Ektimo

Visy Pulp and Paper, Tumut

Emission Testing Report – Q1 Testing (Odour)

Report R017569-1

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Document Information

Client Name:	Visy Pulp and Paper
Report Number:	R017569-1
Date of Issue:	20 September 2024
Attention:	Matthew O`Donovan
Address:	1302 Snowy Mountains Highway Tumut NSW 2720
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation

Aaron Davis
Operations Manager

NATA Accredited Laboratory
No. 14601

Please note that only numerical results pertaining to measurements conducted directly by Ektimo are covered by Ektimo terms of NATA accreditation as described in the Test Methods table. This does not include calculations that use data supplied by third-parties, comments, conclusions, or recommendations based upon the results. Refer to Test Methods section for full details of testing covered by NATA accreditation.

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1 Executive Summary

1.1 Background

Ektimo was engaged by Visy Pulp and Paper to perform an odour monitoring survey at their Tumut facility. The program incorporated both point source and area source (flux hood) monitoring.

1.2 Project Objective & Overview

The objective of the project was to conduct a monitoring program to quantify emissions from multiple discharge points.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
EPA 1 – Main Stack 1	21 August 2024	Odour (duplicate)
EPA 22 – Main Stack 2		
Cooling Pond 3A		
Cooling Pond 3B		
Cooling Tower 1 (#1 Paper Machine Side)		
Cooling Tower 2 (#2 Paper Machine Side)		
Vacuum Pump 3 – (790 Couch)		
Vacuum Pump 7 – (794 First Bottom)		
Vacuum Pump 9 – (Paper Machine Hood Vent Exhaust)		
Vacuum Pump 10 – (Paper Machine Hood Vent Exhaust)		

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

All results are reported on a dry basis at STP (except odour wet – STP).

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2 Results

2.1 EPA 1 – Main Stack 1

Date	21/08/2024	**Client**	Visy Pulp and Paper
Report	R017569	**Stack ID**	EPA 1 - Main Stack 1
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Aaron Davis	**State**	NSW
Process Conditions	Please refer to client records.		*240828*

Stack Parameters		
Moisture content, %v/v	22	
Gas molecular weight, g/g mole	26.6 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.19 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	0.66	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1002	
Temperature, °C	198	
Temperature, K	471	
Velocity at sampling plane, m/s	31	
Volumetric flow rate, actual, m³/s	170	
Volumetric flow rate (wet STP), m³/s	96	
Volumetric flow rate (dry STP), m³/s	75	
Mass flow rate (wet basis), kg/h	410000	

Odour	Average		Test 1		Test 2	
Sampling time			1005 - 1015		1017 - 1027	
	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min
Results	470	2700000	500	2900000	450	2600000
Lower uncertainty limit	390		380		350	
Upper uncertainty limit	570		640		580	
Hedonic tone			mildly unpleasant		mildly unpleasant	
Odour character			Chemicals, wood, pine, gas, damp, resin		Timber, pine, resin, wood, gas, sulfur	
Analysis date & time			22/08/24, 1000 - 1300		22/08/24, 1000 - 1300	
Holding time			24 hours		24 hours	
Dilution factor			1		1	
Bag material			Nalophan		Nalophan	
Butanol threshold (ppb)	42					
Laboratory temp (°C)	22					
Last calibration date	October 2023					

2.2 EPA 22 – Main Stack 2

Date	21/08/2024	**Client**	Visy Pulp and Paper
Report	R017569	**Stack ID**	EPA 22 - Main Stack 2
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Aaron Davis	**State**	NSW
Process Conditions	Please refer to client records.		*240828*

Stack Parameters		
Moisture content, %v/v	24	
Gas molecular weight, g/g mole	26.3 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.17 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	0.69	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0850	
Temperature, °C	175	
Temperature, K	449	
Velocity at sampling plane, m/s	23	
Volumetric flow rate, actual, m³/s	110	
Volumetric flow rate (wet STP), m³/s	62	
Volumetric flow rate (dry STP), m³/s	47	
Mass flow rate (wet basis), kg/h	260000	

Odour	Average		Test 1		Test 2	
Sampling time			900 - 910		911 - 921	
	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min
Results	340	1300000	340	1300000	340	1300000
Lower uncertainty limit	280		270		260	
Upper uncertainty limit	410		450		440	
Hedonic tone			mildly unpleasant		mildly unpleasant	
Odour character			Gas, sulfur, fermenting, wood, resin, timber, combustion, formaldehyde		Sulfur, combustion, gas, mud, earthy tones	
Analysis date & time			22/08/24, 1000 - 1300		22/08/24, 1000 - 1300	
Holding time			25 hours		25 hours	
Dilution factor			1		1	
Bag material			Nalophan		Nalophan	
Butanol threshold (ppb)	42					
Laboratory temp (°C)	22					
Last calibration date	October 2023					

2.3 Cooling Pond 3A

Client	Visy Pulp and Paper	**Test Location**	Cooling Pond 3A	
Date	21/08/2024	**Plant/Site**	Tumut	
Report No.	R017569		Tumut, NSW	
Ektimo Staff	Scott Woods / Aaron Davis			***220907***
Test Location Details				
Location Description		Brown murky liquid, filling		
Surface Description		Cloudy, aerating, some foam		
Area Classification		Industrial		
Source dimensions (L x W), m		50 x 32		
Source area, m^2		1600		
Sampling Method		AS4323.4 (Flux)		
Odour		Test 1	Test 2	
Sampling time, hrs		0835 - 0845	0845 - 0855	
Sample dilution		1	1	
Concentration, ou		44	<30	
Average concentration, ou		**≤39**		
95% Confidence Interval		33 - 47		
Flux Emission Rate, ou.m^3/m^2/min		**≤1.3**		
Total area source emission rate, ou.m^3/min		**≤2100**		
Flux Testing Parameters				
Equilibration time, hrs		0811 - 0835		
Sweep Rate @ STP, L/min		4.29		
Penetration Depth, mm		5		
Static Pressure, Pa		10		
Surface temperature, °C		15		
Chamber temperature, °C		15		
Ambient temperature, °C		13		

