



August 29, 2023

Dare County Schools
Ian Adams
3020 S. Wrightsville Avenue
Nags Head, NC

**Re: Limited Environmental Post Remediation Clearance Investigation with Airborne and Surface Fungal Sampling at First Flight Elementary School, Kill Devil Hills, NC
LRC Project – 23-1842**

At your request, on August 22, 2023, LRC Indoor Testing & Research, Inc. (LRC) performed a limited environmental fungal post remediation clearance inspection 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. This fungal inspection was requested at the completion of remediation 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 remediated areas.
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 some areas of the building.

Table A – Temperature and Relative Humidity by Location

Location	Temperature	Relative Humidity
Entry Hall @ Cafe	72°F	67%
Hall A	74.8°F	57%
Hall B	75°F	60%
Room B-102	76°F	67%
Media	73°F	60%
Hall C	71°F	65%
Hall E	72°F	63%
Outdoor Air	83°F	78%

Descriptions in this report are based on looking at the structure from the main entrance door.

General Observations:

The studied property is a single-story building used as an elementary school. It was reported that remediation activity was recently completed. This project was limited to the remediated areas of the building.

On the day of this inspection, contents were in place and the students were not occupying the building. It was reported that remediation activity was based on a previous initial report issued by an industrial hygiene company.

Room B-102:

The humidity was elevated in this room. Moderate particulate was noted on the HVAC supply vents and inside the sink base cabinet in the kitchen area. A sample collected from the particulate inside the sink base cabinet (Sample 20) had only occasional settled fungal spores showing a Condition 1. Staining was not seen on ceiling tiles in this room.

Media Room:

A stack of computer cases had light particulate on the bottom. A surface sample collected from the particulate (Sample 25) had only occasional settled fungal spores. The initial air sample collected in this room (Sample 05) had a low spore count but a predominance of

Penicillium/Aspergillus group spores. A further inspection showed no problem areas. HEPA air scrubbers were operated and a fungal air sample collected (Sample 18) showed a normal fungal ecology.

B-148:

The desk chair at the teacher's desk had particulate on the bottom, sides and back. A surface sample collected (Sample 24) had only occasional settled fungal spores. The air sample collected from this room had a predominance of *Penicillium/Aspergillus* group spores. Further observations and testing was conducted in an attempt to find the source of the altered indoor fungal ecology. Surface samples were taken from the top and back of an area rug in place over carpeting. The samples (Sample 21 and 22) both had Condition 3 fungal growth. A carpet panel was removed from the flooring and the bottom sampled. The sample (Sample 27) had only occasional settled fungal spores. A floor panel was lifted and the bottom was sampled (Sample 23) and the sample had only occasional settled fungal spores. The area carpet was bagged and removed from the room. Carpeting was HEPA vacuumed and steam cleaned. Air samples were collected throughout the inspection, cleaning and air cleaning. The final air sample collected after the air scrubbers were allowed to clean the air (Sample 15) showed a 'normal 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 13) was measured at 4107 Spores/m³ and was comprised of *Cladosporium* (44%), Ascospores (8%), Basidiospores (25%), Smuts (5%), *Penicillium/Aspergillus* group (5%) and 4% 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	Entry Hall at Cafeteria	213	Low
02	Hall A	160	Low
03	Hall B	213	Low
04	B 148	578	Low
05	Media	293	Low-moderate
06	Hall at Media	80	Low
07	Hall E	160	Low
08	Hall C122	93	Low
09	B102	80	Low
10	Hall 105	320	Low
11	Media	280	Low-moderate
12	B148	8427	Low-moderate
13	Outdoor Air	4107	Low-moderate
14	B 148 -retest-	787	Low-moderate
15	B 148 – re-test after cleaning	200	Low
16	B 143	93	Low
17	142	133	Low
18	Media Center -after cleaning	133	Low

*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 counts in the areas sampled indoors were lower than that found in the outdoor air. With the exception of the samples collected in B148 (Sample 04, 12 and 14) and the

Media Center (Sample 11) 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 those areas sampled.

The samples from B148 and the Media Center were comprised predominantly of *Penicillium/Aspergillus* group spores. Spores in this grouping are commonly considered to be among the water loss fungi. Therefore, the results suggested an altered indoor airborne fungal ecology in the areas sampled. Some species of these fungi are considered allergenic and/or toxicogenic and should be handled with caution. These areas were re-cleaned and final air samples collected showed a normal fungal ecology.

The particulate in the indoor air samples was in the low to low-moderate range. The particulate that we see in the microscope at the magnification used is usually called ‘course particulate’ and consist of many things and can include the following: dirt, dust, mold, 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
20	B 102 - cabinet	Occasional: <i>Penicillium/Aspergillus</i>	1
21	Room B 148-back of large area rug	Moderate: <i>Penicillium/Aspergillus</i> Few: Hyphal Elements	3
22	B 148 top of area rug	Numerous: <i>Pithomyces</i> Moderate: <i>Curvularia</i> Few: <i>Penicillium/Aspergillus</i> Occasional: Hyphal Elements	3
23	B 148 – Floor Panel - bottom	Occasional: <i>Penicillium/Aspergillus</i>	1
24	B 148 – teachers desk chair	Moderate: <i>Penicillium/Aspergillus</i> Occasional: Hyphal Elements	3
25	Media Center - computer	Media Center – computer case	1
26	Kitchen Cabinet	Few: <i>Chaetomium</i>	3
27	B 148 – Carpet square	Occasional: <i>Cladosporium</i>	1

CONCLUSIONS

Results as reported by LRC apply only to the day of this inspection. LRC cannot and does not warrant 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.

The clearance requirements for this project were as follows:

- The primary clearance criterion was no visible fungal growth. The cleaned areas were inspected for removal of materials and that a thorough cleaning of any remaining surfaces had been completed to remove excess fungal spores, dust and debris.
- Surfaces should be dried to industry standards.
- Representative tape lift samples were collected where deemed necessary for non-viable fungal analysis. Acceptance criterion was fewer than 100 spores, on average, per square inch of material tested. There can be no predominance of fungi commonly considered to be among the water loss fungi (e.g. *Penicillium/Aspergillus* group spores, etc.). There can be no *Stachybotrys* or *Chaetomium* spores.
- Clearance criteria for the non-viable spore trap air samples were as follows: the total fungal spore count should be lower than that found in the outdoor air. The fungal composition indoors should be similar to that found outdoors with no predominance of water-damage fungi indoors. The caveat to these criteria is if common water-damage fungi are present in the outdoor air samples, it is unreasonable to expect them to be excluded from the indoor sample.

The visual observations, moisture measurements, and final air/surface sample results reflect that of a normal indoor fungal ecology.

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

Sincerely,



Cathy Richmond, B.S.
LRC Indoor Testing & Research



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