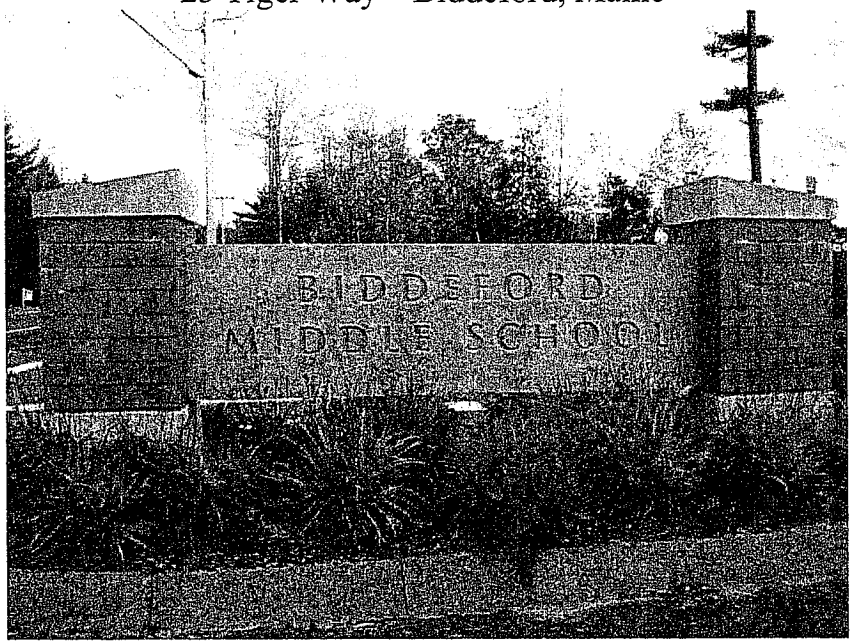
Air Quality Management Services, Inc.
"Discovering Solutions for Healthier Living"

INDOOR AIR QUALITY EVALUATION

Biddeford Middle School

25 Tiger Way – Biddeford, Maine



PREPARED FOR

Biddeford School Department
C/o Mr. Phil Radding – Director of Facilities
PO Box 586
Biddeford, Maine 04005

Date of Inspection

October 29th, 2010

AQM PROJECT #10-455A

Nick Ferrala

Nick Ferrala, CIEC
Industrial Hygienist

OFFICE: PO Box 865, Gray, Maine 04039 · Phone 207-657-7360 · Fax 207-657-7361
www.aqmservices.com

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AQM SUMMARY REPORT: Project # 10-455A

Report Type: IAQ ☒

Inspection Date:	October 29th, 2010	*Onsite Industrial Hygienist:*	Nick Ferrala, CIEC
Client:	Biddeford School Department C/o Mr. Phil Radding	*Property Owner:*	City of Biddeford
Mailing Address:	PO Box 586 - Biddeford, Maine	*Location:*	Middle School 25 Tiger Way, Biddeford, Maine

Concern: Unknown / Not specified; sample locations and types were determined / requested by the Client.

Actions to Date:

- ☐ No Actions To Date
- ☐ Installed Fresh-air Source and/or Air Exchange Unit
- ☐ Cleaned Mechanical System - including Ductwork
- ☐ Mechanical System Filter(s) Changed
- ☐ Carpeting Cleaned / Extracted / Treated
- ☐ Area(s) HEPA Vacuumed and Damp Dusted
- ☐ HEPA Air Cleaners Installed - Portable
- ☐ Water-damaged Materials Removed – See Comments

Comments: Unknown actions to date

TESTING

Sampling Decision Logic

- ☒ Air samples were collected to determine airborne influences.
- ☐ Surface samples were collected to characterize suspect contamination.
- ☒ Health Issues reported ☒ None ☐ Allergies ☐ Asthma ☐ Other:

Comments: No health issues reported to AQM.

