



**FOLLOW-UP TOTAL VOLATILE ORGANIC COMPOUND SAMPLING
SIR WILFRED GRENFELL COLLEGE
CORNER BROOK, NL**

Prepared for:

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EXECUTIVE SUMMARY

Pinchin LeBlanc Environmental Limited (Pinchin) was retained by Mr. Steve Hynes of Sir Wilfred Grenfell College (SWG) to conduct Total Volatile Organic Compounds (TVOC) sampling. The follow up assessment was conducted throughout the Arts & Science building of SWGC in Corner Brook, NL. Ms. Karla Coles and Ms. Julia King performed the assessment from November 20 - 28, 2013.

The follow-up assessment was conducted as a result of air quality concerns following the application of floor sealant in the gymnasium, which occurred approximately three weeks ago. The initial report titled "Total Volatile Organic Compound Sampling, Sir Wilfred Grenfell College, Corner Brook, NL" was issued November 14, 2013.

The HVAC unit has been turned off since the floor sealant application and three exhaust fans have been placed in the gymnasium exhausting to the exterior. The HVAC unit was turned on for a brief time on November 27, 2013 but turned back off on the same day due to odour complaints by the occupants in the area.

The TVOC readings collected throughout the Arts & Science Building during November 20-28, 2013 were all below the Health Canada suggested comfort level of 0.4 ppm.

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1.0 INTRODUCTION AND SCOPE

1.1 Statement of Understanding

Pinchin LeBlanc Environmental Limited (Pinchin) was retained by Mr. Steve Hynes of Sir Wilfred Grenfell College (SWGC) to conduct Total Volatile Organic Compounds (TVOC) sampling. The follow up assessment was conducted throughout the Arts & Science building of SWGC in Corner Brook, NL. Ms. Karla Coles and Ms. Julia King performed the assessment from November 20 - 28, 2013.

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1.2 Scope of Work

This follow up assessment was conducted throughout the Arts & Science building of SWGC and involved the following activities:

- Development of a sampling strategy;
- Measurement of the following indoor air quality (IAQ) factors:
 - Concentration of total volatile organic compounds (TVOC); and,
- Preparation of this report.

1.3 Assessment Methodology

The investigator interviewed the SWGC representative to discuss the sampling strategy. It was reported that since the sealant was applied to the gymnasium floor, there are still concerns with the smell migrating to other areas of the building. It was decided that the sampling would begin in the area of the gymnasium and expand to the surrounding areas and second floor adjacent to the gymnasium.

1.4 Test Methods

Spot-check sampling for total volatile organic compounds (TVOCs) was conducted with a miniRAE. The instrument is a portable gas detector that uses Photo-ionization technology to detect a large range of Volatile Organic Compounds (VOCs). Outdoor ambient air measurements were made in addition to samples collected in the building.

All sampling was performed in compliance with current professional practice¹.

2.0 ASSESSMENT AND FINDINGS

2.1 Facility Description

The Arts & Science building is a three storey structure with basement. The gymnasium is located in the southwest corner of the building.

2.1.1 Results of Interview

The following information was reported to the consultant by the SWGC representative:

- The HVAC unit has been turned off since the floor sealant application and three exhaust fans have been placed in the gymnasium exhausting to the exterior. The HVAC unit was turned on for a brief time on November 27, 2013 but turned back off, the same day, due to odour complaints by the occupants in the area.

2.2 Results of Indoor Air Quality Monitoring

2.2.1 Background

The term “volatile organic compounds” (VOCs) refers to organic compounds with a boiling point of greater than 50°C and less than 260°C. Offices or other non-industrial workplaces can contain many VOC sources such as paints, furniture, cleaners, personal care products and office equipment. Where VOCs are present at higher concentrations, there is a risk of adverse health effects such as unacceptable odours, eye, nose or throat irritation, or headache. Indoor air in office environments is usually a mixture of many VOCs present in varying concentrations, measured in micrograms per cubic metre ($\mu\text{g}/\text{m}^3$) or parts per million in air (ppm). The sum of the VOCs in an environment is termed the Total Volatile Organic Compound concentration (TVOC), frequently measured by direct reading instrumentation or laboratory methods. IAQ investigators use the TVOC concentration to estimate the risk of adverse health effects.

There is no legislated TVOC standard or even a consensus standard set to prevent all IAQ complaints from VOCs in office buildings. In the past, Health Canada published guidance based on work by the Danish researcher Lars Molhave, recommending a threshold of 200 $\mu\text{g}/\text{m}^3$ for no adverse health effects, and noting that discomfort could be expected above 3,000 $\mu\text{g}/\text{m}^3$. However, Molhave has recently withdrawn support for these thresholds and Pinchin no longer recommends use of the Health Canada TVOC guidelines.

