Stephenson

Environmental Management Australia

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EMISSION TEST REPORT (ETR) NO.7020

ANNUAL EPL 2732 SCRUBBER EMISSIONS MONITORING

THE COMFORT GROUP - DUNLOP FOAMS

WETHERILL PARK, NSW

PROJECT NO.: **7020/S25392/19**

DATE OF SURVEY: **19 SEPTEMBER 2019**

DATE OF ISSUE: **15 OCTOBER 2019**

NATA accredited laboratory number 15043.

Accredited for Compliance with ISO/IEC 17025 – Testing

1 EMISSION TEST REPORT NO.7020

The sampling and analysis was commissioned by:

Organisation:	The Comfort Group - Dunlop Foams
Contact:	Mick Meehan
Site Address:	32-36 Frank Street, Wetherill Park, NSW 2164
Telephone:	02 8784 9903, 0413 025 259
Email:	Mick.Meehan@dunlopfoams.com.au
Project Number:	7020/S25392/19
Test Date:	19 September 2019
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, 2,4 TDI and DCM as per EPL 2732.
Sample Locations:	EPA ID No.1 Scrubber exhaust stack serving the Pouring line and EPA ID No.2 Scrubber exhaust stack serving the 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.

NATA accredited laboratory number 15043.

Accredited for Compliance with ISO/IEC 17025 - Testing

Test	*Test Method Number for Sampling and Analysis*	*NATA Laboratory Analysis By: NATA Accreditation No. & Report No.*
Dry Gas Density	NSW TM-23, USEPA M3	SEMA, Accreditation No. 15043, ETR No. 7020
Flow	NSW TM-2, USEPA M2	SEMA, Accreditation No. 15043, ETR No. 7020
Moisture	NSW TM-22, USEPA M4	SEMA, Accreditation No. 15043, ETR No. 7020
Stack Pressure	NSW TM-2, USEPA M2	SEMA, Accreditation No. 15043, ETR No. 7020
Stack Temperature	NSW TM-2, USEPA M2	SEMA, Accreditation No. 15043, ETR No. 7020
Toluene Di-isocyanate (TDI 2,4)	HSE-MDHS 25/3, (WCA 110)	TestSafe Australia, Accreditation No. 3726, Report No. 2019-4366
Velocity	NSW TM-2, USEPA M2	SEMA, Accreditation No. 15043, ETR No. 7020
Volatile Organic Compounds (VOCs) including Dichloromethane (DCM)	NSW TM-34, USEPA 18	TestSafe Australia, Accreditation No. 3726, Report No. 2019 – 4365

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 – 15 October 2019

P W Stephenson
Managing Director

1.1 SUMMARY OF EPA ID NOS 1 & 2 EMISSION TEST RESULTS – 19 SEPTEMBER 2019

Parameter	Unit of measure	EPA ID No. 1 Exhaust stack serving Pouring Line	EPA ID No. 2 Exhaust stack serving Hot Block Store		EPL 2732 EPA concentration limit
			Run 1 Pour	Run 2 Purge	
Stack Temperature	^oC	24	20	21	--
Velocity	m/s	10.5	14.6	14.6	--
Volumetric flow	m^3/s	10.9	15.1	15.1	--
Gas density	kg/m^3	1.3	1.3	1.3	--
Stack pressure	kPa	102.7	102.9	102.9	--
Moisture	%	1.7	1.3	1.3	--
TDI 2,4	mg/m^3	0.002	<0.002	<0.001	0.002
DCM	mg/m^3	1145	284	1157	1200

Key:

	TDI 2,4	=	Toluene Di-isocyanate 2,4
	DCM	=	Dichloromethane
	VOC	=	Volatile Organic Compounds
	^oC	=	degrees Celsius
	m/s	=	metres per second
	m^3/s	=	dry cubic metre per second at 0^oC and 101.3 kilopascals (kPa)
	kg/m^3	=	Kilograms per cubic metre
	kPa	=	Kilo Pascals
	%	=	percent
	mg/m^3	=	milligrams per cubic metre at 0^oC and 101.3 kilopascals (kPa)
	<	=	less than the limit of detection for the analytical method