RECOMMENDED GUIDELINES			TESTING METHOD				
Carbon Dioxide (CO_2)	ASHRAE	Not Applicable	*Gray Wolf DirectSense 100*	☒	Airborne Mold	Allergenco-D	☒
	OSHA	5000 ppm	*Colorimetric*	☐		N6	☐
Carbon Monoxide (CO)	ASHRAE	9 ppm	*Gray Wolf DirectSense 100*	☒	Surface Mold	Tape	☐
	OSHA	50 ppm	*Colorimetric*	☐		Swab	☐
Relative Humidity (%)	ASHRAE	30 – 60%	*Gray Wolf DirectSense 100*	☒	Airborne Particulate	Lighthouse IAQ 3016	☒
			Extech RH-401 Pen	☐		NIOSH/EPA	☐
Optimal Recommended Temperatures (°F)	Summer	72 - 78°F	*Gray Wolf DirectSense 100*	☒	Total Volatile Organic Compounds (TVOC)	ppb-RAE	☐
			Extech RH-401 Pen	☐		Detector Tube	☐
	Winter	68 - 76°F	*WBGT*	☐			

# of Air Samples	6	# of Surface Samples	0	# of Bulk Samples	0	# of Swab Samples	0

Other Testing: None

FINDINGS

Air Quality Monitoring Readings					TPM (Total Particulate Matter), ug / m^3 Sampled for 1 minute						TVOC
Location	CO_2 (ppm)	CO (ppm)	Temp. °F	RH%	0.3um	0.5um	1.0um	2.5um	5um	10um	
Instrument Zero	----	----	----	----	0.00	0.00	0.00	0.00	0.00	0.00	----
Outdoor	220	0.0	62.8	42.5	1.09	1.37	2.00	5.00	11.83	12.29	----
Room A001	435	0.1	71.4	37.6	0.63	1.10	4.49	24.90	104.9	187.6	----
Room A002	220	0.2	71.6	36.1	0.47	0.58	0.81	1.73	4.66	6.51	----
Room A003	285	0.1	72.1	35.5	0.54	0.67	0.93	1.85	4.78	7.55	----
Elevator Shaft	420	0.2	72.7	36.0	0.73	1.94	10.77	70.82	289.2	453.8	----
Room A040	450	0.2	75.5	34.8	0.62	1.48	8.64	52.89	221.4	347.1	----
EPA Criteria	----	----	----	----	----	----	----	**15.0**	----	**150.0**	----

Comments EPA Criteria = National Ambient Air Quality Standards (NAAQS). AQM sample times are 1 minute; EPA criteria based on 24hrs (10um) and annual average (2.5um). Particulate levels determined by AQM are a screening and use methodology different than that required by EPA. NAAQS values are for outdoor air - there are no standards for indoor air.

OBSERVATIONS / FINDINGS

Comments

►Carbon monoxide and carbon dioxide readings were within published Guidelines, and for carbon dioxide, indoor levels were not significantly higher than outdoor levels - no risks anticipated.

►Temperature and relative humidity readings were within the ASHRAE Comfort Guidelines - no risks anticipated.

►Total Particulate Matter (TPM) was below outdoor levels as well as the reference EPA criteria in rooms A002 and A003. TPM in Rooms A001, A040 and Elevator shaft was not significantly above the outdoor levels for the smaller particulate sizes (0.3 and 0.5um) but was elevated above the outdoor levels for the medium and larger sizes (1.0 - 10um). Levels were also above the EPA reference criteria in these areas.

►Elevator shaft readings were made at the floor seam (elevator door open) on the basement level. Based on the above readings the Elevator shaft may be the source of elevated particulates in the area.

AQM SUMMARY REPORT: Project # 10-455A

FUNGAL GROWTH - See laboratory results for details

Results are as follows:

Air Samples:
- ☒ Concentrations similar to outdoor control (Sample A1) and / or typical levels for an occupied indoor location – no immediate risks anticipated
- ☒ Concentrations above background (outdoor control) ☒ Trace ☒ Low ☐ Moderate ☐ High
- ☐ Air sample analysis suggests surface contamination is influencing the overall airborne fungal burden.

