

**Impact Fertilisers Pty Ltd, Derwent Park
Six Monthly Monitoring Program
Emission Testing Report - June 2022
Report Number R013181**

Document Information

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Report Authorisation



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NATA Accredited Laboratory
No. 14601

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.

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Please note that only numerical results pertaining to measurements conducted directly by Ektimo are covered by Ektimo's 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' for full details of testing covered by NATA accreditation.

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1 Executive Summary

1.1 Background

Ektimo was engaged by Impact Fertilisers Pty Ltd to perform emission monitoring as part of ongoing environmental compliance monitoring. The sampling conducted constituted the six-monthly monitoring program.

1.2 Project Objective

The objective of the project was to quantify emissions from four (4) discharge points and one (1) ambient location, to determine compliance with Impact Fertilisers Pty Ltd's Environmental Licence.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
Broadfield Mixer Scrubber Stack (Den Stack)	30 June 2022	Total particulate matter Total gaseous and particulate fluoride
Mill Baghouse		Total particulate matter
Hygiene Vent		Total gaseous and particulate fluoride
Fertiliser Rotary Dryer Stack		Total particulate matter Total gaseous and particulate fluoride
Ambient Site: Birch Road**	28-29 June 2022	Ambient fluoride (as HF)

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

** Flow rate, velocity, temperature, and moisture were not determined.

All results are reported on a dry basis at STP. Plant operating conditions have been noted in the report.

1.3 Licence Comparison

The following licence comparison table shows that all analytes highlighted in green are within the licence limit set by the Tasmanian Environmental Protection Notice (EPN) as per licence 7316/2 (last amended on 8 July 2019).

Location Description	Pollutant	Units	Licence limit	Detected values 28 - 30 June 2022
Broadfield Mixer Scrubber Stack	Fluoride (as F)	mg/m ³	50	11
	Particulates	mg/m ³	100	24
Fertiliser Rotary Dryer Stack	Fluoride (as F)	mg/m ³	50	1.8
	Particulates	mg/m ³	100	27
Hygiene Vent	Fluoride (as F)	mg/m ³	50	48
Mill Baghouse Stack	Particulates	mg/m ³	250	18
Birch Road	Ambient fluoride (as HF)	µg/m ³ 24 hour average	2.9	0.23

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

Refer to the Test Methods table for the measurement uncertainties.

2 Results

2.1 Broadfield Mixer Scrubber Stack (Den Stack)

Date	30/06/2022	Client	Impact Fertilisers Pty Ltd
Report	R013181	Stack ID	Broadfield Mixer Scrubber Stack
Licence No.	7316/2	Location	Derwent Park
Ektimo Staff	G Trenear & V Liu	State	TAS
Process Conditions	Feed rate: 23 t/hr Rock type: Nauru 79.2%, Vietnamese 20.1%, Bauxite 0.7%		220628

Sampling Plane Details	
Sampling plane dimensions	900 mm
Sampling plane area	0.636 m ²
Sampling port size, number	4" BSP (x2)
Duct orientation & shape	Horizontal Circular
Downstream disturbance	Centrifugal fan 1 D
Upstream disturbance	Bend 1 D
No. traverses & points sampled	1 10
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 discharge is assumed to be composed of dry air and moisture	
The sampling plane is deemed to be non-conforming due to the following reasons:	
The highest to lowest gas velocity ratio exceeds 1.6:1	
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	

Stack Parameters		
Moisture content, %v/v	5.6 (saturated)	
Gas molecular weight, g/g mole	28.4 (wet)	29.0 (dry)
Gas density at STP, kg/m ³	1.27 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m ³	1.11	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0938 & 1233	
Temperature, °C	39	
Velocity at sampling plane, m/s	17	
Volumetric flow rate, actual, m ³ /min	650	
Volumetric flow rate (wet STP), m ³ /min	570	
Volumetric flow rate (dry STP), m ³ /min	540	
Mass flow rate (wet basis), kg/hour	43000	

Isokinetic Results	Sampling time	Results	
		1125-1225	
		Concentration mg/m ³	Mass Rate g/min
Total particulate matter		24	13
Particulate fluoride (as F)		1.2	0.62
Gaseous fluoride (as F)		9.8	5.3
Total fluoride (as F)		11	5.9
Isokinetic Sampling Parameters			
Sampling time, min		60	
Isokinetic rate, %		100	
Gravimetric analysis date (total particulate)		08-07-2022	

