

## Test Report 610.14661.00000-TR1R0

### 1 CLIENT DETAILS

Organisation:	Cogent Energy Pty Ltd
Company Contact:	Eoghain Maguire
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Telephone Number:	02 9503 5799
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### 2 PROJECT DETAILS & SCOPE OF WORK REQUESTED

Project Number:	610.14661.00000
Project Name:	Annual Emission Testing
Project Manager:	Michael Brecko
Monitoring Date(s):	20-Nov-2014
Production/Operational Conditions:	Normal (greater than 80% load)
Parameters requested:	Molecular weight, dry gas density, nitrogen oxides, moisture, oxygen, temperature, flow, velocity, volatile organic compounds
Sample Locations:	EPA ID Points 1, 2, 3 and 4
Sample Identification Numbers:	Refer to Section 4

Signatory



Michael Brecko

Issue Date: 30 January 2015



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The results of the tests, calibration and/or  
measurements included in this document are  
traceable to Australian/national standards.

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### 3 PROCESS EMISSIONS MONITORING - PARAMETER, SAMPLING AND ANALYSIS METHOD AND ANALYSIS LABORATORY

#### 3.1 Test Methods and Analysis References

All sampling and monitoring was performed by SLR Consulting Australia Pty Ltd (SLR Consulting) unless otherwise specified. The following table outlines for each parameter requested to be tested, the relevant test method for sampling and analysis and the NATA Accredited Laboratory that completed the analysis.

All associated NATA endorsed Test Reports/Certificates of Analysis are provided separately in Appendix A.

##### 3.1.1 Point Source Emissions

Parameter	State	Test Method Number for Sampling and Analysis	NATA Laboratory Analysis By: NATA Accreditation No. & Report No.
Sampling Location	NSW	TM-1, AS4323.1	SLR Consulting Australia Pty Ltd, Accreditation No.3130, Report No. 610.14661.00000-TR1R0
Velocity	NSW	TM-2, USEPA M2A, 2C	SLR Consulting Australia Pty Ltd, Accreditation No.3130, Report No. 610.14661.00000-TR1R0
Duct Temperature	NSW	TM-2, USEPA M2, 2C	SLR Consulting Australia Pty Ltd, Accreditation No.3130, Report No. 610.14661.00000-TR1R0
Volumetric Flow Rate	NSW	TM-2, USEPA M2A, 2C	SLR Consulting Australia Pty Ltd, Accreditation No.3130, Report No. 610.14661.00000-TR1R0
Duct Pressure	NSW	TM-2, USEPA M2, 2C	SLR Consulting Australia Pty Ltd, Accreditation No.3130, Report No. 610.14661.00000-TR1R0
Dry Gas Density	NSW	TM-23, USEPA M3	SLR Consulting Australia Pty Ltd, Accreditation No.3130, Report No. 610.14661.00000-TR1R0
Moisture	NSW	TM-22, USEPA M4	SLR Consulting Australia Pty Ltd, Accreditation No.3130, Report No. 610.14661.00000-TR1R0
Molecular Weight of Stack Gases	NSW	TM-23, USEPA M3	SLR Consulting Australia Pty Ltd, Accreditation No.3130, Report No. 610.14661.00000-TR1R0
Oxygen	NSW	TM-25, USEPA M3A	SLR Consulting Australia Pty Ltd, Accreditation No.3130, Report No. 610.14661.00000-TR1R0
Oxides of Nitrogen	NSW	TM-11, USEPA M7E, 7D	SLR Consulting Australia Pty Ltd, Accreditation No.3130, Report No. 610.14661.00000-TR1R0
Volatile Organic Compounds	NSW	TM-34, USEPA M18	Testsafe Australia, Accreditation No. 3726, Report No. 2014-2705

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### 3.2 Deviations from Test Methods

There were no deviations to the test methods.

### 3.3 Sampling Times

As per the relevant test reference method or State requirement.

### 3.4 Reference Conditions

As per relevant test reference method, State requirement, or Environment Protection Licence or equivalent.

