



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

Weekly Report
02/01/18 - 05/01/18

Cringila Public School

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Air Monitoring Risk Assessment

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

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1. INTRODUCTION

At the request of the Department of Education, Greencap were engaged to undertake 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 those of the general public regarding the potential exposure to air pollutants originating from the pre-identified subsurface hotspot occurring in this particular area of the school.

Based on the correspondence provided by the NSW Department of Education, the objectives of this assessment are as follows:

- Undertake an assessment of the air quality at the source of the subsurface hotspot and to determine the extent of associated atmospheric pollutants (gases) distribution within Cringila Public School;
- Pollutants to be monitored using real-time monitors to provide a profile of air quality i.e. carbon monoxide (CO), carbon dioxide (CO₂), volatile organic compounds, sulphur dioxide (SO₂), hydrogen sulphide (H₂S), methane (CH₄ – LEL), oxygen (O₂), nitric oxide (NO) and nitrogen dioxide (NO₂).
- Real time monitoring was to provide a snapshot to determine the extent of atmospheric pollutant levels on School grounds.

This report presents the results relating to an ongoing air monitoring investigation carried out in the North-Western Hotspot, situated on the Cringila Public School grounds, located at 35 Sheffield Street, Cringila NSW 2502.

2. ASSESSMENT CRITERIA

As demonstrated in Table 1 below, the assessment criteria referenced as part of this project is based on several sources as this monitoring assessment had to consider numerous factors including outside air exposure, indoor air quality exposure and personal worker exposure. 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 highlighted in bold will be referenced in this report as they are deemed to be the most conservative levels based on the multifaceted monitoring works undertaken. It is however important to note that WES do not apply to children. Reference to WES is purely for guidance purposes only.



Table 1 Air Quality Monitoring Assessment Criteria

POLLUTANT	AVERAGING PERIOD	CRITERIA	SOURCE
<i>Carbon monoxide (CO)</i>	8-hours	9 ppm	NSW EPA 2016 ^a
		9 ppm	ASHRAE Standard 62.1-2016
		30 ppm	SWA 2013 ^b
<i>Carbon dioxide (CO²)</i>	8-hours	5000 ppm	SWA 2013 ^b
		Not greater than 700 ppm above local outdoor concentration levels	ASHRAE Standard 62.1-2016
<i>Sulphur dioxide (SO²)</i>	24-hours	0.08 ppm (8 ppm)	NSW EPA 2016 ^a
	8-hours	2 ppm (5 ppm STEL) ^d	SWA 2013 ^b
<i>Hydrogen sulphide (H²S)</i>	8-hour	10 ppm (15 ppm STEL) ^d	SWA 2013
		0.9 ppm (Peak)	NSW EPA 2016
<i>Nitric oxide (NO)</i>	8-hour	25 ppm	SWA 2013
<i>Nitrogen dioxide (NO²)</i>	1-hour	0.12 ppm (12 ppm)	NSW EPA 2016 ^a
	8-hours	3 ppm (5 ppm STEL) ^d	SWA 2013 ^b
<i>Oxygen (O²)</i>	-	19.5-23.5%	SWA 2011 ^c
<i>Volatile organic compounds (VOC)</i>	-	Contaminant specific	-
<i>Methane (as LEL)</i>	-	<5%	SWA 2011 ^c

Sources:

a - NSW EPA 2016, Approved methods for the Modelling and Assessment of Air Pollutants in New South Wales, NSW Environment Protection Authority.

b - SWA 2013, Workplace Exposure Standards for Airborne Contaminants, Safe Work Australia. These concentrations are based on Time Weighted Averages (TWA) for an 8-hour shift.

c - SWA 2011, Confined Spaces Code of Practice, Safe Work Australia. These concentrations are based on conditions that do not pose an immediate risk to human health.

d - Short term exposure limit (STEL) means the average airborne concentration of a substance calculated over a 15-minute period. The STEL should not be exceeded at any time during a normal eight hour working day.



