Annual Air Emission Monitoring Report 2024

Mt Piper Power Station

PREPARED FOR

EnergyAustralia

DATE
19 February 2024

REFERENCE
0745212

DOCUMENT DETAILS

DOCUMENT TITLE	Annual Air Emission Monitoring Report 2024
DOCUMENT SUBTITLE	Mt Piper Power Station
PROJECT NUMBER	0745212
Date	19 February 2024
Version	Final
Author	Ethan Edwards, James Grieve
Client name	EnergyAustralia

DOCUMENT HISTORY

				ERM APPROVAL TO ISSUE		COMMENTS
VERSION	REVISION	AUTHOR	REVIEWED BY	NAME	DATE	
Draft	D1	E. Edwards	J. Grieve	M. Lawson *for* T. Weaver	06.02.2024	Draft for client review
Draft	D2	E. Edwards	J. Grieve	M. Lawson *for* T. Weaver	10.02.2024	Draft for client review
Final	F1	E. Edwards	J. Grieve	M. Lawson *for* T. Weaver	19.02.2024	Final

This report was prepared in accordance with the scope of services set out in the contract between Environmental Resources Management Australia Pty Ltd ABN 12 002 773 248 (ERM) and the Client.

To the best of our knowledge, the proposal presented herein accurately reflects the Client's intentions when the report was printed. However, the application of conditions of approval or impacts of unanticipated future events could modify the outcomes described in this document.

In preparing the report, ERM used data, surveys, analyses, designs, plans and other information provided by the individuals and organisations referenced herein. While checks were undertaken to ensure that such materials were the correct and current versions of the materials provided, except as otherwise state, ERM did not independently verify the accuracy or completeness of these information sources.

SIGNATURE PAGE

Annual Air Emission Monitoring Report 2024

Mt Piper Power Station

0745212

Megan Lawson
Partner

James Grieve
Principal Consultant

Environmental Resources Management
Australia Pty Ltd
Level 14, 207 Kent Street
Sydney, NSW 2000

T +61 2 8584 8888

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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
AAEMR	Annual Air Emission Monitoring Report
AEMO	Australian Energy Market Operator
APC	Air Pollution Control
AQIA	Air quality impact assessment
AQMS	Air quality monitoring station
AWS	Automatic weather station
BCA	Brine Conditioned Ash
CEMS	Continuous emissions monitoring system
DPHI	Department of Planning, Housing and Infrastructure
EPA	Environment Protection Authority
EPL	Environment protection licence
ERM	Environmental Resources Management Australia Pty Ltd
GWh	Gigawatt hour
HDPE	High Density Polyethylene
K	Degrees Kelvin

Acronyms	Description
kPa	Kilopascals
LBL	(NSW) Load-based Licencing Scheme
LNAR	Lamberts North Ash Repository
mg/Nm³	Milligrams per normal cubic metre (i.e. at conditions of 273K and 101.3 kPa)
MPAR	Mt Piper Ash Repository
MPPS	Mount Piper Power Station
MW	Megawatt
MWh	Megawatt hour
NEPC	National Environment Protection Council
Nm³	Normal cubic metre (i.e. 1 cubic metre at conditions of 273 K and 101.3 kPa)
NO	Nitric oxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NPI	National Pollutant Inventory
NSW	New South Wales
LOR	Limit of reporting
O_2	Oxygen (molecular)
OEMP	Operational Environment Management Plan
PM_{10}	Particulate matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$	Particulate matter less than 2.5 microns in aerodynamic diameter
ppb	Parts per billion (by volume)
pphm	Parts per hundred million (by volume)
QA/QC	Quality Assurance / Quality Control
RAA	Relative Accuracy Audit
RATA	Relative Accuracy Test Audit
RL	Reduced Level
SO_2	Sulfur dioxide
SO_3	Sulfur trioxide
SWTP	Springvale Water Treatment Plant
t	Tonne
µg/m³	Micrograms per cubic metre
WCA	Water Conditioned Ash

1. INTRODUCTION

EnergyAustralia operates the Mount Piper Power Station (MPPS), located at 350 Boulder Road, Portland, New South Wales. The MPPS is approved to operate 700 MW and 730 MW coal-fired steam turbine generators that have the capacity (> 4000 GWh) to meet the energy needs of approximately 1.18 million homes in New South Wales every year. MPPS is fuelled using black coal sourced from coal mines in the local area.

The MPPS operates under various licences and approvals including Environmental Protection Licence (EPL) 13007 issued by the NSW Environmental Protection Authority (EPA). This Annual Air Emissions Monitoring Report (AAEMR) has been prepared to satisfy Condition R1.9 of EPL13007. The AAEMR is required to analyse and summarise air emission and ambient air quality monitoring data collected within the reporting period.

ERM was engaged by EnergyAustralia to prepare the AAEMR for the 2024 calendar year ('the reporting period') and summarise the methodology and findings in a technical report (this report).

1.1 EPL UPDATES

The licence was revised two times in the reporting period. Both of these variations included conditions relevant to air emissions. These variations are as follows:

Licence Variation: 1 March, 2024

The 1 March 2024 variation to EPL 13007 includes the following updates:

- Administrative Conditions:
  - Front page and Condition A1.1 – Varied. The scheduled activities: Coal works; Crushing, grinding or separating; and Waste storage have been added to the Scheduled activities list. Through the 5-year review the Licensee verified that these activities, formerly listed as ancillary activities, meet the definition, scale and threshold of Schedule 1 of the Act.
  - Condition A2.1 – Varied. The description of the premises plan document has been updated for clarity of the plan details.
  - Condition A2.1 – Removed. The Lot and DP has been removed as the provided and referenced premises plan document is suitable for the purposes of A2.1.
  - Conditions A2.1, A2.2, A2.4 and A2.5 – Varied. The word 'reference' has been added to the cited EPA document references for clarity.
  - Condition A3.1 – Removed. The ancillary activities: Coal works, Crushing, grinding or separating and Waste storage have been removed, for the reasons provided previously in this Notice.
- Discharges to Air and Water and Applications to Land:
  - Conditions P1.1 and P1.3 – Varied. The formatting of the sentences in the Location Description column has been varied to add a full stop at the end of each description.
  - Condition P1.1 – Varied. The description of EPA identification No. 11 Meteorological weather monitoring has been varied to reference the already introduced premises plan.

- Condition P1.3 – Varied. The formatting of the word ‘point’ has been changed to a capital and the description for No. 13 to 25 Ground water quality monitoring have been varied to make reference to the ‘Water Plan’ as defined later in the Licence. The word 'EPA reference' has been added to the Location Description for No. 26 and 27.
- Condition P1.4 – Added. A condition has been added to define the document referred to by the term ‘Water Plan’ used in License conditions.

- Limit Conditions:
  - Condition L3.2 Note – Changed. The previous L3.2 Note has been converted into Licence condition L3.3 to ensure that it is lawfully applicable and enforceable.
  - Conditions L3.3 to L3.10 – Varied – The condition numbers have been moved up one place due to the addition of new condition L3.2 as detailed above. The condition references within the wording of each condition have also been moved so that former L3.3 to L3.10 now refer to L3.4 to L3.11 respectively.
  - Condition L3.5 – Varied. The definition of the acronym HF as hydrogen fluoride has been added.
  - Condition L3.6 – Varied. The definition of the acronym Australian Energy Market Operator (AEMO) has been added.
  - Conditions L3.10 and L3.11 – Varied. The formatting of the word ‘point’ has been varied to capitalise the word.
  - Condition L5.3 – Varied. The formatting of sub-points has been varied to use lower case letters for consistency with similar Licence conditions.
  - Condition L5.5 – Varied. The formatting of sub-point 1) has been varied to use a lower-case letter for consistency with similar Licence conditions.
  - Condition L6.1 and Note – Varied. Reference of the legislation has been simplified to the ‘Act’ as it has previously been defined in the Licence.
- Operating Conditions:
  - Condition O4 Note – Varied. A reference has been made to the ‘Act’ as previously defined in the Licence, and ‘Part’ has been changed to ‘Chapter’ as per the formatting of the regulation quoted.
  - Condition O5.1 – Varied. The spelling of the word ’identified’ has been corrected and the formatting of the word ‘point’ has been varied to capitalise the word.
  - Condition O5.2 – Varied. The formatting of the word ‘point’ has been varied to capitalise the word. The condition references have been varied due to the numbers being moved up for L3.3 to L3.10 so that former L3.6 and L3.9 now refer to L3.7 and L3.10 respectively.
  - Condition O5.4 – The definition for AEMO has been removed as it is already defined in the Licence.
- Monitoring and Recording Conditions:
  - Condition M2.5 – Varied. The formatting of the word ‘points’ has been varied to capitalise the word.

- Reporting Conditions:
  - Conditions R4.2 and R4.3 – Varied. The email referenced in the condition has been updated to info@epa.nsw.gov.au to reflect the EPA's central operating model for submission of documents.
  - Condition R4.3 – Varied. The formatting of the word 'licensees' has been varied to 'licensee's'.
- General Conditions:
  - Condition G2.1 - Varied. The formatting of sub-points in b), i. and ii. has been varied for consistency with similar conditions within the Licence.
- Pollution Studies and Reduction Programs:
  - Condition U1.1 (former) – Removed. The development of the Coal Ash Repository Water Sampling Program has been removed. On 23 September 2022, the Licensee provided the report "Mt Piper Power Station Coal Ash Repository Water Sampling Program", meeting the requirement under condition U1.1 (former) and as such has been removed.
  - Conditions U1.1 and U1.2 – Varied. The numbering of the conditions has been changed due to the removal of former condition U1.1.
  - Condition U1.2 – Varied. The formatting of the sub-points in roman numerals has been varied to lower case letters consistent with similar Licence conditions.
- General Conditions:
  - Condition G4.1 – Added. A Completed Programs table has been added.
- Special Conditions:
  - Condition E2 – Varied. The spelling of 'Systems' has been corrected.
  - Condition E3.1 - Varied. The formatting of sub-points in h), i. to iii. has been varied for consistency with similar conditions within the Licence.
  - Condition E5.1 – Varied. The former ANZECC water quality reference has now been updated to the current national Water Quality Guidelines (ANZG, 2018).
  - Conditions E5.2 and E5.3 – Varied. The email referenced in the condition has been updated to info@epa.nsw.gov.au to reflect the EPA's central operating model for submission of documents.

Licence Variation: 3 July, 2024

The 3 July 2024 variation to EPL 13007 includes the following updates:

- Limit Conditions:
  - Condition L3.2 – Varied. The condition has been varied to enforce stricter air concentration limits for cadmium, mercury, type 1 & type 2 substances in aggregate, chlorine and volatile organic compounds; as follows:
    - Cadmium has been reduced from 0.20 mg/m^3 to 0.03 mg/m^3;
    - Mercury has been reduced from 0.05 mg/m^3 to 0.03 mg/m^3;
    - Type 1 & type 2 substances in aggregate has been reduced from 0.75 mg/m^3 to 0.60 mg/m^3;
    - Chlorine has been reduced from 20 mg/m^3 to 4 mg/m^3; and

  - Volatile organic compounds has been reduced from 10 mg/m^3 to 8 mg/m^3.
- Reporting Conditions:
  - Condition R4.7, R4.8 and R4.9 – Added. Conditions have been added that requires the Licensee to report greenhouse gas emissions in carbon dioxide equivalent (CO2-equivalent) and energy production to the EPA on an annual basis.
- Special Conditions:
  - Condition E9 - Note – Added. A new Note has been added detailing the EPA's intention to include conditions on the Licence in the future with respect to greenhouse gas mitigation and climate change adaptation issues.
  - Condition E10 – Added. A new condition has been added to require the Licensee to operate a Community Consultative Committee (CCC) for the power station.

1.2 EPL REQUIREMENTS

Condition R1.9 – Annual Air Emission Monitoring Report outlines a number of requirements that are to be addressed in preparation of the AAEMR. Table 1-1 lists these requirements with corresponding report sections that address each condition.

The monitoring requirements of *Condition M2.2 – Air Monitoring Requirements*, (as referenced in Condition R1.9) are shown in Table 1-2.

Condition – M9.1 Other Monitoring and Recording Conditions Coal Ash Monitoring outlines a number of reporting requirements relating to the production and storage of ash. These requirements are listed in Table 1-3. In addition to Condition – *R4.4 Other Monitoring Conditions Coal Ash Monitoring Reporting*, shown in Table 1-4, it is noted that this condition is not a specific requirement of the AAEMR, but has nominally been incorporated into the AAEMR to address conditions M9.1 and R4.4.

