INDOOR AIR QUALITY TESTING REPORT

Report Prepared For:
Grand Rapids Public Schools

Project Site:
Campus Elementary

Project Dates:
September 11th, 2023

***MicroAir Project No.*: MA-162-23**

September 13, 2023
Project No.: MA-162-23

Mr. Alex Smart, RA
Executive Director of Facilities and Operations
Facilities & Operations
Grand Rapids Public Schools
900 Union, NE
Grand Rapids, MI 49503

MicroAir Consulting, LLC
13351 Oakcrest Avenue
Gowen, MI 49326
Phone: 616-302-0819
Web: microairconsulting.com
Email: microairconsulting@gmail.com

RE: Indoor Air Quality Assessment
Campus Elementary

Dear Mr. Smart:

MicroAir Consulting, LLC (MicroAir) is pleased to submit this indoor air quality (IAQ) testing report for Campus Elementary located at 710 Benjerman Avenue, SE, Grand Rapids, Michigan. The IAQ testing was conducted on September 11th, 2023.

Please find the enclosed Indoor Air Quality (IAQ) assessment report and supporting documents including our testing procedures, findings, testing results, and conclusions. This report is for the explicit use of Grand Rapids Public Schools.

MicroAir is glad to be of service to you and your team. If you have any questions or require additional information, please contact me at 616-302-0819 or microairconsulting@gmail.com.
Thank you.

Sincerely,

MicroAir Consulting, LLC

Christian T. Decker

Christian T. Decker, MS
Industrial Hygienist

1.0 INTRODUCTION

MicroAir Consulting was retained by Grand Rapids Public Schools (GRPS) to conduct indoor air quality testing for nuisance dust (total particulates), fibers-in-air, and molds (fungi). The IAQ testing was conducted in several locations inside floors 1-3 on September 11th, 2023.

2.0 TOTAL PARTICULATES IN AIR (Nuisance Dust)

2.1 Testing Procedures

Air quality monitoring data was collected by use of a real-time data logging aerosol monitor. A TSI® Dusttrak™ was utilized for dust monitoring for dust particles between the sizes of 0.1 to 15 µm (micrometers). This allows the monitor to provide an aerosol concentration rage of 0.001 to 150 milligrams per cubic meter. The Dusttrak™ was calibrated by premier safety prior to monitor setup. Dust monitoring was conducted on each of the three floor of the building.

2.2 Exposure Limits

The OSHA permissible exposure limit (PEL) for total dust particulates is 15 milligrams per cubic meter of air (mg/m^3) averaged over an 8-hour workday or time-weighted average (TWA). The TWA means the employee's average airborne exposure in any 8-hour work shift of a 40-hour work week that shall not be exceeded.

3.0 FIBERS-IN-AIR utilizing NIOSH Method 7400 (PCM)

3.1 Testing Procedures

Fiber-in-air samples were collected in accordance with EPA NIOSH 7400 method (Issue 2 of August 15, 1994). The air pumps were calibrated to ensure accuracy in the sample volume. All samples were collected using 25-millimeter diameter, 0.8 micrometer, open faced filter cassettes equipped with non-static 50 millimeter extension cowls. The filter media were mixed cellulose ester membranes. All samples were analyzed by a MicroAir analyst using phase contrast microscopy. The samples were analyzed using an Olympus™ phase contrast microscope (PCM). Fibers greater than 5-microns in length with a 3:1 length-to-width ratio are counted.

3.2 Exposure Limits

The OSHA permissible exposure limit (PEL) for fibers-in-air is 0.1 fibers per cubic centimeter of air (f/cc) averaged over an 8-hour workday or time-weighted average (TWA). The TWA means the exposed persons average airborne exposure in any 8-hour work shift of a 40-hour work week that shall not be exceeded. The EPA's allowable concentration of asbestos fibers in a school is 0.01 f/cc (PCM method).