2.4 Cooling Pond 3B

Client	Visy Pulp and Paper	**Test Location**	Cooling Pond 3B	
Date	21/08/2024	**Plant/Site**	Tumut	
Report No.	R017569		Tumut, NSW	
Ektimo Staff	Scott Woods / Aaron Davis			***220907***
Test Location Details				
Location Description		Brown murky liquid, filling		
Surface Description		Scattered foamy surface, aerating		
Area Classification		Industrial		
Source dimensions (L x W), m		50 x 32		
Source area, m^2		1600		
Sampling Method		AS4323.4 (Flux)		
Odour		Test 1	Test 2	
Sampling time, hrs		0925 - 0935	0935 - 0945	
Sample dilution		1	1	
Concentration, ou		52	<30	
Average concentration, ou		**≤43**		
95% Confidence Interval		36 - 52		
Flux Emission Rate, ou.m^3/m^2/min		**≤1.5**		
Total area source emission rate, ou.m^3/min		**≤2400**		
Flux Testing Parameters				
Equilibration time, hrs		0900 - 0924		
Sweep Rate @ STP, L/min		4.32		
Penetration Depth, mm		10		
Static Pressure, Pa		10		
Surface temperature, °C		16		
Chamber temperature, °C		15		
Ambient temperature, °C		14		

2.5 Cooling Tower 1 (#1 Paper Machine Side)

Date	21/08/2024	**Client**	Visy Pulp and Paper
Report	R017569	**Stack ID**	Cooling Tower 1 (#1 Paper Machine Side)
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Scott Woods / Zak Hedges	**State**	NSW
Process Conditions	Please refer to client records.		

Comments
Velocity and volumetric flowrate measurements could not be taken.
The discharge is assumed to be composed of dry air and moisture

Odour	Average	Test 1	Test 2
Sampling time		1002 - 1012	1013 - 1023
	Concentration ou	Concentration ou	Concentration ou
Results	470	450	500
Lower uncertainty limit	390	350	380
Upper uncertainty limit	570	580	640
Analysis date & time		22/08/24, 1000 - 1300	22/08/24, 1000 - 1300
Holding time		24 hours	24 hours
Dilution factor		1	1
Bag material		Nalophan	Nalophan
Butanol threshold (ppb)	42		
Laboratory temp (°C)	22		
Last calibration date	October 2023		

2.6 Cooling Tower 2 (#2 Paper Machine Side)

Date	21/08/2024	**Client**	Visy Pulp and Paper
Report	R017569	**Stack ID**	Cooling Tower 2 (#2 Paper Machine Side)
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Scott Woods / Zak Hedges	**State**	NSW
Process Conditions	Please refer to client records.		

Comments
Velocity and volumetric flowrate measurements could not be taken.
The discharge is assumed to be composed of dry air and moisture

Odour	Average	Test 1	Test 2
Sampling time		1004 - 1014	1015 - 1025
	Concentration ou	Concentration ou	Concentration ou
Results	260	280	240
Lower uncertainty limit	210	220	180
Upper uncertainty limit	310	360	310
Analysis date & time		22/08/24, 1000 - 1300	22/08/24, 1000 - 1300
Holding time		24 hours	24 hours
Dilution factor		1	1
Bag material		Nalophan	Nalophan
Butanol threshold (ppb)	42		
Laboratory temp (°C)	22		
Last calibration date	October 2023		

2.7 Vacuum Pump 3 – (790 Couch)

Date	21/08/2024	**Client**	Visy Pulp and Paper
Report	R017569	**Stack ID**	Vacuum Pump 3 (790 Couch)
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Scott Woods / Zak Hedges	**State**	NSW
Process Conditions	Please refer to client records.		*240828*

Comments
The discharge is assumed to be composed of dry air and moisture
The gas temperature of the sampling plane is below the dew point

Stack Parameters		
Moisture content, %v/v	13 (saturated)	
Gas molecular weight, g/g mole	27.5 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.23 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	1.00	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1040	
Temperature, °C	51	
Temperature, K	324	
Velocity at sampling plane, m/s	8.2	
Volumetric flow rate, actual, m³/s	6.5	
Volumetric flow rate (wet STP), m³/s	5.3	
Volumetric flow rate (dry STP), m³/s	4.6	
Mass flow rate (wet basis), kg/h	24000	

Odour	Average		Test 1		Test 2	
Sampling time			1042 - 1052		1053 - 1103	
	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min
Results	13000	4200000	13000	4200000	13000	4200000
Lower uncertainty limit	11000		10000		10000	
Upper uncertainty limit	16000		17000		17000	
Hedonic tone			very unpleasant		very unpleasant	
Odour character			Sewage, gas, landfill, leachate, sludge		Sewage, damp pipes, gas, landfill, used cooking oil, sludge	
Analysis date & time			22/08/24, 1000 - 1300		22/08/24, 1000 - 1300	
Holding time			23 hours		23 hours	
Dilution factor			9		9	
Bag material			Nalophan		Nalophan	
Butanol threshold (ppb)	42					
Laboratory temp (°C)	22					
Last calibration date	October 2023					

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2.8 Vacuum Pump 7 – (794 First Bottom)

Report	R017569	**Stack ID**	Vacuum Pump 7 (794 First Bottom)
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Scott Woods / Zak Hedges	**State**	NSW
Process Conditions	Please refer to client records.		*240828*

Comments
The discharge is assumed to be composed of dry air and moisture
The gas temperature of the sampling plane is below the dew point

Stack Parameters		
Moisture content, %v/v	12 (saturated)	
Gas molecular weight, g/g mole	27.7 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.23 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	1.01	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1038	
Temperature, °C	49	
Temperature, K	322	
Velocity at sampling plane, m/s	7.2	
Volumetric flow rate, actual, m³/s	4.6	
Volumetric flow rate (wet STP), m³/s	3.8	
Volumetric flow rate (dry STP), m³/s	3.3	
Mass flow rate (wet basis), kg/h	17000	

Odour	Average		Test 1		Test 2	
Sampling time			1040 - 1050		1052 - 1102	
	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min
Results	19000	4200000	19000	4200000	19000	4200000
Lower uncertainty limit	15000		14000		14000	
Upper uncertainty limit	22000		24000		24000	
Hedonic tone			very unpleasant		very unpleasant	
Odour character			Sewage, damp, gas, landfill, sludge, used cooking oil		Sewage, damp, used cooking oil, sludge, leachate	
Analysis date & time			22/08/24, 1000 - 1300		22/08/24, 1000 - 1300	
Holding time			23 hours		23 hours	
Dilution factor			9		9	
Bag material			Nalophan		Nalophan	
Butanol threshold (ppb)	42					
Laboratory temp (°C)	22					
Last calibration date	October 2023					