Surface Samples:
- ☒ Surface samples were not collected: ☐ Not authorized / requested ☒ No visible Fungi
- ☐ No active fungi detected for surfaces tested
- ☐ Fungal Growth Detected ☐ Trace ☐ Low ☐ Moderate ☐ High
- ☐ Personal contents have visible fungal growth or impact.
- ☐ Fungal contamination appears to be isolated to surfaces with minimal airborne influences.

Comments: ►Air sample results indicate that indoor spore levels were well below those of the outdoor reference sample. There were low levels of spores of concern (Aspergillus/Penicillium-like, commonly associated with water / moisture issues and indoor growth) in Room A001 and the Elevator Shaft, and a trace level of these spores in Rooms A003 and A040.

RECOMMENDATIONS

- ☐ Ensure adequate fresh-air source to mechanical system with per current applicable ASHRAE Standards.
- ☐ Ensure the system filters are pleated with an efficiency rating of at least 40% (or greater) and properly sized for the system.
- ☐ Consult a Professional Engineer or Qualified Contractor to determine the appropriate mechanical system modifications.
- ☐ The HVAC system should be cleaned (including the ductwork) based on the report that the system has not been cleaned since the original install and / or airborne mold spore levels. The HVAC system should be part of a maintenance plan that includes monthly inspections of the filters and total system cleanings every three (3) to five (5) years, based on location and environmental influences.
- ☐ Enlist the services of an HVAC Cleaning Contractor that is competent / knowledgeable with NADCA ACR-2005 Cleaning Standards.
- ☐ Upgrade Housekeeping - Detail clean (HEPA vacuum & damp dust) to control dust / particulate levels in the hard to reach areas.
- ☐ A resilient floor covering (vinyl tile / linoleum) or like product should be considered as a finished floor covering to afford ease of maintenance and resists moisture influences.
- ☐ Control water intrusion into area / space.
- ☒ Mold Remediation should be undertaken by a qualified Contractor in accordance with the IICRC S520 Standard or other similarly recognized protocols. See Comments.
- ☒ Areas of immediate impact should be isolated from the unaffected areas of the building to prevent contaminant communications thus limiting damages and exposure risks.
- ☐ High Temperature Steam Clean and Treat all carpeting and ensure areas are rapidly dried to reduce microbial influences.

Comments:
►Based on mold and particulate results it is possible that the Elevator Shaft is the source of elevated particulates and mold spores of concern (no other issues were observed or reported to AQM).
►Isolate the elevator shaft from adjacent areas.
►Evaluate conditions within the elevator shaft and remove / clean any mold growth, if discovered. Ensure to correct any water / moisture issues in the Elevator Shaft if present.
►Detail Clean Rooms A001, A040, Elevator Car and Basement Level Hallway in the area of the elevator due to elevations in airborne mold spores and/or particulates.

END OF SECTION

GENERAL INDOOR AIR QUALITY GUIDELINES & TESTING METHODOLOGIES

General Indoor Air Quality Guidelines and Testing Methodologies

AQM evaluates carbon monoxide, carbon dioxide, temperature and relativity using a Gray Wolf DirectSense100 to evaluate general air quality parameters. These parameters are evaluated to determine fresh air exchange efficiencies and building purge rates as well as background ambient moisture levels.

The data collected was compared to standards outlined by the American Society of Heating, Refrigeration, and Air conditioning Engineers (ASHRAE), American Conference of Governmental Industrial Hygienist (ACGIH), and the Occupational Safety and Health Administration (OSHA).

Airborne Total Mold and Non-viable Particulates

AQM collects airborne fungi samples using Allergenco-D air sampling cassettes designed for evaluating total airborne fungi and non-viable particulates. Samples are collected at 15-liters per minute over 5-minute or 10-minute sampling periods each depending on site conditions. The samples are analyzed using direct microscopy examination.

