

## TECHNICAL MEMORANDUM

**DATE** 17 December 2019

**Reference No.** 1667000-181-M Rev0

**TO** Mr Nino Frasca, Barro Group Pty Ltd

**FROM** Golder Associates

**EMAIL** cvanbrink@golder.com.au

### BARRO SUNSHINE LANDFILL – VOC RESULTS BY EVACUATED SUMMA CANISTER

Dear Nino,

Barro Group Pty Ltd (Barro) engaged Golder Associates (Golder) to undertake boundary monitoring for volatile organic compounds (VOCs) at 2 locations along the Barro Sunshine Landfill (the site) boundary following the identification of a hotspot in Cell 5 North. The following technical memorandum presents the results from the samples taken 9 December 2019.

#### Sampling Location

Monitoring for VOCs was undertaken at two locations using summa canisters, located near the western boundary (“West”) and northern boundary (“North”). These locations were chosen to best represent ambient air quality conditions at neighbouring residential properties. Details of the monitoring locations and corresponding siting assessment against criteria contained in AS3580.10.1 are presented in Table 1.

**Table 1: Monitoring locations – VOCs by evacuated canister**

Siting requirements (AS 3580.1.1)	Location ID	
	West	North
Co-ordinates (AMG)	308579, 5820432	3087310, 5820691
Clear sky angle 120 <sup>0</sup>	✓	✓
Unrestricted air flow of 270 <sup>0</sup> around sample inlet or 180 <sup>0</sup> if inlet is on side of building	✓	✓
Height above ground to probe 2 m – 15 m	✓	✓
≥2 m from road	✓	✓
10 m from any object with a height exceeding 2 m below the height of sample inlet	X*	X*
No extraneous sources nearby	✓	✓

NOTE: \* trees are located approximately 8 meters from the monitoring locations and are situated on the far side of the monitor to the landfill

The location of the North and West summa canisters does not meet all the siting criteria contained in AS3580.10.1 due to trees located near the site boundary. The presence of nearby trees is a common non-compliance for ambient air quality monitoring sites, however for the purpose of the monitoring it is considered satisfactory.

## Sampling Methodology

The sampling for VOCs was in accordance with Golder Associates Test Method C9 “*Canister (Evacuated) Sampling for VOC and Reduced Sulphur compounds: In Ambient Air and Source Emissions*”.

Sampling was undertaken by collecting whole air samples in electro-polished (SUMMA) stainless steel canisters fitted with a flow restricting device. 6L canisters were used to sample a 24-hour period. The canister is under negative pressure and when opened, slowly draws a whole air sample into the canister. The canister is closed at the end of the monitoring period, while still under a negative pressure.

Canisters were sent to SGS (NATA Accreditation No. 2562) for analysis by Gas Chromatography / Mass Spectrometry (GC/MS) in accordance with USEPA Method TO-15.

The uncertainty varies with the level of component detected, SGS have report a range of uncertainty between 25.5% and 47.4%.

## Results

Volatile organic compound results above the limit of reporting (LOR) were found in both the samples taken 9 December 2019 and are presented in Table 2. A complete list of volatile organic compound analysed are presented in Appendix A.

**Table 2: Results: VOCs by evacuated canister**

Sample No	19-1724	19-1725
Location	West	North
Sample start	9/12/2019 14:59	9/12/2019 14:57
Sample end	10/12/2019 15:07	10/12/2019 15:04
VOCs	Concentration $\mu\text{g}/\text{m}^3$	Concentration $\mu\text{g}/\text{m}^3$
Freon 11	1.7	2.1
Freon 12	3.2	3.0

There are currently no state or national health criteria for assessment of Freon 11 or Freon 12 in ambient air.

## Important information relating to this report

Your attention is drawn to the document, *Important Information Relating to this Report* (LEG04, RL2), which is contained in Appendix B. The statements presented in this document are intended to advise you of what your realistic expectations of this letter should be. The document is not intended to reduce the level of responsibility accepted by Golder Associates, but rather to ensure that all parties who may rely on this letter are aware of the responsibilities each assumes in so doing. We would be pleased to answer any questions the reader may have regarding this document.



Carl Van Brink  
*Environmental Scientist*



Mark Tulau  
*Senior Air Quality Specialist*

CVB/MT/cvb

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**APPENDIX A**

**Lab Results**

Chartered Chemists

16-Dec-2019

Golder Associates

Building 7 Botanicca Corporate Park  
570-588 Swan Street  
Richmond  
Victoria 3121  
Attention: Carl Van Brink

**REPORT NUMBER: M191762**

Site/Client Ref: 1667000

Order No: PO24658

## CERTIFICATE OF ANALYSIS

**SAMPLES:** Two samples were received for analysis  
**DATE RECEIVED:** 12-Dec-2019  
**DATE COMMENCED:** 12-Dec-2019  
**METHODS:** See Attached Results

**RESULTS:** Please refer to attached pages for results.

Note: Results are based on samples as received at SGS laboratories

**REPORTED BY:**



**Adam Atkinson**

Australian Chemistry Manager



NATA Accredited Laboratory Number: 2562  
Corporate Site Number: 14420  
Accredited for compliance  
with ISO/IEC 17025 - Testing.