TABLE 1-1 NSW EPA EPL13007 CONDITION – R1.9 ANNUAL AIR EMISSION MONITORING REPORT

R1.9	Annual Air Emission Monitoring Report	Refer to
	The licensee must submit with the Annual Return an Annual Air Emission Monitoring Report. The Annual Emission Monitoring Report must analyse and summarise emission monitoring data from the reporting period including, but not limited to:	This report.
a)	*a comprehensive summary (tabulated and graphical) of all periodic and continuous monitoring data as required by condition M2.2 of this licence, including a comparison with the concentration limits specified in condition L3.2 and L3.3;*	Section 2 Table 2-1, Table 2-3, Table 2-5 Figure 2-1 to Figure 2-11
b)	*analysis of trends in emission performance for all pollutants monitored as required under condition M2.2. Trend analysis must include comparison of emission performance during the reporting period with emission performance from the previous 4 years;*	Section 3
c)	*details of any exceedances of air emission licence limits and details of plant operating conditions at the times the exceedances occurred;*	Section 2.4.1
d)	*details of plant operating conditions, including Boiler load (MW), during sampling for each Boiler;*	Table 2-1
e)	*demonstrated compliance with the CEMS Quality Assurance and Control Procedures prepared for the premises;*	Section 2.2.2 Table 2-5
f)	*summary of fuel usage, including:* *i. total coal and other permitted fuels consumed in each Boiler (including start-up);* *ii. a statement about the representativeness of fuel quality during periodic air emission sampling compared to non-sampling periods;* *iii. total fuel consumed by each Boiler during times when periodic air emission sampling was undertaken.*	Section 3.1 Table 3-1 Table 2-1
g)	*detailed calculations used to determine the aggregated pollutant emission rates for each boiler.*	Section 4

TABLE 1-2 NSW EPA EPL13007 CONDITION – M2.2 AIR MONITORING REQUIREMENTS

Pollutant	Units of Measure	Frequency	Sampling Method
Point 2,3			
Cadmium	milligrams per cubic metre	Every 6 months	TM-38
Chlorine	milligrams per cubic metre	Every 6 months	TM-38
Fluorine	milligrams per cubic metre	Every 6 months	TM-38
Hydrogen chloride	milligrams per cubic metre	Every 6 months	TM-38
Mercury	milligrams per cubic metre	Every 6 months	TM-38
Nitrogen oxides	milligrams per cubic metre	Continuous	TM-38
Solid particles	milligrams per cubic metre	Quarterly	TM-38
Sulfur dioxide	milligrams per cubic metre	Continuous	TM-38
Sulfuric acid mist and sulfur trioxide (as SO_3)	milligrams per cubic metre	Every 6 months	TM-38

Pollutant	Units of Measure	Frequency	Sampling Method
Type 1 and Type 2 substances in aggregate	milligrams per cubic metre	Every 6 months	TM-38
Volatile organic compounds as n-propane equivalent	milligrams per cubic metre	Every 6 months	TM-38
Point 4,5,6,7			
Cadmium	milligrams per cubic metre	Every 6 months	TM-12
Flow rate	cubic metres per second	Continuous	CEM-6 and US EPA Procedure 1
Mercury	milligrams per cubic metre	Every 6 months	TM-14
Moisture	percent	Continuous	Special Method 1
Nitrogen oxides	milligrams per cubic metre	Continuous	CEM-2 and US EPA Procedure 1
Oxygen (O_2)	percent	Continuous	CEM-3 and US EPA Procedure 1
Solid particles	milligrams per cubic metre	Quarterly	TM-15
Sulfur dioxide	milligrams per cubic metre	Continuous	CEM-2 and US EPA Procedure 1
Temperature	degrees Celsius	Continuous	TM-2 and US EPA Procedure 1
Type 1 and Type 2 substance in aggregate	milligrams per cubic metre	Every 6 months	TM-12, TM-13 & TM-14
Point 4,6			
Carbon dioxide	percent	Every 6 months	TM-24
Chlorine	milligrams per cubic metre	Every 6 months	TM-7
Fluorine	milligrams per cubic metre	Every 6 months	TM-9
Hydrogen chloride	milligrams per cubic metre	Every 6 months	TM-8
Sulfuric acid mist and sulfur trioxide (as SO_3)	milligrams per cubic metre	Every 6 months	TM-3
Volatile organic compounds as n-propane equivalent	milligrams per cubic metre	Every 6 months	TM-34
Point 8			
Fluoride	micrograms per cubic metre	Continuous	AM-8
Point 8,9			
Nitrogen dioxide	parts per hundred million	Continuous	AM-12
$PM_{2.5}$	micrograms per cubic metre	Continuous	Special Method 2
Sulfur dioxide	parts per hundred million	Continuous	AM-20
Point 10			
Nitrogen dioxide	parts per hundred million	Monthly	Special Method 3
Sulfur dioxide	parts per hundred million	Monthly	Special Method 3

TABLE 1-3 NSW EPA EPL13007 CONDITION – M9.1 OTHER MONITORING AND RECORDING CONDITIONS - COAL ASH MONITORING

M9.1	Other monitoring and recording conditions Coal Ash Monitoring (quantities to be reported in tonnes)	Refer to
	For each licence reporting period, the licensee must monitor and record the following details regarding generation, deposition, storage, transport and reuse of coal ash generated at the premises:	Section 5
a)	*Quantity of coal used for electricity generation at the premises;*	Table 5-1 (1)
b)	*Quantity of bottom ash; and quantity of fly ash, generated at the premises and the grade of fly ash produced (if the grade is known);*	Table 5-1 (2) (4)
c)	*Quantity of bottom ash; and quantity of fly ash, deposited, and/or stored at the premises with a description of how it is stored and the processes for managing the storage;*	Section 5 Table 5-1 (3) (5)
d)	*Quantity of bottom ash; and quantity of fly ash, transported from the premises together with identification of the destination; and*	Table 5-2
e)	*Management measures used for coal ash repositories on the premises to maintain the viability of ash reuse, including identification of any other materials being stored concurrently with newly deposited coal ash.*	Section 5

Note: The collection and reporting of information required by the above condition does not come into effect until three months after the issued date of this licence version to allow the licensee to put in place the relevant systems required to meet the condition.

TABLE 1-4 NSW EPA EPL13007 CONDITION – R4.4 OTHER REPORTING CONDITIONS

R4.4	Coal Ash Monitoring Reporting	Refer to
	The licensee must prepare an Annual Coal Ash Monitoring Report that details information required under condition M9.1 in respect of generation, deposition, storage, transport and reuse of coal ash generated at the premises for each Annual Return reporting period.	Section 5

The stack concentration limits as referenced in Condition R1.9, *Condition L3.2 – Air Concentration Limits*, are shown in Table 1-5.

Condition L3.4 states that in addition to the concentration limits specified in condition L3.2, the following 99th percentile concentration limits apply for points 2 and 3 utilising the same units of measure, reference conditions, oxygen correction and averaging period as above for each pollutant listed below:

a) nitrogen oxides: 1,100 mg/Nm^3; and

b) sulfur dioxide: 1,400 mg/Nm^3.

Condition L3.6 states that exceedances due to compliance with an Australian Energy Market Operator (AEMO) direction in accordance with Section 74 of the Protection of the Environment Operations (Clean Air) Regulation 2022 do not count towards the accumulated hours for the purpose of calculating compliance with condition L3.4.

It should be noted that the reference conditions (Dry, 273K, 101.3kPA), oxygen correction (7% O_2) and averaging period (1-hour) are constant for each pollutant and are left out of Table 1-5.

TABLE 1-5 NSW EPA EPL13007 CONDITION – L3.2 AIR CONCENTRATION LIMITS

Pollutant	100th percentile concentration limit
Mercury	0.03 mg/m^3
Chlorine	4 mg/m^3
Type 1 and Type 2 substance in aggregate	0.60 mg/m^3
Volatile organic compounds as n-propane equivalent	8 mg/m^3
Hydrogen chloride	50 mg/m^3
Solid Particles	50 mg/m^3
Sulfuric acid mist and sulfur trioxide (as SO_3)	100 mg/m^3
Nitrogen oxides	1,500 mg/m^3
Fluorine (total fluoride as HF equivalent)	30 mg/m^3
Cadmium	0.03 mg/m^3
Sulfur dioxide	1,700 mg/m^3

Note: During calibration and commissioning testing of the Particulate Continuous Emission Monitors (Particulate CEMS) undertaken in accordance with condition E5.2, the limit for solid particles does not apply, however the concentration must not exceed the limits listed in the *Protection of the Environment Operations (Clean Air) Regulation 2022*.

1.3 STUDY METHODOLOGY

The following steps were undertaken to complete this air emission monitoring report:

- Summarise data of the 2024 monitoring results required under EPL13007;
- Review historical monitoring data to analyse the trends in emission performance for all pollutants monitored under EPL13007;
- Consolidate and analyse monitoring data to understand if the data available is representative of normal operating conditions at MPPS; and
- Summarise compliance with Condition R1.9 under EPL13007.

2. AIR EMISSION MONITORING SUMMARY

The following sections summarise the air monitoring as relevant to the requirements of the *Condition R1.9 – Annual Air Emissions Monitoring Report*.

2.1 STACK TESTING

The stack test documents reviewed for 2024 monitoring include:

- Ektimo 2024a, Quarterly (Q1) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R016420, 1 March 2024;
- Ektimo 2024b, Quarterly (Q2) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R016840, 6 June 2024;
- Ektimo 2024c, Quarterly (Q3) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R017264, 12 August 2024;
- Ektimo 2024d, Quarterly (Q4) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R017581, 5 December 2024; and
- Ektimo 2025, Quarterly (Q4) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R017581-1a2r, 5 February 2025.

The individual 2024 stack testing results are summarised in Table 2-1. All the concentrations provided are at normal conditions (0 °C, 101.325 kPa), dry basis, and at a reference oxygen content of 7% O_2 (dry basis).

The stack test frequencies met the stack, non-continuous sampling requirements as described in *Condition M2.2 – Air Monitoring Requirements* as outlined in Table 1-2. The results of the stack test indicate that there were no exceedances of the air concentration limits outlined in Table 1-5.

The corresponding stack test reports are included in Appendix A.

TABLE 2-1 SUMMARY OF STACK TESTING RESULTS AND POWER STATION OPERATING CONDITIONS

Sampling Date	Unit & Duct	Process condition	Temperature (°C)	Oxygen (%)	Daily Coal Burn (t)	Fuel Oil Consumed (L)	Daily Generation (MWh)	Mass Rate (g/min)	Measured Concentration (mg/Nm³)*
Solid particles									
16/01/2024	1B	Boiler load stable at 220 MW	106	10.9	3,838	4,492	8,214	10	1.4
17/01/2024	1A	Boiler load stable at 280 MW	110	9.0	4,505	1,245	9,988	23	1.9
18/01/2024	2A	Boiler load stable at 280 MW	111	9.3	3,508	1,884	8,000	<9	<0.9
19/01/2024	2B	Boiler load stable at 220 MW	103	10.6	3,293	5,638	7,607	11	1.4
9/04/2024	1B	Load stable at 220 MW	113	12.1	3,833	4,284	8,172	12	1.7
10/04/2024	1A	Load stable at 220 MW	110	11.3	3,176	4,926	7,852	11	1.6
11/04/2024	2A	Load stable at 220 MW	110	11.6	3,878	5,955	8,571	<10	<1
12/04/2024	2B	Load stable at 150 MW	109	13.1	4,072	4,590	9,201	<10	<2
2/07/2024	1B	Load stable at 450 MW	128	7.0	6,608	890	16,452	32	1.6
3/07/2024	1A	Load stable at 450 MW	123	8.3	5,895	4,146	13,869	43	3.0
3/07/2024	2B	Load stable at 450 MW	111	8.9	5,895	4,146	13,869	<20	<1
4/07/2024	2A	Load stable at 450 MW	111	8.3	6,129	3,077	14,634	15	0.95
22/10/2024	1B	Load stable at 350 MW	125	9.8	5,689	2,021	13,621	<20	<1
23/10/2024	1A	Load stable at 350 MW	121	9.1	5,829	740	14,325	23	2.1
27/11/2024	2A	Load stabled at 450 MW	111	8.8	5,510	6,835	13,699	34	2.2
28/11/2024	2B	Load stabled at 450 MW	123	8.1	6,316	4,842	14,843	74	4.6
Sulfuric acid mist and sulfur trioxide (as SO_3)									
9/04/2024	1B	Load stable at 220 MW	113	12.1	3,833	4,284	8,172	15	2.1
11/04/2024	2A	Load stable at 220 MW	110	11.6	3,878	5,955	8,571	28	3.3
22/10/2024	1B	Load stable at 350 MW	125	9.8	5,689	2,021	13,621	25	2.1
27/11/2024	2A	Load stabled at 450 MW	111	8.8	5,510	6,835	13,699	20	1.3
Volatile organic compounds (VOCs) as n-propane equivalent									
9/04/2024	1B	Load stable at 220 MW	111	11.9	3,833	4,284	8,172	1.7	0.23
11/04/2024	2A	Load stable at 220 MW	110	11.1	3,878	5,955	8,571	2.7	0.31
22/10/2024	1B	Load stable at 280 MW	121	10.9	5,689	2,021	13,621	2.1	0.22
27/11/2024	2A	Load stabled at 500 MW	120	8.2	5,510	6,835	13,699	0.7	0.04
Chlorine									
9/04/2024	1B	Load stable at 220 MW	111	11.9	3,833	4,284	8,172	<0.2	<0.02
11/04/2024	2A	Load stable at 220 MW	110	11.1	3,878	5,955	8,571	<0.2	<0.03
22/10/2024	1B	Load stable at 280 MW	121	10.9	5,689	2,021	13,621	2.6	0.27
27/11/2024	2A	Load stabled at 500 MW	120	8.2	5,510	6,835	13,699	<0.2	<0.01
Hydrogen chloride									
9/04/2024	1B	Load stable at 220 MW	111	11.9	3,833	4,284	8,172	16	2.2
11/04/2024	2A	Load stable at 220 MW	110	11.1	3,878	5,955	8,571	26	3.0
22/10/2024	1B	Load stable at 280 MW	121	10.9	5,689	2,021	13,621	2.3	0.25
27/11/2024	2A	Load stabled at 500 MW	120	8.2	5,510	6,835	13,699	54	3.0

Sampling Date	Unit & Duct	Process condition	Temperature (°C)	Oxygen (%)	Daily Coal Burn (t)	Fuel Oil Consumed (L)	Daily Generation (MWh)	Mass Rate (g/min)	Measured Concentration (mg/Nm³)*
Fluorine									
9/04/2024	1B	Load stable at 220 MW	111	11.9	3,833	4,284	8,172	81	11
11/04/2024	2A	Load stable at 220 MW	110	11.1	3,878	5,955	8,571	98	11
22/10/2024	1B	Load stable at 280 MW	121	10.9	5,689	2,021	13,621	13	1.4
27/11/2024	2A	Load stabled at 500 MW	120	8.2	5,510	6,835	13,699	190	10
Cadmium									
16/01/2024	1B	Boiler load stable at 220 MW	106	10.9	3,838	4,492	8,214	0.0091	0.0012
17/01/2024	1A	Boiler load stable at 280 MW	110	9.0	4,505	1,245	9,988	0.012	0.001
18/01/2024	2A	Boiler load stable at 280 MW	111	9.3	3,508	1,884	8,000	0.0078	0.0008
19/01/2024	2B	Boiler load stable at 220 MW	103	10.6	3,293	5,638	7,607	0.0082	0.0011
2/07/2024	1B	Load stable at 450 MW	128	7.0	6,608	890	16,452	0.02	0.001
3/07/2024	1A	Load stable at 450 MW	123	8.3	5,895	4,146	13,869	0.012	0.00084
3/07/2024	2B	Load stable at 450 MW	111	8.9	5,895	4,146	13,869	0.0067	0.00043
4/07/2024	2A	Load stable at 450 MW	111	8.3	6,129	3,077	14,634	0.015	0.00097
Mercury									
16/01/2024	1B	Boiler load stable at 220 MW	106	10.9	3,838	4,492	8,214	0.023	0.0031
17/01/2024	1A	Boiler load stable at 280 MW	110	9.0	4,505	1,245	9,988	0.038	0.0032
18/01/2024	2A	Boiler load stable at 280 MW	111	9.3	3,508	1,884	8,000	0.022	0.0022
19/01/2024	2B	Boiler load stable at 220 MW	103	10.6	3,293	5,638	7,607	0.013	0.0017
2/07/2024	1B	Load stable at 450 MW	128	7.0	6,608	890	16,452	<0.005	<0.0002
3/07/2024	1A	Load stable at 450 MW	123	8.3	5,895	4,146	13,869	0.0038	0.00026
3/07/2024	2B	Load stable at 450 MW	111	8.9	5,895	4,146	13,869	0.0099	0.00064
4/07/2024	2A	Load stable at 450 MW	111	8.3	6,129	3,077	14,634	<0.006	<0.0004
Type 1 and Type 2 substances in aggregate									
16/01/2024	1B	Boiler load stable at 220 MW	106	10.9	3,838	4,492	8,214	≤0.16	≤0.021
17/01/2024	1A	Boiler load stable at 280 MW	110	9.0	4,505	1,245	9,988	≤1	≤0.089
18/01/2024	2A	Boiler load stable at 280 MW	111	9.3	3,508	1,884	8,000	≤1.7	≤0.17
19/01/2024	2B	Boiler load stable at 220 MW	103	10.6	3,293	5,638	7,607	≤0.19	≤0.025
2/07/2024	1B	Load stable at 450 MW	128	7.0	6,608	890	16,452	≤1.1	≤0.054
3/07/2024	1A	Load stable at 450 MW	123	8.3	5,895	4,146	13,869	≤0.61	≤0.042
3/07/2024	2B	Load stable at 450 MW	111	8.9	5,895	4,146	13,869	≤0.31	≤0.02
4/07/2024	2A	Load stable at 450 MW	111	8.3	6,129	3,077	14,634	≤0.76	≤0.049

Notes: *Reported as dry, 0°C, 101.325 kPa and corrected to 7% O_2.
N/A – Not Applicable: Sampling performed as per required sampling frequencies outlined in Table 1-2.