The Allergenco-D is a direct read total particulate air sampling device. It works using the inertial impaction principle similar to other spore trap devices. It is designed for the rapid collection and analysis of airborne particulate including bioaerosols. The particulate includes fibers (e.g. fiberglass, cellulose, clothing fibers) opaque particles (e.g. fly ash, combustion particles, copy toner, oil droplets, paint), and bioaerosols (e.g. mold spores, pollen, insect parts, skin cell fragments).

Typical Indoor Levels (collected using Allergenco-D)

Particulates	Average Concentrations	Rating 0 - 5
Skin Cell Fragments	7,500 to 10,000	2 - 3
Fiberglass Fibers	50 to 75	n.d. - 2
Other Fibers	1,000 to 2,500	n.d. - 2
Black Opaque Particles	2,500 to 5,000	n.d. - 1
Insect Parts	< 27	n.d. - 1
Pollen Grains	< 27	n.d. - 1
Background Debris Rating	1+ to 4+ (low to high)	n.d. - 2

n.d. – None Detected

Airborne Particulate Assessment

AQM conducts testing in representative areas to determine airborne particulate influences and assess general indoor air quality parameters. Testing is conducted to assess airborne particulates using a Lighthouse IAQ 3016 Laser Particle Counter. This unit quantifies particulates by size (microns 0.3 to 10.0). Results are comparatively evaluated to determine particulate concentrations by size and evaluate the efficiencies of the air filtering systems and to identify areas with elevated particulate concerns.

Fungal influences are usually suspected when predominantly high concentrations are noted between 1.0 microns to 10 microns respectively.

Airborne Bacteria and Fungi

Currently there are no set standards or guidelines for bioaerosol / non-aerosolized microbial exposure levels which suggest dose response risks associated with a specific exposure level to airborne environmental bacteria or fungi. Most important, sensitivities to microbial exposures vary widely between individuals with the immuno-compromised population being the most susceptible.

Current studies suggest indoor airborne microbial levels in mechanically ventilated buildings should be less than the levels identified in outdoor air. Building without mechanical ventilations should be either similar in concentration to the outdoor air or less than the outdoor concentrations.

The data also suggests that indoor microbial concentrations that exceed outdoor concentrations by 30% or more should be considered elevated. Additionally, identification of specific microorganisms indoors not identified in the outdoor samples collected suggests an indoor source and should be considered a potential risk based on genera or species isolated. It is important for determining health risk associated with bioaerosols and non-aerosolized microbials to keep in mind that the colony count alone is not the only determining factor. The species of organism(s) identified is sometimes more important than the colony count (number of organisms). The World Health Organization (WHO) and the Indoor Air Quality Association recommends fungi levels not exceed 50 CFUs m^3 (for any single species) or 150 to a max of 300 CFUs m^3 (for total species) when compared to the outdoor samples collected, considering species and/or other risk factors that might be present.

Fungi Bulk Dusts (Carpet Vacuum Samples)

The current Industry Guidelines suggest the following:

< 5,000 CFU / Ft^2	Normal
< 25,000 CFU / Ft^2	Moderate Risk
< 75,000 CFU/ Ft^2	High Risk
> 75,000 CFU/ Ft^2	Very Active Growth

General Indoor Air Quality Testing

Carbon Dioxide

The OSHA Permissible Exposure Limit (PEL) for carbon dioxide is 5000 ppm. These OSHA standards were designed for industrial settings and not office or school settings.

The ASHRAE 62 comfort guidelines for indoor air recommends levels be maintained below 1000 parts of carbon dioxide per million parts of air (ppm) or no more than 700

ppm greater than the outdoor readings. Elevated carbon dioxide concentrations can cause symptoms such as headaches, nausea, dizziness, fatigue, and drowsiness.