2.9 Vacuum Pump 9 – (Paper Machine Hood Vent Exhaust)

Date	21/08/2024	**Client**	Visy Pulp and Paper
Report	R017569	**Stack ID**	Vacuum Pump 9 (Paper Machine Hood Vent Exhaust)
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Scott Woods / Zak Hedges	**State**	NSW
Process Conditions	Please refer to client records.		*240828*

Comments
The discharge is assumed to be composed of dry air and moisture
The gas temperature of the sampling plane is below the dew point

Stack Parameters		
Moisture content, %v/v	23 (saturated)	
Gas molecular weight, g/g mole	26.4 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.18 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	0.93	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1058	
Temperature, °C	63	
Temperature, K	336	
Velocity at sampling plane, m/s	9.8	
Volumetric flow rate, actual, m³/s	26	
Volumetric flow rate (wet STP), m³/s	20	
Volumetric flow rate (dry STP), m³/s	15	
Mass flow rate (wet basis), kg/h	86000	

Odour	Average		Test 1		Test 2	
Sampling time			1100 - 1110		1112 - 1122	
	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min
Results	7000	8500000	6400	7800000	7700	9300000
Lower uncertainty limit	5900		4900		5900	
Upper uncertainty limit	8500		8300		10000	
Hedonic tone			very unpleasant		very unpleasant	
Odour character			Sewage, damp, used cooking oil, sludge, leachate		Sewage, damp, used cooking oil, sludge, leachate	
Analysis date & time			22/08/24, 1000 - 1300		22/08/24, 1000 - 1300	
Holding time			23 hours		23 hours	
Dilution factor			9		9	
Bag material			Nalophan		Nalophan	
Butanol threshold (ppb)	42					
Laboratory temp (°C)	22					
Last calibration date	October 2023					

2.10 Vacuum Pump 10 – (Paper Machine Hood Vent Exhaust)

Date	21/08/2024	**Client**	Visy Pulp and Paper
Report	R017569	**Stack ID**	Vacuum Pump 10 (Paper Machine Hood Vent Exhaust)
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Scott Woods / Zak Hedges	**State**	NSW
Process Conditions	Please refer to client records.		*240828*

Comments
The discharge is assumed to be composed of dry air and moisture
The gas temperature of the sampling plane is below the dew point

Stack Parameters		
Moisture content, %v/v	7.5 (saturated)	
Gas molecular weight, g/g mole	28.1 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.26 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	1.06	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1150	
Temperature, °C	40	
Temperature, K	313	
Velocity at sampling plane, m/s	3.1	
Volumetric flow rate, actual, m³/s	26	
Volumetric flow rate (wet STP), m³/s	22	
Volumetric flow rate (dry STP), m³/s	20	
Mass flow rate (wet basis), kg/h	100000	

Odour	Average		Test 1		Test 2	
Sampling time			1155 - 1205		1207 - 1227	
	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min
Results	8100	11000000	9100	12000000	7100	9400000
Lower uncertainty limit	6800		7000		5500	
Upper uncertainty limit	9800		12000		9200	
Hedonic tone			very unpleasant		very unpleasant	
Odour character			Sewage, damp, used cooking oil, sludge, leachate		Sewage, damp, used cooking oil, sludge, leachate	
Analysis date & time			22/08/24, 1000 - 1300		22/08/24, 1000 - 1300	
Holding time			22 hours		22 hours	
Dilution factor			9		9	
Bag material			Nalophan		Nalophan	
Butanol threshold (ppb)	42					
Laboratory temp (°C)	22					
Last calibration date	October 2023					

3 Sample Plane Compliance

3.1 EPA 1 – Main Stack 1

Sampling Plane Details	
Sampling plane dimensions	2660 mm
Sampling plane area	5.56 m²
Sampling port size, number	4" Flange (x4)
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 5 D
Upstream disturbance	Junction 20 D
No. traverses & points sampled	2 12
Sample plane conformance to USEPA Method 1	Conforming

3.2 EPA 22 – Main Stack 2

Sampling Plane Details	
Source tested	Boiler
Pollution control equipment	Electrostatic precipitator - dry
Sampling plane dimensions	2450 mm
Sampling plane area	4.71 m²
Sampling port size, number	4" Flange (x4)
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 10 D
Upstream disturbance	Junction 5 D
No. traverses & points sampled	2 20
Sample plane conformance to USEPA Method 1	Conforming

3.3 Cooling Tower 1 (#1 Paper Machine Side)

Sampling Plane Details	
Sampling plane dimensions	Exit diameter could not be measured mm
Sampling port size, number	Sampled at exit
Duct orientation & shape	Vertical
Downstream disturbance	Exit 0 D
Upstream disturbance	Exit 0 D
No. traverses & points sampled	1 1
Sample plane conformance to AS 4323.1	Non-conforming

Comments
Velocity and volumetric flowrate measurements could not be taken.
The number of traverses sampled is less than the requirement

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
The stack or duct does not have the required number of access holes (ports)

3.4 Cooling Tower 2 (#2 Paper Machine Side)

Sampling Plane Details	
Sampling plane dimensions	Exit diameter could not be measured mm
Sampling port size, number	Sampled at exit
Duct orientation & shape	Vertical
Downstream disturbance	Exit 0 D
Upstream disturbance	Exit 0 D
No. traverses & points sampled	1 1
Sample plane conformance to AS 4323.1	Non-conforming

Comments
Velocity and volumetric flowrate measurements could not be taken.
The number of traverses sampled is less than the requirement

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
The stack or duct does not have the required number of access holes (ports)

3.5 Vacuum Pump 3 – (790 Couch)

Sampling Plane Details	
Source tested	Vacuum pump outlet
Sampling plane dimensions	1006 mm
Sampling plane area	0.795 m²
Sampling port size, number	Sampled at exit
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 0 D
Upstream disturbance	Exit 0 D
No. traverses & points sampled	1 1
Sample plane conformance to AS 4323.1	Non-conforming

Comments
The number of traverses sampled is less than the requirement
The number of points sampled is less than the requirement

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
The stack or duct does not have the required number of access holes (ports)

