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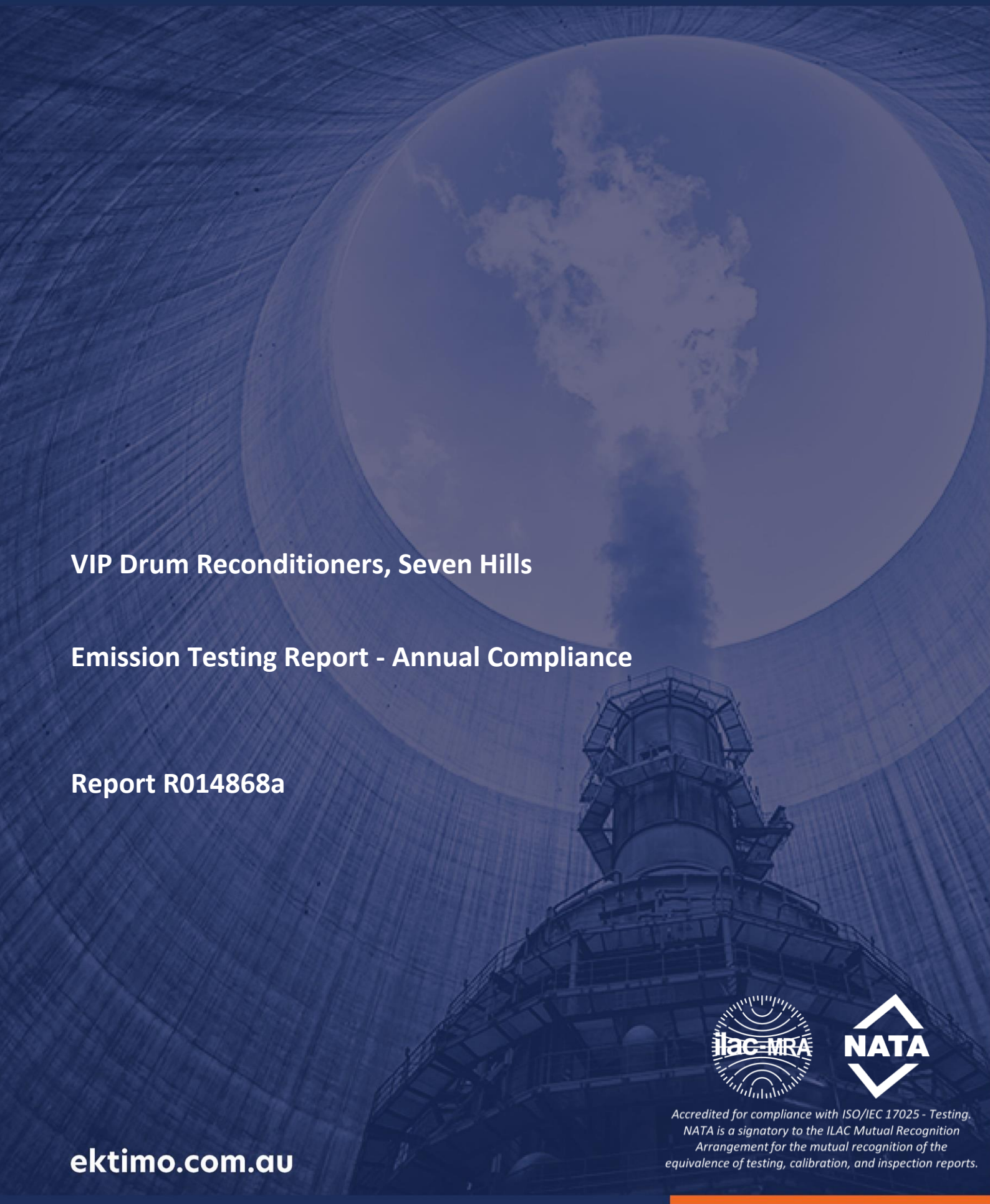

VIP Drum Reconditioners, Seven Hills

Emission Testing Report - Annual Compliance

Report R014868a

Document Information

Client Name:	VIP Drum Reconditioners
Report Number:	R014868a
Date of Issue:	16 February 2024
Attention:	Arielle Comin
Address:	30-32 Powers Rd Seven Hills NSW 2147
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Reissue Record

Original Document Number	Initiator	Original Report Date	Section (s)	Reason for reissue
R014868	Client	1/12/2023	1.3 Licence Comparison 2.1 EPA 1 – Afterburner Discharge Stack	Nitrogen oxides results amended

Report Authorisation

Steven Cooper
Senior Air Monitoring Consultant

NATA Accredited Laboratory
No. 14601

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1 Executive Summary

1.1 Background

Ektimo was engaged by VIP Drum Reconditioners to perform emission testing at their Seven Hills plant. Testing was carried out in accordance with Environmental Licence 124.

1.2 Project Objective

The objective of the project was to conduct a monitoring programme to quantify emissions from the afterburner discharge stack and characteristic of the ingress flow at the cooling air vent as required by VIP Drum Reconditioners' Environmental Licence.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
EPA 1 – Afterburner Discharge Stack	October 4, 2023	Solid particles Carbon dioxide, oxygen, carbon monoxide, nitrogen oxides Sulfuric acid mist & sulfur trioxide (as SO_3) Hydrochloric acid (HCl), chlorine Volatile organic compounds (VOCs) Metals (type 1 substances Sb, As, Cd, Pb, Hg) Dioxins and furans Dry gas density, molecular weight
EPA 1 – Afterburner Discharge Stack	October 18, 2023	Total fluoride, hydrogen sulfide (H_2S)
EPA 2 – Cooling Air Vent	October 4, 2023	Dry gas density, molecular weight

* Flow rate, velocity, temperature, and moisture were also determined.

All results are reported on a dry basis at STP.

Plant operating conditions have been noted in this report.

The cooling air vent (EPA 2) consists of an open slot around the entire 4555mm circumference of the waste air duct stemming from the afterburner. The width of this slot is variable. Fresh ambient air is drawn through the slot under venturi. On the day of sampling the slot was open to a width of 160mm. Velocity measurements were taken with a pitot probe at four accessible locations around the circumference. All calculations assume that the cooling air vent flow into the afterburner waste air duct is consistent and uniform across the entire width and circumference of the slot.

1.3 Licence Comparison

The following licence comparison table shows that analyte highlighted in orange is outside the licence limit set by the NSW EPA as per licence 124 (last amended on 17 May 2023).

EPA	Pollutant	Units	Licence limit	Detected values at STP	Detected values (Corrected to 11% O_2)	Detected values (Corrected to 3% O_2)	Detected values (Corrected to 12% CO_2)
1 - Afterburner Discharge Stack	Dioxins and furans	ng/m^3	0.1	0.0086	**0.064**	-	-
	Hydrogen sulfide (USEPA Method 11)	mg/m^3	5	<0.1	-	**<2**	-
	Hydrogen sulfide (Method Ektimo 255)	mg/m^3	5	0.0074	-	**0.1**	-
	Volatile organic compounds	mg/m^3	40	<0.1	-	**<2**	-
	Nitrogen oxides	mg/m^3	2000	8.1	-	**110**	-
	Mercury	mg/m^3	3	<0.0008	-	**<0.01**	-
	Chlorine	mg/m^3	200	0.13	-	**1.8**	-
	Cadmium	mg/m^3	3	<0.0005	-	**<0.007**	-
	Hydrochloric acid (HCl)	mg/m^3	400	0.33	-	**4.5**	-
	Total fluoride (as HF)	mg/m^3	50	0.051	-	**0.71**	-
	Solid particles	mg/m^3	250	19	-	-	270
	Sulfuric acid mist and sulfur trioxide (as SO_3)	mg/m^3	100	0.17	-	**2.2**	-
	Type 1 substances	mg/m^3	10	≤0.033	-	**≤0.41**	-

Please note that the measurement uncertainty associated with the test results was not considered when determining whether the results were compliant or non-compliant.

