



Stephenson

Environmental Management Australia

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EMISSION TEST REPORT (ETR) No. 5870

PROOF OF PERFORMANCE EMISSION SURVEY – ROUND 2

THE COMFORT GROUP - DUNLOP FOAMS

WETHERILL PARK, NSW

PROJECT NO.: **5870/S24864/17**

DATE OF SURVEY: **25 SEPTEMBER 2017**

DATE OF ISSUE: **16 OCTOBER 2017**



NATA accredited laboratory number 15043.

Accredited for Compliance with ISO/IEC 17025.

1 EMISSION TEST REPORT NO. 5870

The sampling and analysis was commissioned by:

Client	Organisation:	The Comfort Group - Dunlop Foams
	Contact:	Mick Meehan
	Site Address:	32-36 Frank Street, Wetherill Park, NSW 2164
	Telephone:	02 8784 9903
	Email:	Mick.Meehan@dunlopfoams.com.au
	Project Number:	5870/S24864/17
	Test Date(s):	25 September 2017
	Production Conditions:	Normal operating conditions during testing. Production details are available upon request to Dunlop Foams.
	Analysis Requested:	Flow, velocity, pressure, temperature, moisture, gas density, toluene di-isocyanate, dichloromethane and volatile organic compounds
	Sample Locations:	EPA ID No.1 Scrubber stack serving the Pouring line; and EPA ID No.2 Scrubber stack serving Hot Block Store
	Sample ID Nos.:	Refer to Attachment A
	Identification	The samples are labelled individually. Each label recorded the testing laboratory, sample number, sampling location (or Identification) sampling date and time and whether further analysis is required.

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NATA accredited laboratory number 15043.

Accredited for Compliance with ISO/IEC 17025.

<i>Test</i>	<i>Test Method Number for Sampling and Analysis</i>	<i>NATA Laboratory Analysis By: NATA Accreditation No. & Report No.</i>
Dry Gas Density	NSW TM-23, USEPA M3	SEMA, Accreditation No. 15043, ETR No. 5870
Flow	NSW TM-2, USEPA M2	SEMA, Accreditation No. 15043, ETR No. 5870
Stack Pressure	NSW TM-2, USEPA M2	SEMA, Accreditation No. 15043, ETR No. 5870
Stack Temperature	NSW TM-2, USEPA M2	SEMA, Accreditation No. 15043, ETR No. 5870
Toluene Di-isocyanate (TDI) (Isocyanates)	HSE-MDHS 25/3, (WCA 110)	TestSafe Australia, Accreditation No. 3726, Report No. 2017-4331
Velocity	NSW TM-2, USEPA M2	SEMA, Accreditation No. 15043, ETR No. 5870
Volatile Organic Compounds (VOCs) including Dichloromethane	NSW TM-34, USEPA 18	TestSafe Australia, Accreditation No. 3726, Report No. 2017-4330

Sampling Times NSW - As per Test Method requirements or if not specified in the Test Method then as per Protection of the Environment Operations (Clean Air) Regulations Part 2.

Reference Conditions NSW - As per
 (1) Environment Protection Licence conditions, or
 (2) Part 3 of the Protection of the Environment Operations (Clean Air) Regulations

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

Issue Date - 16 October, 2017



P W Stephenson
 Managing Director

1.1 SUMMARY OF EMISSION TEST RESULTS – 25 SEPTEMBER 2017

Parameter	Unit	EPA ID No. 1 Scrubber Stack serving the Pouring Line	EPA ID No. 2 Scrubber Stack serving the Hot Block Store	
		Run 1 (Pour)	Run 1 (Pour)	Run 2 (Purge)
Stack Temperature	°C	29	33	30
Velocity	m/s	8.3	13.5	13.4
Volumetric Flow	m ³ /s	8.5	13.0	13.0
Gas Density	kg/m ³	1.30	1.30	1.30
Stack pressure	kPa	102.4	101.0	101.0
VOCs (Dichloromethane)	mg/m ³	990	370	280
Toluene Di-isocyanate (2,4 TDI)	mg/m ³	<0.0017	<0.0017	<0.0005
Toluene Di-isocyanate (2,6 TDI)	mg/m ³	<0.0017	<0.0017	<0.0005
VOCs (Dichloromethane)	g/s	8.4	4.8	3.6
Toluene Di-isocyanate (2,4 TDI)	g/s	<0.000014	<0.000022	<0.0000065
Toluene Di-isocyanate (2,6 TDI)	g/s	<0.000014	<0.000022	<0.0000065

