GREENCAP
Going Further in Managing Risk

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AIR MONITORING RISK ASSESSMENT
CRINGILA PUBLIC SCHOOL
35 SHEFFIELD STREET
CRINGILA NSW 2502

Summary Report
11/03/2019 – 22/03/2019

NSW Department of Education

Cringila Public School

35 Sheffield Street
Cringila NSW 2502

March 2019
C107826: J153825-02: RC/TO

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Document Control

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1	**Electronic**	NSW Department of Education	Greg Mott Senior Group Leader – School Infrastructure NSW

Air Monitoring Risk Assessment - IAQ

Cringila Public School, 35 Sheffield Street, Cringila NSW 2502

Table of Contents

1. INTRODUCTION

At the request of the Department of Education, Greencap were engaged to undertake indoor air monitoring utilising real-time monitoring devices at Cringila Public School, 35 Sheffield Street Cringila NSW 2502. The aim of this monitoring program was primarily to investigate concerns raised by school employees and the Department of Education regarding the potential exposure to elevated concentrations of air pollutants, specifically carbon dioxide (CO_2) and Carbon Monoxide (CO), during the normal occupation of rooms within the school.

2. OBJECTIVES

Based on the correspondence provided by the NSW Department of Education, the objective of this assessment is to undertake an assessment of the indoor air quality to determine the concentrations of CO_2 and CO within buildings at Cringila Public School.

This report presents the results relating to the weekly indoor air quality monitoring investigation carried out within hallway 5R0011 on the 13th and 21st of March 2019 in Building B005 at Cringila Public School. The locations of the monitoring are displayed in **Appendix A:** Site Map and Sample Locations.

3. ASSESSMENT CRITERIA

The following paragraphs list the relevant standards and guidelines used as a reference in this assessment. These reference sources included Approved Methods for Modelling and Assessment of Air Pollutants in NSW (NSW EPA 2016), Workplace Exposure Standards for Airborne Contaminants (SWA, 2013), ASHRAE Standard 62.1 Ventilation for Acceptable Indoor Air Quality (2016), or equivalent publications as a point of reference. For the purpose of this assessment, these criteria values will be referenced as they are deemed to be the most conservative levels based on the monitoring works undertaken.

3.1 CARBON DIOXIDE (CO_2)

Carbon Dioxide (CO_2) measurements are compared against the ASHRAE Standard 62-2010 *Ventilation for Acceptable Indoor Air Quality* (American Society of Heating, Refrigeration and Air-Conditioning Engineers).

CO_2 measurements provide an indication of the adequacy of fresh air levels supplied to rooms within a building. A person's comfort and health may be affected by high concentrations of CO_2.

For the purpose of this assessment, the recorded CO_2 measurements will be referenced against the ASHRAE Guideline value of 1,000 parts per million (ppm). This criteria is set for human comfort factors and is deemed to be the most conservative level to adopt.

CO_2 is a normal constituent of exhaled breath and is commonly measured as a screening tool to evaluate whether adequate volumes of fresh outdoor air are being introduced into indoor air.

The outdoor level of CO_2 usually ranges from 300 ppm to 400 ppm. The CO_2 level is usually greater inside a building than outside, even in buildings with few complaints about indoor air quality. If indoor carbon dioxide levels are more than 1,000 ppm, there is probably inadequate ventilation; and complaints such as headaches, fatigue, and eye and throat irritation may be prevalent.

3.2 CARBON MONOXIDE (CO)

Sampling for carbon monoxide provides an indication of the level of combustion by-products that may impinge on air quality.

The National Environment Protection (Ambient Air Quality) Measure (EPA 2016) specifies an indoor air quality standard of 9.0 parts per million (ppm) as a maximum concentration. This is considered the most relevant concentration for carbon monoxide and is consistent with other international guidelines such as the World Health Organisation (WHO).