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2 Results

2.1 EPA 1 – Afterburner Discharge Stack

Date	4/10/2023	**Client**	VIP Drum Reconditioners
Report	R014868	**Stack ID**	EPA 1 - Afterburner Discharge Stack
Licence No.	124	**Location**	Seven Hills
Ektimo Staff	Graham Edwards, Ish Alam, Sahad Musthafa	**State**	NSW
Process Conditions	Please refer to client records.		*230914*

Stack Parameters		
Moisture content, %v/v	2.9	
Gas molecular weight, g/g mole	28.7 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.30 (dry)
Gas density at discharge conditions, kg/m³	0.72	
% Oxygen correction & Factor	3 %	13.43
% Oxygen correction & Factor	11 %	7.43
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0900	
Temperature, °C	211	
Temperature, K	484	
Velocity at sampling plane, m/s	33	
Volumetric flow rate, actual, m³/s	28	
Volumetric flow rate (wet STP), m³/s	16	
Volumetric flow rate (dry STP), m³/s	15	
Mass flow rate (wet basis), kg/h	72000	

Gas Analyser Results	Average			Minimum			Maximum		
Sampling time	0926 - 1150			0926 - 1150			0926 - 1150		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/min
Combustion Gases									
Nitrogen oxides (as NO_2)	8.1	110	7.4	<4	<60	<4	15	200	13
Carbon monoxide	5.7	77	5.2	<2	<30	<2	42	570	38
	Concentration ppm	Corrected to 3% O2 ppm	Mass Rate g/min	Concentration ppm	Corrected to 3% O2 ppm	Mass Rate g/min	Concentration ppm	Corrected to 3% O2 ppm	Mass Rate g/min
Carbon monoxide	4.6	61	5.2	<2	<30	<2	34	460	38
		Concentration %v/v			Concentration %v/v			Concentration %v/v	
Carbon dioxide		0.8			<0.4			1	
Oxygen		19.6			19.2			20.3	

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Date	4/10/2023	**Client**	VIP Drum Reconditioners
Report	R014868	**Stack ID**	EPA 1 - Afterburner Discharge Stack
Licence No.	124	**Location**	Seven Hills
Ektimo Staff	Graham Edwards, Ish Alam, Sahad Musthafa	**State**	NSW
Process Conditions	Please refer to client records.		230914

Dioxins & Furans (PCDDs & PCDFs)	Results		
Sampling time	0921 - 1140		
	Concentration ng/m³	Corrected to 11% O2 ng/m³	Mass Rate ng/min
2,3,7,8-TCDF	0.00068	0.0051	0.62
2,3,7,8-TCDD	<0.002	<0.02	<2
1,2,3,7,8-PeCDF	0.000097	0.00072	0.088
2,3,4,7,8-PeCDF	0.0014	0.01	1.3
1,2,3,7,8-PeCDD	<0.003	<0.02	<3
1,2,3,4,7,8-HxCDF	0.00022	0.0016	0.2
1,2,3,6,7,8-HxCDF	0.00023	0.0017	0.21
2,3,4,6,7,8-HxCDF	0.00019	0.0014	0.17
1,2,3,7,8,9-HxCDF	<0.00006	<0.0004	<0.05
1,2,3,4,7,8-HxCDD	<0.0002	<0.001	<0.2
1,2,3,6,7,8-HxCDD	<0.0001	<0.0008	<0.1
1,2,3,7,8,9-HxCDD	<0.0002	<0.001	<0.2
1,2,3,4,6,7,8-HpCDF	<0.00003	<0.0003	<0.03
1,2,3,4,7,8,9-HpCDF	<0.00004	<0.0003	<0.04
1,2,3,4,6,7,8-HpCDD	0.000047	0.00035	0.042
OCDF	<0.0000009	<0.000006	<0.0008
OCDD	0.0000077	0.000057	0.0069
Total TCDF isomers	0.26	1.9	240
Total TCDD isomers	0.051	0.38	46
Total PeCDF isomers	0.062	0.46	57
Total PeCDD isomers	0.022	0.16	20
Total HxCDF isomers	0.018	0.13	16
Total HxCDD isomers	0.018	0.13	16
Total HpCDF isomers	<0.01	<0.08	<10
Total HpCDD isomers	0.011	0.08	9.8
Total PCDDs + PCDFs	0.47	3.5	420
WHO05-TEQ			
Lower Bound	0.0029	0.021	2.6
Middle Bound	0.0057	0.043	5.2
Upper Bound	0.0086	0.064	7.8

Abbreviations and definitions

WHO05-TEQ	World Health Organisation toxic equivalents for dioxins and furans
Lower Bound	Defines values reported below detection as equal to zero.
Middle Bound	Defines values reported below detection are equal to half the detection limit.
Upper Bound	Defines values reported below detection are equal to the detection limit.

TEQs are calculated by multiplying the quantified result for each toxic compound by its corresponding toxic equivalency factor.

Isokinetic Sampling Parameters	Results
Dioxins & Furans	
Sampling time, min	128
Isokinetic rate, %	106

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Date	4/10/2023	**Client**	VIP Drum Reconditioners
Report	R014868	**Stack ID**	EPA 1 - Afterburner Discharge Stack
Licence No.	124	**Location**	Seven Hills
Ektimo Staff	Graham Edwards, Ish Alam, Sahad Musthafa	**State**	NSW
Process Conditions	Please refer to client records.		*230914*

Stack Parameters		
Moisture content, %v/v	2.9	
Gas molecular weight, g/g mole	28.7 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.30 (dry)
Gas density at discharge conditions, kg/m³	0.72	
% Oxygen correction & Factor	3 %	13.70
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0900	
Temperature, °C	212	
Temperature, K	485	
Velocity at sampling plane, m/s	33	
Volumetric flow rate, actual, m³/s	28	
Volumetric flow rate (wet STP), m³/s	16	
Volumetric flow rate (dry STP), m³/s	15	
Mass flow rate (wet basis), kg/h	73000	

Halides & Halogens e.g HCl, Cl2, HF	Results		
Sampling time	0950-1115		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/min
Chloride (as HCl)	0.33	4.5	0.3
Chlorine	0.13	1.8	0.12

Total VOCs (as n-Propane)	Results		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/min
Total	<0.1	<2	<0.1

VOC (speciated)	Results		
Sampling time	0958-1115		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/min
Detection limit(1)	<0.2	<2	<0.1

(1) Unless otherwise reported, the following target compounds were found to be below detection:
Ethanol, Acetone, Isopropanol, Pentane, 1,1-Dichloroethene, Acrylonitrile, Dichloromethane, trans-1,2-Dichloroethene, Methyl ethyl ketone, n-Hexane, cis-1,2-Dichloroethene, Ethyl acetate, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Cyclohexane, Benzene, Carbon tetrachloride, Butanol, Isopropyl acetate, 2-Methylhexane, 2,3-Dimethylpentane, 1-Methoxy-2-propanol, 3-Methylhexane, Heptane, Ethyl acrylate, Trichloroethylene, Methyl methacrylate, Propyl acetate, Methylcyclohexane, Methyl Isobutyl Ketone, Toluene, 1,1,2-Trichloroethane, 2-Hexanone, Octane, Tetrachloroethene, Butyl acetate, Chlorobenzene, Ethylbenzene, m +p-Xylene, 1-Methoxy-2-propyl acetate, Styrene, o-Xylene, Butyl acrylate, Nonane, 2-Butoxyethanol, Cellosolve acetate, 1,1,2,2-Tetrachloroethane, Isopropylbenzene, alpha-Pinene, Propylbenzene, 1,3,5-Trimethylbenzene, beta-Pinene, tert-Butylbenzene, 1,2,4-Trimethylbenzene, Decane, 3-Carene, 1,2,3-Trimethylbenzene, D-Limonene, Undecane, Dodecane, Tridecane, Tetradecane, Residuals as Toluene

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Date	4/10/2023	**Client**	VIP Drum Reconditioners
Report	R014868	**Stack ID**	EPA 1 - Afterburner Discharge Stack
Licence No.	124	**Location**	Seven Hills
Ektimo Staff	Graham Edwards, Ish Alam, Sahad Musthafa	**State**	NSW
Process Conditions	Please refer to client records.		*230914*