2.2 Mill Baghouse

Date	30/06/2022	Client	Impact Fertilisers Pty Ltd
Report	R013181	Stack ID	Mill Baghouse
Licence No.	7316/2	Location	Derwent Park
Ektimo Staff	G Trenear & V Liu	State	TAS
Process Conditions	Feed rate: 23 t/hr Rock type: Nauru 79.2%, Vietnamese 20.1%, Bauxite 0.7%		220628

Sampling Plane Details	
Sampling plane dimensions	600 mm
Sampling plane area	0.283 m ²
Sampling port size, number	1" Holes (x2)
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 2 D
Upstream disturbance	Centrifugal fan 2 D
No. traverses & points sampled	2 12
Sample plane conformance to AS 4323.1	Conforming but non-ideal
Comments	
The discharge is assumed to be composed of dry air and moisture	
The sampling plane is deemed to be non-ideal due to the following reasons:	
The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D	
The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D	

Stack Parameters		
Moisture content, %v/v	3.8	
Gas molecular weight, g/g mole	28.6 (wet)	29.0 (dry)
Gas density at STP, kg/m ³	1.27 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m ³	0.99	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1437 & 1555	
Temperature, °C	82	
Velocity at sampling plane, m/s	15	
Volumetric flow rate, actual, m ³ /min	260	
Volumetric flow rate (wet STP), m ³ /min	200	
Volumetric flow rate (dry STP), m ³ /min	190	
Mass flow rate (wet basis), kg/hour	15000	

Isokinetic Results	Sampling time	Results	
		Concentration mg/m ³	Mass Rate g/min
		1445-1547	
Total particulate matter		18	3.5
Isokinetic Sampling Parameters			
Sampling time, min		60	
Isokinetic rate, %		96	
Gravimetric analysis date (total particulate)		08-07-2022	

2.3 Hygiene Vent

Date	30/06/2022	Client	Impact Fertilisers Pty Ltd
Report	R013181	Stack ID	Hygiene Vent
Licence No.	7316/2	Location	Derwent Park
Ektimo Staff	G Trenear & V Liu	State	TAS
Process Conditions	Feed rate: 23 t/hr Rock type: Nauru 79.2%, Vietnamese 20.1%, Bauxite 0.7%		220628

Sampling Plane Details	
Sampling plane dimensions	600 mm
Sampling plane area	0.283 m ²
Sampling port size, number & depth	4" BSP (x2), 50 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 2 D
Upstream disturbance	Bend 1 D
No. traverses & points sampled	2 12
Sample plane conformance to AS 4323.1	Non-conforming

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

The sampling plane is deemed to be non-conforming due to the following reasons:
 The upstream disturbance is <2D from the sampling plane
 The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D

Stack Parameters		
Moisture content, %v/v	2.3 (saturated)	
Gas molecular weight, g/g mole	28.7 (wet)	29.0 (dry)
Gas density at STP, kg/m ³	1.28 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m ³	1.20	

Gas Flow Parameters	
Flow measurement time(s) (hhmm)	1418 & 1530
Temperature, °C	21
Velocity at sampling plane, m/s	4.4
Volumetric flow rate, actual, m ³ /min	75
Volumetric flow rate (wet STP), m ³ /min	71
Volumetric flow rate (dry STP), m ³ /min	69
Mass flow rate (wet basis), kg/hour	5400

Isokinetic Results	Sampling time	Results	
		1425-1527	
		Concentration mg/m ³	Mass Rate g/min
Total particulate matter		<2	<0.1
Particulate fluoride (as F)		0.14	0.0097
Gaseous fluoride (as F)		48	3.3
Total fluoride (as F)		48	3.3

Isokinetic Sampling Parameters	
Sampling time, min	60
Isokinetic rate, %	96
Gravimetric analysis date (total particulate)	08-07-2022

2.4 Fertiliser Rotary Dryer Stack

Date	30/06/2022	Client	Impact Fertilisers Pty Ltd
Report	R013181	Stack ID	Fertiliser Rotary Dryer Stack
Licence No.	7316/2	Location	Derwent Park
Ektimo Staff	G Trenear & V Liu	State	TAS
Process Conditions	Please refer to client records.		220628

Sampling Plane Details	
Sampling plane dimensions	1000 mm
Sampling plane area	0.785 m ²
Sampling port size, number & depth	4" Flange (x2), 150 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit >2 D
Upstream disturbance	Bend >6 D
No. traverses & points sampled	2 12
Sample plane conformance to AS 4323.1	Ideal sampling plane
Comments	
The discharge is assumed to be composed of dry air and moisture	