Key for Tables 1.1 & 1.2:

°C	=	degrees Celsius
m ²	=	square metres
m/s	=	metres per second
am ³ /min	=	cubic metres at actual conditions per minute
m ³ /min	=	cubic metres per minute
m ³ /s	=	dry cubic metre per second at 0°C and 101.3 kilopascals (kPa)
kPa	=	Kilo Pascals
g/g-mole	=	grams per gram mole
kg/m ³	=	Kilograms per cubic metre
mg/m ³	=	milligrams per cubic metre at 0°C and 101.3 kilopascals (kPa)
mg/m ³	=	milligrams per cubic metre at 0°C and 101.3 kilopascals (kPa)
g/s	=	grams per second
<	=	less than the limit of detection for the analytical method

Abbreviations of Personnel

PWS	=	Peter W Stephenson
JW	=	Jay Weber

1.2 DETAILED EMISSION TEST RESULTS

Emission Test Results	Flow	Flow	Flow
Project Number	5870	5870	5870
Project Name	Dunlop Foams	Dunlop Foams	Dunlop Foams
Test Location	EPA ID No.1 Scrubber Stack serving the Pouring Line (Pour)	EPA ID No.2 Scrubber Stack serving the Hot Block Store (Pour)	EPA ID No.2 Scrubber Stack serving the Hot Block Store (Purge)
Date	25 September 2017	25 September 2017	25 September 2017
RUN	1	1	2
Sample Start Time (hours)	10:45	10:50	12:10
Sample Finish Time (hours)	11:45	11:53	15:35
Sample Location (Inlet/Exhaust)	Exhaust	Exhaust	Exhaust
Stack Temperature (°C)	29	33	30
Stack Cross-Sectional area (m ²)	1.13	1.11	1.11
Average Stack Gas Velocity (m/s)	8.3	13.5	13.4
Actual Gas Flow Volume (am ³ /min)	560	900	900
Total Normal Gas Flow Volume (m ³ /min)	510	790	800
Total Normal Gas Flow Volume (m ³ /sec)	8.5	13	13
Total Stack Pressure (kPa)	102.4	101.0	101.0
Molecular Weight Dry Stack Gas (g/g-mole)	29	29	29
Dry Gas Density (kg/m ³)	1.3	1.3	1.3
Sampling Performed by	PWS, JW	PWS, JW	PWS, JW
Sample Analysed by (Laboratory)	SEMA	SEMA	SEMA
Calculations Entered by	JW	JW	JW
Calculations Checked by	PWS	PWS	PWS

1.3 ESTIMATED UNCERTAINTY OF MEASUREMENT

Pollutant	Methods	Uncertainty
TDI as part of Total Isocyanates	HSE-MDHS 25/3 (WCA.110)	NA
Velocity	AS4323.1, NSW TM-2, USEPA 2	5%
Volatile Organic Compounds (VOCs) (Dichloromethane) (adsorption tube)	NSW TM-34, USEPA 18	25%

Key:

