



**INDOOR AIR QUALITY ASSESSMENT DURING
CONSTRUCTION
January, 2015**

**WINCHESTER HIGH SCHOOL
80 Skillings Road
Winchester, MA 01890**

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1. EXECUTIVE SUMMARY

BACKGROUND

Consigli retained Cashins & Associates, Inc., to perform an indoor air quality (IAQ) assessment at areas adjacent to Phase I of the project at the Winchester High School in Winchester, Massachusetts. This testing was conducted in order to determine whether various IAQ parameters were in compliance with the project's Indoor Air Quality Management Plan.

SCOPE OF WORK

On January 16, 2015, a Senior Indoor Air Quality Consultant from Cashins & Associates performed air sampling as required by the Indoor Air Quality Management Plan developed by Cashins & Associates.

Measurements were taken for the following:

- Carbon Dioxide
- Temperature
- Relative Humidity
- Carbon Monoxide
- Volatile Organic Compounds (VOCs)
- Dust

It should be noted that readings for carbon dioxide are taken during these assessments not to measure ventilation or HVAC effectiveness, but to ensure that exhaust from combustion engines are not entering the space. Different techniques would be employed in order to assess the effectiveness of the school's ventilation system. Thus, carbon dioxide readings listed here are not to be read as an accurate measurement of the amount of fresh air bring brought into classroom spaces.

FINDINGS

Real-time readings for CO and VOCs were all below upper limits set forth in the IAQ Management Plan.

In several locations, dust was found to be slightly higher than the upper limit of 0.15 mg/m³. One of these locations was in the first floor hallway at exit 34. At the time of these readings, heavy work was going on immediately outside this door. It is recommended that additional measures be taken to reduce dust levels. This may be accomplished by the regular application of water as well as by more effective segregation of the work area from the school entrance.

The only other areas that were found to have slightly elevated dust were the 2nd and 3rd floor stairwells immediately adjacent to construction work. This is most likely due to the fact that the window units in these stairways are old and have most likely lost some of their seal. It is recommended that these window units be additionally sealed with plastic sheeting or similar barrier in order to prevent excess dust from migrating into occupied areas of the school.

All areas of the school in and around classrooms were found to have acceptable dust levels.

No significant construction-related odors were detected at the time of this assessment.

2. INTRODUCTION

Cashins & Associates, Inc. was retained by Consigli to provide professional industrial hygiene consulting services. Our scope of work consisted of measuring various basic indoor air quality parameters during construction activities at Winchester High School in Winchester, Massachusetts. This assessment took place on January 16, 2014, and focused on areas adjacent to Phase I of the project.

3. INDOOR AIR QUALITY PARAMETERS

The following is a breakdown of upper limits related to indoor air quality as stipulated in section 01 81 19 of the Project Specification:

Analyte	Upper Limit
Airborne dust	150 $\mu\text{g}/\text{m}^3$ (Occupied), 500 $\mu\text{g}/\text{m}^3$ (Work Area)
Volatile Organic Compounds (VOCs)	5 ppm (5,000 ppb)
Carbon Monoxide (CO)	9 ppm

4. METHODOLOGIES

A TSI Q-Track indoor air quality meter was used to measure carbon dioxide and carbon monoxide at representative locations of the school. The range of measurements obtained is reported in Table 1.

A RAE Instruments part per billion photo-ionization detector (PID) was utilized to screen the school building for the presence of TVOC. The PID is a screening tool that provides information as to total volatile organic compound loading in the space. The instrument does not provide information pertaining to which specific compounds are present in the air.

Dust concentrations were measured using a MIE pDR-1000AN passive air sampler. This real-time aerosol monitor measures both respirable and thoracic fractions, with optimal responses to particles in the 0.1-10 micron size range. The monitor was zeroed on June 19, 2014 prior to the monitoring event by using a hand-inflatable “zero air” pouch in conjunction with an inlet filter cartridge.

5. FINDINGS

5.1 Findings: Basic IAQ Parameters

We have listed in Tables 1 through 3 the results of the real-time air sampling. Three rounds of sampling were conducted at various times of the day in order to gain a more representative data set. It should be noted that these readings are taken in areas adjacent to classrooms, not inside the classrooms themselves.