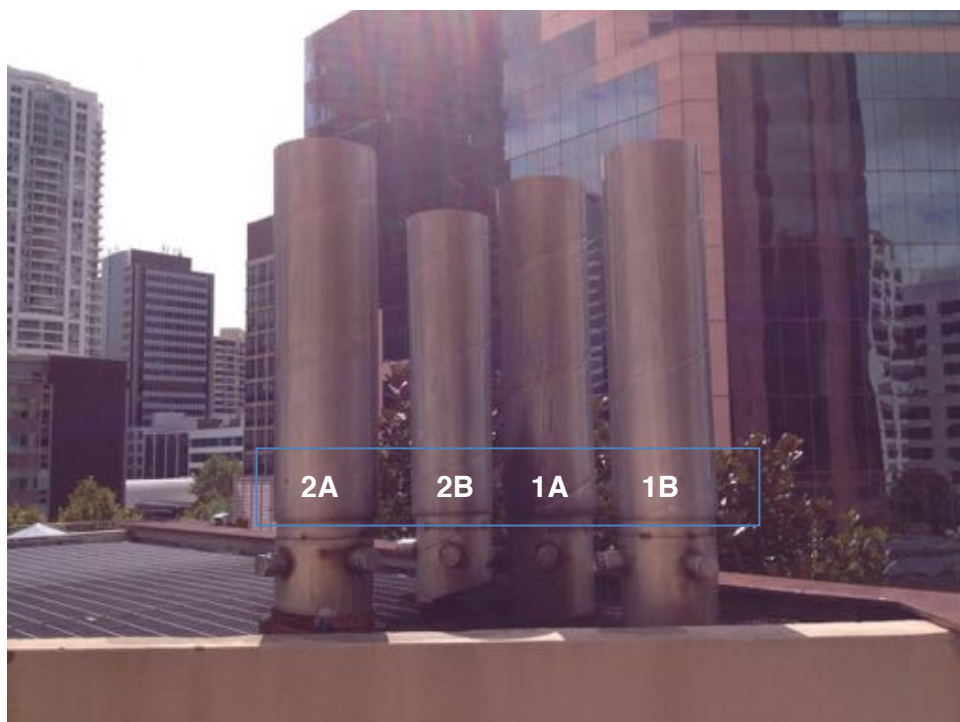
### 3.5 Identification

All samples are individual labelled with reference number, location, sampling date and times.

### 3.6 Sampling Plane Details

Ideal sampling positions: In the absence of cyclonic flow activity ideal sampling plane conditions will be found to exit at 7-8 diameters downstream and 2-3 diameters upstream from a flow disturbance. However, in most cases, a suitable sampling plane will be a position fitting the minimum criteria specified in Table 1 of AS4323.1.

Non Ideal sampling position: If the measurement near a bend is unavoidable, the sampling position shall be greater than one duct diameter upstream of the bend or greater than two duct diameters downstream of the bend. When the criteria in Table 1 of AS4323.1 cannot be met, a greater number of sampling points shall be used in order to retain as much accuracy as is practicable.



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Parameter	EPA ID Point 1 (Stack 1A)	EPA ID Point 3 (Stack 1B)	EPA ID Point 2 (Stack 2A)	EPA ID Point 4 (Stack 2B)
Co-ordinates	UTM 56H 334106.34m E 6254199.32m S	UTM 56H 334106.34m E 6254199.32m S	UTM 56H 334106.34m E 6254199.32m S	UTM 56H 334106.34m E 6254199.32m S
Elevation (ASL) (m)	130m	130m	130m	130m
Duct Diameter (m)	0.300	0.300	0.300	0.300
<b>Upstream Requirements</b>				
Type of Disturbance	Exhaust Exit	Exhaust Exit	Exhaust Exit	Exhaust Exit
Distance to Disturbance (m)	1.33	1.33	1.33	1.33
No. of Duct Diameters	4.4D	4.4D	4.4D	4.4D
Ideal Minimum Distance Criteria	2D	2D	2D	2D
Diameters less than Ideal Criteria	0	0	0	0
Sampling Factor	1.00	1.00	1.00	1.00
<b>Downstream Requirements</b>				
Type of Disturbance	Bend (Fan)	Bend (Fan)	Bend (Fan)	Bend (Fan)
Distance to Disturbance (m)	4.30	4.30	4.30	4.30
No. of Duct Diameters	14D	14D	14D	14D
Ideal Minimum Distance Criteria	8D	8D	8D	8D
Diameters less than Ideal Criteria	0	0	0	0
Sampling Factor	1.00	1.00	1.00	1.00
<b>Number of sampling points for manual isokinetic sampling</b>				
Minimum No. of Sampling Traverses	2	2	2	2
Minimum No. of Access Holes	2	2	2	2
Minimum No. of Sampling Points	4	4	4	4
Combined Sampling Factor	1.00	1.00	1.00	1.00
Total No. of Sampling Points required	4	4	4	4
Comments	SLR adopted a total of 12 sampling points to improve the accuracy of the measurement.	SLR adopted a total of 12 sampling points to improve the accuracy of the measurement.	SLR adopted a total of 12 sampling points to improve the accuracy of the measurement.	SLR adopted a total of 12 sampling points to improve the accuracy of the measurement.

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### 3.7 Results

Results are presented at actual conditions unless otherwise stated. All volumes and concentrations are reported as dry at temperature of 0°C and at absolute pressure of 101.3 kPa unless otherwise stated. Where measured values have been corrected to reference conditions (i.e. 'normalised' or 'standardised') the measured values are reported prefixed with an "N" (e.g. Nm<sup>3</sup>).