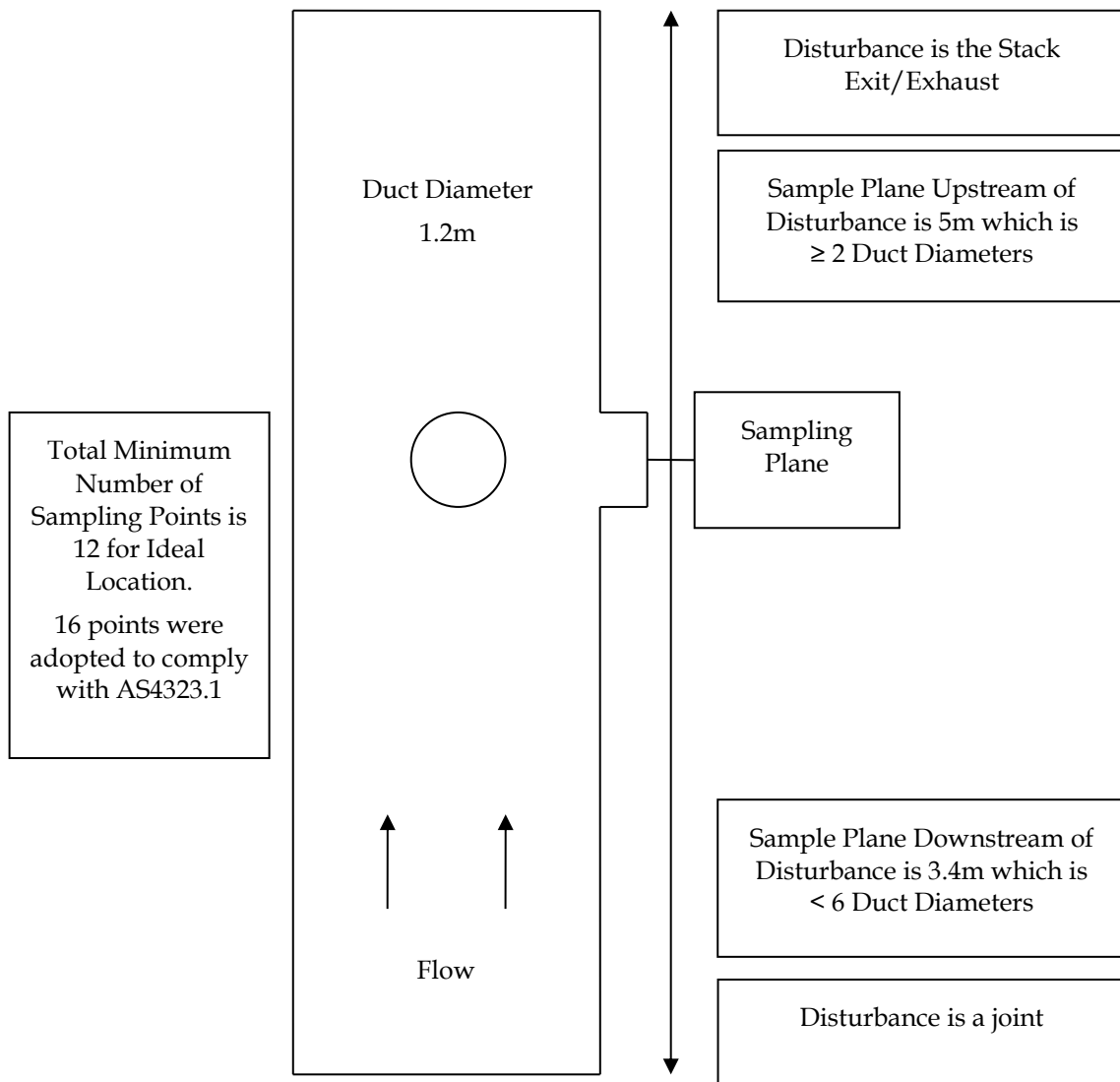
Unless otherwise indicated the uncertainties quoted have been determined @ 95% level of Confidence level (i.e. by multiplying the repeatability standard deviation by a co-efficient equal to 1.96) (Source - Measurement Uncertainty).

Sources: *Measurement Uncertainty - implications for the enforcement of emission limits* by Maciek Lewandowski (Environment Agency) & Michael Woodfield (AEAT) UK

Technical Guidance Note (Monitoring) M2 Monitoring of stack emissions to air Environment Agency Version 3.1 June 2005.