4.0 MOLD (Fungi)

4.1 Testing Procedures – Non-Culture Method

Airborne particulates can be collected directly onto a glass or plastic slide, with a thin layer of light grease, and microscopically examined using 600X magnification to estimate bioaerosol component concentrations

and fungal spore identity without the requirement of incubating the organisms on a suitable growth agar. For this method, samples of airborne particulates were collected using a Air-O-Cell Air Sampler connected with tubing to a rotary vane high volume pump calibrated to 15 liters per minute (lpm) for 5 minutes to collect a volume of 75 liters (L) of air through a narrow slit where it impinges onto the grease. The samples were sent to Apex Research in Whitmore Lake, Michigan for fungal spore analysis.

4.2 Exposure Limits

Currently, there are no published standards of risk associated with exposure to bioaerosols. Some researchers recommend that indoor bioaerosol levels should be less than out-of-doors, or another area of the building where no complaints or odors are reported, and the taxa should be similar. A situation can be considered unusual when overall levels of bioaerosols are at least an order of magnitude higher than those that commonly occur outdoors, or if the bioaerosols differ between outdoors and the environment being sampled.[1]

The limitation of this method is that the full biodiversity can be difficult to ascertain, since important taxonomic features of the fungi are not available for examination. In most cases, fungal spores are identified only to broad taxonomic classes or groups. Additionally, and depending on morphology, other non-distinctive spores are reported in categories such as ascospores (produced in an ascus) or basidiospores (including the mushrooms and other microfungi).

5.0 FINDINGS

5.1 Total Particulates in Air (Nuisance Dust)

The monitoring results indicate that total airborne concentrations of nuisance dust, at the time of sampling, on each of the three ranged in concentration as follows:

First Floor - 0.026 mg/m^3 to 1.020 mg/m^3
Second Floor - 0.165 mg/m^3 to 0.443 mg/m^3
Third Floor - 0.067 mg/m^3 to 0.274 mg/m^3.

The data uploaded from the Dusttrak monitor is attached with this report.

5.2 Fibers-in-Air utilizing NIOSH 7400 (PCM)

Indoor air quality testing results indicate that airborne fiber concentrations, in the areas tested on each the three floors of Campus Elementary ranged in air fiber concentration (see table below):

Campus Elementary Fibers-In Air (PCM) – September 11th, 2023		
Sample Location	**Fiber-In-Air Concentration**	**Units**
Office	<0.001 (none detected)	Fibers/cm^3
Gym	0.003	Fibers/cm^3
Room 102	0.002	Fibers/cm^3
Hallway outside of Room 113	0.003	Fibers/cm^3
Hallway outside of Room 116	0.003	Fibers/cm^3

[1] *Guidelines for the Assessment of Bioaerosols in the Indoor Environment*, American Conference of Governmental Industrial Hygienists (ACGIH), Cincinnati, Ohio.

Campus Elementary		
Fibers-In Air (PCM) – September 11th, 2023		
Room 211	0.003	Fibers/cm^3
Center of 2nd floor hallway	0.004	Fibers/cm^3
Room 214	0.002	Fibers/cm^3
Hallway outside of Room 300	0.003	Fibers/cm^3
Hallway outside of Room 305	0.002	Fibers/cm^3

5.3 Mold (Fungi) Non-Culture Method

A comparison was made of the airborne fungi (taxa) recovered in mold samples indoors with the fungal taxa present outdoors. This method is used to determine whether the airborne levels indoors exceeded that of the fungal taxa present indoors. The data was further evaluated for diversity of the fungi recovered. These two criteria make up the bulk of the information needed to determine if elevated levels of fungi persist in the areas selected for the mold-in-air sampling.

The sampling results show there were no marker or signature fungi recovered such as *Stachybotrys sp.*, *Acremonim sp.*, *Sporobolomyces sp.*, *Memnoniella sp.*, Ulocladium. These fungi, if detected indoors, are very likely associated with water damage and if recovered would cause a need further testing a possibly remediation.

Based on these results, the mold types and the associated mold spore counts and would not be considered unusual at the time of the sampling. See the table below for the sampling results. The analytical laboratory report is also included in this report.

