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February 4, 2009

Department of Education
P.O. Box 8700
St. John's, NL
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RE: Airborne Mould Sampling Results - Frank Roberts Junior High School, Foxtrap, NL

Attention: Mr. David Noel,

During the months of September through to December, 2008, Frank Roberts Junior High School located in Foxtrap, NL, underwent extensive mould abatement following the discovery of a significant amount of mould inside wall cavities throughout the school. During the abatement process all areas of the school were investigated and areas showing signs of microbial growth were remediated. In summary, all drywall on all exterior walls was removed and the wooded studs were cleaned and sprayed with an antimicrobial solution. All buildings materials found inside washroom areas were completely stripped and new components were reinstalled. Extensive removal and re-instatement of drywall was also conducted in the Resource Centre area, the Gym and other areas throughout the school.

From November 26 to December 9, 2008, ALL-TECH conducted a thorough final inspection of Frank Roberts Junior High School to ensure that it was safe for occupancy and that all problems previously discovered had been addressed and properly fixed. Upon completion of all building material re-instatement (drywall, painting, cleaning, etc.), all rooms were returned to a functional learning environment and a final inspection was conducted. As part of the final inspection, microbial air sampling was completed to ensure that the area displayed acceptable airborne mould concentrations prior occupancy.

Final Viable Airborne Mould Spore Sampling

A portable Biotest RCS (Reuter Centrifugal Sampler) Air Sampler was used to collect the 4-minute microbial air samples. The RCS air sampler was set to collect a 40 litre sample per minute; therefore a total volume of 160 litres of air was collected during the 4-minute sample time. The volume of air collected is used to calculate the concentration of microbial contamination in the air.

The RCS sampler was sterilized before each test using isopropyl alcohol swabs. The technician wore latex gloves when handling the agar strips to prevent contamination. Once the sample was collected, the strip was sealed into its original package with strong cellophane tape to ensure that the strips were protected from contamination and desiccation. After the strips were sealed and labelled, they were placed in a cooler and shipped to the laboratory within 24 hours. Once at the laboratory, the agar strips were incubated for 10 to 14 days and microbial colonies were identified and counted. The samples were sent to EMC Scientific Incorporated, Mississauga, Ontario (AIHA EMPAT Participant Lab ID#174080) for culturing analysis to species level.

The agar strips used were; *Agar Strips YM (Art.-No. 941 110)* with *rosa bengal* and *streptomycin*. The substances *rosa bengal* and *streptomycin* inhibit the growth of bacteria to a large extent and thus allow for the unimpaird development of moulds and yeasts. Any significant microbial growth observed on the strips was then quantified and identified to the family, genus or species level. Analysis results were reported in total colony forming units per cubic meter (CFU/m³).

Exposure Criteria:

Currently, Federal/Provincial regulations for airborne mould concentrations in indoor environments do not exist; however, there are numerous guidelines published regarding acceptable airborne mould concentrations. One guideline used to interpret the sampling results was Health Canada's "*Fungal Contamination in Public Buildings: A Guide to Recognition and Management*". When air samples are collected as part of an air quality assessment, most situations dictate that comparisons are made between indoor and outdoor mould levels. Indoor and outdoor samples must be collected

within the same time period. It is important that, to the extent possible, the outdoor samples taken represent the air entering the building.

Indoor/outdoor relationships are assessed both by comparing concentrations and species composition of comparable collected samples. In non-problem environments, the concentration of fungi (mould) in indoor air typically is similar to or lower than the concentration seen outdoors, except when outdoor air concentrations are near zero (i.e. during periods of snow cover). If fungal concentrations indoors are consistently higher than those outdoors, then indoor sources are indicated.¹

Laboratory Results:

**Viable Airborne Mould Spore Concentration Results
 Frank Roberts Jr. High School
 November 26 & December 9, 2008**

Sample	Date	Location	Sample Volume (m ³)	Type of Mould	Colony Forming Units (CFU/m ³)	Total (CFU/m ³)
FR-01	Nov. 26, 2008	Room 122	0.16	None Detected	0	<6
FR-02	Nov. 26, 2008	Room 121	0.16	<i>Cladosporium cladosporioides</i>	6	31
				<i>Cladosporium herbarum</i>	6	
				<i>Penicillium corylophilum</i>	6	
				Non-sporulating isolates	13	
FR-03	Nov. 26, 2008	Room 127	0.16	None Detected	0	<6
FR-04	Nov. 26, 2008	Room 129	0.16	None Detected	0	<6
FR-05	Nov. 26, 2008	G-7 Wing Corridor	0.16	Non-sporulating isolates	6	6
FR-06	Nov. 26, 2008	Exterior	0.16	<i>Cladosporium cladosporioides</i>	6	56
				<i>Cladosporium herbarum</i>	25	
				<i>Penicillium variabile</i>	6	
				Yeasts	6	
				Non-sporulating isolates	13	

