



November 2, 2022

Granville County Schools
Bill Graham
101 Delacroix Street
Oxford, NC 27565

**Re: Limited Fungal Indoor Environmental Quality Investigation with Airborne and Surface Fungal Sampling at Hawley Middle School 2173 Brasfield Road, Creedmoor, NC
LRC Project – 22-2145**

At your request, on November 2, 2022, LRC Indoor Testing & Research, Inc. (LRC) performed a limited environmental fungal Indoor Environmental Quality (IEQ) sampling that included airborne and surface fungal sampling at the property listed above. This project was requested to characterize the types and levels of airborne and surface fungi in the structure.

LRC performs all water-damage and fungal investigations with sampling and recommendations in accordance with guidelines published in *Bioaerosols: Assessment and Control*, by the American Conference of Governmental Industrial Hygienists (ACGIH), in *Mold Remediation in Schools and Commercial Buildings* by the United States Environmental Protection Agency (USEPA), and in the currently recognized and accepted industry standards including the ANSI/IICRC S500 *Standard and Reference Guide for Professional Water Damage Restoration*, Fourth Edition (S500) and the ANSI/IICRC S520 *Standard and Reference Guide for Professional Mold Remediation*, Third Edition (S520).

Our inspection included the following:

1. Visual inspection of the AHU units in Rooms 123 and 124.
2. Collect representative moisture measurements in inspected areas.
3. Measure temperature and relative humidity indoors and outdoors.
4. Collect representative non-viable spore trap air samples indoors and one outdoors for comparison.
5. Collect representative non-viable surface tape lift samples of representative visible or suspect fungal growth if deemed necessary.
6. Provide a written report describing the survey results and comparing those results to accepted guidelines and directives. This report includes a summary of data, Certificates of Laboratory Analysis and a remediation protocol, if needed, based on the ANSI/IICRC S520 *Standard and Reference Guide for Professional Mold Remediation*, Third Edition (S520).

VISUAL INSPECTIONS, MOISTURE MEASUREMENTS, AND RELATIVE HUMIDITY

A calibrated moisture meter was used to measure moisture levels on representative hard surfaces. Typically, moisture contents approaching 17% and greater represent excessive moisture on hard surfaces (wood) in conditioned spaces; however, in non-conditioned spaces wood and semi-porous materials may approach these threshold levels naturally due to seasonal changes in temperature and humidity.

The temperature and relative humidity are summarized in Table A below. The relative humidity did not meet the current ASHRAE Standard to maintain indoor relative humidity below 65% in Room 124.

Table A – Temperature and Relative Humidity by Location

Location	Temperature	Relative Humidity
Room 124	69°F	66%
Room 123	64°F	56%
Outdoor Air	72°F	62%

General Observations:

The subject property is a one-story slab on grade structure used as a Middle School. It was reported that there were concerns about the air quality in 2 classrooms (124 and 123). The purpose of this investigation was to do air quality testing in each room, assess the condition of the AHU units and surrounding structure and to make recommendations on remediation efforts if needed.

In Room 123 the AHU unit had particulate on the grill and the return. A surface sample taken from the grill of the AHU unit (Sample 04) contained Numerous *Cladosporium*, Occasional Smuts, *Periconia*, Myxomycetes and Numerous Hyphal Elements (the growth structure of fungal spores). Several ceiling tiles around the unit showed visible staining, a surface sample taken of that staining (Sample 06) contained Numerous *Stachybotrys*, Occasional Smuts, *Periconia*, Myxomycetes and Numerous Hyphal Elements. There was some visible staining on the bottom of a desk/chair unit nearby and a surface sample taken of that staining contained only Occasional settled fungal spores. The air sample taken in this room (Sample 02) contained 427 fungal spores primarily of common outdoor fungi and exhibited what we consider to be a normal fungal ecology.

In Room 124 the grill of the AHU had been cleaned and ceiling tiles recently replaced. There was still particulate on the return side of the AHU unit. A surface sample taken (Sample 07) contained Numerous *Penicillium/Aspergillus* spores, Few *Cladosporium*, Occasional *Drechslera/Bipolaris* and Occasional Hyphal Elements. The air sample taken in this room contained 523 spores primarily of common outdoor type fungi, however there were trace amounts of *Stachybotrys* spores in this sample and our criteria for a normal fungal ecology does not allow for any. Therefore, this sample shows a slightly altered fungal ecology.

SAMPLING METHODOLOGY

Air Samples:

Currently there are no regulations regarding acceptable airborne fungal levels. Airborne fungal spores are ubiquitous in the outdoor and indoor environment. The guidelines followed in this report for the assessment and/or remediation of airborne and surface fungi are published in *Bioaerosols: Assessment and Control*, by the American Conference of Governmental Industrial Hygienists (ACGIH), in *Mold Remediation in Schools and Commercial Buildings* by the United States Environmental Protection Agency (USEPA), in *Recognition, Evaluation, and Control of Indoor Mold* by the American Industrial Hygiene Association (AIHA), and in the ANSI/IICRC S520 *Standard and Reference Guide for Professional Mold Remediation*, Third Edition (S520). Airborne fungal assessments are performed by comparing results from volumetric samples taken indoors to samples taken outdoors. Airborne fungi levels in non-problem indoor environments generally are less than or approximately the same as that outdoors and also show a similar composition and/or taxonomic predominance. Problems are usually implicated in the indoor air when one or more fungal genera or species are present in a much greater concentration indoors compared to outdoors. Sampling results are shown in the Certificates of Laboratory Analysis attached to this report. Results are discussed below.