¹ American Industrial Hygiene Association: Field Guide for the Determination of Biological Contaminants in Environmental Samples. H.K. Dillon, P.A. Heinsohn, and J.D. Miller, Eds. AIHA, Fairfax, VA (1996).

The literature does include some guidance on typical and maximum acceptable concentrations. The US Environmental Protection Agency (US EPA) has conducted one of the largest IAQ investigations of IAQ in office buildings, including VOC concentrations. In the period of 1994-1998, the US EPA Building Assessment Survey and Evaluation (BASE) study surveyed 100 randomly selected office buildings across 37 cities and 25 states. These were not known to be “problem” buildings. The study found 25 VOC compounds to be present in every building tested. This study found TVOC levels in the 100 randomly selected office buildings to be about 400 µg/m³, while some buildings ranged as high as 1,200 µg/m³. Under the Canada Green Building Council Leadership in Energy and Environmental Design (LEED) program, newly built buildings receive IAQ credits for having TVOC concentrations under 500 µg/m³ (0.2 ppm). Pinchin would consider an office environment with TVOC concentrations up to 1,000 µg/m³ (0.4 ppm) to be at little risk of IAQ complaints. Complaints might be expected if concentrations were much above that level.

2.2.2 Summary of Data

The spot check measurements throughout the Arts & Science building are provided in table 2.2.2 presented below. It should be noted that all sampling results were instantaneous and recommendations provided to SWGC in real time while data was being collected.

**Spot Check Monitoring of TVOCs
 Arts & Science Building, SWGC, Corner Brook, NL
 November 20-28, 2013**

Location	TVOC (ppm)
<i>November 20, 2013</i>	
Outdoors	0.0
Pool Viewing Area	0.0
Help Desk	0.0
Stage Craft	0.0
C & C	0.0
Props	0.0
Gym Hallway	0.0
Gym	0.0
<i>November 21, 2013</i>	
Outdoors	0.0
Pool Viewing Area	0.0
Help Desk	0.0
Stage Craft	0.0
Wardrobe	0.0
Props	0.0

Location	TVOC (ppm)
Gym Hallway	0.0
Stairwell	0.0
Gym	0.0
<i>November 22, 2013</i>	
Outdoors	0.0
Pool Viewing Area	0.0
Help Desk	0.0
Stage Craft	0.0
C & C	0.0
Resource Centre	0.0
Props	0.0
Wardrobe	0.0
Gym Hallway	0.0
Gym	0.0
Cage	0.0
Gym Offices	0.0
<i>November 23, 2013</i>	
Outdoors	0.0
Pool Viewing Area	0.0
Help Desk	0.0
Stage Craft	0.0
C & C	0.0
Resource Centre	0.0
Party Room	0.0
Props	0.0
Wardrobe	0.0
Gym Hallway	0.0
Gym	0.0
<i>November 25, 2013</i>	
Outdoors	0.0
Pool Viewing Area	0.0
Help Desk	0.0
Stage Craft	0.0
C & C	0.0
Resource Centre	0.0
Party Room	0.0
Props	0.0
Wardrobe	0.0
Gym Hallway	0.0
Gym	0.0

Location	TVOC (ppm)
<i>November 27, 2013</i>	
Outdoors	0.0
Gym Hallway	0.0
Gym	0.0
Pool Viewing Area	0.0
Help Desk	0.0
<i>November 28, 2013</i>	
Outdoors	0.0
Gym Hallway	0.0
Gym	0.0
Pool Viewing Area	0.0
Help Desk	0.0
1. Total volatile organic compounds (TVOC) levels above 1.0 mg/m ³ (approximately 0.4 ppm), one may expect complaints. * Numbers in RED are above the recommended value.	

2.2.3.3 Conclusions

The TVOC readings collected throughout the Arts & Science Building during November 20-28, 2013 were all below the Health Canada suggested comfort level of 0.4 ppm.

3.0 LIMITATIONS

Work performed by Pinchin was conducted in accordance with generally accepted engineering or scientific practices current in this geographical area at the time the work was performed. No warranty is either expressed or implied, or intended by the agreement executed with the Client, or by furnishing oral or written reports or findings. The Client acknowledges that subsurface and concealed conditions may vary from those encountered or inspected. Pinchin could only comment on the conditions observed on the date(s) the assessment was performed.

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Air sampling results (if any) will apply only to the time and conditions of the testing and may not be used to reliably predict conditions on other days.

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