



151 Crosbie Road, Suite 402
St. John's, NL A1B 4B4
Email: email@toalltech.com

Tel: 709-754-4146
Fax: 709-754-4194

February 11, 2009

Department of Education
P.O. Box 8700
St. John's, NL
A1B 4J6

RE: Airborne Mould Sampling Results - St. Georges Elementary School, CBS, NL

Attention: Mr. David Noel,

During the months of September to December, 2008, St Georges Elementary School located in CBS, 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 building materials found inside washroom areas were completely stripped and all new components were reinstalled. Extensive removal and re-instatement of drywall was also conducted in other areas throughout the school.

On January 14, 2009, ALL-TECH conducted a thorough final inspection of St Georges Elementary School to ensure that it was safe for occupancy and that all mould problems previously discovered had been addressed and properly fixed. Upon completion of 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 conducted to ensure that the area displayed acceptable airborne mould concentrations for 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
 St Georges Elementary School
 January 14, 2009**

Sample	Date	Location	Sample Volume (m ³)	Type of Mould	Colony Forming Units (CFU/m ³)	Total (CFU/m ³)
SG-01	January 14, 2009	Classroom 5	0.16	<i>Penicillium brevicompactum</i>	6	6
SG-02	January 14, 2009	Classroom 1	0.16	<i>Chaetomium globosum</i>	6	19
				<i>Penicillium brevicompactum</i>	6	
				Non-sporulating isolates	6	
SG-03	January 14, 2009	Corridor D	0.16	<i>Penicillium glabrum</i>	6	13
				<i>Penicillium miczynskii</i>	6	
SG-04	January 14, 2009	Lib/Comp Room	0.16	Non-sporulating isolates	13	13
SG-05	January 14, 2009	Classroom 12	0.16	<i>Penicillium glabrum</i>	19	19
SG-06	January 14, 2009	Classroom 8	0.16	<i>Aspergillus versicolor</i>	13	36
				<i>Penicillium aurantiogriseum</i>	6	
				<i>Ulocladium botrytis</i>	6	
				Yeasts	6	

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.

Sample	Date	Location	Sample Volume (m ³)	Type of Mould	Colony Forming Units (CFU/m ³)	Total (CFU/m ³)
				Non-sporulating isolates	6	
SG-07	January 14, 2009	Classroom 15	0.16	<i>Aspergillus versicolor</i>	13	69
				<i>Mucor plumbeus</i>	6	
				<i>Penicillium chrysogenum</i>	38	
				<i>Penicillium</i> sp	6	
				Non-sporulating isolates	6	
SG-08	January 14, 2009	Kindergarten	0.16	Non-sporulating isolates	6	6
SG-09	January 14, 2009	Music Room	0.16	<i>Mucor plumbeus</i>	6	50
				<i>Penicillium</i> sp	38	
				<i>Rhizopus stolonifer</i>	6	
SG-10	January 14, 2009	Cafeteria	0.16	<i>Alternaria atlernata</i>	6	125
				<i>Chaetomium globosum</i>	6	
				<i>Mucor plumbeus</i>	6	
				<i>Penicillium chrysogenum</i>	75	
				<i>Penicillium</i> sp	6	
				<i>Phoma</i> sp	6	
SG-11	January 14, 2009	Gym/Stage Area	0.16	<i>Alternaria atlernata</i>	6	69
				<i>Chaetomium globosum</i>	6	
				<i>Penicillium chrysogenum</i>	31	
				Non-sporulating isolates	25	
SG-12	January 14, 2009	EXTERIOR	0.16	None Detected	0	<6

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 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 the time of sampling. Although the airborne microbial concentrations in some classrooms were higher when compared to those of the exterior sample, it must be noted that the 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* sp. and *Cladosporium* sp., both of which are very common moulds found in indoor environments. These types of moulds are generally not problematic to humans in such low concentrations as were determined. It should also be noted that *Aspergillus versicolor* was detected in classrooms 8 and 15. Although this is generally a mould of concern due to its ability to produce mycotoxins, the concentration of 13 CFU/m³ detected in each classroom indicates that four spores were detected 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 completed.

