ARCHITECTURE
ENGINEERING
ENVIRONMENTAL
LAND SURVEYING

MOLD ASSESSMENT REPORT

Project Location:

Belleville Henderson CSD
8372 County Route 75
Adams, NY 13605

Prepared for:

Ms. Jane Collins
Superintendent – Belleville/Henderson CSD
8372 County Route 75
Adams, NY 13605

Prepared by:

GYMO Architecture, Engineering, & Land Surveying D.P.C.
18969 US Route 11
Watertown, NY 13601
(315) 788-3900 www.gymodpc.com

ARCHITECTURE
ENGINEERING
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LAND SURVEYING

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September 8, 2018

Ms. Jane Collins
Superintendent – Belleville/Henderson CSD
8372 County Route 75
Adams, NY 13605

RE: Mold Assessment Report
Library & Computer Lab

Dear Superintendent Collins,

As requested, GYMO completed a Mold Assessment for the library located at the Belleville Henderson Central School. Our NYS certified mold assessor Hayward B. Arthur, visited the site on September 6, 2018 and completed a visual inspection of property. Based on the inspection, swab and air samples were taken. The following samples were taken and analyzed for the presence and type of mold.

It was determined that mold was present on surfaces in the library and in the air in the library and neighboring computer lab, on the bookshelves, furniture, and books. When compared to the ambient air (exterior) the subject area contained unique spore types and counts, this can be seen in the spore count column below. A remediation plan was communicated to Rainbow International and is included in this report.

Sample #	Location	Testing	Spore Count
S1	Library Furniture	Swab	High
S2	Book Shelves	Swab	High
S3	Circulation Desk	Swab	High
S4	Return Duct	Swab	Medium
S5	Book	Swab	Medium
S6	Computer Lab Carpet	Swab	High
S7	Library Unit Filter	Swab	Medium
S8	Computer Lab Filter	Swab	Low

Sample #	Location	Testing	Spore Count	Predominant Spore Type
A1	Library – Elementary Side	Air	14,130	Aspergillus/Penecillium
A2	Library – High School Side	Air	8,600	Aspergillus/Penecillium
A3	Library – Instructional Area	Air	9,630	Aspergillus/Penecillium
A4	Interior Hallway	Air	52,800	Basidiospores
A5	Ambient – Exterior	Air	123,500	Basidiospores
A6	Computer Lab	Air	78,490	Aspergillus/Penecillium
A7	English Classroom 341	Air	45,470	Basidiospores

The spores present in the library and computer lab were unique (aspergillus/penicillium) compared to the ambient sample and are consistent with the white surface mold found in those areas. The ambient air samples contained multiple spore types but Basidiospores were the predominant spore type present. The interior hallway and English Classroom 341 both contained high levels of Basidiospores. It is common to find spore type consistent with outside air in unconditioned interior spaces.

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This report is representative of the mold conditions present on September 6, 2018. The conditions are subject to change due to mold being a living and dynamic organism. The remediation plan is included in attachment E of this report. An evaluation of the library and computer lab will be completed at the conclusion of the remediation and will be compared to the results obtained during the initial assessment. It should be noted that mold is normally present in both indoor and outdoor environments with levels varying based on conditions present. Mold levels may still be present following remediation but should be significantly reduced based on the plan provided.

If you have any questions pertaining to this report, please contact me directly at (315) 788-3900. We thank you for the opportunity to work with you on this project.

Sincerely,
GYMO Architecture, Engineering & Land Surveying, D.P.C.

Hayward B. Arthur

Digitally signed by Hayward B. Arthur
Date: 2018.09.10 13:11:30 -04'00'

Hayward B. Arthur
Principal, Director or Environmental Solutions

Attachment A: **License and Certifications**
Attachment B: **Sampling Data**
Attachment C: **Site Notes and Diagrams**
Attachment D: **Site Photos**
Attachment E: **Remediation Plan**

Appendix 1: **New York City Department of Health & Mental Hygiene "Guidelines on Assessment and Remediation of Fungi in Indoor Environments**

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ATTACHMENT A

LICENSE AND CERTIFICATIONS

GYMO Architecture, Engineering, & Land Surveying D.P.C.
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STATE OF NEW YORK - DEPARTMENT OF LABOR

MOLD ASSESSOR

HAYWARD B. ARTHUR, III

EXPIRES: 01-20

CERT# MA000256

01213 004533318 43

EYES BLU

HAIR BRN

HGT 6' 0 "

IF FOUND, RETURN TO:

NYSDOL - L&C UNIT

ROOM 161A BUILDING 12

STATE OFFICE CAMPUS

ALBANY NY 12240

NEW YORK STATE - DEPARTMENT OF LABOR
DIVISION OF SAFETY AND HEALTH
LICENSE AND CERTIFICATE UNIT
STATE CAMPUS BUILDING 12

Mold Assessor Company License

Gymo Architecture, Engineering & Land Surveying,
18969 US RTE 11
WATERTOWN, NY 13601

LICENSE NUMBER 00237
DATE OF ISSUE: 3/5/2018
EXPIRATION DATE 1/31/2020

This license is valid only for the contractor named above.

Eileen Franko, Director
FOR THE COMMISSIONER OF LABOR

ATTACHMENT B

Sampling Data

GYMO Architecture, Engineering, & Land Surveying D.P.C.
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EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-0262
http://www.EMSL.com / cinnmicrolab@emsl.com

Order ID: 371815529
Customer ID: GYMO50
Customer PO:
Project ID:

Attn: Brad Arthur
GYMO D.P.C.
18969 US Route 11
Watertown, NY 13601

Phone: (315) 788-3900
Fax: (315) 788-0668
Collected: 09/06/2018
Received: 09/07/2018
Analyzed: 09/08/2018

Proj: Belleville Henderson Library

Test Report: Microscopic Examination of Fungal Spores, Fungal Structures, Hyphae, and Other Particulates from Swab Samples (EMSL Method MICRO-SOP-200)

Lab Sample Number:	371815529-0001	371815529-0002	371815529-0003	371815529-0004	371815529-0005
Client Sample ID:	S1	S2	S3	S4	S5
Sample Location:	Wood Chair	Book Shelves	Circulation Desk	Air Duct	Duct
Spore Types	Category	Category	Category	Category	Category
Alternaria (Ulocladium)	-	-	-	Rare	-
Ascospores	-	-	-	-	-
Aspergillus/Penicillium	-	High	-	Medium	-
Basidiospores	-	-	-	Rare	-
Bipolaris++	-	-	-	-	-
Chaetomium	-	-	-	-	-
Cladosporium	-	-	-	*Medium*	-
Curvularia	-	-	-	-	-
Epicoccum	-	-	Rare	-	-
Fusarium	-	-	-	-	-
Ganoderma	-	-	-	-	-
Myxomycetes++	-	-	Rare	Rare	-
Pithomyces++	-	-	-	Rare	-
Rust	-	-	-	Rare	-
Scopulariopsis/Microascus	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-
Zygomycetes	-	-	-	-	-
Aspergillus	*High*	-	*High*	-	*Medium*
Bispora	-	-	-	-	-
Polythrincium	-	-	-	Rare	-
Stemphylium	-	-	-	-	-
Torula-like	-	-	-	-	-
Hyphal Fragment	-	-	-	-	-
Insect Fragment	-	-	-	Rare	-
Pollen	-	-	-	-	-
Fibrous Particulate	Rare	-	Low	Rare	-

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

- Denotes Not Detected.
++ = Includes other spores with similar morphology; see EMSL's fungal glossary for each specific category.
* = Sample contains fruiting structures and/or hyphae associated with the spores.

Preliminary Report

Actual final results may differ.

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

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ AIHA-LAP, LLC--EMLAP Accredited #100194

Initial report from: 09/08/2018 13:20:24

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

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Analyzed: 09/08/2018

Proj: Belleville Henderson Library

Test Report: Microscopic Examination of Fungal Spores, Fungal Structures, Hyphae, and Other Particulates from Swab Samples (EMSL Method MICRO-SOP-200)

Lab Sample Number:	371815529-0006	371815529-0007	371815529-0008		
Client Sample ID:	S6	S7	S8		
Sample Location:	Computer Lab Carpet	Library Air Filter	Computer Lab Air Filter		
Spore Types	Category	Category	Category	-	-
Alternaria (Ulocladium)	-	Rare	Rare	-	-
Ascospores	-	-	Rare	-	-
Aspergillus/Penicillium	High	-	-	-	-
Basidiospores	-	Rare	Rare	-	-
Bipolaris++	-	Rare	-	-	-
Chaetomium	-	-	-	-	-
Cladosporium	*Low*	*Medium*	Low	-	-
Curvularia	-	Rare	Rare	-	-
Epicoccum	-	Rare	-	-	-
Fusarium	-	-	-	-	-
Ganoderma	-	-	Rare	-	-
Myxomycetes++	-	Rare	-	-	-
Pithomyces++	-	Rare	Rare	-	-
Rust	-	Rare	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-
Unidentifiable Spores	-	-	Rare	-	-
Zygomycetes	-	-	-	-	-
Aspergillus	-	-	-	-	-
Bispora	-	-	Rare	-	-
Polythrincium	-	Rare	Rare	-	-
Stemphylium	-	Rare	-	-	-
Torula-like	-	-	Rare	-	-
Hyphal Fragment	-	-	-	-	-
Insect Fragment	-	Low	-	-	-
Pollen	-	Rare	Rare	-	-
Fibrous Particulate	-	-	Rare	-	-

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

- Denotes Not Detected.
++ = Includes other spores with similar morphology; see EMSL's fungal glossary for each specific category.
* = Sample contains fruiting structures and/or hyphae associated with the spores.