Stack Parameters		
Moisture content, %v/v	1.6	
Gas molecular weight, g/g mole	28.9 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.29 (wet)	1.30 (dry)
Gas density at discharge conditions, kg/m³	0.73	
% Oxygen correction & Factor	3 %	12.70
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1310	
Temperature, °C	211	
Temperature, K	484	
Velocity at sampling plane, m/s	33	
Volumetric flow rate, actual, m³/s	28	
Volumetric flow rate (wet STP), m³/s	16	
Volumetric flow rate (dry STP), m³/s	15	
Mass flow rate (wet basis), kg/h	72000	

Isokinetic Results	Results		
Sampling time	1320-1445		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/min
Antimony	0.019	0.24	0.017
Arsenic	<0.002	<0.03	<0.002
Cadmium	<0.0005	<0.007	<0.0005
Lead	0.0098	0.12	0.009
Mercury	<0.0008	<0.01	<0.0008
Total Type 1 Substances	≤0.033	≤0.41	≤0.03
Isokinetic Sampling Parameters			
Sampling time, min		80	
Isokinetic rate, %		100	

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Date	4/10/2023	**Client**	VIP Drum Reconditioners
Report	R014868	**Stack ID**	EPA 1 - Afterburner Discharge Stack
Licence No.	124	**Location**	Seven Hills
Ektimo Staff	Graham Edwards, Ish Alam, Sahad Musthafa	**State**	NSW
Process Conditions	Please refer to client records.		*230914*

Stack Parameters		
Moisture content, %v/v	2.1	
Gas molecular weight, g/g mole	28.8 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.30 (dry)
Gas density at discharge conditions, kg/m³	0.72	
% Oxygen correction & Factor	3 %	12.70
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1310	
Temperature, °C	212	
Temperature, K	485	
Velocity at sampling plane, m/s	33	
Volumetric flow rate, actual, m³/s	28	
Volumetric flow rate (wet STP), m³/s	16	
Volumetric flow rate (dry STP), m³/s	15	
Mass flow rate (wet basis), kg/h	72000	

Isokinetic Results	Results		
Sampling time		1320-1445	
	Concentration mg/m³	Corrected to 12% CO2 mg/m³	Mass Rate g/min
Solid Particles	19	270	17
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/min
Sulfur trioxide and/or Sulfuric acid (as SO3)	0.17	2.2	0.16
Isokinetic Sampling Parameters			
Sampling time, min		80	
Isokinetic rate, %		100	
Gravimetric analysis date (total particulate)		09-10-2023	

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Date	18/10/2023	**Client**	VIP Drum Reconditioners
Report	R014868	**Stack ID**	EPA 1 - Afterburner Discharge Stack
Licence No.	124	**Location**	Seven Hills
Ektimo Staff	Graham Edwards, James Cullen	**State**	NSW
Process Conditions	Please refer to client records.		231003

Stack Parameters		
Moisture content, %v/v	3.2	
Gas molecular weight, g/g mole	28.7 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.30 (dry)
Gas density at discharge conditions, kg/m³	0.73	
% Oxygen correction & Factor	3 %	13.87
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1030	
Temperature, °C	211	
Temperature, K	484	
Velocity at sampling plane, m/s	33	
Volumetric flow rate, actual, m³/s	27	
Volumetric flow rate (wet STP), m³/s	16	
Volumetric flow rate (dry STP), m³/s	15	
Mass flow rate (wet basis), kg/h	72000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	1100 - 1335	1100 - 1335	1100 - 1335
	Concentration %v/v	Concentration %v/v	Concentration %v/v
Carbon dioxide	0.8	0.6	1.2
Oxygen	19.6	19.2	20

Hydrogen Sulfide (Method 11)	Results		
Sampling time	1020-1330		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/min
Hydrogen Sulfide	<0.1	<2	<0.1

Hydrogen Sulfide (Ektimo 255)	Results		
Sampling time	1020-1330		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/min
Hydrogen Sulfide	0.0074	0.1	0.0067

Isokinetic Results	Results		
Sampling time	1130-1320		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/min
Total fluoride (as HF)	0.051	0.71	0.046
Isokinetic Sampling Parameters			
Sampling time, min		80	
Isokinetic rate, %		101	

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2.2 EPA 2 – Cooling Air Vent

Date	18/10/2023	**Client**	VIP Drum Reconditioners
Report	R014868	**Stack ID**	EPA 2 - Cooling Air Vent
Licence No.	124	**Location**	Seven Hills
Ektimo Staff	Graham Edwards, James Cullen	**State**	NSW
Process Conditions	Please refer to client records.		*231003*

Comments
Slot width is 160mm this year
The number of points sampled is less than the requirement
The discharge is assumed to be composed of dry air and moisture

Stack Parameters		
Moisture content, %v/v	1	
Gas molecular weight, g/g mole	28.9 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.29 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	1.08	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1350	
Temperature, °C	55	
Temperature, K	328	
Velocity at sampling plane, m/s	22	
Volumetric flow rate, actual, m³/s	16	
Volumetric flow rate (wet STP), m³/s	14	
Volumetric flow rate (dry STP), m³/s	14	
Mass flow rate (wet basis), kg/h	63000	

3 Sample Plane Compliance

3.1 EPA 1 – Afterburner Discharge Stack

Sampling Plane Details	
Source tested	Exhaust vent
Sampling plane dimensions	1035 mm
Sampling plane area	0.841 m²
Sampling port size, number & depth	4" BSP (x2), 80 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 7 D
Upstream disturbance	Change in diameter 3 D
No. traverses & points sampled	2 16
Sample plane conformance to AS 4323.1	Conforming but non-ideal

The sampling plane is deemed to be non-ideal due to the following reasons:
The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D

3.2 EPA 2 – Cooling Air Vent

Sampling Plane Details	
Source tested	Exhaust vent
Sampling plane dimensions	4555 x 160 mm
Sampling plane area	0.729 m²
Sampling port size, number & depth	NA, 0 mm
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Change in diameter 0 D
Upstream disturbance	Change in diameter 0 D
No. traverses & points sampled	4 4
Sample plane conformance to AS 4323.1	Non-conforming

The sampling plane is deemed to be non-conforming due to the following reasons:
The downstream disturbance is <1D from the sampling plane
The upstream disturbance is <2D from the sampling plane

4 Plant Operating Conditions

See VIP Drum Reconditioners records for complete process conditions.

Based on information received from VIP Drum Reconditioners' personnel, it is our understanding that samples were collected during typical plant operations.

5 Test Methods

All sampling and analysis were performed by Ektimo unless otherwise specified. Specific details of the methods are available upon request.

Parameter	Sampling method	Analysis method	Uncertainty*	NATA accredited Sampling	NATA accredited Analysis
Sampling points - Selection	NSW EPA TM-1 (USEPA Method 1)	NA	NA	✓	NA
Flow rate, temperature & velocity	NSW EPA TM-2 (USEPA Method 2)	NSW EPA TM-2 (USEPA Method 2)	8%, 2%, 7%	NA	✓
Moisture content	NSW EPA TM-22 (USEPA Method 4)	NSW EPA TM-22 (USEPA Method 4)	8%	✓	✓
Molecular weight	NA	NSW EPA TM-23 (USEPA Method 3)	not specified	NA	✓
Dry gas density	NA	NSW EPA TM-23 (USEPA Method 3)	not specified	NA	✓
Carbon dioxide	NSW EPA TM-24 (USEPA Method 3A)	NSW EPA TM-24 (USEPA Method 3A)	13%	✓	✓
Carbon monoxide	NSW EPA TM-32 (USEPA Method 10)	NSW EPA TM-32 (USEPA Method 10)	12%	✓	✓
Nitrogen oxides	NSW EPA TM-11 (USEPA Method 7E)	NSW EPA TM-11 (USEPA Method 7E)	12%	✓	✓
Oxygen	NSW EPA TM-25 (USEPA Method 3A)	NSW EPA TM-25 (USEPA Method 3A)	13%	✓	✓
Hydrogen sulfide	Ektimo 255	Ektimo 255	not specified	✓	✓†
Hydrogen sulfide	NSW EPA TM-5 (USEPA Method 11)	NSW EPA TM-5	not specified	✓	✓†
Speciated volatile organic compounds (VOCs)	NSW EPA TM-34[d] (USEPA Method 18)	Ektimo 344	19%	✓	✓†
Solid particles (total)	NSW EPA TM-15 (AS 4323.2)	NSW EPA TM-15 (AS 4323.2)	3%	✓	✓††
Type 1 substances (As, Cd, Hg, Pb, Sb)	NSW EPA TM-12 (USEPA Method 29)	Envirolab in-house methods Metals-020/021/022	15%	✓	✓‡
Dioxins & furans (PCDDs & PCDFs)	NSW EPA TM-18 (USEPA Method 23)	NMI in-house method AUTL_MET_02	16%	✓	✓¶
Fluorine & fluorine compounds[1]	NSW EPA TM-9 (USEPA Method 13B)	Ektimo 235	25%	✓	✓†
Hydrogen chloride	NSW EPA TM-8 (USEPA Method 26A)	Ektimo 235	14%	✓	✓†i
Chlorine	NSW EPA TM-7 (USEPA Method 26A)	Ektimo 235	14%	✓	✓†i
Sulfuric acid mist and/or sulfur trioxide	NSW EPA TM-3 (USEPA Method 8)	Ektimo 235	16%	✓	✓†m

