MATRIX
Health & Safety Consultants, L.L.C.

November 9, 2015

Wake County Public Schools
Department of Environmental Health & Safety
1551 Rock Quarry Road
Raleigh, NC 27610

Attention: Mr. Donald Davis

Subject: Limited Indoor Air Quality
Investigation Room 3320
Middle Creek High School
Apex, North Carolina
Matrix Project Number 151114

Dear Mr. Davis:

As requested, a limited indoor air quality investigation was conducted at the referenced property on November 6, 2015. The indoor air survey was performed by Mr. Britt Wester, Certified Industrial Hygienist with Matrix Health & Safety Consultants, L.L.C. (Matrix). The purpose of this study was to document concentrations of indoor air quality indicators, collect samples for suspect mold contamination, and provide recommendations where appropriate.

An effort was made to provide as complete and comprehensive an evaluation as professionally practical. Observations, findings, results, and conclusions are limited to those conditions apparent at the time. It should not be construed that actions taken as a result of this work will achieve complete compliance with every regulatory standard nor prevent every possible accident or loss. Neither should it be considered that any recommendations noted are the only possible actions to be taken. Management should assess and analyze each recommendation in relation to company resources and objectives.

Comfort Indicators

Temperature and relative humidity readings were collected from the inside and outside the building. The inside temperature measurement in Room 3302 was 69degrees Fahrenheit with a relative humidity measurement of 60%. During our survey, the ambient outside temperature was 70 degrees Fahrenheit, and the Relative Humidity was 80%. Humidity levels above 60% will generally promote mold growth.

Visual Inspection

An inspection of the target area was conducted by Mr. Wester during our site visit. The purpose of the inspection was to document any evidence of water intrusion or system issues that may produce symptoms consistent with typical air quality complaints. However, it should be noted that this inspection was environmental in nature, and Matrix makes no claims as to the engineering aspects of the system other than general observations.

At the time of the survey, water stained fireproofing was observed above the suspended ceiling in the corner of the classroom. The supply and return registers for the HVAC were noted to be clean. The supply register over the teacher's desk had been blocked with cardboard to reduce direct airflow to that area. The HVAC fan and coil units in the mechanical room were also inspected for obvious issues. None were noted during our inspection.

Matrix used an infrared thermal imaging camera to inspect the classroom for signs of water intrusion (see attached photos). An apparent roof leak was detected in above the suspended ceiling tiles in the corner of the room. However, moisture content of the fireproofing in this area was noted to range between 11%-13%. Moisture content in building materials above 16% tends to support mold growth.

Sampling & Analysis

Air samples for total fungal matter were collected using Air-O-Cell microbial sampling cassettes. All fungal samples were shipped to EMSL Analytical, Inc. for analysis.

The following table provides a brief summary of the airborne fungi sampling results:

SAMPLE #	LOCATON	LABORATORY RESULTS
AIR-O-CELL AIR SAMPLES (NON-VIABLE FUNGUS)		
MC-2	Classroom 3320	50 count/m3
MC-3	Outside Background Sample	24,100 count/m3
MC-4	Teacher's Lounge room 3305	120 count/m3

Count/m3 – Fungal count per cubic meter of air.

Air sampling analysis indicated significantly lower concentration of airborne fungi within the building than outside. Types of molds identified were consistent, and are considered benign.

The following table provides a brief summary of the surface fungi sampling results:

SAMPLE #	LOCATON	LABORATORY RESULTS
CONTACT SURFACE AND/R BULK SAMPLES		
MC-1	Water Damaged Fireproofing above Suspended Ceiling - Room 3320	No Spores Detected

The surface samples collected from the water stained fireproofing contained no detectable mold spores.

Discussion/Recommendations

Based on visual observations and testing data, it is our opinion that a potential exposure risk to mold is not currently present in the areas tested. It is recommended that the apparent roof leak be corrected to prevent potential issues in the future. Continued routine cleaning and maintenance of the HVAC system is recommended to ensure continued air quality.

Room 3320
Middle Creek High School

Matrix Health & Safety Consultants, L.L.C. is pleased to have provided our professional services to you and your organization. If you have any questions or comments, please do not hesitate to call at (919) 833-2520.

Sincerely,
MATRIX HEALTH & SAFETY CONSULTANTS, L.L.C.

C. Britt Wester, CIH
Principal

Attachments: Laboratory Analytical Reports
Site Photographs and Thermal Imaging

Room 3320
Middle Creek High School

LABORATORY REPORT

EMSL Analytical, Inc.