# ANALYTICAL RESULTS

**Matrix: Canister**

**Method: TO-15.04 Receipt Vacuum / Pressure**

Units as Listed - ^^ Vacuum reported as inches of Mercury below standard atmospheric pressure

Test Started: 13-Dec-19

Analyte Name	Sampled Date	Leeder ID	2019026419	2019026420
		Client ID	19-1724 L4550	19-1725 R3467
	PQL			
Receipt Pressure (PSIA)			12.1	14.5
Receipt Vacuum (inch Hg) ^^			5.10	0.204

# ANALYTICAL RESULTS

**Matrix: Canister**
**Method: TO-15.02 Volatile Organics (w/v)**

 Sample units are expressed in  $\mu\text{g}/\text{m}^3$ 

Test Started: 13-Dec-19

Analyte Name	Leeder ID Client ID	2019026419 19-1724 L4550 10-Dec-19	2019026420 19-1725 R3467 10-Dec-19	2019026421 19-1724 L4550	2019026422 Method
Acrolein		<3.5	<2.9	<3.5	<1.4
Acrylonitrile		<8.9	<7.4	<8.9	<3.6
tert-Amyl Methyl Ether		<3	<2.5	<3	<1.2
Benzene		<2.5	<2.1	<2.5	<1
Bromodichloromethane		<4.9	<4.1	<4.9	<2
Bromoform		<5.9	<5	<5.9	<2.4
Bromomethane		<4.4	<3.7	<4.4	<1.8
1,3-Butadiene		<1.5	<1.2	<1.5	<0.6
2-Butanone (Methyl Ethyl Ketone)		<2.5	<2.1	<2.5	<1
tert-Butyl Alcohol		<2.5	<2.1	<2.5	<1
n-Butylbenzene		<4	<3.3	<4	<1.6
sec-Butylbenzene		<4	<3.3	<4	<1.6
tert-Butylbenzene		<4	<3.3	<4	<1.6
Carbon Tetrachloride		<4.9	<4.1	<4.9	<2
Chlorobenzene		<3	<2.5	<3	<1.2
Chloroethane		<3	<2.5	<3	<1.2
Chloroform		<4.4	<3.7	<4.4	<1.8
Chloromethane		<3.5	<2.9	<3.5	<1.4
2-Chloroprene		<5.4	<4.6	<5.4	<2.2
3-Chloropropene		<3.5	<2.9	<3.5	<1.4
2-Chlorotoluene		<4.4	<3.7	<4.4	<1.8
alpha-Chlorotoluene		<3.5	<2.9	<3.5	<1.4
Cumene		<4	<3.3	<4	<1.6
Cyclohexane		<2	<1.7	<2	<0.8
o-Cymene		<4	<3.3	<4	<1.6
Dibromochloromethane		<5.9	<5	<5.9	<2.4
1,2-Dibromoethane (EDB)		<5.9	<5	<5.9	<2.4
1,2-Dichlorobenzene		<6.4	<5.4	<6.4	<2.6
1,3-Dichlorobenzene		<6.4	<5.4	<6.4	<2.6
1,4-Dichlorobenzene		<6.4	<5.4	<6.4	<2.6
1,1-Dichloroethane		<3.5	<2.9	<3.5	<1.4
1,2-Dichloroethane		<4.9	<4.1	<4.9	<2
1,1-Dichloroethene		<3	<2.5	<3	<1.2
cis-1,2-Dichloroethene		<4	<3.3	<4	<1.6
trans-1,2-Dichloroethene		<3	<2.5	<3	<1.2
1,2-Dichloropropane		<8.9	<7.4	<8.9	<3.6
cis-1,3-Dichloropropene		<3	<2.5	<3	<1.2
trans-1,3-Dichloropropene		<3.5	<2.9	<3.5	<1.4
Diisopropyl Ether		<3.5	<2.9	<3.5	<1.4
1,4-Dioxane		<3	<2.5	<3	<1.2