2.2 CEMS

Condition M2.2 – *Air Monitoring Requirements* requires the continuous monitoring of specific stack parameters. Table 2-2 summarises the continuous emissions monitoring system (CEMS) data as required in Condition M2.2.

The following sections summarise the CEMS data and quality assurance program.

TABLE 2-2 LIST OF REQUIRED CEMS PARAMETERS

Pollutant	Monitoring Points	Unit & Duct
Nitrogen Oxides	Point 2, 3, 4, 5, 6, 7	Unit 1, Unit 2, Unit 1A, Unit 1B, Unit 2A, Unit 2B
Sulfur dioxide		
Flow rate [a]	Point 4, 5, 6, 7	Unit 1A, Unit 1B, Unit 2A, Unit 2B
Moisture		
Oxygen (O_2)		
Temperature		

Moisture, temperature and oxygen are monitored as part of the existing CEMS at MPPS. EnergyAustralia submitted the *Development of Fan Curve Methodology for Calculating Flue Gas Flowrate for MPPS* report to the EPA on 20 December 2024 as required by EPL 13007.

2.2.1 CEMS RESULTS SUMMARY

The 2024 CEMS monitoring results are summarised in Table 2-3 and presented in Figure 2-1 to Figure 2-7.

For NO_x and SO_2, compliance was achieved with the limits set for the 100th and 99th percentile concentration at the monitoring points. The NO_x concentrations are distributed broadly between 200 mg/Nm^3 and 1,100 mg/Nm^3, while the SO_2 concentrations are more concentrated between 750 mg/Nm^3 and 1,300 mg/Nm^3.

The moisture is generally between 5% and 9% for both boilers, with an average moisture of approximately 7.0%. The discharge oxygen percentage was, on average, 8.8%. The discharge temperatures are mostly between 100 °C and 130 °C, with some lower temperatures of ~60 °C. The trends identified are a result of a higher load profile during the middle and end of the year at MPPS, shown in Figure 2-8.

FIGURE 2-1 CEMS RESULTS – NO_X (POINT 2 AND 3)

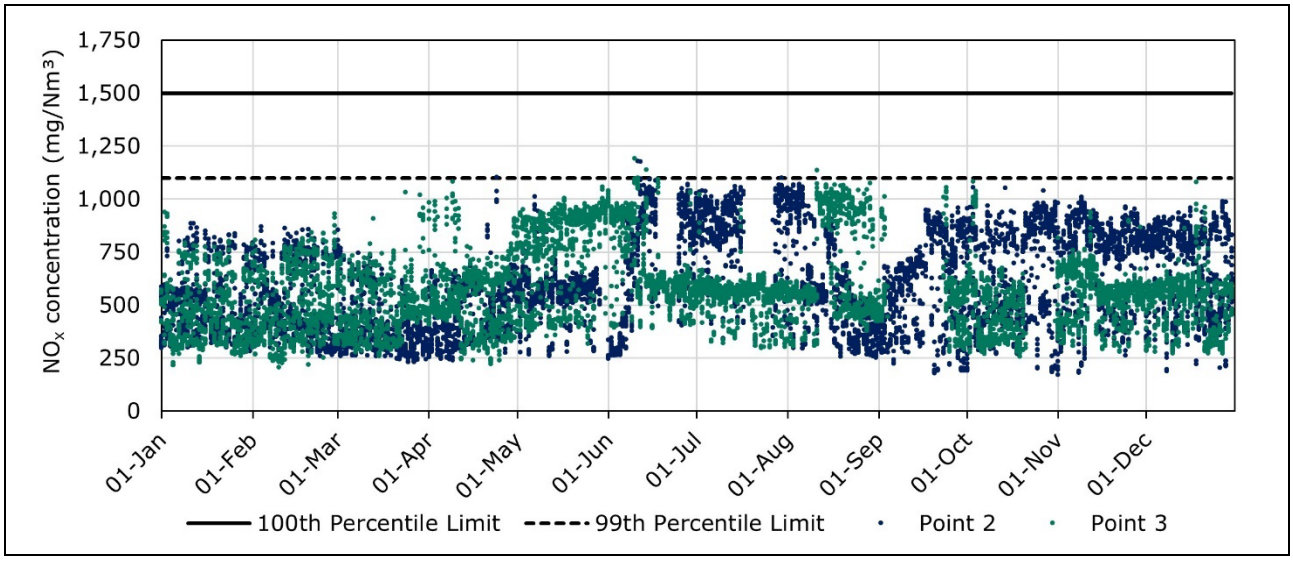


FIGURE 2-2 CEMS RESULTS – NO_X (POINT 4, 5, 6 AND 7)

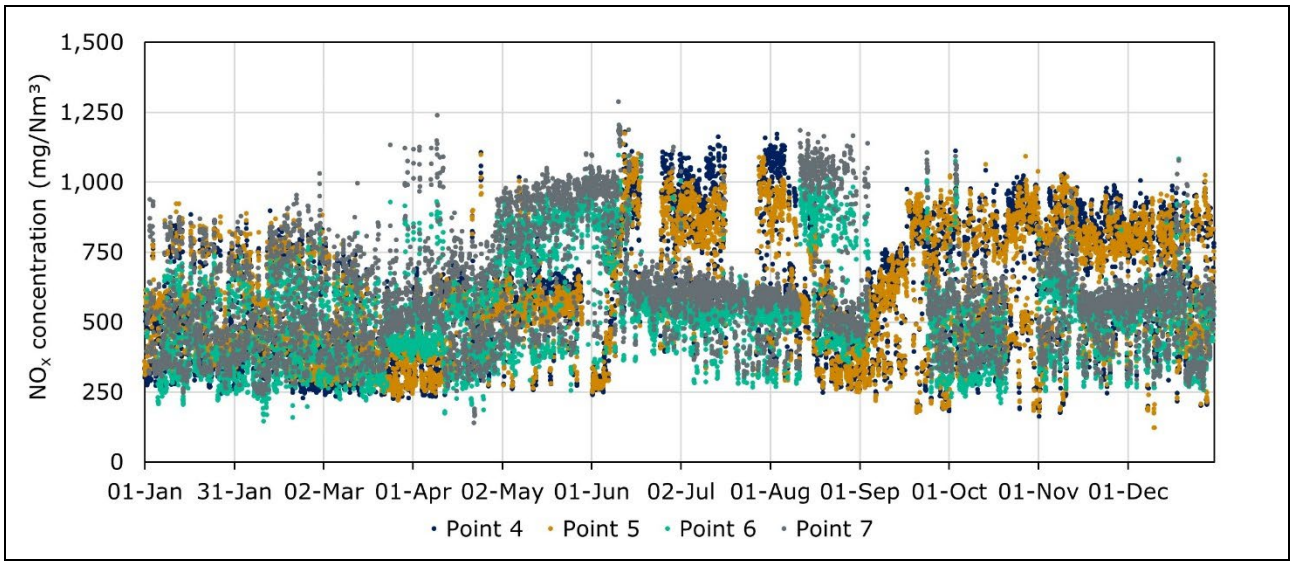


FIGURE 2-3 CEMS RESULTS – SO_2 (POINT 2 AND 3)

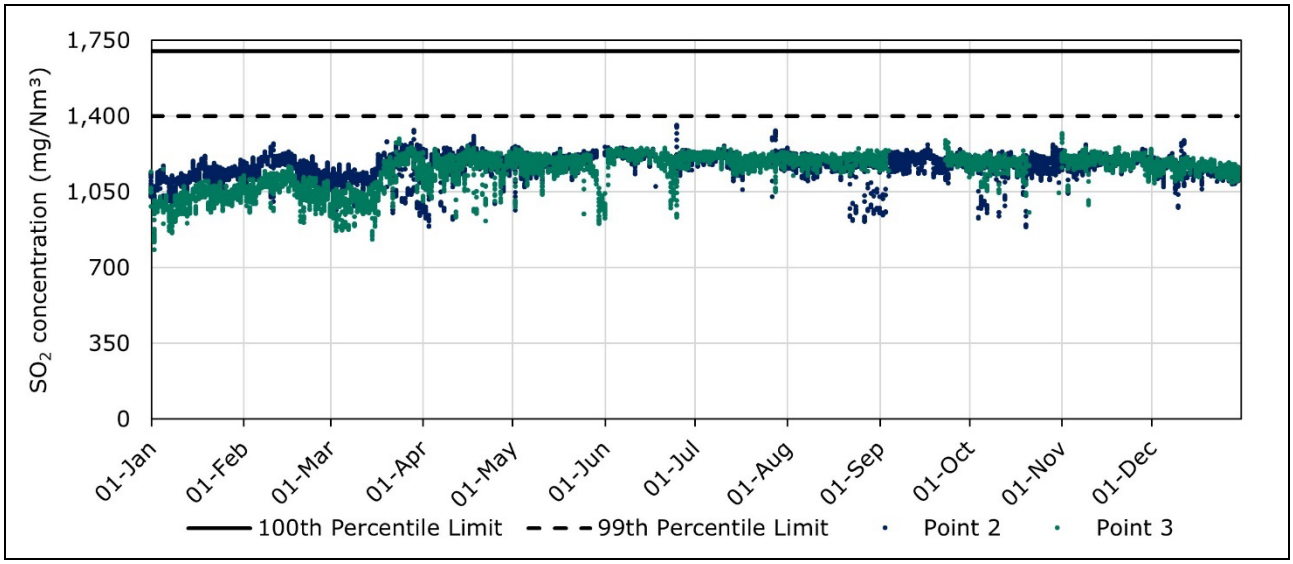


FIGURE 2-4 CEMS RESULTS – SO_2 (POINT 4, 5, 6 AND 7)

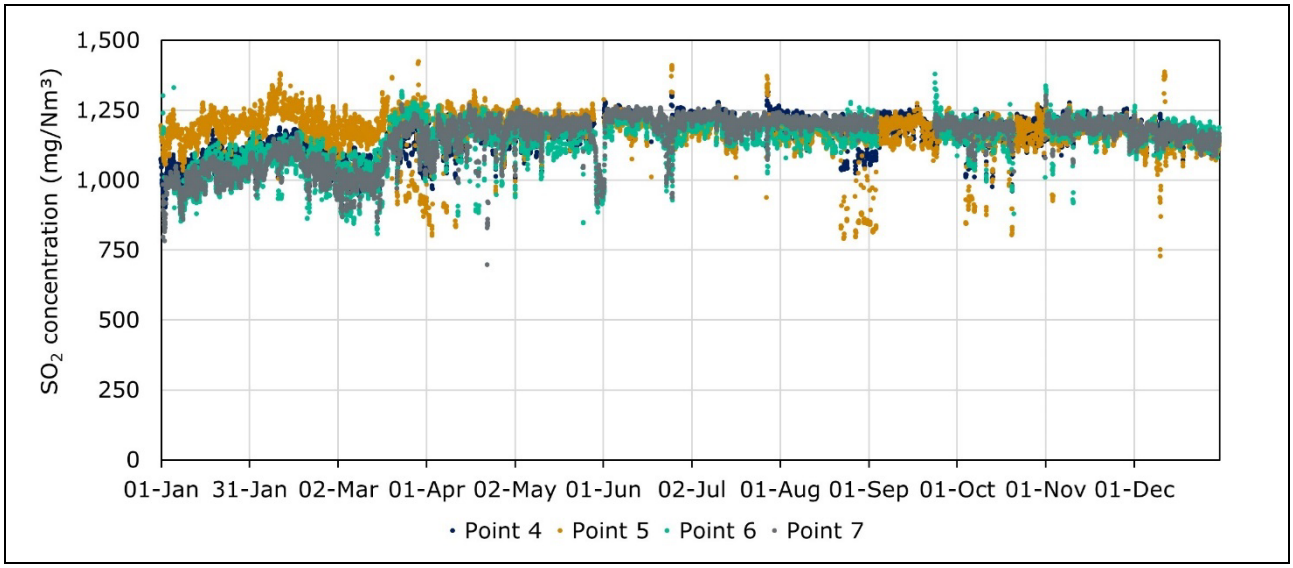


FIGURE 2-5 CEMS RESULTS – MOISTURE (POINT 4, 5, 6 AND 7)