2500 Gateway Centre Blvd., Suite 600 Morrisville, NC 27560
Phone/Fax: (919) 465-3900 / (919) 465-3950
http://www.EMSL.com / raleighlab@emsl.com

Order ID:	291506521
Customer ID:	MATR63
Customer PO:	
Project ID:	

Attn: Britt Wester
Matrix Health & Safety
2900 Yonkers Road, Suite B
Raleigh, NC 27604

Phone: (919) 833-2520
Fax: (919) 882-9926

Collected: 11/06/2015
Received: 11/06/2015
Analyzed: 11/09/2015

Proj: Middle Creek HS

Test Report: Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods EMSL 05-TP-003, ASTM D7391)

Lab Sample Number:	291506521-0001			291506521-0002			291506521-0003		
Client Sample ID:	MC-2			MC-3			MC-4		
Volume (L):	75			75			75		
Sample Location:	Classroom 3320			Outside			Room 3305		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria	-	-	-	-	-	-	-	-	-
Ascospores	-	-	-	37	1600	7.5	-	-	-
Aspergillus/Penicillium	-	-	-	-	-	-	-	-	-
Basidiospores	1	40	80	354	14900	69.6	2	80	66.7
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	-	-	-	109	4600	21.5	-	-	-
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	3	100	0.5	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	1*	10*	20	5	200	0.9	1	40	33.3
Pithomyces	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis	-	-	-	-	-	-	-	-	-
Stachybotrys	-	-	-	-	-	-	-	-	-
Torula	-	-	-	-	-	-	-	-	-
Ulocladium	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Total Fungi	**2**	**50**	**100**	**508**	**21400**	**100**	**3**	**120**	**100**
Hyphal Fragment	1*	10*	-	-	-	-	2*	30*	-
Insect Fragment	-	-	-	-	-	-	1	40	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	42	-	-	42	-	-	42	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	3	-	-	1	-	-	3	-
Fibrous Particulate (1-4)	-	1	-	-	-	-	-	1	-
Background (1-5)	-	1	-	-	1	-	-	1	-

Bipolaris++ = Bipolaris/Drechslera/Exserohilum
Myxomycetes++ = Myxomycetes/Periconia/Smut

No discernable field blank was submitted with this group of samples.

Alan Goldstein

Alan Goldstein, Ph.D., Laboratory Manager
or Other Approved Signatory

Samples analyzed by EMSL Analytical, Inc. Morrisville, NC AIHA-LAP, LLC--EMLAP Lab 173741

Initial report from: 11/09/2015 09:20:12

For Information on the fungi listed in this report please visit the Resources section at www.emsl.com

EMSL Analytical, Inc.

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Collected: 11/06/2015
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Analyzed: 11/09/2015

Proj: Middle Creek HS

Test Report: Microscopic Examination of Fungal Spores, Fungal Structures, Hyphae, and Other Particulates from Bulk Samples (EMSL Method: M041)

Lab Sample Number:	291506521-0004				
Client Sample ID:	MC-1				
Sample Location:	Fireproofing				
Spore Types	Category	-	-	-	-
Agrocybe/Coprinus	-	-	-	-	-
Alternaria	-	-	-	-	-
Ascospores	-	-	-	-	-
Aspergillus/Penicillium	-	-	-	-	-
Basidiospores	-	-	-	-	-
Bipolaris++	-	-	-	-	-
Chaetomium	-	-	-	-	-
Cladosporium	-	-	-	-	-
Curvularia	-	-	-	-	-
Epicoccum	-	-	-	-	-
Fusarium	-	-	-	-	-
Ganoderma	-	-	-	-	-
Myxomycetes++	-	-	-	-	-
Paecilomyces	-	-	-	-	-
Rust	-	-	-	-	-
Scopulariopsis	-	-	-	-	-
Stachybotrys	-	-	-	-	-
Torula	-	-	-	-	-
Ulocladium	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-
Zygomycetes	-	-	-	-	-
Fibrous Particulate	Low	-	-	-	-
Hyphal Fragment	-	-	-	-	-
Insect Fragment	-	-	-	-	-
Pollen	-	-	-	-	-

Category: Count/per area analyzed
Rare: 1 to 10 Low: 11 to 100 Medium: 101 to 1000 High: >1000

Bipolaris++ = Bipolaris/Dreschlera/Exserohilum Myxomycetes++ = Myxomycetes/Periconia/Smut
* = Sample contains fruiting structures and/or hyphae associated with the spores.

