Ektimo

Experts in air quality, odour and emission monitoring.

Emission Testing Report

December 2024

Report: R016539-5

Tianqi Lithium Kwinana Pty Ltd, Kwinana Beach

Document Information

Client Name:	Tianqi Lithium Kwinana Pty Ltd
Report Number:	R016539-5
Date of Issue:	24 January 2025
[redacted]	[redacted]
Address:	61 Donaldson Road Kwinana Beach WA 6167
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation

[redacted]

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 Tianqi Lithium Kwinana Pty Ltd to perform emission testing at their Kwinana Beach plant. Testing was carried out in accordance with Works Approval W5977/2016/1.

1.2 Project Objective & Overview

The objective of the project was to quantify emissions from five (5) discharge points to determine compliance with Tianqi Lithium Kwinana Pty Ltd's Works Approval.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
Calciner Fan Stack 1200-SK-001	11 December 2024	Total particulate matter, PM_{10} Oxygen (O_2), carbon dioxide (CO_2), oxides of nitrogen (as NO_2)
Calciner Refeed (feed) 1210-BH-001		Total particulate matter & PM_{10}
Calciner Refeed (discharge) 1210-BH-002		
Acid Roast Scrubber 1340-SK-001	12 December 2024	Total particulate matter, PM_{10} Sulfur dioxide & sulfur trioxide/ sulfuric acid mist
Sodium Sulfate Heater 1710-VL-017	13 December 2024	Total particulate matter, PM_{10} Oxygen (O_2), carbon dioxide (CO_2), oxides of nitrogen (as NO_2)

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

All results are reported on a dry basis at STP.

1.3 Licence Comparison

The following licence comparison table shows any analytes highlighted in orange are outside the licence limit set by the WA Department of Water and Environmental Regulation (DWER) as per licence Works Approval W5977/2016/1.

Location Description	Pollutant	Units	Licence Limit	Detected Values
Calciner Fan Stack 1200-SK-001	Nitrogen oxides	mg/m^3 at STP dry	350	**63**
		mg/m^3 at 15% O_2 STP dry	350	**83**
	Total particulate matter	mg/m^3 at STP dry	50	**<3**
Sodium Sulfate Heater 1710-VL-017	Nitrogen oxides	mg/m^3 at STP dry	350	**<4**
		mg/m^3 at 15% O_2 STP dry	350	**<200**
	Total particulate matter	mg/m^3 at STP dry	50	**<2**
Acid Roast Scrubber 1340-SK-001	SO_3	mg/m^3 at STP dry	100	**0.65**
	Total particulate matter	mg/m^3 at STP dry	50	**41**
Calciner Refeed (feed) 1210-BH-001	Total particulate matter	mg/m^3 at STP dry	50	**330**
Calciner Refeed (Discharge End) 1200-BH-002	Total particulate matter	mg/m^3 at STP dry	50	**2.4**

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

2 Results

2.1 Calciner Fan Stack 1200-SK-001

Gas Analyser Results	Average
Sampling time	1226 - 1327
	Concentration mg/m³ / Corrected to 15% O2 mg/m³ / Mass Rate g/s
Combustion Gases	
Nitrogen oxides (as NO_2)	63 / 83 / 1.1
	Concentration %v/v
Carbon dioxide	2.6
Oxygen	16.4

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				1220-1321			1335-1436		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Total particulate matter	<3	<3	<0.05	<2	<3	<0.04	<3	<4	<0.05
PM10 (PSA)	<3	<3	<0.05	<2	<3	<0.04	<3	<4	<0.05
Isokinetic Sampling Parameters									
Sampling time, min					60			60	
Isokinetic rate, %					100			100	
Gravimetric analysis date (total particulate)					16-12-2024			16-12-2024	

Note: There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the limit of detection of the total particulate matter test.

2.2 Calciner Refeed (feed) 1210-BH-001

Isokinetic Results	Average		Test 1		Test 2	
Sampling time			0940-1041		1050-1151	
	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter	330	0.17	350	0.18	300	0.16
PM10 (PSA)	220	0.12	240	0.12	210	0.11
Isokinetic Sampling Parameters						
Sampling time, min			60		60	
Isokinetic rate, %			100		99	
Gravimetric analysis date (total particulate)			16-12-2024		16-12-2024	

2.3 Calciner Refeed (discharge) 1210-BH-002

Isokinetic Results	Average		Test 1		Test 2	
Sampling time			1220-1321		1335-1436	
	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter	2.4	0.00047	1.5	0.00028	3.3	0.00065
PM10 (PSA)	2.4	0.00047	1.5	0.00028	3.3	0.00065
Isokinetic Sampling Parameters						
Sampling time, min			60		60	
Isokinetic rate, %			109		101	
Gravimetric analysis date (total particulate)			16-12-2024		16-12-2024	

Note: There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the total particulate matter test as a worse-case scenario.

2.4 Acid Roast Scrubber 1340-SK-001

Isokinetic Results	Average		Test 1		Test 2	
Sampling time			0920-1021		1035-1136	
	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter	41	0.0064	25	0.004	57	0.0088
PM10 (PSA)	21	0.0032	14	0.0021	28	0.0043
Sulfur dioxide	3200	0.49	2800	0.44	3500	0.54
Sulfur trioxide and/or Sulfuric acid (as SO3)	0.65	0.0001	0.71	0.00011	0.59	0.00009
Isokinetic Sampling Parameters						
Sampling time, min			60		60	
Isokinetic rate, %			93		106	
Gravimetric analysis date (total particulate)			16-12-2024		16-12-2024	

2.5 Sodium Sulfate Heater 1710-VL-017

Gas Analyser Results	Average
Sampling time	0900 - 1000
	Concentration mg/m³ / Corrected to 15% O2 mg/m³ / Mass Rate g/s
Combustion Gases	
Nitrogen oxides (as NO_2)	<4 / <200 / <0.01
	Concentration %v/v
Carbon dioxide	<0.4
Oxygen	20.7

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				0900-1001			1010-1111		
	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 15% O2 mg/m³	Mass Rate g/s
Total particulate matter	<2	<80	<0.007	<2	<90	<0.008	<2	<70	<0.006
PM10 (PSA)	<2	<80	<0.007	<2	<90	<0.008	<2	<70	<0.006
Isokinetic Sampling Parameters									
Sampling time, min					60			60	
Isokinetic rate, %					94			97	
Gravimetric analysis date (total particulate)					17-12-2024			17-12-2024	

Note: There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the limit of detection of the total particulate matter test.

3 Sample Plane Compliance

3.1 Calciner Fan Stack 1200-SK-001

Sampling Plane Details	
Sampling plane dimensions	1100 mm
Sampling plane area	0.95 m²
Sampling port size, number & depth	4" BSP (x2), 242 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 3 D
Upstream disturbance	Axial fan 9 D
No. traverses & points sampled	2 12
Sample plane conformance to AS 4323.1	Ideal sampling plane

3.2 Calciner Refeed (feed) 1210-BH-001

Sampling Plane Details	
Sampling plane dimensions	200 mm
Sampling plane area	0.0314 m²
Sampling port size, number & depth	3" Flange (x1), 260 mm
Duct orientation & shape	Horizontal Circular
Downstream disturbance	Bend 1 D
Upstream disturbance	Bend 3 D
No. traverses & points sampled	1 4
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 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

3.3 Calciner Refeed (discharge) 1210-BH-002

Sampling Plane Details	
Sampling plane dimensions	200 mm
Sampling plane area	0.0314 m²
Sampling port size, number & depth	3" Flange (x1), 250 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Bend 1 D
Upstream disturbance	Bend 3 D
No. traverses & points sampled	1 2
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 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

3.4 Acid Roast Scrubber 1340-SK-001

Sampling Plane Details	
Sampling plane dimensions	150 mm
Sampling plane area	0.0177 m²
Sampling port size, number & depth	4" Flange (x2), 50 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Change in diameter >2 D
Upstream disturbance	Axial fan >8 D
No. traverses & points sampled	2 4
Sample plane conformance to AS 4323.1	Ideal sampling plane

3.5 Sodium Sulfate Heater 1710-VL-017

Sampling Plane Details		
Sampling plane dimensions		500 mm
Sampling plane area		0.196 m²
Sampling port size, number & depth		4" Flange (x2), 110 mm
Duct orientation & shape		Vertical Circular
Downstream disturbance	Change in diameter	>2 D
Upstream disturbance	Axial fan	>8 D
No. traverses & points sampled		1 4
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 stack or duct does not have the required number of access holes (ports)

4 Plant Operating Conditions

See Tianqi Lithium Kwinana Pty Ltd records for complete process conditions.