3.6 Vacuum Pump 7 – (794 First Bottom)

Sampling Plane Details	
Source tested	Vacuum pump outlet
Sampling plane dimensions	906 mm
Sampling plane area	0.645 m²
Sampling port size, number	Sampled at exit
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 0 D
Upstream disturbance	Exit 0 D
No. traverses & points sampled	1 1
Sample plane conformance to AS 4323.1	Non-conforming

Comments
The number of traverses sampled is less than the requirement
The number of points sampled is less than the requirement

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
The stack or duct does not have the required number of access holes (ports)

3.7 Vacuum Pump 9 – (Paper Machine Hood Vent Exhaust)

Sampling Plane Details	
Source tested	Vacuum pump outlet
Sampling plane dimensions	1500 x 1750 mm
Sampling plane area	2.63 m²
Sampling port size, number	1/4 inch hole
Duct orientation & shape	Vertical Rectangular
Downstream disturbance	Exit 2 D
Upstream disturbance	Junction 0.1 D
No. traverses & points sampled	1 1
Sample plane conformance to AS 4323.1	Non-conforming

Comments
The number of traverses sampled is less than the requirement
The number of points sampled is less than the requirement

The sampling plane is deemed to be non-conforming due to the following reasons:
The upstream disturbance is <2D from the sampling plane
The stack or duct does not have the required number of access holes (ports)
The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D

3.8 Vacuum Pump 10 – (Paper Machine Hood Vent Exhaust)

Sampling Plane Details	
Source tested	Vacuum pump outlet
Sampling plane dimensions	2450 x 3500 mm
Sampling plane area	8.58 m²
Sampling port size, number	Sampled at exit
Duct orientation & shape	Vertical Rectangular
Downstream disturbance	Exit 0 D
Upstream disturbance	Exit 0 D
No. traverses & points sampled	1 1
Sample plane conformance to AS 4323.1	Non-conforming

Comments
The number of traverses sampled is less than the requirement
The number of points sampled is less than the requirement

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
The stack or duct does not have the required number of access holes (ports)

4 Plant Operating Conditions

See Visy Pulp and Paper records for complete process conditions.

Based on information received from Visy Pulp and Paper 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	Analysis
Sampling points - Selection	NSW EPA TM-1 (AS 4323.1)	NA	NA	✓	NA
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 Alt-Method 008)	NSW EPA TM-22 (USEPA Alt-Method 008)	19%	✓	✓
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	✓
Odour	NSW EPA OM-7 (AS 4323.3)	NSW EPA OM-7 (AS 4323.3)	refer to results	✓	✓¥
Odour from diffuse sources	NSW EPA OM-8 (AS 4323.4)	NSW EPA OM-8 (AS 4323.4)	refer to results	✓	✓¥

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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).

¥ Odour analysis conducted at the Ektimo NSW laboratory by forced choice olfactometry. Results were reported to Ektimo on 22 August 2024 in report ON-00269.

6 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.

7 Definitions

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

% v/v	Volume to volume ratio, dry or wet basis
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
APHA	American Public Health Association, Standard Methods for the Examination of Water and Waste Water
AS	Australian Standard
BaP-TEQ	Benzo(a)pyrene toxic equivalents
BSP	British standard pipe
CEM/CEMS	Continuous emission monitoring/Continuous emission monitoring system
CTM	Conditional test method
D	Duct diameter or equivalent duct diameter for rectangular ducts
D_{50}	'Cut size' of a cyclone is defined as the particle diameter at which the cyclone achieves a 50% collection efficiency i.e. half of the particles are retained by the cyclone and half pass through it. The D_{50} method simplifies the capture efficiency distribution by assuming that a given cyclone stage captures all of the particles with a diameter equal to or greater than the D_{50} of that cyclone and less than the D_{50} of the preceding cyclone.
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.
DWER	Department of Water and Environmental Regulation (WA)
DEHP	Department of Environment and Heritage Protection (QLD)
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
I-TEQ	International toxic equivalents
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
NIOSH	National Institute of Occupational Safety and Health
NT	Not tested or results not required
OM	Other approved method
OU	Odour unit. One OU is that concentration of odorant(s) at standard conditions that elicits a physiological response from a panel equivalent to that elicited by one Reference Odour Mass (ROM), evaporated in one cubic metre of neutral gas at standard conditions.
PM_{10}	Particulate matter having an equivalent aerodynamic diameter less than or equal to 10 microns (µm).
$PM_{2.5}$	Particulate matter having an equivalent aerodynamic diameter less than or equal to 2.5 microns (µm).
PSA	Particle size analysis. PSA provides a distribution of geometric diameters, for a given sample, determined using laser diffraction.
RATA	Relative accuracy test audit
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.
Vic EPA	Victorian Environment Protection Authority
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.

8 Appendices

Appendix A: Site Images

EPA 1 - Main Stack 1

EPA 22 – Main Stack 2

Cooling Pond 3A

Cooling Pond 3B

Vacuum Pump 3 – (790 Couch)

Vacuum Pump 7 – (794 First Bottom)

Vacuum Pump 9 (Paper Machine Hood Vent Exhaust)

Vacuum Pump 10 (Paper Machine Hood Vent Exhaust)

Cooling Tower (#1 Paper Machine Side)

Cooling Tower (#2 Paper Machine Side)

Ektimo

ektimo.com.au
1300 364 005

MELBOURNE (Head Office)
26 Redland Drive
Mitcham
VIC 3132
AUSTRALIA

SYDNEY
6/78 Reserve Road
Artarmon
NSW 2064
AUSTRALIA

WOLLONGONG
1/251 Princes Highway
Unanderra
NSW 2526
AUSTRALIA

PERTH
52 Cooper Road
Cockburn Central
WA 6164
AUSTRALIA

BRISBANE
3/109 Riverside Place
Morningside
QLD 4170
AUSTRALIA

Ektimo

Experts in air quality, odour and emission monitoring.

Emission Testing Report

Q3 Testing – Odour

Report: R018538-1

Visy Pulp and Paper, Tumut

ilac-MRA NATA

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

Document Information

Client Name:	Visy Pulp and Paper
Report Number:	R018538-1
Date of Issue:	24 February 2025
Attention:	Matthew O`Donovan
Address:	1302 Snowy Mountains Highway Tumut NSW 2720
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation

Aaron Davis
Operations Manager (NSW)

NATA Accredited Laboratory
No. 14601

Please note that only numerical results pertaining to measurements conducted directly by Ektimo are covered by Ektimo terms of NATA accreditation as described in the Test Methods table. This does not include calculations that use data supplied by third-parties, comments, conclusions, or recommendations based upon the results. Refer to Test Methods section for full details of testing covered by NATA accreditation.