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* Uncertainties cited in this table are estimated using typical values and are calculated at the 95% confidence level (coverage factor = 2).

¶ Analysis performed by Australian Government National Measurement Institute, NATA accreditation number 198. Results were reported to Ektimo on 13 November 2023 in report DAU23_264.

† Analysis performed by Ektimo. Results were reported to Ektimo on.
16 October 2023 in report LV-004988.
16 October 2023 in report LV-004993.
18 October 2023 in report LV-005002.
31 October 2023 in report LV-005052.
3 November 2023 in report LV-005064.
3 November 2023 in report LV-005086.

†† Gravimetric analysis conducted at the Ektimo NSW laboratory.

‡ Analysis performed by Envirolab, NATA accreditation number 2901. Results were reported to Ektimo on 12 October 2023 in report 334654.

[1] Sampling follows USEPA Method 13B and analysis follows Ektimo 235 (ion chromatography which uses the same principle as the NSW EPA approved alternative analysis method USEPA SW-846 Method 9056A).

[d] Excludes recovery study as specified in section 8.4.3 of USEPA Test Method 18.

[i] Includes analysis of chlorine/chloride by Ektimo 235 which uses the same principle as USEPA Method 26/26A.

[m] Includes analysis of SO_3/H_2SO_4 by Ektimo 235 which uses the same principle as USEPA SW-846 Method 9056A which is an approved alternative to the analytical procedure of USEPA Method 8.

6 Deviations to Test Methods

HYDROGEN SULFIDE

The hydrogen sulfide result (sampled on 7 June 2022) was performed via Ektimo Method 255 (based on Vic EPA Method B18; UV-Vis, colorimetric detection).

Ektimo Method 255 comprises sampling into an impinger solution containing an alkaline cadmium hydroxide suspension.

The hydrogen sulfide in the sample is precipitated as cadmium sulfide and the collected sulfide is determined spectrophotometrically at 670nm by measuring methylene blue. The methylene blue is produced by reaction of sulfide with an acid solution of N,N-dimethyl-p-phenylenediamine and ferric chloride.

Use of Ektimo Method 255 provides for a significantly lower detection limit than USEPA Method 11. A lower detection limit may be necessary at this location because the measured hydrogen sulfide concentration is subject to 3% oxygen correction. Please note, that hydrogen sulfide was also sampled via USEPA 11 (NSW TM-5).

NSW EPA TM-34 (USEPA 18)

Ektimo notes that the sampling and analysis of Volatile Organic Compounds (VOCs), per USEPA Method 18 has excluded the recovery study as specified in Section 8.4.3. Performing the recovery study described in Section 8.4.3 of USEPA Method 18 for analytes present at low levels is problematic. Given this, Ektimo applies a threshold of 50µg as a lower-bound mass, below which the 'spiking' of specific volatile organic compounds is not performed. For the purposes of this round of monitoring, all compounds were below 50µg. Therefore, recovery studies were not performed.

7 Quality Assurance/Quality Control Information

Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants from industrial sources. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA's website www.nata.com.au.

Ektimo is accredited by NATA to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Quality Director.

NATA is a member of APAC (Asia Pacific Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through mutual recognition arrangements with these organisations, NATA accreditation is recognised worldwide.

Unless specifically noted, all samples were collected and handled in accordance with Ektimo's QA/QC standards.

8 Definitions

The following symbols and abbreviations may be used in this test report:

% v/v	Volume to volume ratio
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
AS	Australian Standard
D	Duct diameter or equivalent duct diameter for rectangular ducts
DECC	Department of Environment & Climate Change (NSW)
Disturbance	A flow obstruction or instability in the direction of the flow which may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter.
EPA	Environment Protection Authority
FTIR	Fourier transform infra-red
ISC	Intersociety Committee, Methods of Air Sampling and Analysis
ISO	International Organisation for Standardisation
ITE	Individual threshold estimate
Lower bound	When an analyte is not present above the detection limit, the result is assumed to be equal to zero.
Medium bound	When an analyte is not present above the detection limit, the result is assumed to be equal to half of the detection limit.
NA	Not applicable
NATA	National Association of Testing Authorities
NT	Not tested or results not required
Semi-quantified VOCs	Unknown VOCs (those for which an analytical standard is not available), are identified by matching the mass spectrum of the chromatographic peak to the NIST Standard Reference Database (version 14.0), with a match quality exceeding 70%. An estimated concentration is determined by matching the area of the peak with the nearest suitable compound in the analytical calibration standard mixture.
STP	Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0 °C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa.
TM	Test method
TOC	Total organic carbon. This is the sum of all compounds of carbon which contain at least one carbon-to-carbon bond, plus methane and its derivatives.
USEPA	United States Environmental Protection Agency
VDI	Verein Deutscher Ingenieure (Association of German Engineers)
Velocity difference	The percentage difference between the average of initial flows and after flows.
VOC	Volatile organic compound. A carbon-based chemical compound with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the given conditions of use. VOCs may contain oxygen, nitrogen and other elements. VOCs do not include carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
WHO05-TEQ	World Health Organisation toxic equivalents
XRD	X-ray diffractometry
Upper bound	When an analyte is not present above the detection limit, the result is assumed to be equal to the detection limit.
95% confidence interval	Range of values that contains the true result with 95% certainty. This means there is a 5% risk that the true result is outside this range.

9 Appendices

Appendix A: Site Images

Image 1. EPA 1 – Afterburner Discharge Stack

Image 3. EPA 2 – Cooling Air Vent

Appendix B: Chain(s) of Custody

JOB NUMBER R014868

Ektimo

Checked at Ektimo Dispatch by: SMH 5/10/23 (Sign/Date)

Samples received in good order: [signature] 5/10/23 (Sign/Date)

Sample ID	Job No.	Analysis Required	Units Required	Analytical Lab	Purchase Order No.	Ektimo Contact	Notes	TAT Required (days)
N 19965 1	R014868	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn)	ug/samples	Envirolab	W012270	Graham Edwards	Filter (Blank)	
N 19966 2	R014868	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn)	ug/samples	Envirolab	W012270	Graham Edwards	Filter (Sample)	
N 19967 3	R014868	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn)	ug/litre	Envirolab	W012270	Graham Edwards	Solution (Blank)	
N 19968 4	R014868	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn)	ug/litre	Envirolab	W012270	Graham Edwards	Impinger 1-4	
N 19969 5	R014868	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn)	ug/litre	Envirolab	W012270	Graham Edwards	Impinger Rinse (Blank)	
N 19970 6	R014868	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn)	ug/litre	Envirolab	W012270	Graham Edwards	Impinger Rinse	
N 19971 7	R014868	Hg	ug/litre	Envirolab	W012270	Graham Edwards	Impinger 5-6 (Blank)	
N 19972 8	R014868	Hg	ug/litre	Envirolab	W012270	Graham Edwards	Impinger 5-6	
N 19973 9	R014868	Hg	ug/litre	Envirolab	W012270	Graham Edwards	HCl Rinse (Blank)	
N 19974 10	R014868	Hg	ug/litre	Envirolab	W012270	Graham Edwards	HCl Rinse	

