



SOURCE EMISSIONS MONITORING – LION CO

TOOHEYS – APRIL 2022

Project ID. 14289

R_0

DATE OF RELEASE: 24/05/2022

Assured Environmental

Table 1: Document approval


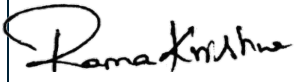

	Name	Position Title	Signature	Date
Author	David Arbuckle	General Manager		24/05/2022
Reviewer	Rama Tirnaty	Team Leader		24/05/2022
Approver	David Arbuckle	General Manager		24/05/2022

Table 2: Revision register

Revision	Date	Issuer	Recipient	Comment
R_O	24/05/2022	David Arbuckle	Jason Lee	Initial release

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ACCREDITED FOR COMPLIANCE TO ISO/IEC 17025

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

Accreditation ID: 19703



EXECUTIVE SUMMARY

The following table provides a summary of results from emissions monitoring conducted from the exhaust of the co-generator exhaust stack located on at the Lion Co, Toohey's Brewery in Lidcombe, NSW. Sampling was conducted on 29th of April 2022 to meet the requirements of NSW EPL 1167. In summary;

- Oxides of nitrogen (NOx) concentration was below the EPL limit of 250 mg/Nm³
- Total VOC concentration was above the EPL limit of 40 mg/Nm³

Table 3: Executive summary

Parameter	Average Results	GUIDELINE LIMIT	unit of measure	Pass/Fail
Gas temperature at sampling plane	207.6	na	°C	na
Exit velocity	20.7	na	m/s	na
Oxygen	9.35	na	%v/v	na
Carbon dioxide	6.47	na	%v/v	na
Stack gas water vapour content	8.89	na	%v/v	na
Oxides of nitrogen (NOx) at 5%O ₂	240	250	mg/Nm ³	Pass
Total VOCs as n-propane	< 0.928	40	mg/Nm ³	Pass