1.2 FLOW EMISSION TEST RESULTS - EPA ID NOS.1 & 2

Emission Test Results	**Flow**	**Flow**	**Flow**
Project Number	7020	7020	7020
Project Name	The Comfort Group Dunlop Foams	The Comfort Group Dunlop Foams	The Comfort Group 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	19 September 2019	19 September 2019	19 September 2019
RUN	1	1	2
Sample Start Time (hours)	10:22	10:22	11:27
Sample Finish Time (hours)	11:22	11:22	13:27
Sample Location (Inlet/Exhaust)	Exhaust	Exhaust	Exhaust
Stack Temperature (^oC)	24	20	21
Stack Cross-Sectional area (m^2)	1.13	1.11	1.11
Average Stack Gas Velocity (m/s)	10.5	14.6	14.6
Actual Gas Flow Volume (am^3/min)	710	970	970
Total Normal Gas Flow Volume (m^3/min)	660	910	910
Total Normal Gas Flow Volume (m^3/sec)	10.9	15.1	15.1
Total Stack Pressure (kPa)	102.7	102.9	102.9
Moisture Content (% by volume)	1.7	1.3	1.3
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

Key:

^oC	=	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/sec	=	cubic metres per second
kPa	=	Kilo Pascals
g/g-mole	=	grams per gram mole
kg/m^3	=	kilograms per cubic metre
%	=	percent

1.3 ESTIMATED UNCERTAINTY OF MEASUREMENT

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

Key:

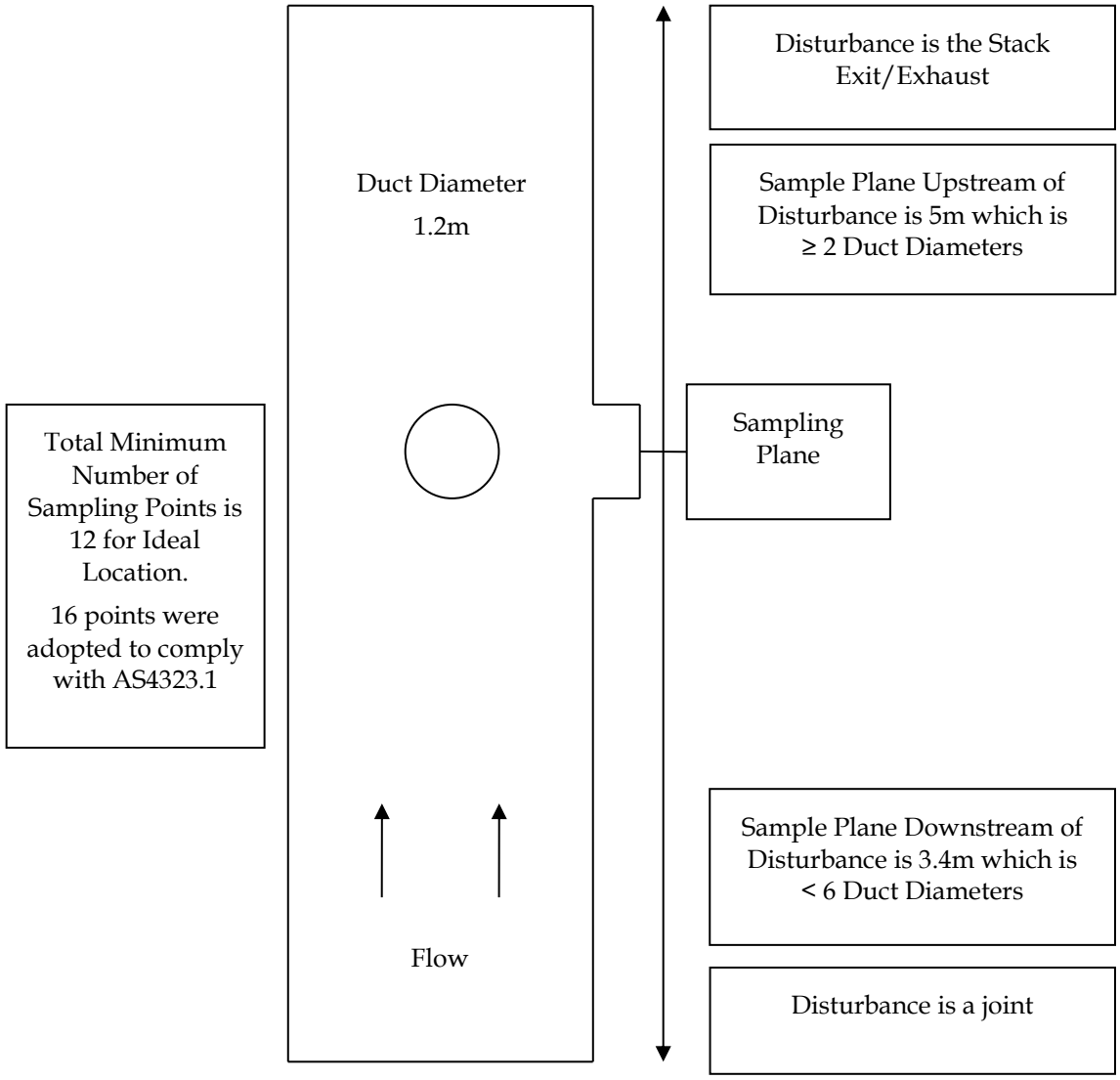
Unless otherwise indicated the uncertainties quoted have been determined @ 95% level of Confidence level (i.e. by multiplying the repeatability standard deviation by a co-efficient equal to 1.96) (Source – Measurement Uncertainty).