Parameter	Unit	Reporting Conditions	Average Measured Value			
			EPA ID Point 1 (Stack 1A)	EPA ID Point 3 (Stack 1B)	EPA ID Point 2 (Stack 2A)	EPA ID Point 4 (Stack 2B)
Location	--	--				
Date Tested	--	--	20-Nov-14	20-Nov-14	20-Nov-14	20-Nov-14
Sampling start times	hours	AESTD	9:09	9:08	10:50	10:50
Sampling finish times	hours	AESTD	10:09	10:08	11:00	11:50
Duct diameter	m	actual	0.30	0.30	0.30	0.30
Cross sectional area	m <sup>2</sup>	actual	0.071	0.071	0.071	0.071
Temperature	°C	actual	355	348	356	349
Velocity	m/s	actual	28.9	26.0	32.4	26.9
Volumetric Flow	m <sup>3</sup> /s	actual	2.04	1.84	2.29	1.90
Volumetric Flow	Nm <sup>3</sup> /s	101.3kPa, 0°C, dry	0.77	0.72	0.63	0.77
Atmospheric Pressure	kPa	actual	100.6	100.6	100.6	100.6
Absolute Stack Pressure	kPa	actual	100.4	100.4	100.3	100.4
Molecular Weight Dry Stack Gas	g/g mole	actual, dry	29.4	29.2	29.4	29.1
Gas Density	kg/m <sup>3</sup>	actual, dry	1.3	1.3	1.3	1.3
Moisture	% by vol.	actual	12.1	10.3	35.9	7.2
Oxygen	%	actual, dry	10.1	11.5	9.8	10.1
Carbon Dioxide	%	actual, dry	6.2	4.6	6.5	4.6
Carbon Monoxide	mg/m <sup>3</sup>	actual, dry	584	456	624	499
Nitrogen Oxides (as NO <sub>2</sub> )	mg/m <sup>3</sup>	actual, dry, corrected to 5% O <sub>2</sub>	222	248	210	240
Volatile Organic Compounds (as n-propane equivalent)	mg/m <sup>3</sup>	actual, dry, corrected to 5% O <sub>2</sub>	< 0.24	< 0.29	< 0.23	< 0.25

EPA ID Point 1, 2, 3 and 4 Nitrogen Oxide (as NO<sub>2</sub>) 100 percentile concentration limit is 250 mg/m<sup>3</sup> at 5% O<sub>2</sub>.

EPA ID Point 1, 2, 3 and 4 Volatile organic compounds 100 percentile concentration limit is 40 mg/m<sup>3</sup> at stack O<sub>2</sub>.

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Key:

°C	=	degrees Celsius
<	=	less than
%	=	percentage
AESTD	=	Australian Eastern Standard Time Daylight Savings
EPA ID	=	Environment Protection Agency Identification
kg/m <sup>3</sup>	=	kilograms per cubic metre of air
kPa	=	kilopascals
g/g mole	=	grams per gram mole
m <sup>3</sup> /s	=	cubic metre of air per second
m	=	metres
m <sup>2</sup>	=	metres square
m/s	=	metres per second
mg/m <sup>3</sup>	=	milligrams per cubic metre of air
NO <sub>2</sub>	=	Nitrogen dioxide
O <sub>2</sub>	=	oxygen
ppm	=	parts per million

### 3.8 Instrument Calibration Details

Asset No.	Instrument Description	Date Last Calibrated	Calibration Due Date
2004	VOC Sampling Pump	05/05/2014	05/05/2015
2006	VOC Sampling Pump	05/05/2014	05/05/2015
1789	Digital Barometer	09/04/2014	09/04/2015
2060	Field Balance	On use within ±2g of Field Mass	On use within ±2g of Field Mass – Satisfactory for use
1793	Field Mass (100g)	26/03/2013	26/03/2016
1830	Gas Analyser	08/07/2013	08/01/2014
2100	Gas Analyser	25/05/2014	25/11/2014
1800	Gas Meter	27/05/2014	27/05/2015
1807	Manometer (Digital)	23/04/2014	23/04/2015
1832	Pitot Tube	28/06/2013	Visual inspection for damage, defects or blockages on use – Satisfactory for use
1836	Thermocouple	15/09/2014	15/03/2015
1805	Thermometer (Digital)	15/09/2014	15/03/2015
1828	Timepiece	30/09/2014	30/12/2014
1802	Volumetric Air Flow Calibrator	01/09/2014	01/09/2015

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### 3.9 Calibration Gases Information

Special Gas Mixtures	Certified Concentration	Cylinder No.	Expiry Date
NO NO <sub>x</sub>	2,000 ppm 2,020 ppm	ALSY0579	06/02/2018
CO	980 ppm	ALTU2297	14/01/2018
O <sub>2</sub>	10.1%	ALTV2608	14/05/2019
CO <sub>2</sub>	9.8%	ALTV2608	14/05/2019

### 3.10 Measurement Uncertainty

Parameter	Associated Test Method	Uncertainty
Velocity	TM-2, AS 4323.1, USEPA M2A, 2C	± 5%
Temperature	TM-2, USEPA M2C	±2°C
Moisture	TM-22, USEPA M4	± 25%
Oxygen	TM-25, USEPA M3	± 15%
Carbon monoxide	TM-32, USEPA M10	± 15%
Carbon dioxide	TM-24, USEPA M3	± 15%
Nitrogen oxides	TM-11, USEPA 7E	± 15%
Volatile Organic Compounds (adsorption tube)	TM-34, USEPA M18	± 25%

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### 4 CERTIFICATES OF ANALYSIS



Lab. Reference: 2014-2705

M Brecko  
SLR Consulting Australia Pty Ltd  
Level 2  
2 Lincoln Street  
LANE COVE NSW 2066

**SAMPLE ORIGIN:** Project no: 610.14661.00000

**DATE OF INVESTIGATION:** 20/11/14

**DATE RECEIVED:** 21/11/14

**ANALYSIS REQUIRED:** Volatile Organic Compounds


**AMENDED REPORT**

*Samples Analysed as Received*

This report has been amended to correct the Project Number

The results of this report have been approved by the NATA signatory whose signature appears below

For all administrative or account enquiries please contact Jeanine Wells.