1.4 SAMPLING LOCATIONS

FIGURE 1-1 EPA No.1 SCRUBBER STACK SERVING THE POURING LINE

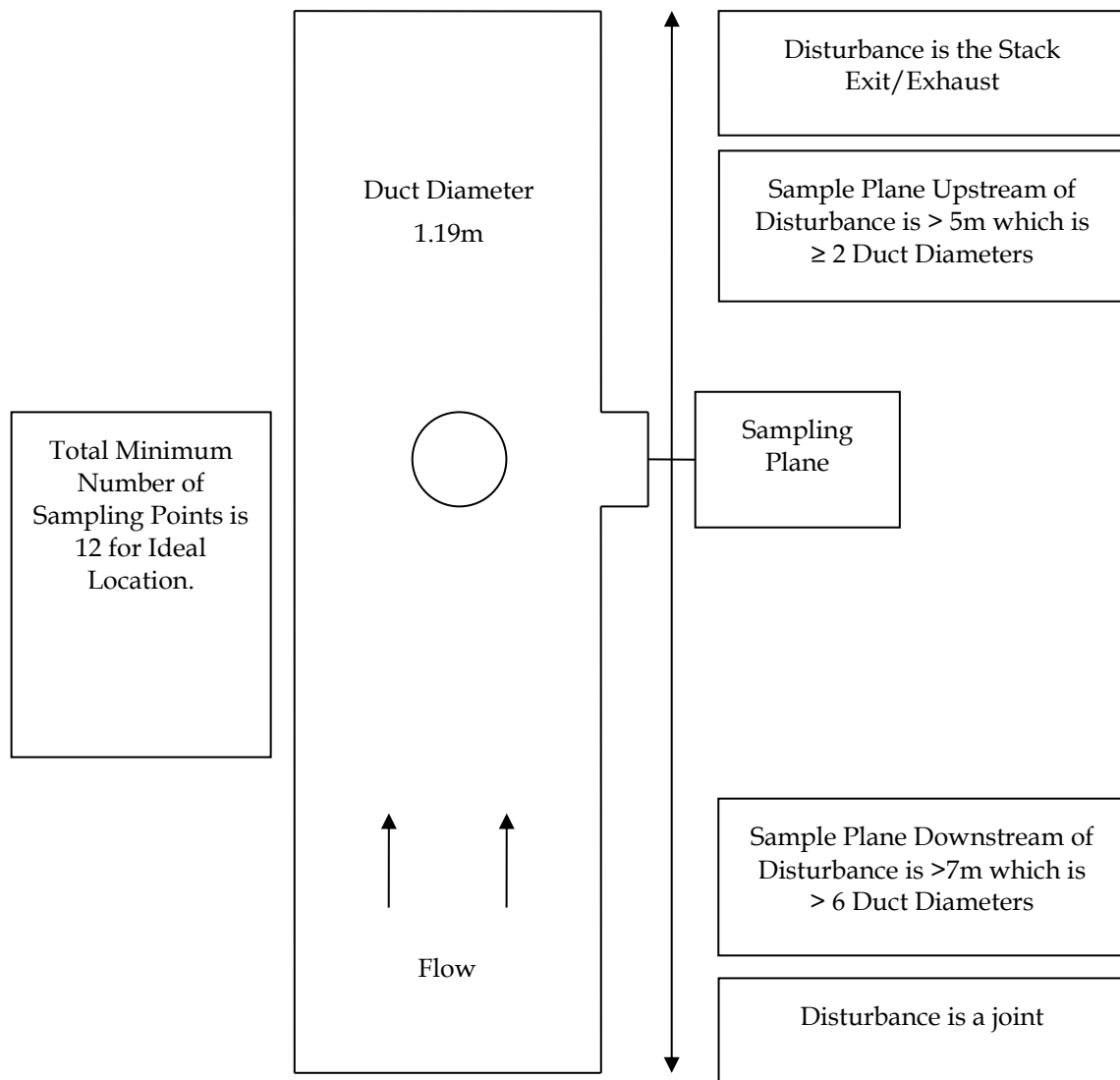


In the absence of cyclonic flow activity ideal sampling plane conditions will be found to exist at 6-8 duct diameters downstream and 2-3 duct diameters upstream from a flow disturbance. The sampling plane does not meet this criterion. Additional sample points were used in compliance with AS4323.1 as the sampling plane was non-ideal.

The sample plane however does meet the minimum sampling plane conditions; sampling plane conditions will be found to exist at 2 duct diameters downstream and 0.5 duct diameters upstream from a flow disturbance.

The location of the sampling plane complies with AS4323.1 criteria for temperature, velocity and gas flow profile and therefore is satisfactory for gas flow sampling.

FIGURE 1-2 EPA No.2 SCRUBBER STACK SERVING THE HOT BLOCK STORE



In the absence of cyclonic flow activity ideal sampling plane conditions will be found to exist at 6-8 duct diameters downstream and 2-3 duct diameters upstream from a flow disturbance. The sampling plane does meet this criterion.

The location of the sampling plane complies with AS4323.1 criteria for temperature, velocity and gas flow profile and therefore is satisfactory for gas flow sampling.

1.5 INSTRUMENT CALIBRATION DETAILS

SEMA Asset No.	Equipment Description	Date Last Calibrated	Calibration Due Date
676	Personal Sampler	22-Mar-17	22-Mar-18
834	Personal Sampler	22-Mar-17	22-Mar-18
677	Personal Sampler	22-Mar-17	22-Mar-18
932	Personal Sampler	06-Oct-16	06-Oct-17
921	Thermocouple	17-Jul-17	17-Jan-18
858	Digital Temperature Reader	17-Jul-17	17-Jan-18
894	Thermocouple	17-Jul-17	17-Jan-18
815	Digital Manometer	23-Feb-17	23-Feb-18
613	Barometer	23-Feb-17	23-Feb-18
726	Pitot	03-Jun-17	03-Jun-2018 Visually inspected on-site before use
594	Pitot	03-Jun-17	03-Jun-2018 Visually inspected on-site before use

ATTACHMENT A – NATA CERTIFICATES OF ANALYSIS



Jay Weber
 Stephenson Environmental Management Australia
 PO Box 6398
 SILVERWATER NSW 1811

Lab. Reference: 2017-4331

SAMPLE ORIGIN: Project No. 5870

DATE OF INVESTIGATION: 25/09/2017

DATE RECEIVED: 26/09/17

ANALYSIS REQUIRED: Isocyanates

REPORT OF ANALYSIS

See attached sheet(s) for sample description and test results.

