Airborne Mould Testing
St Jean Elementary School
Charlottetown, PEI

Project No. 12702

PEI Dept. Transportation &
Infrastructure Renewal
P.O. Box 2000
Charlottetown, PE
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February 14, 2011

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1.0 INTRODUCTION

ALL-TECH Environmental Services Limited was retained by the PEI Department of Transportation & Infrastructure Renewal to conduct airborne mould testing at St. Jean Elementary School located at 335 Queen Street in Charlottetown, Prince Edward Island.

The testing was carried out on January 19, 2011. The approach was to conduct random representative test locations within the school to evaluate current conditions related to air quality.

2.0 MOULD IN INDOOR ENVIRONMENTS

Mould is a naturally occurring and essential part of our environment as they act as decomposers, breaking down dead organic material (such as leaves, wood and other plant debris) which they use as a food source. Mould spores are brought into indoor environments through ventilation systems, open windows or doors, or tracked in on footwear. Therefore, mould is found in almost every indoor environment and a normal background population of mould spores on indoor surfaces and within indoor air should be expected.

If conditions exist that allow mould to grow indoors, concentrations will increase to levels that are typically not found in buildings. Indoor mould growth occurs primarily as a result of water damage to cellulose-containing building materials and/or furnishings (such as wood, drywall, wallpaper, ceiling tiles, etc.) during catastrophic or chronic events such as leaks, floods, condensation (associated with high humidity or cold spots), improper design or operation of humidification systems, and building envelope failures. Under these conditions, mould growth may present a risk to the building structure itself (through decomposition of building materials) as well as to occupants in the building (through potentially adverse health effects).

3.0 METHODOLOGY

A total of eight (8) samples were collected for identification of viable airborne mould throughout randomly selected locations within the school.
A portable Biotest RCS (Reuter Centrifugal Sampler) air sampler was used to collect 4 minute (160L) samples. The RCS sampler was sterilized before each test using isopropyl alcohol swabs. The technician wore latex gloves when handling the agar strips. Once the samples were collected, the strips were sealed into their original

packages.
The RCS works on impaction. Airborne microorganisms are collected onto agar (culture medium) strips. After the samples were taken, the agar strips were placed in a cooler and shipped to an independent laboratory. Once at the laboratory, the agar strips were incubated for 10 days and colonies and species were identified.
The agar strips used were *Agar Strips YM (Art.-No. 941 110) with Rosa Bengal and Streptomycin.*
It should be noted that generally an outdoor sample is collected for comparison of species and total concentrations. However, outdoor concentrations during the wintertime are often significantly reduced and therefore may not serve as a valid comparison to evaluate conditions during snow cover. Therefore, indoor comparisons are taken to assist in evaluating conditions.

4.0 INTERPRETATION OF AIR SAMPLING RESULTS

4.1 Background for Proper Interpretation of Results

Air sampling for mould spores can be useful in determining whether there are hidden mould amplification sites within a building. Air sampling can also assist in evaluating the degree to which the presence of hidden or known mould amplification sites are impacting on the quality of air within the locations sampled. However, air sampling for mould spores should not be used as a sole assessment tool to determine health risks to building occupants. This is due to the numerous limitations associated with air sampling for mould, the lack of a clear dose-response relationship for airborne spore exposure and the wide range of susceptibility for exposed persons. No scientifically validated airborne spore concentrations have been established that would indicate a health risk to building occupants and therefore no regulated exposure limits for airborne mould exposure currently exist.

Given the lack of adequate scientific data to establish airborne spore exposure limits, currently recommended practice for proper interpretation of air sampling results is to perform comparison analysis. If air sampling is performed due to concern regarding potential exposure in a particular room or area of a building, samples should generally be taken in the area of concern, in an area of no concern (i.e., a non-complaint or non-affected area) and outside the building as a minimum. Analytical results are then compared to one another with respect to indoor and outdoor biodiversity. Generally, in an area not affected by mould contamination, one would expect to see the same type of mould spores present inside at a similar rank order but lower concentration (especially for mechanically ventilated buildings) as detected in outdoor air. Mould types that dominate samples retrieved from the area of concern but are not dominant or not detected in indoor and/or outdoor control samples provides indication that an interior

mould amplification site likely exists and that air quality is degraded. Under these conditions, further assessment of the areas of concern would be recommended in order to determine if an indoor mould contamination site exists and the appropriate remedial measures required, if necessary.

5.0 RESULTS

Viable air samples were collected and sent to EMC Scientific in Mississauga, Ontario for species identification and spore concentrations respectively (see Appendix 1 for complete Laboratory Analysis).