3. AIR QUALITY MONITORING METHODOLOGY

3.1 SPOT CHECK / REAL TIME AIR QUALITY MONITORING

‘Spot-check’ air quality monitoring at locations within the vicinity of the subsurface hotspot area was conducted to determine the extent of atmospheric pollutants (gases) associated with the hotspot. Pollutants monitored using real-time Multi-Gas Detectors provided and continue to provide a profile of air quality which include: carbon monoxide (CO), carbon dioxide (CO₂), volatile organic compounds (VOCs), sulphur dioxide (SO₂), hydrogen sulphide (H₂S), methane (CH₄) as LEL, oxygen (O₂), nitric oxide (NO) and nitrogen dioxide (NO₂).

These air quality parameters were recorded at specific nominated locations within the northwest hotspot area over an interval of 15 minutes at each location. Monitoring included sensitive receptors such as locations within the school boundary and adjacent neighbouring residences in order to effectively delineate the extent and distribution of these atmospheric pollutants. This will be performed at the digression of the Greencap Consultant on site.

In this assessment, RAE Systems Multi RAE Gas Detectors were used with specific sensor configurations to target the nominated pollutants/gases to be assessed against the Air Quality Monitoring Criteria detailed below in Table 2. Each unit will be configured to log data at one second intervals, and upper and lower alarm limits will be set to reflect the adopted air monitoring criteria.

Table 2 Multi-Gas Detector Sensor Specifications

UNIT	SENSOR	RANGE	RESOLUTION
<i>Multi RAE Lite – Unit 1</i>	SO ₂	0 to 20 ppm	0.1 ppm
	NO	0 to 250 ppm	0.5 ppm
	NO ₂	0 to 20 ppm	0.1 ppm
	O ₂	To 30% (Volume)	0.1% (Volume)
	VOCs	0 to 1,000 ppm	1 ppm
<i>Multi RAE Lite – Unit 2</i>	CO	0 to 200 ppm	0.1 ppm
	CO ₂	0 to 50,000 ppm	100 ppm
	H ₂ S	0 to 100 ppm	0.1 ppm
	LEL (Methane)	0 to 100%	1%

3.2 MONITORING LOCATIONS

Spot measurements were taken within the North-Western Hotspot area and at surrounding locations to determine whether potential air pollutants from the subsurface hotspot were present. These monitoring locations included the following:

- A-01 General Background
- A-02 NW Hotspot – Concrete Cap Surface
- A-03 NW Hotspot – Small Mound
- A-04 NW Hotspot – NE fence line
- A-05 Exclusion Area Fence Line East of Hotspot (Approx. 10m)
- A-06 Exclusion Area Fence Line Southeast of Hotspot (Approx. 15m)
- A-07 Exclusion Area Fence Line South of Hotspot (Approx. 30m)
- A-08 Exclusion Area Fence Line Northwest of Hotspot, adjacent 17 Lackawanna Street (Approx. 50m)



4. SPOT CHECK / REAL TIME AIR MONITORING RESULTS

The atmospheric pollutant results for each monitoring event are summarised below in Table 3, and locations can be viewed in **Appendix A**.

Date of Monitoring: Tuesday 2nd January 2018											
Location		Carbon monoxide (CO) (ppm)	Carbon dioxide (CO ²) (ppm)	Sulphur dioxide (SO ²) (ppm)	Hydrogen sulphide (H ² S) (ppm)	Nitric oxide (NO) (ppm)	Nitrogen dioxide (NO ²) (ppm)	Oxygen (O ²) (%)	Volatile organic compounds (VOC) (ppm)	Methane (as LEL) (%)	Within Acceptable Limits?
A-01	General Background – West of Site Fence	0	300	0	0	0	0	20.9	0	0	✓
A-02	NW Hotspot – Adjacent Concrete Cap	0	400	0	0	0	0	20.9	0	0	✓
A-03	NW Hotspot – Small Mound	0	400	0	0	0	0	20.9	0	0	✓
A-04	NE Fence Line Adjacent Hotspot	0	400	0	0	0	0	20.9	0	0	✓
A-05	Exclusion Area Fence Line East of Hotspot (Approx. 10m)	0	400	0	0	0	0	20.9	0	0	✓
A-06	Exclusion Area Fence Line Southeast of Hotspot (Approx. 15m)	0	400	0	0	0	0	20.9	0	0	✓
A-07	Exclusion Area Fence Line South of Hotspot (Approx. 30m)	0	400	0	0	0	0	20.9	0	0	✓
A-08	Exclusion Area Fence Line Northwest of Hotspot, adjacent 17 Lackawanna Street (Approx. 50m)	0	300	0	0	0	0	20.9	0	0	✓