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

For all administrative or account details please contact the Laboratory.

Increment and total pagination can be seen on the following pages.


 Martin Mazereeuw
 Manager



Date: 10/10/17

TestSafe Australia – Chemical Analysis Branch
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 ABN 81 913 830 179



Accreditation No. 3726

Accredited for compliance with ISO/IEC 17025

Analysis of Total Isocyanates in Air

Client: Jay Weber

Date Sampled: 25-Sep-17

SEMA

Reference Number	Sample ID	Sample Type	TDI 2,4 * (µg NCO/Sample)	TDI 2,6 * (µg NCO/Sample)	Total Isocyanates (µg NCO/Sample)
2017-4331-1	726557	Filter	ND	ND	ND
2017-4331-1	726557	Impinger	ND	ND	ND
2017-4331-2	726558	Filter	ND	ND	ND
2017-4331-2	726558	Impinger	ND	ND	ND
2017-4331-3	726559	Filter	ND	ND	ND
2017-4331-3	726559	Impinger	ND	ND	ND
2017-4331-4	726560	Filter	ND	ND	ND
2017-4331-4	726560	Impinger	ND	ND	ND

* Quantitation of TDI 2,4 and TDI 2,6 are not covered under the laboratory NATA accreditation.

ND = Not Detected

Method : Analysis of Total Isocyanates in Air by HPLC

Method No : WCA.110

Detection Limit : 0.1 µg NCO/Sample

Brief Description : Isocyanates are collected onto filters and/or impingers containing 1-(2-methoxyphenyl)-piperazine/toluene absorbing solution. The filters trap the greater proportion of isocyanates in the vapour phase and the impingers trap the greater proportion of isocyanates in the aerosol phase. The organic isocyanates react to form urea derivatives that are measured by HPLC using UV detection at 242 nm and electrochemical detection.



Jay Weber
Stephenson Environmental Management Australia
PO Box 6398
SILVERWATER NSW 1811

Lab. Reference: 2017-4330

SAMPLE ORIGIN: Project No. 5870

DATE OF INVESTIGATION: 25/09/2017

DATE RECEIVED: 26/09/17

ANALYSIS REQUIRED: Volatile Organic Compounds

REPORT OF ANALYSIS

See attached sheet(s) for sample description and test results.

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

For all administrative or account details please contact the Laboratory.

Increment and total pagination can be seen on the following pages.

A handwritten signature in black ink, appearing to read "Martin Mazereeuw".

Martin Mazereeuw

Manager

Date: 9/10/17

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Accreditation No. 3726

Accredited for compliance with ISO/IEC 17025



SafeWork NSW



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

Client : Jay Weber

Sample ID : 726561

Sample : 2017-4330-1

No	Compounds	CAS No	Front	Back	No	Compounds	CAS No	Front	Back
			µg/section					µg/section	
Aliphatic hydrocarbons (LOD = 5µg/compound/section)					Aromatic hydrocarbons (LOD = 1µg/compound/section)				
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 & 106-38-1	ND	ND
10	Cyclohexane	110-82-7	ND	ND	48	o-Xylene	95-47-6	ND	ND
11	Methylcyclohexane	108-87-2	ND	ND	Ketones (LOD #49, #54 & #55 = 5µg/section; #50, #51, #52 & #53 = 25µg/section)				
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	Alcohols (LOD = 25µg/compound/section)				
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
Chlorinated hydrocarbons (LOD = 5µg/compound/section)					60	2-Ethyl hexanol	104-76-7	ND	ND
24	Dichloromethane	75-09-2	5500	ND	61	Cyclohexanol	108-93-0	ND	ND
25	1,1-Dichloroethane	75-34-3	ND	ND	Acetates (LOD = 25µg/compound/section)				
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	Ethers (LOD = 25µg/compound/section)				
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	Glycols (LOD = 25µg/compound/section)				
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
Miscellaneous (LOD #37= 5µg & #38=25µg/compound/section)					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
Total VOCs (LOD = 50µg/compound/section)			5500	ND	Worksheet check			yes	yes