Preliminary Report

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Received: 09/07/2018
Analyzed: 09/08/2018

Project: Belleville Henderson Library

Test Report: Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods MICRO-SOP-201, ASTM D7391)

Lab Sample Number:	371815529-0009			371815529-0010			371815529-0011		
Client Sample ID:	A1			A2			A3		
Volume (L):	75			75			75		
Sample Location	Elementary Area			High School Area			Instructional Area		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria (Ulocladium)	-	-	-	1	40	0.5	1	40	0.4
Ascospores	2	90	0.6	6	300	3.5	2	90	0.9
Aspergillus/Penicillium	286	12600	89.2	133	5880	68.4	193	8530	88.6
Basidiospores	27	1200	8.5	44	1900	22.1	18	800	8.3
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	5	200	1.4	10	440	5.1	2	90	0.9
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	1	40	0.4
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	1	40	0.5	1	40	0.4
Myxomycetes++	-	-	-	-	-	-	-	-	-
Pithomyces++	1	40	0.3	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Cercospora++	-	-	-	-	-	-	-	-	-
Chaetoconis	-	-	-	-	-	-	-	-	-
Oidiodendron	-	-	-	-	-	-	-	-	-
Paecilomyces-like	-	-	-	-	-	-	-	-	-
Pestalotia/Pestalotiopsis	-	-	-	-	-	-	-	-	-
Polythrincium	-	-	-	-	-	-	-	-	-
Torula-like	-	-	-	-	-	-	-	-	-
Total Fungi	**321**	**14130**	**100**	**195**	**8600**	**100**	**218**	**9630**	**100**
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	1	40	-	-	-	-	1	40	-
Analyt. Sensitivity 600x	-	44	-	-	44	-	-	44	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	2	-	-	2	-	-	2	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	2	-	-	2	-	-	2	-

++ Includes other spores with similar morphology; see EMSL's fiungal glossary fior each specific category.

Preliminary Report

Vincent Iuzzolino, M.S., Laboratory Manager
or other approved signatory

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

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ AIHA-LAP, LLC--EMLAP Lab 100194

Initial report from: 09/08/2018 13:20:24

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Project: Belleville Henderson Library

Test Report: Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods MICRO-SOP-201, ASTM D7391)

Lab Sample Number:	371815529-0012			371815529-0013			371815529-0014		
Client Sample ID:	A4			A5			A6		
Volume (L):	75			75			75		
Sample Location	Interior Hall			Ambient- Exterior			Computer Lab		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**	**Raw Count**	**Count/m³**	**% of Total**
Alternaria (Ulocladium)	1	40	0.1	6	300	0.2	1*	10*	0
Ascospores	117	5170	9.8	242	10700	8.7	11	490	0.6
Aspergillus/Penicillium	22	970	1.8	36	1600	1.3	1660	73400	93.5
Basidiospores	968	42800	81.1	2240	99000	80.2	71	3100	3.9
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	58	2600	4.9	122	5390	4.4	30	1300	1.7
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	16	710	1.3	29	1300	1.1	2	90	0.1
Myxomycetes++	3	100	0.2	14	620	0.5	-	-	-
Pithomyces++	3	100	0.2	14	620	0.5	2	90	0.1
Rust	-	-	-	3	100	0.1	1*	10*	0
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	1	40	0.1	3	100	0.1	-	-	-
Cercospora++	1	40	0.1	-	-	-	-	-	-
Chaetoconis	1	40	0.1	-	-	-	-	-	-
Oidiodendron	-	-	-	1	40	0	-	-	-
Paecilomyces-like	2	90	0.2	76	3400	2.8	-	-	-
Pestalotia/Pestalotiopsis	1*	10*	0	1	40	0	-	-	-
Polythrincium	-	-	-	2	90	0.1	-	-	-
Torula-like	2	90	0.2	4	200	0.2	-	-	-
Total Fungi	**1196**	**52800**	**100**	**2793**	**123500**	**100**	**1778**	**78490**	**100**
Hyphal Fragment	1	40	-	-	-	-	1	40	-
Insect Fragment	1*	10*	-	-	-	-	-	-	-
Pollen	1	40	-	3	100	-	1	40	-
Analyt. Sensitivity 600x	-	44	-	-	44	-	-	44	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	2	-	-	1	-	-	2	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	2	-	-	1	-	-	2	-

++ Includes other spores with similar morphology; see EMSL's fiungal glossary fior each specific category.

Preliminary Report

Vincent Iuzzolino, M.S., Laboratory Manager
or other approved signatory

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

High levels of background particulate can obscure spores and other particulates leading to underestimation. Background levels of 5 indicate an overloading of background particulates, prohibiting accurate detection and quantification. Present = Spores detected on overloaded samples. Results are not blank corrected unless otherwise noted. The detection limit is equal to one fungal spore, structure, pollen, fiber particle or insect fragment. "*" Denotes particles found at 300X. "-" Denotes not detected. Due to method stopping rules, raw counts in excess of 100 are extrapolated based on the percentage analyzed. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ AIHA-LAP, LLC--EMLAP Lab 100194

Initial report from: 09/08/2018 13:20:24

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Analyzed: 09/08/2018

Project: Belleville Henderson Library

Test Report: Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods MICRO-SOP-201, ASTM D7391)

Lab Sample Number:	**371815529-0015**		
Client Sample ID:	**A7**		
Volume (L):	**75**		
Sample Location	**English Classroom**		
Spore Types	**Raw Count**	**Count/m³**	**% of Total**
Alternaria (Ulocladium)	3*	40*	0.1
Ascospores	73	3200	7
Aspergillus/Penicillium	13	570	1.3
Basidiospores	897	39600	87.1
Bipolaris++	-	-	-
Chaetomium	-	-	-
Cladosporium	29	1300	2.9
Curvularia	-	-	-
Epicoccum	-	-	-
Fusarium	-	-	-
Ganoderma	11	490	1.1
Myxomycetes++	1	40	0.1
Pithomyces++	2	90	0.2
Rust	-	-	-
Stachybotrys/Memnoniella	-	-	-
Unidentifiable Spores	-	-	-
Cercospora++	-	-	-
Chaetoconis	1	40	0.1
Oidiodendron	-	-	-
Paecilomyces-like	3	100	0.2
Pestalotia/Pestalotiopsis	-	-	-
Polythrincium	-	-	-
Torula-like	-	-	-
Total Fungi	**1033**	**45470**	**100**
Hyphal Fragment	-	-	-
Insect Fragment	-	-	-
Pollen	-	-	-
Analyt. Sensitivity 600x	-	44	-
Analyt. Sensitivity 300x	-	13*	-
Skin Fragments (1-4)	-	2	-
Fibrous Particulate (1-4)	-	1	-
Background (1-5)	-	2	-

++ Includes other spores with similar morphology; see EMSL's fiungal glossary fior each specific category.

Vincent Iuzzolino, M.S., Laboratory Manager
or other approved signatory

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

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OrderID: 371815529

Microbiology Chain of Custody

EMSL Order Number (*Lab Use Only*): 371815529

EMSL ANALYTICAL, INC.
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077
PHONE: (800) 220-3675
FAX:(856) 786-0262

Company : GYMO	**EMSL-Bill to:** ☑ Same ☐ Different If Bill to is Different note instructions in Comments**
Street: 18969 US 11	*Third Party Billing requires written authorization from third party*
City: WATERTOWN **State/Province:** NY	**Zip/Postal Code:** 13601 **Country:** USA
Report To (Name): BRAD ARTHUR	**Telephone #:** (315) 788-3907
Email Address: labs@gymodpc.com	**Fax #:** **Purchase Order:**
Project Name/Number: BELLEVILLE HENDERSON LIBRARY	**Please Provide Results:** ☐ Fax ☑ Email ☐ Fax
U.S. State Samples Taken: NY	**Connecticut Samples:** ☐ Commercial ☐ Residential

Turnaround Time (TAT) Options* - Please Check

☐ 3 Hour ☐ 6 Hour ☑ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

**Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide. TATs are subject to methodology requirements*

RECEIVED 2018 SEP 7 AM 10:47 EMSL HENDERSON, N.J.