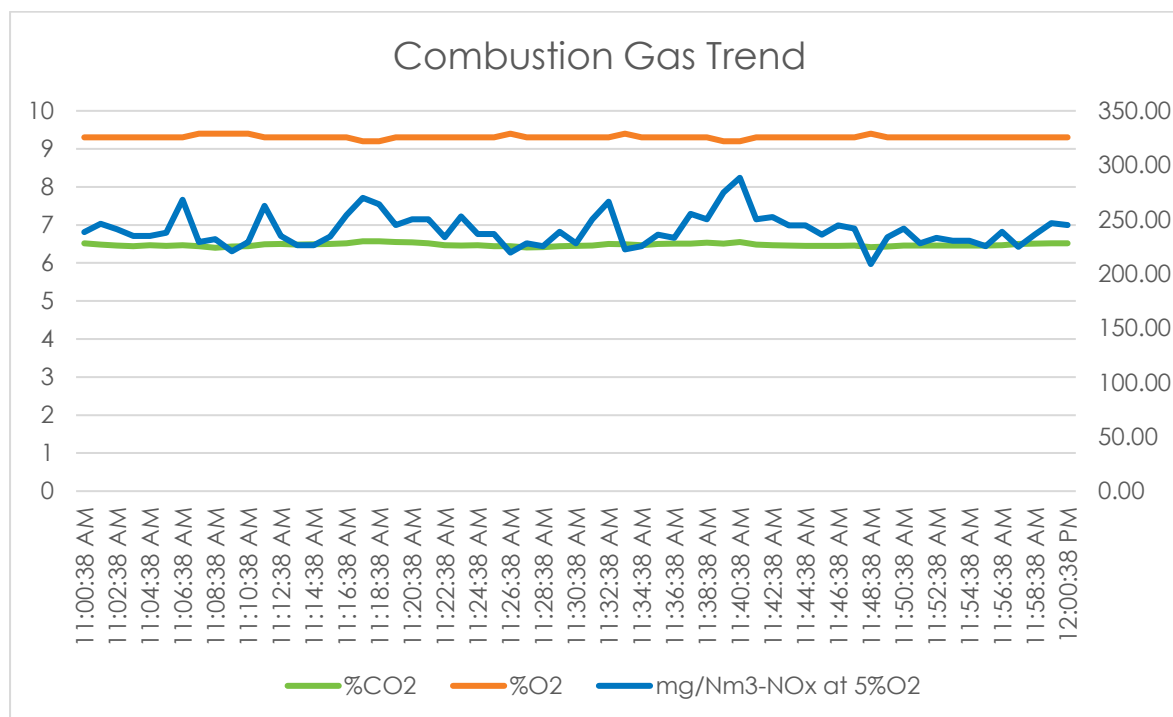


Figure 1: Combustion Gas trend – 29th of April 2022

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1 INTRODUCTION

Assured Environmental (AE) was appointed by Lion Co Pty Ltd to monitor stack emissions from the 2MW natural gas co-generation engine operating at the Lion Co, Toohey's Brewery in Lidcombe as per conditions listed in NSW EPA EPL 1167. Sampling was conducted by AE on the 29th of April 2022. Refer to section 6 for the co-generators operating conditions during the test period.

AE was responsible for the collection and analysis of samples, unless otherwise indicated. The samples were recovered and stored in the appropriate manner until their return to the laboratory where the samples were prepared and analysed according to the methodologies listed below in this report.

2 METHODOLOGY & EQUIPMENT

2.1 Sampling methodology

All sampling and analysis were carried in accordance with the listed requirements in Table 4. Any deviations to these methods have been documented as required.

Table 4: Test methods & EPL limits

PARAMETERS	Unit	NSW EPA TM	Reference Test Method	NATA	EPL limit
Traverse point selection	N/A	TM-1	AS4323.1	Yes	Na
Stack gas velocity	m/s	TM-2	USEPA Method 2	Yes	Na
Volumetric flow rate	m ³ /s	TM-2	USEPA Method 2	Yes	Na
Moisture	%	TM-22	USEPA Method 4	Yes	Na
Stack gas temperature	°C	TM-22	USEPA Method 2	Yes	Na
Oxides of nitrogen (NO + NO ₂)	mg/m ³	TM-11	USEPA Method 7E	Yes	250 ^a
Volatile organic compounds ^b	mg/m ³	TM-32	USEPA Method 18	Yes	40 ^c

Table 5: Analysis notes

Note	Company	Work performed	NATA ID	Report Number
1	Assured Environmental	Sampling & analysis	19703	13594
2	Envirolab Services	VOC Analysis	2901	295045-[R00]

Table 6: Deviations

Note	Comment
A	Pre & post calibration of the analyser was completed in the AE laboratory.

^a mg/Nm³ referenced to 5% oxygen.

^b Speciated and total as n-propane – 1 sample taken over approximately 30 minutes.

^c mg/Nm³ as n-propane equivalent referenced to 5% oxygen.

2.2 Sampling location

The below images illustrate the Toohey's Brewery site and sample locations.

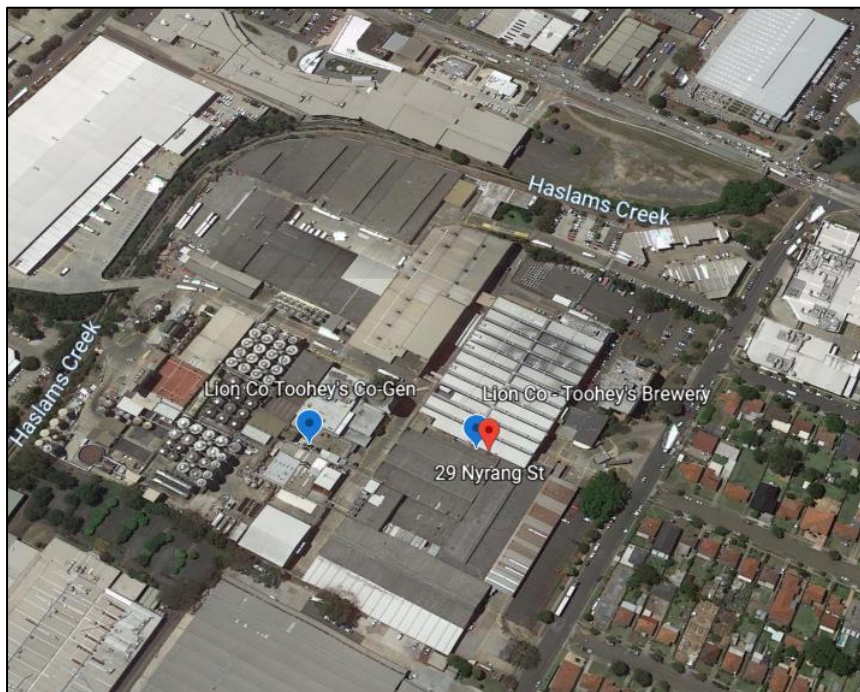


Figure 2: Site location



Figure 3: Co-Gen emission point



Figure 4: EWP used for testing



Figure 5: EWP and Co-Gen stack

2.3 Test equipment

All equipment used for the testing meets or exceeds all relevant performance standards as required by all jurisdictions. Our isokinetic and non-isokinetic equipment used for this project was from Apex Instruments^d. Combustion gases were monitored using a Testo 350XL flue gas analyser.