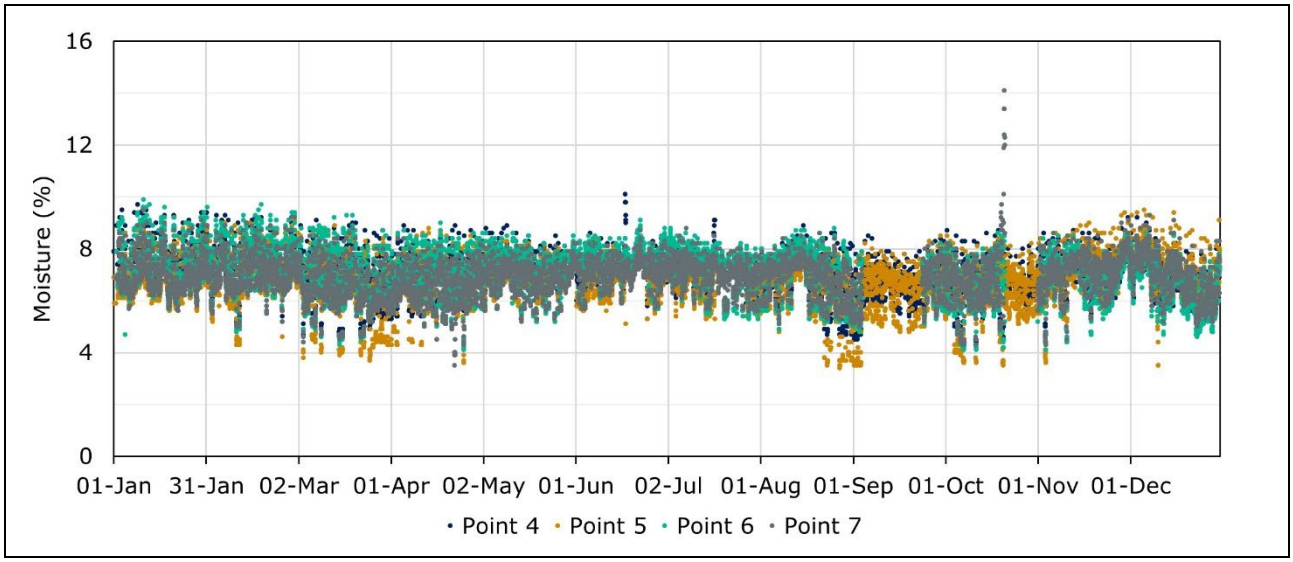


FIGURE 2-6 CEMS RESULTS – OXYGEN (POINT 4, 5, 6 AND 7)

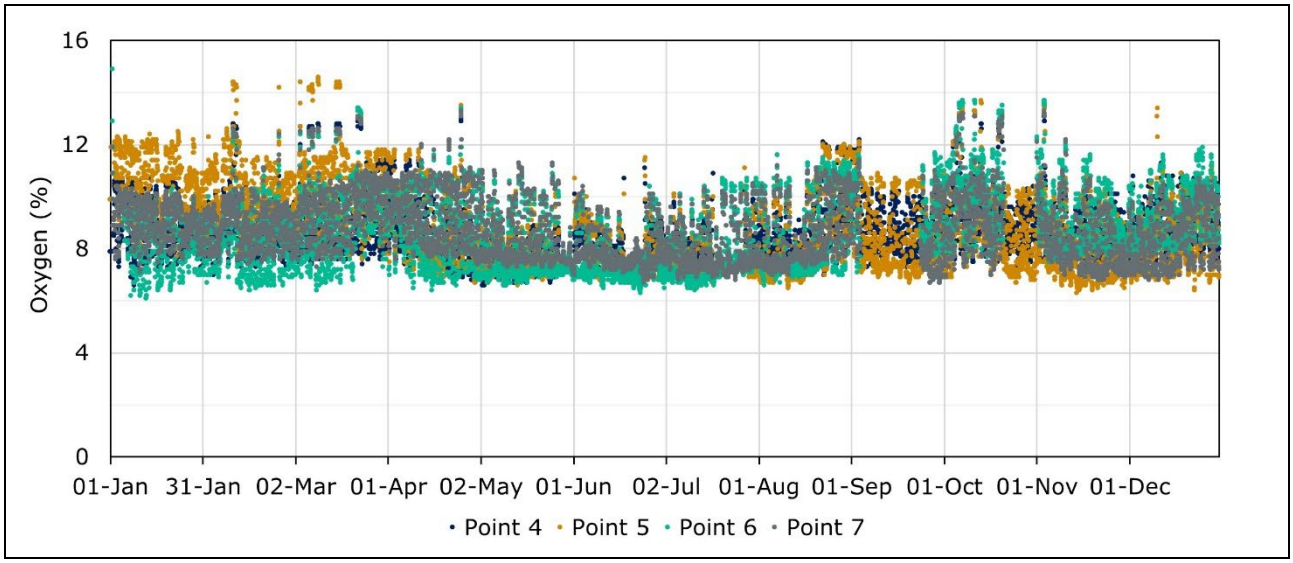


FIGURE 2-7 CEMS RESULTS – TEMPERATURE (POINT 4, 5, 6 AND 7)

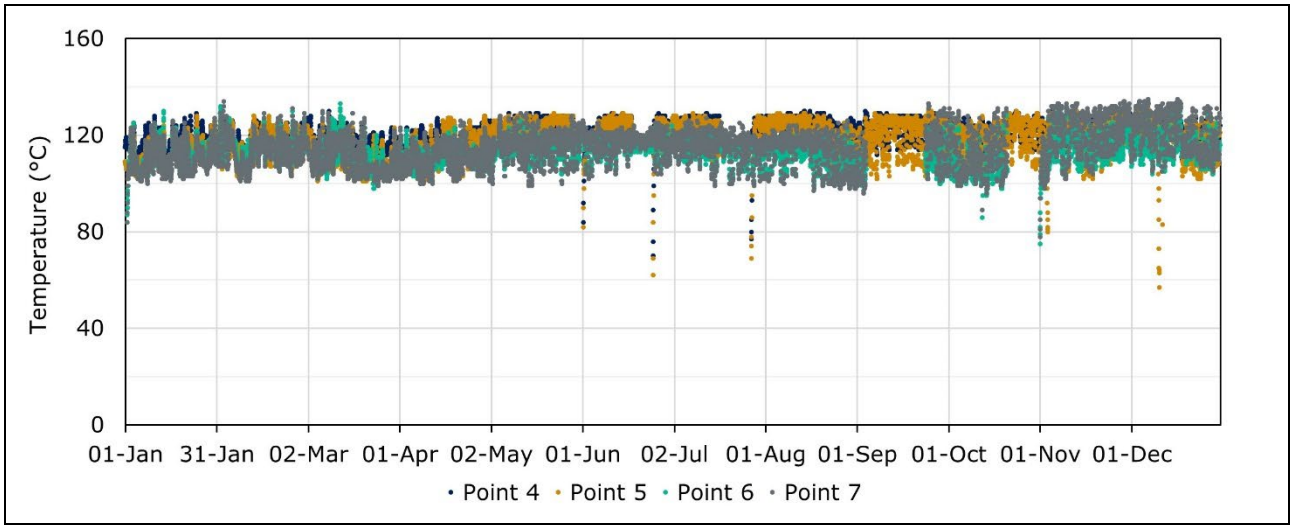


FIGURE 2-8 CEMS RESULTS – LOAD (MW, POINT 2 AND 3)

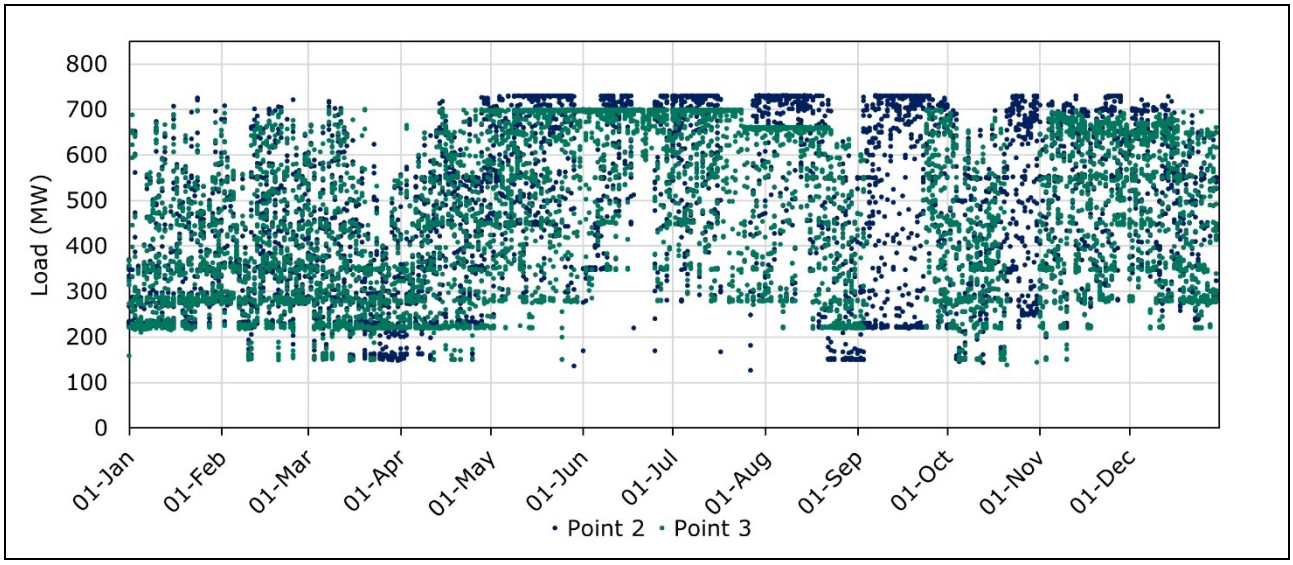


TABLE 2-3 SUMMARY OF 2024 CEMS RESULTS

Monitoring Point	Data Capture[a]	Minimum	Average	Maximum	50th Percentile	70th Percentile	99th Percentile	100th Percentile Concentration Limit compliance	99th percentile Concentration Limit Compliance
NO_x (mg/Nm³) – 1-hour average									
Point 2 (Unit 1)	99.0%	172	584	1,178	555	726	1,033	✓	✓
Point 3 (Unit 2)	98.1%	207	559	1,193	543	605	1,024	✓	✓
Point 5 (Unit 1A)	99.0%	163	586	1,180	554	732	1,086	N/A	
Point 4 (Unit 1B)	98.7%	123	583	1,180	557	723	1,025		
Point 6 (Unit 2A)	98.1%	145	522	1,097	508	573	966		
Point 7 (Unit 2B)	99.1%	140	595	1,288	570	639	1,092		
SO_2 (mg/Nm³) – 1-hour average									
Point 2 (Unit 1)	99.0%	887	1,170	1,358	1,183	1,203	1,259	✓	✓
Point 3 (Unit 2)	98.1%	830	1,148	1,320	1,180	1,201	1,244	✓	✓
Point 5 (Unit 1A)	99.0%	903	1,160	1,315	1,179	1,204	1,256	N/A	
Point 4 (Unit 1B)	98.7%	729	1,179	1,423	1,189	1,208	1,299		
Point 6 (Unit 2A)	98.1%	808	1,144	1,379	1,172	1,198	1,256		
Point 7 (Unit 2B)	99.1%	697	1,150	1,302	1,186	1,206	1,251		
Moisture (%)									
Point 5 (Unit 1A)	99.0%	4.3	7.1	10.2	7.1	7.4	8.8	N/A	
Point 4 (Unit 1B)	98.7%	3.5	6.8	9.6	6.9	7.2	8.7		
Point 6 (Unit 2A)	99.0%	4.2	7.1	10.0	7.2	7.7	9.0		
Point 7 (Unit 2B)	99.1%	3.6	6.9	14.2	7.0	7.4	8.6		
O_2 (%)									
Point 5 (Unit 1A)	99.0%	6.7	8.7	13.5	8.5	9.0	12.7	N/A	
Point 4 (Unit 1B)	98.7%	6.4	9.0	14.7	8.7	9.9	13.3		
Point 6 (Unit 2A)	98.1%	6.2	8.7	14.7	8.4	9.4	12.5		
Point 7 (Unit 2B)	99.1%	6.8	8.8	13.4	8.6	9.5	12.5		

Monitoring Point	Data Capture[a]	Minimum	Average	Maximum	50th Percentile	70th Percentile	99th Percentile	100th Percentile Concentration Limit compliance	99th percentile Concentration Limit Compliance
Temperature (°C)									
Point 5 (Unit 1A)	100%	70	121	131	122	125	129	N/A	
Point 4 (Unit 1B)	99.7%	57	117	131	119	123	129		
Point 6 (Unit 2A)	100%	75	113	133	113	116	127		
Point 7 (Unit 2B)	100%	78	114	135	115	118	132		

Notes: [a] Data capture calculation only considers periods when the units are in operation at loads of greater than 150 MW. Periods when the boilers are out of service are excluded.
N/A: Not Applicable.

2.2.2 CEMS QUALITY ASSURANCE AND CONTROL PROCEDURES

Condition E2 requires an implemented CEMS Quality Assurance and Quality Control Procedure. The document *ENERGYAUSTRALIA NSW Mt Piper Power Station – Continuous Emissions Monitoring Plan Quality Assurance and Control Procedures* (HRL, 2022) ('the Procedures') was compared with the requirements of Condition E3.1 in Table 2-4.

TABLE 2-4 NSW EPA EPL13007 CONDITION – E2 CONTINUOUS EMISSIONS MONITORING SYSTEMS QUALITY ASSURANCE AND CONTROL PROCEDURES

E2	Continuous Emissions Monitoring Systems Quality Assurance and Control Procedures	Review
E2.1	*The licensee must implement and maintain a CEMS quality assurance (QA) and quality control (QC) procedure which enables the evaluation of the quality of data produced by any CEMS monitoring required by conditions of this licence. As a minimum, the CEMS QA/QC procedure must describe in detail the following:*	EnergyAustralia has provided the Procedure for ERM to review.
	a) calibration and adjustment measures;	Detailed in section 8 of the Procedure.
	b) preventive maintenance measures (including spare parts inventory);	Detailed in section 9 of the Procedure.
	c) data handling, recording and calculation procedures;	Detailed in section 10.3 of the Procedure.
	d) processes for evaluating, verifying and reporting monitoring data;	Detailed in section 11.2 of the Procedure.
	e) accuracy audit measures including sampling and analysis methods;	Detailed in section 11.3 of the Procedure.
	f) fault identification and corrective action measures; and	Detailed in section 11.4 of the Procedure.
	g) process for ongoing review and evaluation of the effectiveness of the CEMS QA/QC procedures	Detailed in section 12 of the Procedure.