Martin Mazereeuw

Manager

Date: 27/01/15

**WorkCover NSW Chemical Analysis Branch**

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WorkCover Assistance Service: 13 10 50 W: [www.workcover.nsw.gov.au](http://www.workcover.nsw.gov.au)

**Analysis of Volatile Organic Compounds in Workplace Air by GC/MS**  
**Amended Report**

Client : M.Brecko

Sample ID : 3614

Sample : 2014-2705-1

No	Compounds	CAS No	Front	Back	No	Compounds	CAS No	Front	Back
			µg/section					µg/section	
<b>Aliphatic hydrocarbons (LOD = 5µg/compound/section)</b>					<b>Aromatic hydrocarbons (LOD = 1µg/compound/section)</b>				
1	2-Methylbutane	78-78-4	ND	ND	39	Benzene	71-43-2	ND	ND
2	n-Pentane	109-66-0	ND	ND	40	Ethylbenzene	100-41-4	ND	ND
3	2-Methylpentane	107-83-5	ND	ND	41	Isopropylbenzene	98-82-8	ND	ND
4	3-Methylpentane	96-14-0	ND	ND	42	1,2,3-Trimethylbenzene	526-73-8	ND	ND
5	Cyclopentane	287-92-3	ND	ND	43	1,2,4-Trimethylbenzene	95-63-6	ND	ND
6	Methylcyclopentane	96-37-7	ND	ND	44	1,3,5-Trimethylbenzene	108-67-8	ND	ND
7	2,3-Dimethylpentane	565-59-3	ND	ND	45	Styrene	100-42-5	ND	ND
8	n-Hexane	110-54-3	ND	ND	46	Toluene	108-88-3	ND	ND
9	3-Methylhexane	589-34-4	ND	ND	47	p-Xylene &/or m-Xylene	<sup>106-42-3 &amp; 108-38-3</sup>	ND	ND
10	Cyclohexane	110-8-27	ND	ND	48	o-Xylene	95-47-6	ND	ND
11	Methylcyclohexane	108-87-2	ND	ND	<b>Ketones (LOD #49, #54 &amp; #55 = 5µg/e/s; #50, #51, #52 &amp; #53 = 25µg/e/s)</b>				
12	2,2,4-Trimethylpentane	540-84-1	ND	ND	49	Acetone	67-64-1	ND	ND
13	n-Heptane	142-82-5	ND	ND	50	Acetoin	513-86-0	ND	ND
14	n-Octane	111-65-9	ND	ND	51	Diacetone alcohol	123-42-2	ND	ND
15	n-Nonane	111-84-2	ND	ND	52	Cyclohexanone	108-94-1	ND	ND
16	n-Decane	124-18-5	ND	ND	53	Isophorone	78-59-1	ND	ND
17	n-Undecane	1120-21-4	ND	ND	54	Methyl ethyl ketone (MEK)	78-93-3	ND	ND
18	n-Dodecane	112-40-3	ND	ND	55	Methyl isobutyl ketone (MIBK)	108-10-1	ND	ND
19	n-Tridecane	629-50-5	ND	ND	<b>Alcohols (LOD = 25µg/compound/section)</b>				
20	n-Tetradecane	629-59-4	ND	ND	56	Ethyl alcohol	64-17-5	ND	ND
21	α-Pinene	80-56-8	ND	ND	57	n-Butyl alcohol	71-36-3	ND	ND
22	β-Pinene	127-91-3	ND	ND	58	Isobutyl alcohol	78-83-1	ND	ND
23	D-Limonene	138-86-3	ND	ND	59	Isopropyl alcohol	67-63-0	ND	ND
<b>Chlorinated hydrocarbons (LOD = 5µg/compound/section)</b>					60	2-Ethyl hexanol	104-76-7	ND	ND
24	Dichloromethane	75-09-2	ND	ND	61	Cyclohexanol	108-93-0	ND	ND
25	1,1-Dichloroethane	75-34-3	ND	ND	<b>Acetates (LOD = 25µg/compound/section)</b>				
26	1,2-Dichloroethane	107-06-2	ND	ND	62	Ethyl acetate	141-78-6	ND	ND
27	Chloroform	67-66-3	ND	ND	63	n-Propyl acetate	109-60-4	ND	ND
28	1,1,1-Trichloroethane	71-55-6	ND	ND	64	n-Butyl acetate	123-86-4	ND	ND
29	1,1,2-Trichloroethane	79-00-5	ND	ND	65	Isobutyl acetate	110-19-0	ND	ND
30	Trichloroethylene	79-01-6	ND	ND	<b>Ethers (LOD = 25µg/compound/section)</b>				
31	Carbon tetrachloride	56-23-5	ND	ND	66	Ethyl ether	60-29-7	ND	ND
32	Perchloroethylene	127-18-4	ND	ND	67	tert-Butyl methyl ether (MTBE)	1634-04-4	ND	ND
33	1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	68	Tetrahydrofuran (THF)	109-99-9	ND	ND
34	Chlorobenzene	108-90-7	ND	ND	<b>Glycols (LOD = 25µg/compound/section)</b>				
35	1,2-Dichlorobenzene	95-50-1	ND	ND	69	PGME	107-98-2	ND	ND
36	1,4-Dichlorobenzene	106-46-7	ND	ND	70	Ethylene glycol diethyl ether	629-14-1	ND	ND
<b>Miscellaneous (LOD #37= 5µg &amp; #38=25µg/compound/section)</b>					71	PGMEA	108-65-6	ND	ND
37	Acetonitrile	75-05-8	ND	ND	72	Cellosolve acetate	111-15-9	ND	ND
38	n-Vinyl-2-pyrrolidinone	88-12-0	ND	ND	73	DGMEA	112-15-2	ND	ND
<b>Total VOCs (LOD = 50µg/compound/section)</b>			ND	ND	Worksheet check			yes	yes