ENVIROLAB

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 334654
Date Received: 5/10/23
Time Received: 1620
Received By: R
Temp: Cool/Ambient 21.1C
Cooling: Ice/Icepack
Security: Intact/Broken/None

EKTI\$1|231009
Due 06|10|23
RV

Ektimo

Checked at Ektimo Dispatch by: _____ (Sign/Date)

Samples received in good order: _____ (Sign/Date)

Sample ID	Job No.	Analysis Required	Units Required	Analytical Lab	Purchase Order No.	Ektimo Contact	Notes	TAT Required (days)
N 19985	R014868	Dioxins and Furans Filter - AUT231003A	ng/sample	NMI	W012286	Graham Edwards	Dioxins and Furans Filter - AUT231003A	
N 19986	R014868	Dioxins and Furans Resin - AUT231003A	ng/sample	NMI	W012286	Graham Edwards	Dioxins and Furans Resin - AUT231003A	
N 19987	R014868	Dioxins and Furans Rinse - AUT231003A	ng/sample	NMI	W012286	Graham Edwards	Dioxins and Furans Rinse - AUT231003A	

N23/020710

RECEIVED
09 OCT 2023
BY: RV 12:15

JOB NUMBER R014868

Ektimo

Checked at Ektimo Dispatch by: SMH 05/10/23 (Sign/Date)

Samples received in good order: _____ (Sign/Date)

Sample ID	Job No.	Analysis Required	Units Required	Analytical Lab	Purchase Order No.	Ektimo Contact	Notes	TAT Required (days)
N 19975	R014868	SO3 + H2SO4	ug/litre	Ektimo		Graham Edwards	SO3 (Blank)	
N 19976	R014868	SO3 + H2SO4	ug/litre	Ektimo		Graham Edwards	SO3 Solution	
N 19977	R014868	HCl, HF	ug/litre	Ektimo		Graham Edwards	HCl (Blank)	
N 19978	R014868	HCl, HF	ug/litre	Ektimo		Graham Edwards	Halides (HCl) - Sample A	
N 19979	R014868	HCl, HF	ug/litre	Ektimo		Graham Edwards	Halides (HCl) - Sample B	
N 19980	R014868	Cl2	ug/litre	Ektimo		Graham Edwards	Halogens (Cl2) (Blank)	
N 19981	R014868	Cl2	ug/litre	Ektimo		Graham Edwards	Halogens (Cl2) - Sample A	
N 19982	R014868	Cl2	ug/litre	Ektimo		Graham Edwards	Halogens (Cl2) - Sample B	
N 19983	R014868	VOC	ug/sample	Ektimo		Graham Edwards	VOCs Blank tube	
N 19984	R014868	VOC	ug/sam[ple	Ektimo		Graham Edwards	VOCs	

logged AKo 6/10/23

Appendix C: Laboratory Results

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CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-005064
Job Number:	R014868
Date of Issue:	3/11/2023
Attention:	VIP Drum Reconditioners
Address:	30-32 Powers Rd Seven Hills, NSW 2147
Date samples received:	24/10/2023
Number of samples received:	2
Date samples analysed:	1/11/2023
No of samples analysed:	2
Test method(s) used:	Ektimo 235

Comments

QC Acceptance Criteria:

Parameter	Criteria	Pass/Fail
Standard Curve	$R^2 > 0.99$	Pass
Range	All samples <110% of highest standard	Pass
Repeat samples	Between 80% - 120%	Pass
Method Blanks	All method blanks < PQL	Pass
QC sample	2 standard deviations of theoretical	Pass
Chemical Expiry	All chemicals within expiry date	Pass

This report supersedes any previous report(s) with this reference. Sample(s) have been analysed as received.

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A formal Quality Control program is in place at Ektimo to monitor analyses performed in the laboratory and sampling conducted in the field. The program is designed to check where appropriate; the sampling reproducibility, analytical method, accuracy, precision and the performance of the analyst. The Laboratory Manager is responsible for the administration and maintenance of this program.

REPORT AUTHORISATION

Version 230707

Cappi Tuffery
Laboratory Chemist

Daniel Balaam
Senior Laboratory Chemist

NATA Accredited Laboratory 14601

Accredited for compliance with ISO/IEC 17025. NATA is a signatory to the ILAC mutual recognition arrangement for the mutual recognition of the equivalence of testing, calibration and inspection reports

Ektimo

Analytical Results

Report No. LV-005064
Job No. R014868
Client Name: VIP Drum Reconditioners

Parameter	Analyte	Units	N 20162 VIP Drum Reconditioners EPA 1 Blank (HF)	N 20163 VIP Drum Reconditioners EPA 1 Filter + Solution
Sample Volume		mL	350	330
Hydrogen fluoride (HF)	F^-	mg/L	<0.1	0.20
PQL	<	mg/L	0.1	0.1

* Results marked with an asterisk are outside the acceptable calibration range of the instrument.

NATA Accredited Laboratory 14601

Ektimo

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CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Client:	VIP Drum Reconditioners
Report Number:	LV-005086
Job Number:	R014868
Date of Issue:	8/11/2023
Attention:	VIP Drum Reconditioners
Address:	30-32 Powers Rd Seven Hills, NSW 2147
Date samples received:	24/10/2023
Number of samples received:	2
Date samples analysed:	3/11/2023
No of samples analysed:	2
Test method(s) used:	USEPA Method 11

Comments

Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants from industrial sources; unless otherwise stated, the test method used falls within the scope of Ektimo's NATA accreditation. For full details, search for Ektimo at NATA's website www.nata.com.au.

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REPORT AUTHORISATION

Version 160223

Annie Kolokithas
Laboratory Technician

Daniel Balaam
Senior Laboratory Chemist

NATA Accredited Laboratory 14601

Ektimo

Analytical Results

Report No. LV-005086

Job No. R014868

Client Name: VIP Drum Reconditioners

Sample ID	Location	Sample name	Observations	As received sample volume (ml)	Volume analysed (ml)	H_2S mass in impinger solution (µg)
N20157	EPA 1	BLANK	Nil odour, Clear	43	43	< 42.6
N20158	EPA 1	Impinger 3-5	Slight odour, Clear	43	43	< 42.6

* Results marked with an asterisk are outside the acceptable calibration range of the instrument.

Ektimo

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CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	
Job Number:	R014868
Date of Issue:	31/10/2023
Attention:	Ektimo Adminstration
Address:	26 Redland Dr Mitcham, VIC, 3132
Date samples received:	24/10/2023
Number of samples received:	3
Date samples analysed:	26/10/2023
Number of samples analysed:	3
Test method(s) used:	Ektimo 255

Comments

QC Acceptance Criteria:

Parameter	Criteria	Pass/Fail
Standard Curve	$R^2 > 0.99$	PASS
Range	All samples <100% of highest standard.	PASS
QC sample	2 standard deviations of theoretical.	PASS
Chemical expiry	All chemicals within expiry date.	PASS
Holding time	All samples analysed within 3 day holding time.	FAIL

This report supersedes any previous report(s) with this reference. Sample(s) have been analysed as received.

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REPORT AUTHORISATION

Version 220412

Matthew Cook
Laboratory Manager

Daniel Balaam
Senior Laboratory Chemist

NATA Accredited Laboratory 14601

Ektimo **Analytical Results**

Report No. R014868
Job No. LV-005052
Client Name: VIP Drum Reconditioners

Sample ID	Location	Sample Name	Observations	Volume (mL)	H_2S Concentration (µg/L)	PQL < (µg/L)
N 20159	EPA 1	H2S Blank (UV VIS)	Nil odour, no discolouration	440	< 29.95	29.95
N 20160	EPA 1	H2S A (UV VIS)	Slight odour, no discolouration	20	85.42	34.44
N 20161	EPA 1	H2S B (UV VIS)	Slight odour, no discolouration	15	46.84	45.93

* Results marked with an asterisk are outside the acceptable calibration range of the instrument.