Figure 6: VOC Sampling Train (Apex Instruments^e)



Figure 7: Test Analyser

^d<http://www.apexinst.com/>

^e A sampling train like this was used. A carbon tube was placed in line after the first knock out impinger.

3 QUALITY ASSURANCE & QUALITY CONTROL (QA/QC)

AE operates within a quality system based upon the requirements of ISO17025. Our quality system defines specific procedures and methodologies to ensure any project undertaken by AE is conducted with the highest level of quality given the specific confines of each project. The overall objective of our QA/QC procedures is to representatively sample and accurately analyse components in the gas streams and therefore report valid measurements of emission concentrations.

To ensure representativeness of field work, our quality procedures target:

1. Correct sampling locations
2. Sample time
3. Frequency of samples and
4. Method selection & adherence

To ensure representativeness of lab work, our quality procedures target:

1. Sample preservation
2. Chain of custody (COC)
3. Sample preparation and
4. Analytical techniques

AE maintains strict quality assurance throughout all its sampling programs, covering on-site 'field work' and the analytical phase of our projects. Our QA program covers the calibration of all sampling and analytical apparatus where applicable and the use of spikes, replicate sample and reference standards. The test methodologies used for this project are outlined in section 2 of this document. Field test data has been recorded and calculated using direct entry into Microsoft Excel spreadsheets following the procedures of the appropriate test methods. Determination of emission concentrations has been performed using the same MS Excel spreadsheets which are partially supplied as an attachment to this report. More detailed information can be supplied upon request.

QA/QC checks for this project will use validation techniques and criteria appropriate to the type of data and the purpose of the measurement to approve the test report. Records of all data will be maintained. Complete chain of custody (COC) procedures has been followed to document the entire custodial history of each sample. The COC forms also served as a laboratory sheet detailing sample ID and analysis requirements.

Table 7: Sampling data QA/QC checklist

Sampling Data QA/QC Checklist	Comment
Use of appropriate test methods	Yes
'Normal' operation of the process being tested	Yes – as instructed by client
Use of properly operating and calibrated test equipment	Yes
Use of high purity reagents	Yes
Performance of leak checks post sample (at least)	Yes

Table 8: Laboratory data QA/QC checklist

Laboratory Data QA/QC Checklist	Comment
Use of appropriate analytical methods	Yes
Use of properly operating and calibrated analytical equipment	Yes
Precision and accuracy comparable to that achieved in similar projects	Yes
Accurate reporting	Yes

4 DEFINITIONS

The following terms and abbreviations may be used in this report:

Table 9: Definitions

Symbol	Definition
<	The analytes tested for was not detected; the value stated is the reportable limit of detection
Am ³	Gas volume in cubic metres at measured conditions
AS	Australian Standard
BH	Back half of sample train (filter holder and impingers) (referred to during sample recovery)
°C	Degrees Celsius
dscm	dry standard cubic meters
FH	Front half of sample train (probe and filter holder) (referred to during sample recovery)
g	Grams
kg	Kilograms
m	Metres
m ³	actual gas volume in cubic metres as measured
mbar	Millibars
mg	Milligrams (10 ⁻³ grams)
min	Minute
ml	Millilitres
mmH ₂ O	Millimetres of water
Mole	SI unit that measures the amount of substance
N/A	Not applicable
n/a	Not applicable
Nm ³	Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa)
NMI	National Measurement Institute
NM VOC	Non methane volatile organic compound
NR	Not required on this occasion
PM	Particulate matter
ppb	Parts per billion
ppm	Parts per million
sec	Second
Sm ³	Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa) and corrected to a standardised value (e.g. 15% O ₂)
STP	Standard temperature and pressure (0°C and 101.3 kPa)
USEPA	United States Environmental Protection Authority