Stack Parameters		
Moisture content, %v/v	3.1 (saturated)	
Gas molecular weight, g/g mole	28.6 (wet)	29.0 (dry)
Gas density at STP, kg/m ³	1.28 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m ³	1.18	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0938 & 1107	
Temperature, °C	27	
Velocity at sampling plane, m/s	14	
Volumetric flow rate, actual, m ³ /min	650	
Volumetric flow rate (wet STP), m ³ /min	600	
Volumetric flow rate (dry STP), m ³ /min	590	
Mass flow rate (wet basis), kg/hour	46000	

Isokinetic Results	Sampling time	Results	
		0955-1058	
		Concentration mg/m ³	Mass Rate g/min
Total particulate matter		27	16
Particulate fluoride (as F)		0.43	0.25
Gaseous fluoride (as F)		1.4	0.8
Total fluoride (as F)		1.8	1.1
Isokinetic Sampling Parameters			
Sampling time, min		60	
Isokinetic rate, %		102	
Gravimetric analysis date (total particulate)		08-07-2022	

2.5 Birch Road



Ambient Fluoride Sampling Location	Birch Rd
Co-ordinates	S 42°50'09 E 147°18'45
Siting in compliance with AS2922	Yes
Start Date and Time	28/06/2022 16:40
Finish Date and Time	29/06/2022 16:40
Average Temp (°C)	13
Barometric pressure (mBar)	1010
Particulate Fluoride Concentration (as HF) ($\mu\text{g}/\text{m}^3$) at Wet NTP (average per day)	0.12
Gaseous Fluoride Concentration (as HF) ($\mu\text{g}/\text{m}^3$) at Wet NTP (average per day)	0.11
Total Fluoride Concentration (as HF) ($\mu\text{g}/\text{m}^3$) at Wet NTP (average per day)	0.23

Refer to "WEATHER OBSERVATIONS" in the appendix.

Refer to "AMBIENT FLUORIDE SAMPLING LOCATIONS" in the appendix.

3 Test Methods

All sampling and analysis 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	AS 4323.1	NA	NA	✓	NA
Flow rate and velocity	AS 4323.1	AS 4323.1	8%, 7%	✓	✓
Moisture	USEPA Method 4	USEPA Method 4	8%	✓	✓
Moisture (stacks <60°C)	Ektimo 050	Ektimo 050	not specified	✓	✓
Total particulate matter	AS 4323.2	AS 4323.2	7%	✓	✓ ^{††}
Total fluoride	USEPA Method 13B	ALS in-house method EA144C & Ektimo 235	17%	✓	✓ ^{#,†}
Ambient gaseous and acid soluble particulate fluoride	AS 3580.13.2	AS 3580.13.2 and ALS in-house method EA144C	not specified	✓	✓ [#]

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

† Analysis conducted at the Ektimo Mitcham, VIC laboratory, NATA accreditation number 14601. Results were reported on 12 July 2022 in report LV-003057

†† Gravimetric analysis conducted at the Ektimo Mitcham, VIC laboratory, NATA accreditation number 14601.

Analysis (solid fluoride only) performed by Australian Laboratory Services Pty Ltd, NATA accreditation number 825. Results were reported to Ektimo on 14 July 2022 in report EN2206640.

4 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.

5 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
BSP	British standard pipe
CARB	Californian Air Resources Board
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
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 odourant(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.
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.

6 Appendix 1: Weather Observations

Hobart Tasmania June 2022

Date	Day	Temps		Rain mm	Evap mm	Sun hours	Max wind gust Dir km/h	9:00 AM					3:00 PM									
		Min °C	Max °C					Spd local	Time	Temp °C	RH %	Cld 8th	Dir km/h	Spd hPa	MSLP hPa	Temp °C	RH %	Cld 8th	Dir km/h	Spd hPa	MSLP hPa	
28	Tu	5	14.9	0	1.8		NNW	59	4:23	10.9	67	7	NNE	17	1023.3	14.8	57	7	NNW	17	1021.1	
29	We	8.3	13.5	0	0.6		NNW	43	13:40	8.9	75	7	NNW	13	1018.9	13.4	54	8	NNW	13	1014.9	
30	Th	7.1	12.5	1	0.8		SSW	41	4:17	7.7	73	3	SW	17	1025.5	10.2	53	6	SW	24	1026	
Statistics for June 2022																						
Mean		5.8	12.5		1.1					8	76	5		14	1012.4	11.1	63	5		16	1011.4	
Lowest		2.4	8	0	0					4.4	58	1	Calm		987.6	5.1	48	1	Calm		988.6	
Highest		10.2	16.2	13.2	2.8		WNW	106		11.3	99	8	NNW	30	1032.1	15.6	85	8	WSW	39	1029.2	
Total				58.2	33.6																	

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7 Appendix 2: Ambient Fluoride Sampling Locations



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AUSTRALIA