Table of Contents

1 Executive Summary

1.1 Background

Ektimo was engaged by Visy Pulp and Paper to perform routine odour monitoring at their Tumut facility. The program incorporated both point source and area source (flux hood) monitoring.

1.2 Project Objective & Overview

The objective of the project was to quantify odour emissions from 10 discharge points.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
EPA 1 – Main Stack 1	13 February 2025	Odour (duplicate)
EPA 22 – Main Stack 2		
Cooling Pond 3A		
Cooling Pond 3B		
Cooling Tower 1 (#1 Paper Machine Side)		
Cooling Tower 2 (#2 Paper Machine Side)		
Vacuum Pump 3 – (790 Couch)		
Vacuum Pump 7 – (794 First Bottom)		
Vacuum Pump 9 – (Paper Machine Hood Vent Exhaust)		
Vacuum Pump 10 – (Paper Machine Hood Vent Exhaust)		

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

All results are reported on a wet basis at STP.

2 Results

2.1 EPA 1 – Main Stack 1

Date	13/02/2025	**Client**	Visy Pulp and Paper
Report	R018538-1	**Stack ID**	EPA 1 - Main Stack 1
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Aaron Davis	**State**	NSW
Process Conditions	Please refer to client records.		250211

Stack Parameters		
Moisture content, %v/v	23	
Gas molecular weight, g/g mole	28.0 (wet)	30.9 (dry)
Gas density at STP, kg/m³	1.25 (wet)	1.38 (dry)
Gas density at discharge conditions, kg/m³	0.70	
% Oxygen correction & Factor	8 %	0.81
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0950	
Temperature, °C	191	
Temperature, K	465	
Ambient pressure, kPa	97	
Stack pressure, kPa	97	
Velocity at sampling plane, m/s	29	
Volumetric flow rate, actual, m³/s	160	
Volumetric flow rate (wet STP), m³/s	91	
Volumetric flow rate (dry STP), m³/s	71	
Mass flow rate (wet basis), kg/h	410000	

Odour	Average		Test 1		Test 2	
Sampling time			0955 - 1005		1006 - 1016	
	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min
Results	1600	8800000	1500	8500000	1700	9200000
Lower uncertainty limit	1300		1200		1300	
Upper uncertainty limit	2000		2000		2200	
Hedonic tone			Very unpleasant		Very unpleasant	
Odour character			Gas, chlorine, chemical, wet grains, fermenting, sulfur, diesel exhaust		Gas, chlorine, chemical, wet grains, fermenting, sulfur, diesel exhaust	
Analysis date & time			14/02/25, 1000 - 1315		14/02/25, 1000 - 1315	
Holding time			24 hours		24 hours	
Dilution factor			1		1	
Bag material			Nalophan		Nalophan	
Butanol threshold (ppb)	56					
Laboratory temp (°C)	25					
Last calibration date	October 2024					

2.2 EPA 22 – Main Stack 2

Date	13/02/2025	**Client**	Visy Pulp and Paper
Report	R018538-1	**Stack ID**	EPA 22 - Main Stack 2
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Aaron Davis	**State**	NSW
Process Conditions	Please refer to client records.		250211

Stack Parameters		
Moisture content, %v/v	21	
Gas molecular weight, g/g mole	28.1 (wet)	30.9 (dry)
Gas density at STP, kg/m³	1.26 (wet)	1.38 (dry)
Gas density at discharge conditions, kg/m³	0.73	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0820	
Temperature, °C	178	
Temperature, K	451	
Ambient pressure, kPa	97	
Stack pressure, kPa	97	
Velocity at sampling plane, m/s	21	
Volumetric flow rate, actual, m³/s	99	
Volumetric flow rate (wet STP), m³/s	57	
Volumetric flow rate (dry STP), m³/s	45	
Mass flow rate (wet basis), kg/h	260000	

Odour	Average		Test 1		Test 2	
Sampling time			0825 - 0835		0836 - 0846	
	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min
Results	1800	6000000	1700	5800000	1800	6300000
Lower uncertainty limit	1400		1300		1400	
Upper uncertainty limit	2100		2200		2400	
Hedonic tone			Very unpleasant		Very unpleasant	
Odour character			Gas, chlorine, chemical, wet grains, fermenting, sulfur, diesel exhaust		Gas, chlorine, chemical, wet grains, fermenting, sulfur, diesel exhaust	
Analysis date & time			14/02/25, 1000 - 1315		14/02/25, 1000 - 1315	
Holding time			26 hours		26 hours	
Dilution factor			1		1	
Bag material			Nalophan		Nalophan	
Butanol threshold (ppb)	56					
Laboratory temp (°C)	25					
Last calibration date	October 2024					

2.3 Cooling Pond 3A

Client	Visy Pulp and Paper	**Test Location**	Cooling Pond 3A
Date	13/02/2025	**Plant/Site**	Tumut
Report No.	R018538-1		Tumut, NSW
Ektimo Staff	Ahmad Ramiz / Zak Hedges		*041024*

Test Location Details		
Location Description	Green/brown murky liquid, not filling	
Surface Description	Clear surface, not aerating	
Area Classification	Industrial	
Source dimensions (L x W), m	50 x 32	
Source area, m^2	1600	
Sampling Method	AS4323.4 (Flux)	
Odour	Test 1	Test 2
Sampling time, hrs	0931 - 0941	0942 - 0952
Sample dilution	1	1
Concentration, ou	110	120
Hedonic tone	Mildly unpleasant	Mildly unpleasant
Odour character	Mud, water, earthy, grass, algae	Dirt, earthy, water, chemicals
Average concentration, ou	**120**	
95% Confidence Interval	97 - 140	
Flux Emission Rate, ou.m^3/m^2/min	**2.7**	
Total area source emission rate, ou.m^3/min	**4300**	
Flux Testing Parameters		
Equilibration time, hrs	0907 - 0931	
Sweep Rate @ STP, L/min	2.88	
Penetration Depth, mm	5	
Static Pressure, Pa	15	
Surface temperature, °C	21	
Chamber temperature, °C	28	
Ambient temperature, °C	24	