No discernable field blank was submitted with this group of samples.

Alan Goldstein

Alan Goldstein, Ph.D., Laboratory Manager
or Other Approved Signatory

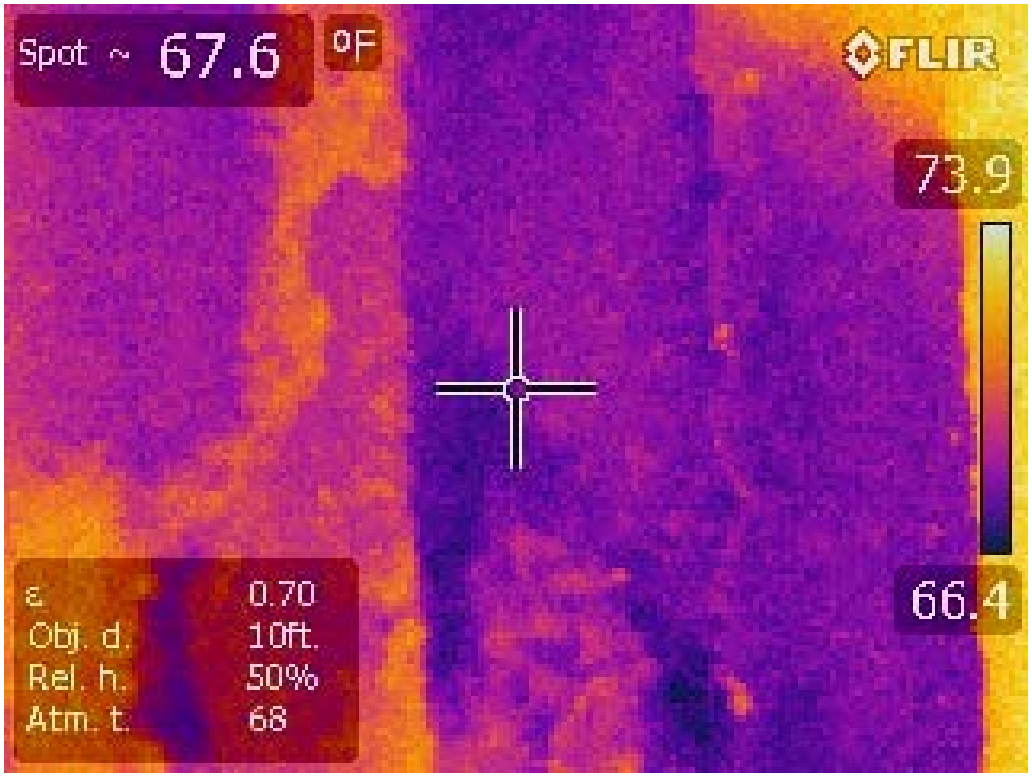
Initial report from: 11/09/2015 09:20:12

For Information on the fungi listed in this report please visit the Resources section at www.emsl.com

Room 3320
Middle Creek High School

PHOTOGRAPHS AND THERMAL IMAGING

Water damaged fireproofing above suspended ceiling in 3320.



IR image of fireproofing showing apparent roof leak.

Room 3320
Middle Creek High School

Target area of investigation in classroom 3320.

HVAC supply registers appeared to be clean. Register over teacher's desk was blocked with cardboard.

WAKE COUNTY PUBLIC SCHOOL SYSTEM

Environmental & Grounds

November 3, 2015

Mr. Wade Martin
Principal, Middle Creek High School

Mr. Martin:

As requested, the Environmental & Grounds (E&G) Department is pleased to present the results of the Phase 1 Indoor Air Quality (IAQ) Assessment performed at Middle Creek High School on October 28, 2015. Christina Larkins of the E&G Department performed the IAQ testing.

BACKGROUND

Our assessment was initiated in response to concerns related to IAQ at Middle Creek High School, Room 3320.

PROCEDURES

E&G's Phase 1 IAQ Assessment includes a general visual review of the subject area, collection of general IAQ data (Temperature, Relative Humidity, Carbon Dioxide, and Carbon Monoxide), and a limited non-invasive moisture survey. Also included in the assessment are interviews with school staff, teachers, and maintenance employees.

The scope of this work primarily focuses on collecting general IAQ data and visual inspection of the classroom for microbial activity, pest infiltration, and general room conditions. General IAQ data are collected in several locations within the subject areas and also outside of the school for comparison. The IAQ data are collected using instruments that provide immediate readings and can provide information on the air exchange rate within the occupied space.