5 RESULTS

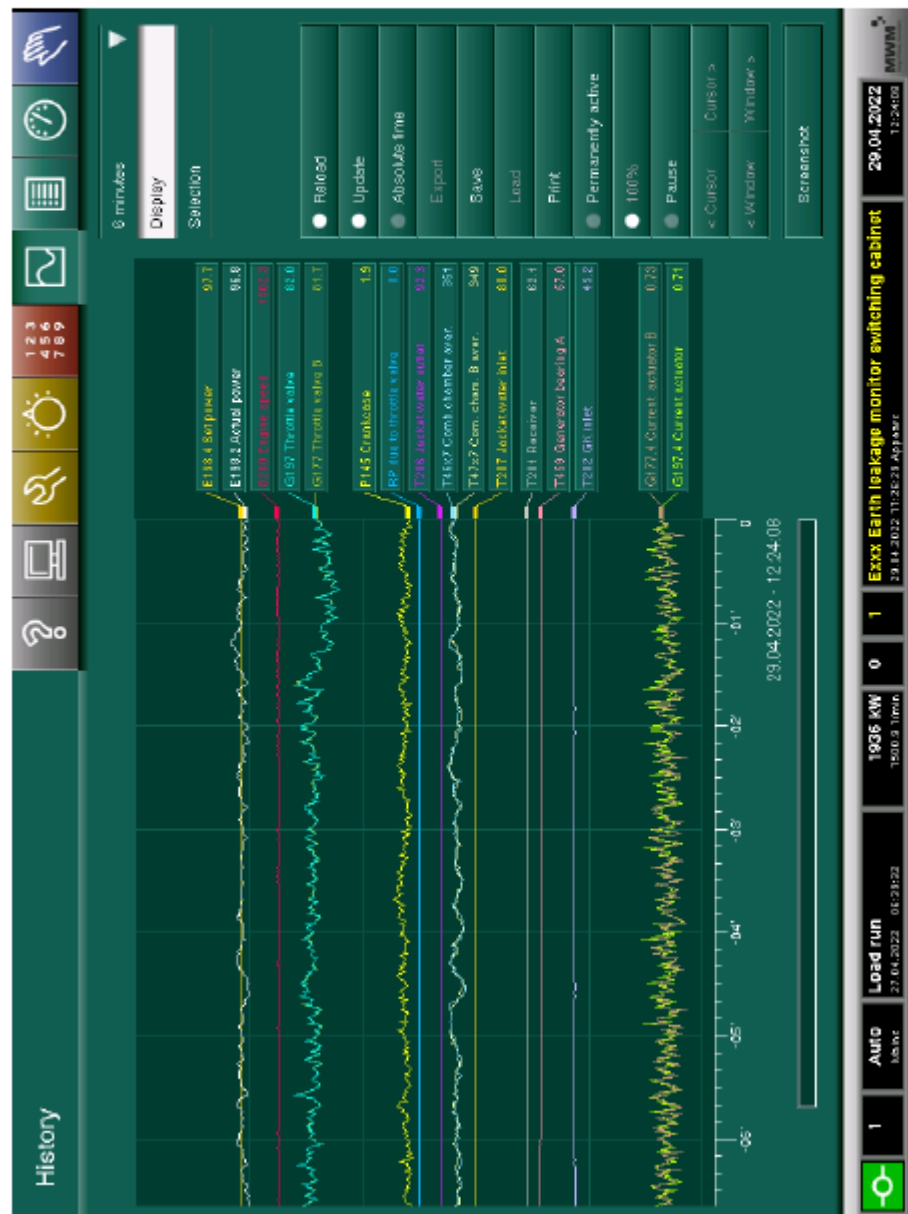
Table 10 presents a summary of the sample run.