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 EXHAUST SAMPLING LOCATIONS

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

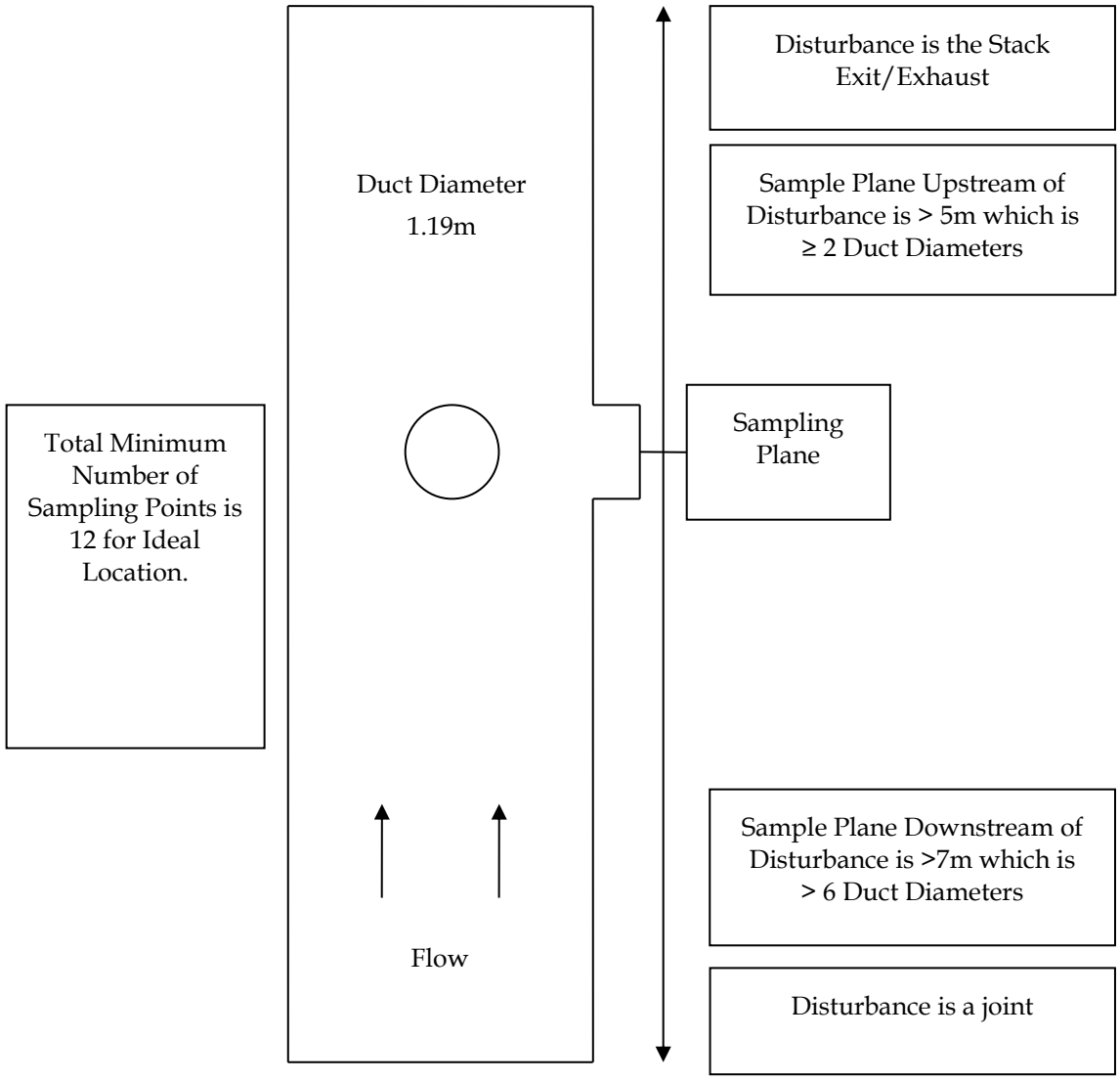


In the absence of cyclonic flow activity ideal sampling plane conditions will be found to exist at 6-8 duct diameters downstream and 2-3 duct diameters upstream from a flow disturbance. The sampling plane does not meet this criterion. Additional sample points were used in compliance with AS4323.1 as 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
857	Digital Temperature Reader	04-Jul-19	04-Jan-20
858	Digital Temperature Reader	04-Jul-19	04-Jan-20
769	Thermocouple	04-Jul-19	04-Jan-20
919	Thermocouple	04-Jul-19	04-Jan-20
815	Digital Manometer	21-Jan-19	21-Jan-20
885	Digital Manometer	21-Jan-19	21-Jan-20
613	Barometer	21-Jan-19	21-Jan-20
835	Personal Sampler	14-Mar-19	14-Mar-20
24	Personal Sampler	09-Apr-19	09-Apr-20
834	Personal Sampler	14-Mar-19	14-Mar-20
675	Personal Sampler	09-Apr-19	09-Apr-20
726	Pitot	23-Jul-19	23-Jul-2020 Visually inspected On-Site before use
183	Pitot	17-Apr-19	17-Apr-2020 Visually inspected On-Site before use

ATTACHMENT A – NATA CERTIFICATES OF ANALYSIS

NSW GOVERNMENT | SafeWork NSW

Test Safe AUSTRALIA

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