The CEMS quality assurance and quality control reporting has been reviewed and demonstrates compliance with the Procedures. The procedures require completion of quarterly cylinder gas audits as an accuracy audit measure. All cylinder gas audits indicate performance of CEMS units within respective accuracy criteria.

EnergyAustralia is currently updating their QA/QC processes to incorporate quarterly Relative Accuracy Audit (RAA) and Relative Accuracy Test Audit (RATA) processes. At the time of preparation, EnergyAustralia has initiated RAA/RATA testing, but is yet to incorporate this testing into an updated revision of the Procedures. RAA/RATA testing conducted during 2024 indicates compliance with relative accuracy criteria with the exception of a quarterly (April) RAA completed for NO_x on Point 7. A review of this testing indicates that the audit was performed at a unit output of approximately 20% which is near to minimum output[1] and below the '*50% of normal load'* that is required by the performance specification. EnergyAustralia is reviewing the results of the April RAA report and will action accordingly.

[1] A unit output of 152 MW was reported during the testing period which is in the lowest 1% of loads reported during 2024, and below the average and maximum Unit 2 loads of 459 MW and 701 MW (respectively).

2.3 AMBIENT AIR MONITORING

As shown in Table 1-2, ambient air monitoring is required at three locations:

- Point 8 (Blackmans Flat);
- Point 9 (Wallerawang); and
- Point 10 (Newnes Plateau).

The ambient air monitoring results for 2024 are summarised in Table 2-6 and presented in Figure 2-9 to Figure 2-11.

FIGURE 2-9 AMBIENT MONITORING RESULTS – NO_2

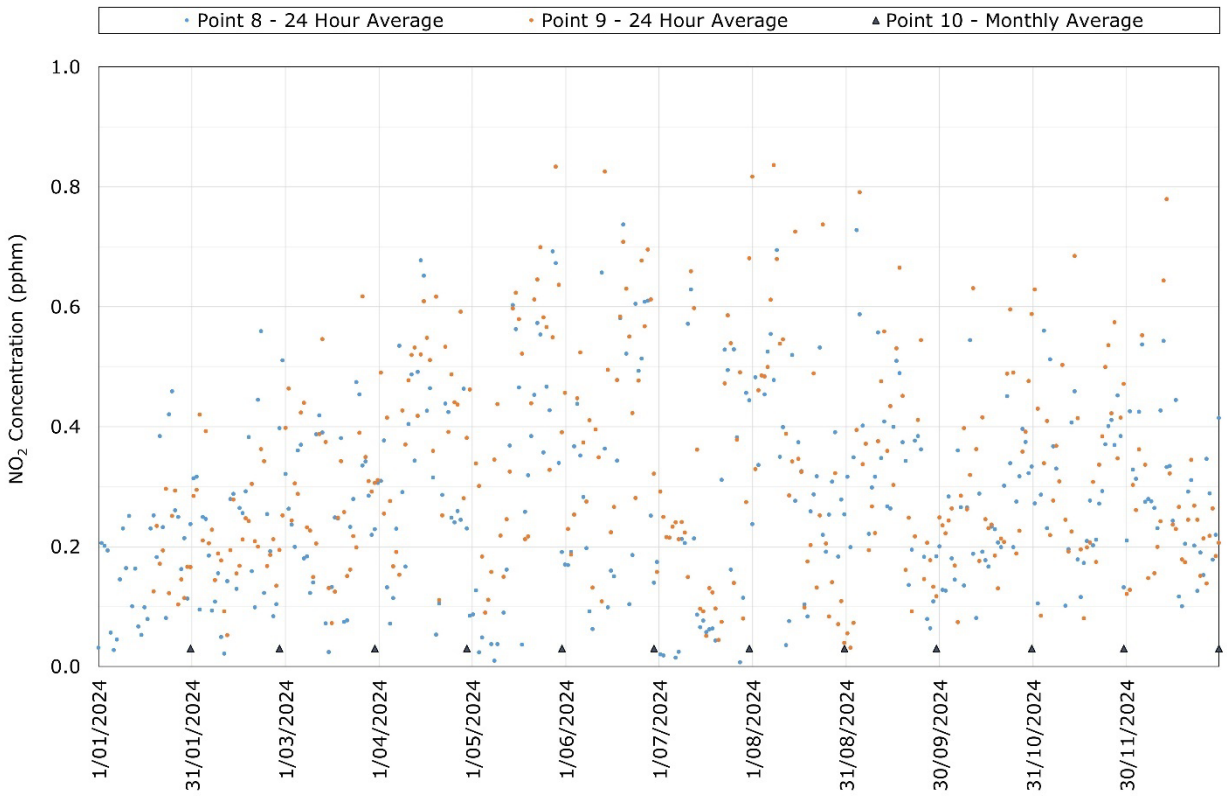


FIGURE 2-10 AMBIENT MONITORING RESULTS – SO_2

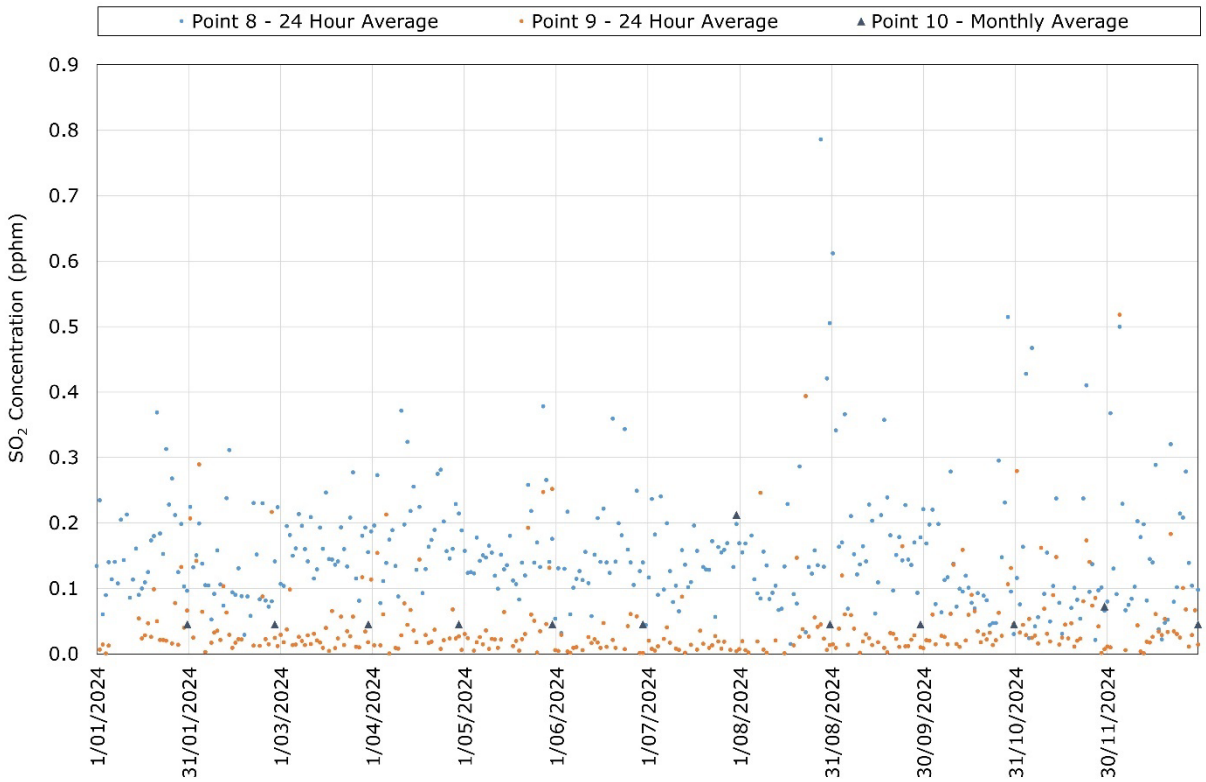


FIGURE 2-11 AMBIENT MONITORING RESULTS – $PM_{2.5}$

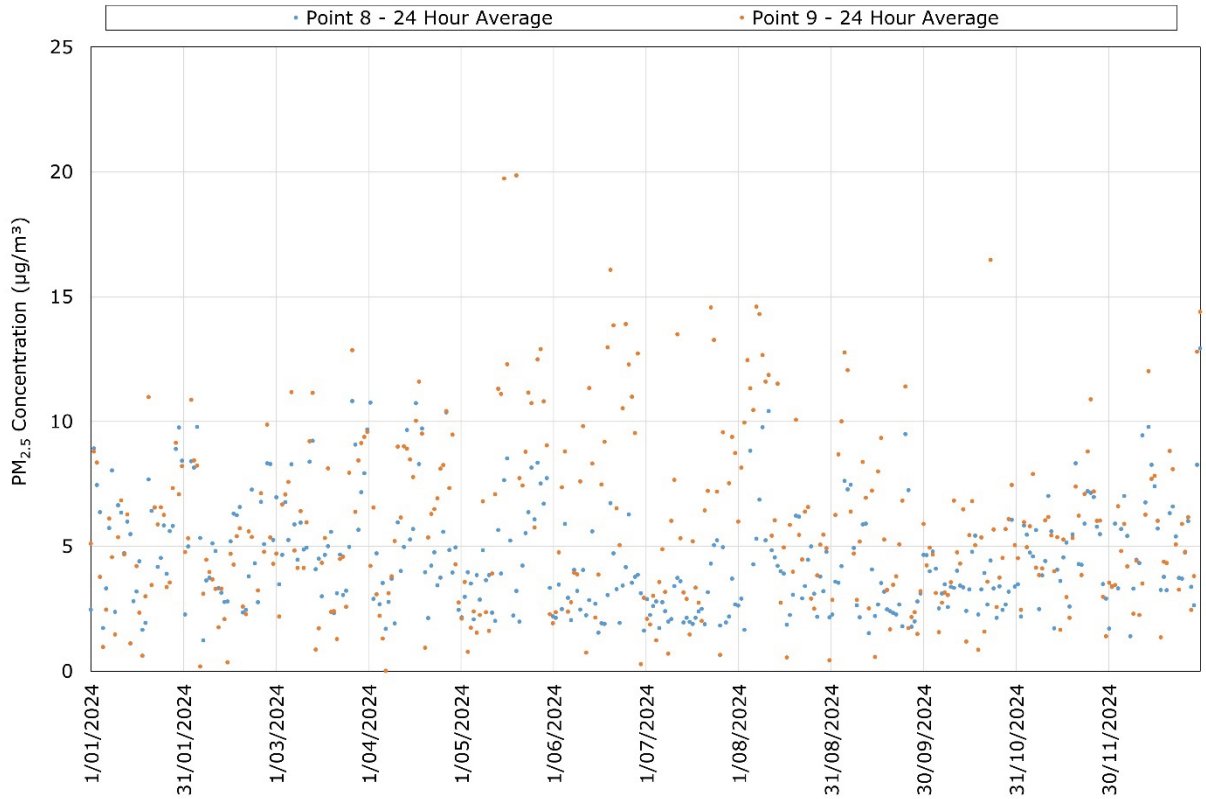


TABLE 2-5 SUMMARY OF 2024 AMBIENT MONITORING RESULTS

Pollutant	Average Period	Unit of Concentration	Data Capture	Concentration Statistic					
				Minimum	Average	Maximum	50th percentile	70th percentile	99th percentile
Point 8 (Blackmans Flat)									
Nitrogen dioxide	1-hour	pphm	91%	-0.08	0.27	2.55	0.19	0.32	1.33
	24-hour		98%	-0.03	0.27	0.74	0.26	0.35	0.68
Sulfur dioxide	1-hour		92%	-0.19	0.15	3.95	0.12	0.16	1.20
	24-hour		100%	-0.15	0.15	0.79	0.14	0.18	0.50
$PM_{2.5}$	24-hour	µg/m³	100%	1.23	4.51	12.9	4.00	5.37	10.5
Fluoride	7 days		94%	0.00	0.01	0.03	0.01	0.01	0.03
	30 days		100%	0.00	0.01	0.02	0.01	0.01	0.02
	90 days		100%	0.01	0.01	0.01	0.01	0.01	0.01
Point 9 (Wallerawang)									
Nitrogen dioxide	1-hour	pphm	90%	-0.01	0.33	2.76	0.19	0.37	1.50
	24-hour		95%	0.03	0.33	0.84	0.28	0.41	0.81
Sulfur dioxide	1-hour		89%	-0.09	0.04	2.80	0.02	0.03	0.63
	24-hour		98%	-0.04	0.03	0.52	0.02	0.03	0.26
$PM_{2.5}$	24-hour	µg/m³	99%	-0.65	5.83	19.9	5.32	7.19	15.2
Point 10 (Newnes Plateau)									
Nitrogen dioxide	1 month	pphm	100%	0.03	0.03	0.03	0.03	0.03	0.03
Sulfur dioxide	1 month		100%	0.05	0.06	0.21	0.05	0.05	0.20

Notes: "<" – Less than limit of reporting. * average and percentile values incorporate values less than the LOR at half of the LOR. Statistics prepared from hourly average data.

2.4 COMPLIANCE REVIEW

Compliance against monitoring requirements (EPL Condition M2.2) and air concentration limits (EPL Condition L3.2 and L3.3) has been reviewed and is summarised in Table 2-6.

TABLE 2-6 SUMMARY OF MONITORING REQUIREMENTS AND LIMIT COMPLIANCE REVIEW

Pollutant	Compliance			Comments
	Monitoring Frequency	Monitoring Method	Concentration Limit	
Point 2,3				
Cadmium	✓	✓	✓	-
Chlorine	✓	✓	✓	
Fluorine	✓	✓	✓	
Hydrogen chloride	✓	✓	✓	
Mercury	✓	✓	✓	
Nitrogen oxides	✓	✓	✓	
Solid particles	✓	✓	✓	
Sulfur dioxide	✓	✓	✓	
Sulfuric acid mist and sulfur trioxide (as SO_3)	✓	✓	✓	
Type 1 and Type 2 substances in aggregate	✓	✓	✓	
Volatile organic compounds as n-propane equivalent	✓	✓	✓	
Point 4,5,6,7				
Cadmium	✓	✓	N/A	
Flow rate	N/A	N/A	N/A	
Mercury	✓	✓	N/A	
Moisture	✓	✓	N/A	
Nitrogen oxides	✓	✓	N/A	
Oxygen (O_2)	✓	✓	N/A	
Solid particles	✓	✓	N/A	
Sulfur dioxide	✓	✓	N/A	
Temperature	✓	✓	N/A	
Type 1 and Type 2 substance in aggregate	✓	✓	N/A	
Point 4,6				
Carbon dioxide	✓	✓	N/A	
Chlorine	✓	✓	N/A	
Fluorine	✓	✓	N/A	
Hydrogen chloride	✓	✓	N/A	

Pollutant	Compliance			Comments
	Monitoring Frequency	Monitoring Method	Concentration Limit	
Sulfuric acid mist and sulfur trioxide (as SO_3)	✓	✓	N/A	
Volatile organic compounds as n-propane equivalent	✓	✓	N/A	
Point 8				
Fluoride	✓	✓	N/A	-
Point 8,9				
Nitrogen dioxide	✓	✓	N/A	-
$PM_{2.5}$	✓	✓	N/A	
Sulfur dioxide	✓	✓	N/A	
Point 10				
Nitrogen dioxide	✓	✓	N/A	-
Sulfur dioxide	✓	✓	N/A	

2.4.1 EXCEEDANCES OF AIR EMISSION LIMITS AND PLANT OPERATING CONDITIONS AT THE TIME

No exceedances of air emission limits were reported during the reporting period.