Non Culturable Air Samples (Spore Traps) – Test Codes

- **M001** Air-O-Cell
- **M049** BioSIS
- **M030** Micro 5
- **M173** Allegro M2
- **M003** Burkard
- **M174** MoldSnap
- **M004** Allergenco
- **M043** Cyclex
- **M176** Relle Smart
- **M032** Allergenco-D
- **M002** Cyclex-d
- **M130** Via-Cell
- **M172** Versa Trap

Other Microbiology Test Codes

- **M041** Fungal Direct Examination
- **M005** Viable Fungi ID and Count
- **M006** Viable Fungi ID and Count (Speciation)
- **M007** Culturable Fungi
- **M008** Culturable Fungi (Speciation)
- **M009** Gram Stain Culturable Bacteria
- **M010** Bacterial Count and ID – 3 Most Prominent
- **M011** Bacterial Count and ID – 5 Most Prominent
- **M013** Sewage Contamination in Buildings
- **M014** Endotoxin Analysis
- **M015** Heterotrophic Plate Count
- **M180** Real Time Q-PCR-ERMI 36 Panel
- **M018** Total Coliform (Membrane Filtration)
- **M020** Fecal *Streptococcus* (Membrane Filtration)
- **M210-215** *Legionella* Detection
- **M026** Recreational Water Screen
- **M027** Mycotoxin Analysis
- **M029** *Enterococci*
- **M019** Fecal Coliform
- **M133** MRSA Analysis
- **M028** *Cryptococcus neoformans* Detection
- **M120** *Histoplasma capsulatum* Detection
- **M033-39** Allergen Testing
- **M044** Group Allergen (Cat, Dog, Cockroach, Dustmites)
- **Other** See Analytical Price Guide

Preservation Method (Water):

Name of Sampler: HAYWARD B. ARTHUR **Signature of Sampler:** H. B. Arthur

Sample #	Sample Location	Sample Type	Test Code	Volume/Area	Date/Time Collected
Example: A1	Kitchen	Air	M001	75L	1/1/12 4:00 PM
S1	WOOD CHAIR	SWAB	M041	—	9/6/18
S2	BOOK SHELVES	↓	↓	↓	↓
S3	CIRCULATION DESK				
S4	AIR DUCT				
S5	DUCT				
S6	COMPUTER LAB CARPET				
S7	LIBRARY AIR FILTER				
S8	COMPUTER LAB AIR FILTER	↓	↓	↓	↓
A1	ELEMENTARY AREA	AIR	M001	75L	↓

Client Sample # (s): S1 - A7 **Total # of Samples:** 15

Relinquished (Client): H. B. Arthur **Date:** 9/6/18 **Time:** 1411

Received (Client): Arthur F **Date:** 9/7/18 **Time:** 1015

Comments:

15

OrderID: 371815529

EMSL ANALYTICAL, INC.
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Microbiology Chain of Custody

EMSL Order Number (*Lab Use Only*): 371815529

EMSL ANALYTICAL, INC.
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077
PHONE: (800) 220-3675
FAX:(856) 786-0262

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

Sample #	Sample Location	Sample Type	Test Code	Volume/Area	Date/Time Collected
A2	HIGH SCHOOL AREA	AIR	M001	75L	9/6/18
A3	INSTRUCTIONAL AREA	↓	↓	↓	↓
A4	INTERIOR HALL				
A5	AMBIENT - EXTERIOR				
A6	COMPUTER LAB				
A7	ENGLISH CLASSROOM				

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**Comments/Special Instructions:

Page 2 of 2 pages

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ATTACHMENT C

Site Visit Notes and Diagrams

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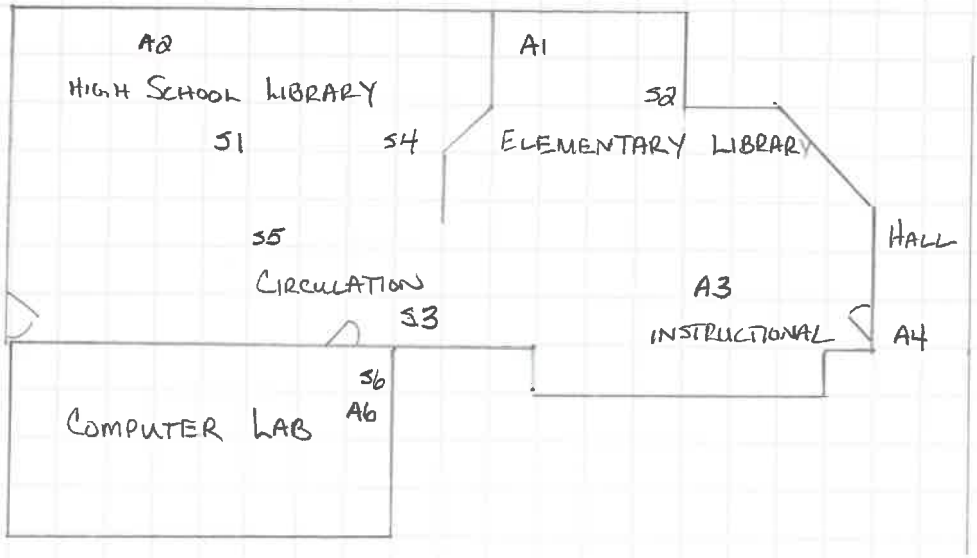
GYMO ARCHITECTURE, ENGINEERING & LAND SURVEYING, P.C.
220 Sterling Street, Watertown, NY 13601 Tel: (315) 788-3900 Fax: (315) 788-0668

PROJECT	SHEET	BY	DATE	FILE NO.
Belleville Henderson CSD Library	1/1	HBA	9/6/18	2018-357

A5-Ext



A1- Elementary Library 75L
A2- High School Library 75L
A3- Instructional Area 75L
A4- Interior Hallway 75L
A5- Ambient-Exterior 75L
A6- Computer Lab 75L
A7- English Classroom 341 75L

S1- Wood Chair
S2- Book Shelves
S3- Circulation Desk
S4- Return Air Duct
S5- Book
S6- Computer Room Carpet
S7- Library HVAC Filter
S8- Computer Lab HVAC Filter

ATTACHMENT D

Site Photos

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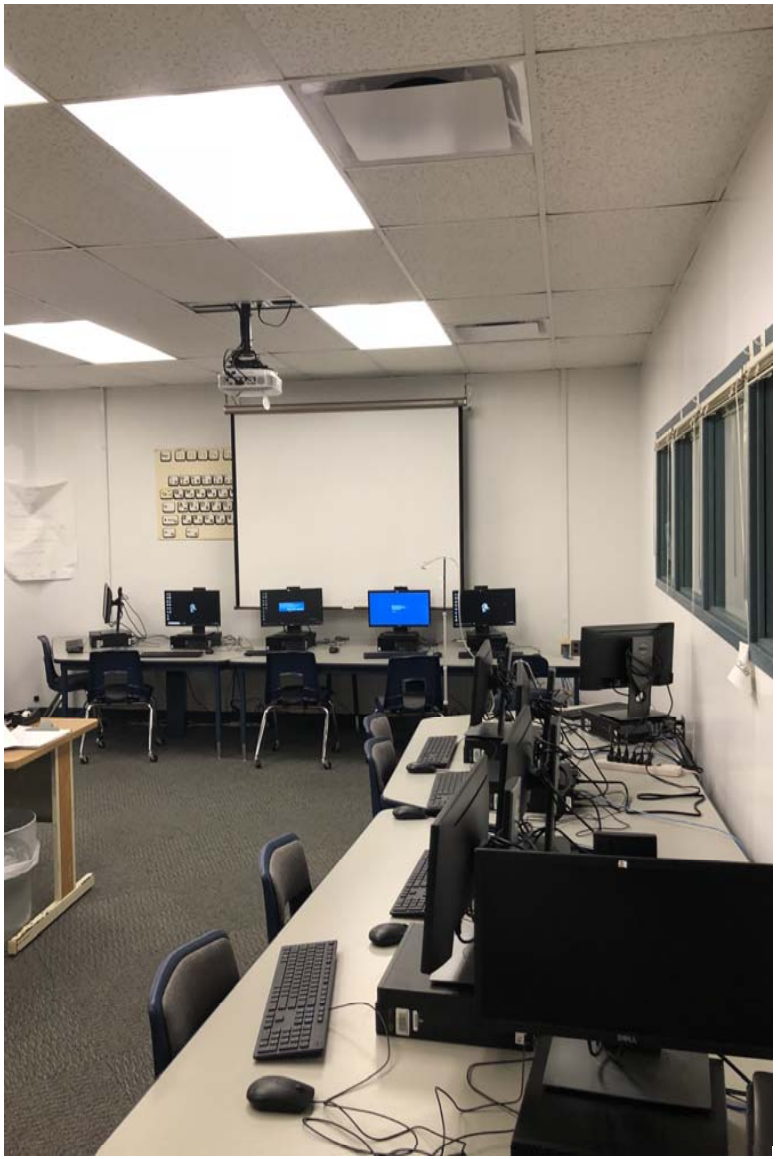


Maker
Tech
Lab

ATTACHMENT E

Remediation Plan

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Remediation Plan

This Plan has been prepared to meet NYSDOL regulations.