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CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-004993
Job Number:	R014868
Date of Issue:	16/10/2023
Attention:	VIP DRUM RECONDITIONERS
Address:	30-32 Powers Rd Seven Hills, NSW 2147
Date samples received:	6/10/2023
Number of samples received:	2
Date samples analysed:	9/10/2023
No of samples analysed:	2
Test method(s) used:	Ektimo 235

Comments

QC Acceptance Criteria:

Parameter	Criteria	Pass/Fail
Standard Curve	$R^2 > 0.99$	Pass
Range	All samples <110% of highest standard	Pass
Repeat samples	Between 80% - 120%	Pass
Method Blanks	All method blanks < PQL	Pass
QC sample	2 standard deviations of theoretical	Pass
Chemical Expiry	All chemicals within expiry date	Pass

This report supersedes any previous report(s) with this reference. Sample(s) have been analysed as received.

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REPORT AUTHORISATION

Version 230707

Cappi Tuffery
Laboratory Chemist

Daniel Balaam
Senior Laboratory Chemist

NATA Accredited Laboratory 14601

Accredited for compliance with ISO/IEC 17025. NATA is a signatory to the ILAC mutual recognition arrangement for the mutual recognition of the equivalence of testing, calibration and inspection reports

Ektimo

Analytical Results

Report No. LV-004993
Job No. R014868
Client Name: VIP DRUM RECONDITIONERS

Parameter	Analyte	Units	N 19975 VIP Drum Reconditioners EPA1 SO3 Solution (SO3 + H2SO4)	N 19976 VIP Drum Reconditioners EPA1 SO3 Solution
Sample Volume		mL	150	158
Sulfur trioxide (SO_3)	SO_4^{2-}	mg/L	<0.2	1.80
Sulfuric acid (H_2SO_4)	SO_4^{2-}	mg/L	<0.2	1.80
PQL	<	mg/L	0.2	0.2

* Results marked with an asterisk are outside the acceptable calibration range of the instrument.

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CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-005002
Job Number:	R014868
Date of Issue:	18/10/2023
Attention:	VIP Drum Reconditioners
Address:	30-32 Powers Rd Seven Hills, NSW 2147
Date samples received:	6/10/2023
Number of samples received:	2
Date samples analysed:	18/10/2023
No of samples analysed:	2
Test method(s) used:	Ektimo 344

Comments

QC Acceptance Criteria:

Parameter	Criteria	Pass/Fail
Standard Curve	$R^2 > 0.99$	Pass
Range	All samples <110% of highest standard	Pass
Repeat samples	Between 80% - 120%	Pass
Method Blanks	All method blanks < PQL	Pass
QC sample	2 standard deviations of theoretical	Pass
Chemical Expiry	All chemicals within expiry date	Pass

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REPORT AUTHORISATION

Version 230707

Matthew Cook
Laboratory Manager

Daniel Balaam
Senior Laboratory Chemist

NATA Accredited Laboratory 14601

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Ektimo

Analytical Results

Report No. LV-005002

Job No. R014868

Client Name: VIP Drum Reconditioners

Parameter	Units	N19983 R014868	N19984 R014868
	PQL	2.0	2.0
Ethanol	µg	<2	<2
Acetone	µg	<2	<2
Isopropanol	µg	<2	<2
Pentane	µg	<2	<2
1,1-Dichloroethene	µg	<2	<2
Acrylonitrile	µg	<2	<2
Dichloromethane	µg	<2	<2
trans-1,2-Dichloroethene	µg	<2	<2
Methyl ethyl ketone	µg	<2	<2
n-Hexane	µg	<2	<2
cis-1,2-Dichloroethene	µg	<2	<2
Ethyl acetate	µg	<2	<2
Chloroform	µg	<2	<2
1,1,1-Trichloroethane	µg	<2	<2
1,2-Dichloroethane	µg	<2	<2
Cyclohexane	µg	<2	<2
Benzene	µg	<2	<2
Carbon tetrachloride	µg	<2	<2
Butanol	µg	<2	<2
Isopropyl acetate	µg	<2	<2
2-Methylhexane	µg	<2	<2
2,3-Dimethylpentane	µg	<2	<2
1-Methoxy-2-propanol	µg	<2	<2
3-Methylhexane	µg	<2	<2
Heptane	µg	<2	<2
Ethyl acrylate	µg	<2	<2
Trichloroethylene	µg	<2	<2
Methyl methacrylate	µg	<2	<2
Propyl acetate	µg	<2	<2
Methylcyclohexane	µg	<2	<2
Methyl Isobutyl Ketone	µg	<2	<2
Toluene	µg	<2	<2
1,1,2-Trichloroethane	µg	<2	<2
2-Hexanone	µg	<2	<2
Octane	µg	<2	<2
Tetrachloroethene	µg	<2	<2
Butyl acetate	µg	<2	<2
Chlorobenzene	µg	<2	<2
Ethylbenzene	µg	<2	<2
m + p-Xylene	µg	<2	<2
1-Methoxy-2-propyl acetate	µg	<2	<2
Styrene	µg	<2	<2
o-Xylene	µg	<2	<2
Butyl acrylate	µg	<2	<2
Nonane	µg	<2	<2

* Results marked with an asterisk are outside the acceptable calibration range of the instrument.

NATA Accredited Laboratory 14601

Ektimo

Analytical Results

Report No. LV-005002

Job No. R014868

Client Name: VIP Drum Reconditioners

Parameter	Units	N19983 R014868	N19984 R014868
	PQL	2.0	2.0
2-Butoxyethanol	µg	<2	<2
Cellosolve acetate	µg	<2	<2
1,1,2,2-Tetrachloroethane	µg	<2	<2
Isopropylbenzene	µg	<2	<2
alpha-Pinene	µg	<2	<2
Propylbenzene	µg	<2	<2
1,3,5-Trimethylbenzene	µg	<2	<2
beta-Pinene	µg	<2	<2
tert-Butylbenzene	µg	<2	<2
1,2,4-Trimethylbenzene	µg	<2	<2
Decane	µg	<2	<2
3-Carene	µg	<2	<2
1,2,3-Trimethylbenzene	µg	<2	<2
D-Limonene	µg	<2	<2
Undecane	µg	<2	<2
Dodecane	µg	<2	<2
Tridecane	µg	<2	<2
Tetradecane	µg	<2	<2
Residuals as Toluene	µg	<2	<2

* Results marked with an asterisk are outside the acceptable calibration range of the instrument.

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CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-004988
Job Number:	R014868
Date of Issue:	16/10/2023
Attention:	VIP Drum Reconditioners
Address:	30-32 Powers Rd Seven Hills, NSW 2147
Date samples received:	6/10/2023
Number of samples received:	6
Date samples analysed:	16/10/2023
No of samples analysed:	6
Test method(s) used:	Ektimo 235

Comments

QC Acceptance Criteria:

Parameter	Criteria	Pass/Fail
Standard Curve	$R^2 > 0.99$	Pass
Range	All samples <110% of highest standard	Pass
Repeat samples	Between 80% - 120%	Pass
Method Blanks	All method blanks < PQL	Pass
QC sample	2 standard deviations of theoretical	Pass
Chemical Expiry	All chemicals within expiry date	Pass

This report supersedes any previous report(s) with this reference. Sample(s) have been analysed as received.

Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants from industrial sources. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA's website www.nata.com.au.

Ektimo is accredited by NATA (National Association of Testing Authorities) to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Quality Director.

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A formal Quality Control program is in place at Ektimo to monitor analyses performed in the laboratory and sampling conducted in the field. The program is designed to check where appropriate; the sampling reproducibility, analytical method, accuracy, precision and the performance of the analyst. The Laboratory Manager is responsible for the administration and maintenance of this program.