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	AS 4323.1	NA	NA	✓	NA
Flow rate, temperature & velocity	USEPA Method 2	USEPA Method 2	8%, 2%, 7%	NA	✓
Moisture	USEPA Method 4	USEPA Method 4	8%	✓	✓
Carbon dioxide & oxygen	USEPA Method 3A	USEPA Method 3A	13%	✓	✓
Carbon monoxide	USEPA Method 10	USEPA Method 10	12%	✓	✓
Nitrogen oxides	USEPA Method 7E	USEPA Method 7E	12%	✓	✓
Total particulate matter	USEPA Method 17	USEPA Method 17	7%	✓	✓††
Particulate matter (PM_{10} & $PM_{2.5}$) by particle size analysis	USEPA Method 17	Ektimo 410 in-house method using Malvern Mastersizer 3000	not specified	✗	✗†
Sulfuric acid mist and/or sulfur oxides	USEPA Method 8	Ektimo 235	16%	✓	✓†

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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 Ektimo. Results were reported to Ektimo on:
- 6 January 2025 in report LV-006669.
- 7 January 2025 in report LV-006681.

†† Gravimetric analysis conducted at the Ektimo WA laboratory.

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 basis
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
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

Ektimo

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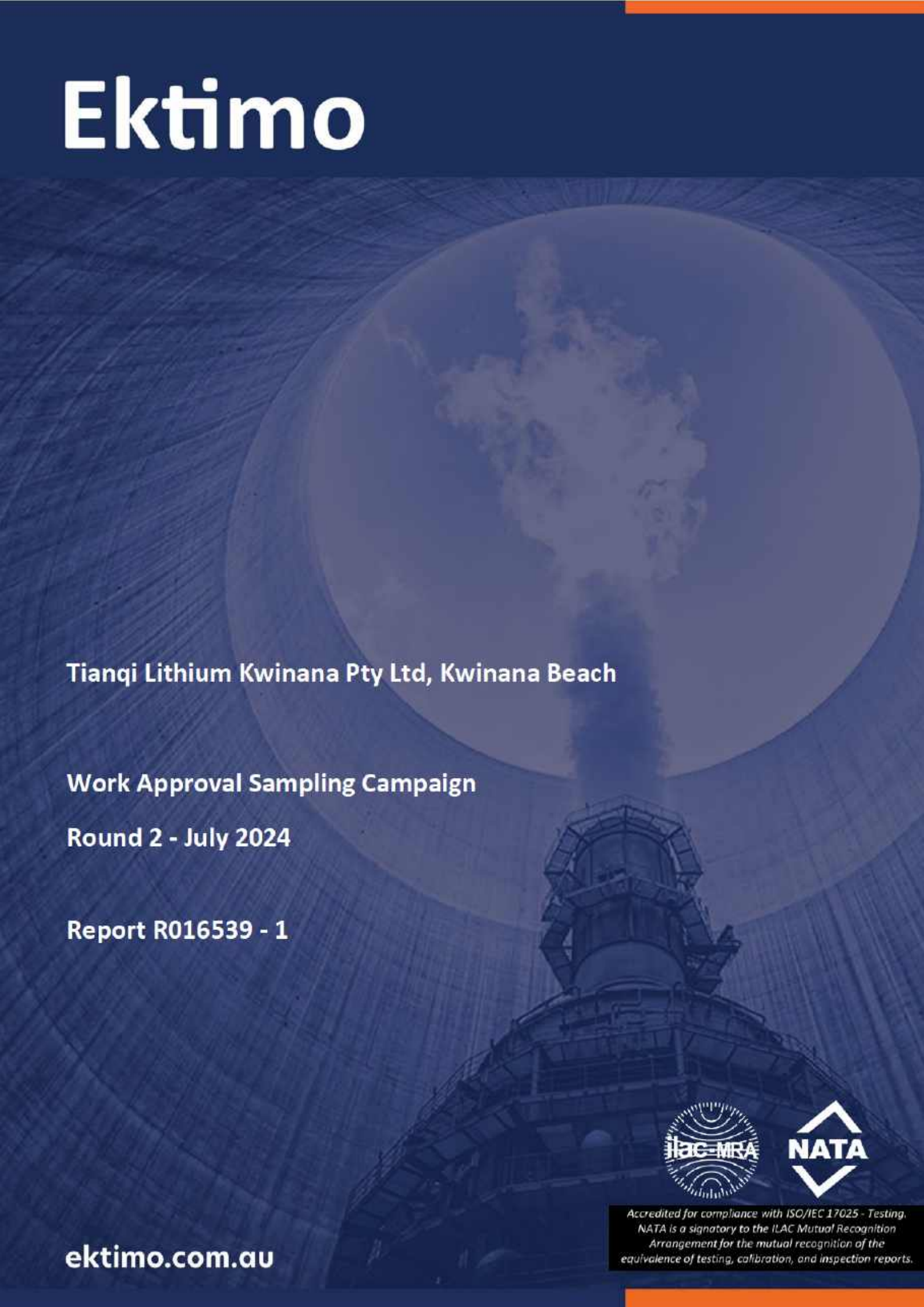
Ektimo



Tianqi Lithium Kwinana Pty Ltd, Kwinana Beach

Work Approval Sampling Campaign

Round 2 - July 2024

Report R016539 - 1

Document Information

[redacted]

Report Authorisation

[redacted]

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1 Executive Summary

1.1 Background

1.2 Project Objective & Overview

Location	Test Date	Test Parameters*
[redacted]	[redacted]	[redacted]
1230-SK-001	4 July 2024	
Acid Roast Scrubber 1340-SK-001	4 July 2024	Total particulate matter, PM_{10} Oxygen (O_2), carbon dioxide (CO_2), oxides of nitrogen (as NO_2) Sulfur dioxide & sulfuric acid mist
Sodium Sulfate Heater 1710-VL-017	3 July 2024	Total particulate matter, PM_{10} Oxygen (O_2), carbon dioxide (CO_2), oxides of nitrogen (as NO_2)

* 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.

1.3 Licence Comparison

Location Description	Pollutant	Units	Licence Limit	Detected Values
[redacted]	Nitrogen oxides	mg/m^3 at STP dry	350	82
		mg/m^3 at 3% O_2 STP dry	350	350
	Total particulate matter	mg/m^3 at STP dry	50	<2
	Nitrogen oxides	mg/m^3 at STP dry	350	<4
		mg/m^3 at 3% O_2 STP dry	350	<300
	Total particulate matter	mg/m^3 at STP dry	50	≤2.9
	SO_3	mg/m^3 at STP dry	100	1.2
	Total particulate matter	mg/m^3 at STP dry	50	<2
	Total particulate matter	mg/m^3 at STP dry	50	600
1200-BH-002	Total particulate matter	mg/m^3 at STP dry	50	63
Spodumene Mill 1230-SK-001	Total particulate matter	mg/m^3 at STP dry	50	<3

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

2 Results

2.1 Calciner Fan Stack 1200-SK-001

[redacted]

Gas Analyser Results	Average
Sampling time	1042 - 1141
	Concentration mg/m³ / Corrected to 3% O2 mg/m³ / Mass Rate g/s
Combustion Gases	
Nitrogen oxides (as NO_2)	82 / 350 / 1.4
	Concentration %v/v
Carbon dioxide	2.4
Oxygen	16.7

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				1040-1145			1155-1300		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s
Total particulate matter	<2	<8	<0.03	<2	<8	<0.03	<2	<8	<0.03
PM10 (PSA)	<2	<8	<0.03	<2	<8	<0.03	<2	<8	<0.03
Isokinetic Sampling Parameters									
Sampling time, min					60			60	
Isokinetic rate, %					101			101	
Gravimetric analysis date (total particulate)					04-07-2024			04-07-2024	

Note: There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the limit of detection of the total particulate matter test.