Carbon Monoxide

OSHA's Permissible Exposure Limit (PEL) for carbon monoxide is 50 ppm. These OSHA standards were designed for industrial settings and not office or school settings.

ASHRAE guidelines for indoor air quality comfort limits recommend levels be maintained below 9 ppm. Elevated carbon monoxide concentrations can cause symptoms such as; severe headaches, nausea, dizziness, fatigue, and drowsiness, and in high concentrations, death.

Relative Humidity

Relative Humidity levels should be maintained between 30% to 60%. AQM recommends levels be maintained between 35% to 55% optimally. When relative humidity levels are below these guidelines, symptoms can occur causing discomfort such as; dry eyes, nose, throat, and irritated upper respiratory tract. Low relative humidity dries the mucus membranes, which prohibits the body's normal ability to rid our body of certain contaminants increasing the potential for discomforts associated with eyes, noses, and throats. Elevated relative humidity can contribute to a conducive environment for microbial growth associated with moisture damage.

Temperature

Temperatures can affect people psychologically; they may assume there is a problem when it is too warm or when there is no air movement in their work area, even in the absence of an air contaminant.

ASHRAE Recommended Comfort Guidelines

Relative Humidity %	Winter Season ^{0}F	Summer Season ^{0}F
30	68.5 to 76.0	74.0 to 80.0
40	68.5 to 75.5	73.5 to 79.5
50	68.5 to 74.5	73.0 to 79.0
60	68.0 to 74.0	72.5 to 78.0

Applies for persons clothed in typical summer and winter clothing, at light, mainly sedentary activity.

END OF SECTION

ASSESSMENT LIMITATIONS

AQM

ASSESSMENT LIMITATIONS

The observations, conclusions and recommendations described in this assessment report were made under the conditions stated herein, taking into account any information / concerns provided or reported to AQM, and were arrived at in accordance with generally accepted standards related to indoor air quality investigations and good industrial hygiene practice. The conclusions presented in the report were based solely upon the services described herein, and not on scientific tasks or procedures beyond the scope of described services, time and / or any budgetary constraints. Assessments were made at the request of the Client based on information provided at the time of authorization to proceed with the evaluation. This report is prepared for the Client's use only and in accordance with scope of services requested, and should not be distributed to other parties for review and reliance.

The findings relating to this assessment were not intended to be exhaustive in nature, nor do they attempt to identify all possible sources of indoor contaminants, chemicals or even mold throughout the entire structure. Building materials may contain asbestos. In the event that asbestos building materials are suspected, further evaluation should be made prior to renovations in accordance with Federal, State, and Local regulations – as applicable. **Note:** Effective April 22nd, 2010 Environmental Protection Agency's (EPA) Renovation, Repair, and Painting (RRP) rule is in effect. This means that any renovation, repair and painting activities on **target housing** or **child-occupied facility** built before 1978 performed for compensation after April 22nd, 2010 falls under this rule. It is mandatory that any renovation impacting painted surfaces in a facility built before 1978 be tested for presence of lead-based paints. A Contractor (or Firm) trained and certified under this rule shall perform removal of lead-base painted surfaces, **ONLY** if lead-based paints are present and renovation / remediation of the structure falls under the definition of EPA's new rule. You can find EPA's RRP rule and definitions at their website: http://www.epa.gov/lead/pubs/renovation.htm. The chosen contractor to perform activities disturbing lead-based painted surfaces will comply with all State, Federal, Local Health and Safety Regulatory Requirements (which ever is more stringent).

Any measured results, analysis data, and / or physical conditions observed are only valid for the period in which this inspection / testing was conducted. Certain assumptions can be made based on information provided to AQM on or before the time of the assessment coupled with analytical data and observations made at the time of the inspection / testing.

Where such quantitative laboratory analyses have been conducted by an outside laboratory, AQM has relied upon the data provided, and has not conducted an independent evaluation of the reliability of the data. This data have been reviewed and interpretations made as presented in the report.

