



October 1, 2008

Project #:8279

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

Attention: Mr. Pat Royle,

On September 10, 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 in 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/m³).

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.¹

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 - Manuals, NL
September 10, 2008**

Sample No.	Location/Description	Test Vol.	Genus & species	Total CFU/M ³
SG-01	Classroom 1	160L	<i>Alternaria alternata</i> (6)	113
			<i>Cladosporium cladosporioides</i> (50)	
			<i>Cladosporium herbarium</i> (6)	
			<i>Penicillium chrysogenum</i> (13)	
			<i>Penicillium commune</i> (13)	
			<i>Penicillium miczynskii</i> (6)	
			Non-sporulating isolates (19)	
SG-02	Classroom 2	160L	<i>Cladosporium cladosporioides</i> (56)	94
			<i>Cladosporium herbarium</i> (13)	
			<i>Penicillium chrysogenum</i> (13)	
			Non-sporulating isolates (13)	
SG-03	Gym	160L	<i>Aspergillus versicolor</i> (13)	156
			<i>Cladosporium cladosporioides</i> (75)	

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 – St. George’s Elementary, Manuals, NL

Sample No.	Location/ Description	Test Vol.	Genus & species	Total CFU/M ³
			<i>Cladosporium herbarum</i> (6)	
			<i>Penicillium chrysogenum</i> (38)	
			<i>Penicillium commune</i> (6)	
			<i>Penicillium</i> sp (6)	
			Yeasts (6)	
			Non-sporulating isolates (6)	
SG-04	Café	160L	<i>Aspergillus versicolor</i> (13)	69
			<i>Cladosporium cladosporioides</i> (13)	
			<i>Cladosporium herbarium</i> (6)	
			<i>Penicillium chrysogenum</i> (19)	
			Yeasts (6)	
			Non-sporulating isolates (13)	
SG-05	Music	160L	<i>Cladosporium cladosporioides</i> (6)	25
			<i>Penicillium fellutanum</i> (6)	
			<i>Phoma glomerata</i> (6)	
			Non-sporulating isolates (6)	
SG-06	Classroom 18 (A. Benson)	160L	<i>Alternaria Alternata</i> (6)	69
			<i>Botrytis cinerea</i> (6)	
			<i>Cladosporium cladosporioides</i> (13)	
			<i>Cladosporium herbarium</i> (13)	
			<i>Epicoccum nigrum</i> (6)	
			<i>Penicillium chrysogenum</i> (6)	
			<i>Stachybotrys chartarum</i> (6)	
			Yeasts (6)	
			Non-sporulating isolates (6)	
SG-07	KNG (C. Collier)	160L	<i>Alternaria Alternata</i> (6)	188
			<i>Aspergillus ustus</i> (13)	
			<i>Penicillium chrysogenum</i> (106)	
			<i>Penicillium</i> sp (44)	
			<i>Stachybotrys chartarum</i> (13)	
			Non-sporulating isolates (6)	
SG-08	Classroom 15	160L	<i>Alternaria Alternata</i> (6)	206
			<i>Aspergillus ustus</i> (25)	
			<i>Chaetomium globosum</i> (6)	
			<i>Cladosporium cladosporioides</i> (6)	
			<i>Penicillium chrysogenum</i> (113)	
			<i>Penicillium</i> sp (44)	

Microbial Air Sampling – St. George’s Elementary, Manuals, NL

Sample No.	Location/ Description	Test Vol.	Genus & species	Total CFU/M ³
			Non-sporulating isolates (6)	
SG-09	Classroom 3/4	160L	<i>Cladosporium cladosporioides</i> (31)	63
			<i>Penicillium chrysogenum</i> (13)	
			Non-sporulating isolates (19)	
SG-10	Classroom 5	160L	<i>Cladosporium cladosporioides</i> (31)	50
			<i>Penicillium chrysogenum</i> (13)	
			Non-sporulating isolates (19)	
SG-11	Classroom 12	160L	<i>Aspergillus</i> sp (6)	31
			<i>Cladosporium cladosporioides</i> (6)	
			Non-sporulating isolates (19)	
SG-12	Classroom 11	160L	<i>Cladosporium cladosporioides</i> (25)	38
			<i>Penicillium chrysogenum</i> (6)	
			Non-sporulating isolates (6)	
SG-13	Classroom 10	160L	<i>Aspergillus versicolor</i> (6)	56
			<i>Cladosporium cladosporioides</i> (31)	
			<i>Cladosporium herbarum</i> (6)	
			<i>Penicillium chrysogenum</i> (13)	
SG-14	Classroom 9	160L	<i>Alternaria Alternata</i> (13)	94
			<i>Aspergillus versicolor</i> (6)	
			<i>Cladosporium cladosporioides</i> (38)	
			<i>Cladosporium herbarium</i> (6)	
			<i>Eurotium herbariorum</i> (6)	
			<i>Penicillium chrysogenum</i> (6)	
			Non-sporulating isolates (19)	
SG-15	Classroom 8	160L	<i>Cladosporium cladosporioides</i> (31)	63
			<i>Cladosporium herbarium</i> (13)	
			<i>Fusarium</i> sp (6)	
			<i>Penicillium chrysogenum</i> (6)	
			Non-sporulating isolates (6)	
SG-16	Library/ Computer Room	160L	<i>Cladosporium cladosporioides</i> (19)	50
			<i>Cladosporium herbarium</i> (6)	
			<i>Fusarium</i> sp (6)	
			<i>Penicillium chrysogenum</i> (6)	
			<i>Penicillium</i> sp (6)	
			<i>Stachybotrys chartarum</i> (6)	
SG-17	Exterior	160L	<i>Cladosporium cladosporioides</i> (13)	181
			<i>Eupenicillium</i> sp (6)	