REPORT AUTHORISATION

Version 230707

Cappi Tuffery
Laboratory Chemist

Daniel Balaam
Senior Laboratory Chemist

NATA Accredited Laboratory 14601

Accredited for compliance with ISO/IEC 17025. NATA is a signatory to the ILAC mutual recognition arrangement for the mutual recognition of the equivalence of testing, calibration and inspection reports

Ektimo

Analytical Results

Report No. LV-004988
Job No. R014868
Client Name: VIP Drum Reconditioners

Parameter	Analyte	Units	N 19977 VIP Drum Reconditioners EPA1 HCl Blank (HCl, HF)	N 19978 VIP Drum Reconditioners EPA1 Halides HCl - Sample A	N 19979 VIP Drum Reconditioners EPA1 Halides HCl - Sample B	N 19980 VIP Drum Reconditioners EPA1 Halogens Cl2 Blank (Cl2)	N 19981 VIP Drum Reconditioners EPA1 Halogens Cl2 Sample A	N 19982 VIP Drum Reconditioners EPA1 Halogens Cl2 Sample B
Sample Volume		mL	24	16.5	12.5	25	13	11.5
Hydrogen chloride (HCl)	Cl^-	mg/L	<0.1	1.83	0.71			
Chlorine (Cl_2)	Cl^-	mg/L				0.24	0.70	0.95
Hydrogen fluoride (HF)	F^-	mg/L	<0.1	1.23	0.19			
PQL	<	mg/L	0.1	0.1	0.1	0.1	0.1	0.1

* Results marked with an asterisk are outside the acceptable calibration range of the instrument.

NATA Accredited Laboratory 14601

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CERTIFICATE OF ANALYSIS 334654

Client Details

Client	Ektimo (Unanderra)
Attention	Graham Edwards
Address	1/251 Princes Hwy, Unanderra, NSW, 2526

Sample Details

Your Reference	**R014868**
Number of Samples	2 Filter, 8 Water
Date samples received	05/10/2023
Date completed instructions received	05/10/2023

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.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	12/10/2023
Date of Issue	12/10/2023

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Loren Bardwell, Development Chemist

Authorised By
Nancy Zhang, Laboratory Manager

Metals on filters			
Our Reference		334654-1	334654-2
Your Reference	UNITS	N19965	N19966
Type of sample		Filter	Filter
Date prepared	-	12/10/2023	12/10/2023
Date analysed	-	12/10/2023	12/10/2023
Antimony	µg/filter	<5	20
Arsenic	µg/filter	<2	<2
Cadmium	µg/filter	<0.5	<0.5
Lead	µg/filter	<1	9
Mercury	µg/filter	<0.2	<0.2
Beryllium	µg/filter	<0.5	<0.5
Chromium	µg/filter	2	9.0
Cobalt	µg/filter	<0.5	2
Manganese	µg/filter	<0.5	1
Nickel	µg/filter	<1	<1
Selenium	µg/filter	<5	<5
Vanadium	µg/filter	<1	<1
Tin	µg/filter	<2	<2

Metals in water - mass units						
Our Reference		334654-3	334654-4	334654-5	334654-6	334654-7
Your Reference	UNITS	N19967	N19968	N19969	N19970	N19971
Type of sample		Water	Water	Water	Water	Water
Volume	mL	210	253	198	243	368
Antimony	µg	<0.5	<0.5	<0.5	<0.5	[NA]
Arsenic	µg	<0.5	<0.5	<0.5	<0.5	[NA]
Cadmium	µg	<0.05	<0.05	<0.05	<0.05	[NA]
Lead	µg	<0.5	0.7	<0.5	1	[NA]
Mercury	µg	<10	<10	<10	<10	<1
Beryllium	µg	<0.5	<0.5	<0.5	<0.5	[NA]
Chromium	µg	1	2	<0.5	1	[NA]
Cobalt	µg	<0.5	<0.5	<0.5	<0.5	[NA]
Manganese	µg	<3	<3	<3	<3	[NA]
Nickel	µg	0.7	3	<0.5	3	[NA]
Selenium	µg	<0.5	<0.5	<0.5	<0.5	[NA]
Vanadium	µg	<0.5	<0.5	<0.5	<0.5	[NA]
Tin	µg	4	5	<0.5	<0.5	[NA]
Date prepared	-	11/10/2023	11/10/2023	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	11/10/2023	11/10/2023	11/10/2023	11/10/2023	11/10/2023
Antimony-Dissolved	µg/L	<1	<1	<1	<1	[NA]
Arsenic-Dissolved	µg/L	<1	<1	<1	<1	[NA]
Cadmium-Dissolved	µg/L	0.1	0.1	0.2	0.2	[NA]
Lead-Dissolved	µg/L	2	3	<1	4	[NA]
Mercury-Dissolved	µg/L	<1	<1	<1	<1	<0.1
Beryllium-Dissolved	µg/L	<0.5	<0.5	<0.5	<0.5	[NA]
Chromium-Dissolved	µg/L	7	9	<1	5	[NA]
Cobalt-Dissolved	µg/L	<1	<1	<1	<1	[NA]
Manganese-Dissolved	µg/L	<5	8	<5	6	[NA]
Nickel-Dissolved	µg/L	3	11	<1	13	[NA]
Selenium-Dissolved	µg/L	<1	<1	<1	<1	[NA]
Vanadium-Dissolved	µg/L	<1	<1	<1	<1	[NA]
Tin-Dissolved	µg/L	21	19	<1	1	[NA]

Metals in water - mass units				
Our Reference		334654-8	334654-9	334654-10
Your Reference	UNITS	N19972	N19973	N19974
Type of sample		Water	Water	Water
Volume	mL	421	217	215
Mercury	µg	<1	<0.5	<0.5
Date prepared	-	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	11/10/2023	11/10/2023	11/10/2023
Mercury-Dissolved	µg/L	0.4	<0.05	<0.05

Method ID	Methodology Summary
Metals-020/021/022	Determination of various metals on filters by ICP-AES/MS and or CV/AAS. Note - air volume measurements are not covered by Envirolab's NATA accreditation.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms (e.g. FeO, PbO, ZnO) are determinined stoichiometrically from the base metal concentration.

QUALITY CONTROL: Metals on filters					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			12/10/2023	[NT]	[NT]	[NT]	[NT]	12/10/2023	[NT]
Date analysed	-			12/10/2023	[NT]	[NT]	[NT]	[NT]	12/10/2023	[NT]
Antimony	µg/filter	5	Metals-020/021/022	<5	[NT]	[NT]	[NT]	[NT]	98	[NT]
Arsenic	µg/filter	2	Metals-020/021/022	<2	[NT]	[NT]	[NT]	[NT]	97	[NT]
Cadmium	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	98	[NT]
Lead	µg/filter	1	Metals-020/021/022	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Mercury	µg/filter	0.2	Metals-020/021/022	<0.2	[NT]	[NT]	[NT]	[NT]	95	[NT]
Beryllium	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	107	[NT]
Chromium	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	95	[NT]
Cobalt	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	101	[NT]
Manganese	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	98	[NT]
Nickel	µg/filter	1	Metals-020/021/022	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Selenium	µg/filter	5	Metals-020/021/022	<5	[NT]	[NT]	[NT]	[NT]	95	[NT]
Vanadium	µg/filter	1	Metals-020/021/022	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Tin	µg/filter	2	Metals-020/021/022	<2	[NT]	[NT]	[NT]	[NT]	103	[NT]