Date of Monitoring: Wednesday 3rd January 2018											
Location		Carbon monoxide (CO) (ppm)	Carbon dioxide (CO ²) (ppm)	Sulphur dioxide (SO ²) (ppm)	Hydrogen sulphide (H ² S) (ppm)	Nitric oxide (NO) (ppm)	Nitrogen dioxide (NO ²) (ppm)	Oxygen (O ²) (%)	Volatile organic compounds (VOC) (ppm)	Methane (as LEL) (%)	Within Acceptable Limits?
A-01	<i>General Background – West of Site Fence</i>	0	300	0	0	0	0	20.9	0	0	✓
A-02	<i>NW Hotspot – Adjacent Concrete Cap</i>	0	300	0	0	0	0	20.9	0	0	✓
A-03	<i>NW Hotspot – Small Mound</i>	0	300	0	0	0	0	20.9	0	0	✓
A-04	<i>NE Fence Line Adjacent Hotspot</i>	0	300	0	0	0	0	20.9	0	0	✓
A-05	<i>Exclusion Area Fence Line East of Hotspot (Approx. 10m)</i>	0	300	0	0	0	0	20.9	0	0	✓
A-06	<i>Exclusion Area Fence Line Southeast of Hotspot (Approx. 15m)</i>	0	300	0	0	0	0	20.9	0	0	✓
A-07	<i>Exclusion Area Fence Line South of Hotspot (Approx. 30m)</i>	0	300	0	0	0	0	20.9	0	0	✓
A-08	<i>Exclusion Area Fence Line Northwest of Hotspot, adjacent 17 Lackawanna Street (Approx. 50m)</i>	0	300	0	0	0	0	20.9	0	0	✓



Date of Monitoring: Thursday 4th January 2018											
Location		Carbon monoxide (CO) (ppm)	Carbon dioxide (CO ²) (ppm)	Sulphur dioxide (SO ²) (ppm)	Hydrogen sulphide (H ² S) (ppm)	Nitric oxide (NO) (ppm)	Nitrogen dioxide (NO ²) (ppm)	Oxygen (O ²) (%)	Volatile organic compounds (VOC) (ppm)	Methane (as LEL) (%)	Within Acceptable Limits?
A-01	General Background – West of Site Fence	0	400	0	0	0	0	20.9	0	0	✓
A-02	NW Hotspot – Adjacent Concrete Cap	0	400	0	0	0	0	20.9	0	0	✓
A-03	NW Hotspot – Small Mound	0	400	0	0	0	0	20.9	0	0	✓
A-04	NE Fence Line Adjacent Hotspot	0	400	0	0	0	0	20.9	0	0	✓
A-05	Exclusion Area Fence Line East of Hotspot (Approx. 10m)	0	400	0	0	0	0	20.9	0	0	✓
A-06	Exclusion Area Fence Line Southeast of Hotspot (Approx. 15m)	0	400	0	0	0	0	20.9	0	0	✓
A-07	Exclusion Area Fence Line South of Hotspot (Approx. 30m)	0	400	0	0	0	0	20.9	0	0	✓
A-08	Exclusion Area Fence Line Northwest of Hotspot, adjacent 17 Lackawanna Street (Approx. 50m)	0	400	0	0	0	0	20.9	0	0	✓