2.2 Calciner Refeed (feed) 1210-BH-001

[redacted]

Isokinetic Results		Average		Test 1		Test 2	
Sampling time				1120-1220		1230-1330	
		Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter		600	0.33	670	0.38	530	0.28
PM10	(PSA)	410	0.23	460	0.26	360	0.19
Isokinetic Sampling Parameters							
Sampling time, min				60		60	
Isokinetic rate, %				100		103	
Gravimetric analysis date (total particulate)				04-07-2024		04-07-2024	

2.3 Calciner Refeed (discharge) 1210-BH-002

Isokinetic Results	Average		Test 1		Test 2	
Sampling time			1400-1500		1500-1600	
	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter	63	0.028	52	0.023	74	0.032
PM10 (PSA)	43	0.019	35	0.015	51	0.022
Isokinetic Sampling Parameters						
Sampling time, min			60		60	
Isokinetic rate, %			99		99	
Gravimetric analysis date (total particulate)			04-07-2024		04-07-2024	

2.4 Spodumene Mill 1230-SK-001

[redacted]

Isokinetic Results	Average		Test 1		Test 2	
Sampling time			0950-1055		1100-1205	
	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter	<3	<0.005	<3	<0.005	<3	<0.005
PM10 (PSA)	<3	<0.005	<3	<0.005	<3	<0.005
Isokinetic Sampling Parameters						
Sampling time, min			60		60	
Isokinetic rate, %			99		99	
Gravimetric analysis date (total particulate)			08-07-2024		08-07-2024	

Note: There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the limit of detection of the total particulate matter test.

2.5 Acid Roast Scrubber 1340-SK-001

[redacted]

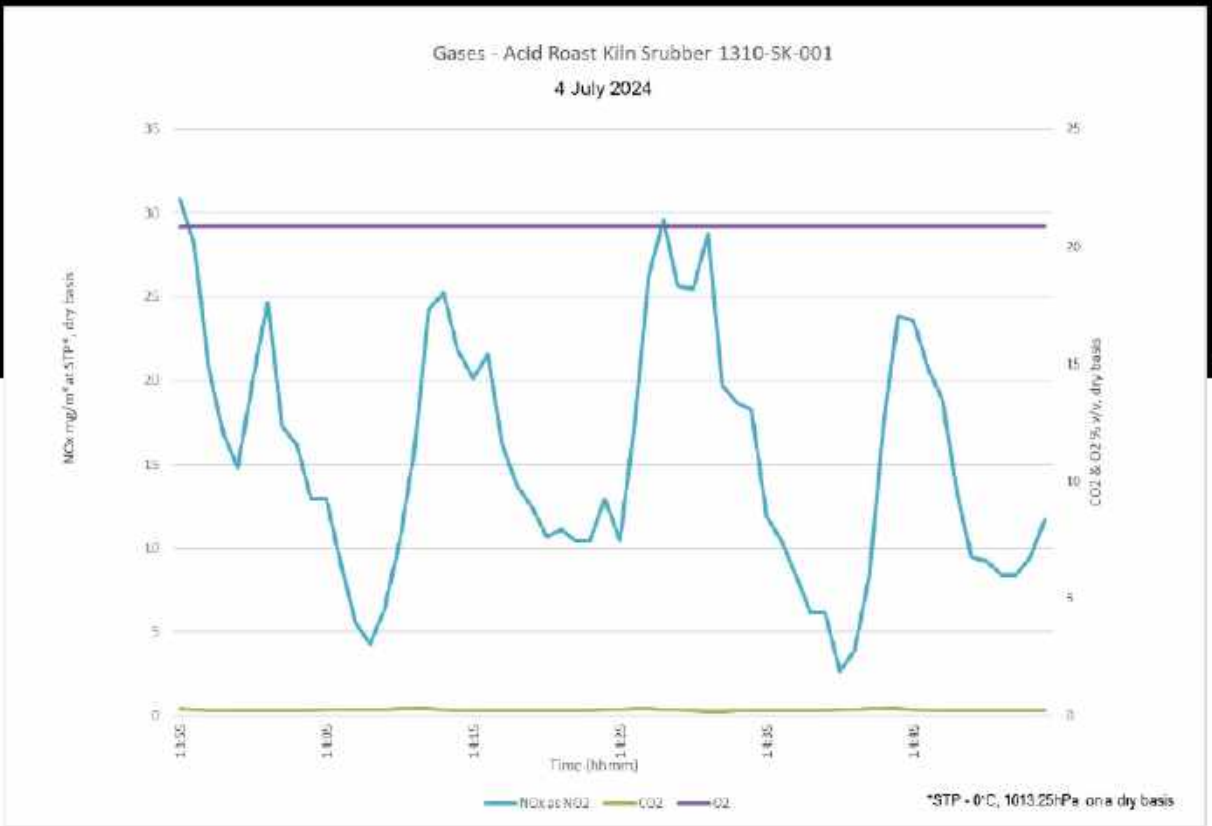
Isokinetic Results		Results	
	Sampling time	1240-1345	
		Concentration mg/m³	Mass Rate g/s
Total particulate matter		<2	<0.0004
PM10	(PSA)	<2	<0.0004
Sulfur dioxide		760	0.11
Sulfur trioxide		1.2	0.00018
Isokinetic Sampling Parameters			
Sampling time, min		60	
Isokinetic rate, %		74	
Gravimetric analysis date (total particulate)		08-07-2024	

Note:

1. Test 2 has not been reported due to compromised sample integrity.
2. There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the limit of detection of the total particulate matter test.

Date	4/07/2024	**Client**	Tianqi Lithium
Report	R016539	**Stack ID**	Acid Roast Kiln Srubber 1310-SK-001
Licence No.	W5977/2016/1	**Location**	Kwinana
Ektimo Staff	Eric Tujek & Zach Marcus	**State**	WA
Process Conditions	Please refer to client records.		240531

Gas Analyser Results	Average	
Sampling time	1355 - 1454	
	Concentration mg/m³	**Mass Rate g/s**
Combustion Gases		
Nitrogen oxides (as NO_2)	16	0.0023
	Concentration %v/v	
Carbon dioxide	<0.4	
Oxygen	20.9	



2.6 Sodium Sulfate Heater1710-VL-017

[redacted]

Gas Analyser Results	Average
Sampling time	1036 - 1135
	Concentration mg/m³ / Corrected to 3% O2 mg/m³ / Mass Rate g/s
Combustion Gases	
Nitrogen oxides (as NO_2)	<4 / <300 / <0.01
	Concentration %v/v
Carbon dioxide	<0.4
Oxygen	20.7

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				1035-1135			1140-1240		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s
Total particulate matter	≤2.9	≤210	≤0.01	3.9	290	0.014	<2	<100	<0.007
PM10 (PSA)	≤2.9	≤210	≤0.01	3.9	290	0.014	<2	<100	<0.007
Isokinetic Sampling Parameters									
Sampling time, min					60			60	
Isokinetic rate, %					101			106	
Gravimetric analysis date (total particulate)					04-07-2024			04-07-2024	

Note: There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the limit of detection of the total particulate matter test.