Table 1: Real-time Air Quality Readings

<i>Location</i>	<i>CO₂</i> <i>(ppm)</i>	<i>CO</i> <i>(ppm)</i>	<i>TVOC</i> <i>(ppb)</i>	<i>Dust</i> <i>(µg/m³)</i>
1st floor				
Main Office	651	<0.1	45	134
@ exit 34	531	<0.1	18	256
@ Room A101	579	<0.1	29	235
@ Room A102	577	<0.1	44	188
B hall @ women's room	716	<0.1	60	225
@ Room B101	792	<0.1	73	250
@ Photography	1142	<0.1	112	189
@ Cafeteria	821		120	185
East Wing		<0.1		
Hall @ Music Suite	454	<0.1	18	145
Shop	423	<0.1	16	125
Band Room	733	<0.1	7	22
West Exit	344	<0.1	<0.1	10
Men's Locker	343	<0.1	<0.1	11
@ Boiler Room	388	<0.1	2	12
2nd floor				
West side @ work	840	<0.1	92	64
@ Room C210	880	<0.1	86	65
@ Room C207	824	<0.1	76	41
@ Room C202	657	<0.1	62	10
@ Room C205	826	<0.1	50	44
@ Room B209	1011	0.3	84	53
B Hall @ bubbler	851	0.6	83	4181
@ Room B207	953	0.7	100	99
@ Room B203	1007	0.6	111	60
@ Room B201	828	0.7	72	17
@ Room A211	691	0.7	54	71
Social Studies Dept.	860	0.7	91	54
@ Room A210	813	0.7	115	32
@ Room A201	1047	0.7	146	18
@ Room A202	1337	0.7	141	22

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<i>Location</i>	<i>CO₂</i> <i>(ppm)</i>	<i>CO</i> <i>(ppm)</i>	<i>TVOC</i> <i>(ppb)</i>	<i>Dust</i> <i>(µg/m³)</i>
Blue stair landing 3rd Floor	725	0.9	70	383
Blue stair landing	731	0.6	48	321
Science Teacher's Room	790	<0.1	26	120
@ Room A302	757	<0.1	28	131
Science Lecture Room	847	<0.1	41	81
@ Room A305	607	<0.1	8	11
@ Room B301	940	0.5	64	43
@ Room B303	911	0.7	43	17
B Wing Hall	966	0.8	62	109
@ Room B307	842	1.0	80	56
@ Room C302	990	0.9	72	92
@ Room C306	918	0.8	54	11
@ Room C309	902	0.9	13	53
West Hall	1007	1.2	79	16
@ Room C308	841	1.2	36	8

6. DISCUSSION

Real-time readings for CO and VOCs were below upper limits set forth in the IAQ Management Plan.

In several locations, dust was found to be slightly higher than the upper limit of 0.15 mg/m³. One of these locations was in the first floor hallway at exit 34. At the time of these readings, heavy work was going on immediately outside this door. It is recommended that additional measures be taken to reduce dust levels. This may be accomplished by the regular application of water as well as by more effective segregation of the work area from the school entrance.

The only other areas that were found to have slightly elevated dust were the 2nd and 3rd floor stairwells immediately adjacent to construction work. This is most likely due to the fact that the window units in these stairways are old and have most likely lost some of their seal. It is recommended that these window units be additionally sealed with plastic sheeting or similar barrier in order to prevent excess dust from migrating into occupied areas of the school. Again, the more liberal use of water during construction activities can help keep airborne dust levels down.

All areas of the school in and around classrooms were found to have acceptable dust levels.

No significant construction-related odors were detected at the time of this assessment.

Indoor air quality related to construction activities will be monitored on a regular basis by Cashins & Associates throughout this project in order to ensure that concentrations of various airborne contaminants remain at acceptable levels.

Please call if you have any questions or if we can be of further assistance.

Sincerely,
Cashins & Associates, Inc.



Zachary Keefe, CIE
Senior Indoor Air Quality Consultant