<i>Date of Monitoring: Friday 5th January 2018</i>											
Location		Carbon monoxide (CO) (ppm)	Carbon dioxide (CO ²) (ppm)	Sulphur dioxide (SO ²) (ppm)	Hydrogen sulphide (H ² S) (ppm)	Nitric oxide (NO) (ppm)	Nitrogen dioxide (NO ²) (ppm)	Oxygen (O ²) (%)	Volatile organic compounds (VOC) (ppm)	Methane (as LEL) (%)	Within Acceptable Limits?
A-01	<i>General Background – West of Site Fence</i>	0	300	0	0	0	0	20.9	0	0	✓
A-02	<i>NW Hotspot – Adjacent Concrete Cap</i>	0	300	0	0	0	0	20.9	0	0	✓
A-03	<i>NW Hotspot – Small Mound</i>	0	300	0	0	0	0	20.9	0	0	✓
A-04	<i>NE Fence Line Adjacent Hotspot</i>	0	300	0	0	0	0	20.9	0	0	✓
A-05	<i>Exclusion Area Fence Line East of Hotspot (Approx. 10m)</i>	0	300	0	0	0	0	20.9	0	0	✓
A-06	<i>Exclusion Area Fence Line Southeast of Hotspot (Approx. 15m)</i>	0	300	0	0	0	0	20.9	0	0	✓
A-07	<i>Exclusion Area Fence Line South of Hotspot (Approx. 30m)</i>	0	300	0	0	0	0	20.9	0	0	✓
A-08	<i>Exclusion Area Fence Line Northwest of Hotspot, adjacent 17 Lackawanna Street (Approx. 50m)</i>	0	300	0	0	0	0	20.9	0	0	✓



5. DISCUSSION

Based on the air quality monitoring data obtained as part of this monitoring assessment, the inhalation risk to human health as a result of the subsurface hotspot remains low. The reasons for this conclusions are as follows:

- Real time monitoring results did not indicate the presence of gas in elevated concentrations; even at the source (i.e. the subsurface hotspot vent source). Concentrations of gases commonly associated with combustion (e.g. carbon monoxide (CO), carbon dioxide (CO₂), volatile organic compounds, sulphur dioxide (SO₂), hydrogen sulphide (H₂S), methane (CH₄ – LEL), oxygen (O₂), nitric oxide (NO) and nitrogen dioxide (NO₂), were not detected at concentrations that pose a risk to human health in the North-Western Hotspot area, including locations surrounding the hotspot .