3 Sample Plane Compliance

3.1 Calciner Fan Stack 1200-SK-001

Sampling Plane Details	
Source tested	Calciner
Pollution control equipment	Filter baghouse
Sampling plane dimensions	1100 mm
Sampling plane area	0.95 m²
Sampling port size, number & depth	4" BSP (x2), 242 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 3 D
Upstream disturbance	Axial fan 9 D
No. traverses & points sampled	2 12
Sample plane conformance to AS 4323.1	Ideal sampling plane

3.2 Calciner Refeed (feed) 1210-BH-001

Sampling Plane Details	
Source tested	Calciner
Pollution control equipment	Filter baghouse
Sampling plane dimensions	200 mm
Sampling plane area	0.0314 m²
Sampling port size, number & depth	3" Flange (x1), 260 mm
Duct orientation & shape	Horizontal Circular
Downstream disturbance	Bend 1 D
Upstream disturbance	Bend 3 D
No. traverses & points sampled	1 2
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 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

3.3 Calciner Refeed (discharge) 1210-BH-002

Sampling Plane Details	
Source tested	Calciner
Pollution control equipment	Filter baghouse
Sampling plane dimensions	200 mm
Sampling plane area	0.0314 m²
Sampling port size, number & depth	3" Flange (x1), 250 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Bend 1 D
Upstream disturbance	Bend 3 D
No. traverses & points sampled	1 2
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 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

3.4 Spodumene Mill 1230-SK-001

Sampling Plane Details	
Source tested	Calciner
Pollution control equipment	Filter baghouse
Sampling plane dimensions	1180 mm
Sampling plane area	1.09 m²
Sampling port size, number & depth	4" Flange (x2), 160 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Change in diameter >2 D
Upstream disturbance	Axial fan >8 D
No. traverses & points sampled	2 12
Sample plane conformance to AS 4323.1	Non-conforming

The sampling plane is deemed to be non-conforming due to the following reasons:
The differential pressure at one or more sampling points is less than 5 Pa

3.5 Acid Roast Scrubber 1340-SK-001

Sampling Plane Details	
Source tested	Calciner
Pollution control equipment	Filter baghouse
Sampling plane dimensions	150 mm
Sampling plane area	0.0177 m²
Sampling port size, number & depth	4" Flange (x2), 50 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Change in diameter >2 D
Upstream disturbance	Axial fan >8 D
No. traverses & points sampled	2 4
Sample plane conformance to AS 4323.1	Ideal sampling plane

3.6 Sodium Sulfate Heater 1710-VL-017

Sampling Plane Details	
Source tested	Calciner
Pollution control equipment	Filter baghouse
Sampling plane dimensions	500 mm
Sampling plane area	0.196 m²
Sampling port size, number & depth	4" Flange (x2), 110 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Change in diameter >2 D
Upstream disturbance	Axial fan >8 D
No. traverses & points sampled	1 4
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 stack or duct does not have the required number of access holes (ports)

4 Plant Operating Conditions

[redacted]

5 Test Methods

[redacted]

Parameter	Sampling method	Analysis method	Uncertainty*	NATA accredited Sampling	NATA accredited Analysis
Sampling points - Selection	AS 4323.1	NA	NA	✓	NA
Flow rate, temperature & velocity	USEPA Method 2	USEPA Method 2	8%, 2%, 7%	NA	✓
Moisture	USEPA Method 4	USEPA Method 4	8%	✓	✓
Carbon dioxide & oxygen	USEPA Method 3A	USEPA Method 3A	13%	✓	✓
Nitrogen oxides	USEPA Method 7E	USEPA Method 7E	12%	✓	✓
Total particulate matter	USEPA Method 17	USEPA Method 17	7%	✓	✓[†]
Particulate matter (PM_{10} & $PM_{2.5}$) by particle size analysis	USEPA Method 17	Ektimo 410 In-house method using Malvern Mastersizer 3000	not specified	×	×[†]
Sulfuric acid mist and/or sulfur oxides	USEPA Method 8	Ektimo 235	16%	✓	✓[†]

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.

Ektimo

7 Definitions

[redacted]

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.

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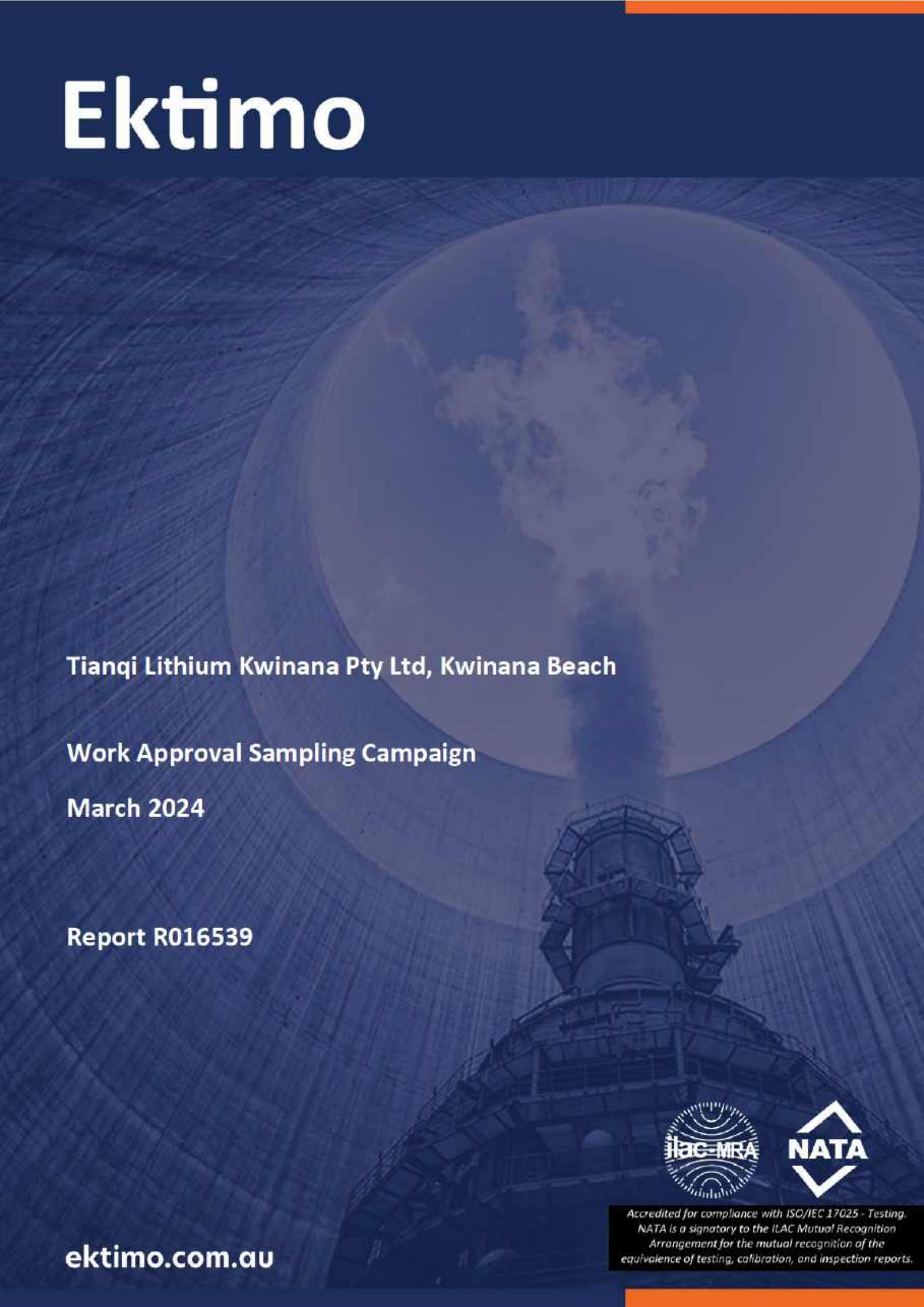
Ektimo

Tianqi Lithium Kwinana Pty Ltd, Kwinana Beach

Work Approval Sampling Campaign

March 2024

Report R016539



Document Information

[redacted]

Report Authorisation

[redacted]

Ektimo

Table of Contents

1 Executive Summary

1.1 Background

1.2 Project Objective & Overview

Location	Test Date	Test Parameters*
[redacted]	[redacted]	[redacted]
Spodumene Mill 1230-SK-001	26 March 2024	
Sodium Sulfate Heater 1710-VL-017	27 March 2024	Total particulate matter, PM_{10} Oxygen (O_2), carbon dioxide (CO_2), oxides of nitrogen (as NO_2)

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

* The Acid Roast Scrubber 1340-SK-001 went offline during the sampling campaign and therefore has not been reported.

All results are reported on a dry basis at STP.

Plant operating conditions have been noted in this report.