3. HISTORICAL AIR EMISSION MONITORING REVIEW

Condition R1.9(b) requires an analysis of the boilers' emissions performance for the past five years. The historical analysis was completed for the pollutants listed in Condition M2.2. The data used for the historical analysis were sourced from annual returns, stack testing, CEMS data and ambient air monitoring and have been reported at dry, 0°C, 101.325 kPa conditions, corrected to 7% O_2.

3.1 HISTORICAL FUEL USAGE

MPPS has combusted black coal as the primary fuel with supplementary firing using fuel oil during start-up operations for at least the past ten years.

Monthly amounts of coal burnt and average coal analysis for the reporting year 2024 are shown in Table 3-1. The stack tests for the reporting period of 2024 were performed in January, April, July, October and November, as shown bold font in Table 3-1. While there is variability in the coal quality, the quality of coal burnt during the stack testing did not favour any specific conditions and is considered to be representative of typical coal properties for coal used at MPPS.

The long-term trends of the coal consumption and coal quality are presented in Figure 3-1 to Figure 3-3. The data show the monthly coal consumption variations over the past five years. Coal consumption typically peaks in the winter months (June, July and August), with an additional peak observed later in the year during November and December in 2024. The coal quality has been generally stable over the past five years, especially for carbon, ash, sulfur, nitrogen and hydrogen percentages. The moisture and oxygen contents show more variation, with a distinct increase in oxygen percentage observed in 2023.

Based on the review of the coal composition during 2024 and the long-term trends of coal quality, the coal quality during stack testing is considered to be representative of typical conditions.

TABLE 3-1 MONTHLY COAL CONSUMED AND COAL ANALYSIS – 2024

Month	Coal Burnt	Average Coal Analysis							
		Moisture	Ash	S	F	C	H	N	O
		%	%	%	ppm	%	%	%	%
Jan	219,159	8.32	26.3	0.70	170	82.6	5.40	1.90	9.50
Feb	229,103	8.45	26.4	0.70	135	82.6	5.44	1.95	9.30
Mar	208,632	7.72	27.1	0.72	155	82.3	5.38	1.84	9.80
Apr	244,836	7.92	26.5	0.78	170	82.7	5.40	1.88	9.20
May	322,801	7.93	23.0	0.77	130	83.7	5.51	1.95	8.10
Jun	311,041	8.88	22.9	0.83	120	84.0	5.47	1.99	7.70
Jul	309,827	8.65	23.7	0.80	130	83.3	5.51	1.90	8.50
Aug	322,470	8.76	23.8	0.73	150	83.4	5.43	1.92	8.50
Sep	206,416	7.98	26.1	0.80	135	83.6	5.40	1.94	8.30

Month	Coal Burnt	Average Coal Analysis							
		Moisture	Ash	S	F	C	H	N	O
		%	%	%	ppm	%	%	%	%
Oct	220,348	8.22	25.8	0.78	150	83.0	5.42	1.90	8.90
Nov	328,871	8.22	27.0	0.79	155	83.2	5.49	1.94	8.60
Dec	309,400	7.90	26.5	0.76	165	81.7	5.39	2.00	10.1
Average	-	8.25	25.4	0.76	147	83.0	5.44	1.93	8.88
Total	*3,232,903*	-							

FIGURE 3-1 HISTORICAL MONTHLY COAL BURNT (TONNES)

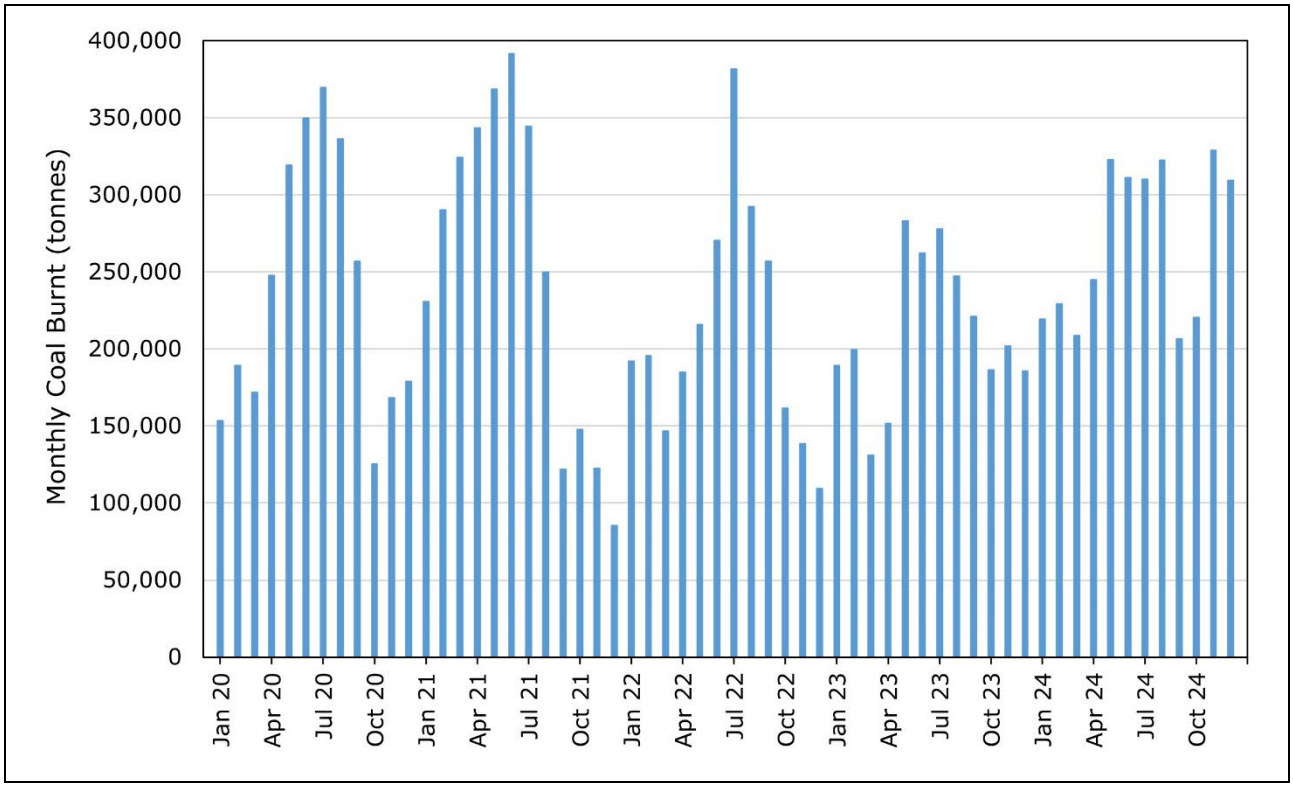


FIGURE 3-2 HISTORICAL COAL ANALYSIS – CARBON AND ASH (%)

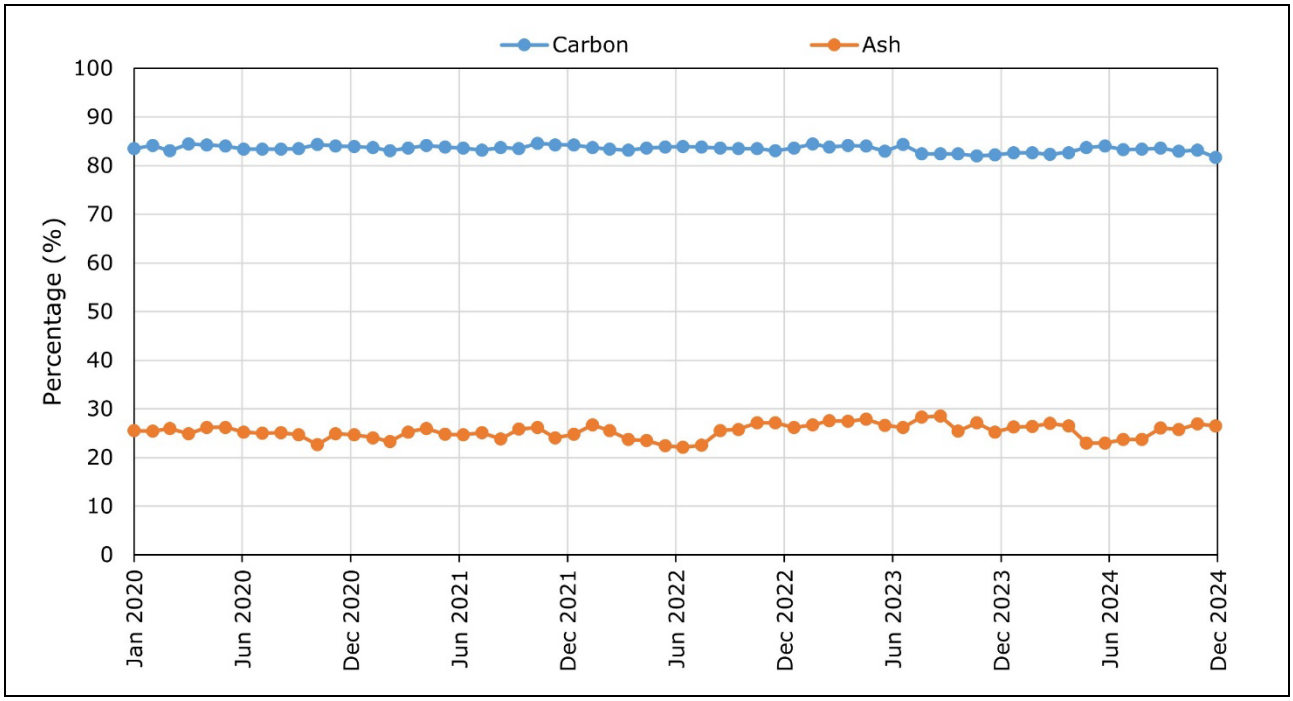
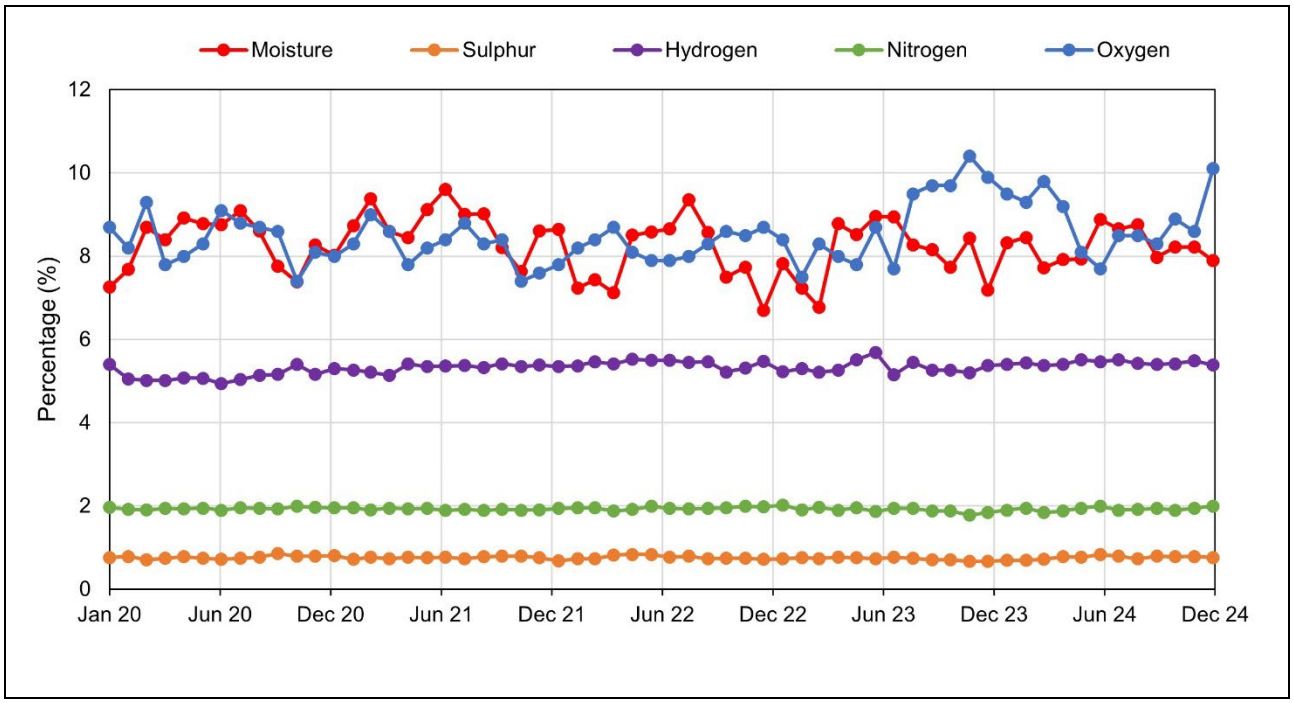


FIGURE 3-3 HISTORICAL COAL ANALYSIS – MOISTURE, SULFUR, HYDROGEN, NITROGEN AND OXYGEN (%)



3.2 COMPARISON WITH HISTORICAL STACK EMISSION MONITORING

The analysis of the historical stack emissions includes review of the fuel usages, stack concentrations (at dry, 0 °C, 101.325 kPa conditions, corrected to 7% O_2), as well as the analysis of correlations with default emission factors and potential coal quality influences. Samples below the limit of reporting (LOR) have been shown at half of the LOR.

