



September 17, 2008

Project #:8221

Eastern School District  
Suite 601, Atlantic Place  
215 Water Street  
St. John's, NL  
A1C 6C9

**RE: Microbial Air Sampling – St. George's Elementary, Manuels, NL**

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Attention: Mr. Pat Royle,

On August 29, 2008, ALL-TECH Environmental Services Limited representative Sean Hynes conducted air sampling to determine microbial types (genus & species) and concentrations within random areas of St. Georges Elementary School, Manuels, NL. It should be noted that no destructive testing or visual inspections of the school was requested or completed as part of this work at the time of sampling.

**Protocol for Microbial Air 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 unimpaired 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/m<sup>3</sup>).

**Microbial Air Sampling – St. Georges Elementary, Manuels, NL**

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.

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 mould in indoor air is typically 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 mould concentrations indoors are consistently higher than that outdoors, then indoor sources are indicated.<sup>1</sup>

**Survey Findings**

The results of the microbial air samples collected are located in Table 1.0.

**Table 1.0  
Microbial Air Sampling Results  
St. George’s Elementary - Manuels, NL**

<b>Sample No.</b>	<b>Location/ Description</b>	<b>Test Vol.</b>	<b>Genus &amp; species</b>	<b>Total CFU/M<sup>3</sup></b>
SG-01	Classroom #13	160L	<i>Alternaria alternata</i> (6)	<b>144</b>
			<i>Cladosporium cladosporioides</i> (38)	
			<i>Cladosporium herbarium</i> (56)	
			<i>Eurotium</i> sp (13)	
			Non-sporulating isolates (31)	
SG-02	Classroom #14	160L	<i>Chaetomium globosum</i> (6)	<b>163</b>
			<i>Cladosporium cladosporioides</i> (63)	
			<i>Cladosporium herbarium</i> (38)	
			<i>Penicillium chrysogenum</i> (13)	
			<i>Penicillium</i> sp (6)	
SG-03	Classroom #KGN	160L	<i>Aspergillus versicolor</i> (6)	<b>125</b>
			<i>Cladosporium cladosporioides</i> (31)	
			<i>Cladosporium herbarum</i> (31)	
			<i>Penicillium chrysogenum</i> (13)	
			<i>Stachybotrys chartarum</i> (25)	

<sup>1</sup>

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 – St. Georges Elementary, Manuels, NL**

Sample No.	Location/ Description	Test Vol.	Genus & species	Total CFU/M <sup>3</sup>
SG-04	Classroom #7	160L	<i>Aspergillus versicolor</i> (6)	<b>150</b>
			<i>Cladosporium cladosporioides</i> (50)	
			<i>Cladosporium herbarium</i> (44)	
			<i>Eurotium</i> sp (6)	
			<i>Fusarium sporotrichioides</i> (6)	
			Yeasts (6)	
			Non-sporulating isolates (31)	
SG-05	Classroom #6	160L	<i>Alternaria alternata</i> (6)	<b>156</b>
			<i>Cladosporium cladosporioides</i> (50)	
			<i>Cladosporium herbarium</i> (31)	
			<i>Fusarium sporotrichioides</i> (6)	
			<i>Penicillium chrysogenum</i> (25)	
			<i>Stachybotrys chartarum</i> (6)	
			Non-sporulating isolates (31)	
SG-06	Exterior	160L	<i>Alternaria alternata</i> (19)	<b>263</b>
			<i>Cladosporium cladosporioides</i> (106)	
			<i>Cladosporium herbarium</i> (63)	
			<i>Epicoccum nigrum</i> (6)	
			<i>Fusarium sporotrichioides</i> (6)	
			<i>Penicillium</i> sp (6)	
			Yeasts (19)	
			Non-sporulating isolates (38)	

**Observations**

Listed below are observations made during the time and condition of the assessment:

- Renovation work had been completed within various areas of the school prior to the sampling period. Evidence of water damage was discovered under some of the windows during these renovations.

**Discussion of Results/Conclusions**

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 degraded air quality. 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.<sup>2</sup>

Laboratory analysis confirmed that sample's SG-03 (elevated level) and SG-05 (low level) indicated the presence of *Stachybotrys chartarum* in the interior air samples. Due to the elevated presence of this type of mould in sample SG-03, it is recommended that further investigation be completed to determine the source of the mould and also to determine the extent of water damage throughout the school. **It should be noted that since the time of this sampling, remediation has commenced at this location.**

### **Limitations**

The findings contained in this report are based upon conditions as they were observed at the time of the survey. No assurance is made regarding changes in conditions subsequent to the time of the survey. A change in occupancy rate/or and mechanical ventilation system within a building can impact indoor air quality.

