floor Level, AGL = Above Ground
min = minutes, L = Liters, Cassette: Zefon Air-O-Cell®

PELLaboratories

Client:	Nova Environmental, Inc.	Report Version No.:	1
Project Name:	Saline Middle School	PEL Work Order No.:	22508160
Project Address:	Orchestra Room	Date Received:	8/29/2025
Project No.:	CI0511/MS195	Date Analyzed:	8/29/2025
Project Contact:	Meghan McCarthy	Sample Date :	8/29/2025
Sample Type:	Spore Trap - Air-O-Cell	Received By:	Nico Alvarez-Lopez
T/A Time:	ASAP	Analyzed By:	Ryan Shannon

PEL Sample No.:	**1**				**2**							
Sample ID/No.:	**A01**				**A02**							
Sample Description:	**Orchestra Room**				**Exterior**							
Volume (liters):	**74.5**				**74.5**							
FUNGAL IDENTIFICATION	Raw Count	%	LOD /m^3	Count/m^3	Raw Count	%	LOD /m^3	Count/m^3	Raw Count	%	LOD /m^3	Count/m^3
Ascospores	1	4.8%	43	43	82	38.9%	43	3560				
Basidiospores	5	23.8%	43	217	111	52.6%	43	4820				
Cladosporium sp.	1	4.8%	43	43	8	3.8%	43	348				
Aspergillus /Penicillium sp.	13	62.0%	43	565	4	1.9%	43	174				
Ganoderma sp.	1	4.8%	43	43	6	2.8%	43	261				
Total	21			912	211			9160				
Hyphal Fragments *												
Pollen												
Dust/Debris*	1 - Less than 5% load				3 - 25% to 75% load							

* The presence of dust/debris on an air cassette may mask the presence of fungal spores thereby creating negative quantitation bias. In accordance with ASTM d7391-17, PEL Laboratories categorizes percentages of dust/debris as follows: **0** - No particulate matter present. Indicates either a blank or improper sampling. **1** - 0%-5% total loading. Results minimally affected. 2 - 5%-25% total loading, 3 - 25%-75% total loading, 4 - 75%-90% total loading. Negative bias is expected, increasing with the percent occluded. 5 - 90% plus total loading. Overloaded - quantification not possible.

* Hyphal Fragments and Pollen are not included in calculations

Analyst Signature: _____ Date of Report: 8/29/2025

Reviewer Signature: _____ Date of Report: 8/29/2025

Mold Glossary - Genera

Acremonium sp. - *Acremonium* species are found growing in plant-decaying matter, plant debris, soils, and decaying organic matter. Some species are found indoors. Due to the high water requirements of *acremonium* (water activity 0.90 – 0.98), they are considered a tertiary colonizer and marker of advanced water damage when found amplified indoors. Reported to be allergenic. Common type I and III allergen. It can produce mycetomas, infections of the nails, onychomycosis, corneal ulcers, eumycotic mycetoma, endophthalmitis, meningitis, and endocarditis.
References: De Hoog, G.S., J. Guarro, J. Gene, and M.J. Figueras. Atlas of Clinical Fungi, 2nd Edition. The Netherlands: CBS,
2000.

Alternaria sp. - *Alternaria* is a ubiquitous fungal genus that includes saprobic, endophytic and pathogenic species. Commonly found in soil, on plants and frequently found indoors, most commonly in poorly ventilated attics and other very warm, consistently damp spaces. With a water activity between 0.84-0.90, Alternaria is an early indicator of worsening water damage. In It is an important airborne allergen and common agent for hay fever, asthma, and other allergy related symptoms. ***References:*** *J.H.C. Woudenberg, J.Z. Groenewald, M. Binder, and P.W. Crous. Alternaria Redefined. 2013 CBS-KNAW Fungal Biodiversity Centre.*

Ascospore sp. – One of the most common spore types. There are over 30,000 different species in the *ascospore* category, most of which cannot be differentiated by direct microscopy. Found everywhere in nature. Spores are predominantly forcibly discharged during periods of high humidity or rain. Ascospores are rarely found amplified indoors, except occasionally on houseplants and in buildings in obviously poor condition. *Reference: Manstretta V, Rossi V. Effects of Temperature and Moisture. Perithecia in Maize Stalk Residues. Appl Environ Microbiol. 2015;82(1):184–191. Published 2015 Oct 16. doi:10.1128/AEM.02436-15*

Aspergillus sp. – One of the most common fungal genera found worldwide with about 180 species. Commonly found in soil and decaying vegetation and indoors in dust, food, and various building materials. One of the most common molds found amplified indoors. Many common food molds are *Aspergillus*. *Aspergillus* spores usually cannot be distinguished from *Penicillium* on air samples. Various species of *Aspergillus* are reported to be allergenic, to cause certain infections in compromised individuals, and some species do produce toxins thought to be unhealthy to humans. With various species having water activities as low as 0.6 and as high as 0.8, *Aspergillus* is the most common primary colonizer. Many species can grow in moist areas even without significant condensation.