Lab. Reference: 2019-4366

Samples analysed as received

SAMPLE ORIGIN: Project No. 7020

DATE OF INVESTIGATION: 19/9/2019 **DATE RECEIVED:** 23/09/19

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: 8/10/19

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Accreditation No. 3726

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Test Safe AUSTRALIA

Analysis of Total Isocyanates in Air

Client: Jay Weber **Date Sampled: 23th September 2019**

Stephenson

Reference Number	Sample ID	Sample Type	TDI (2,4) (µg NCO/Sample)	TDI (2,6) (µg NCO/Sample)
2019-4366-1	727672-F	Filter	0.19	0.25
	727672-S	Impinger	ND	ND
2019-4366-2	727673-F	Filter	ND	ND
	727673-S	Impinger	ND	ND
2019-4366-3	727674-F	Filter	ND	ND
	727674-S	Impinger	ND	ND
2019-4366-4	727675-F	Filter	ND	ND
	727675-S	Impinger	ND	ND

ND = Not Detected

Method : Analysis of Total Isocyanates in Air by HPLC
Method No : WCA.110
Quantification 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.

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Test Safe AUSTRALIA

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

Lab. Reference: 2019-4365

Samples analysed as received

SAMPLE ORIGIN: Project No. 7020

DATE OF INVESTIGATION: 19/09/2019 **DATE RECEIVED:** 23/09/19

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.