Grand Rapids Montessori Academy		
Lead In Air - August 19th, 2023		
Sample Location	**Raw Spore Count Indoors**	**Outdoor Raw Spore Count**
Office	28	>426
Gym	24	>426
Room 102	23	>426
Hallway outside of Room 113	102	>426
Hallway outside of Room 116	131	>426
Room 211	30	>426
Center of 2nd floor hallway	34	>426
Room 214	29	>426
Hallway outside of Room 300	50	>426
Hallway outside of Room 305	21	>426

6.0 CONCLUSIONS

On September 11th, 2023 MicroAir Consulting, LLC (MicroAir) conducted IAQ testing on the three floors of Campus Elementary. The testing was requested by GRPS due to parent concerns of acceptable IAQ conditions. The indoor air quality samples were collected classrooms and in common areas.

The sampling and the laboratory analytical results, airborne concentrations of total particulates (nuisance dust), fibers-in-air, and mold (fungi) in air were below current Michigan EGLE, EPA, and OSHA, and

standard industrial hygiene levels. Based on this information, the conditions at the time of sampling, would not be considered unusual.

7.0 LIMITATIONS

The testing procedures, findings, conclusions, and recommendations presented in this report are based on the scope of work defined herein and have been made to assist in making a reasonable assessment of risk with respect to the possible presence of mold, particulates, or fibers-in-air in the specific areas of the building. This testing has been performed in accordance with standards of care and diligence, which are considered to be representative of environmental engineering practices at the present time. Any conclusions made are based on limited sampling and visual observations and were derived in accordance with generally accepted standards of industrial hygiene practice. No other warranty, either expressed or implied, is made. In addition, the conclusions presented in the report were based solely upon the services described, and not on scientific tasks or procedures beyond the intended scope of services.

If you have any questions or require additional information, please contact me at 616-302-0819 or microairconsulting@gmail.com. Thank you.

End of report

LABORATORY ANALYTICAL REPORTS

(See attachments)

Certificate of Laboratory Analysis

Test Method, Fungal Spore Analysis

Project: Campus School

Report to:
Mr. Chris Decker, MS
MicroAir Consulting
13351 Oakcrest Ave.
Gowen, MI 49326

ARL Report # 23-M26325
Date Received: 09/13/23
Date Analyzed: 09/13/23
Date Reported: 09/13/23
Media: Zefon

ARL #	M26325-01		M26325-02		M26325-03		M26325-04	
Client #	Office		Gym		102		Hall 113	
Location:	Office		Gym		Rm. 102		Hallway Outside 113	
Sampling Date:	09/11/23		09/11/23		09/11/23		09/11/23	
Volume:	75		75		75		75	
Debris Rating:	**3**		**2**		**2**		**3**	
Spore Type/Particulate	**Raw Ct.**	**Spore/m^3**	**Raw Ct.**	**Spore/m^3**	**Raw Ct.**	**Spore/m^3**	**Raw Ct.**	**Spore/m^3**
Alternaria	0	0	0	0	0	0	2	104
Ascospores	3	156	0	0	0	0	0	0
Basidiospores	9	468	7	364	17	884	35	1820
Cladosporium	6	312	5	260	2	104	25	1300
Epicoccum	0	0	0	0	0	0	4	208
Hyphal Fragments	4	208	2	104	1	52	5	260
Penicillium / Aspergillus	2	104	7	364	3	156	8	416
Periconia / Myxomycetes	3	156	1	52	0	0	0	0
Pithomyces	0	0	0	0	0	0	2	104
Rust Urediniospores	1	52	2	104	0	0	21	1092
Torula	0	0	0	0	0	0	0	0
Nigrospora	0	0	0	0	0	0	0	0
Polythrincium	0	0	0	0	0	0	0	0
Total	28	1456	24	1248	23	1196	102	5304

Robert T. Letarte, Jr., Laboratory Director

Certificate of Laboratory Analysis

Test Method, Fungal Spore Analysis

Project: Campus School

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MicroAir Consulting
13351 Oakcrest Ave.
Gowen, MI 49326