4. INDOOR AIR QUALITY MONITORING METHODOLOGY

4.1 INDOOR AIR QUALITY MONITORING

Indoor air quality monitoring was conducted at a single location over the course of a school day to study the concentrations of CO_2 and CO within school buildings while they are occupied. Weekly monitoring was conducted within hallway 5R0011 in Building B005 at Cringila Public School.

In this assessment, RAE Systems Multi RAE Gas Detectors were used with a specific sensor configuration to target CO_2 and CO concentrations to be assessed against the relevant guidelines as detailed above.

4.2 DATA ANALYSIS AND REPORTING

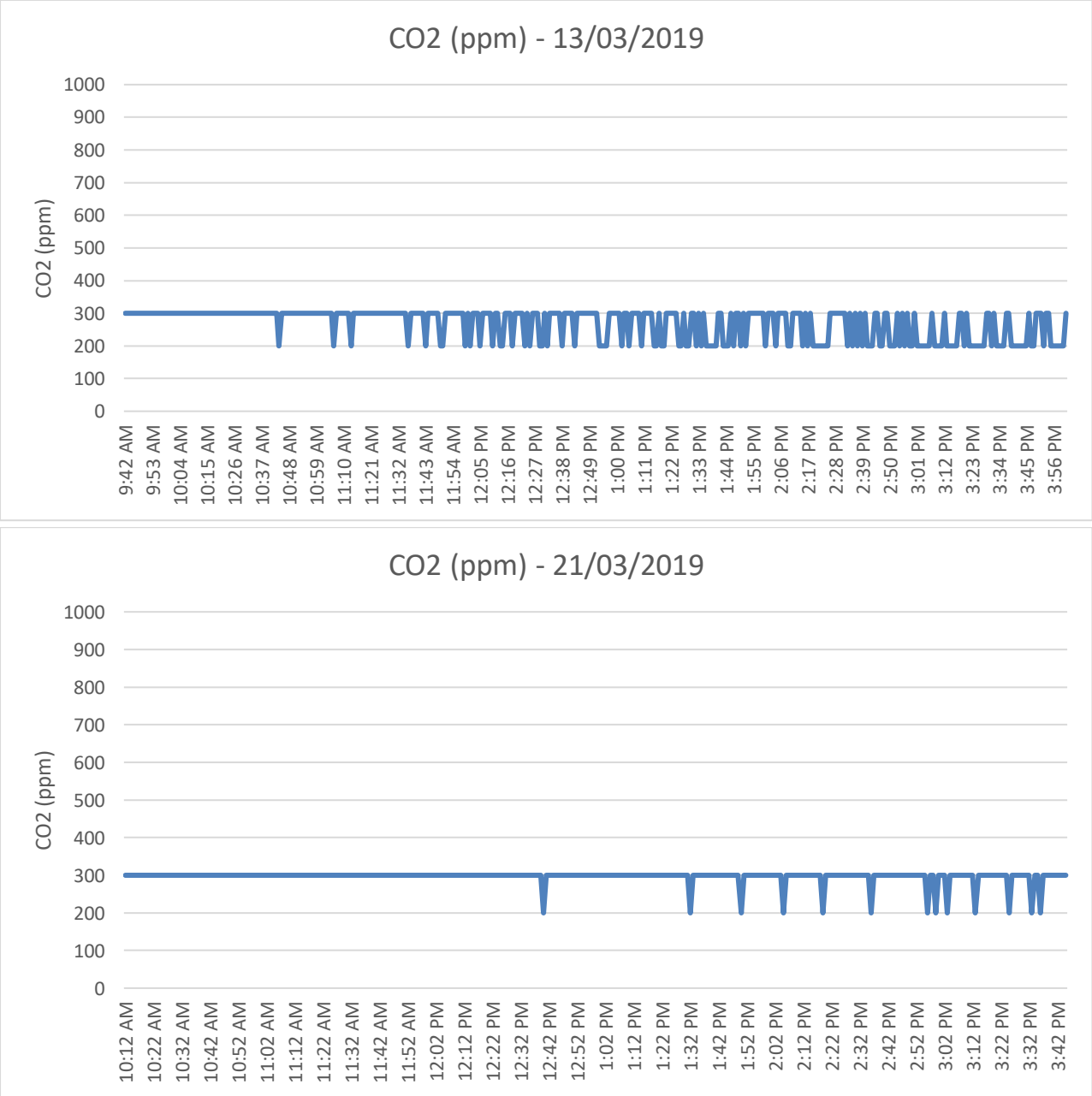
The MultiRAE Gas Detector units are configured to log data at one-minute intervals and run throughout the course of the school day. Logged data was downloaded from the device and tabulated in this report to present the results. Refer to **Section 5:** Indoor Air Quality Monitoring Results.