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Accreditation No. 3726

Accredited for compliance with ISO/IEC 17025 - Testing

SW08051 0817



SafeWork NSW



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

Client : Jay Weber

Sample ID : 726562

Sample : 2017-4330-2

No	Compounds	CAS No	Front	Back	No	Compounds	CAS No	Front	Back
			µg/section					µg/section	
Aliphatic hydrocarbons (LOD = 5µg/compound/section)					Aromatic hydrocarbons (LOD = 1µg/compound/section)				
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	106-42-6 106-36-3	ND	ND
10	Cyclohexane	110-82-7	ND	ND	48	o-Xylene	95-47-6	ND	ND
11	Methylcyclohexane	108-87-2	ND	ND	Ketones (LOD #49, #54 & #55 = 5µg/c/s; #50, #51, #52 & #53 = 25µg/c/s)				
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	Alcohols (LOD = 25µg/compound/section)				
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
Chlorinated hydrocarbons (LOD = 5µg/compound/section)					60	2-Ethyl hexanol	104-76-7	ND	ND
24	Dichloromethane	75-09-2	2164	ND	61	Cyclohexanol	108-93-0	ND	ND
25	1,1-Dichloroethane	75-34-3	ND	ND	Acetates (LOD = 25µg/compound/section)				
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	Ethers (LOD = 25µg/compound/section)				
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	Glycols (LOD = 25µg/compound/section)				
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
Miscellaneous (LOD #37= 5µg & #38=25µg/compound/section)					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
Total VOCs (LOD = 50µg/compound/section)			2164	ND	Worksheet check			yes	yes

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Accreditation No. 3726

Accredited for compliance with ISO/IEC 17025 - Testing

SW08051 0817



SafeWork NSW



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

Client : Jay Weber
Sample ID : 726563

Sample : 2017-4330-3

No	Compounds	CAS No	Front	Back	No	Compounds	CAS No	Front	Back
			µg/section					µg/section	
Aliphatic hydrocarbons (LOD = 5µg/compound/section)					Aromatic hydrocarbons (LOD = 1µg/compound/section)				
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	108-88-5	ND	ND
9	3-Methylhexane	589-34-4	ND	ND	47	p-Xylene &/or m-Xylene	106-127-6 106-38-3	ND	ND
10	Cyclohexane	110-82-7	ND	ND	48	o-Xylene	95-47-6	ND	ND
11	Methylcyclohexane	108-87-2	ND	ND	Ketones (LOD #49, #54 & #55 = 5µg/c/s; #50, #51, #52 & #53 = 25µg/c/s)				
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	Alcohols (LOD = 25µg/compound/section)				
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
Chlorinated hydrocarbons (LOD = 5µg/compound/section)					60	2-Ethyl hexanol	104-76-7	ND	ND
24	Dichloromethane	75-09-2	5274	ND	61	Cyclohexanol	108-93-0	ND	ND
25	1,1-Dichloroethane	75-34-3	ND	ND	Acetates (LOD = 25µg/compound/section)				
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	Ethers (LOD = 25µg/compound/section)				
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 (tBME)	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	Glycols (LOD = 25µg/compound/section)				
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
Miscellaneous (LOD #37 = 5µg & #38 = 25µg/compound/section)					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
Total VOCs (LOD = 50µg/compound/section)			5274	ND	Worksheet check			yes	yes

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TestSafe Australia – Chemical Analysis Branch

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Accreditation No. 3726

Accredited for compliance with ISO/IEC 17025 - Testing

SW08051 0817



SafeWork NSW



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

Client : Jay Weber

Stephenson Environmental Management Australia

ND = Not Detected
 VOCs = Volatile Organic Compounds
 All compounds numbered 1-73 are included of this analysis in the scope of NATA accreditation. Any additional compounds attanated with * are not covered by NATA accreditation.

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 CS₂. An aliquot of the desorbant is analysed by capillary gas chromatography with mass spectrometry detection.

Total Volatile Organic Compounds (TVOC) test result in µg/section is calculated by comparison to the average mass detector response of the 73 quantified compounds. The response of a mass detector is dependent on the fragmentation of the molecule. 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 less than the addition of the total amount of the 73 quantified compounds then the TVOC result is of little value other than for comparative purposes. 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.

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