Table 10: Results summary

Source Data		Stack SDS version - 3.28	
Client		Lion CO	
Site		Tooheys	
Sample Point		Co-GEN	
Reference Method		M18 - CONSTANT FLOW	
Test Parameters		VOCs & Gases	
Process conditions		Normal	
Historical Data & Hardware Information - Manual Sample			
Run Start Date		29/04/2022	dd-mm-yyyy
Project ID		14289	
Run ID		-1	
Run Start Time	Ti	11:00	hh:mm
Run Stop Time	Tf	12:00	hh:mm
Positioning compliance check with AS4323.1		Non-ideal	
Flow & temperature compliance check with AS4323.1		YES	
Traverse pt factors; up, down, total & trav pts		1.15 , 1 , 1.15 , 12	
Console Serial Number		gm4	
Meter Calibration Factor	(Y)	1.000	
Orifice Coefficient		N/A	(DH _{or})
Pitot Tube Coefficient	(C _p)	0.81	
Actual Nozzle Diameter	(D _{no})	N/A	mm
Stack Test Data			
Initial Meter Volume	(V _{m,i})	0.0000	m ³
Final Meter Volume	(V _{m,f})	0.0300	m ³
Actual Sampling Time	(Q)	60.0	minutes
Average Meter Temperature	(t _m) _{avg}	23.86	°C
Average Stack Temperature	(t _s) _{avg}	207.58	°C
Barometric Pressure	(P _b)	1012	mb
Stack Static Pressure	(P _{static})	6.50	mm H ₂ O
Absolute Stack Pressure	(P _s)	1013	mb
Sample Volumes			
Actual Meter Volume	(V _m)	0.0300	m ³
Standard Meter Volume	(V _m) _{std}	0.0276	Nm ³
Moisture Content Data			
Water vapour concentration	(B _{wa(calc)})	8.89	%
Stack Gas Density Analysis Data			
Carbon Dioxide Percentage	(%CO ₂)	6.48	%
Oxygen Percentage	(%O ₂)	9.30	%
Carbon Monoxide Percentage	(%CO)	0.047	%
Nitrogen Percentage	(%N ₂)	84.22	%
Dry Gas Molecular Weight	(M _d)	1.313	kg/Nm ³
Dry Gas Molecular Weight	(M _d)	29.4	g/g-mole
Wet Stack Gas Molecular Weight	(M _w)	28.4	g/g-mole
Volumetric Flow Rate Data (at Sample Plane)			
Average Stack Gas Velocity	(v _s)	20.70	m/sec
Stack Diameter	D _s	0.480	m
Stack Cross-Sectional Area	(A _s)	0.181	m ²
Upstream distance (from disturbance)	B	1.40	m
Downstream distance (from disturbance)	A	1.90	m
Actual Stack Flow Rate	(Q _{aw})	224.7	m ³ /min
Wet Standard Stack Flow Rate	(Q _{sw})	127.6	Nm ³ /min-wet
Dry Standard Stack Flow Rate	(Q _{sd})	116.3	Nm ³ /min-dry
Percent of Isokinetic Rate	(I)	N/A	%
Particulate Uncertainty Calculation			
Uncertainty expressed at 95%CI	(U)	Non ideal.	%
Uncertainty expressed at 95%CI	(U)	Cannot quote	mg/Nm ³
Instrumental Analyser - Historical Data & Hardware Information			
Analyser serial number, make & model		Testo 350XL	value
Analyser Run Start Time	Ti	11:00	hh:mm
Analyser Run Stop Time	Tf	12:00	hh:mm
Analyser Total Sampling Time	(Q)	1:00	hh:min
Instrumental Analyser Raw Data Averages			
Oxides of Nitrogen	(NO _x)	85.38	ppm
Average Oxides of Nitrogen (USEPA Method 7E - instrumental analyser)			
Nitrogen Oxides (NO _x as NO ₂)	(Conc)	175.4	mg/Nm ³
Nitrogen Oxides at 5 % O ₂	(Conc)	240.5	mg/Nm ³
Nitrogen Oxides (NO _x as NO ₂)	(E)	20.39	g/min
OTHER ANALYTES (PLEASE SPECIFY)			
TVOC as n-propane	(Conc)	< 0.928	mg/Nm ³

6 OPERATING CONDITIONS

Name:	PLC date: 29.04.2022	Number of faults: 0 Number of alarms: 1
Comment: Toohey's	PLC release: 2.50.21-m03	State: Load run Operation mode: Mains
Number: 9296876	PLC operating system: 2.53.03	Actual power: 1836 kW Actual speed: 1500.9 1/min
Engine type: TCG2020V20	Visualisation: 3.4.2	Operation hours: 23464 Starts: 1814
Serial number CPU-P: 233500100-01891	Serial number BRT: 26030040114483	Serial number DZR: 832600092