# ANALYTICAL RESULTS

**Matrix: Canister**
**Method: TO-15.02 Volatile Organics (w/v)**

 Sample units are expressed in  $\mu\text{g}/\text{m}^3$ 

Test Started: 13-Dec-19

Analyte Name	Sampled Date PQL	Leeder ID	2019026419	2019026420	2019026421	2019026422
		Client ID	19-1724 L4550	19-1725 R3467	19-1724 L4550	Method
			10-Dec-19	10-Dec-19	Duplicate	Blank
Ethyl Acetate			<4	<3.3	<4	<1.6
Ethyl Benzene			<3	<2.5	<3	<1.2
Ethyl tert-Butyl Ether			<2.5	<2.1	<2.5	<1
4-Ethyltoluene			<3	<2.5	<3	<1.2
Freon 11			1.7	2.1	1.5	<0.6
Freon 113			<4.9	<4.1	<4.9	<2
Freon 114			<1.5	<1.2	<1.5	<0.6
Freon 12			3.2	3.0	3.2	<0.8
Heptane			<3.5	<2.9	<3.5	<1.4
Hexachlorobutadiene			<9.9	<8.3	<9.9	<4
Hexane			<3	<2.5	<3	<1.2
2-Hexanone			<3	<2.5	<3	<1.2
m,p-Xylene			<6.4	<5.4	<6.4	<2.6
Methyl Methacrylate			<3.5	<2.9	<3.5	<1.4
Methyl tert-butyl ether			<3	<2.5	<3	<1.2
4-Methyl-2-pentanone			<3	<2.5	<3	<1.2
Naphthalene			<10	<8.7	<10	<4.2
2-Propanol			<49	<41	<49	<20
Propene			<4.9	<4.1	<4.9	<2
Propylbenzene			<3.5	<2.9	<3.5	<1.4
Styrene			<3	<2.5	<3	<1.2
1,1,1,2-Tetrachloroethane			<4.9	<4.1	<4.9	<2
1,1,2,2-Tetrachloroethane			<3.5	<2.9	<3.5	<1.4
Tetrachloroethene			<5.4	<4.6	<5.4	<2.2
Tetrahydrofuran			<2	<1.7	<2	<0.8
Toluene			<3	<2.5	<3	<1.2
1,2,4-Trichlorobenzene			<18	<15	<18	<7.2
1,1,1-Trichloroethane			<4	<3.3	<4	<1.6
1,1,2-Trichloroethane			<4	<3.3	<4	<1.6
Trichloroethene			<4.4	<3.7	<4.4	<1.8
1,2,4-Trimethylbenzene			<4	<3.3	<4	<1.6
1,3,5-Trimethylbenzene			<3	<2.5	<3	<1.2
2,2,4-Trimethylpentane			<4.4	<3.7	<4.4	<1.8
Vinyl Acetate			<3.5	<2.9	<3.5	<1.4
Vinyl Bromide			<4	<3.3	<4	<1.6
Vinyl Chloride			<2	<1.7	<2	<0.8
o-Xylene			<3	<2.5	<3	<1.2





## QA/QC RESULTS

**Matrix: Canister****Method: TO-15.02 Volatile Organics (w/v)**

Quality Control Results are expressed in Percent Recovery of expected result

Test Started: 13-Dec-19

Analyte Name	Sampled Date	Leeder ID	2019026423
		Client ID	Method
	PQL	Spike	
Acrylonitrile			100
Benzene			114
1,3-Butadiene			110
Chloroform			119
1,2-Dichloroethane			121

**Matrix: Canister****Method: TO-15.02 Volatile Organics (w/v)**

Quality Control Results are expressed in Percent Recovery of expected result

Test Started: 13-Dec-19

Analyte Name	Sampled Date	Leeder ID	2019026423
		Client ID	Method
	PQL	Spike	
Tetrachloroethene			95
Trichloroethene			100
Vinyl Chloride			115

## QUALIFIERS / NOTES FOR REPORTED RESULTS

PQL	Practical Quantitation Limit
nd	Not Detected – The analyte was not detected above the reported PQL.
is	Insufficient Sample to perform this analysis.
T	Tentative identification based on computer library search of mass spectra.
NC	Not calculated and/or Results below PQL
NV	No Vacuum, Canister received above standard atmospheric pressure
nr	Not Requested for analysis.
R	Rejected Result – results for this analysis failed QC checks.
SQ	Semi-Quantitative result – quantitation based on a generic response factor for this class of analyte.
IM	Inappropriate method of analysis for this compound
U	Unable to provide Quality Control data – high levels of compounds in sample interfered with analysis of QC results.
UF	Unable to provide Quality Control data- Surrogates failed QC checks due to sample matrix effects
L	Analyte detected at a level above the linear response of calibration curve.
E	Estimated result. NATA accreditation does not cover estimated results.
C1	These compounds co-elute.
--	Parameter Not Determined
CT	Elevated concentration. Results reported from carbon tube analysis
**	Sample shows non-petroleum hydrocarbon profile

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**APPENDIX B**

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