

TECHNICAL MEMORANDUM

DATE 12 December 2019

Reference No. 1667000-179-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 6 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°	✓	✓
Unrestricted air flow of 270° around sample inlet or 180° 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 one of the two samples taken and are presented in Table 2. All other compounds were less than the limit of reporting. All volatile organic compound results are presented in Appendix A.

Table 2: Results: VOCs by evacuated canister

Sample No	19-1723
Location	North
Sample start	6/12/2019 12:02
Sample end	7/12/2019 11:13
VOCs	Concentration $\mu\text{g}/\text{m}^3$
Freon 12	2.5

There are currently no state or national health criteria for assessment of 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

11-Dec-2019

REPORT NUMBER: M191752

Site/Client Ref: 1667000

Order No: PO24658

Golder Associates

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

CERTIFICATE OF ANALYSIS

SAMPLES: Two samples were received for analysis
DATE RECEIVED: 9-Dec-2019
DATE COMMENCED: 9-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: 10-Dec-19

Analyte Name	Sampled Date	Leeder ID	2019026271	2019026272
		Client ID	19-1722 R3463	19-1723 L4522
	PQL			
Receipt Pressure (PSIA)			12.1	12.9
Receipt Vacuum (inch Hg) ^^			5.10	3.47

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: 10-Dec-19

Analyte Name	Leeder ID Client ID	2019026271 19-1722 R3463 07-Dec-19	2019026272 19-1723 L4522 07-Dec-19	2019026273 19-1722 R3463	2019026274 Method
Acrolein		<3.5	<3.2	<3.5	<1.4
Acrylonitrile		<8.9	<8.3	<8.9	<3.6
tert-Amyl Methyl Ether		<3	<2.8	<3	<1.2
Benzene		<2.5	<2.3	<2.5	<1
Bromodichloromethane		<4.9	<4.6	<4.9	<2
Bromoform		<5.9	<5.6	<5.9	<2.4
Bromomethane		<4.4	<4.2	<4.4	<1.8
1,3-Butadiene		<1.5	<1.4	<1.5	<0.6
2-Butanone (Methyl Ethyl Ketone)		<2.5	<2.3	<2.5	<1
tert-Butyl Alcohol		<2.5	<2.3	<2.5	<1
n-Butylbenzene		<4	<3.7	<3.9	<1.6
sec-Butylbenzene		<4	<3.7	<3.9	<1.6
tert-Butylbenzene		<4	<3.7	<3.9	<1.6
Carbon Tetrachloride		<4.9	<4.6	<4.9	<2
Chlorobenzene		<3	<2.8	<3	<1.2
Chloroethane		<3	<2.8	<3	<1.2
Chloroform		<4.4	<4.2	<4.4	<1.8
Chloromethane		<3.5	<3.2	<3.5	<1.4
2-Chloroprene		<5.4	<5.1	<5.4	<2.2
3-Chloropropene		<3.5	<3.2	<3.5	<1.4
2-Chlorotoluene		<4.4	<4.2	<4.4	<1.8
alpha-Chlorotoluene		<3.5	<3.2	<3.5	<1.4
Cumene		<4	<3.7	<3.9	<1.6
Cyclohexane		<2	<1.9	<2	<0.8
o-Cymene		<4	<3.7	<3.9	<1.6
Dibromochloromethane		<5.9	<5.6	<5.9	<2.4
1,2-Dibromoethane (EDB)		<5.9	<5.6	<5.9	<2.4
1,2-Dichlorobenzene		<6.4	<6	<6.4	<2.6
1,3-Dichlorobenzene		<6.4	<6	<6.4	<2.6
1,4-Dichlorobenzene		<6.4	<6	<6.4	<2.6
1,1-Dichloroethane		<3.5	<3.2	<3.5	<1.4
1,2-Dichloroethane		<4.9	<4.6	<4.9	<2
1,1-Dichloroethene		<3	<2.8	<3	<1.2
cis-1,2-Dichloroethene		<4	<3.7	<3.9	<1.6
trans-1,2-Dichloroethene		<3	<2.8	<3	<1.2
1,2-Dichloropropane		<8.9	<8.3	<8.9	<3.6
cis-1,3-Dichloropropene		<3	<2.8	<3	<1.2
trans-1,3-Dichloropropene		<3.5	<3.2	<3.5	<1.4
Diisopropyl Ether		<3.5	<3.2	<3.5	<1.4
1,4-Dioxane		<3	<2.8	<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: 10-Dec-19