Surface Samples:

Surface sampling results should follow guidelines as stated in the ANSI/IICRC S520 *Standard and Reference Guide for Professional Mold Remediation*, Third Edition (S520). Under normal circumstances, building materials that appear clean and free of dirt, water damage, and/or fungal amplification should show “Condition 1” or “normal fungal ecology”. Condition 1 is described in the Standard as “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”. Results from sampling “clean” surfaces, if performed, should show that there is no evidence of fungal amplification. Condition 2 is described as “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 is described as “an indoor environment contaminated with the presence of actual mold growth and associated spores”. Representative surface tape lift samples were collected as discussed below. Surface samples may be taken either with a tape lift or a swab and are analyzed microscopically. Sampling results are shown in the Certificates of Laboratory Analysis attached to this report. Results are discussed below.

SAMPLING RESULTS

Total Non-Viable Spore Air Sample Results:

Representative samples were taken for total airborne fungal spores with a calibrated Buck spore trap. Total airborne fungal spore sample volumes were 75-liters. The outdoor total fungal spore level (Sample 03) was measured at 17,547 Spores/m³ and was comprised of Ascospores (28%), Basidiospores (57%), *Cladosporium* (8%), *Penicillium/Aspergillus* group (4%), Smuts (2%), and

1% or less of various other fungal spores. The air sample results are summarized below in Table B.

Table B – Air Sampling Results

Sample #	Location	Total Airborne Spore Count (Spores/m ³)	*Non-Fungal Background Particulate Level
01	Room 124	533	Moderate
02	Room 123	427	Low-moderate
03	Outdoor Air	17,547	Low-moderate

*The Background Particulate Level refers to non-fungal debris seen in the air sample; such as skin cells, hair, fibers, dust, dirt, etc.

The total fungal spore count in sample 2 taken in Room 123 was lower than that found in the outdoor air. The types of fungal spores found in the indoor air samples were all common outdoor-type fungi present in low concentrations with no spikes in water loss fungi. Therefore, the results suggested a normal indoor fungal ecology in that sample.

The total fungal spore count in sample 1 taken in Room 124 was lower than that found in the outdoor air. However, the sample contained trace amounts of *Stachybotrys* spores. Spores in this grouping are commonly considered to be among the water loss fungi. Therefore, the results suggested a slightly altered indoor airborne fungal ecology in that sample. Some species of these fungi are considered allergenic and/or toxicogenic and should be handled with caution.

The background particulate that we see in the microscope at the magnification used is usually called ‘coarse particulate’ and consists of many things and can include the following: dirt, dust, pollen, fiber, hair, skin cells, dust mites and other insects. Fine particulates (to include VOC’s – volatile organic compounds) are not seen with the magnification used for these samples.

Surface Non-viable Tape Lift Sample Results:

Representative surface tape lift samples were collected from suspect mold-contaminated surfaces. Tape lift samples are collected to confirm visual observations. The samples are discussed in the narrative above and detailed in the attached certificates of laboratory analysis. The surface sampling results are summarized below in Table C.

Table C – Surface Sampling Results

Sample #	Location	Spores and Enumeration	Condition
04	Room 123- AHU Grill	Numerous: <i>Cladosporium</i> Occasional: Smuts, <i>Periconia</i> , Myxomycetes Numerous: Hyphal Elements	3
05	Room 123- Chair Bottom	Occasional: Basidiospores Occasional: Smuts, <i>Periconia</i> , Myxomycetes Occasional: Hyphal Elements	1

Sample #	Location	Spores and Enumeration	Condition
06	Room 123 – Ceiling tile	Numerous: <i>Stachybotrys</i> Occasional: Smuts, <i>Periconia</i> , Myxomycetes Numerous: Hyphal Elements	3
07	Room 124- Return	Numerous: <i>Penicillium/Aspergillus</i> Few: <i>Cladosporium</i> Occasional: <i>Drechslera/Bipolaris</i> Occasional: Hyphal Elements	3

CONCLUSIONS AND RECOMMENDATIONS

Results as reported by LRC apply only to the day of this inspection. LRC cannot and does not warranty that other parts of the structure were completely free or that the structure will remain free in the future from hidden sources of moisture or fungal contamination.

LRC’s visual inspection of the structure was as thorough as possible considering the nature of this investigation. It should be noted that conditions reported in this report were based on the time of the inspection only and circumstances may change following the inspection. Should further issues occur and conditions change it may be necessary to re-evaluate the structure and consider more in-depth testing. Standard quality controls such as air filtration devices, negative pressure and containments should be used.

