



May 3, 2025

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

**Re: Limited Indoor Air Quality Sampling with Airborne Fungal Sampling at Kitty Hawk Elementary School, 16 S. Dogwood Trail, Kitty Hawk, NC.
LRC Project – 25-1414**

At your request, on April, 20, 2025, LRC Indoor Testing & Research, Inc. (LRC) performed a limited environmental fungal Indoor Air Quality (IAQ) sampling that included airborne fungal sampling at the property listed above.

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).

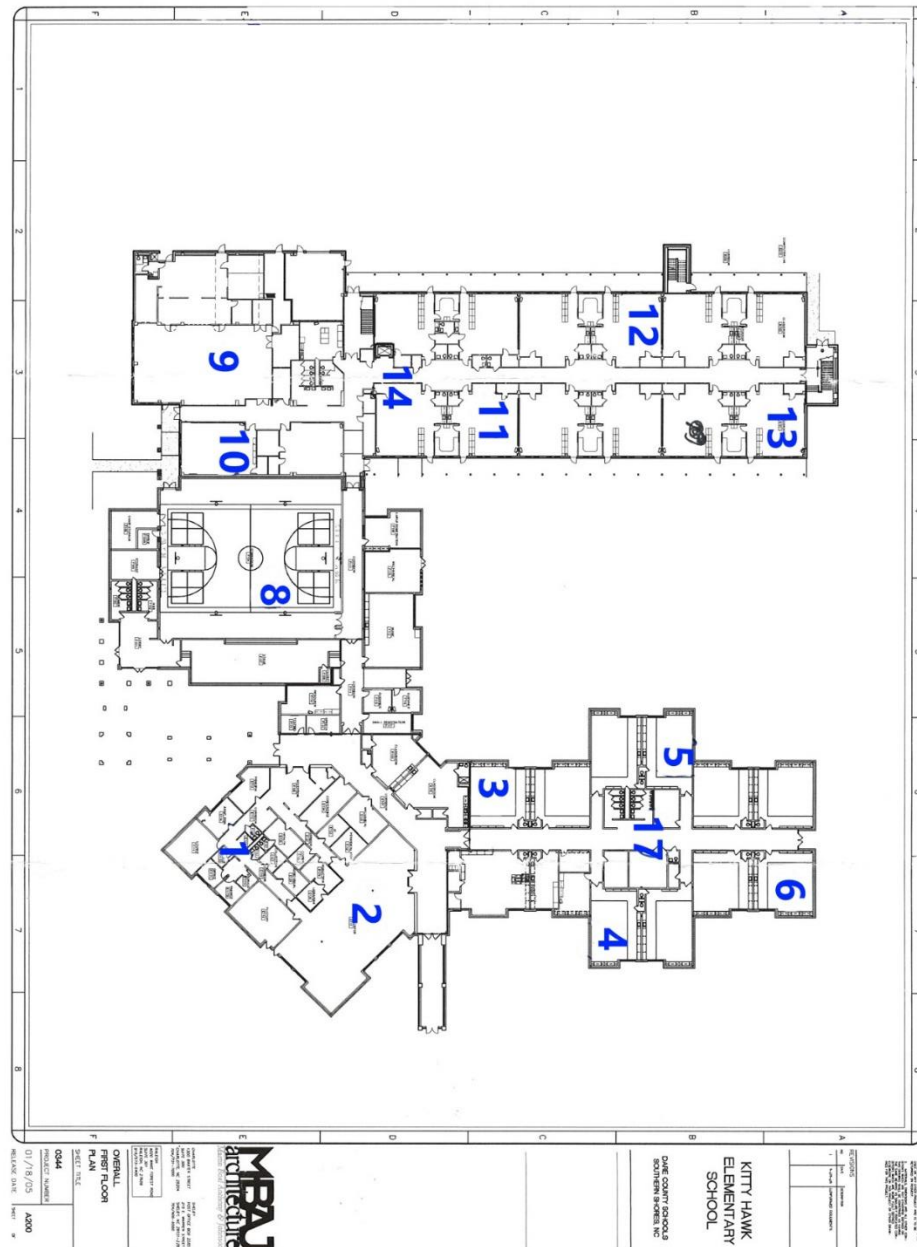
Our inspection included the following:

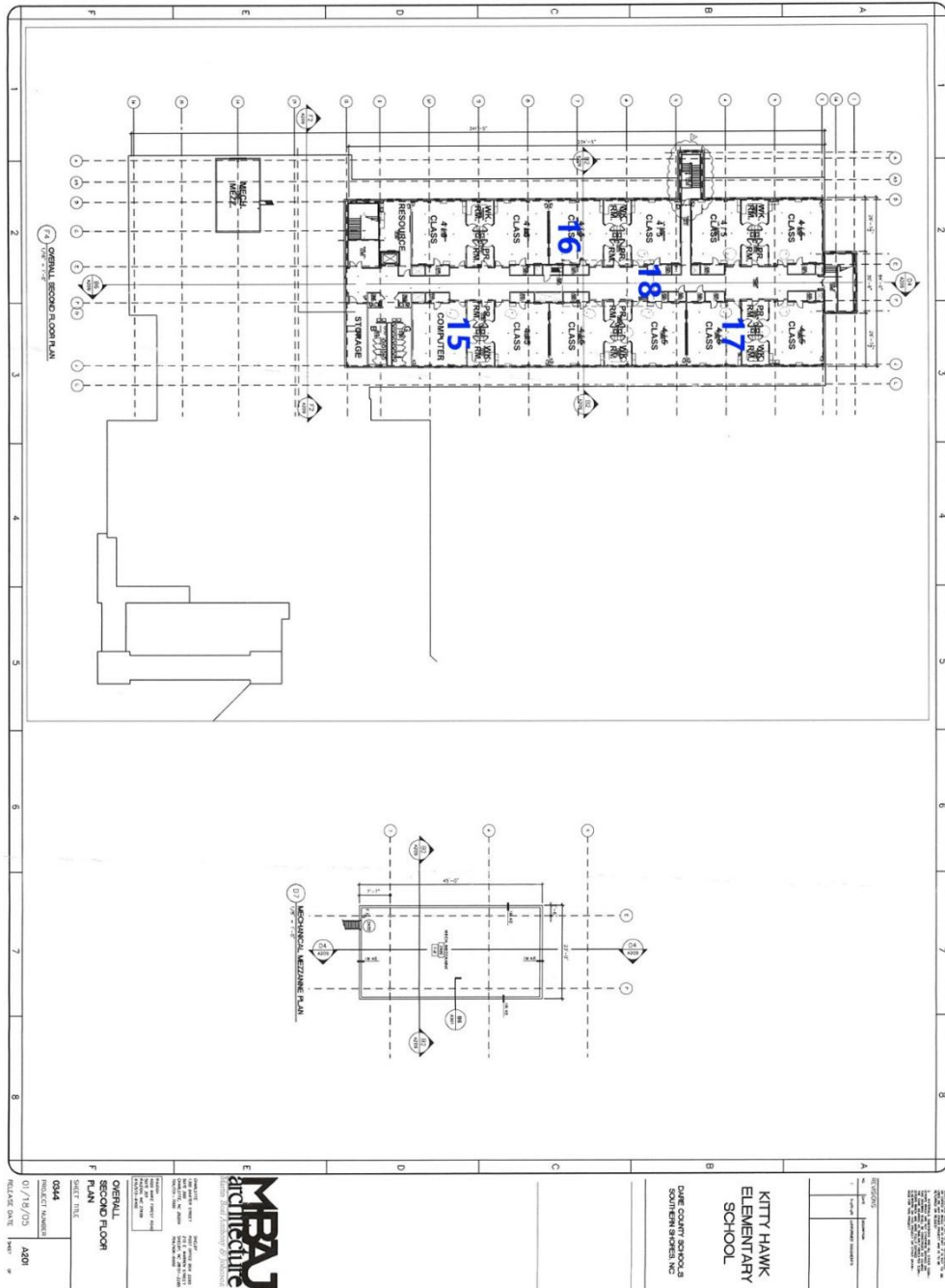
1. Measure temperature and relative humidity indoors and outdoors.
2. Collect representative non-viable spore trap air samples indoors and one outdoors for comparison.
3. Collect representative Particle Counts, Carbon Dioxide and Carbon Monoxide counts at locations where air samples are collected.
4. Provide a written report describing the survey results and comparing those results to accepted guidelines and directives. This report includes a summary of data and Certificates of Laboratory Analysis.