The historical stack test documents reviewed include:

- Ektimo 2020, Annual Emission Testing Report – Energy Australia – Mt Piper Power Station, report no. R009203, 2 September 2020;
- Ektimo 2020, Annual Emission Testing Report – Energy Australia – Mt Piper Power Station, report no. R009204, 2 September 2020;
- Ektimo 2020, Emission Testing Report – Energy Australia – Mt Piper Power Station, report no. R009599, 13 October 2020;
- Ektimo 2021, Emission Testing Report – Energy Australia – Mt Piper Power Station, report no. R009826, 11 January 2021;
- Ektimo 2021, Quarterly (Q1) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R010363, 12 May 2021;
- Ektimo 2021, Quarterly (Q2) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R010887, 25 June 2021;
- Ektimo 2021, Quarterly (Q3) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R011365, 13 October 2021;
- Ektimo 2021, Quarterly (Q4) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R011676, 5 January 2022;
- Ektimo 2022, Quarterly (Q1) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R012309, 30 March 2022;
- Ektimo 2022, Quarterly (Q2) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R012769ar, 12 July 2022;
- Ektimo 2022, Quarterly (Q3) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R013250, 29 July 2022;
- Ektimo 2022, Quarterly (Q4) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R013593, 25 October 2022;
- Ektimo 2022, Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R013819, 9 November 2022;
- Ektimo 2022, Quarterly (Q4) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R013949, 16 December 2022;
- Ektimo 2023, Quarterly (Q1) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R014323, 5 April 2023;
- Ektimo 2023, Quarterly (Q1) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R014518, 26 April 2023;
- Ektimo 2023, Quarterly (Q3) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R015163, 14 August 2023;
- Ektimo 2023, Quarterly (Q4) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R015826, 30 November 2023; and

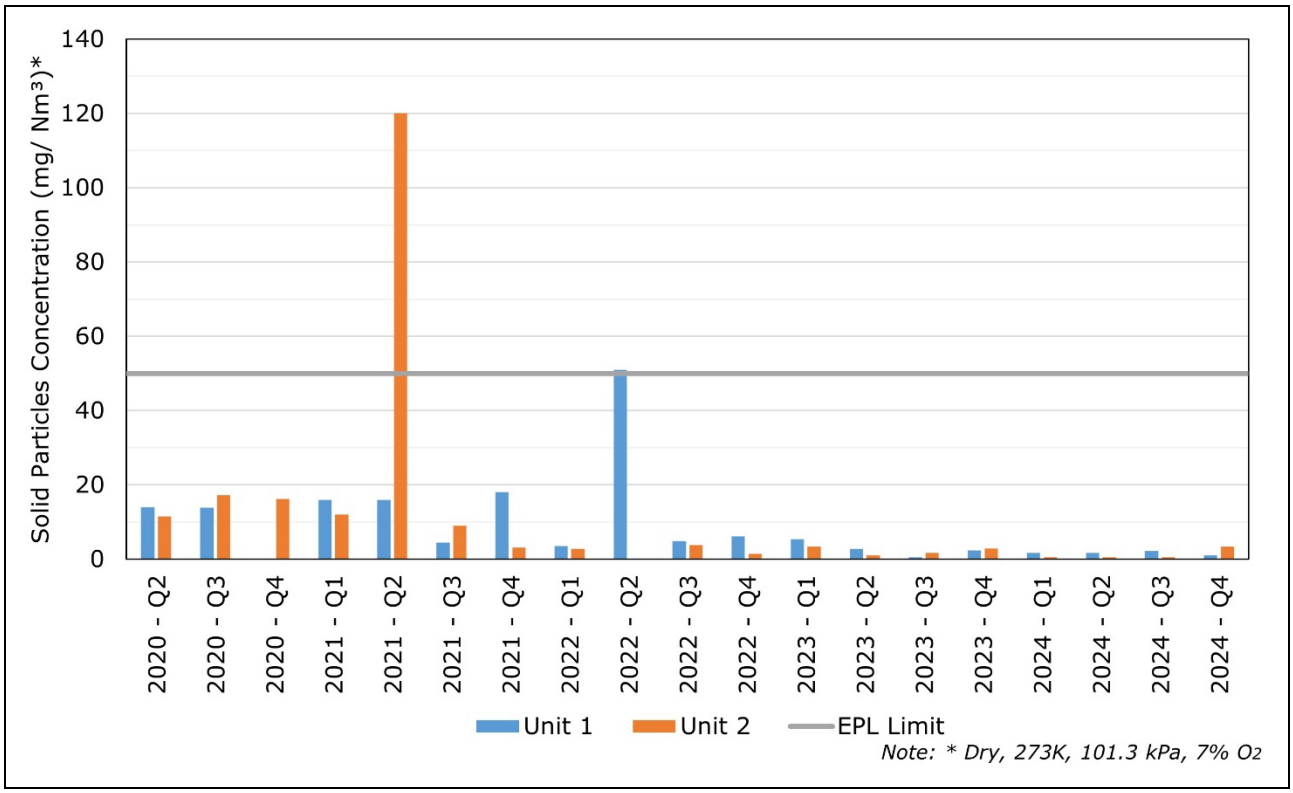
- Ektimo 2024, Quarterly (Q2) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station. Report number R014882a, 15 January 2024.

The 2024 stack test reports are included in Appendix A and all other reports can be made available upon request.

3.2.1 SOLID PARTICLES

Figure 3-4 shows the solid particles concentrations measured between 2020 and 2024. The solid particles limit is 50 mg/Nm³ in both the current and previous EPL, measured quarterly. All reported concentrations were below the EPL limit as shown in Figure 3-4 with the exception of Unit 2 in Quarter 2 of 2021 and Unit 1 in Quarter 2 of 2022.

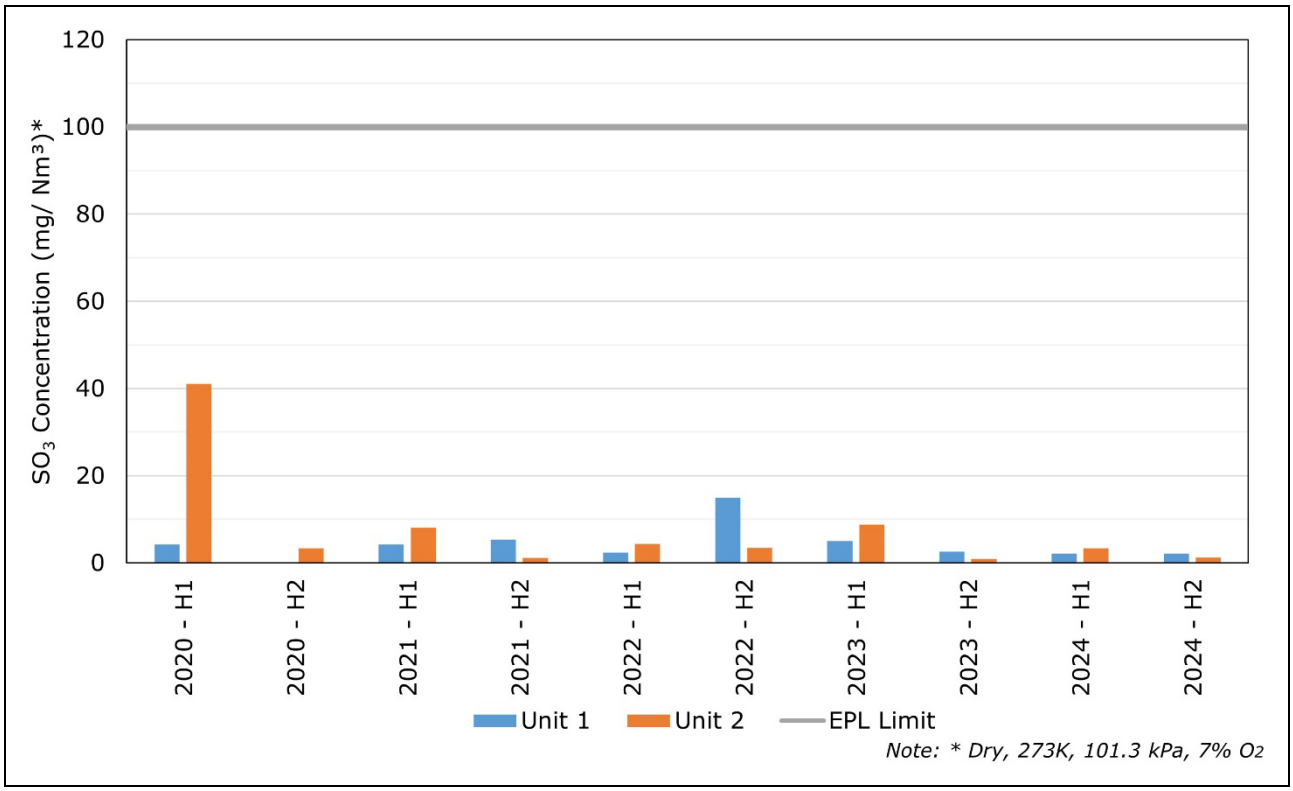
FIGURE 3-4 2020 – 2024 STACK TESTING RESULTS – SOLID PARTICLES



3.2.2 SULFUR TRIOXIDE/SULFURIC ACID (AS SO_3)

Figure 3-5 shows the sulfur trioxide/sulfuric acid (as SO_3) concentrations measured between 2020 and 2024. The sulfur trioxide/sulfuric acid (as SO_3) limit is 100 mg/Nm³ in both the current and previous EPL, measured six-monthly. All reported concentrations were below the EPL limit as shown in Figure 3-5.

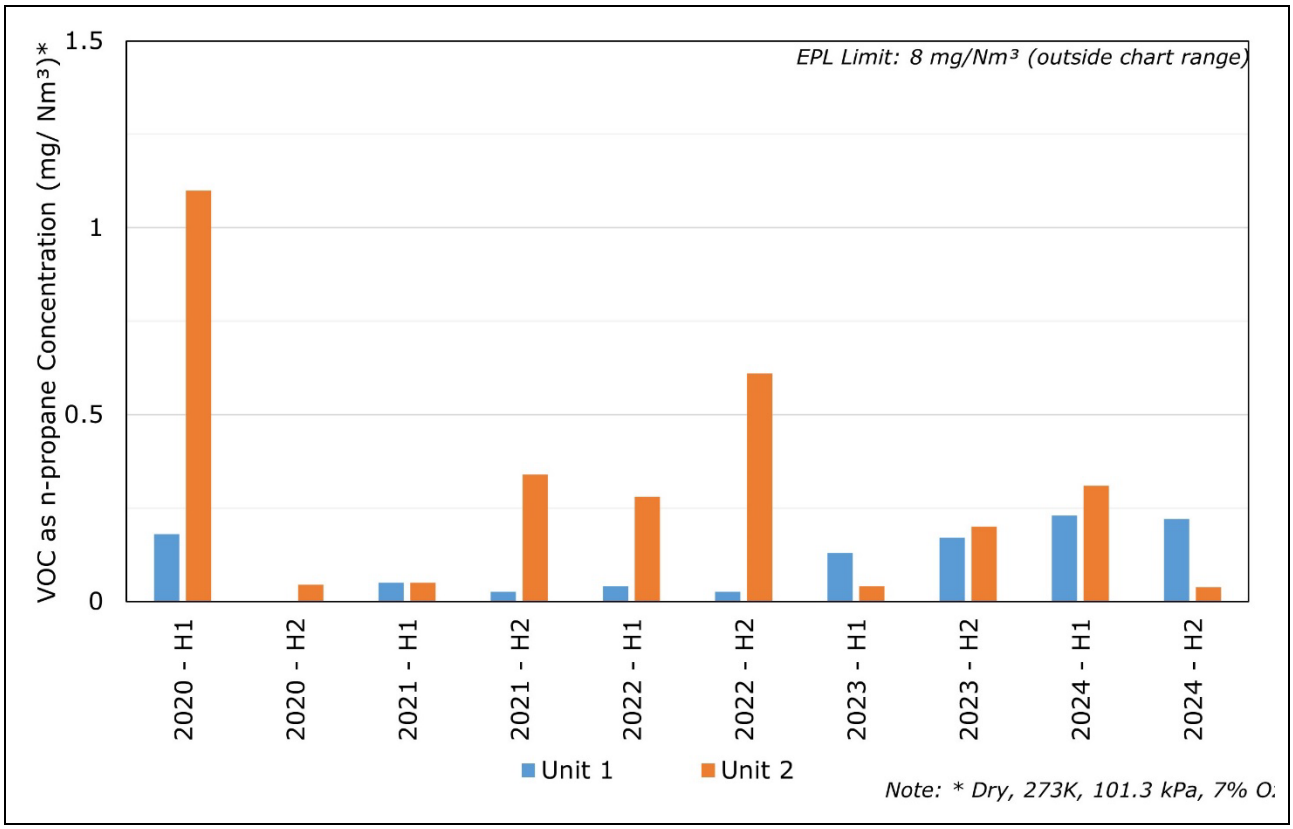
FIGURE 3-5 2020 – 2024 STACK TESTING RESULTS – SULFUR TRIOXIDE AND/OR SULFURIC ACID (AS SO_3)



3.2.3 VOC (AS N-PROPANE)

Figure 3-6 shows VOC concentrations measured between 2020 and 2024. The VOC limit reduced from 10 mg/Nm³ to 8 mg/Nm³ in the current EPL, measured six-monthly. All reported concentrations were below the EPL limit as shown in Figure 3-6. Reported concentrations are commonly below the LOR, which varies based on sampling and analysis conditions, and was commonly in the range of 0.05 – 0.10 mg/Nm³.