Rooms & Areas Where Work Will Be performed:

The work area shall be defined as the Library and Computer Lab.

Method for Remediation

- Install multiple air scrubbers and run throughout the remediation process
- Install multiple dehumidifiers and run throughout the remediation process.
- HEPA Vacuum wood furniture, books, walls, ceilings, and return air ducts.
- Wipe wood furniture, books, walls, ceilings, and return air ducts with an antimicrobial disinfectant.
- Disinfect carpets with hot water and biocide.
- Remove and dispose of the fabric chair and couch in the library.
- The utilization of a negative pressure enclosure and decontamination unit is not recommended for this scope of work.

Preventative Maintenance Recommendations:

- Based on the seasonal temperatures changes at this time of the year, a dehumidifier should be utilized until full time heating is required.

Guidelines:
Remediation should be conducted consistent with the New York City Department of Health & Mental Hygiene “Guidelines on Assessment and Remediation of Fungi in Indoor Environments”, 2008 edition for a “Large Area” and USEPA “Mold Remediation in Schools and Commercial Buildings”.

Disinfectants, Antimicrobials & Coatings:

The recommended disinfectant is Shockwave 8310 or similar. This product is registered with the USEPA for its intended use and should be used following the manufacturers specifications.

The contractor is advised that all horizontal and vertical surfaces require disinfecting and cleaning using an approved fungicide. All hard surfaces should be scrubbed with non-metallic scrub brushes and sealed properly with a fungal coating after cleaning is complete and post remedial clearance is achieved.

1. Porous Materials
    - Remove all visual fungal contamination
    - HEPA vacuum transitory fungal accumulation

2. Non- porous Materials
    - Surface fungal contamination- treat in place, wipe down/ abrasive treatment, HEPA vacuum, biocide treatment
    - Sub-surface fungal contamination (rots)- remove with care to structural integrity of building. Engineering oversight may be required.

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- Transitory fungal accumulation- HEPA vacuum, wipe down, biocide treatment.

3. Air scrubbing technique and HEPA Vacuuming of the working and adjacent areas should be performed by contractor.

4. Salvageable contents cleaning should be performed using the following methods included following table:

   Methods:

   Method 1. Wet HEPA vacuum, steam cleaning or dry cleaning.
   Method 2. Biocide
   Method 3. HEPA vacuum
   Method 4. Discard; apply biocide and HEPA vacuum area after biocide is dried.

Affected Material	Clean-up Method
Books and Papers	3
Carpet and Backing	4
Concrete or Cinderblock	2,3
Hard Surface, tile, linoleum	1,2,3
Plastics and metals	1,2,3
Toys, furniture, drapes	2,3,4
Gypsum	2,3,4
Wood	2,3,4

5. Non-salvageable and adjacent spaces
   - All non-salvageable materials with a mold growth should be disposed
   - All floors in adjacent non-remediation areas shall be treated as transitory fungal accumulation impacted. HEPA vacuum and air scrubbing techniques will be used during remediation

6. Personnel trained in the handling of mold-damaged materials equipped with:
   - A minimum of half-face elastomeric respirator with P-100 filters used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134)
   - Full body coveralls with head and foot covering.
   - Gloves and eye protection.

7. Containment of the work area should be used:
   - The work area should be unoccupied.
   - Cover the Floor, egress pathways, and items left in the work area with plastic sheeting and seal with tape before remediation.
   - Isolate the work area using plastic sheeting sealed with duct tape.
   - Consider using and exhaust fan equipped with HEPA Filter to generate negative pressurization.
   - Consider using air locks and a clean changing room.
   - Efforts should be made to reduce dust generation. Dust suppression methods particularly during any cutting or resurfacing of materials are highly recommended. Methods to consider include: cleaning or gently misting surfaces with a dilute soap

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or detergent solution prior to removal; the use of High-Efficiency Particulate Air (HEPA) vacuum-shrouded tools; or using a vacuum equipped with HEPA filter at the point of dust generation. Work practices that create dust should be avoided.

- Moldy material's that can be cleaned should be cleaned using a soap or detergent solution. Materials that cannot be cleaned should be removed from the building in sealed plastic bags. Plastic sheeting should be discarded after use. There are no special requirements for disposal of moldy materials.
- The work area and areas used for workers for egress should be HEPA- vacuumed and cleaned with a damp cloth and/or mop and soap or detergent solution.
- All areas should be left dry and visibly free from mold, dust, and debris.

Personal Protective Equipment (PPE):
Respiratory protection (e.g.., N-95 disposable respirator), in accordance with OSHA respiratory protection standard (*29 CFR 1910.134*), is recommended. Gloves and eye protection should also be worn. The contractor must refer to the MSDS sheets for all Biocides/Fungicides used on the project for specific PPE Guidelines. PPE shall be required until clearance is achieved. All personnel entering the work area are required to provide documentation of certification to the potential hazards associated with exposure to mold and use of Personal Protective Equipment. All activities must be in compliance with NYSDOL's Regulations for the Remediation of Mold and OSHA General Duty Clause.

Post Remediation Assessment

Visual Inspection for visible accumulation of dust or debris or visible mold and/or air sampling techniques shall be conducted by a NYSDOL certified mold assessment consultant, independent of the firm completing the remediation. Presence of dust and debris or visible mold contamination is grounds for additional cleaning. Air samples may be taken for comparison to baseline and control samples. Effective mold remediation involves reducing inside mold levels to less or equal to typical background. Follow up evaluation is recommended within the first six months after completing remediation.

Notification and Posting:

The work area and areas directly adjacent should be unoccupied. Further vacating of spaces near the work area is recommended including other tradesmen, recent surgical recovery patients, and immune-suppressed individuals. The work area should be marked with appropriate signage and barrier tape and remain this way until a satisfactory post remediation clearance is achieved. Signs advising that a mold remediation project is in progress shall be displayed at all accessible entrances to the remediation area.

Cost Estimate and Completion Time:

Cost Estimate is to be determined.

Underlying Causes of the Mold:

Breakage of a waterpipe in the rear side of basement is the cause of the water intrusion throughout the basement area. Fans and dehumidifiers were present upon arriving at the site for assessment.

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APPENDIX 1

New York City Department of Health & Mental Hygiene "Guidelines on Assessment and Remediation of Fungi in Indoor Environments

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Guidelines

on

Assessment and Remediation of Fungi in Indoor Environments

New York City Department of Health and Mental Hygiene

November 2008

Table of Contents

Preface

This 2008 document revises existing guidelines and supersedes all prior editions. It is based both on a review of the current literature regarding fungi (mold) and on comments from a review panel consisting of experts in the fields of mycology/microbiology, environmental health sciences, environmental/occupational medicine, industrial hygiene, and environmental remediation.

These guidelines are intended for use by building owners and managers, environmental contractors and environmental consultants. It is also available for general distribution to anyone concerned about indoor mold growth. The attached fact sheet, "*Mold Growth: Prevention and Cleanup for Building Owners and Managers*," is a simplified summary of these guidelines, which may be useful for building owners, managers and workers. It is strongly recommended that the complete guidelines be referred to before addressing the assessment or remediation of indoor mold growth.

In 1993, the New York City Department of Health and Mental Hygiene (DOHMH) first issued recommendations on addressing mold growth indoors. In 2000, DOHMH made major revisions to the initial guidance and made minor edits in 2002.

The terms *fungi* and *mold* are used interchangeably throughout this document.

This document should be used only as guidance. It is not a substitute for a site-specific assessment and remediation plan and is not intended for use in critical care facilities such as intensive care units, transplant units, or surgical suites. Currently there are no United States Federal, New York State, or New York City regulations for the assessment or remediation of mold growth.

 These guidelines are subject to change as more information regarding this topic becomes available.

The New York City Department of Health and Mental Hygiene would like to thank the following individuals and organizations for participating in the revision of these guidelines. Please note that these guidelines do not necessarily reflect the opinions of the participants or their organizations.