**Analysis of Volatile Organic Compounds in Workplace Air by GC/MS**  
**Amended Report**

Client : M.Brecko

Sample ID : 3615

Sample : 2014-2705-2

No	Compounds	CAS No	Front	Back	No	Compounds	CAS No	Front	Back
			µg/section					µg/section	
<b>Aliphatic hydrocarbons (LOD = 5µg/compound/section)</b>					<b>Aromatic hydrocarbons (LOD = 1µg/compound/section)</b>				
1	2-Methylbutane	78-78-4	ND	ND	39	Benzene	71-43-2	ND	ND
2	n-Pentane	109-66-0	ND	ND	40	Ethylbenzene	100-41-4	ND	ND
3	2-Methylpentane	107-83-5	ND	ND	41	Isopropylbenzene	98-82-8	ND	ND
4	3-Methylpentane	96-14-0	ND	ND	42	1,2,3-Trimethylbenzene	526-73-8	ND	ND
5	Cyclopentane	287-92-3	ND	ND	43	1,2,4-Trimethylbenzene	95-63-6	ND	ND
6	Methylcyclopentane	96-37-7	ND	ND	44	1,3,5-Trimethylbenzene	108-67-8	ND	ND
7	2,3-Dimethylpentane	565-59-3	ND	ND	45	Styrene	100-42-5	ND	ND
8	n-Hexane	110-54-3	ND	ND	46	Toluene	108-88-3	ND	ND
9	3-Methylhexane	589-34-4	ND	ND	47	p-Xylene &/or m-Xylene	106-42-3 & 108-38-3	ND	ND
10	Cyclohexane	110-8-27	ND	ND	48	o-Xylene	95-47-6	ND	ND
11	Methylcyclohexane	108-87-2	ND	ND	<b>Ketones (LOD #49, #54 &amp; #55 = 5µg/c/s; #50, #51, #52 &amp; #53 = 25µg/c/s)</b>				
12	2,2,4-Trimethylpentane	540-84-1	ND	ND	49	Acetone	67-64-1	ND	ND
13	n-Heptane	142-82-5	ND	ND	50	Acetoin	513-86-0	ND	ND
14	n-Octane	111-65-9	ND	ND	51	Diacetone alcohol	123-42-2	ND	ND
15	n-Nonane	111-84-2	ND	ND	52	Cyclohexanone	108-94-1	ND	ND
16	n-Decane	124-18-5	ND	ND	53	Isophorone	78-59-1	ND	ND
17	n-Undecane	1120-21-4	ND	ND	54	Methyl ethyl ketone (MEK)	78-93-3	ND	ND
18	n-Dodecane	112-40-3	ND	ND	55	Methyl isobutyl ketone (MIBK)	108-10-1	ND	ND
19	n-Tridecane	629-50-5	ND	ND	<b>Alcohols (LOD = 2µg/compound/section)</b>				
20	n-Tetradecane	629-59-4	ND	ND	56	Ethyl alcohol	64-17-5	ND	ND
21	α-Pinene	80-56-8	ND	ND	57	n-Butyl alcohol	71-36-3	ND	ND
22	β-Pinene	127-91-3	ND	ND	58	Isobutyl alcohol	78-83-1	ND	ND
23	D-Limonene	138-86-3	ND	ND	59	Isopropyl alcohol	67-63-0	ND	ND
<b>Chlorinated hydrocarbons (LOD = 2µg/compound/section)</b>					60	2-Ethyl hexanol	104-76-7	ND	ND
24	Dichloromethane	75-09-2	ND	ND	61	Cyclohexanol	108-93-0	ND	ND
25	1,1-Dichloroethane	75-34-3	ND	ND	<b>Acetates (LOD = 2µg/compound/section)</b>				
26	1,2-Dichloroethane	107-06-2	ND	ND	62	Ethyl acetate	141-78-6	ND	ND
27	Chloroform	67-66-3	ND	ND	63	n-Propyl acetate	109-60-4	ND	ND
28	1,1,1-Trichloroethane	71-55-6	ND	ND	64	n-Butyl acetate	123-86-4	ND	ND
29	1,1,2-Trichloroethane	79-00-5	ND	ND	65	Isobutyl acetate	110-19-0	ND	ND
30	Trichloroethylene	79-01-6	ND	ND	<b>Ethers (LOD = 2µg/compound/section)</b>				
31	Carbon tetrachloride	56-23-5	ND	ND	66	Ethyl ether	60-29-7	ND	ND
32	Perchloroethylene	127-18-4	ND	ND	67	tert-Butyl methyl ether (MTBE)	1634-04-4	ND	ND
33	1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	68	Tetrahydrofuran (THF)	109-99-9	ND	ND
34	Chlorobenzene	108-90-7	ND	ND	<b>Glycols (LOD = 25µg/compound/section)</b>				
35	1,2-Dichlorobenzene	95-50-1	ND	ND	69	PGME	107-98-2	ND	ND
36	1,4-Dichlorobenzene	106-46-7	ND	ND	70	Ethylene glycol diethyl ether	629-14-1	ND	ND
<b>Miscellaneous (LOD #37= 5µg &amp; #38=25µg/compound/section)</b>					71	PGMEA	108-65-6	ND	ND
37	Acetonitrile	75-05-8	ND	ND	72	Cellosolve acetate	111-15-9	ND	ND
38	n-Vinyl-2-pyrrolidinone	88-12-0	ND	ND	73	DGMEA	112-15-2	ND	ND
<b>Total VOCs (LOD = 50µg/compound/section)</b>			ND	ND	Worksheet check			yes	yes