2.4 Cooling Pond 3B

Client	Visy Pulp and Paper	**Test Location**	Cooling Pond 3B
Date	13/02/2025	**Plant/Site**	Tumut
Report No.	R018538-1		Tumut, NSW
Ektimo Staff	Ahmad Ramiz / Zak Hedges		*041024*

Test Location Details		
Location Description	Green/brown murky liquid, filling	
Surface Description	Clear, minor foam on edges	
Area Classification	Industrial	
Source dimensions (L x W), m	50 x 32	
Source area, m^2	1600	
Sampling Method	AS4323.4 (Flux)	
Odour	Test 1	Test 2
Sampling time, hrs	0842 - 0852	0853 - 0903
Sample dilution	1	1
Concentration, ou	160	100
Hedonic tone	Mildly unpleasant	Mildly unpleasant
Odour character	Chemicals, peanuts, earthy, dirt, bbq seasoning	Chemicals, peanuts, earthy, dirt, bbq seasoning
Average concentration, ou	**130**	
95% Confidence Interval	110 - 160	
Flux Emission Rate, ou.m^3/m^2/min	**3.1**	
Total area source emission rate, ou.m^3/min	**4900**	
Flux Testing Parameters		
Equilibration time, hrs	0818 - 0842	
Sweep Rate @ STP, L/min	2.96	
Penetration Depth, mm	5	
Static Pressure, Pa	10	
Surface temperature, °C	20	
Chamber temperature, °C	27	
Ambient temperature, °C	23	

2.5 Cooling Tower 1 (#1 Paper Machine Side)

Date	13/02/2025	**Client**	Visy Pulp and Paper
Report	R018538-1	**Stack ID**	Cooling Tower 1 (#1 Paper Machine Side)
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Aaron Davis / Ahmad Ramiz / Zak Hedges	**State**	NSW
Process Conditions	Please refer to client records.		*250214*

Comments
Velocity and volumetric flowrate measurements could not be taken
The discharge is assumed to be composed of dry air and moisture

Odour	Average	Test 1	Test 2
Sampling time		1002 - 1012	1012 - 1022
	Concentration ou	Concentration ou	Concentration ou
Results	300	240	370
Lower uncertainty limit	250	180	280
Upper uncertainty limit	370	320	490
Hedonic tone		Very unpleasant	Very unpleasant
Odour character		Sewer, mould, damp, water pipe,, car exhaust, stagnant water	Garbage bin, stagnant water, mould, car exhaust, rubbish
Analysis date & time		14/02/25, 1000 - 1315	14/02/25, 1000 - 1315
Holding time		24 hours	24 hours
Dilution factor		1	1
Bag material		Nalophan	Nalophan
Butanol threshold (ppb)	56		
Laboratory temp (°C)	25		
Last calibration date	October 2024		

2.6 Cooling Tower 2 (#2 Paper Machine Side)

Date	13/02/2025	**Client**	Visy Pulp and Paper
Report	R018538-1	**Stack ID**	Cooling Tower 2 (#2 Paper Machine Side)
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Aaron Davis / Ahmad Ramiz / Zak Hedges	**State**	NSW
Process Conditions	Please refer to client records.		*250214*

Comments
Velocity and volumetric flowrate measurements could not be taken
The discharge is assumed to be composed of dry air and moisture

Odour	Average	Test 1	Test 2
Sampling time		1005 - 1015	1016 - 1026
	Concentration ou	Concentration ou	Concentration ou
Results	920	1000	840
Lower uncertainty limit	760	760	640
Upper uncertainty limit	1100	1300	1100
Hedonic tone		Very unpleasant	Very unpleasant
Odour character		Stagnant water, exhaust, mould, rubbish	Leachate, stagnant water, mould, water pipe
Analysis date & time		14/02/25, 1000 - 1315	14/02/25, 1000 - 1315
Holding time		24 hours	24 hours
Dilution factor		1	1
Bag material		Nalophan	Nalophan
Butanol threshold (ppb)	56		
Laboratory temp (°C)	25		
Last calibration date	October 2024		

2.7 Vacuum Pump 3 – (790 Couch)

Date	13/02/2025	**Client**	Visy Pulp and Paper
Report	R018538-1	**Stack ID**	Vacuum Pump 3 (790 Couch)
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Aaron Davis / Zak Hedges / Ahmad Ramiz	**State**	NSW
Process Conditions	Please refer to client records.		250214

Comments
The discharge is assumed to be composed of dry air and moisture

Stack Parameters		
Moisture content, %v/v	16 (saturated)	
Gas molecular weight, g/g mole	27.2 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.21 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	0.96	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1110	
Temperature, °C	55	
Temperature, K	328	
Ambient pressure, kPa	97	
Stack pressure, kPa	97	
Velocity at sampling plane, m/s	8.6	
Volumetric flow rate, actual, m³/s	6.8	
Volumetric flow rate (wet STP), m³/s	5.4	
Volumetric flow rate (dry STP), m³/s	4.5	
Mass flow rate (wet basis), kg/h	24000	

Odour	Average		Test 1		Test 2	
Sampling time			1115 - 1117		1118 - 1120	
	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min
Results	5300	1700000	5000	1600000	5500	1800000
Lower uncertainty limit	4300		3800		4200	
Upper uncertainty limit	6400		6600		7200	
Hedonic tone			Very unpleasant		Very unpleasant	
Odour character			Used cooking oil, wet grains, gas, sulfur, chemicals, butchers		Wet grains, used cookin goil, raw meat, wet cadboard, gas	
Analysis date & time			14/02/25, 1000 - 1315		14/02/25, 1000 - 1315	
Holding time			23 hours		23 hours	
Dilution factor			6		6	
Bag material			Nalophan		Nalophan	
Butanol threshold (ppb)	56					
Laboratory temp (°C)	25					
Last calibration date	October 2024					

2.8 Vacuum Pump 7 – (794 First Bottom)

Date	13/02/2025	**Client**	Visy Pulp and Paper
Report	R018538-1	**Stack ID**	Vacuum Pump 7 (794 First Bottom)
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Aaron Davis / Zak Hedges / Ahmad Ramiz	**State**	NSW
Process Conditions	Please refer to client records.		250214