Donald Ahearn, PhD	Georgia State University
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Terry Brennan, MS	Camroden Associates Inc.
Armando Chamorro, CIH	CIH Environmental
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Susan Conrath, PhD, MPH	US Public Health Service, Indoor Environments Division
Dorr Dearborn, MD	Rainbow Childrens Hospital
Marie-Alix d'Halewyn	Institut National de Santé Publique du Québec
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Elissa Favata, MD	Environmental and Occupational Health Associates
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Bruce Jarvis, PhD	University of Maryland at College Park Dept of Chemistry and Biochemistry
Eckardt Johanning, MD, MS	Fungal Research Group Foundation, Inc.
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Bruce Lippy, PhD	The Lippy Group
Gerald Llewellyn, PhD	State of Delaware, Division of Public Health
J David Miller, PhD	Carleton University, Department of Chemistry
Philip Morey, PhD, CIH	Environ Corporation
David Newman, MA, MS	New York Committee for Occupational Safety and Health
Ted Outwater	US National Institute of Environmental Health Sciences
Alex Potievsky	New York City, Citywide Office of Occupational Safety and Health
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Virginia Salares, PhD	Canada Mortgage and Housing Corporation
AnnMarie Santiago	New York City Department of Housing Preservation & Development
Bill Sothern, MS, CIH	Microecologies Inc.
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John Tancredi	Environmental Contractors Association of New York City – Pinnacle Environmental Corp.
Donald Weekes, CIH, CSP	InAIR Environmental Ltd.
Chin Yang, Ph.D.	Prestige EnviroMicrobiology Inc

We would also like to thank the many others who offered opinions, comments, and assistance at various stages during the development of these guidelines.

These guidelines were prepared by the Environmental and Occupational Disease Epidemiology Unit of the New York City Department of Health and Mental Hygiene. This document, and any future revisions, is available online at nyc.gov/health. For further information please call 311 or (212) NEW-YORK (from outside the City). **November 2009**

Introduction

Fungi (mold) are present almost everywhere. In an indoor environment hundreds of different kinds of mold are able to grow wherever there is moisture and an organic substrate (food source). They can grow on building and other materials, including: the paper on gypsum wallboard (drywall); ceiling tiles; wood products; paint; wallpaper; carpeting; some furnishings; books/papers; clothes; and other fabrics. Mold can also grow on moist, dirty surfaces such as concrete, fiberglass insulation, and ceramic tiles. It is neither possible nor warranted to eliminate the presence of all indoor fungal spores and fragments; however, mold growth indoors can and should be prevented and removed if present.

The purpose of these guidelines is to provide an approach to address potential and observed mold growth on structural materials in commercial, school, and residential buildings. Mold growth in critical care areas of health-care facilities such as intensive care units or surgery suites may pose significant health concerns to patients. This document is not intended for such situations. Please visit the US Centers for Disease Control and Prevention (CDC) at www.cdc.gov for more information on dealing with mold growth and its cleanup in health-care facilities.[1] Mold on bathroom tile grout, in shower stalls, and on bathtubs is a common occurrence. Occupants can control this growth through frequent use of household cleaners.

Water accumulation in indoor environments can lead to mold growth (and other environmental problems), which has been associated with human health effects (see ***Appendix A***).[2-6] Indoor mold growth can be prevented or minimized, however, by actively maintaining, inspecting, and correcting buildings for moisture problems and immediately drying and managing water-damaged materials. In the event that mold growth does occur, this guide is intended to assist those responsible for maintaining facilities in evaluating and correcting this problem.

Removing mold growth and correcting the underlying cause of water accumulation can help to reduce mold exposures and related health symptoms.[7,8] Prompt remediation of mold-damaged materials and infrastructure repair should be the primary response to mold growth in buildings. The simplest, most expedient remediation that properly and safely removes mold growth from buildings should be used. Extensive mold growth poses more difficult problems that should be addressed on a case-by-case basis in consultation with an appropriate building or environmental health professional. In all situations, the source of water must be identified and corrected or the mold growth will recur.

Effective communication with building occupants is an important component of all remedial efforts. Individuals who believe they have mold-related health problems should see their physicians. Individuals who may have an occupationally related illness should be referred to an occupational/environmental physician for evaluation, following any needed initial care. Clinic contact information is available from the New York State Department of Health at www.health.state.ny.us/environmental/workplace/clinic_network.

Environmental Assessment

The presence of mold growth, water damage, or musty odors should be addressed quickly. In all instances, any sources of water must be identified and corrected and the extent of water damage and any mold growth determined. Water-damaged materials should be removed or cleaned and dried. For additional information on cleaning water-damaged materials and personal belongings, refer to the EPA document "Mold Remediation in Schools and Commercial Buildings."[9]

A trained building or environmental health professional may be helpful in assessing the extent of the moisture problem and mold growth and developing a site-specific work plan. The presence of a trained professional to provide oversight during remediation can also be helpful to ensure quality work and compliance with the work plan. According to the American Industrial Hygiene Association a trained professional should have, at a minimum, a relevant science or engineering degree and two years of full-time supervised experience in mold assessment.[10]

Visual Inspection

A visual inspection is the most important initial step in identifying a possible mold problem and in determining remedial strategies. The extent of any water damage and mold growth should be visually assessed and the affected building materials identified. A visual inspection should also include observations of hidden areas where damages may be present, such as crawl spaces, attics, and behind wallboard. Carpet backing and padding, wallpaper, moldings (*e.g.* baseboards), insulation and other materials that are suspected of hiding mold growth should also be assessed.

Ceiling tiles, paper-covered gypsum wallboard (drywall), structural wood, and other cellulose-containing surfaces should be given careful attention during a visual inspection. Ventilation systems should be visually checked for damp conditions and/or mold growth on system components such as filters, insulation, and coils/fins, as well as for overall cleanliness.

Equipment such as a moisture meter or infrared camera (to detect moisture in building materials) or a borescope (to view spaces in ductwork or behind walls) may be helpful in identifying hidden sources of mold growth, the extent of water damage, and in determining if the water source is active.

Using personal protective equipment such as gloves and respiratory protection (*e.g.* N-95 disposable respirator) should be considered if assessment work might disturb mold. Efforts should also be made to minimize the generation and migration of any dust and mold.

Environmental Sampling

Environmental sampling is **not** usually necessary to proceed with remediation of visually identified mold growth or water-damaged materials. Decisions about appropriate remediation strategies can generally be made on the basis of a thorough visual inspection. Environmental sampling may be helpful in some cases, such as, to confirm the presence of visually identified

mold or if the source of perceived indoor mold growth cannot be visually identified.

If environmental samples will be collected, a sampling plan should be developed that includes a clear purpose, sampling strategy, and addresses the interpretation of results. [11,12] Many types of sampling can be performed (*e.g.* air, surface, dust, and bulk materials) on a variety of fungal components and metabolites, using diverse sampling methodologies. Sampling methods for fungi are not well standardized, however, and may yield highly variable results that can be difficult to interpret.[11-17] Currently, there are no standards, or clear and widely accepted guidelines with which to compare results for health or environmental assessments.

Environmental sampling should be conducted by an individual who is trained in the appropriate sampling methods and is aware of the limitations of the methods used. Using a laboratory that specializes in environmental mycology is also recommended. The laboratory should be accredited in microbiology by an independent and reputable certifying organization.

For additional information on sampling, refer to the American Conference of Governmental Industrial Hygienists' publication, "Bioaerosols: Assessment and Control" and the American Industrial Hygiene Association's " Field Guide for the Determination of Biological Contaminants in Environmental Samples."[11,18]

Remediation

The goal of remediation is to remove or clean mold-damaged materials using work practices that protect occupants by controlling the dispersion of mold from the work area and protect remediation workers from exposures to mold. The listed remediation methods were designed to achieve this goal; however, they are not meant to exclude other similarly effective methods and are not a substitute for a site-specific work plan. Since little scientific information exists that evaluates the effectiveness and best practices for mold remediation, these guidelines are based on principles used to remediate common indoor environmental hazards. These guidelines are not intended for use in critical care facilities such as intensive care units, transplant units, or surgical suites.

Prior to any remediation, consideration must be given to the potential presence of other environmental hazards, such as asbestos and lead. These guidelines are based on possible health risks from mold exposure and may be superseded by standard procedures for the remediation of other indoor environmental hazards.

Moisture Control and Building Repair

In all situations, the underlying moisture problem must be corrected to prevent recurring mold growth. Indoor moisture can result from numerous causes, such as: façade and roof leaks; plumbing leaks; floods; condensation; and high relative humidity. An appropriate building expert may be needed to identify and repair building problems. An immediate response

and thorough cleaning, drying, and/or removal of water-damaged materials will prevent or limit microbial growth.

Relative humidity should generally be maintained at levels below 65% to inhibit mold growth.[19] Short-term periods of higher humidity would not be expected to result in mold growth.[20] However, condensation on cold surfaces could result in water accumulation at much lower relative humidity levels. Relative humidity should be kept low enough to prevent condensation on windows and other surfaces.