**Analysis of Volatile Organic Compounds in Workplace Air by GC/MS**  
**Amended Report**

Client : M.Brecko

Sample ID : 3616

Sample : 2014-2705-3

No	Compounds	CAS No	Front	Back	No	Compounds	CAS No	Front	Back
			µg/section					µg/section	
<b>Aliphatic hydrocarbons (LOD = 5µg/compound/section)</b>					<b>Aromatic hydrocarbons (LOD = 1µg/compound/section)</b>				
1	2-Methylbutane	78-78-4	ND	ND	39	Benzene	71-43-2	ND	ND
2	n-Pentane	109-66-0	ND	ND	40	Ethylbenzene	100-41-4	ND	ND
3	2-Methylpentane	107-83-5	ND	ND	41	Isopropylbenzene	98-82-8	ND	ND
4	3-Methylpentane	96-14-0	ND	ND	42	1,2,3-Trimethylbenzene	526-73-8	ND	ND
5	Cyclopentane	287-92-3	ND	ND	43	1,2,4-Trimethylbenzene	95-63-6	ND	ND
6	Methylcyclopentane	96-37-7	ND	ND	44	1,3,5-Trimethylbenzene	108-67-8	ND	ND
7	2,3-Dimethylpentane	565-59-3	ND	ND	45	Styrene	100-42-5	ND	ND
8	n-Hexane	110-54-3	ND	ND	46	Toluene	108-88-3	ND	ND
9	3-Methylhexane	589-34-4	ND	ND	47	p-Xylene &/or m-Xylene	106-42-3 & 108-38-3	ND	ND
10	Cyclohexane	110-8-27	ND	ND	48	o-Xylene	95-47-6	ND	ND
11	Methylcyclohexane	108-87-2	ND	ND	<b>Ketones (LOD #49, #54 &amp; #55 = 5µg/c/s; #50, #51, #52 &amp; #53 = 25µg/c/s)</b>				
12	2,2,4-Trimethylpentane	540-84-1	ND	ND	49	Acetone	67-64-1	ND	ND
13	n-Heptane	142-82-5	ND	ND	50	Acetoin	513-86-0	ND	ND
14	n-Octane	111-65-9	ND	ND	51	Diacetone alcohol	123-42-2	ND	ND
15	n-Nonane	111-84-2	ND	ND	52	Cyclohexanone	108-94-1	ND	ND
16	n-Decane	124-18-5	ND	ND	53	Isophorone	78-59-1	ND	ND
17	n-Undecane	1120-21-4	ND	ND	54	Methyl ethyl ketone (MEK)	78-93-3	ND	ND
18	n-Dodecane	112-40-3	ND	ND	55	Methyl isobutyl ketone (MIBK)	108-10-1	ND	ND
19	n-Tridecane	629-50-5	ND	ND	<b>Alcohols (LOD = 2µg/compound/section)</b>				
20	n-Tetradecane	629-59-4	ND	ND	56	Ethyl alcohol	64-17-5	ND	ND
21	α-Pinene	80-56-8	ND	ND	57	n-Butyl alcohol	71-36-3	ND	ND
22	β-Pinene	127-91-3	ND	ND	58	Isobutyl alcohol	78-83-1	ND	ND
23	D-Limonene	138-86-3	ND	ND	59	Isopropyl alcohol	67-63-0	ND	ND
<b>Chlorinated hydrocarbons (LOD = 5µg/compound/section)</b>					60	2-Ethyl hexanol	104-76-7	ND	ND
24	Dichloromethane	75-09-2	ND	ND	61	Cyclohexanol	108-93-0	ND	ND
25	1,1-Dichloroethane	75-34-3	ND	ND	<b>Acetates (LOD = 25µg/compound/section)</b>				
26	1,2-Dichloroethane	107-06-2	ND	ND	62	Ethyl acetate	141-78-6	ND	ND
27	Chloroform	67-66-3	ND	ND	63	n-Propyl acetate	109-60-4	ND	ND
28	1,1,1-Trichloroethane	71-55-6	ND	ND	64	n-Butyl acetate	123-86-4	ND	ND
29	1,1,2-Trichloroethane	79-00-5	ND	ND	65	Isobutyl acetate	110-19-0	ND	ND
30	Trichloroethylene	79-01-6	ND	ND	<b>Ethers (LOD = 2µg/compound/section)</b>				
31	Carbon tetrachloride	56-23-5	ND	ND	66	Ethyl ether	60-29-7	ND	ND
32	Perchloroethylene	127-18-4	ND	ND	67	tert-Butyl methyl ether (MTBE)	1634-04-4	ND	ND
33	1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	68	Tetrahydrofuran (THF)	109-99-9	ND	ND
34	Chlorobenzene	108-90-7	ND	ND	<b>Glycols (LOD = 2µg/compound/section)</b>				
35	1,2-Dichlorobenzene	95-50-1	ND	ND	69	PGME	107-98-2	ND	ND
36	1,4-Dichlorobenzene	106-46-7	ND	ND	70	Ethylene glycol diethyl ether	629-14-1	ND	ND
<b>Miscellaneous (LOD #37= 5µg &amp; #38= 2µg/compound/section)</b>					71	PGMEA	108-65-6	ND	ND
37	Acetonitrile	75-05-8	ND	ND	72	Cellosolve acetate	111-15-9	ND	ND
38	n-Vinyl-2-pyrrolidinone	88-12-0	ND	ND	73	DGMEA	112-15-2	ND	ND
<b>Total VOCs (LOD = 50µg/compound/section)</b>			ND	ND	Worksheet check			yes	yes