QUALITY CONTROL: Metals in water - mass units						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W5	334654-6
Antimony	µg	0.5	Metals-022	<0.5	4	<0.5	[NT]		[NT]	[NT]
Arsenic	µg	0.5	Metals-022	<0.5	4	<0.5	[NT]		[NT]	[NT]
Cadmium	µg	0.05	Metals-022	<0.05	4	<0.05	[NT]		[NT]	[NT]
Lead	µg	0.5	Metals-022	<0.5	4	0.7	[NT]		[NT]	[NT]
Mercury	µg	0.5	Metals-021	<0.5	4	<10	<10	0	[NT]	[NT]
Beryllium	µg	0.5	Metals-022	<0.5	4	<0.5	[NT]		[NT]	[NT]
Chromium	µg	0.5	Metals-022	<0.5	4	2	[NT]		[NT]	[NT]
Cobalt	µg	0.5	Metals-022	<0.5	4	<0.5	[NT]		[NT]	[NT]
Manganese	µg	3	Metals-022	<3	4	<3	[NT]		[NT]	[NT]
Nickel	µg	0.5	Metals-022	<0.5	4	3	[NT]		[NT]	[NT]
Selenium	µg	0.5	Metals-022	<0.5	4	<0.5	[NT]		[NT]	[NT]
Vanadium	µg	0.5	Metals-022	<0.5	4	<0.5	[NT]		[NT]	[NT]
Tin	µg	0.5	Metals-022	<0.5	4	5	[NT]		[NT]	[NT]
Date prepared	-			11/10/2023	4	11/10/2023	11/10/2023		11/10/2023	11/10/2023
Date analysed	-			11/10/2023	4	11/10/2023	11/10/2023		11/10/2023	11/10/2023
Antimony-Dissolved	µg/L	1	Metals-022	<1	4	<1	[NT]		91	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	4	<1	[NT]		96	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	4	0.1	[NT]		101	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	4	3	[NT]		100	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	4	<1	<1	0	90	97
Beryllium-Dissolved	µg/L	0.5	Metals-022	<0.5	4	<0.5	[NT]		105	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	4	9	[NT]		110	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	<1	4	<1	[NT]		110	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	<5	4	8	[NT]		112	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	4	11	[NT]		105	[NT]
Selenium-Dissolved	µg/L	1	Metals-022	<1	4	<1	[NT]		94	[NT]
Vanadium-Dissolved	µg/L	1	Metals-022	<1	4	<1	[NT]		105	[NT]
Tin-Dissolved	µg/L	1	Metals-022	<1	4	19	[NT]		105	[NT]

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

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.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

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.

Report Comments

Metals in water - mass units - The PQL for Hg has been raised due to the sample matrix requiring dilution.

Australian Government
National Measurement Institute

CERTIFICATE OF ANALYSIS # DAU23_264

Client	Ektimo Pty. Ltd. 6/78 Reserve Road Artarmon NSW 2064	**Job No.**	EKTI01/231009
		Sampled by	Client
		Date Sampled	Not provided
Contact	Graham Edwards	**Date Received**	9-Oct-23

The results relate only to the sample(s) as received and tested.
Sampling date(s) were not provided by the client. Holding time requirements could not be determined.

Method AUTL_MET_002 **Date Reported** 13-Nov-23

Details

The method is for determination of tetra- through octa-chlorinated dibenzo-p-dioxins (PCDDs) & dibenzofurans (PCDFs) in emission samples by high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS). This method provides data on all toxic 2,3,7,8-PCDD (seven) and PCDF (ten) isomers. PCDD and PCDF totals for each homologue group (tetra to octa) are also reported. The dioxin toxicity equivalent (I-TEQ) in each sample is calculated using International toxic equivalency factors (I-TEFs).
All results are corrected for labelled surrogate recoveries.

After sampling the filter & resin are spiked with a range of isotopically labelled surrogate standards and exhaustively extracted. Clean up is effected by partitioning with sulphuric acid then distilled water. Further purification is performed using column chromatography on acid and base modified silica gels, basic alumina and carbon dispersed on celite.

Immediately prior to injection, internal standards are added to each extract, and an aliquot of the extract is injected into the GC. The analytes are separated by the GC and detected by a high-resolution (>10,000) mass spectrometer.

Authorisation

Nino Piro
Senior Chemist
Australian Ultra Trace Laboratory

Robert Crough
Chemist
Australian Ultra Trace Laboratory

Accreditation

NATA Accreditation Number : 198

Accredited for compliance with ISO/IEC 17025 - Testing.

This report shall not be reproduced, except in full.
Measurement uncertainty is available upon request.

Sample Details : Job No. EKTI01/231009

Laboratory Reg. No.	Client Sample Ref.	Matrix	Description
N23/020710X	N 19985-19987	Emission	Resin AUT231003A, Filter, Solvent Rinses

Project Details

Project Name	*Not specified*
Project Number	*R014868 / PO W012286*

Key

Analytes

TCDD	Tetrachlorodibenzo-p-dioxin	TCDF	Tetrachlorodibenzofuran
PeCDD	Pentachlorodibenzo-p-dioxin	PeCDF	Pentachlorodibenzofuran
HxCDD	Hexachlorodibenzo-p-dioxin	HxCDF	Hexachlorodibenzofuran
HpCDD	Heptachlorodibenzo-p-dioxin	HpCDF	Heptachlorodibenzofuran
OCDD	Octachlorodibenzo-p-dioxin	OCDF	Octachlorodibenzofuran

Units & Abbreviations

pg	picograms
<	level less than limit of detection (LOD)
I-TEF‡	International toxic equivalency factor
I-TEQ‡	International toxic equivalents - dioxins & furans

TEQs are calculated by multiplying the quantified level for each individual dioxin and furan congener reported by the corresponding TEF value and summing the result:

$$\text{I-TEQ} = \sum_{i=1}^{7}\left[\text{PCDD}_i \times \text{TEF}_i\right] + \sum_{j=1}^{10}\left[\text{PCDF}_j \times \text{TEF}_j\right]$$

i = PCDD congener index (1 - 7)
j = PCDF congener index (1 - 10)

Lower Bound TEQ	defines all congener values reported below the LOD as equal to zero.
Middle Bound TEQ	defines all congener values reported below the LOD as equal to half the LOD.
Upper Bound TEQ	defines all congener values reported below the LOD as equal to the LOD.

Surrogate Recovery	percentage recovery for $^{13}C_{12}$ labelled surrogate standard
⚑	Laboratory surrogate recovery outside normal acceptance criteria: **40-130%** for Tetra/Penta/Hexa congeners - **25-130%** for Hepta/Octa congeners
⚑	Field surrogate recovery outside normal acceptance criteria (**70-130%**)

‡ as defined in USEPA publication **EPA/625/3-89/016** (1989)
USEPA US Environmental Protection Agency

Results : Job No. EKTI01/231009

Laboratory Reg. No. N23/020710X **Date Extracted** 19-Oct-23

Client Sample Ref. N 19985-19987 **DB5 Analysis** 30-Oct-23
Matrix Emission **DB-Dioxin Analysis** 06-Nov-23
Description Resin AUT231003A, Filter, Solvent Rinses

PCDD/F Congeners	Level pg	I-TEF	I-TEQ contribution	Labelled Surrogate recovery	
2,3,7,8-TCDF	12	0.1	1.2	55	
2,3,7,8-TCDD	<4	1	2	47	
1,2,3,7,8-PeCDF	5.7	0.05	0.29	76	
2,3,4,7,8-PeCDF	8.3	0.5	4.2	**123**	
1,2,3,7,8-PeCDD	<5	0.5	1.3	80	
1,2,3,4,7,8-HxCDF	3.8	0.1	0.38	**110**	
1,2,3,6,7,8-HxCDF	4.0	0.1	0.40	73	
2,3,4,6,7,8-HxCDF	3.4	0.1	0.34		
1,2,3,7,8,9-HxCDF	<1	0.1	0.05		
1,2,3,4,7,8-HxCDD	<3	0.1	0.15	**99**	
1,2,3,6,7,8-HxCDD	<2	0.1	0.1	75	
1,2,3,7,8,9-HxCDD	<3	0.1	0.15		
1,2,3,4,6,7,8-HpCDF	<6	0.01	0.03	90	
1,2,3,4,7,8,9-HpCDF	<7	0.01	0.035	**80**	
1,2,3,4,6,7,8-HpCDD	8.2	0.01	0.082	83	
OCDF	<5	0.001	0.0025		
OCDD	45	0.001	0.045	62	

PCDD/F Homologue Groups	Level pg
Total TCDF isomers	460
Total TCDD isomers	89
Total PeCDF isomers	110
Total PeCDD isomers	39
Total HxCDF isomers	32
Total HxCDD isomers	31
Total HpCDF isomers	<20
Total HpCDD isomers	19

Summary Results		
Sum of PCDD and PCDF congeners		
Excluding LOD values	830	pg
I-TEQ		
Lower Bound [excluding LOD values]	**6.9**	pg
Middle Bound [including half LOD values]	**11**	pg
Upper Bound [including LOD values]	**14**	pg

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