Emphasis should be placed on ensuring proper repairs of the building infrastructure so that water intrusion and moisture accumulation is stopped and does not recur.

Worker Training

Proper training of workers is critical in successfully and safely remediating mold growth.[21,22] Training topics that should be addressed include:

- Causes of moisture intrusion and mold growth
- Health concerns related to mold exposure
- The use of appropriate personal protective equipment
- Mold remediation work practices, procedures, and methods

For additional information, the National Institute of Environmental Health Sciences' publication, "Guidelines for the Protection and Training of Workers Engaged in Maintenance and Remediation Work Associated with Mold" lists minimum training criteria for building maintenance and mold remediation workers that should be completed before addressing indoor mold growth.[23]

Trained building maintenance staff can address limited and occasional mold growth. For larger jobs, more extensively trained mold remediation workers may be needed.

Cleaning Methods

Non-porous materials (*e.g.* metals, glass, and hard plastics) can almost always be cleaned. Semi-porous and porous structural materials, such as wood and concrete can be cleaned if they are structurally sound. Porous materials, such as ceiling tiles and insulation, and wallboards (with more than a small area of mold growth) should be removed and discarded. Wallboard should be cleaned or removed at least six inches beyond visually assessed mold growth (including hidden areas, see ***Visual Inspection***) or wet or water-damaged areas.[24] A professional restoration consultant should be contacted to restore valuable items that have been damaged.

Cleaning should be done using a soap or detergent solution. Use the gentlest cleaning method that effectively removes the mold to limit dust generation. All materials to be reused should be dry and visibly free from mold. Consideration should also be given to cleaning surfaces and materials adjacent to areas of mold growth for settled spores and fungal fragments. A vacuum

equipped with a High-Efficiency Particulate Air (HEPA) filter could also be used to clean these adjacent areas.

Disinfectants are seldom needed to perform an effective remediation because removal of fungal growth remains the most effective way to prevent exposure. Disinfectant use is recommended when addressing certain specific concerns such as mold growth resulting from sewage waters. If disinfectants are considered necessary, additional measures to protect workers and occupants may also be required. Disinfectants must be registered for use by the United States Environmental Protection Agency (EPA). Any antimicrobial products used in a HVAC system must be EPA-registered specifically for that use.

The use of gaseous, vapor-phase, or aerosolized (*e.g.* fogging) biocides for remedial purposes is **not** recommended. Using biocides in this manner can pose health concerns for people in occupied spaces of the building and for people returning to the treated space. Furthermore, the effectiveness of these treatments is unproven and does not address the possible health concerns from the presence of the remaining non-viable mold.

Quality Assurance Indicators

Measures to ensure the quality and effectiveness of remediation should be undertaken regardless of the project size. Evaluations *during* as well as *after* remediation should be conducted to confirm the effectiveness of remedial work, particularly for large-scale remediation. At minimum, these quality assurance indicators should be followed and documented:

- The underlying moisture problem was identified and eliminated
- Isolation of the work area was appropriate and effective
- Mold removal and worksite cleanup was performed according to the site-specific plan
- Any additional moisture or mold damage discovered during remediation was properly addressed
- Upon completion of remediation, surfaces are free from visible dust and debris.
- If environmental sampling was performed, the results of such sampling were evaluated by a trained building or environmental health professional.[10]

Restoring Treated Spaces

After completing mold remediation and correcting moisture problems, building materials that were removed should be replaced and brought to an intact and finished condition. The use of new building materials that do not promote mold growth should be considered. Anti-microbial paints are usually unnecessary after proper mold remediation. They should not be used in lieu of mold removal and proper moisture control, but may be useful in areas that are reasonably expected to be subject to moisture.

Remediation Procedures

Three different sizes of remediation and the remediation of heating, ventilation, and air-conditioning (HVAC) systems are described below. Currently, existing research does not relate the amount of mold growth to the frequency or severity of health effects. However, as the presence of moldy materials increases, so does the potential for exposure[8] and the need to limit the spread of mold-containing dusts and worker exposures. As such, the size of the area impacted by mold growth as well as practical considerations were used to help define remedial procedures.

Since the following areas were arbitrarily selected, site-specific conditions must be considered in choosing adequate remediation procedures. For more information on the unique characteristics of building types and occupancies that may influence remediation procedures refer to the American Industrial Hygiene Association's publication, "Recognition, Evaluation, and Control of Indoor Mold."[25]

Small Isolated Areas (less than 10 square feet) – *e.g.* ceiling tiles, small areas on walls

(a) Remediation can be conducted by trained building maintenance staff. Such persons should receive training on proper cleaning methods, personal protection, and potential health hazards associated with mold exposure. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

(b) Respiratory protection (e.g., N-95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection should also be worn.

(c) The work area should be unoccupied.

(d) If work may impact difficult-to-clean surfaces or items (e.g. carpeting, electronic equipment), the floor of the work area, egress pathways, and other identified materials/belongings should be removed or covered with plastic sheeting and sealed with tape before remediation.

(e) Efforts should be made to reduce dust generation. Dust suppression methods particularly during any cutting or resurfacing of materials are highly recommended. Methods to consider include: cleaning or gently misting surfaces with a dilute soap or detergent solution prior to removal; the use of High-Efficiency Particulate Air (HEPA) vacuum-shrouded tools; or using a vacuum equipped with a HEPA filter at the point of dust generation. Work practices that create excessive dust should be avoided.

(f) Moldy materials that can be cleaned should be cleaned using a soap or detergent solution. Materials that cannot be cleaned should be removed from the building in a sealed plastic bag(s). Plastic sheeting should be discarded after use. There are no special requirements for the disposal of moldy materials.

(g) The work area and areas used by workers for egress should be HEPA-vacuumed (a vacuum equipped with a High-Efficiency Particulate Air filter) or cleaned with a damp cloth and/or mop and a soap or detergent solution.

(h) All areas should be left dry and visibly free from mold, dust, and debris. Check that other quality assurance indicators (see ***Quality Insurance Indicators***) have also been met.

Medium-Sized Isolated Areas (10 – 100 square feet)

(a) Remediation can be conducted by trained building maintenance staff. Such persons should receive training on proper cleaning methods, personal protection, and potential health hazards associated with mold exposure. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

(b) Respiratory protection (e.g., N-95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection should also be worn.

(c) The work area should be unoccupied.

(d) Cover the floor, egress pathways, and items left in the work area with plastic sheeting and seal with tape before remediation.

(e) Seal ventilation ducts/grills and other openings in the work area with plastic sheeting. The HVAC system servicing this area may need to be shut down to properly seal vents.

(f) Efforts should be made to reduce dust generation. Dust suppression methods particularly during any cutting or resurfacing of materials are highly recommended. Methods to consider include: cleaning or gently misting surfaces with a dilute soap or detergent solution prior to removal; the use of High-Efficiency Particulate Air (HEPA) vacuum-shrouded tools; or using a vacuum equipped with a HEPA filter at the point of dust generation. Work practices that create excessive dust should be avoided.

(g) Moldy materials that can be cleaned should be cleaned using a soap or detergent solution. Materials that cannot be cleaned should be removed from the building in sealed plastic bags. Plastic sheeting should be discarded after use. There are no special requirements for disposal of moldy materials.

(h) The work area and areas used by workers for egress should be HEPA-vacuumed and cleaned with a damp cloth and/or mop and a soap or detergent solution.

(i) All areas should be left dry and visibly free from mold, dust, and debris. Check that other quality assurance indicators (see ***Quality Insurance Indicators***) have also been met.

Large Areas (greater than 100 square feet in a contiguous area) – *e.g.* on separate walls in a single room

Properly trained and equipped mold remediation workers should conduct the remediation. The presence of a trained building or environmental health professional (see ***Environmental Assessment***) to provide oversight during remediation may be helpful to ensure quality work and compliance with the work plan. The following procedures are recommended:

(a) Personnel trained in the handling of mold-damaged materials equipped with:

i. A minimum of half-face elastomeric respirators with P-100 filters used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134)
ii. Full body coveralls with head and foot coverings
iii. Gloves and eye protection

(b) Containment of the affected area:

i. The HVAC system servicing this area should be shut down during remediation.
ii. Isolation of the work area using plastic sheeting sealed with duct tape. Furnishings should be removed from the area. Ventilation ducts/grills, any other openings, and remaining fixtures/furnishings should be covered with plastic sheeting sealed with duct tape.
iii. Consider using an exhaust fan equipped with a HEPA filter to generate negative pressurization.
iv. Consider using airlocks and a clean changing room.
v. Egress pathways should also be covered if a clean changing room is not used.

(c) The work area should be unoccupied.

