



October 1, 2008

Project #:8283

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

RE: Microbial Air Sampling – Frank Roberts Jr. High School, CBS, NL

Attention: Mr. Pat Royle,

On September 11th, 2008, ALL-TECH Environmental Services Limited representative Sean Hynes conducted air sampling to determine microbial types (genus & species) and concentrations within random areas of Frank Roberts Jr. High School in CBS, 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).

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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
Frank Roberts Jr. High School
CBS, NL

Sample/ Date	Location	Sample Volume (m ³)	Type of Mould	Colony Forming Units (CFU/m ³)	Total (CFU/m ³)
FR-01/ Sept 11, 2008	Room 216	0.16	<i>Aspergillus versicolor</i>	13	38
			<i>Cladosporium cladosporioides</i>	13	
			<i>Cladosporium herbarum</i>	6	
			<i>Penicillium chrysogenum</i>	6	
FR-02/ Sept 11, 2008	Room 201	0.16	<i>Alternaria alternata</i>	6	75
			<i>Aspergillus versicolor</i>	25	
			<i>Chaetomium globosum</i>	6	
			<i>Cladosporium herbarum</i>	6	
			<i>Penicillium chrysogenum</i>	31	
FR-03/ Sept	Room 204	0.16	<i>Aspergillus versicolor</i>	6	44

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.

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Sample/ Date	Location	Sample Volume (m ³)	Type of Mould	Colony Forming Units (CFU/m ³)	Total (CFU/m ³)
11, 2008			<i>Penicillium chrysogenum</i>	25	
			<i>Penicillium sp</i>	6	
			<i>Trichoderma koningii</i>	6	
FR-04/ Sept 11, 2008	Room L-104	0.16	<i>Aspergillus versicolor</i>	19	63
			<i>Cladosporium cladosporioides</i>	6	
			<i>Penicillium chrysogenum</i>	25	
			Non –sporulating isolates	13	
FR-05/ Sept 11, 2008	Room L-113	0.16	<i>Aspergillus versicolor</i>	6	63
			<i>Cladosporium cladosporioides</i>	25	
			<i>Cladosporium herbarum</i>	6	
			<i>Penicillium chrysogenum</i>	6	
			Non –sporulating isolates	19	
FR-06/ Sept 11, 2008	Exterior	0.16	<i>Cladosporium cladosporioides</i>	50	106
			<i>Cladosporium herbarum</i>	25	
			Yeasts	6	
			Non –sporulating isolates	25	
FR-07/ Sept 11, 2008	Room L-101	0.16	<i>Aspergillus versicolor</i>	19	81
			<i>Botrytis cinerea</i>	6	
			<i>Cladosporium cladosporioides</i>	13	
			<i>Cladosporium herbarum</i>	6	
			<i>Penicillium chrysogenum</i>	25	
			Non –sporulating isolates	13	

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. Extent of renovation/remediation work was unknown at the time of sampling.

Discussion of Results/Conclusions

There is no precise formula for distinguishing normal background mould from

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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 all interior sample's indicated presence of *Aspergillus versicolor*. Due to the elevated presence of this type of mould, 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) 639-8381 or via email at onevnewhook@toalltech.com.

Thank you,



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

Encl: Laboratory Results (2)

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.

To:

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

EMC LAB REPORT NUMBER: 17707
Job/Project Name: Frank Roberts
Job/Project No: 8283 **No. of Samples:** 7
Sample Type: RCS **Date Received:** Sep 12/08
Analysis Method(s): Quantification and Identification to Species
Date Analyzed: Sep 29/08 **Date Reported:** Sep 29/08
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.	103266			103267			103268			103269			103270		
Sampling Date	Sep 11/08			Sep 11/08			Sep 11/08			Sep 11/08			Sep 11/08		
Description/Location	Room 216			Room 201			Room 204			Room L104			Room L113		
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	8	6									
<i>Aspergillus versicolor</i>	2	33	13	4	33	25	1	14	6	3	30	19	1	10	6
<i>Botrytis cinerea</i>															
<i>Chaetomium globosum</i>				1	8	6									
<i>Cladosporium cladosporioides</i>	2	33	13							1	10	6	4	40	25
<i>Cladosporium herbarum</i>	1	17	6	1	8	6							1	10	6
<i>Penicillium chrysogenum</i>	1	17	6	5	42	31	4	57	25	4	40	25	1	10	6
<i>Penicillium</i> sp							1	14	6						
<i>Trichoderma koningii</i>							1	14	6						
Yeasts															
Non-sporulating isolates										2	20	13	3	30	19
Number of CFU/sample	6			12			7			10			10		
Detection Limit (CFU/M ³)	6			6			6			6			6		
TOTAL CFU/M³	38			75			44			63			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: 17707
 Client's Job/Project No.: 8283
 Analyst: Fajun Chen, Ph.D., *Principal Mycologist*

Client's Sample ID	FR-06			FR-07											
EMC Lab Sample No.	103271			103272											
Sampling Date	Sep 11/08			Sep 11/08											
Description/Location	Exterior			Room L101											
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 versicolor</i>				3	23	19									
<i>Botrytis cinerea</i>				1	8	6									
<i>Chaetomium globosum</i>															
<i>Cladosporium cladosporioides</i>	8	47	50	2	15	13									
<i>Cladosporium herbarum</i>	4	24	25	1	8	6									
<i>Penicillium chrysogenum</i>				4	31	25									
<i>Penicillium sp</i>															
<i>Trichoderma koningii</i>															
Yeasts	1	6	6												
Non-sporulating isolates	4	24	25	2	15	13									
Number of CFU/sample	17			13											
Detection Limit (CFU/M ³)	6			6											
TOTAL CFU/M³	106			81											

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.