5. INDOOR AIR QUALITY MONITORING RESULTS

5.1 CARBON DIOXIDE (CO_2)

The Carbon Dioxide (CO_2) concentration results for the monitoring conducted between the 11th of March and 22nd of March 2019 is summarised below in **Figure 1**. Monitoring locations are displayed in **Appendix A**: Site Map and Sampling Locations.

Figure 1: Carbon Dioxide (CO_2) monitoring results



5.2 CARBON MONOXIDE (CO)

The Carbon Monoxide (CO) concentration results for the monitoring conducted between the 11th of March and 22nd of March 2019 were consistently 0ppm.

6. DISCUSSION

6.1 CARBON DIOXIDE (CO_2)

Generally, the peak monitoring results for CO_2 within hallway 5R0011 at Cringila Public School were between 200 ppm and 300 ppm during the period of monitoring. All results were below the ASHRAE guideline level of 1,000 ppm.

It should be noted that the adopted ASHRAE Guideline of 1,000 ppm is set for comfort only. A time weighted average (TWA) of 5,000 ppm has been set by Safe Work Australia for health purposes.

It should be noted that short term static monitoring results cannot be compared to exposure monitoring criteria and therefore may be used as guidance only with regard to concentrations of CO_2 in these locations.

Adequate supply of fresh air is required to dilute CO_2 and other pollutants to acceptable levels for human comfort and health considerations.

6.2 CARBON MONOXIDE (CO)

The peak monitoring results for CO within hallway 5R0011 at Cringila Public School was 0ppm during each period of monitoring. All results were below the adopted maximum guideline level of 9 ppm.

7. CONCLUSION

This concludes the indoor air quality monitoring summary report for monitoring conducted between the 11th of March and 22nd of March 2019. It is recommended that weekly assessments are continued in order to gain firm and reliable data sets regarding the concentration of CO_2 and CO within indoor environments at the school whilst further investigation of the site is undertaken.

Air Monitoring Risk Assessment

Cringila Public School NW Hotspot – 35 Sheffield Street, Cringila NSW 2502

Appendix A: Site Map and Sampling Locations

Legend:

- Air Quality Monitoring Location
- North West Hotspot Investigation Area

Site	Cringila Public School
Area	Building B007
Consultant	Rowan Clark/Tom Oyston
Date	11th to 22nd of March 2019
Job Number	J153825-02
Report	AMR-IAQ-05
Version	1.0

Air Monitoring Risk Assessment

Cringila Public School NW Hotspot – 35 Sheffield Street, Cringila NSW 2502

Appendix B: Calibration Certificates

Calibration & Service Report
Gas Monitor

Company:	Active Environmental Solutions Hire	Manufacturer:	RAE Systems	Serial #:	M01C005769
Contact:	William Pak/Milenko Sisic	Instrument:	MultiRAE Lite	Hire #:	BN2215
Address:	Unit 16, 191 Parramatta Road	Model:	PGM 6208	Client:	Rowan Clark
	AUBURN NSW 2144	Configuration:	LEL, CO2, CO, SO2, H2S	Company:	Greencap
Phone:	02 9716 5966 | Fax: 02 9716 5988	Wireless:	-		
Email:	hire@aesoultions.com.au				