1.3 Licence Comparison

Location Description	Pollutant	Units	Licence Limit	Detected Values
[redacted]	Nitrogen oxides	mg/m^3 at STP dry	350	70
		mg/m^3 at 3% O_2 STP dry	350	330
	Total particulate matter	mg/m^3 at STP dry	50	<2
	Nitrogen oxides	mg/m^3 at STP dry	350	<4
		mg/m^3 at 3% O_2 STP dry	350	<400
	Total particulate matter	mg/m^3 at STP dry	50	3.8
	Total particulate matter	mg/m^3 at STP dry	50	140
	Total particulate matter	mg/m^3 at STP dry	50	98
1230-SK-001	Total particulate matter	mg/m^3 at STP dry	50	<3

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

2 Results

2.1 Calciner Fan 1200-SK-001

[redacted]

Gas Analyser Results	Average
Sampling time	1044 - 1146
	Concentration mg/m³ / Corrected to 3% O2 mg/m³ / Mass Rate g/s
Combustion Gases	
Nitrogen oxides (as NO_2)	70 / 330 / 1.4
	Concentration % v/v
Carbon dioxide	2.2
Oxygen	17.1

Isokinetic Results		Average			Test 1			Test 2		
Sampling time					1035-1140			1145-1250		
		Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s
Total particulate matter		<2	<9	<0.04	<2	<9	<0.04	<2	<10	<0.04
PM10	(PSA)	<2	<9	<0.04	<2	<9	<0.04	<2	<10	<0.04
Isokinetic Sampling Parameters										
Sampling time, min					60			60		
Isokinetic rate, %					101			101		
Gravimetric analysis date (total particulate)					02-04-2024			02-04-2024		

Note: There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the limit of detection of the total particulate matter test.

2.2 Calciner Refeed (feed) 1210-BH-001

[redacted]

Isokinetic Results	Average		Test 1		Test 2	
Sampling time			1125-1225		1230-1330	
	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter	140	0.065	120	0.06	170	0.07
PM10 (PSA)	77	0.035	62	0.032	93	0.038
Isokinetic Sampling Parameters						
Sampling time, min			60		60	
Isokinetic rate, %			104		96	
Gravimetric analysis date (total particulate)			02-04-2024		02-04-2024	

2.3 Calciner Refeed (discharge) 1210-BH-002

[redacted]

Isokinetic Results	Average		Test 1		Test 2	
Sampling time			1345-1435		1440-1540	
	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter	98	0.019	87	0.017	110	0.021
PM10 (PSA)	85	0.017	75	0.015	96	0.019
Isokinetic Sampling Parameters						
Sampling time, min			60		60	
Isokinetic rate, %			99		98	
Gravimetric analysis date (total particulate)			02-04-2024		02-04-2024	

2.4 Spodumene Mill 1230-SK-001

[redacted]

Isokinetic Results	Average		Test 1		Test 2	
Sampling time			1025-1130		1135-1240	
	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter	<3	<0.005	<3	<0.005	<3	<0.005
PM10 (PSA)	<3	<0.005	<3	<0.055	<3	<0.005
Isokinetic Sampling Parameters						
Sampling time, min			60		60	
Isokinetic rate, %			100		100	
Gravimetric analysis date (total particulate)			02-04-2024		02-04-2024	

Note: There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the limit of detection of the total particulate matter test.

2.5 *Sodium Sulfate Heater 1710-VL-017*

[redacted]

Gas Analyser Results	Average
Sampling time	1024 - 1124
	Concentration mg/m³ / Corrected to 3% O2 mg/m³ / Mass Rate g/s
Combustion Gases	
Nitrogen oxides (as NO_2)	<4 / <400 / <0.02
	Concentration % v/v
Carbon dioxide	<0.4
Oxygen	20.7

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				1020-1120			1125-1225		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s
Total particulate matter	3.8	380	0.014	4.5	450	0.016	3.1	310	0.011
PM10 (PSA)	2.4	240	0.0087	2.9	290	0.011	1.8	180	0.0066
Isokinetic Sampling Parameters									
Sampling time, min				60			60		
Isokinetic rate, %				102			105		
Gravimetric analysis date (total particulate)				02-04-2024			02-04-2024		

3 Sample Plane Compliance

3.1 Calciner Fan 1200-SK-001

Sampling Plane Details	
Source tested	Calciner
Pollution control equipment	Filter baghouse
Sampling plane dimensions	1100 mm
Sampling plane area	0.95 m²
Sampling port size, number & depth	4" BSP (x2), 242 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 3 D
Upstream disturbance	Axial fan 9 D
No. traverses & points sampled	2 12
Sample plane conformance to AS 4323.1	Ideal sampling plane

3.2 Calciner Refeed (feed) 1210-BH-001

Sampling Plane Details	
Source tested	Calciner
Pollution control equipment	Filter baghouse
Sampling plane dimensions	200 mm
Sampling plane area	0.0314 m²
Sampling port size, number & depth	3" Flange (x1), 260 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Bend 1 D
Upstream disturbance	Bend 3 D
No. traverses & points sampled	1 2
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 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

3.3 Calciner Refeed (discharge) 1210-BH-002

Sampling Plane Details	
Source tested	Calciner
Pollution control equipment	Filter baghouse
Sampling plane dimensions	200 mm
Sampling plane area	0.0314 m²
Sampling port size, number & depth	2" Flange (x1), 250 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Bend 1 D
Upstream disturbance	Bend 3 D
No. traverses & points sampled	1 2
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 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

3.4 Spodumene Mill 1230-SK-001

Sampling Plane Details	
Sampling plane dimensions	1180 mm
Sampling plane area	1.09 m²
Sampling port size, number & depth	4" Flange (x2), 160 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Change in diameter >2 D
Upstream disturbance	Axial fan >8 D
No. traverses & points sampled	2 12
Sample plane conformance to AS 4323.1	Non-conforming

The sampling plane is deemed to be non-conforming due to the following reasons:
The differential pressure at one or more sampling points is less than 5 Pa

3.5 Sodium Sulfate Heater 1710-VL-017

Sampling Plane Details	
Sampling plane dimensions	500 mm
Sampling plane area	0.196 m²
Sampling port size, number & depth	4" Flange (x1), 110 mm
Duct orientation & shape	Horizontal Circular
Downstream disturbance	Bend 2 D
Upstream disturbance	Axial fan 7 D
No. traverses & points sampled	1 4
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 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
The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D

4 Plant Operating Conditions

See Tianqi Lithium Kwinana Pty Ltd records for complete process conditions.

5 Test Methods

[redacted]

Parameter	Sampling method	Analysis method	Uncertainty*	NATA accredited Sampling	NATA accredited Analysis
Sampling points - Selection	AS 4323.1	NA	NA	✓	NA
Flow rate, temperature & velocity	USEPA Method 2	USEPA Method 2	8%, 2%, 7%	NA	✓
Moisture	USEPA Method 4	USEPA Method 4	8%	✓	✓
Carbon dioxide & oxygen	USEPA Method 3A	USEPA Method 3A	13%	✓	✓
Nitrogen oxides	USEPA Method 7E	USEPA Method 7E	12%	✓	✓
Total particulate matter	USEPA Method 17	USEPA Method 17	7%	✓	✓††
Particulate matter (PM_{10} & $PM_{2.5}$) by particle size analysis	USEPA Method 17	Ektimo 410 in-house method using Malvern Mastersizer 3000	not specified	*	*†

[redacted]

6 Quality Assurance/Quality Control Information

[redacted]

all 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

[redacted]

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.