7 RELEVANT NSW EPA EPL 1167 EXTRACTS

Section 55 Protection of the Environment Operations Act 1997

Environment Protection Licence

Licence - 1167



POINT 7

Pollutant	Units of measure	100 percentile concentration limit	Reference conditions	Oxygen correction	Averaging period
Nitrogen Oxides	milligrams per cubic metre	250	Dry, 273k, 101.3kPa,	5%	As per test method
volatile organic compounds as n-propane equivalent	milligrams per cubic metre	40	Dry, 273k, 101.3kPa,	5%	As per test method

Figure 8: EPL 1167 Limits

POINT 7

Pollutant	Units of measure	Frequency	Sampling Method
Dry gas density	kilograms per cubic metre	Yearly	TM-23
Moisture	percent	Yearly	TM-22
Molecular weight of stack gases	grams per gram mole	Yearly	TM-23
Nitrogen Oxides	milligrams per cubic metre	Yearly	TM-11
Temperature	degrees Celsius	Yearly	TM-2
Velocity	metres per second	Yearly	TM-2
volatile organic compounds as n-propane equivalent	milligrams per normalised cubic metre	Yearly	TM-34

Environment Protection Authority - NSW
Licence version date: 25-Feb-2019

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Figure 9: EPL 1167 Frequency & Test Methods

8 LAB ANALYTICAL TEST DATA

8.1 Chain of Custody

Doc Number F101.007.001		File Name LAB COC FORM		Last modified 16/08/2021		Authorised by JW		Version 10.7		TECHNICAL - LABORATORY	
INTERNAL ANALYSIS AE COC for Project Number: <u>AE COC 01 Project Number</u>											
SAMPLES TO GO TO: Attention: Sample Reception Lab Name: <u>EnviroLab Services</u> Lab Address: <u>12 Ashley Street</u> <u>Cherrywood</u> <u>NEW SOUTH WALES 2037</u> <u>AUSTRALIA</u>				Primary Contact Phone: <u>07 3333 1980</u> Email: <u>france@assuredenv.com.au</u> <u>france@assuredenv.com.au</u>				AE Project ID: Date Sent: <u>09/05/22</u> Lab Report Number: <u>1320</u> Date Received: <u>09/05/22</u> Received by: <u>Christine</u> DUE DATE: <u>Standard</u>			
Project ID	RUN ID	Specific ID	Sample Description	Analyte	Test Method	NOTE	LOGGED BY	CONFIRMED BY			
14289	1	-1	Carbon tube	VOC TO-15 suite	GC	na					
Job No: <u>205746</u> Date Received: <u>09/05/22</u> Time Received: <u>15.0</u> Received by: <u>[Signature]</u> Temp: <u>Cool/Ambient</u> Cooling: <u>Ice/No/Back</u> Security: <u>Intact/Broken/None</u>											
PLEASE FORWARD A SAMPLE RECEIPT OF THESE SAMPLES ONCE RECEIVED AT YOUR LAB Please retain samples for a minimum of 2 months											
Signed By: <u>[Signature]</u>											

8.2 ELS Analytical Report



Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2087
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 295045

Client Details	
Client	Assured Environmental Pty Ltd
Attention	Jay
Address	Unit 7, 142 Tennyson Memorial Avenue, Tennyson, QLD, 4105

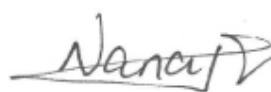
Sample Details	
Your Reference	14289
Number of Samples	1 Carbon tube
Date samples received	09/05/2022
Date completed instructions received	09/05/2022

Analysis Details	
Please refer to the following pages for results, methodology summary and quality control data.	
Samples were analysed as received from the client. Results relate specifically to the samples as received.	
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.	

Report Details	
Date results requested by	16/05/2022
Date of Issue	16/05/2022
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By
Dragana Tomas, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