(d) Efforts should be made to reduce dust generation. Dust suppression methods particularly during any cutting or resurfacing of materials are highly recommended. Methods to consider include: cleaning or gently misting surfaces with a dilute soap or detergent solution prior to removal; the use of High-Efficiency Particulate Air (HEPA) vacuum-shrouded tools; or using a vacuum equipped with a HEPA filter at the point of dust generation. Work practices that create excessive dust should be avoided.

(e) Moldy materials, that can be cleaned, should be cleaned using a soap or detergent solution. Materials that cannot be cleaned should be removed from the building in sealed plastic bags. The outside of the bags should be cleaned with a damp cloth and a soap or detergent solution or HEPA-vacuumed in the work area (or clean changing room) prior to their transport to unaffected areas of the building. There are no special requirements for the disposal of moldy materials.

(f) Before leaving isolated areas, workers should remove disposable clothing to prevent the tracking of mold-containing dusts outside of the work area.

(g) The work area and egress pathways (and clean changing room if present) should be HEPA-vacuumed and cleaned with a damp cloth and/or mop with a soap or detergent solution and be visibly clean prior to the removal of isolation barriers. Plastic sheeting should be discarded after use.

(h) All areas should be left dry and visibly free from mold, dust, and debris. Check that other quality assurance indicators (see ***Quality Insurance Indicators***) have also been met.

Remediation of HVAC Systems

Mold growth in heating, ventilation, and air-conditioning (HVAC) systems can pose building-wide problems. Obtaining professional help should always be considered in addressing even small amounts of mold growth or moisture problems within an HVAC system. Recurring problems, regardless of size, may indicate a systemic problem and appropriate professional help should be sought.

Small Isolated Area of Mold Growth in the HVAC System (<10 square feet) – *e.g.* box filter, small area on insulation

(a) Remediation can be conducted by trained building maintenance staff that are familiar with the design and function of the impacted HVAC system. Such persons should receive training on proper cleaning methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

(b) Respiratory protection (*e.g.* N-95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection should be worn.

(c) The HVAC system should be shut down prior to any remedial activities.

(d) Efforts should be made to reduce dust generation. Dust suppression methods particularly during any cutting or resurfacing of materials are highly recommended. Methods to consider include: cleaning or gently misting surfaces with a dilute soap or detergent solution prior to removal; the use of High-Efficiency Particulate Air (HEPA) vacuum-shrouded tools; or using a vacuum equipped with a HEPA filter at the point of dust generation. Work practices that create excessive dust should be avoided.

(e) The use of plastic sheeting to isolate other sections of the system should be considered.

(f) Moldy materials that can be cleaned should be cleaned using a soap or detergent solution. Growth-supporting materials that are moldy, such as the insulation of interior-lined ducts, flexible ducts, and filters, should be removed and sealed in plastic bags. There are no special requirements for the disposal of moldy materials.

(g) The work area and areas used for egress should be HEPA-vacuumed and cleaned with a damp cloth and/or mop and a soap or detergent solution. Any plastic sheeting should be discarded after use.

(h) All areas should be left dry and visibly free from mold, dust and debris. Check that other quality assurance indicators (see ***Quality Insurance Indicators***) have also been met.

Large Area of Mold Growth in the HVAC System (>10 square feet)

Properly trained and equipped mold remediation workers with specific training and experience in HVAC systems, should conduct the remediation. The presence of a trained building or environmental health professional (see ***Environmental Assessment***) with experience and specific knowledge of HVAC systems, to provide oversight during remediation can be helpful to ensure quality work and compliance with the work plan. The following procedures are recommended:

(a) Personnel trained in the handling of mold-damaged materials equipped with:

i. A minimum of half-face elastomeric respirators with P-100 filters used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134)
ii. Full body coveralls with head and foot coverings
iii. Gloves and eye protection

(b) The HVAC system should be shut down prior to any remedial activities.

(c) Containment of the affected area:

i. Isolation of work area from the other areas of the HVAC system using plastic sheeting sealed with duct tape
ii. The use of an exhaust fan equipped with a HEPA filter to generate negative pressurization should be considered
iii. Consider using airlocks and a clean changing room
iv. Egress pathways should also be covered if a clean changing room is not used

(d) Efforts should be made to reduce dust generation. Dust suppression methods particularly during any cutting or resurfacing of materials are highly recommended. Methods to consider include: cleaning or gently misting surfaces with a dilute soap or detergent solution prior to removal; the use of High-Efficiency Particulate Air (HEPA) vacuum-shrouded tools; or using a vacuum equipped with a HEPA filter at the point of dust generation. Work practices that

create excessive dust should be avoided.

(e) Moldy materials that can be cleaned should be cleaned using a soap or detergent solution. Growth-supporting materials that are moldy, such as the insulation of interior-lined ducts, flexible ducts, and filters, should be removed in sealed plastic bags. The outside of the bags should be cleaned with a damp cloth and a soap or detergent solution or HEPA-vacuumed prior to their removal from the isolated work area. There are no special requirements for the disposal of moldy materials.

(f) Before leaving isolated areas, workers should remove disposable clothing to prevent the tracking of mold-containing dust outside of the work area.

(g) The work area and egress pathways (and clean changing room if present) should be HEPA-vacuumed and cleaned with a damp cloth and/or mop and a soap or detergent solution prior to the removal of isolation barriers. Plastic sheeting should be discarded after use.

(h) All areas should be left dry and visibly free from mold, dust, and debris. Check that other quality assurance indicators (see ***Quality Insurance Indicators***) have also been met.

Communication with Building Occupants

Communication with occupants of affected spaces is important regardless of the size of the project but is especially important when mold growth requiring large-scale remediation is found. When large-scale remediation is performed, the building owner, management, and/or employer should notify occupants in the building. Notification should include a description of the remedial measures to be taken and a timetable for completion. Group meetings, held before and after remediation, with full disclosure of plans and results, can be an effective communication mechanism. Building occupants should be provided with a copy of all inspection reports upon request. For more detailed information on risk communication refer to the American Industrial Hygiene Association's publication, "Recognition, Evaluation, and Control of Indoor Mold."[26]

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Appendix A

Health Effects

Several comprehensive reviews of the scientific literature on the health effects of mold in indoor spaces have been published in recent years.[1-3] This appendix reflects these reviews but has also considered more recently published articles.

Potential for Exposure and Health Effects

Fungi are common in both indoor and outdoor environments and play a vital role in the earth's ecology by decomposing organic matter such as dead trees and leaves. As a result, all people have routine exposure to fungi, which may occur through inhalation, ingestion, and touching moldy surfaces. The main route of exposure to mold for people living or working in moldy indoor environments is inhalation of airborne fungal spores, fragments, or metabolites.[2] Ingestion and dermal exposures are less understood in these scenarios and can easily be minimized or prevented by workers through proper hygiene and work practices. Therefore, the remaining discussion will focus on the adverse health effects of mold due to inhalational exposure.

Adverse health effects may include: allergic reactions; toxic effects and irritation; and infections.[1-5] The mere presence of mold growth does not necessarily indicate that people present in the area will exhibit adverse health effects. However, as the amount of mold-impacted materials increases, so do potential exposures. Certain exposures may represent a significant risk such as occupational exposures to high concentrations of fungi and chronic (long-term) exposures, especially of individuals with underlying health conditions such as asthma, compromised immune systems, or allergies.

Evidence linking mold exposures to severe human health effects is documented in reports of occupational disease, particularly in forestry and agricultural settings where inhalation exposures were typically high and/or chronic.[2,6-11] The intensity of mold exposure and associated health effects experienced in undisturbed indoor environments is usually much less severe than that experienced by agricultural or forestry workers.[2,7,12-14] With the possible exception of exposures from mold remediation work, such high-level exposures are not expected indoors.[15-16] Although high-level exposures are unlikely to occur in undisturbed indoor settings, chronic exposures to lower levels may still raise health concerns.

Several factors influence the likelihood that individuals might experience health effects following exposure to mold in indoor environments. These include: the nature of the fungal material (e.g., allergenic, toxic/irritant, or infectious); the degree of exposure (amount and duration); and the susceptibility of exposed people. Susceptibility varies with genetic predisposition, age, state of health, concurrent exposures, and previous sensitization. It is not possible to determine "safe" or "unsafe" levels of exposure for the general public because of variation of individual susceptibility, lack of standardized and validated environmental exposure sampling methods, and lack of reliable biological markers. [17]

In addition to the adverse health effects associated with exposure to mold, in 2004, the Institute of Medicine (IOM) reported health risks associated with living in damp indoor environments. The IOM reported evidence suggesting an association between damp indoor environments and the development of asthma. Reported respiratory symptoms included, wheezing, coughing, and exacerbation of asthma.[2]

Allergic and Hypersensitivity Effects

It is well established that fungi can cause allergic reactions in humans. The most common symptoms associated with allergic reactions include runny nose, sneezing, post-nasal drip with sore throat, eye irritation, cough, wheeze, and other symptoms associated with the aggravation of asthma.[2,13,18-23] Immunological responses to mold include allergic rhinitis, hypersensitivity pneumonitis, and asthma exacerbations. These conditions require prior exposure for sensitization. These symptoms may persist for some time after removal from the source.