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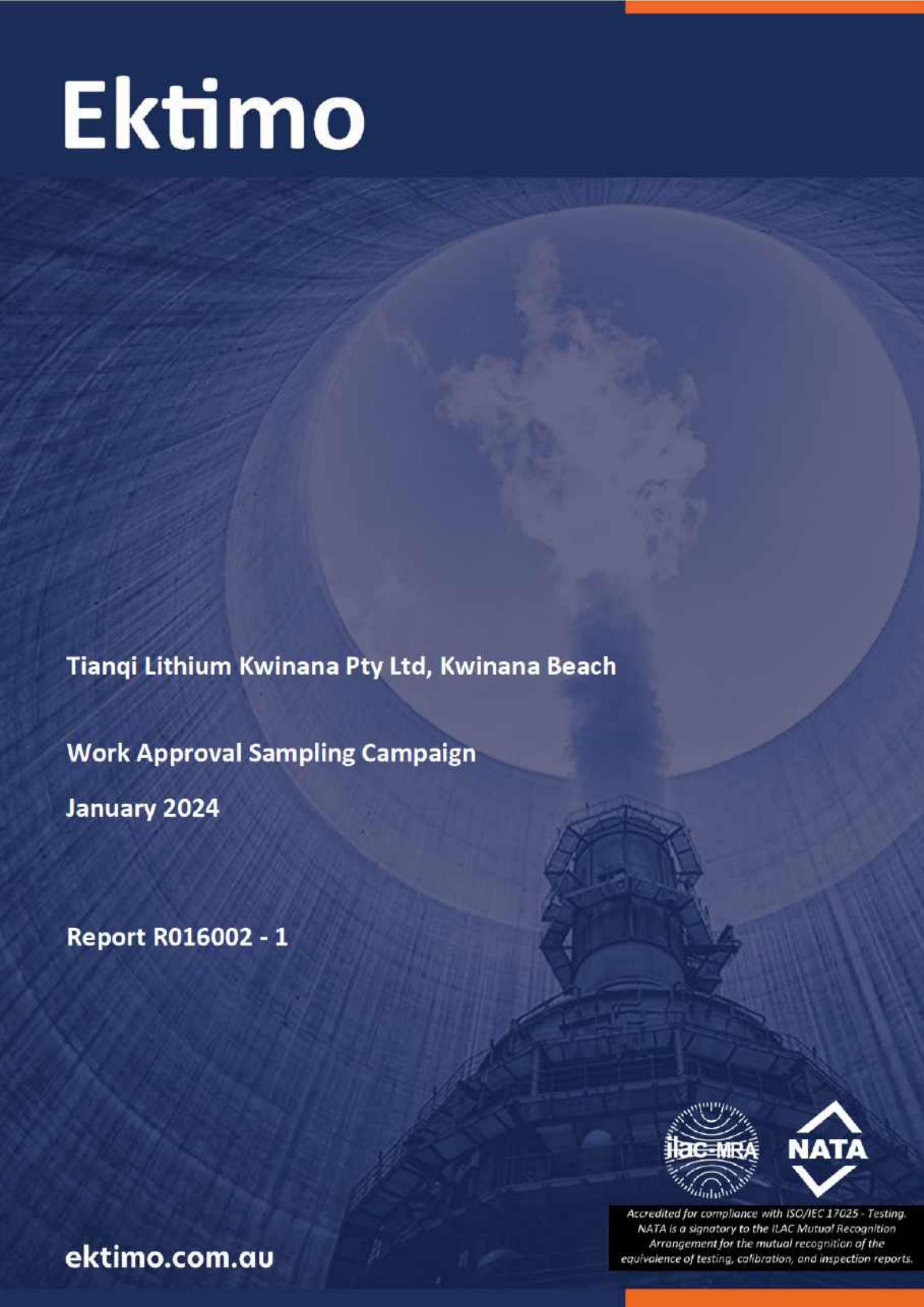
Tianqi Lithium Kwinana Pty Ltd, Kwinana Beach

Work Approval Sampling Campaign

January 2024

Report R016002 - 1



Document Information

[redacted]

Report Authorisation

[redacted]

Ektimo

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1 Executive Summary

1.1 Background

1.2 Project Objective & Overview

Location	Test Date	Test Parameters*
[redacted]	[redacted]	[redacted]
1230-SK-001	9 January 2024	
Sodium sulfate heater 1710-VL-017	9 January 2024	Total particulate matter, PM_{10} Oxygen (O_2), carbon dioxide (CO_2), oxides of nitrogen (as NO_2)

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

* The Acid roast scrubber 1340-SK-001 was not operating during the sampling campaign and was therefore not tested.

All results are reported on a dry basis at STP.

Plant operating conditions have been noted in this report.

1.3 Licence Comparison

Location Description	Pollutant	Units	Licence Limit	Detected Values
[redacted]	Nitrogen oxides	mg/m^3 at STP dry	350	71
		mg/m^3 at 3% O_2 STP dry	350	320
	Total particulate matter	mg/m^3 at STP dry	50	<2
	Nitrogen oxides	mg/m^3 at STP dry	350	<4
		mg/m^3 at 3% O_2 STP dry	350	<600
	Total particulate matter	mg/m^3 at STP dry	50	≤1.9
	Total particulate matter	mg/m^3 at STP dry	50	58
	Total particulate matter	mg/m^3 at STP dry	50	<2
1230-SK-001	Total particulate matter	mg/m^3 at STP dry	50	<2

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

2 Results

2.1 Calciner Fan 1200-SK-001

[redacted]

Gas Analyser Results	Average
Sampling time	1333 - 1432
	Concentration mg/m³ / Corrected to 3% O2 mg/m³ / Mass Rate g/s
Combustion Gases	
Nitrogen oxides (as NO_2)	71 / 320 / 1.3
	Concentration %v/v
Carbon dioxide	2.8
Oxygen	16.9

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				1120-1225			1240-1345		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s
Total particulate matter	<2	<8	<0.03	<2	<8	<0.03	<2	<8	<0.03
PM10 (PSA)	<2	<8	<0.03	<2	<8	<0.03	<2	<8	<0.03
Isokinetic Sampling Parameters									
Sampling time, min				60			60		
Isokinetic rate, %				102			100		
Gravimetric analysis date (total particulate)				11-01-2024			11-01-2024		

Note: There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the limit of detection of the total particulate matter test.

2.2 Calciner Refeed (feed) 1210-BH-001

[redacted]

Isokinetic Results	Average		Test 1		Test 2	
Sampling time			1300-1400		1410-1510	
	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter	58	0.027	56	0.027	60	0.027
PM10 (PSA)	39	0.018	41	0.02	38	0.017
Isokinetic Sampling Parameters						
Sampling time, min			60		60	
Isokinetic rate, %			106		100	
Gravimetric analysis date (total particulate)			11-01-2024		11-01-2024	

2.3 Calciner Refeed (discharge) 1210-BH-002

[redacted]

Isokinetic Results Sampling time	Average		Test 1 1040-1140		Test 2 1150-1250	
	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter	<2	<0.0004	<2	<0.0004	<2	<0.0003
PM10 (PSA)	<2	<0.0004	<2	<0.0004	<2	<0.0003
Isokinetic Sampling Parameters						
Sampling time, min			60		60	
Isokinetic rate, %			100		101	
Gravimetric analysis date (total particulate)			11-01-2024		11-01-2024	

Note: There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the limit of detection of the total particulate matter test.

2.4 Spodumene Mill 1230-SK-001

[redacted]

Isokinetic Results	Average		Test 1		Test 2	
Sampling time			1250-1355		1355-1500	
	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter	<2	<0.005	<2	<0.005	<2	<0.004
PM10 (PSA)	<2	<0.005	<2	<0.005	<2	<0.004
Isokinetic Sampling Parameters						
Sampling time, min			60		60	
Isokinetic rate, %			102		108	
Gravimetric analysis date (total particulate)			11-01-2024		11-01-2024	

Note: There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the limit of detection of the total particulate matter test.

2.5 Sodium Sulfate Heater 1710-VL-017

[redacted]

Gas Analyser Results	Average
Sampling time	1014 - 1113
	Concentration mg/m³ / Corrected to 3% O2 mg/m³ / Mass Rate g/s
Combustion Gases	
Nitrogen oxides (as NO_2)	<4 / <600 / <0.02
	Concentration %v/v
Carbon dioxide	<0.4
Oxygen	20.8

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				1010-1110			1120-1220		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s
Total particulate matter	≤1.9	≤260	≤0.0074	<2	<300	<0.007	1.9	260	0.0075
PM10 (PSA)	≤1.9	≤260	≤0.0074	<2	<300	<0.007	1.9	260	0.0075
Isokinetic Sampling Parameters									
Sampling time, min				60			60		
Isokinetic rate, %				101			100		
Gravimetric analysis date (total particulate)				11-01-2024			11-01-2024		

Note: There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the limit of detection of the total particulate matter test.