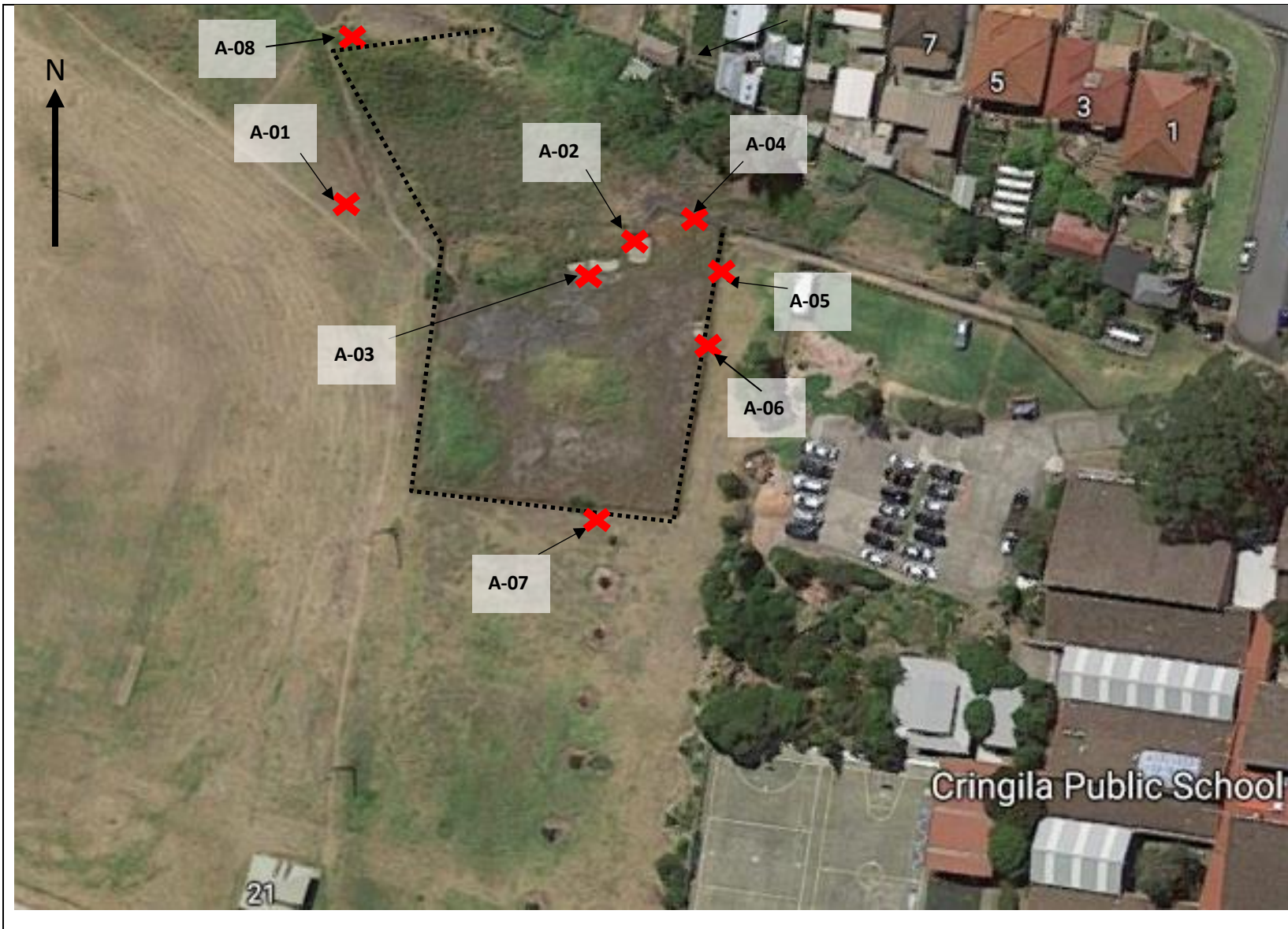
This concludes the interim air monitoring report from the 2nd of January 2018, to the 5th of January 2018. It is recommended that weekly interim assessments are conducted to continually monitor the potential risk to human health whilst further investigation of the site is undertaken.



Air Monitoring Risk Assessment

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

Appendix A: Site Map and Sampling Locations



Legend:	
	Sampling Location
A-00	Sample Location ID
.....	Fence-line

Site	Cringila Public School
Area	Northwest Hotspot
Consultant	Rowan Clark
Date	Friday, 5 January 2018
Job Number	J153825
Report	AMR-06
Version	1.0

Air Monitoring Risk Assessment

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

Appendix B: Calibration Certificates



AES

ACTIVE ENVIRONMENTAL SOLUTIONS

Calibration and Service Report – Gas Monitor

Company: Active Environmental Solutions Hire	Manufacturer: RAE Systems	Serial #: MAA30042QB
Contact: Aleks Todorovic	Instrument: MultiRAE	Asset #: -
Address: Unit 3	Model: PGM 6208	Part #: -
266 Bolton Street	Configuration: PID, LEL, O2, COSH	Sold: -
ELTHAM, VIC 3095	Wireless: -	Last Cal: -
Phone: 03 9431 3500	Network ID: -	Job #: -
Fax: 03 9431 3577	Unit ID: -	Cal Spec: Standard
Email: hire@aesolutions.com.au	Details: -	Order #: -

Item	Test	Pass/Fail	Comments	Part Code	S/W
Battery	Li Ion	✓			
Charger	Charger, Power supply	✓			
	Cradle	✓			
Pump	Flow	✓	>300mL/min		
Filter	Filter, fitting, etc	✓			
Alarms	Audible, visual, vibration	✓			
Display	Operation	✓			
Switches	Operation	✓			
PCB	Operation	✓			
Connectors	Condition	✓			
Firmware	Version	✓	V1.40		
Datalogger	Operation	✓			
Monitor Housing	Condition	✓			
Case	Condition/Type	✓			
Sensors					
Oxygen	O2	✓			
LEL	LEL	✓			
PID	10.6eV	✓			
Toxic 1	COSH	✓			
Toxic 2		-			
Toxic 3		-			
Toxic 4		-			
Toxic 5		-			
Toxic 6		-			
Other		-			

Engineer's Report

Setup and calibration for hire.