**Analysis of Volatile Organic Compounds in Workplace Air by GC/MS**  
**Amended Report**

Client : M.Brecko  
Sample ID : 3617

Sample : 2014-2705-4

No	Compounds	CAS No	Front	Back	No	Compounds	CAS No	Front	Back
			µg/section					µg/section	
<b>Aliphatic hydrocarbons (LOD = 5µg/compound/section)</b>					<b>Aromatic hydrocarbons (LOD = 1µg/compound/section)</b>				
1	2-Methylbutane	78-78-4	ND	ND	39	Benzene	71-43-2	ND	ND
2	n-Pentane	109-66-0	ND	ND	40	Ethylbenzene	100-41-4	ND	ND
3	2-Methylpentane	107-83-5	ND	ND	41	Isopropylbenzene	98-82-8	ND	ND
4	3-Methylpentane	96-14-0	ND	ND	42	1,2,3-Trimethylbenzene	526-73-8	ND	ND
5	Cyclopentane	287-92-3	ND	ND	43	1,2,4-Trimethylbenzene	95-63-6	ND	ND
6	Methylcyclopentane	96-37-7	ND	ND	44	1,3,5-Trimethylbenzene	108-67-8	ND	ND
7	2,3-Dimethylpentane	565-59-3	ND	ND	45	Styrene	100-42-5	ND	ND
8	n-Hexane	110-54-3	ND	ND	46	Toluene	108-88-3	ND	ND
9	3-Methylhexane	589-34-4	ND	ND	47	p-Xylene &/or m-Xylene	108-38-3 <sup>a</sup>	ND	ND
10	Cyclohexane	110-8-27	ND	ND	48	o-Xylene	95-47-6	ND	ND
11	Methylcyclohexane	108-87-2	ND	ND	<b>Ketones (LOD #49, #54 &amp; #55 = 5µg/c/s; #50, #51, #52 &amp; #53 = 25µg/c/s)</b>				
12	2,2,4-Trimethylpentane	540-84-1	ND	ND	49	Acetone	67-64-1	ND	ND
13	n-Heptane	142-82-5	ND	ND	50	Acetoin	513-86-0	ND	ND
14	n-Octane	111-65-9	ND	ND	51	Diacetone alcohol	123-42-2	ND	ND
15	n-Nonane	111-84-2	ND	ND	52	Cyclohexanone	108-94-1	ND	ND
16	n-Decane	124-18-5	ND	ND	53	Isophorone	78-59-1	ND	ND
17	n-Undecane	1120-21-4	ND	ND	54	Methyl ethyl ketone (MEK)	78-93-3	ND	ND
18	n-Dodecane	112-40-3	ND	ND	55	Methyl isobutyl ketone (MIBK)	108-10-1	ND	ND
19	n-Tridecane	629-50-5	ND	ND	<b>Alcohols (LOD = 1µg/compound/section)</b>				
20	n-Tetradecane	629-59-4	ND	ND	56	Ethyl alcohol	64-17-5	ND	ND
21	α-Pinene	80-56-8	ND	ND	57	n-Butyl alcohol	71-36-3	ND	ND
22	β-Pinene	127-91-3	ND	ND	58	Isobutyl alcohol	78-83-1	ND	ND
23	D-Limonene	138-86-3	ND	ND	59	Isopropyl alcohol	67-63-0	ND	ND
<b>Chlorinated hydrocarbons (LOD = 5µg/compound/section)</b>					60	2-Ethyl hexanol	104-76-7	ND	ND
24	Dichloromethane	75-09-2	ND	ND	61	Cyclohexanol	108-93-0	ND	ND
25	1,1-Dichloroethane	75-34-3	ND	ND	<b>Acetates (LOD = 1µg/compound/section)</b>				
26	1,2-Dichloroethane	107-06-2	ND	ND	62	Ethyl acetate	141-78-6	ND	ND
27	Chloroform	67-66-3	ND	ND	63	n-Propyl acetate	109-60-4	ND	ND
28	1,1,1-Trichloroethane	71-55-6	ND	ND	64	n-Butyl acetate	123-86-4	ND	ND
29	1,1,2-Trichloroethane	79-00-5	ND	ND	65	Isobutyl acetate	110-19-0	ND	ND
30	Trichloroethylene	79-01-6	ND	ND	<b>Ethers (LOD = 2µg/compound/section)</b>				
31	Carbon tetrachloride	56-23-5	ND	ND	66	Ethyl ether	60-29-7	ND	ND
32	Perchloroethylene	127-18-4	ND	ND	67	tert-Butyl methyl ether (MTBE)	1634-04-4	ND	ND
33	1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	68	Tetrahydrofuran (THF)	109-99-9	ND	ND
34	Chlorobenzene	108-90-7	ND	ND	<b>Glycols (LOD = 1µg/compound/section)</b>				
35	1,2-Dichlorobenzene	95-50-1	ND	ND	69	PGME	107-98-2	ND	ND
36	1,4-Dichlorobenzene	106-46-7	ND	ND	70	Ethylene glycol diethyl ether	629-14-1	ND	ND
<b>Miscellaneous (LOD #37= 5µg &amp; #38=25µg/compound/section)</b>					71	PGMEA	108-65-6	ND	ND
37	Acetonitrile	75-05-8	ND	ND	72	Cellosolve acetate	111-15-9	ND	ND
38	n-Vinyl-2-pyrrolidinone	88-12-0	ND	ND	73	DGMEA	112-15-2	ND	ND
<b>Total VOCs (LOD = 5µg/compound/section)</b>			ND	ND	Worksheet check			yes	yes