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 (3)

Floor Plan (1)



Laboratory Analysis Report

To:

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

EMC LAB REPORT NUMBER: 19652

Job/Project Name:

Job/Project No: 8279

Sample Type: RCS

Analysis Method(s): Quantification and Identification to Species

Date Analyzed: Jan 30/09

Analyst:

No. of Samples: 12

Date Received: Jan 15/09

Date Reported: Jan 30/09

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

Client's Sample ID	SG-1			SG-2			SG-3			SG-4			SG-5		
EMC Lab Sample No.	110928			110929			110930			110931			110932		
Sampling Date	Jan 14/09			Jan 14/09			Jan 14/09			Jan 14/09			Jan 14/09		
Description/Location	Class 5 - St. Georges			Class 1 - St. Georges			Corridor D - St. Georges			Lib/comp - St. Georges			Class 12 - St. Georges		
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	33	6									
<i>Mucor plumbeus</i>															
<i>Penicillium aurantiogriseum</i>															
<i>Penicillium brevicompactum</i>	1	100	6	1	33	6									
<i>Penicillium chrysogenum</i>															
<i>Penicillium glabrum</i>							1	50	6				3	100	19
<i>Penicillium miczynskii</i>							1	50	6						
<i>Penicillium</i> sp															
<i>Phoma</i> sp															
<i>Rhizopus stolonifer</i>															
<i>Ulocladium botrytis</i>															
Yeasts															
Non-sporulating isolates				1	33	6				2	100	13			
Number of CFU/sample	1			3			2			2			3		
Detection Limit (CFU/M ³)	6			6			6			6			6		
TOTAL CFU/M³	6			19			13			13			19		

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: 19652
Client's Job/Project No.: 8279
Analyst: Fajun Chen, Ph.D., Principal Mycologist

Client's Sample ID	SG-6			SG-7			SG-8			SG-9			SG-10		
EMC Lab Sample No.	110933			110934			110935			110936			110937		
Sampling Date	Jan 14/09			Jan 14/09			Jan 14/09			Jan 14/09			Jan 14/09		
Description/Location	Class 8 - St. Georges			Class 15 - St. Georges			KNDG - St. Georges			Music room - St. Georges			Cafeteria - St. Georges		
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	5	6
<i>Aspergillus versicolor</i>	2	33	13	2	18	13									
<i>Chaetomium globosum</i>													1	5	6
<i>Mucor plumbeus</i>				1	9	6				1	13	6	1	5	6
<i>Penicillium aurantiogriseum</i>	1	17	6												
<i>Penicillium brevicompactum</i>															
<i>Penicillium chrysogenum</i>				6	55	38							12	60	75
<i>Penicillium glabrum</i>															
<i>Penicillium miczynskii</i>															
<i>Penicillium sp</i>				1	9	6				6	75	38	1	5	6
<i>Phoma sp</i>													1	5	6
<i>Rhizopus stolonifer</i>										1	13	6			
<i>Ulocladium botrytis</i>	1	17	6												
Yeasts	1	17	6												
Non-sporulating isolates	1	17	6	1	9	6	1	100	6				3	15	19
Number of CFU/sample	6			11			1			8			20		
Detection Limit (CFU/M ³)	6			6			6			6			6		
TOTAL CFU/M³	38			69			6			50			125		

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: 19652
 Client's Job/Project No.: 8279
 Analyst: Fajun Chen, Ph.D., Principal Mycologist

Client's Sample ID	SG-11			SG-12											
EMC Lab Sample No.	110938			110939											
Sampling Date	Jan 14/09			Jan 14/09											
Description/Location	Gym/stage - St. Georges			Exterior St. Georges											
Air Volume (m ³)	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	9	6												
<i>Aspergillus versicolor</i>															
<i>Chaetomium globosum</i>	1	9	6												
<i>Mucor plumbeus</i>															
<i>Penicillium aurantiogriseum</i>															
<i>Penicillium brevicompactum</i>															
<i>Penicillium chrysogenum</i>	5	45	31												
<i>Penicillium glabrum</i>															
<i>Penicillium miczynskii</i>															
<i>Penicillium sp</i>															
<i>Phoma sp</i>															
<i>Rhizopus stolonifer</i>															
<i>Ulocladium botrytis</i>															
Yeasts															
Non-sporulating isolates	4	36	25												
Number of CFU/sample	11			0											
Detection Limit (CFU/M ³)	6			6											
TOTAL CFU/M³	69			<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.

St Georges Elementary School – Floor Plan