Historical events or ambient air conditions that may have existed prior to this assessment cannot be correlated in any way with the enclosed data. No warranty, real or implied, is made as to what was or is the exact cause or source that may have adversely affected the indoor air quality prior to the date of this assessment.

The report is based on AQM's professional opinion and on our experience in conjunction with information gathered during the assessment and laboratory data provided. Information and recommendations set forth in this report are intended to characterize current conditions based on the reported concerns and discoveries made at the time of the inspection and testing period. Information is being provided to aid in the development of corrective actions or remediation that may improve overall conditions identified and/or to improve the overall air quality.

SUPPORTING DOCUMENTATION

AQM

Northeast Laboratory Services

Sample Custody Record

Ph: 1-800-244-8378 FAX: (207) 873-7022

Industrial Hygiene Microbiology

NELAP Accredited AIHA EMPAT Lab No. 102960

For UPS & FedX Shipments:	For U.S. Postal Shipments:
227 China Rd, Winslow, ME 04901	PO Box 788, Waterville, ME 04903

Lab Use Only

Client	AQM
Address	
City, State, Zip	Gray, ME
Contact	Nick Ferrala
Phone:	FAX:
Email:	Project No: 10-455A Proj. Name: Bath-9-Mid
Sampled By:	MF
Report by:	X Fax X Email ___ Regular Mail Only
Turnaround*:	___ Standard (2-Day) X Next Day (as available) ___ RUSH - Same Day (surcharge applies)

Sample Type Codes

AC = Air Culture Plate	ST = Spore Trap	W = Water	O = Other (describe)
BS = Bulk Solid	SS = Surface Swab	WC = Wall Cavity (Air)	
D = Dust	T = Tape	WP = Wipe	

Sample Information

Lab No.	Sample Identification	Type	Date/Time	Volume/Area	Analysis Requested**
	A1- Outdoor	ST	10/29/10	150L	Fmj.
	A2- ~~A002~~ A001				
	A3- A002				
	A4- A003				
	A5- Elevator/shaft				
	A6- A040 Elev. Rm				

Purchase Order Number (if Applicable):

Spore Traps - Brand & Type (e.g. Cyclex slide, Air-O-Cell Cassette, Laro-100, etc.):

Air Culture Plates - Sampler & Type (e.g. Andersen N6, SAS-100, etc.):

Special Sample Information, Testing or Reporting Instructions:

Sample Temperature Upon Receipt at Laboratory (If Required)

Custody Record

Date	Time	Samples Relinquished By	Samples Received By	Comments
10/29/10	230			

*Turnaround Times are for Direct-Exam Analysis Only and are Contingent on Daily Workload; Culture Sample Turnaround is 5-6 Business Days.
Please contact NEL prior to submitting samples for same-day turnaround.

**Analysis Requested - Please Describe or use NEL Analysis Code.

Northeast Laboratory SERVICES

AIHA Accredited Laboratory

1-800-244-8378 Phone
1-207-873-7022 FAX
227 China Rd., Winslow, ME 04901
SOP 4.3.24

Client:	Air Quality Management	**Date Sampled:**	10/29/10
Address:	19B Portland Road	**Date Received:**	11/1/10
	Gray ME 04039	**Date Reported:**	11/2/10
Project Number:	10-455A		