If you have any questions regarding this report, please do not hesitate to call me at (709) 754-4146 or via email at [onewhook@toalltech.com](mailto:onewhook@toalltech.com).

Thank you,



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Orven Newhook B.Sc.  
Environmental Consultant  
**ALL-TECH Environmental Services Limited**

Encl: Laboratory Results (2)

## Laboratory Analysis Report

To:

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

EMC LAB REPORT NUMBER: 17427

Job/Project Name:

Job/Project No: 8221

No. of Samples: 6

Sample Type: RCS

Date Received: Aug 30/08

Analysis Method(s): Quantification and Identification to Genus

Date Analyzed: Sep 15/08

Date Reported: Sep 16/08

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

Client's Sample ID	SG-01			SG-02			SG-03			SG-04			SG-05		
EMC Lab Sample No.	102230			102231			102232			102233			102234		
Sampling Date	Aug 29/08			Aug 29/08			Aug 29/08			Aug 29/08			Aug 29/08		
Description/Location	Class rm. #13			Class rm. #14			Class rm. #KGN			Class rm. #7			Class rm. #6		
Air Volume (m <sup>3</sup> )	0.160			0.160			0.160			0.160			0.160		
Fungal Name	CFU	%	CFU/m <sup>3</sup>	CFU	%	CFU/m <sup>3</sup>	CFU	%	CFU/m <sup>3</sup>	CFU	%	CFU/m <sup>3</sup>	CFU	%	CFU/m <sup>3</sup>
<i>Alternaria alternata</i>	1	4	6										1	4	6
<i>Aspergillus versicolor</i>							1	5	6	1	4	6			
<i>Chaetomium globosum</i>				1	4	6									
<i>Cladosporium cladosporioides</i>	6	26	38	10	38	63	5	25	31	8	33	50	8	32	50
<i>Cladosporium herbarum</i>	9	39	56	6	23	38	5	25	31	7	29	44	5	20	31
<i>Epicoccum nigrum</i>															
<i>Eurotium</i> sp	2	9	13							1	4	6			
<i>Fusarium sporotrichioides</i>										1	4	6	1	4	6
<i>Penicillium chrysogenum</i>				2	8	13	2	10	13				4	16	25
<i>Penicillium</i> sp				1	4	6									
<i>Stachybotrys chartarum</i>							4	20	25				1	4	6
Yeasts										1	4	6			
Non-sporulating isolates	5	22	31	6	23	38	3	15	19	5	21	31	5	20	31
Number of CFU/sample	23			26			20			24			25		
Detection Limit (CFU/M <sup>3</sup> )	6			6			6			6			6		
<b>TOTAL CFU/M<sup>3</sup></b>	<b>144</b>			<b>163</b>			<b>125</b>			<b>150</b>			<b>156</b>		

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:** 17427  
**Client's Job/Project No.:** 8221  
**Analyst:** Fajun Chen, Ph.D., *Principal Mycologist*

<b>Client's Sample ID</b>	SG-06														
EMC Lab Sample No.	102235														
Sampling Date	Aug 29/08														
Description/Location	Exterior														
Air Volume (m <sup>3</sup> )	0.160														
<b>Fungal Name</b>	<b>CFU</b>	<b>%</b>	<b>CFU/m<sup>3</sup></b>	<b>CFU</b>	<b>%</b>	<b>CFU/m<sup>3</sup></b>	<b>CFU</b>	<b>%</b>	<b>CFU/m<sup>3</sup></b>	<b>CFU</b>	<b>%</b>	<b>CFU/m<sup>3</sup></b>	<b>CFU</b>	<b>%</b>	<b>CFU/m<sup>3</sup></b>
<i>Alternaria alternata</i>	3	7	19												
<i>Aspergillus versicolor</i>															
<i>Chaetomium globosum</i>															
<i>Cladosporium cladosporioides</i>	17	40	106												
<i>Cladosporium herbarum</i>	10	24	63												
<i>Epicoccum nigrum</i>	1	2	6												
<i>Eurotium</i> sp															
<i>Fusarium sporotrichioides</i>	1	2	6												
<i>Penicillium chrysogenum</i>															
<i>Penicillium</i> sp	1	2	6												
<i>Stachybotrys chartarum</i>															
<b>Yeasts</b>	<b>3</b>	<b>7</b>	<b>19</b>												
<b>Non-sporulating isolates</b>	<b>6</b>	<b>14</b>	<b>38</b>												
<b>Number of CFU/sample</b>	<b>42</b>														
<b>Detection Limit (CFU/M<sup>3</sup>)</b>	<b>6</b>														
<b>TOTAL CFU/M<sup>3</sup></b>	<b>263</b>														

**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.