Item	Test	Pass/Fail	Comments
Battery	Li Ion	✓	
Charger	Charger, Power supply	✓	
	Cradle	✓	
Pump	Flow	✓	>300 mL/min
Filter	Filter, fitting, etc	✓	
Alarms	Audible, visual, vibration	✓	
Display	Operation	✓	
PCB	Operation	✓	
Connectors	Condition	✓	
Firmware	Version	✓	1.40
Datalogger	Operation	✓	
Monitor Housing	Condition	✓	
Case	Condition/Type	✓	
Sensors			
Oxygen		-	
LEL	LEL	✓	
PID		-	
Toxic 1	CO2	✓	
Toxic 2	CO	✓	
Toxic 3	SO2	✓	
Toxic 4	H2S	✓	
Toxic 5		-	

Engineer's Report

Setup, service and calibration for hire

Calibration Certificate

Sensor	Type	Serial No:	Span Gas	Concentration	Traceability Lot #	CF	Reading	
							Zero	Span
Oxygen								
LEL	LEL	03111028U6	Methane	2.5% (50% LEL)	WO151924-1		0	50%
PID								
Toxic 1	CO2	03610030P9	Carbon Dioxide	5000ppm	WO169824-1		0	5000ppm
Toxic 2	CO	03060154N5	Carbon Monoxide	50ppm	WO151924-1		0	50ppm
Toxic 3	SO2	03AF0014Q5	Sulfur Dioxide	5ppm	WO155612-5		0	5ppm
Toxic 4	H2S	03AR0208Q2	Hydrogen Sulfide	10ppm	WO151924-1		0	10ppm
Toxic 5								

Calibrated/Repaired by: William Pak

Date: 19.12.2018

Next due: 19.06.2019

Calibration & Service Report
Gas Monitor

Company:	Active Environmental Solutions Hire	Manufacturer:	RAE Systems	Serial #:	MAA30065R4
Contact:	William Pak/Milenko Sisic	Instrument:	MultiRAE Lite	Hire #:	BN2215
Address:	Unit 16, 191 Parramatta Road AUBURN NSW 2144	Model:	PGM 6208	Client:	Rowan Clark
		Configuration:	PID (VOC), NO, NO2, CO, O2	Company:	Greencap
Phone:	02 9716 5966 | Fax: 02 9716 5988	Wireless:	-		
Email:	hire@aesoultions.com.au				

Item	Test	Pass/Fail	Comments
Battery	Li Ion	✓	
Charger	Charger, Power supply	✓	
	Cradle	✓	
Pump	Flow	✓	>300 mL/min
Filter	Filter, fitting, etc	✓	
Alarms	Audible, visual, vibration	✓	
Display	Operation	✓	
PCB	Operation	✓	
Connectors	Condition	✓	
Firmware	Version	✓	1.40
Datalogger	Operation	✓	
Monitor Housing	Condition	✓	
Case	Condition/Type	✓	
Sensors			
Oxygen	O2	✓	
LEL		-	
PID	10.6eV	✓	
Toxic 1	NO	✓	
Toxic 2	NO2	✓	
Toxic 3	CO	✓	
Toxic 4		-	
Toxic 5		-	

Engineer's Report

Setup, service and calibration for hire

Calibration Certificate

Sensor	Type	Serial No:	Span Gas	Concentration	Traceability Lot #	CF	Reading	
							Zero	Span
Oxygen	O2	03420415U9	Fresh Air	20.9%	WO151924-1		20.9%	
			Oxygen	18.0%				18.0%
LEL								
PID	10.6eV	03A30515U6	Isobutylene	100ppm	WO148384-1	1.00	0	100ppm
Toxic 1	NO	0374009257	Nitric Oxide	25ppm	WO153855-2		0	5000ppm
Toxic 2	NO2	03750044RC	Nitrogen Dioxide	5ppm	WO181028-1		0	5ppm
Toxic 3	CO	03060334Q1	Carbon Monoxide	50ppm	WO151924-1		0	50ppm
Toxic 4								
Toxic 5								

Calibrated/Repaired by: William Pak

Date: 19.12.2018

Next due: 19.06.2019