Basidiospore sp. – One of the most common spore types. There are over 40,000 species in the basidiospore category, most of which cannot be distinguished by direct microscopy. Basidiospores are in general the spores of what we commonly call mushrooms. This group of spores is ubiquitous in nature and can be found anywhere there is moisture and an organic food source. Basidiospores are moisture driven as their spores disseminate during rain or in times of high humidity. Indoor amplification of undifferentiated basidiospores in uncommon, and will generally be identifiable by the mushroom growth. *Reference: John Webster and Roland Weber. Introduction to Fungus. Third Edition Pg. 550*

Bipolaris/Drechslera/Exserohilum/Helminthosporium Group*:* They belong to the group hyphomycetes and have about 50 different species. They are found in soil, plant debris, wood, and paper. *Bipolaris* has indeterminate conidiophores which extend sympodially producing a succession of large dark and transversely septate spores. Spores are basically fusoid in shape and germinate only from the end. Large spores can be deposited in the upper respiratory tract and may cause allergic fungal sinusitis, asthma, and hay fever. It is also known to produce mycotoxin (sterigmatocystin) that can damage liver and kidney in animals. The fungus may also cause keratitis and osteomyelitis on humans. The water activity of this group is generally between 0.80 and 0.85, and as such they are considered primary/secondary colonizers, and can propagate in high moisture areas without active water damage.

Chaetomium – Very commonly found amplified indoors. Considered one of the major contributors to "sick building syndrome". In nature, found growing in soil and fruiting on cellulose-rich substrata such as seeds, textiles in contact with soil, straw, sacking and dung. Wood infected by *Chaetomium* may undergo a superficial decay known as soft rot. Indoors, *Chaetomium* produces several mycotoxins including chaetoglobosins A and C, which cause a host of issues in immunocompromised individuals, and are thought to cause permanent neurological issues due to causing erosion of the myelin sheath on neurons. Due to relatively high water activity (0.91-0.94), considered a 'tertiary colonizer', and will only amplify in significant water damage.

Lillard S (2004). *Chaetomium*

Cladosporium - The most commonly identified outdoor and indoor fungus. The outdoor numbers are reduced in the winter and are often high in the summer, often well over 10000/m^3. A wide variety of plants are food sources for this fungus. It is found on dead plants, woody plants, food, straw, soil, paint and textiles. Often found in dirty refrigerators and especially in reservoirs where condensation is collected, on moist window frames it can easily be seen covering the whole painted area with a velvety olive green layer. One of the most common molds found amplified indoors. Cladosporium has a water activity of 0.86-0.88, and is considered a secondary colonizer. It generally needs a source of water beyond ambient moisture, but any amount of condensed humidity is sufficient for growth. *Cladosporium* is thought to be one of the main causes of hay fever and common allergies. *References:* Flannigan, Brian, Robert A. Samson, and J. David Miller, eds. Microorganisms in Home and Indoor Work Environments: Diversity, Health Impacts, Investigation, and Control. London and New York: Taylor & Francis, 2001.

Curvularia – Very similar to *Bipolaris* group, and is beginning to be included in this group by experts. It is common in outdoor environment and can be found in soil, leaves, and plant debris. Indoors, *Curvularia* species can be found on any cellulose containing product, although it is relatively uncommonly amplified indoors. With water activity 0.80-0.85, *Curvularia* is considered to be a secondary colonizer, and can amplify anywhere there is condensation. *Curvularia* is thought to be a common allergen. Some people may experience hay fever, asthma and allergic fungal sinusitis. It may also cause corneal infections, onychomycosis or nail infection, pneumonia, and mycetoma, primarily in immunocompromised individuals.

***Epicoccum* -** Saprophytic fungus that occurs worldwide. Very commonly identified outdoors, but relatively uncommonly found amplified indoors. It is considered a common allergen but rarely causes systemic diseases in humans. With water activity of around 0.97, Epicoccum is very much a tertiary colonizer that requires significant water damage to propagate.

Erysiphe/Oidium - A group of two closely-related species of plant pathogens commonly found on leaves, stems, flowers, and fruits. They are sometimes referred to as "powdery" or "downy" mildew. Commonly identified outdoors, but uncommon to find indoors except on houseplants and fruits/vegetables.

Fusarium – A contaminant / opportunistic pathogen, found on fruit, grains and is common in soil. Commonly identified outdoors, rarely found amplified indoors. One of the most common fungal infection agents in hospitals and other places with immunocompromised people. With water activity of about 0.86, fusarium is a secondary colonizer, and can propagate in condensation.