¹ Burge, Harriet A., and Otten, James A., **In Bioaerosols: Assessment and Control**, pp 19-12, J.Macher, H.A. Ammann, H.A. Burge et. Al., eds. American Conference of Governmental Industrial Hygienists, Cincinnati OH, 1999.

Microbial Air Sampling Results
 Frank Roberts Junior High School, Foxtrap, NL

Sample	Date	Location	Sample Volume (m ³)	Type of Mould	Colony Forming Units (CFU/m ³)	Total (CFU/m ³)
FR-01	Dec. 9, 2008	Room 205	0.16	<i>Scopulariopsis brevicaulis</i>	6	6
FR-02	Dec. 9, 2008	Corridor 222	0.16	<i>Cladosporium cladosporioides</i>	13	50
				<i>Penicillium chrysogenum</i>	19	
				<i>Penicillium corylophilum</i>	6	
				Yeasts	13	
FR-03	Dec. 9, 2008	Room 213	0.16	<i>Aspergillus versicolor</i>	6	113
				<i>Chaetomium globosum</i>	6	
				<i>Cladosporium cladosporioides</i>	13	
				<i>Penicillium chrysogenum</i>	63	
				<i>Penicillium</i> sp.	6	
				<i>Scopulariopsis brevicaulis</i>	6	
				Yeasts	6	
				Non-sporulating isolates	6	
FR-04	December 9, 2008	Room L-101	0.16	<i>Alternaria atlernata</i>	6	19
				<i>Cladosporium cladosporioides</i>	6	
				<i>Cladosporium herbarum</i>	6	
FR-05	Dec. 9, 2008	Corridor 180	0.16	<i>Cladosporium cladosporioides</i>	6	38
				<i>Cladosporium herbarum</i>	13	
				Yeasts	19	
FR-06	Dec. 9, 2008	Room L-113	0.16	<i>Cladosporium cladosporioides</i>	50	156
				<i>Cladosporium herbarum</i>	75	
				<i>Penicillium aurantiogriseum</i>	6	
				<i>Penicillium</i> sp.	13	
				Non-sporulating isolates	6	
FR-07	Dec. 9, 2008	L-106	0.16	<i>Chaetomium globosum</i>	6	69
				<i>Cladosporium cladosporioides</i>	31	
				<i>Cladosporium herbarum</i>	25	
				Non-sporulating isolates	6	

Sample	Date	Location	Sample Volume (m ³)	Type of Mould	Colony Forming Units (CFU/m ³)	Total (CFU/m ³)
FR-08	Dec. 9, 2008	General Office	0.16	<i>Cladosporium cladosporioides</i>	13	44
				<i>Cladosporium herbarum</i>	13	
				<i>Penicillium chrysogenum</i>	6	
				Yeasts	6	
				Non-sporulating isolates	6	
FR-09	Dec. 9, 2008	Corridor 142	0.16	<i>Chaetomium globosum</i>	13	113
				<i>Cladosporium cladosporioides</i>	6	
				<i>Penicillium chrysogenum</i>	63	
				<i>Penicillium</i> sp.	13	
				<i>Stachybotrys chartarum</i>	6	
				<i>Ulocladium botrytis</i>	6	
				Yeasts	6	
FR-10	Dec. 9, 2008	Gym	0.16	<i>Chaetomium globosum</i>	6	56
				<i>Cladosporium cladosporioides</i>	6	
				<i>Penicillium chrysogenum</i>	13	
				<i>Penicillium corylophilum</i>	13	
				Yeasts	13	
				Non-sporulating isolates	6	
FR-11	Dec. 9, 2008	Exterior	0.16	<i>Penicillium brevicompactum</i>	6	44
				<i>Penicillium chrysogenum</i>	6	
				Yeasts	19	
				Non-sporulating isolates	13	