Sample Type:	Allergenco-D		Percent of Trace Assayed (1):	25		Analyst	Tom Cheetham							
Volume Sampled (L):	150			150			150			150			150	
Sample Description	A1 Outdoors			A2 A001			A3 A002			A4 A003			A5 Elevator/Shaft	
Lab Number	MJ 20008			MJ 20009			MJ 20010			MJ 20011			MJ 20012	
Sample Condition	Good			Good			Good			Good			Good	
Background Debris rating, 0-5 (2)	2			5			1			2			5	
	Raw Ct.	Ct./m³	%	Raw Ct.	Ct./m³	%	Raw Ct.	Ct./m³	%	Raw Ct.	Ct./m³	%	Raw Ct.	Ct./m³	%
Total Mold Spores & Fragments	565	15,000	100	58	1,600	100	225	590	100	17	450	100	45	1,200	101
Ascospores	50	1,300	9	10	270	17	3	80	14						
Aspergillus/Penicillium-like				16	430	28				2	53	12	13	350	29
Basidiospores	475	13,000	84	24	640	41	19	510	86	15	400	88	25	670	56
Cladosporium	40	1,100	7	5	130	9							3	80	7
Unidentified Spores				3	80	5							4	110	9
Particulates (3)															
Skin cell fragments (2-3)	2			5			1			2			5		
Black opaque particles (n.d. - 2)	1			2			1			1			2		
Other fibers (n.d. - 2)	n.d.			3			1			1			3		
Misc. Clear particulates (n.d. - 2)	2			3			1			1			4		

Note: Some values may not appear to be perfectly additive due to rounding. Ct = Counts

(1) Value indiates % of sample trace analyzed. 100% of Sample Trace is always examined for anomalies, spore clusters and Stachybotrys / Memnoniella spores, and any appropriate corrections are made as a result of findings. This process results in a lower MDL for Stachybotrys / Memnoniella spores and a more accurate overall analysis.

(2) Debris Rating Scale: 0 = No trace visible; 5 = Contiguous debris. Background debris levels greater than 3 indicate poor visibility for the analyst reading the slide, which can result in under-counting of small spores such as those from members of the Aspergillus/Penicillium-like group.

(3) Particulate are rated on a scale from n.d. (not detected) to 5 (highest abundance). Values in parentheses indicate typical indoor levels.

No discernable field blank was submitted with these samples. Minimum detection limit varies with amount of air sampled: 30L= 133 ct./m3; 75L= 53 ct./m3; 150L= 13 ct./m3

Created by: _____
Tom Cheetham, PhD, Environmental Microbiology Division

Reviewed By: _____
Brett Goodrich, Manager, Environmental Microbiology Division

Northeast Laboratory SERVICES

1-800-244-8378 Phone
1-207-873-7022 FAX
227 China Rd., Winslow, ME 04901

SOP 4.3.24

Client:	Air Quality Management	**Date Sampled:**	10/29/10
Address:	19B Portland Road	**Date Received:**	11/1/10
	Gray ME 04039	**Date Reported:**	11/2/10
Project Number:	10-455A		

Sample Type:	Allergenco-D		**Percent of Trace Assayed (1):**	25		**Analyst**	Tom Cheetham								
Volume Sampled (L):		150														
Sample Description		A6														
		A040 Elev. Rm.														
Lab Number		MJ 20013														
Sample Condition		Good														
Background Debris rating, 0-5 (2)		5														
		Raw Ct.	**Ct./m³**	**%**												
Total Mold Spores & Fragments		63	1,700	100												
Ascospores		7	190	11												
Aspergillus/Penicillium-like		3	80	5												
Basidiospores		40	1,100	63												
Cladosporium		6	160	10												
Mycelial Fragments		2	53	3												
Unidentified Spores		5	130	8												
Particulates (3)																
Skin cell fragments (2-3)		5														
Black opaque particles (n.d. - 2)		2														
Other fibers (n.d. - 2)		3														
Misc. Clear particulates (n.d. - 2)		4														

Note: Some values may not appear to be perfectly additive due to rounding. Ct = Counts

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(3) Particulate are rated on a scale from n.d. (not detected) to 5 (highest abundance). Values in parentheses indicate typical indoor levels.

No discernable field blank was submitted with these samples. Minimum detection limit varies with amount of air sampled: 30L= 193 ct./m3; 75L= 58 ct./m3; 150L= 13 ct./m3

Created by: _____
Tom Cheetham, PhD, Environmental Microbiology Division

Reviewed By: _____
Brett Goodrich, Manager, Environmental Microbiology Division