***Ganoderma* –** Commonly called "shelf fungus", very commonly seen growing on tree trunks. Ganoderma are frequently used in traditional Asian medicines, and reishi mushroom tea is *Ganoderma* based. Very uncommon to find amplified indoors.

Helicomyces - This group includes genera Helicoma, Helicomyces, and Helicosporium, all of which are closely related helical-spored fungi. They are common on dead and decaying wood and bark lying on the ground. Fungi in the helicomyces group are not known human pathogens. Very, very rarely found amplified.

***Mucor* -** Characterized by rapid growth. Rare infections in severely debilitated patients have occurred (Mucorosis). Rarely identified in samples indoors or outdoors.

***Nigrosporum* -** Often found growing in soil and decaying plant material. It seldom found growing indoors. No report of mycotoxin production is known. Some people may experience hay fever and asthma if large numbers of spores are inhaled. Very rarely found in air samples indoors or outdoors in quantities of more than a spore or two.

Penicillium/Aspergillus Group - the two genera of mold *Penicillium* and *Aspergillus* cannot be distinguished in air samples, but can usually be separated in lift/swab samples due to their distinct hyphal morphologies. Please see the entry for each,

Penicillium - One of the most common fungal genera found worldwide with about 300 species. Commonly found in soil and decaying vegetation and indoors in dust, food, and various building materials. One of the most common molds found amplified indoors. Common bread mold is a species of Penicillium, as are many fruit molds. Spores usually cannot be distinguished from Aspergillus on non-cultured samples (like tape-lifts and air cassettes). It is reported to be allergenic, to cause certain infections in compromised individuals, and some species do produce toxins thought to be unhealthy to humans. With various species having water activities as low as 0.7 and as high as 0.85, *Penicillium* is a very common primary and secondary colonizer. Many species can grow in moist areas even without significant condensation.

Pithomyces – Saprophytic fungus, generally found outdoors on decaying plant material. Very common outdoors, especially in spring/summer. Very unlikely to be found indoors, except in severe water damage cases where the framing wood has rotted.

Pollen – Plant reproductive agent. Very common seasonal allergy trigger.

Rust - A plant pathogen that is commonly found on leaves, stems, fruits, and seeds of various plants. Rarely found amplified indoors except on certain houseplants.

Smut, Periconia, Myxomycetes – Similar genera commonly referred to as "slime molds", *Myxomycetes/Periconia* are among the few mold types that prefer colder climates to tropical climates. Fairly uncommon amplified indoors, but not unheard of, especially in buildings with extremely poor/no housekeeping. Some allergenic properties reported, but generally pose no health concerns to humans or animals. Smuts are ubiquitous parasitic plant pathogens, which require a living host to complete their life cycle and are not usually found growing indoors, other than indoor farms of the like. Smuts are most often found on corn, grass, weeds, flowering plants and other fungi; they are usually disseminated by wind. They are called smuts because they form black powdery spore masses that resemble soot or smut. *Myxomycetes/Periconia* are ubiquitous outdoor molds, and are commonly found in forested areas where bark, soil, dung, and leaf litter are present.

Stachybotrys – "Black mold". This organism is rarely found in outdoor samples, but is frequently found in indoor samples. It is one of the major contributors to "sick building" syndrome. It can produce a trichothecene mycotoxin, Satratoxin H, which is a poisonous by inhalation. Individuals with chronic exposure to the toxin reported cold and flu symptoms, sore throats, diarrhea, headaches, fatigue, dermatitis, intermittent local hair loss and generalized malaise. The toxins produced by this fungus can suppress the immune system affecting the lymphoid tissue and the bone marrow. With a water activity of 0.88, *Stachybotrys* is a tertiary colonizer, and requires active water damage in order to propagate. Stachybotrys is the most common fungus found on the cellulose outer faces of drywall, and is rare anywhere other than on drywall indoors.

Reference: Department of Environmental Health and Safety-Stachybotrys spp.
https://dehs.umn.edu/stachybotrys-spp

Spegazzinia – Saphrophytic fungus. Uncommon fungus, but spores are very large/distinctive, so one or two will be sometimes be identified in outdoor samples. Extremely rare to find any indoor amplification.

Stemphylium – A saprophytic fungus that generally infects certain crops such as carrot, tomato, asparagus, and soybeans. Uncommon to find outdoors in quantities of more than one of two, and very uncommon to find amplified indoors.

Torula - A common outdoor yeast-like mold that can be found on soil, dung, plant debris, sugar beet roots, oats, fresh and sea water. Rarely found amplified indoors. It produces simple or branched chains of dark spores which arise more or less directly from the vegetative hyphae. The spores are round, ellipsoidal or sub-spherical, brown or olivaceous in color. Dried torula is a common food additive used for its "smoky, umami" flavor.