Discussion of Results:

There is no precise formula for distinguishing normal background mould from contamination. Indoor and outdoor environments naturally harbour a great variety of microscopic organisms such as moulds. In most, but not all, healthy building environments, the qualitative diversity (types) of airborne mould indoors and outdoors should be similar. Conversely, the dominating presence of

one or two kinds of mould indoors and the absence of the same kind outdoors may indicate a moisture problem and potential air quality issues. In most healthy building environments, the total concentration of mould inside of the building should be generally less than in the ambient environment outside of the building.²

Based on results of laboratory analysis for the microbial air samples collected, the concentrations of airborne moulds found inside the school are considered insignificant in regards to impacting the air quality of the school at this time of sampling. Although the airborne microbial concentrations in some classrooms were higher when compared to those of the exterior sample collected on December 9, 2008, it must be noted that this exterior sample was collected while the ground was snow covered, resulting in lower detectable airborne concentrations. In addition, the dominating species of airborne moulds found on the interior samples were *Penicillium chrysogenum* and *Cladosporium herbarum*, both of which are very common moulds found in indoor environments. These types of moulds generally are not problematic to humans in such low concentrations as were determined. It should be noted that *Stachybotrys chartarum* was detected in Corridor 142. Although this is generally a mould of concern due to its ability to produce mycotixins, the concentration of 6 CFU/m³ detected indicates that a single spore was discovered in the entire school. Due to the magnitude of microbial abatement that has occurred at the school and the fact that the inspection did not identify any visible mould growth, this is not a matter of concern.

NOTE: This report is an interim report indicating that the levels of microbial activity are safe for occupancy. A thorough final report detailing exactly what areas were remediated including the remediation process and detailed final inspection will be issued once all of the windows are replaced.

Limitations:

The findings contained in this report are based upon conditions as they were observed at the time of the final survey. It is possible that these procedures will not identify all airborne moulds present in a building; however, this sampling approach can be considered to be a reasonable estimate of

² Daniel Baxter, Jimmy Perkins, Charles McPhee, James Seltzer: A Regional Comparison of Mold Spore Concentrations Outdoors and inside "Clean and Mold Contaminated" Southern California Buildings, Journal of Occupational and Environmental Hygiene, January 2005, pp 16-17, Fairfax VA

the extent of airborne moulds present. ALL-TECH provides no assurances that conditions observed or measured will not change with time since moulds are naturally occurring. ALL-TECH's observations and/or any readings obtained represent conditions only at the date and time observed and/or measured.

ALL-TECH's assessment reports present professional opinions and findings of a scientific and technical nature. While attempts were made to relate the data and findings to applicable environmental laws and regulations, the report shall not be construed to offer legal opinion or representations as to the requirements of, nor compliance with, environmental laws, rules, regulations or policies of federal, provincial, or local governmental agencies. Any use of the assessment report constitutes acceptance of the limits of ALL-TECH's liability.

If you should have any questions, please do not hesitate to contact our office.

Thank You,

Orven Newhook

Orven Newhook, B. Sc.

Environmental Consultant

ALL-TECH Environmental Services Limited

Reviewed by:

Robert Gardner

Robert Gardner, CET

Occupational Hygienist

ALL-TECH Environmental Services Limited

Encl: Laboratory Results (5)



Laboratory Analysis Report

To:

Orven Newhook
 ALL-TECH Environmental
 151 Crosbie Road, Suite 402
 St. John's, Newfoundland
 A1B 4B4

EMC LAB REPORT NUMBER: 19029

Job/Project Name:

Job/Project No: 8283

Sample Type: RCS

Analysis Method(s): Quantification and Identification to Species

Date Analyzed: Dec 10/08

Analyst:

No. of Samples: 6

Date Received: Nov 27/08

Date Reported: Dec 10/08

Date Reported: Dec 10/08

Fajun Chen, Ph.D., *Principal Mycologist*

Client's Sample ID	FR-01			FR-02			FR-03			FR-04			FR-05		
EMC Lab Sample No.	108469			108470			108471			108472			108473		
Sampling Date	Nov 26/08			Nov 26/08			Nov 26/08			Nov 26/08			Nov 26/08		
Description/Location	Room 122 - G-7 wing			Room 121 - G-7 wing			Room 127 - G-7 wing			Room 129 - G-7 wing			Corridor G-7 wing		
Air Volume (m ³)	0.160			0.160			0.160			0.160			0.160		
Fungal Name	CFU	%	CFU/m ³	CFU	%	CFU/m ³	CFU	%	CFU/m ³	CFU	%	CFU/m ³	CFU	%	CFU/m ³
<i>Cladosporium cladosporioides</i>				1	20	6									
<i>Cladosporium herbarum</i>				1	20	6									
<i>Penicillium corylophilum</i>				1	20	6									
<i>Penicillium variabile</i>															
Yeasts															
Non-sporulating isolates				2	40	13							1	100	6
Number of CFU/sample	0			5			0			0			1		
Detection Limit (CFU/M ³)	6			6			6			6			6		
TOTAL CFU/M³	<6			31			<6			<6			6		

Note:

1. CFU = Colony Forming Unit
2. Non-sporulating isolates are those failing to produce spores when identification is performed.
3. These results are only related to the sample(s) analyzed.



Laboratory Analysis Report

EMC LAB REPORT NUMBER: 19029
 Client's Job/Project No.: 8283
 Analyst: Fajun Chen, Ph.D., Principal Mycologist

Client's Sample ID	FR-06														
EMC Lab Sample No.	108474														
Sampling Date	Nov 26/08														
Description/Location	Exterior														
Air Volume (m ³)	0.160														
Fungal Name	CFU	%	CFU/m³	CFU	%	CFU/m³	CFU	%	CFU/m³	CFU	%	CFU/m³	CFU	%	CFU/m³
<i>Cladosporium cladosporioides</i>	1	11	6												
<i>Cladosporium herbarum</i>	4	44	25												
<i>Penicillium corylophilum</i>															
<i>Penicillium variable</i>	1	11	6												
Yeasts	1	11	6												
Non-sporulating isolates	2	22	13												
Number of CFU/sample	9														
Detection Limit (CFU/M ³)	6														
TOTAL CFU/M³	56														

Note:

1. CFU = Colony Forming Unit
2. Non-sporulating isolates are those failing to produce spores when identification is performed.
3. These results are only related to the sample(s) analyzed.





Laboratory Analysis Report

To:

Orven Newhook
 ALL-TECH Environmental
 151 Crosbie Road, Suite 402
 St. John's, Newfoundland
 A1B 4B4

EMC LAB REPORT NUMBER: 19257
 Job/Project Name:
 Job/Project No: 8283 - Dec No. of Samples: 11
 Sample Type: RCS Date Received: Dec 10/08
 Analysis Method(s): Quantification and Identification to Species
 Date Analyzed: Dec 31/08 Date Reported: Dec 31/08
 Analyst: Fajun Chen, Ph.D., *Principal Mycologist*

Client's Sample ID	FR-01			FR-02			FR-03			FR-04			FR-05		
EMC Lab Sample No.	109425			109426			109427			109428			109429		
Sampling Date	Dec 9/08			Dec 9/08			Dec 9/08			Dec 9/08			Dec 9/08		
Description/Location	Room 205 - Frank Roberts			Corridor 222 - Frank Roberts			Room 213 - Frank Roberts			Room L-101 - Frank Roberts			Corridor 180 - Frank Roberts		
Air Volume (m ³)	0.160			0.160			0.160			0.160			0.160		
Fungal Name	CFU	%	CFU/m ³	CFU	%	CFU/m ³	CFU	%	CFU/m ³	CFU	%	CFU/m ³	CFU	%	CFU/m ³
<i>Alternaria alternata</i>										1	33	6			
<i>Aspergillus versicolor</i>							1	6	6						
<i>Chaetomium globosum</i>							1	6	6						
<i>Cladosporium cladosporioides</i>				2	25	13	2	11	13	1	33	6	1	17	6
<i>Cladosporium herbarum</i>										1	33	6	2	33	13
<i>Penicillium aurantiogriseum</i>															
<i>Penicillium brevicompactum</i>															
<i>Penicillium chrysogenum</i>				3	38	19	10	56	63						
<i>Penicillium corylophilum</i>				1	13	6									
<i>Penicillium sp</i>							1	6	6						
<i>Stachybotrys chartarum</i>															
<i>Scopulariopsis brevicaulis</i>	1	100	6				1	6	6						
<i>Ulocladium botrytis</i>															
Yeasts				2	25	13	1	6	6				3	50	19
Non-sporulating isolates							1	6	6						
Number of CFU/sample	1			8			18			3			6		
Detection Limit (CFU/M ³)	6			6			6			6			6		
TOTAL CFU/M³	6			50			113			19			38		

Note:

1. CFU = Colony Forming Unit
2. Non-sporulating isolates are those failing to produce spores when identification is performed.
3. These results are only related to the sample(s) analyzed.