Allergic rhinitis is a group of symptoms that mostly affects the mucous membranes of nasal passages and may result from an allergic reaction to fungi. Symptoms often associated with "hay fever" such as congestion, runny nose, and sneezing may occur.[5,24]

Hypersensitivity pneumonitis (HP) is a rare lung disease with delayed onset (3-8 hours) of fever, shortness of breath, cough, chest tightness, chills, and general malaise. With continued exposure, HP can lead to permanent lung disease. The occurrence of HP, even among those that are highly exposed to fungi, is rare. HP has typically been associated with repeated heavy exposures in forestry and agricultural settings, which raises concerns for workers routinely performing mold remediation, but has also been reported in indoor settings with lower level chronic exposures.[3,11,18,25-27]

Allergic bronchopulmonary aspergillosis (ABPA) and allergic fungal sinusitis (AFS) are examples of rarely occurring allergic reactions to non-invasive fungal growth in the respiratory system. Most symptoms are non-specific resembling asthma or chronic sinusitis. In addition, ABPA and AFS usually occur in those with underlying medical problems. In the case of ABPA, this includes cystic fibrosis, asthma, and other predisposing medical conditions.[28,29]

Recent studies, which have suggested an association between the presence of indoor mold and the development of asthma or allergies, are limited and difficult to interpret. Stark *et al.* found higher concentrations of dust-borne mold in infants' homes were associated with development of allergic rhinitis, which is a known risk factor for childhood asthma.[24] However, other studies have shown higher concentrations of dust-borne fungi and other microorganisms in infants' homes were associated with a *decreased* risk for asthma and wheezing.[30,31] Jaakkola et al. reported an association between a moldy odor in the home and development of asthma, but no association with visible mold or water damage was found. Although the sample size for this subset was small, it suggests that active mold growth might be a stronger risk factor for certain health effects than presence of nonviable or inactive mold alone.[32] This also is supported by recent studies that have shown allergen production is significantly increased during active growth.[33,34]

Though available, allergy testing for molds is limited, subject to high rates of error, and can be difficult to interpret. Preparations for skin testing or the specific antigen in blood tests may be different from the mold to which an individual is sensitive. A positive test indicates an allergic response but does not definitively link a specific mold exposure to an individual's current health condition.[5]

Irritant and Toxic Effects

Irritant Effects

Indoor growth of mold can lead to the production of volatile organic compounds (VOCs), also referred to as microbial VOCs (MVOCs), and the presence of fungal glucans.[13,35-38] Glucans are components of many fungal cell walls. Some studies have reported an association with the inhalation of glucans and airway irritation and inflammation, but results have been mixed and may not be applicable to expected indoor concentrations. Observed effects may also be the result of exposure to or contact with other fungal components, metabolites, or synergistic effects with other microbial agents.[17,36,39] Resolution of irritant symptoms upon removal from the source can help distinguish irritant effects from allergic symptoms.[5]

MVOCs are responsible for the musty odor often associated with mold growth, which may be noticeable at very low concentrations. Many of the MVOCs are common to other sources in the home.[40] The very low levels usually found indoors have not been shown to cause health effects.[35,37]

Toxic Effects

Some symptoms and maladies have been attributed to the toxic effects of fungi in indoor environments. Certain fungi can produce toxins (mycotoxins) at varying levels that are dependent on many complex environmental and biological factors.[41] The reported symptoms from exposure to mycotoxins indoors include headaches, irritation, and nausea/loss of appetite, but are often non-specific (*e.g.* fatigue, inability to concentrate/remember), and may be caused by other environmental and non-environmental agents.[2,42-46] Although health effects from exposures to mycotoxins have been associated with certain occupational exposures or ingestion of mold-contaminated food, scientific support for the reported effects in indoor environments has not been established. This may be due to the lower levels of exposure and different routes of exposure.[2,5,13,21,27,46-49]

Stachybotrys is colloquially referred to as "black mold" or "toxic mold." It has been suggested that toxins produced by this mold are associated with specific health effects. Acute Idiopathic Pulmonary Hemorrhage (AIPH) in infants has been described in several reports suggesting a relationship with *Stachybotrys*. AIPH is an uncommon condition that results in bleeding in the lungs. The IOM reviewed the existing studies and concluded that there was insufficient evidence to determine if mold exposure was associated with AIPH.[2,3] The evidence is also insufficient for an association between inhalation of *Stachybotrys* toxins indoors and neurological damage.[2,26,49] Although severe health effects from the inhalation exposures to

Stachybotrys toxins indoors is plausible, it is not well-supported, and the issue remains controversial.[2,3,5,27,49,50]

Organic dust toxic syndrome (ODTS) describes the abrupt onset of fever, flu-like symptoms, and respiratory symptoms in the hours following a single, heavy exposure to dust-containing fungi and other microorganisms. Unlike HP, ODTS does not require repeated exposures to bioaerosols and can occur after the first exposure. ODTS has been documented in farm workers handling contaminated material, but may also affect workers performing remediation of building materials with widespread mold growth.[2,11,27] ODTS is a self-limited illness, which usually improves within 24 hours after the discontinuation of exposure. It may be underreported among workers exposed to fungi, but would not be expected in occupants of buildings with mold growth.[11,27]

Infectious Disease

Only a small number of fungi have been associated with infectious disease. Few of these fungi are typically found in the indoor environment.[51,52] Several species of *Aspergillus* are known to cause aspergillosis, most commonly *A. fumigatus*, *A. flavus*, and rarely, other species. Aspergillosis is a disease that generally affects severely immunosuppressed persons. Exposure to these molds, even in high concentrations, is unlikely to cause infection in healthy individuals.[21,53] Heavy exposure to fungi associated with bird and bat droppings (*e.g.* *Histoplasma capsulatum* and *Cryptococcus neoformans*) can lead to health effects, usually transient flu-like illnesses, in healthy individuals. More severe health effects are primarily encountered in immunocompromised persons.[18,54]

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Preventing and Cleaning Mold Growth
Fact Sheet for Building Owners and Managers

Mold (mildew) is a fungus that can grow inside building on wet or damp surfaces. Mold can cause allergic reactions, trigger asthma attacks, or cause other health problems in some people.

Mold needs water or moisture to grow. Stop indoor mold growth by fixing leaks, drying damp or wet areas and controlling humidity. Before a clean-up, refer to the complete "Mold Guidelines" at nyc.gov/health.

PREVENT MOLD GROWTH

Fix Water Problems Immediately

- Correct water leaks.
- Dry any and all water-damaged items or areas.

Control Moisture Sources

- In bathrooms without windows, check that bathroom fans or exhaust vents are working.
- In bathrooms with windows, check that the window can be opened.
- Use a dehumidifier to lower humidity levels in basements.

CHECK THE SIZE OF THE AREA WITH MOLD GROWTH AND WATER DAMAGE

- Look for hidden mold and water damage
- If the amount of mold observed covers a large area (more than 100 square feet), is in the HVAC system, or is difficult to get to, you may need professional help.
- If there is less than 100 square feet of mold growth, trained building staff should be able to do the cleanup job.

FOLLOW THE PROPER STEPS TO CLEAN MOLD GROWTH

- Tell people living or working in the building about the plan to clean the mold growth.
- Tenants and others should leave the work area before cleaning begins.
- Cover or remove difficult-to-clean surfaces or items (e.g. carpeting, electronics) from the work area before cleaning begins.
- Use safety goggles, gloves, and a disposable respirator when removing mold growth.
- Clean mold growth with soap or a detergent, and water.
- Remove and throw away porous materials (e.g. ceiling tiles, insulation) with mold growth on them.
- Dispose of any plastic sheeting, moldy materials, and used sponges or rags in sealed heavy-duty plastic bags.
- Always fix water problems immediately. If the mold returns quickly or spreads, you may have an ongoing water problem.

If more than 10 square feet of mold growth is present also:

- Cover the floor in the work area with plastic sheeting.
- Cover entry and exit pathways with plastic sheeting.
- Seal any ventilation ducts with plastic sheeting.
- Mop and/or HEPA-vacuum the work area and pathways.

CLEAN MOLD GROWTH WITH PROPER SUPPLIES

- Soap or detergent
- Disposable rags/sponges and scrub brush
- Buckets
- Heavy-duty plastic garbage bags
- Protective gear (e.g. goggles, rubber gloves, N95 respirator)

FOR MORE INFORMATION

Visit our web site at **nyc.gov/health** for the complete "Mold Guidelines" or **call 311**.