1551 Rock Quarry Road • Raleigh, North Carolina 27610

Telephone: (919) 856.3715 • Fax: (919) 508-0831

FINDINGS

The Phase 1 IAQ Assessment worksheet is attached to this report as **Appendix A**. The meter readings were within recommended indoor air quality levels for carbon dioxide, carbon monoxide, relative humidity. An inspection of the areas above the ceiling, walls, carpet, and along the baseboards yielded no sign of microbial growth. Additionally, no microbial growth was found on the non-porous office furniture, desks, chairs, vents, or diffusers in the subject room.

Also as part of the assessment, the HVAC unit and filters were inspected. Work Order #13559336 was initiated to have the Energy Management Department check the proper function of the equipment. There were no current issues with the HVAC operation at the time of our investigation. The filters for the HVAC systems are changed every 3 months, and the next scheduled filter change will be during the week of December 14, 2015. The coils are due to be evaluated during the summer of 2016. Additionally, no unusual amount or type of dust has been noted on the current filters or coils.

There appears to be a few areas of water intrusion in this section of the school. At the time of our investigation, the location of concern was Room 3320. Due to the recent rainstorms, water entered the school through an area above the ceiling. Upon further investigation, it appears there is an area above the roof which needs caulk. A Work Order (#13343531) was generated, which will be addressed by Regional Maintenance.

Middle Creek High School would greatly benefit from participating in our Indoor Air Quality Program called Tools *for* Schools (T*f*S). Wake County Public Schools has elected to participate in this program designed by the federal EPA aimed at tackling indoor air quality (IAQ) issues. T*f*S is a unique and systematic program specifically focused on addressing indoor air quality issues. It is a comprehensive approach to methodically identify IAQ concerns, develop potential solutions, and implement action plans.

CONCLUSION

In conclusion, there was no visible evidence of microbial growth or moisture problems in Room 3320. There is no evidence of a lack of fresh air, contamination from building materials or contamination from the outside. The E&PP will continue to maintain the mechanical system and run it in such a way as to provide the greatest comfort possible in all conditions. The facility has good general housekeeping. There does not appear to be an issue with ongoing pest activity. No further testing is recommended unless there is evidence of microbial growth, interior off-gassing, persistent odor or other source of contamination within this facility. None of these factors was present in the facility at the time of our investigation. Therefore, this investigation suggests that the IAQ sampling did not reveal any indication of an IAQ problem in Room 3320.

RECOMMENDATIONS

ACTION ITEM	RESPONSIBILITY
1. Caulk several areas of Sector A3 Roof	Regional Maintenance WO #13343531
2. Check proper function of AHU-26	Energy Management WO #13559336 Completed 10.28.15
3. Implement Tools for Schools Program at this facility (IAQ education for staff)	E&G & School Staff

If you have any questions regarding this report, please feel free to contact the Environmental & Grounds Department at 919-856-3715.

Appendix A

Phase 1 Indoor Air Quality (IAQ) Assessment
Environmental and Grounds Department

Facility Name: Middle Creek HS **Room #:** Rm 3320 **Conducted By:** CLarkins

IAQ Parameters

Date	Location	Time	Temp (°F)	RH (%)	CO (ppm)	CO_2 (ppm)
10.28.15	3320	12:35	72.5	65.3	0	1705

Outdoor Air Parameters

Date	Location	Time	Temp (°F)	RH (%)	CO (ppm)	CO_2 (ppm)
10.28.15	OFFICE	1:17	73.4	94%	0	1409

Pollen Count		**Predominant Pollen**	

Microbial Activity

Visual Check Walls, Ceiling/Tiles, Flooring/Carpet, Windows, Air Vents/Returns

Evidence of Growth	YES	NO
Water Damage/Moisture Intrusion	YES	NO
Excessive Dust/Dirt	YES	NO

Comments

Tape Samples

Date	Location	Sample ID

Integrated Pest Management

Visual Check

Evidence of Pest Activity	YES	NO
Overnight Food Storage	YES	NO
Evidence of Pesticide Use	YES	NO
Wall/Floor Openings or Cracks	YES	NO
IPM Follow-up Recommended	YES	NO

General Room Conditions

Visual Check

Excessive Dust/Dirt	YES	NO
Noticeable Odors	YES	NO
Use of Chemicals/Cleaners	YES	NO
Excessive Clutter/Trash	YES	NO
Airflow is Blocked or Restricted	YES	NO