Envirolab Reference: 295045
Revision No: R00



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Client Reference: 14289

VOC in Carbon tubes		
Our Reference		295045-1
Your Reference	UNITS	14289-1-1
Type of sample		Carbon tube
Date extracted	-	16/05/2022
Date analysed	-	16/05/2022
Acetone	µg/tube	<5
Acrylonitrile	µg/tube	<5
Methylethylketone (MEK)	µg/tube	<5
Hexane	µg/tube	<5
Ethylacetate	µg/tube	<5
1,2-Dichloroethane	µg/tube	<5
Benzene	µg/tube	<2
Carbon Tetrachloride	µg/tube	<5
Cyclohexane	µg/tube	<5
Ethylacrylate	µg/tube	<5
Trichloroethene	µg/tube	<5
1,4-Dioxane	µg/tube	<5
Propylene Oxide	µg/tube	<10
Epichlorohydrin	µg/tube	<5
Methylisobutylketone (MIBK)	µg/tube	<5
Toluene	µg/tube	<5
Tetrachloroethene	µg/tube	<5
n-Butylacetate	µg/tube	<5
Chlorobenzene	µg/tube	<5
Ethylbenzene	µg/tube	<5
m+p-Xylene	µg/tube	<10
Styrene	µg/tube	<5
o-Xylene	µg/tube	<5
Cyclohexanone	µg/tube	<5
Nonane	µg/tube	<5
Isopropylbenzene	µg/tube	<5
Diisobutylketone (DIBK)	µg/tube	<5
α-Methylstyrene	µg/tube	<5
Decane	µg/tube	<5
Benzylchloride	µg/tube	<5
Naphthalene	µg/tube	<5
Dodecane	µg/tube	<5
TVOC's as hexane in tubes*	µg/tube	<50
Surrogate Toluene-d8	%	82
Surrogate 4-Bromofluorobenzene	%	84

Envirolab Reference: 295045
Revision No: R00

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Client Reference: 14289

Method ID	Methodology Summary
ORG-022	<p>Determination of volatile organic compounds in charcoal tubes/badges/sorbents using CS₂ extraction, based on NIOSH methods using GC/GC-MS. Desorption efficiencies are not applied to results in µg/tube.</p> <p>Note where µg/m³ results are supplied for SKC badges, the factors used are for 575-001, if 575-001 data is unavailable for an analyte then use 575-002 then 575-003 (exposure time must be supplied).</p> <p>Note - air volume measurements are not covered by Envirolab's NATA accreditation.</p>

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Revision No: R00

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Client Reference: 14289

QUALITY CONTROL: VOC in Carbon tubes					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			16/05/2022	[NT]	[NT]	[NT]	[NT]	16/05/2022	[NT]
Date analysed	-			16/05/2022	[NT]	[NT]	[NT]	[NT]	16/05/2022	[NT]
Acetone	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	85	[NT]
Acrylonitrile	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	86	[NT]
Methylethylketone (MEK)	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	99	[NT]
Hexane	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	108	[NT]
Ethylacetate	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	99	[NT]
1,2-Dichloroethane	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	104	[NT]
Benzene	µg/tube	2	ORG-022	<2	[NT]	[NT]	[NT]	[NT]	109	[NT]
Carbon Tetrachloride	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	106	[NT]
Cyclohexane	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	110	[NT]
Ethylacrylate	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	106	[NT]
Trichloroethene	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	106	[NT]
1,4-Dioxane	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	104	[NT]
Propylene Oxide	µg/tube	10	ORG-022	<10	[NT]	[NT]	[NT]	[NT]	96	[NT]
Epichlorohydrin	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	95	[NT]
Methylisobutylketone (MIBK)	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	114	[NT]
Toluene	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	112	[NT]
Tetrachloroethene	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	117	[NT]
n-Butylacetate	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	112	[NT]
Chlorobenzene	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	103	[NT]
Ethylbenzene	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	118	[NT]
m+p-Xylene	µg/tube	10	ORG-022	<10	[NT]	[NT]	[NT]	[NT]	106	[NT]
Styrene	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	107	[NT]
o-Xylene	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	107	[NT]
Cyclohexanone	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	111	[NT]
Nonane	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	110	[NT]
Isopropylbenzene	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	107	[NT]
Diisobutylketone (DIBK)	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	110	[NT]
a-Methylstyrene	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	109	[NT]
Decane	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	111	[NT]
Benzylchloride	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	115	[NT]
Naphthalene	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	104	[NT]
Dodecane	µg/tube	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	104	[NT]
TVOC's as hexane in tubes*	µg/tube	50	ORG-022	<50	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Toluene-d8	%		ORG-022	81	[NT]	[NT]	[NT]	[NT]	108	[NT]
Surrogate 4-Bromofluorobenzene	%		ORG-022	114	[NT]	[NT]	[NT]	[NT]	119	[NT]

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Result Definitions	
NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

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Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

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