Calibration Certificate

Sensor	Type	Serial No:	Span Gas	Concentration	Traceability Lot #	CF	Reading (ppm)	
							Zero	Span
Oxygen	O2	03420684RC	Fresh Air	20.9%	S104965-1		20.9%	
			Oxygen	18.0%				18.0%
LEL	LEL	03110703T9	Methane	2.5% (50% LEL)	S104965-1		0	50%
PID	10.6eV	03A3031QB	Isobutylene	100ppm	WO19052-4		0	100
Toxic 1	COSH	03130012S7	Carbon Monoxide	50ppm	S104965-1		0	50
			Hydrogen Sulfide	10ppm			0	10
Toxic 2								
Toxic 3								
Toxic 4								
Toxic 5								
Toxic 6								
Other								

Calibrated/Repaired by: **W.PAK** Date: **06.11.2017** Next Due: **06.05.2018**

Melbourne	Head Office	2 Merchant Avenue	THOMASTOWN VIC 3074	T: +(613) 9464 2300	F: +(613) 9464 3421
Sydney	514 Lvl2	6-8 Holden Street	ASHFIELD NSW 2131	T: +(612) 9716 5966	F: +(612) 9716 5988
Perth	Unit 6	41 Holder Way	MALAGA WA 6090	T: +(618) 9249 5663	F: +(618) 9249 5362
Brisbane	Unit 17	23 Ashtan Place	BANYO QLD 4014	T: +(617) 3267 1433	F: +(617) 3267 3559

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ACTIVE ENVIRONMENTAL SOLUTIONS

Calibration and Service Report – Gas Monitor

Company: Active Environmental Solutions Hire
Contact: Aleks Todorovic
Address: Unit 3
 266 Bolton Street
 ELTHAM, VIC 3095
Phone: 03 9431 3500
Fax: 03 9431 3577
Email: hire@aesolutions.com.au

Manufacturer: RAE Systems
Instrument: MultiRAE
Model: PGM 6208
Configuration: CO2, NO, NO2, SO2

Serial #: M01C005735
Asset #: -
Part #: -
Sold: -
Last Cal: -
Job #: -
Cal Spec: Standard
Order #: -

Wireless: -
Network ID: -
Unit ID: -
Details: -

Item	Test	Pass/Fail	Comments	Part Code	S/W
Battery	Li Ion	✓			
Charger	Charger, Power supply	✓			
	Cradle	✓			
Pump	Flow	✓	>300mL/min		
Filter	Filter, fitting, etc	✓			
Alarms	Audible, visual, vibration	✓			
Display	Operation	✓			
Switches	Operation	✓			
PCB	Operation	✓			
Connectors	Condition	✓			
Firmware	Version	✓	V1.40		
Datalogger	Operation	✓			
Monitor Housing	Condition	✓			
Case	Condition/Type	✓			
Sensors					
	Oxygen	-			
	LEL	-			
	PID	-			
	Toxic 1 CO2	✓			
	Toxic 2 NO	✓			
	Toxic 3 NO2	✓			
	Toxic 4 SO2	✓			
	Toxic 5	-			
	Toxic 6	-			
	Other	-			
Engineer's Report Setup and calibration for hire.					

Calibration Certificate

Sensor	Type	Serial No:	Span Gas	Concentration	Traceability Lot #	CF	Reading (ppm)	
							Zero	Span
Oxygen								
LEL								
PID								
Toxic 1	CO2	03610036QC	Carbon Dioxide	5000ppm	WO131063-1		0	5000
Toxic 2	NO	03740180Q2	Nitric Oxide	25ppm	WO124693-1		0	25
Toxic 3	NO2	03750052RC	Nitrogen Dioxide	5ppm	WO137782-1		0	5
Toxic 4	SO2	03AF0109T5	Sulfur Dioxide	5ppm	WO123886-2		0	5
Toxic 5								
Toxic 6								
Other								

Calibrated/Repaired by:

W.PAK

Date:

06.11.2017

Next Due:

06.05.2018

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