3 Sample Plane Compliance

3.1 Calciner Fan 1200-SK-001

Sampling Plane Details	
Source tested	Calciner
Pollution control equipment	Filter baghouse
Sampling plane dimensions	1100 mm
Sampling plane area	0.95 m²
Sampling port size, number & depth	4" BSP (x2), 242 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 3 D
Upstream disturbance	Axial fan 9 D
No. traverses & points sampled	2 12
Sample plane conformance to AS 4323.1	Ideal sampling plane

3.2 Calciner Refeed (feed) 1210-BH-001

Sampling Plane Details	
Pollution control equipment	Filter baghouse
Sampling plane dimensions	200 mm
Sampling plane area	0.0314 m²
Sampling port size, number & depth	3" Flange (x1), 260 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Bend 1 D
Upstream disturbance	Bend 3 D
No. traverses & points sampled	1 2
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 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

3.3 Calciner Refeed (discharge) 1210-BH-002

Sampling Plane Details	
Pollution control equipment	Filter baghouse
Sampling plane dimensions	200 mm
Sampling plane area	0.0314 m²
Sampling port size, number & depth	2" Flange (x1), 250 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Bend 1 D
Upstream disturbance	Bend 3 D
No. traverses & points sampled	1 2
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 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

3.4 Spodumene Mill 1230-SK-001

Sampling Plane Details	
Pollution control equipment	Filter baghouse
Sampling plane dimensions	1180 mm
Sampling plane area	1.09 m²
Sampling port size, number & depth	4" Flange (x2), 160 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Change in diameter >2 D
Upstream disturbance	Axial fan >8 D
No. traverses & points sampled	2 12
Sample plane conformance to AS 4323.1	Non-conforming

The sampling plane is deemed to be non-conforming due to the following reasons:
The differential pressure at one or more sampling points is less than 5 Pa

3.5 Sodium Sulfate Heater 1710-VL-017

Sampling Plane Details	
Sampling plane dimensions	500 mm
Sampling plane area	0.196 m²
Sampling port size, number & depth	4" Flange (x1), 110 mm
Duct orientation & shape	Horizontal Circular
Downstream disturbance	Bend 2 D
Upstream disturbance	Axial fan 7 D
No. traverses & points sampled	1 4
Sample plane conformance to AS 4323.1	Conforming (alternative procedure)

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

4 Plant Operating Conditions

See Tianqi Lithium Kwinana Pty Ltd records for complete process conditions.

5 Test Methods

Parameter	Sampling method	Analysis method	Uncertainty*	NATA accredited Sampling	NATA accredited Analysis
Sampling points - Selection	AS 4323.1	NA	NA	✓	NA
Flow rate, temperature & velocity	USEPA Method 2	USEPA Method 2	8%, 2%, 7%	NA	✓
Moisture	USEPA Method 4	USEPA Method 4	8%	✓	✓
Carbon dioxide & oxygen	USEPA Method 3A	USEPA Method 3A	13%	✓	✓
Nitrogen oxides	USEPA Method 7E	USEPA Method 7E	12%	✓	✓
Total particulate matter	USEPA Method 17	USEPA Method 17	7%	✓	✓††
Particulate matter (PM_{10} & $PM_{2.5}$) by particle size analysis	USEPA Method 17	Ektimo in-house method using Malvern Mastersizer 3000	not specified	*	*†

6 Quality Assurance/Quality Control Information

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.

Ektimo

7 Definitions

[redacted]

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.

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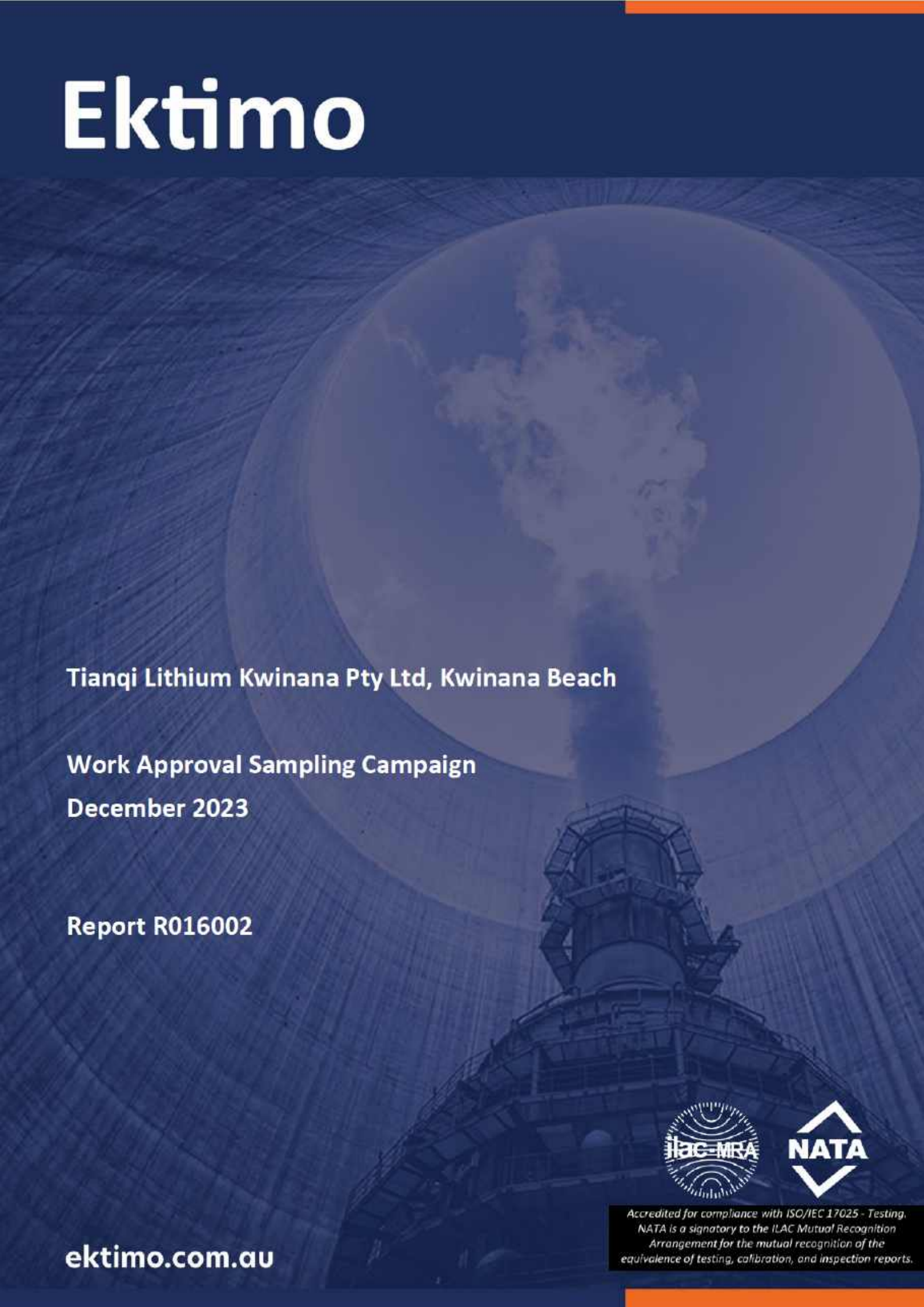

Tianqi Lithium Kwinana Pty Ltd, Kwinana Beach

Work Approval Sampling Campaign
December 2023

Report R016002

Document Information

[redacted]

Report Authorisation

[redacted]

Ektimo

Table of Contents

1 Executive Summary

1.1 Background

[redacted]

1.2 Project Objective & Overview

[redacted]

Location	Test Date	Test Parameters*
[redacted]		
Spodumene mill 1230-SK-001	23 November 2023	
Acid roast scrubber 1340-SK-001	24 November 2023	Total particulate matter, PM_{10} sulfur dioxide, sulfur trioxide and sulfuric acid mist
Sodium sulfate heater 1710-VL-017	23 November 2023	Total particulate matter, PM_{10}

* 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.