Sample No.	Location/Description	Test Vol.	Genus & species	Total CFU/M ³
			Yeasts (13)	
			Non-sporulating isolates (150)	

Observations

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

- Evidence of water damage was discovered under some of the windows in the Kindergarten classroom.

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.²

Laboratory analysis confirmed that some interior air samples contained various mould species that were not found on the exterior sample. Due to this vast variation in the types and concentrations moulds found on some of the interior samples, it is recommended that further investigation be completed. **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 ndavis@toalltech.com.

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.

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Thank you,

Nikki Davis

Nikki Davis, B.Tech., Env. Tech
Environmental Consultant
ALL-TECH Environmental Services Limited

Encl: Laboratory Results (4)



Laboratory Analysis Report

To:

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

EMC LAB REPORT NUMBER: 17706
 Job/Project Name: St. Georges
 Job/Project No: 8279 No. of Samples: 17
 Sample Type: RCS Date Received: Sep 12/08
 Analysis Method(s): Quantification and Identification to Species
 Date Analyzed: Sep 29/08 Date Reported: Sep 30/08
 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.	103249			103250			103251			103252			103253		
Sampling Date	Sep 10/08			Sep 10/08			Sep 10/08			Sep 10/08			Sep 10/08		
Description/Location	Classroom 1			Classroom 2			Gym			Café			Music		
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	6	6												
<i>Aspergillus ustus</i>															
<i>Aspergillus versicolor</i>							2	8	13	2	18	13			
<i>Aspergillus sp</i>															
<i>Botrytis cinerea</i>															
<i>Chaetomium globosum</i>															
<i>Cladosporium cladosporioides</i>	8	44	50	9	60	56	12	48	75	2	18	13	1	25	6
<i>Cladosporium herbarum</i>	1	6	6	2	13	13	1	4	6	1	9	6			
<i>Epicoccum nigrum</i>															
<i>Eupenicillium sp</i>															
<i>Eurotium herbariorum</i>															
<i>Fusarium sp</i>															
<i>Penicillium chrysogenum</i>	2	11	13	2	13	13	6	24	38	3	27	19			
<i>Penicillium commune</i>	2	11	13				1	4	6						
<i>Penicillium fellutanum</i>													1	25	6
<i>Penicillium miczynskii</i>	1	6	6												
<i>Penicillium sp</i>							1	4	6						
<i>Phoma glomerata</i>													1	25	6
<i>Stachybotrys chartarum</i>															
Yeasts							1	4	6	1	9	6			
Non-sporulating isolates	3	17	19	2	13	13	1	4	6	2	18	13	1	25	6
Number of CFU/sample	18			15			25			11			4		
Detection Limit (CFU/M ³)	6			6			6			6			6		
TOTAL CFU/M³	113			94			156			69			25		