Comments
The discharge is assumed to be composed of dry air and moisture

Stack Parameters		
Moisture content, %v/v	12 (saturated)	
Gas molecular weight, g/g mole	27.6 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.23 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	1.00	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1120	
Temperature, °C	49	
Temperature, K	322	
Ambient pressure, kPa	97	
Stack pressure, kPa	97	
Velocity at sampling plane, m/s	7.5	
Volumetric flow rate, actual, m³/s	4.9	
Volumetric flow rate (wet STP), m³/s	3.9	
Volumetric flow rate (dry STP), m³/s	3.4	
Mass flow rate (wet basis), kg/h	17000	

Odour	Average		Test 1		Test 2	
Sampling time			1122 - 1124		1125 - 1127	
	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min
Results	2800	660000	2400	570000	3200	750000
Lower uncertainty limit	2300		1900		2400	
Upper uncertainty limit	3400		3200		4200	
Hedonic tone			Very unpleasant		Very unpleasant	
Odour character			Boiled egg, sewer, chlorine, water, mould, wet cardboard		Water, leachate, wet cardboard, chemicals	
Analysis date & time			14/02/25, 1000 - 1315		14/02/25, 1000 - 1315	
Holding time			23 hours		23 hours	
Dilution factor			6		6	
Bag material			Nalophan		Nalophan	
Butanol threshold (ppb)	56					
Laboratory temp (°C)	25					
Last calibration date	October 2024					

2.9 Vacuum Pump 9 – (Paper Machine Hood Vent Exhaust)

Date	13/02/2025	**Client**	Visy Pulp and Paper
Report	R018538-1	**Stack ID**	Vacuum Pump 9 (Paper Machine Hood Vent Exhaust)
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Aaron Davis / Zak Hedges / Ahmad Ramiz	**State**	NSW
Process Conditions	Please refer to client records.		250214

Comments
The discharge is assumed to be composed of dry air and moisture

Stack Parameters		
Moisture content, %v/v	31 (saturated)	
Gas molecular weight, g/g mole	25.6 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.14 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	0.87	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1130	
Temperature, °C	69	
Temperature, K	342	
Ambient pressure, kPa	97	
Stack pressure, kPa	97	
Velocity at sampling plane, m/s	9.9	
Volumetric flow rate, actual, m³/s	26	
Volumetric flow rate (wet STP), m³/s	20	
Volumetric flow rate (dry STP), m³/s	14	
Mass flow rate (wet basis), kg/h	81000	

Odour	Average		Test 1		Test 2	
Sampling time			1132 - 1134		1135 - 1137	
	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min
Results	5100	6000000	5500	6500000	4600	5500000
Lower uncertainty limit	4200		4200		3500	
Upper uncertainty limit	6100		7200		6100	
Hedonic tone			Very unpleasant		Very unpleasant	
Odour character			Acrid, varnish, acidic, water, rubbish		Acrid, varnish, green waste, leachate, stagnant water	
Analysis date & time			14/02/25, 1000 - 1315		14/02/25, 1000 - 1315	
Holding time			23 hours		23 hours	
Dilution factor			6		6	
Bag material			Nalophan		Nalophan	
Butanol threshold (ppb)	56					
Laboratory temp (°C)	25					
Last calibration date	October 2024					

2.10 Vacuum Pump 10 – (Paper Machine Hood Vent Exhaust)

Date	13/02/2025	**Client**	Visy Pulp and Paper
Report	R018538-1	**Stack ID**	Vacuum Pump 10 (Paper Machine Hood Vent Exhaust)
Licence No.	10232	**Location**	Tumut
Ektimo Staff	Aaron Davis / Zak Hedges / Ahmad Ramiz	**State**	NSW
Process Conditions	Mist sprays not operational during sampling		250214

Comments
The discharge is assumed to be composed of dry air and moisture

Stack Parameters		
Moisture content, %v/v	15	
Gas molecular weight, g/g mole	27.3 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.22 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	0.89	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1155	
Temperature, °C	82	
Temperature, K	355	
Ambient pressure, kPa	97	
Stack pressure, kPa	97	
Velocity at sampling plane, m/s	4	
Volumetric flow rate, actual, m³/s	34	
Volumetric flow rate (wet STP), m³/s	25	
Volumetric flow rate (dry STP), m³/s	21	
Mass flow rate (wet basis), kg/h	110000	

Odour	Average		Test 1		Test 2	
Sampling time			1200 - 1202		1205 - 1207	
	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min	Concentration ou	Odourant Flow Rate ou.m³/min
Results	2400	3500000	2000	3100000	2700	4000000
Lower uncertainty limit	1900		1500		2000	
Upper uncertainty limit	2900		2700		3500	
Hedonic tone			Very unpleasant		Very unpleasant	
Odour character			Sewer, water, wet cardboard, musky, sulfur, chemicals		Water, wet cardboard, raw meat, sulfur , chemicals, butchers	
Analysis date & time			14/02/25, 1000 - 1315		14/02/25, 1000 - 1315	
Holding time			22 hours		22 hours	
Dilution factor			6		6	
Bag material			Nalophan		Nalophan	
Butanol threshold (ppb)	56					
Laboratory temp (°C)	25					
Last calibration date	October 2024					

3 Sample Plane Compliance

3.1 EPA 1 – Main Stack 1

Sampling Plane Details	
Sampling plane dimensions	2660 mm
Sampling plane area	5.56 m²
Sampling port size, number	4" Flange (x4)
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 5 D
Upstream disturbance	Junction 20 D
No. traverses & points sampled	2 12
Sample plane conformance to USEPA Method	Conforming

3.2 EPA 22 – Main Stack 2

Sampling Plane Details	
Sampling plane dimensions	2450 mm
Sampling plane area	4.71 m²
Sampling port size, number	4" Flange (x4)
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 10 D
Upstream disturbance	Junction 5 D
No. traverses & points sampled	2 20
Sample plane conformance to USEPA Method	Conforming

3.3 Cooling Tower 1 (#1 Paper Machine Side)

Sampling Plane Details	
Sampling plane dimensions	Exit diamater could not be measured mm
Sampling port size, number	Sampled at exit
Duct orientation & shape	Vertical
Downstream disturbance	Exit 0 D
Upstream disturbance	Exit 0 D
No. traverses & points sampled	1 1
Sample plane conformance to AS 4323.1	Non-conforming