1.3 Licence Comparison

Location Description	Pollutant	Units	Licence Limit	Detected Values
[redacted]	Nitrogen oxides	mg/m^3 at STP dry	350	71
		mg/m^3 at 3% O_2 STP dry	350	320
	Total particulate matter	mg/m^3 at STP dry	50	<2
	Nitrogen oxides	mg/m^3 at STP dry	350	<4
		mg/m^3 at 3% O_2 STP dry	350	<700
	Total particulate matter	mg/m^3 at STP dry	50	16
	SO_3	mg/m^3 at STP dry	100	2.4
	Total particulate matter	mg/m^3 at STP dry	50	10
	Total particulate matter	mg/m^3 at STP dry	50	40
1200-BH-002	Total particulate matter	mg/m^3 at STP dry	50	46
Spodumene Mill 1230-SK-001	Total particulate matter	mg/m^3 at STP dry	50	<2

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

2 Results

2.1 Calciner Fan 1200-SK-001

[redacted]

Gas Analyser Results	Average
Sampling time	1304 - 1404
	Concentration mg/m³ / Corrected to 3% O2 mg/m³ / Mass Rate g/s
Combustion Gases	
Nitrogen oxides (as NO_2)	71 / 320 / 1.2
	Concentration %v/v
Carbon dioxide	2.3
Oxygen	16.9

Isokinetic Results	Average			Test 1			Test 2		
Sampling time				1300-1401			1410-1510		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s
Total particulate matter	<2	<9	<0.04	<2	<10	<0.04	<2	<9	<0.03
PM10 (PSA)	<2	<9	<0.04	<2	<10	<0.04	<2	<9	<0.03
Isokinetic Sampling Parameters									
Sampling time, min				60			60		
Isokinetic rate, %				108			105		
Gravimetric analysis date (total particulate)				24-11-2023			24-11-2023		

Note: There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the limit of detection of the total particulate matter test.

2.2 Calciner Refeed (feed) 1210-BH-001

[redacted]

Isokinetic Results	Average		Test 1		Test 2	
Sampling time			1230-1330		1335-1435	
	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter	40	0.02	22	0.011	59	0.028
PM10 (PSA)	22	0.011	12	0.006	32	0.016
Isokinetic Sampling Parameters						
Sampling time, min			60		60	
Isokinetic rate, %			94		100	
Gravimetric analysis date (total particulate)			24-11-2023		24-11-2023	

2.3 Calciner Refeed (discharge) 1210-BH-002

[redacted]

Isokinetic Results	Average		Test 1		Test 2	
Sampling time			1300-1400		1410-1510	
	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter	46	0.02	24	0.011	67	0.028
PM10 (PSA)	11	0.005	6.9	0.0032	16	0.0067
Isokinetic Sampling Parameters						
Sampling time, min			60		60	
Isokinetic rate, %			97		99	
Gravimetric analysis date (total particulate)			24-11-2023		24-11-2023	

2.4 *Spodumene Mill 1230-SK-001*

[redacted]

Isokinetic Results		Results	
Sampling time		1043-1144	
		Concentration mg/m³	Mass Rate g/s
Total particulate matter		<2	<0.007
PM10	(PSA)	<2	<0.007
Isokinetic Sampling Parameters			
Sampling time, min		60	
Isokinetic rate, %		93	
Gravimetric analysis date (total particulate)		24-11-2023	

Note: There was insufficient particulate matter collected on the filter to perform accurate particle size analysis. In this instance, the PM_{10} results have been reported as per the limit of detection of the total particulate matter test.

2.5 Acid Roast Scrubber 1340-SK-001

[redacted]

Isokinetic Results	Average		Test 1		Test 2	
Sampling time			1000-1101		1025-1126	
	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s	Concentration mg/m³	Mass Rate g/s
Total particulate matter	10	0.0014	4.7	0.00065	16	0.0022
PM10 (PSA)	5.4	0.00076	2.5	0.00035	8.2	0.0012
Sulfur dioxide	350	0.049	290	0.04	410	0.058
Sulfur trioxide	2.4	0.00034	2.6	0.00035	2.3	0.00032
Isokinetic Sampling Parameters						
Sampling time, min			60		60	
Isokinetic rate, %			95		100	
Gravimetric analysis date (total particulate)			28-11-2023		28-11-2023	

2.6 Sodium Sulfate Heater 1710-VL-017

[redacted]

Gas Analyser Results		Average
	Sampling time	1026 - 1125
		Concentration mg/m³ / Corrected to 3% O2 mg/m³ / Mass Rate g/s
Combustion Gases		
Nitrogen oxides (as NO_2)		<4 / <700 / <0.01
		Concentration %v/v
Carbon dioxide		<0.4
Oxygen		20.8

Isokinetic Results		Average			Test 1			Test 2		
	Sampling time				1017-1117			1135-1235		
		Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/s
Total particulate matter		16	2500	0.053	19	3000	0.059	13	2000	0.047
PM10	(PSA)	7.1	1100	0.024	8	1300	0.025	6.2	980	0.023
Isokinetic Sampling Parameters										
Sampling time, min					60			60		
Isokinetic rate, %					100			100		
Gravimetric analysis date (total particulate)					28-11-2023			05-12-2023		

3 Sample Plane Compliance

3.1 Calciner Fan 1200-SK-001

Sampling Plane Details	
Source tested	Calciner
Pollution control equipment	Filter baghouse
Sampling plane dimensions	1100 mm
Sampling plane area	0.95 m²
Sampling port size, number & depth	4" BSP (x2), 242 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 3 D
Upstream disturbance	Axial fan 9 D
No. traverses & points sampled	2 12
Sample plane conformance to AS 4323.1	Ideal sampling plane

3.2 Calciner Refeed (feed) 1210-BH-001

Sampling Plane Details	
Source tested	Calciner
Pollution control equipment	Filter baghouse
Sampling plane dimensions	200 mm
Sampling plane area	0.0314 m²
Sampling port size, number & depth	3" Flange (x1), 260 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Bend 1 D
Upstream disturbance	Bend 3 D
No. traverses & points sampled	1 2
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 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

3.3 Calciner Refeed (discharge) 1210-BH-002

Sampling Plane Details	
Source tested	Calciner
Pollution control equipment	Filter baghouse
Sampling plane dimensions	200 mm
Sampling plane area	0.0314 m²
Sampling port size, number & depth	2" Flange (x1), 250 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Bend 1 D
Upstream disturbance	Bend 3 D
No. traverses & points sampled	1 2
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 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

3.4 Spodumene Mill 1230-SK-001

Sampling Plane Details	
Sampling plane dimensions	1180 mm
Sampling plane area	1.09 m²
Sampling port size, number & depth	4" Flange (x2), 160 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Change in diameter >2 D
Upstream disturbance	Axial fan >8 D
No. traverses & points sampled	2 12
Sample plane conformance to AS 4323.1	Ideal sampling plane

3.5 Acid Roast Scrubber 1340-SK-001

Sampling Plane Details	
Source tested	Kiln
Pollution control equipment	Wet scrubber
Sampling plane dimensions	150 mm
Sampling plane area	0.0177 m²
Sampling port size, number & depth	3" Flange (x1), 50 mm
Duct orientation & shape	Vertical Circular
Downstream disturbance	Bend >2 D
Upstream disturbance	Axial fan >8 D
No. traverses & points sampled	1 2
Sample plane conformance to AS 4323.1	Ideal sampling plane

3.6 Sodium Sulfate Heater 1710-VL-017

Sampling Plane Details	
Sampling plane dimensions	500 mm
Sampling plane area	0.196 m²
Sampling port size, number & depth	4" Flange (x1), 110 mm
Duct orientation & shape	Horizontal Circular
Downstream disturbance	Bend 2 D
Upstream disturbance	Axial fan 7 D
No. traverses & points sampled	1 4
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 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
The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D

4 Plant Operating Conditions

[redacted]

5 Test Methods

[redacted]

Parameter	Sampling method	Analysis method	Uncertainty*	NATA accredited Sampling	NATA accredited Analysis
Sampling points - Selection	AS 4323.1	NA	NA	✓	NA
Flow rate, temperature & velocity	USEPA Method 2	USEPA Method 2	8%, 2%, 7%	NA	✓
Moisture	USEPA Method 4	USEPA Method 4	8%	✓	✓
Carbon dioxide & oxygen	USEPA Method 3A	USEPA Method 3A	13%	✓	✓
Nitrogen oxides	USEPA Method 7E	USEPA Method 7E	12%	✓	✓
Total particulate matter	USEPA Method 17	USEPA Method 17	7%	✓	✓††
Particulate matter (PM_{10} & $PM_{2.5}$) by particle size analysis	USEPA Method 17	Ektimo in-house method using Malvern Mastersizer 3000	not specified	✓	✓†
Sulfuric acid mist and/or sulfur oxides	USEPA Method 8	Ektimo 235	16%	✓	✓†

[redacted]

15 December 2023 in report LV-005253.
10 January 2024 in report LV-005320.
†† Gravimetric analysis conducted at the Ektimo WA laboratory.

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

[redacted]

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.

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