Analyte Name	Sampled Date PQL	Leeder ID	2019026271	2019026272	2019026273	2019026274
		Client ID	19-1722 R3463	19-1723 L4522	19-1722 R3463	Method
			07-Dec-19	07-Dec-19	Duplicate	Blank
Ethyl Acetate			<4	<3.7	<3.9	<1.6
Ethyl Benzene			<3	<2.8	<3	<1.2
Ethyl tert-Butyl Ether			<2.5	<2.3	<2.5	<1
4-Ethyltoluene			<3	<2.8	<3	<1.2
Freon 11			<1.5	<1.4	<1.5	<0.6
Freon 113			<4.9	<4.6	<4.9	<2
Freon 114			<1.5	<1.4	<1.5	<0.6
Freon 12			<2	2.5	2.6	<0.8
Heptane			<3.5	<3.2	<3.5	<1.4
Hexachlorobutadiene			<9.9	<9.3	<9.9	<4
Hexane			<3	<2.8	<3	<1.2
2-Hexanone			<3	<2.8	<3	<1.2
m,p-Xylene			<6.4	<6	<6.4	<2.6
Methyl Methacrylate			<3.5	<3.2	<3.5	<1.4
Methyl tert-butyl ether			<3	<2.8	<3	<1.2
4-Methyl-2-pentanone			<3	<2.8	<3	<1.2
Naphthalene			<10	<9.7	<10	<4.2
2-Propanol			<49	<46	<49	<20
Propene			<4.9	<4.6	<4.9	<2
Propylbenzene			<3.5	<3.2	<3.5	<1.4
Styrene			<3	<2.8	<3	<1.2
1,1,1,2-Tetrachloroethane			<4.9	<4.6	<4.9	<2
1,1,2,2-Tetrachloroethane			<3.5	<3.2	<3.5	<1.4
Tetrachloroethene			<5.4	<5.1	<5.4	<2.2
Tetrahydrofuran			<2	<1.9	<2	<0.8
Toluene			<3	<2.8	<3	<1.2
1,2,4-Trichlorobenzene			<18	<17	<18	<7.2
1,1,1-Trichloroethane			<4	<3.7	<3.9	<1.6
1,1,2-Trichloroethane			<4	<3.7	<3.9	<1.6
Trichloroethene			<4.4	<4.2	<4.4	<1.8
1,2,4-Trimethylbenzene			<4	<3.7	<3.9	<1.6
1,3,5-Trimethylbenzene			<3	<2.8	<3	<1.2
2,2,4-Trimethylpentane			<4.4	<4.2	<4.4	<1.8
Vinyl Acetate			<3.5	<3.2	<3.5	<1.4
Vinyl Bromide			<4	<3.7	<3.9	<1.6
Vinyl Chloride			<2	<1.9	<2	<0.8
o-Xylene			<3	<2.8	<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: 10-Dec-19

Analyte Name	Sampled Date	Leeder ID	2019026275
		Client ID	Method
	PQL	Spike	
Acrylonitrile			111
Benzene			103
1,3-Butadiene			122
Chloroform			106
1,2-Dichloroethane			106

Matrix: Canister

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

Quality Control Results are expressed in Percent Recovery of expected result

Test Started: 10-Dec-19

Analyte Name	Sampled Date	Leeder ID	2019026275
		Client ID	Method
	PQL	Spike	
Tetrachloroethene			99
Trichloroethene			106
Vinyl Chloride			112

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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This Report**



IMPORTANT INFORMATION RELATING TO THIS REPORT

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