Comments

Velocity and volumetric flowrate measurements could not be taken

The number of traverses sampled is less than the requirement

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

The stack or duct does not have the required number of access holes (ports)

3.4 Cooling Tower 2 (#2 Paper Machine Side)

Sampling Plane Details	
Sampling plane dimensions	Exit diamater could not be measured mm
Sampling port size, number	Sampled at exit
Duct orientation & shape	Vertical
Downstream disturbance	Exit 0 D
Upstream disturbance	Exit 0 D
No. traverses & points sampled	1 1
Sample plane conformance to AS 4323.1	Non-conforming

Comments

Velocity and volumetric flowrate measurements could not be taken
The number of traverses sampled is less than the requirement

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
The stack or duct does not have the required number of access holes (ports)

3.5 Vacuum Pump 3 – (790 Couch)

Sampling Plane Details	
Source tested	Vacuum pump outlet
Sampling plane dimensions	1006 mm
Sampling plane area	0.795 m²
Sampling port size, number	Sampled at exit
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 0 D
Upstream disturbance	Exit 0 D
No. traverses & points sampled	1 1
Sample plane conformance to AS 4323.1	Non-conforming

Comments

The number of traverses sampled is less than the requirement
The number of points sampled is less than the requirement
The gas temperature of the sampling plane is below the dew point

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
The stack or duct does not have the required number of access holes (ports)

3.6 Vacuum Pump 7 – (794 First Bottom)

Sampling Plane Details	
Source tested	Vacuum pump outlet
Sampling plane dimensions	906 mm
Sampling plane area	0.645 m²
Sampling port size, number	Sampled at exit
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 0 D
Upstream disturbance	Exit 0 D
No. traverses & points sampled	1 1
Sample plane conformance to AS 4323.1	Non-conforming

Comments

The number of traverses sampled is less than the requirement
The number of points sampled is less than the requirement
The gas temperature of the sampling plane is below the dew point

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
The stack or duct does not have the required number of access holes (ports)

3.7 Vacuum Pump 9 – (Paper Machine Hood Vent Exhaust)

Sampling Plane Details	
Source tested	Vacuum pump outlet
Sampling plane dimensions	1500 x 1750 mm
Sampling plane area	2.63 m²
Sampling port size, number	1/4 inch hole
Duct orientation & shape	Vertical Rectangular
Downstream disturbance	Exit 2 D
Upstream disturbance	Junction 0.1 D
No. traverses & points sampled	1 1
Sample plane conformance to AS 4323.1	Non-conforming

Comments

The number of traverses sampled is less than the requirement
The number of points sampled is less than the requirement
The gas temperature of the sampling plane is below the dew point

The sampling plane is deemed to be non-conforming due to the following reasons:

The upstream disturbance is <2D from the sampling plane
The stack or duct does not have the required number of access holes (ports)
The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D

3.8 Vacuum Pump 10 – (Paper Machine Hood Vent Exhaust)

Sampling Plane Details	
Source tested	Vacuum pump outlet
Sampling plane dimensions	2450 x 3500 mm
Sampling plane area	8.58 m²
Sampling port size, number	Sampled at exit
Duct orientation & shape	Vertical Rectangular
Downstream disturbance	Exit 0 D
Upstream disturbance	Exit 0 D
No. traverses & points sampled	1 1
Sample plane conformance to AS 4323.1	Non-conforming

Comments

The number of traverses sampled is less than the requirement
The number of points sampled is less than the requirement

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
The stack or duct does not have the required number of access holes (ports)

4 Plant Operating Conditions

See Visy Pulp and Paper records for complete process conditions.

Based on information received from Visy Pulp and Paper 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 (AS 4323.1)	NA	NA	✓	NA
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 Alt-Method 008)	NSW EPA TM-22 (USEPA Alt-Method 008)	19%	✓	✓
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	✓
Odour	NSW EPA OM-7 (AS 4323.3)	NSW EPA OM-7 (AS 4323.3)	refer to results	✓	✓¥
Odour from diffuse sources	NSW EPA OM-8 (AS 4323.4)	NSW EPA OM-8 (AS 4323.4)	refer to results	✓	✓¥

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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).

¥ Odour analysis conducted at the Ektimo NSW laboratory by forced choice olfactometry. Results were reported to Ektimo on 14 February 2025 in report ON-00294.

6 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.

7 Definitions

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

% v/v	Volume to volume ratio, wet basis
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
AS	Australian Standard
BSP	British standard pipe
CTM	Conditional test method
D	Duct diameter or equivalent duct diameter for rectangular ducts
D_{50}	'Cut size' of a cyclone is defined as the particle diameter at which the cyclone achieves a 50% collection efficiency i.e. half of the particles are retained by the cyclone and half pass through it. The D_{50} method simplifies the capture efficiency distribution by assuming that a given cyclone stage captures all of the particles with a diameter equal to or greater than the D_{50} of that cyclone and less than the D_{50} of the preceding cyclone.
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
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
OM	Other approved method
OU	Odour unit. One OU is that concentration of odorant(s) at standard conditions that elicits a physiological response from a panel equivalent to that elicited by one Reference Odour Mass (ROM), evaporated in one cubic metre of neutral gas at standard conditions.
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
USEPA	United States Environmental Protection Agency
Velocity difference	The percentage difference between the average of initial flows and after flows.
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

8 Appendix: Site Images

Image 1. EPA 1 - Main Stack 1

Image 2. EPA 22 – Main Stack 2

Image 3. Cooling Pond 3A

Image 4. Cooling Pond 3B

Image 5. Cooling Tower (#1 Paper Machine Side)

Image 6. Cooling Tower (#2 Paper Machine Side)

Image 7. Vacuum Pump 3 – (790 Couch)

Image 8. Vacuum Pump 7 – (794 First Bottom)

Image 9. Vacuum Pump 9 (Paper Machine Hood Vent Exhaust)

Image 10. Vacuum Pump 10 (Paper Machine Hood Vent Exhaust)

Ektimo

Experts in air quality, odour and emission monitoring.

Melbourne
(Head Office)
26 Redland Dr
Mitcham, VIC 3132

Wollongong
1/10 Doyle Ave
Unanderra
NSW 2526

Brisbane
3/109 Riverside Pl
Morningside
QLD 4170

Perth
52 Cooper Rd
Cockburn Central
WA 6164

1300 364 005

ektimo.com.au