All water damage and fungal remediation should follow guidelines as stated in the ANSI/IICRC S500 *Standard and Reference Guide for Professional Water Damage Restoration*, Fourth Edition (S500) and in the ANSI/IICRC S520 *Standard and Reference Guide for Professional Mold Remediation*, Third Edition (S520). All work should follow recommendations therein to protect workers, occupants, building spaces from dusts and debris during remediation and removal of fungal contaminated materials.

Due to finding the slightly impacted indoor air in Room 124 and surface fungal growth we make the following recommendations. Please see Appendix A at the end of this document for general mold remediation recommendations and general responsibilities of the remediation contractor.

Specific recommendations for this project are as follows:

- It is recommended that the AHU units in both rooms be cleaned. Depending on the unit the components should be cleaned to include the supply and return ducts and registers, grills and diffusers, heating and cooling coils, condensate drain pans, fan motor and fan housing and air handling unit housing.
- Run HEPA filtered air scrubbers in both rooms during and following the cleaning activity. It is recommended that the scrubbers run for a minimum of 24 hours following the cleaning.
- Remove and replace the stained ceiling tiles. Immediately bag and seal the removed tiles and clean the surrounding grid structure.

Before clearance testing:

- Run air scrubbers at the completion of remediation to cleanse the air to get a minimum of 100 air exchanges.
- Prior to re-sampling, seal and turn off air scrubbers.
- HEPA vacuum and wipe clean all surfaces within the containment.
- Control the indoor relative humidity to be between 30 and 60% at all times.

Disclaimer:

The recommendations are given in order to assist a certified mold remediation contractor in returning the impacted structures to “Condition 1” or “normal fungal ecology” in accordance with the ANSI/IICRC S520 *Standard and Reference Guide for Professional Mold Remediation*, Third Edition (S520).

If you have any questions or concerns, please do not hesitate to contact us.

Sincerely,

A handwritten signature in cursive script that reads "Tony Richmond".

Tony Richmond, BBA, CAI, WRT
LRC Indoor Testing & Research

APPENDIX A

General recommendations are as follows:

- Services should be performed by a certified mold remediation contractor. IICRC or equivalent certifications and experience are suggested.
- Mold remediation contractors should carry Mold Specific Liability Insurance.
- Remediation workers should use all appropriate personal protective equipment (PPE), including but not limited to half-face respirators with HEPA cartridges, protective eyeglasses, disposable protective clothing, gloves, and safety shoes.
- All negative air machines and air scrubbers must have triple filtration, including at least one HEPA filter.
- All vacuums must have a certified HEPA filter.

The remediation contractor will use their professional judgment to:

- Determine the ultimate extent and method of material removal based on current environmental conditions and previous sampling and inspection results.
- Preserve the structure's architectural and structural integrity.
- Identify and implement specific work practices meeting health, safety, and environmental regulations.
- Select appropriate and, where regulated, approved materials to successfully conduct this project.
- Construct containment(s) and place all work areas to be remediated under negative pressure relative to surrounding areas. If possible, negative pressure should be maintained using HEPA-filtered air scrubbers exhausted to the outside. Containment should include polyethylene barriers, negative air pressure machines with HEPA-filtration, and decontamination chambers. Care should be taken to ensure make up air is drawn from acceptable sources.
- Any debris or materials removed from containment should be secured in closed 6-mil polyethylene bags or containers prior to removal. Any sheetrock removed should be removed to a distance of 24 inches beyond the end of damage or visible microbial growth if practical. Removal of additional material to facilitate ease of work, i.e. replacing sheetrock in full or half sheets should be after discussion with the homeowner and insurance representative.
- Source or sources of water intrusion should be identified and corrected before final cleaning is conducted or new materials are installed.
- Surfaces inside the containment that will not be removed should be HEPA-vacuumed, cleaned with an appropriate detergent and/or treated with an EPA registered biocide, and vacuumed a second time to remove any residue.
- The use of HEPA filtered air scrubbers is recommended in areas outside containment to minimize dust and inadvertent cross contamination.
- Inspect the HVAC system and associated duct work and where appropriate clean and treat with an EPA registered and approved biocide including components such as fan, coil, ducts, and diffusers.

- A thorough HEPA filtered vacuuming should be performed of the surfaces, floors and carpets, and a final HEPA vacuuming be performed after all remediation is complete.
- After cleaning and removal is complete, a final inspection and testing should be performed prior to the replacement of building materials. Application of an anti-microbial sealant such as Fosters or Fiberlock is permissible based on discussion with the building owner and the insurance company.
- Prior to rebuild or put back, LRC should be engaged to perform a post-remediation verification (PRV). The standard in our industry. The IICRC S520, states: “It is preferable that the IEP [Indoor Environmental Professional] be an unbiased resource ... independent of the remediator. If the IEP conducting any activity such as assessment or post-remediation verification is not independent from the remediator, they should disclose in writing to the client that they are deviating from the Standard.”