BACKGROUND

This inspection was limited to non-viable spore trap air samples, particle counts, CO and CO² measurements that were collected from representative locations selected throughout the building. Descriptions in this report are based on looking at the structure from the main office entrance. Moisture measurements and visual inspections were not conducted on this day.

Map – Sampling Locations





Photos – Representative Air Sampling Locations



Air Sample Outdoors



Air Sample in Media Center



Air Sample in Classroom



Air Sample in Classroom



Air Sample in Hallway



Air Sample in Gym



Air Sample in Cafeteria



Air Sample in Classroom



Air Sample in Classroom



Air Sample Hallway

AIR SAMPLING METHODOLOGY

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.

TEMPERATURE & RELATIVE HUMIDITY METHODOLOGY

Temperature and relative humidity readings were recorded by the Lighthouse Handheld 3016 Particle Counter. The temperature and relative humidity are summarized in Table A below.

The American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standard 55 for thermal comfort suggests that the indoor temperature should be between 73 °F to 79 °F in the summer and 68 °F to 75 °F in the winter.

ASHRAE recommends a relative humidity of 30-60% in habitable spaces. The Environmental Protection Agency (EPA) recommends that indoor relative humidity (RH) be kept below 60%-ideally between 30 and 50%).

AIR SAMPLING AND TEMPERATURE & RELATIVE HUMIDITY 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 19) was measured at 5867 Spores/m³ and was comprised of Basidiospores (49%), *Cladosporium* (37%), Smuts (5%), Ascospores (4%), *Penicillium/Aspergillus* (4%), and 1% or less of various other fungal spores. The air sample results are summarized below in Table A.

Table A – Air Sampling Results

Sample #	Location	Total Airborne Spore Count (Spores/m³)	*Non-Fungal Background Particulate Level	Temperature °F	Relative Humidity %
01	Office	133	Low-moderate	73	51
02	Media Center	173	Moderate	72	51
03	D 120	40	Low	72	54
04	D 112	27	Low	72	59
05	D 129	40	Low	71	59
06	D 102	80	Low	70	64
07	D Hall	147	Low-moderate	71	62
08	Gymnasium	93	Low	71	58
09	Cafeteria	40	Low	72	57
10	G 103	120	Low-moderate	72	54
11	A 109	53	Low	73	54
12	A 106	93	Low-moderate	72	52
13	A 101	27	Low	71	55
14	A Hall	160	Low-moderate	72	56
15	Hall at B 111	93	Low	73	57
16	B 108	40	Low	73	56
17	B 103	27	Low	74	53
18	B Hall	93	Low-moderate	74	56
19	Outdoor Air	5867	Low-moderate	75	60

The total fungal spore counts in the areas sampled indoors were 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 a fungal composition similar to the outdoor showing a ‘normal fungal ecology’.

The particulate in the indoor air samples was in the Light to 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.

The temperature was within the recommended range.

The relative humidity met the current ASHRAE and EPA standards to maintain indoor relative humidity below 60% except in two areas: D 102 and D Hall.

PARTICLE COUNT METHODOLOGY

A Lighthouse Handheld 3016 Particle Counter was used to measure the levels of airborne particulates. Airborne particles are solids suspended in the air. In a commercial setting, particle levels should be less than outside readings due to better filtration. Particle counts can vary in a school building due to occupant activity, including ingress/egress from outside. For this project, the particle count results are used to compare those results to locations where the air sample results suggest an altered environment.