Laboratory Analysis Report

EMC LAB REPORT NUMBER: 19257
 Client's Job/Project No.: 8283 - Dec
 Analyst: Fajun Chen, Ph.D., *Principal Mycologist*

Client's Sample ID	FR-06			FR-07			FR-08			FR-09			FR-10		
EMC Lab Sample No.	109430			109431			109432			109433			109434		
Sampling Date	Dec 9/08			Dec 9/08			Dec 9/08			Dec 9/08			Dec 9/08		
Description/Location	Room L-113 Frank Roberts			Room L-106 - Frank Roberts			General office - Frank Roberts			Corridor 142 - Frank Roberts			Gym - Frank Roberts		
Air Volume (m ³)	0.160			0.160			0.160			0.160			0.160		
Fungal Name	CFU	%	CFU/m ³	CFU	%	CFU/m ³	CFU	%	CFU/m ³	CFU	%	CFU/m ³	CFU	%	CFU/m ³
<i>Alternaria alternata</i>															
<i>Aspergillus versicolor</i>															
<i>Chaetomium globosum</i>				1	9	6				2	11	13	1	11	6
<i>Cladosporium cladosporioides</i>	8	32	50	5	45	31	2	29	13	1	6	6	1	11	6
<i>Cladosporium herbarum</i>	12	48	75	4	36	25	2	29	13						
<i>Penicillium aurantiogriseum</i>	1	4	6												
<i>Penicillium brevicompactum</i>															
<i>Penicillium chrysogenum</i>							1	14	6	10	56	63	2	22	13
<i>Penicillium corylophilum</i>													2	22	13
<i>Penicillium sp</i>	2	8	13							2	11	13			
<i>Stachybotrys chartarum</i>										1	6	6			
<i>Scopulariopsis brevicaulis</i>															
<i>Ulocladium botrytis</i>										1	6	6			
Yeasts							1	14	6	1	6	6	2	22	13
Non-sporulating isolates	2	8	13	1	9	6	1	14	6				1	11	6
Number of CFU/sample	25			11			7			18			9		
Detection Limit (CFU/M ³)	6			6			6			6			6		
TOTAL CFU/M³	156			69			44			113			56		

Note:

1. CFU = Colony Forming Unit
2. Non-sporulating isolates are those failing to produce spores when identification is performed.
3. These results are only related to the sample(s) analyzed.



Laboratory Analysis Report

EMC LAB REPORT NUMBER: 19257
Client's Job/Project No.: 8283 - Dec
Analyst: Fajun Chen, Ph.D., *Principal Mycologist*

Client's Sample ID	FR-11														
EMC Lab Sample No.	109435														
Sampling Date	Dec 9/08														
Description/Location	Exterior - Frank Roberts														
Air Volume (m ³)	0.160														
Fungal Name	CFU	%	CFU/m³	CFU	%	CFU/m³	CFU	%	CFU/m³	CFU	%	CFU/m³	CFU	%	CFU/m³
<i>Alternaria alternata</i>															
<i>Aspergillus versicolor</i>															
<i>Chaetomium globosum</i>															
<i>Cladosporium cladosporioides</i>															
<i>Cladosporium herbarum</i>															
<i>Penicillium aurantiogriseum</i>															
<i>Penicillium brevicompactum</i>	1	14	6												
<i>Penicillium chrysogenum</i>	1	14	6												
<i>Penicillium corylophilum</i>															
<i>Penicillium sp</i>															
<i>Stachybotrys chartarum</i>															
<i>Scopulariopsis brevicaulis</i>															
<i>Ulocladium botrytis</i>															
Yeasts	3	43	19												
Non-sporulating isolates	2	29	13												
Number of CFU/sample	7														
Detection Limit (CFU/M ³)	6														
TOTAL CFU/M³	44														

- Note:
1. CFU = Colony Forming Unit
 2. Non-sporulating isolates are those failing to produce spores when identification is performed.
 3. These results are only related to the sample(s) analyzed.