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: 17706

Client’s Job/Project No.: 8279

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

Client’s Sample ID	SG-06			SG-07			SG-08			SG-09			SG-10		
EMC Lab Sample No.	103254			103255			103256			103257			103258		
Sampling Date	Sep 10/08			Sep 10/08			Sep 10/08			Sep 10/08			Sep 10/08		
Description/Location	Classroom 18 (A. Benson)			KNG (C. Collier)			Classroom 15			Classroom 3/4			Classroom 5		
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	9	6	1	3	6	1	3	6						
<i>Aspergillus ustus</i>				2	7	13	4	12	25						
<i>Aspergillus versicolor</i>															
<i>Aspergillus</i> sp															
<i>Botrytis cinerea</i>	1	9	6												
<i>Chaetomium globosum</i>							1	3	6						
<i>Cladosporium cladosporioides</i>	2	18	13				1	3	6	5	50	31	4	50	25
<i>Cladosporium herbarum</i>	2	18	13												
<i>Epicoccum nigrum</i>	1	9	6												
<i>Eupenicillium</i> sp															
<i>Eurotium herbariorum</i>															
<i>Fusarium</i> sp															
<i>Penicillium chrysogenum</i>	1	9	6	17	57	106	18	55	113	2	20	13	3	38	19
<i>Penicillium commune</i>															
<i>Penicillium fellutanum</i>															
<i>Penicillium miczynskii</i>															
<i>Penicillium</i> sp				7	23	44	7	21	44						
<i>Phoma glomerata</i>															
<i>Stachybotrys chartarum</i>	1	9	6	2	7	13									
Yeasts	1	9	6												
Non-sporulating isolates	1	9	6	1	3	6	1	3	6	3	30	19	1	13	6
Number of CFU/sample	11			30			33			10			8		
Detection Limit (CFU/M ³)	6			6			6			6			6		
TOTAL CFU/M³	69			188			206			63			50		

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: 17706
 Client's Job/Project No.: 8279
 Analyst: Fajun Chen, Ph.D., Principal Mycologist

Client's Sample ID	SG-11			SG-12			SG-13			SG-14			SG-15		
EMC Lab Sample No.	103259			103260			103261			103262			103263		
Sampling Date	Sep 10/08			Sep 10/08			Sep 10/08			Sep 10/08			Sep 10/08		
Description/Location	Classroom 12			Classroom 11			Classroom 10			Classroom 9			Classroom 8		
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>										2	13	13			
<i>Aspergillus ustus</i>															
<i>Aspergillus versicolor</i>							1	11	6	1	7	6			
<i>Aspergillus sp</i>	1	20	6												
<i>Botrytis cinerea</i>															
<i>Chaetomium globosum</i>															
<i>Cladosporium cladosporioides</i>	1	20	6	4	67	25	5	56	31	6	40	38	5	50	31
<i>Cladosporium herbarum</i>							1	11	6	1	7	6	2	20	13
<i>Epicoccum nigrum</i>															
<i>Eupenicillium sp</i>															
<i>Eurotium herbariorum</i>										1	7	6			
<i>Fusarium sp</i>													1	10	6
<i>Penicillium chrysogenum</i>				1	17	6	2	22	13	1	7	6	1	10	6
<i>Penicillium commune</i>															
<i>Penicillium fellutanum</i>															
<i>Penicillium miczynskii</i>															
<i>Penicillium sp</i>															
<i>Phoma glomerata</i>															
<i>Stachybotrys chartarum</i>															
Yeasts															
Non-sporulating isolates	3	60	19	1	17	6				3	20	19	1	10	6
Number of CFU/sample	5			6			9			15			10		
Detection Limit (CFU/M ³)	6			6			6			6			6		
TOTAL CFU/M³	31			38			56			94			63		

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: 17706
 Client’s Job/Project No.: 8279
 Analyst: Fajun Chen, Ph.D., Principal Mycologist

Client’s Sample ID	SG-16			SG-17											
EMC Lab Sample No.	103264			103265											
Sampling Date	Sep 10/08			Sep 10/08											
Description/Location	Lib/Comput			Exterior											
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>															
<i>Aspergillus ustus</i>															
<i>Aspergillus versicolor</i>															
<i>Aspergillus sp</i>															
<i>Botrytis cinerea</i>															
<i>Chaetomium globosum</i>															
<i>Cladosporium cladosporioides</i>	3	38	19	2	7	13									
<i>Cladosporium herbarum</i>	1	13	6												
<i>Epicoccum nigrum</i>															
<i>Eupenicillium sp</i>				1	3	6									
<i>Eurotium herbariorum</i>															
<i>Fusarium sp</i>	1	13	6												
<i>Penicillium chrysogenum</i>	1	13	6												
<i>Penicillium commune</i>															
<i>Penicillium fellutanum</i>															
<i>Penicillium miczynskii</i>															
<i>Penicillium sp</i>	1	13	6												
<i>Phoma glomerata</i>															
<i>Stachybotrys chartarum</i>	1	13	6												
Yeasts				2	7	13									
Non-sporulating isolates				24	83	150									
Number of CFU/sample	8			29											
Detection Limit (CFU/M ³)	6			6											
TOTAL CFU/M³	50			181											

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.