ARL Report # 23-M26325
Date Received: 09/13/23
Date Analyzed: 09/13/23
Date Reported: 09/13/23
Media: Zefon

ARL #	M26325-05		M26325-06		M26325-07		M26325-08	
Client #	Hall 116		211		Center 2nd Fl. Hall		214	
Location:	Hallway Outside 116		Rm. 211		Center 2nd Fl. Hall		Rm. 214	
Sampling Date:	09/11/23		09/11/23		09/11/23		09/11/23	
Volume:	75		75		75		75	
Debris Rating:	**4**		**2**		**2**		**2**	
Spore Type/Particulate	**Raw Ct.**	**Spore/m^3**	**Raw Ct.**	**Spore/m^3**	**Raw Ct.**	**Spore/m^3**	**Raw Ct.**	**Spore/m^3**
Alternaria	5	260	1	52	1	52	0	0
Ascospores	0	0	0	0	0	0	1	52
Basidiospores	43	2236	23	1196	15	780	16	832
Cladosporium	32	1664	1	52	6	312	2	104
Epicoccum	4	208	1	52	1	52	2	104
Hyphal Fragments	5	260	1	52	0	0	1	52
Penicillium / Aspergillus	28	1456	1	52	4	208	3	156
Periconia / Myxomycetes	6	312	0	0	0	0	1	52
Pithomyces	1	52	1	52	1	52	0	0
Rust Urediniospores	6	312	1	52	6	312	3	156
Torula	1	52	0	0	0	0	0	0
Nigrospora	0	0	0	0	0	0	0	0
Polythrincium	0	0	0	0	0	0	0	0
Total	131	6812	30	1560	34	1768	29	1508

Robert T. Letarte, Jr., Laboratory Director

Some fungi, yeasts and molds are not able to be identified by microscopic examination. All identifications are presumptive and confirmation of specific molds, fungi, yeast or bacteria should be confirmed by culturing. APEX Research Inc. is not responsible for the sample collection or interpretation of results. The results are presumptive and analyzed to reflect the conditions at the moment tested with understanding that results may vary with time and space. The above certificate of analysis relates only to the samples tested and to insure the integrity of results may only be reproduced in full. Liability limited to cost of analysis.

Certificate of Laboratory Analysis

Test Method, Fungal Spore Analysis

Project: Campus School

Report to:
Mr. Chris Decker, MS
MicroAir Consulting
13351 Oakcrest Ave.
Gowen, MI 49326

ARL Report # 23-M26325
Date Received: 09/13/23
Date Analyzed: 09/13/23
Date Reported: 09/13/23
Media: Zefon

ARL #	M26325-09		M26325-10		M26325-11			
Client #	Hall 300		Hall 305		Outdoor			
Location:	Hallway O/S Rm. 300		Hallway O/S Rm. 305		Outdoors			
Sampling Date:	09/11/23		09/11/23		09/11/23			
Volume:	75		75		75			
Debris Rating:	**2**		**2**		**4**			
Spore Type/Particulate	**Raw Ct.**	**Spore/m^3**	**Raw Ct.**	**Spore/m^3**	**Raw Ct.**	**Spore/m^3**	**Raw Ct.**	**Spore/m^3**
Alternaria	0	0	0	0	7	364		
Ascospores	0	0	0	0	59	3068		
Basidiospores	42	2184	15	780	>150	>7800		
Cladosporium	6	312	5	260	>150	>7800		
Epicoccum	1	52	0	0	1	52		
Hyphal Fragments	1	52	1	52	6	312		
Penicillium / Aspergillus	0	0	0	0	40	2080		
Periconia / Myxomycetes	0	0	0	0	3	156		
Pithomyces	0	0	0	0	2	104		
Rust Urediniospores	0	0	0	0	6	312		
Torula	0	0	0	0	0	0		
Nigrospora	0	0	0	0	1	52		
Polythrincium	0	0	0	0	1	52		
Total	50	2600	21	1092	>426	>22152		