Ulocladium – Very similar to *Alternaria*, many references now include *Ulocladium* with *Alternaria*. *Ulocladium* is saprophytic and is found both outdoors and indoors, with indoor amplification not uncommon. With water activity of 0.89 to 0.90, it is a late secondary/early tertiary colonizer, and generally requires active water intrusion to propagate. *Ulocladium* is considered on of, if not the, most allergenic molds, with *Ulocladium botrytis* in common use in skin-prick tests for mold allergies.

Quick Guide:

Spore Name	Indoor	Outdoor	Ubiquitous
Acremonium		X	
Alternaria			X
Ascospore		X	
Aspergillus			X
Basidiospore		X	
Bipolaris+			X
Chaetomium	X		
Cladosporium			X
Curvularia			X
Epicoccum			X
Erysiphe/Oidium		X	
Fusarium		X	
Ganoderma		X	
Geotrichum		X	
Helicomyces		X	
Mucor		X	
Nigrospora		X	
Pen/Asp Group			X
Penicillium			X
Pollen		X	
Rust		X	
Smut/Periconia/Myxo			X
Stachybotrys	X		
Stemphylium		X	
Torula		X	
Ulocladium			X

Indoor – Spores primarily found indoor only. While obviously all molds present inside come from outside originally, these spores are rarely found in outdoor air samples.

Outdoor – Spores primarily found outdoors only. While these spores can be found inside in small quantities from having blown in, they will rarely be found amplified inside except in cases of water damage severe enough that the framing wood has become rotten.

Ubiquitous – Spores commonly found both outside and amplified inside.

Do I have mold?

Easy question, harder to answer. Unless you live in a certified clean room, you have mold spores all around you. Your household dust is likely at least 5% mold spores. The vast majority of people (other than the immunocompromised) do not have any reaction whatsoever beyond minor occasional allergies to normal mold levels.

The real question is: Do I have significantly more or different molds inside than outside? The main goal of any mold survey is to identify any particular amplification of mold indoors. Amplification refers to a mold that is present indoors at 10x, 100x, even 1000x more than outdoors, which strongly implies indoor growth. Zero mold is not a reasonable goal. Even with absolutely perfect housekeeping, you are letting tens of thousands of mold spores in every time you open your front door in mid-summer. When looking at your spore trap results, make sure you are looking not only at the total spore concentration, but also checking for any mold types present indoor in significant numbers that are not present outside, or in very small quantities outside.

Why do I have mold, and what should I do?

All mold requires three things to grow: an organic food source, an appropriate amount of water, and an acceptable temperature. It is not reasonable to try to eliminate all household organic food sources nor to make the household temperature too hot or cold for molds. Therefore, the controllable “cause” is water/moisture. The mold was able to propagate because of the presence of extremely humid conditions, small condensation pools, or active water damage, depending on the type of mold. Therefore, the solution is to take care of the water issue. Depending on the severity, this may be a major rebuild to take care of foundation leaks, replacing doors and windows, fixing gutters and/or water piping, or just running a dehumidifier. A professional with a moisture meter can give you a good idea of the severity you’re likely facing, and possible solutions.

While cleaning up the currently present mold with bleach or an antifungal of some type is also important, it must be paired with a correction to the moisture issue, or the mold will just recur.

Should I be worried?

Nobody other than your physician can give you any medical advice of any kind. Rest assured you are not the first person to have an indoor mold problem, and most of time the situation ends up resolved with no major known consequences. Looking around the internet will introduce you to a variety of scaremongers who will tell you every health problem you have is from mold, and only they have the solution. You will also find people who will tell you that everything mold is overblown, if you have a working immune system you won't have any issues, and mold remediation is just an insurance scam.

The truth is, we don't really know. Whereas you can say, for example, that asbestos definitively causes mesothelioma and asbestosis, there does not exist that simple equivalency for environmental mold. There are a wealth of stories of ill health effects from mold, but the related science is lacking. Most species of mold have not been extensively studied for health effects, and those that have are mostly focused on hospitals and immunocompromised individuals, not the home/office environment with generally healthy people. Many molds are known to have the ability to produce certain mycotoxins, but we don't really have a good idea of what chemicals any particular mold in the home situation is going to make or not make based on the nature of the food, amount of water, other species present, etc. There are just too many variables. That said, it is very unlikely that any mold present in your house is providing you benefit, so there is no risk (other than financial) to removing the mold, fixing the water issue, and seeing if you feel better.

But again, nobody other than your physician can provide medical advice of any kind. If you want answers to whether your house is safe to inhabit, whether children should leave for the duration of the work, or anything else similar, those questions can only be answered by a medical professional.