PARTICLE COUNT RESULTS

Table B below summarizes the minimum, maximum, and average particle count in the building in each size category during the sampling period. Each time one liter of air was drawn into the Particle Counter, and the Particle Counter calculated all particles that are greater than or equal to the particle size indicated in the size categories.

Table B – Indoor Particle Count Sampling Results

	0.3 micron	0.5 micron	1.0 micron	2.5 micron	5.0 micron	10.0 micron
Minimum	8516	448	84	11	0	0
Maximum	11642	1479	320	101	52	21
Average	7902	1046	203	34	7	3

Table C below summarizes the average particle count in the outdoor air at the time of sampling. Each time one liter of air was drawn into the Particle Counter, and the Particle Counter calculated all particles that are greater than or equal to the particle size indicated in the size categories.

Table C – Outdoor Particle Count Sampling Results

	0.3 micron	0.5 micron	1.0 micron	2.5 micron	5.0 micron	10.0 micron
Outdoor Air Average	19623	2878	1149	366	18	1

Particle counts were generally similar to, or lower than, that found in the outdoor air. The Office did have elevated particle counts in the 5.0 and 10.0 micron ranges.

CARBON MONOXIDE AND CARBON DIOXIDE METHODOLOGY

A Triplet IAQ Meter (Model GSM350) was used to measure the concentrations of CO and CO₂. CO is a dangerous gas caused by incomplete combustion. The level of CO in an indoor environment should be low (none detected to 4 parts per million [ppm] depending on fuel sources used indoors) or same as outdoors. CO₂ is commonly used as an indicator of ventilation adequacy. Elevated levels of CO₂ may serve as an indicator of insufficient intake of fresh air into a building or an insufficient number of air changes in the work environment. Levels will typically increase over the course of a normal day as human exhalation builds up. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Standard 62.1-2016 states that maintaining a steady-state CO₂ concentration in a space be no greater than about 700 ppm above outdoor air levels. OSHA currently sets 5,000 ppm as their Permissible Exposure Limit (PEL) for occupational exposure.

CARBON MONOXIDE AND CARBON DIOXIDE RESULTS

Table D – CO₂ and CO Sampling Results

	CO₂ (ppm) Indoors	CO₂ (ppm) Outdoors	CO (ppm) Indoors	CO (ppm) Outdoors
Minimum	437	441	0	0
Maximum	481	452	0	0
Average	473	447	0	0

The average CO₂ concentration indoors was within the recommended range.

In addition, the indoor CO concentrations were measured at zero in all locations. Therefore, the results suggested that the indoor CO concentrations were within normal ranges.

CONCLUSIONS

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.

This inspection was limited to indoor air quality parameters. The indoor air samples did not show a fungal amplification or an altered indoor fungal ecology. Temperature and Relative Humidity

readings were within the recommended ranges except in D Hall and D 102. The relative humidity in these areas were slightly above the recommended range. Particle counts were generally lower than, or similar to, the outdoor air except in the Office. Carbon Dioxide levels were within the normal recommended range. Carbon Monoxide levels were zero.

RECOMMENDATIONS

- Due to finding the elevated relative humidity in D 102 and the D Hall it is recommended that the HVAC system services those areas be inspected to make sure it is dehumidifying when operated in the cooling mode.
- Due to the finding the elevated particle counts in the Office, it is recommended that additional custodial efforts be performed. The office did have carpeting, which can contribute to the elevated counts.

This report was prepared for the sole use of Dare County School System and written authorization from them is required to share contents.

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



Amber Campbell, REHS, WRT, CMI
LRC Indoor Testing & Research



Angela Hoyt, B.S., B.A., WRT, CMI
LRC Indoor Testing & Research

A handwritten signature in black ink, appearing to read 'Mitch Richmond', with a stylized, cursive script.

Mitchell Richmond, B.A, PMP, CMI
LRC Indoor Testing & Research

A handwritten signature in black ink, appearing to read 'Brenden McCutcheon', with a stylized, cursive script.

Brenden McCutcheon, B.S. CMC
LRC Indoor Testing & Research