Robert T. Letarte, Jr., Laboratory Director

Campus Elementary 1st Floor

Instrument		Data Properties	
Model	DustTrak DRX	Start Date	09/11/2023
Instrument S/N	8533120308	Start Time	09:02:52
		Stop Date	09/11/2023
		Stop Time	09:22:52
		Total Time	0:00:20:00
		Logging Interval	300 seconds

Statistics					
	PM1	**PM2.5**	**RESP**	**PM10**	**TOTAL**
Avg	0.264 mg/m^3	0.264 mg/m^3	0.264 mg/m^3	0.268 mg/m^3	0.278 mg/m^3
Max	1.020 mg/m^3	1.020 mg/m^3	1.020 mg/m^3	1.020 mg/m^3	1.020 mg/m^3
Max Date	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023
Max Time	09:22:52	09:22:52	09:22:52	09:22:52	09:22:52
Min	0.010 mg/m^3	0.010 mg/m^3	0.011 mg/m^3	0.015 mg/m^3	0.026 mg/m^3
Min Date	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023
Min Time	09:07:52	09:07:52	09:07:52	09:07:52	09:17:52
TWA (8 hr)	0.011	0.011	0.011	0.011	0.012
TWA Start Date	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023
TWA Start Time	09:02:52	09:02:52	09:02:52	09:02:52	09:02:52
TWA End Time	09:22:52	09:22:52	09:22:52	09:22:52	09:22:52

Campus Elementary 2nd Floor

Instrument		Data Properties	
Model	DustTrak DRX	Start Date	09/11/2023
Instrument S/N	8533120308	Start Time	09:31:06
		Stop Date	09/11/2023
		Stop Time	09:51:06
		Total Time	0:00:20:00
		Logging Interval	300 seconds

Statistics					
	PM1	**PM2.5**	**RESP**	**PM10**	**TOTAL**
Avg	0.272 mg/m^3	0.272 mg/m^3	0.272 mg/m^3	0.273 mg/m^3	0.276 mg/m^3
Max	0.442 mg/m^3	0.442 mg/m^3	0.442 mg/m^3	0.442 mg/m^3	0.443 mg/m^3
Max Date	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023
Max Time	09:36:06	09:36:06	09:36:06	09:36:06	09:36:06
Min	0.157 mg/m^3	0.157 mg/m^3	0.158 mg/m^3	0.159 mg/m^3	0.165 mg/m^3
Min Date	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023
Min Time	09:51:06	09:51:06	09:51:06	09:51:06	09:51:06
TWA (8 hr)	0.011	0.011	0.011	0.011	0.011
TWA Start Date	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023
TWA Start Time	09:31:06	09:31:06	09:31:06	09:31:06	09:31:06
TWA End Time	09:51:06	09:51:06	09:51:06	09:51:06	09:51:06

Campus Elementary 3rd Floor

Instrument		Data Properties	
Model	DustTrak DRX	Start Date	09/11/2023
Instrument S/N	8533120308	Start Time	10:01:08
		Stop Date	09/11/2023
		Stop Time	10:26:08
		Total Time	0:00:25:00
		Logging Interval	300 seconds

Statistics					
	PM1	**PM2.5**	**RESP**	**PM10**	**TOTAL**
Avg	0.101 mg/m^3	0.102 mg/m^3	0.103 mg/m^3	0.111 mg/m^3	0.133 mg/m^3
Max	0.142 mg/m^3	0.143 mg/m^3	0.147 mg/m^3	0.179 mg/m^3	0.274 mg/m^3
Max Date	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023
Max Time	10:26:08	10:26:08	10:26:08	10:26:08	10:26:08
Min	0.062 mg/m^3	0.062 mg/m^3	0.062 mg/m^3	0.064 mg/m^3	0.067 mg/m^3
Min Date	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023
Min Time	10:21:08	10:21:08	10:21:08	10:21:08	10:21:08
TWA (8 hr)	0.005	0.005	0.005	0.006	0.007
TWA Start Date	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023
TWA Start Time	10:01:08	10:01:08	10:01:08	10:01:08	10:01:08
TWA End Time	10:26:08	10:26:08	10:26:08	10:26:08	10:26:08