***Analysis of Volatile Organic Compounds in Workplace Air by GC/MS***

***Amended Report***

Client : M.Brecko

SLR Consulting Australia Pty Ltd

ND = Not Detected

VOCs = Volatile Organic Compounds

Method : Analysis of Volatile Organic Compounds in Workplace Air by Gas Chromatography/Mass Spectrometry

Method Number : WCA.207

Detection Limit : 5µg/section; 25µg/section for oxygenated hydrocarbons except acetone, MEK and MIBK at 5µg/section and aromatic hydrocarbon at 1µg/section.

Brief Description : Volatile organic compounds are trapped from the workplace air onto charcoal tubes by the use of a personal air monitoring pump. The volatile organic compounds are then desorbed from the charcoal in the laboratory with CS<sub>2</sub>. An aliquot of the desorbant is analysed by capillary gas chromatography with mass spectrometry detection.

The Total Volatile Organic Compounds (TVOC) test result in µg/section is calculated by combining the determined values of the 73 compounds with other VOCs that have been identified by mass spectrometry in the sample. These extra VOCs were individually estimated by the response of the nearest internal standard to that compound. Therefore, the TVOC test result should be interpreted as a semi-quantitative guide to the amount of VOCs present. If the TVOC test result is greater than the addition of all the compounds quantified then this can indicate that there are additional compounds present other than the 73 quantified compounds reported.

PGME : Propylene Glycol Monomethyl Ether

PGMEA : Propylene Glycol Monomethyl Ether Acetate

DGMEA : Diethylene Glycol Monoethyl Ether Acetate

**Measurement Uncertainty**

The measurement uncertainty is an estimate that characterises the range of values within which the true value is asserted to lie. The uncertainty estimate is an expanded uncertainty using a coverage factor of 2, which gives a level of confidence of approximately 95%. The estimate is compliant with the "ISO Guide to the Expression of Uncertainty in Measurement" and is a full estimate based on in-house method validation and quality control data.

**Quality Assurance**

In order to ensure the highest degree of accuracy and precision in our analytical results, we undertake extensive intra- and inter-laboratory quality assurance (QA) activities. Within our own laboratory, we analyse laboratory and field blanks and perform duplicate and repeat analysis of samples. Spiked QA samples are also included routinely in each run to ensure the accuracy of the analyses. WorkCover Laboratory Services has participated for many years in several national and international inter-laboratory comparison programs listed below:-

- Workplace Analysis Scheme for Proficiency (WASP) conducted by the Health & Safety Executive UK;
- Quality Management in Occupational and Environmental Medicine QA Program, conducted by the Institute for Occupational, Social and Environmental Medicine, University of Erlangen – Nuremberg, Germany;
- Quality Control Technologies QA Program, Australia;
- Royal College of Pathologists QA Program, Australia.