Martin Mazereeuw
Manager

Date: 10/10/19

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

Client : Jay Weber

Sample ID : 727676 **Sample : 2019-4365-1**

No	Compounds	CAS No	Front µg/section	Back µg/section	No	Compounds	CAS No	Front µg/section	Back µg/section
	Aliphatic hydrocarbons (LOQ = 5µg/compound/section)					**Aromatic hydrocarbons** (LOQ = 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	114	97
9	3-Methylhexane	589-34-4	ND	ND	47	p-Xylene &/or m-Xylene	106-42-3 &/or 108-38-3	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** (LOQ #44, #54 & #55 = 5µg/cm; #50, #51, #52 & #53 = 25µg/cm)			
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** (LOQ = 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 (LOQ = 5µg/compound/section)				60	2-Ethyl hexanol	104-76-7	ND	ND
24	Dichloromethane	75-09-2	7973	ND	61	Cyclohexanol	108-93-0	ND	ND
25	1,1-Dichloroethane	75-34-3	ND	ND		**Acetates** (LOQ = 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** (LOQ = 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	NU	NU	68	Tetrahydrofuran (THF)	109-99-9	NU	NU
34	Chlorobenzene	108-90-7	ND	ND		**Glycols** (LOQ = 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 (LOQ #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 (LOQ =50µg/compound/section)		8086	97		Worksheet check		YES	YES

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SWA0051 0817

NSW GOVERNMENT SafeWork NSW

Test Safe AUSTRALIA

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

Client : Jay Weber

Sample ID : 727677 **Sample : 2019-4365-2**

No	Compounds	CAS No	Front µg/section	Back µg/section	No	Compounds	CAS No	Front µg/section	Back µg/section
	Aliphatic hydrocarbons (LOQ = 5µg/compound/section)					**Aromatic hydrocarbons** (LOQ = 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	41	40
9	3-Methylhexane	589-34-4	ND	ND	47	p-Xylene &/or m-Xylene	106-42-3 + 108-38-3	ND	ND
10	Cyclohexane	110-82-7	ND	ND	48	o-Xylene	95-47-6	ND	ND
11	Methylcyclohexane	108-87-2	ND	ND		**Ketones** (LOQ 849, 854 & 855 =5µg/cm; 850, 851, 852 & 853 =15µg/cm)			
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** (LOQ = 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 (LOQ = 5µg/compound/section)				60	2-Ethyl hexanol	104-76-7	ND	ND
24	Dichloromethane	75-09-2	2012	ND	61	Cyclohexanol	108-93-0	ND	ND
25	1,1-Dichloroethane	75-34-3	ND	ND		**Acetates** (LOQ = 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** (LOQ = 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** (LOQ = 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 (LOQ 837= 5µg & 858=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 (LOQ =50µg/compound/section)		2054	ND		Worksheet check		YES	YES

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ilac-MRA NATA

Accreditation No. 3726

Accredited for compliance with ISO/IEC 17025 - Testing

SVAC8051 0817

NSW GOVERNMENT | SafeWork NSW

Test Safe AUSTRALIA

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

Client : Jay Weber

Sample ID : 727678 **Sample : 2019-4365-3**

No	Compounds	CAS No	Front µg/section	Back µg/section	No	Compounds	CAS No	Front µg/section	Back µg/section
	Aliphatic hydrocarbons (LOQ = 5µg/compound/section)					**Aromatic hydrocarbons** (LOQ = 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	35	21
9	3-Methylhexane	589-34-4	ND	ND	47	p-Xylene &/or m-Xylene	106-42-3 & 108-38-3	ND	ND
10	Cyclohexane	110-82-7	ND	ND	48	o-Xylene	95-47-6	ND	ND
11	Methylcyclohexane	108-87-2	ND	ND		**Ketones** (LOQ #49, #54 & #55 =5µg/cs; #50, #51, #52 & #53 =25µg/cs)			
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** (LOQ = 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 (LOQ = 5µg/compound/section)				60	2-Ethyl hexanol	104-76-7	ND	ND
24	Dichloromethane	75-09-2	15160	55	61	Cyclohexanol	108-93-0	ND	ND
25	1,1-Dichloroethane	75-34-3	ND	ND		**Acetates** (LOQ = 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** (LOQ = 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** (LOQ = 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 (LOQ #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 (LOQ =50µg/compound/section)		15195	76		Worksheet check		YES	YES

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Accreditation No. 3726

Accredited for compliance with ISO/IEC 17025 - Testing

SWO8051 0817

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

Client : Jay Weber

Stephenson Environment 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 annotated 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
Limit of Quantitation : 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_2. An aliquot of the desorbent 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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