Sample results for viable mould concentrations have been summarized below in Table 1

Table 1
Summary of Viable Airborne Mould Results
St. Jean Elementary School

Sample ID	*Sample Date*	*Sample Location*	*Sample Results (Total CFU/m^3)*
SJ-001	01/19/11	Room 5	6
SJ-002	01/19/11	Room 18	19
SJ-003	01/19/11	Room 16	19
SJ-004	01/19/11	Room 27	19
SJ-005	01/19/11	Gymnasium	38
SJ-006	01/19/11	Room 23	19
SJ-007	01/19/11	Room 33	25
SJ-008	01/19/11	Room 14	19

CFU – Colony Forming Unit

5.1 General Interpretation of Results

Given the time of year in which the sampling was conducted, (i.e. January) strict comparison between indoor and outdoor levels may not be applicable. During such periods comparison between interior locations (and in particular concern vs. control locations) may offer a better evaluation of conditions.

In evaluating results for St. Jean Elementary School the biodiversity of mould spores throughout the areas tested are different in a number of locations. However, no significant total numbers or single species numbers were reported in any of the locations. Concentrations generally only detected 1 -2 cfu for each species.

The interpretation of results provided, is a general summary of current knowledge and industry practice regarding mould assessment and interpretation of air sampling results.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our air sample results, no significant mould amplification site is expected to be present within the locations sampled throughout representative areas of the school.

We trust this information is beneficial for assisting you in better understanding the process that has been carried out as well as the benefits and limitations of air sample results.

Sincerely,

Larry Koughan, CET, CRSP
Branch Manager

Wes Henry, M.H.Sc., CIH, ROH
Senior Occupational Hygienist

c.c. PEI Dept. of Health
School Inspection Committee

APPENDIX 1
Laboratory Analysis Report

emcscientific INCORPORATED

Laboratory Analysis Report

To:

Larry Koughan
ALL-TECH Environmental
92 Queen Street, Suite 201
Charlottetown, Prince Edward Island
C1A 4B1

EMC LAB REPORT NUMBER: 30946
Job/Project Name: St. Jean Elementary
Job/Project No: 12620 **No. of Samples:** 8
Sample Type: RCS **Date Received:** Jan 21/11
Analysis Method(s): Quantification and Identification to Species
Date Analyzed: Feb 8/11 **Date Reported:** Feb 9/11
Analyst: Fajun Chen, Ph.D., *Principal Mycologist*

Client's Sample ID	**SJ001**			**SJ002**			**SJ003**			**SJ004**			**SJ005**		
EMC Lab Sample No.	155401			155402			155403			155404			155405		
Sampling Date	Jan 19/11			Jan 19/11			Jan 19/11			Jan 19/11			Jan 19/11		
Description/Location	Rm #5			Rm #18			Rm #16			Rm #27			Gym		
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
Alternaria alternata															
Aspergillus flavus										1	33	6			
Aspergillus niger															
Aspergillus sp				1	33	6									
Chaetomium globosum															
Cladosporium cladosporioides													2	33	13
Cladosporium sphaerospermum	1	100	6				1	33	6						
Mucor plumbeus															
Penicillium aurantiogriseum															
Penicillium chrysogenum							1	33	6						
Penicilium spp															
Rhizopus stolonifer															
Scopulariopsis brevicaulis													1	17	6
Stachybotrys chartarum										1	33	6			
Yeasts				2	67	13									
Non-sporulating isolates							1	33	6	1	33	6	3	50	19
Number of CFU/sample	1			3			3			3			6		
Detection Limit (CFU/M^3)	6			6			6			6			6		
TOTAL CFU/M^3	**6**			**19**			**19**			**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.

emcscientific INCORPORATED

Laboratory Analysis Report

EMC LAB REPORT NUMBER: 30946
Client's Job/Project No.: 12620
Analyst: Fajun Chen, Ph.D., *Principal Mycologist*

Client's Sample ID	**SJ006**			**SJ007**			**SJ008**								
EMC Lab Sample No.	155406			155407			155408								
Sampling Date	Jan 19/11			Jan 19/11			Jan 19/11								
Description/Location	Rm #23			Rm #33			Rm #14 music (clean)								
Air Volume (m^3)	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
Alternaria alternata				1	25	6									
Aspergillus flavus															
Aspergillus niger				1	25	6									
Aspergillus sp															
Chaetomium globosum				1	25	6									
Cladosporium cladosporioides															
Cladosporium sphaerospermum															
Mucor plumbeus	1	33	6				1	33	6						
Penicillium aurantiogriseum	1	33	6												
Penicillium chrysogenum															
Penicilium spp				1	25	6	1	33	6						
Rhizopus stolonifer							1	33	6						
Scopulariopsis brevicaulis															
Stachybotrys chartarum															
Yeasts															
Non-sporulating isolates	1	33	6												
Number of CFU/sample	3			4			3								
Detection Limit (CFU/M^3)	6			6			6								
TOTAL CFU/M^3	**19**			**25**			**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.

APPENDIX 2
Site Drawing with sample locations