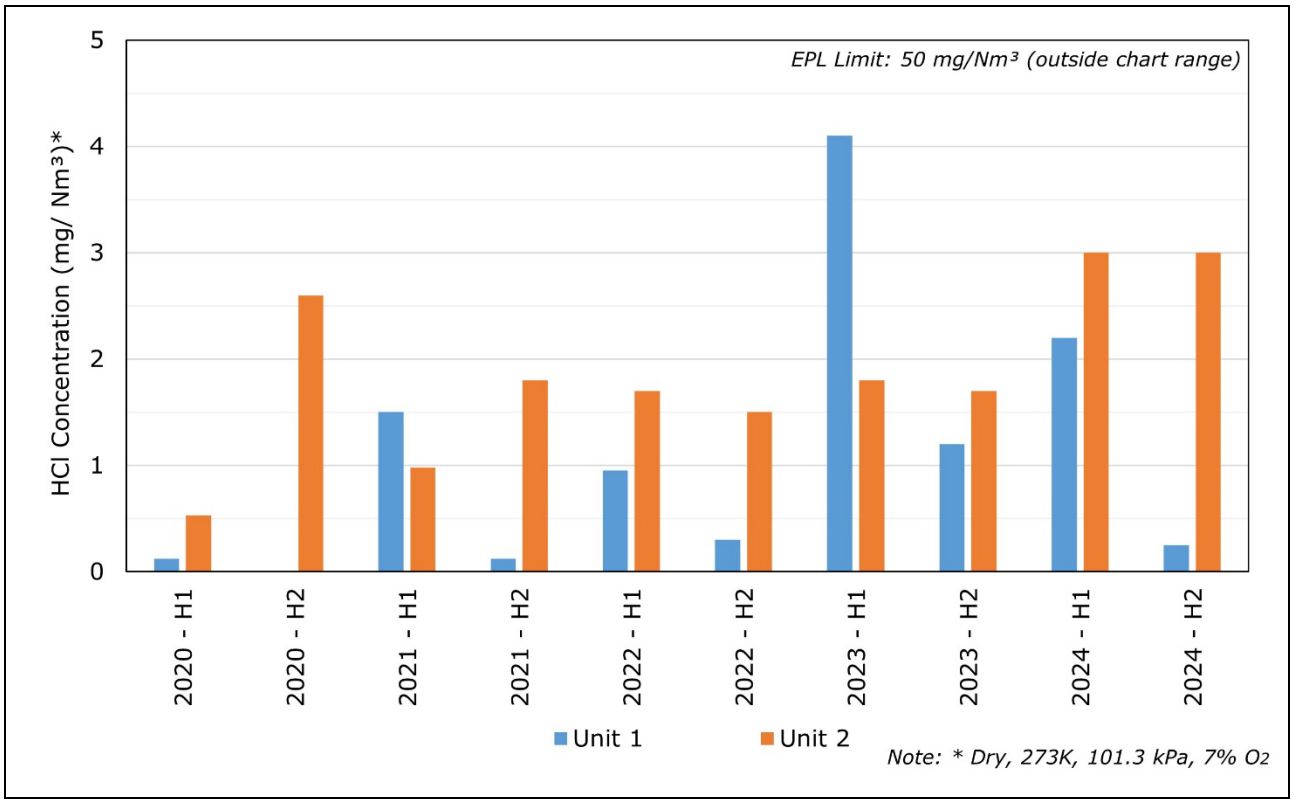
FIGURE 3-6 2020 – 2024 STACK TESTING RESULTS – VOC (AS N-PROPANE)



3.2.4 HYDROGEN CHLORIDE

Figure 3-7 shows hydrogen chloride concentrations measured between 2020 and 2024. The hydrogen chloride limit is 50 mg/Nm³ in both the current and previous EPL, measured six-monthly. All reported concentrations were below the EPL limit as shown in Figure 3-7.

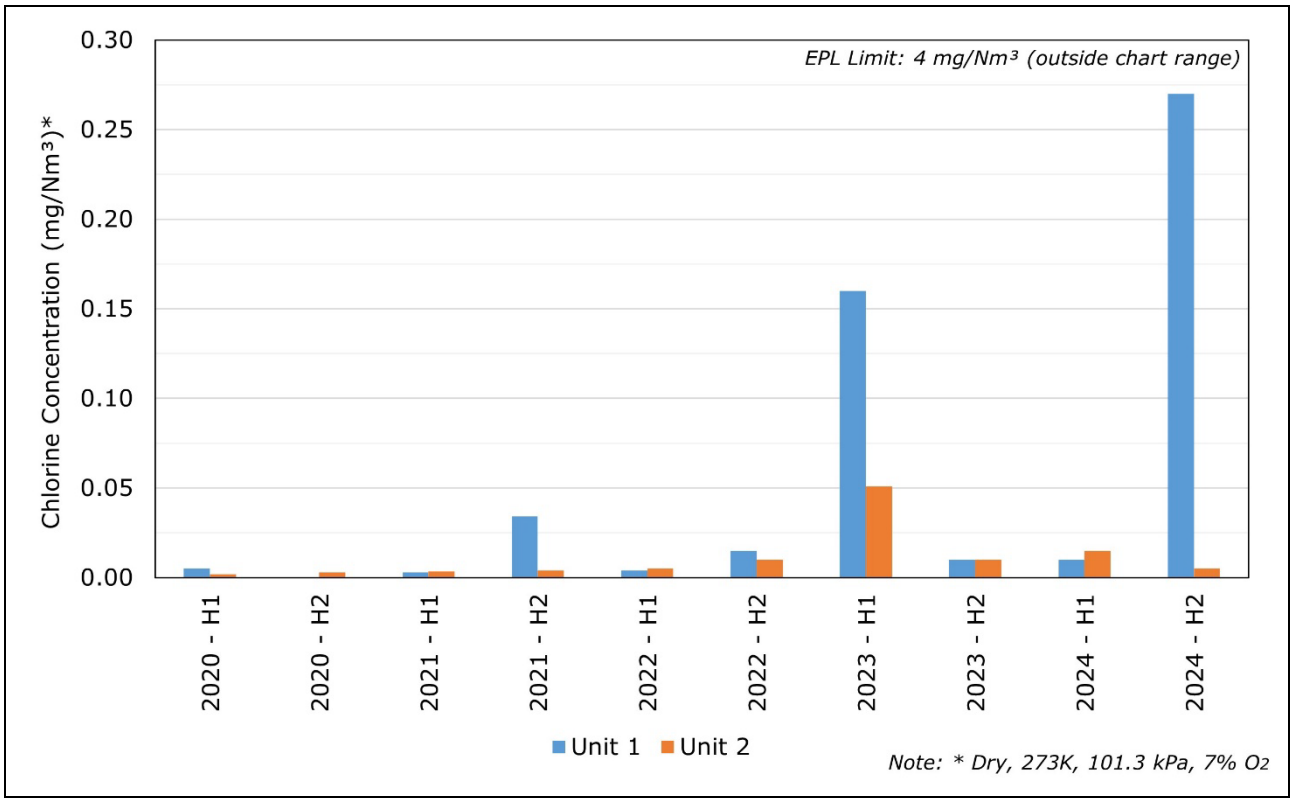
FIGURE 3-7 2020 – 2024 STACK TESTING RESULTS – HYDROGEN CHLORIDE



3.2.5 CHLORINE

Figure 3-8 shows chlorine concentrations measured between 2020 and 2024. The chlorine limit reduced from 20 mg/Nm³ to 4 mg/Nm³ in the current EPL, measured six-monthly. All reported concentrations were well below the EPL limit as shown in Figure 3-8. Reported concentrations were commonly below the LOR, which varied based on sampling and analysis conditions, and was commonly less than 0.03 mg/Nm³.

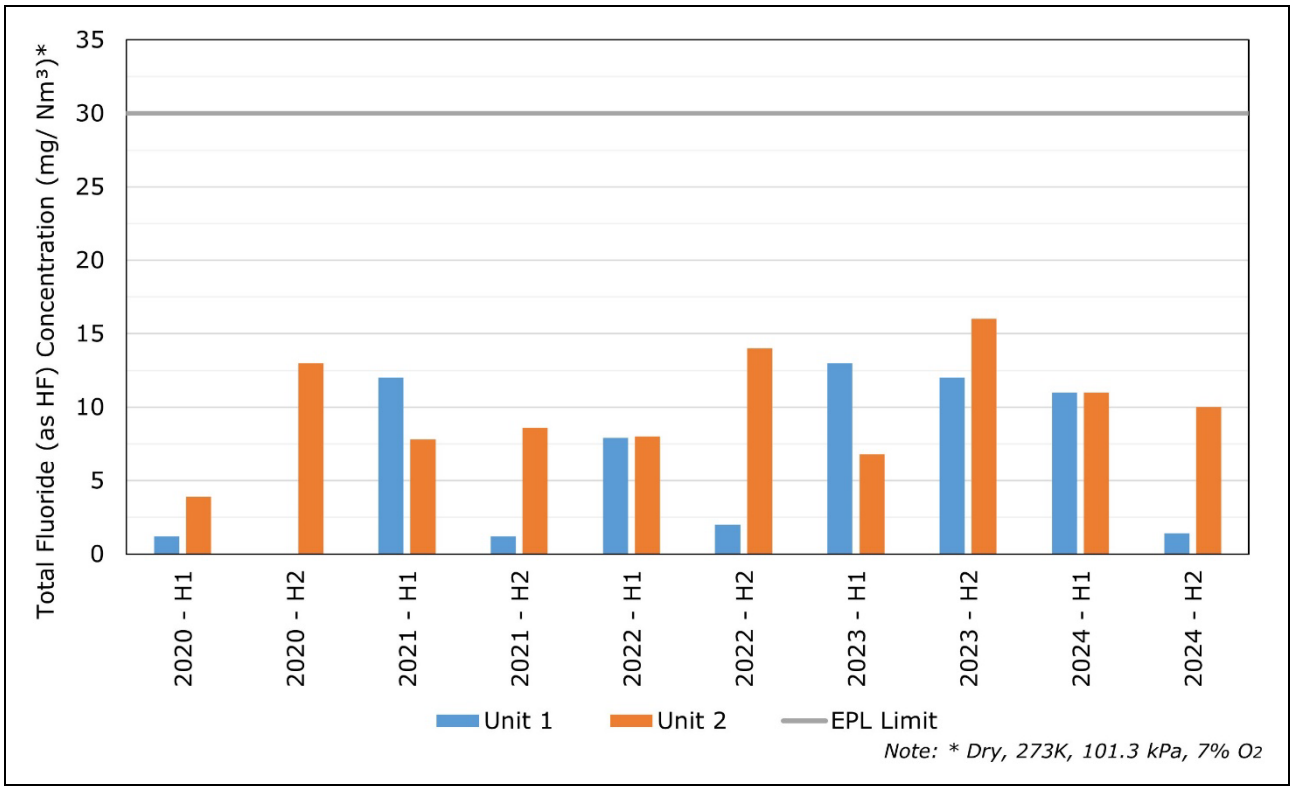
FIGURE 3-8 2020 – 2024 STACK TESTING RESULTS – CHLORINE



3.2.6 TOTAL FLUORIDE

Figure 3-9 shows total fluoride concentrations measured between 2020 and 2024. The total fluoride limit is 30 mg/Nm³ in both the current and previous EPL, measured six-monthly. All reported concentrations were below the EPL limit as shown in Figure 3-9.

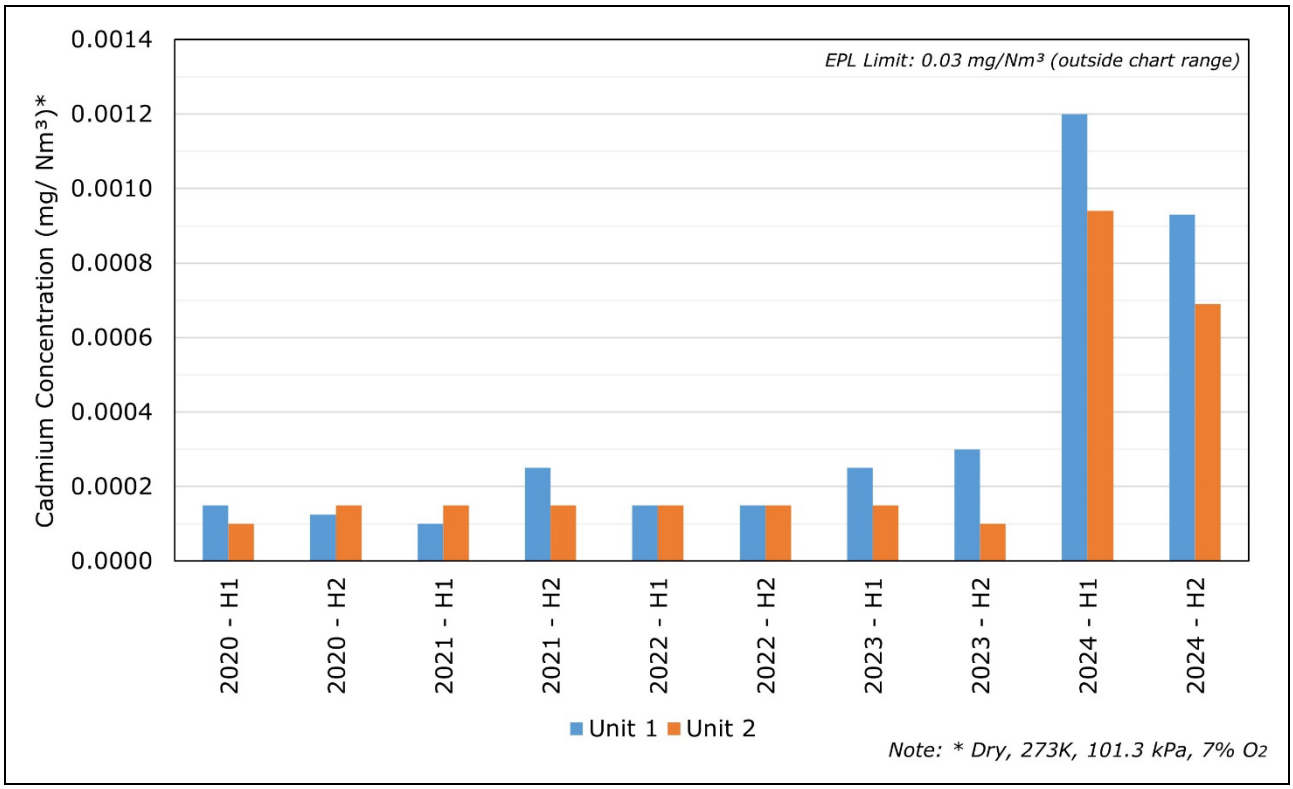
FIGURE 3-9 2020 – 2024 STACK TESTING RESULTS – TOTAL FLUORIDE



3.2.7 CADMIUM

Figure 3-10 shows cadmium concentrations measured between 2020 and 2024. The cadmium limit reduced from 0.2 mg/Nm³ to 0.03 mg/Nm³ in the current EPL, measured six-monthly. All reported concentrations were below the EPL limit as shown in Figure 3-10. Reported concentrations were commonly below the LOR, which varied based on sampling and analysis conditions, and is commonly less than 0.0006 mg/Nm³.

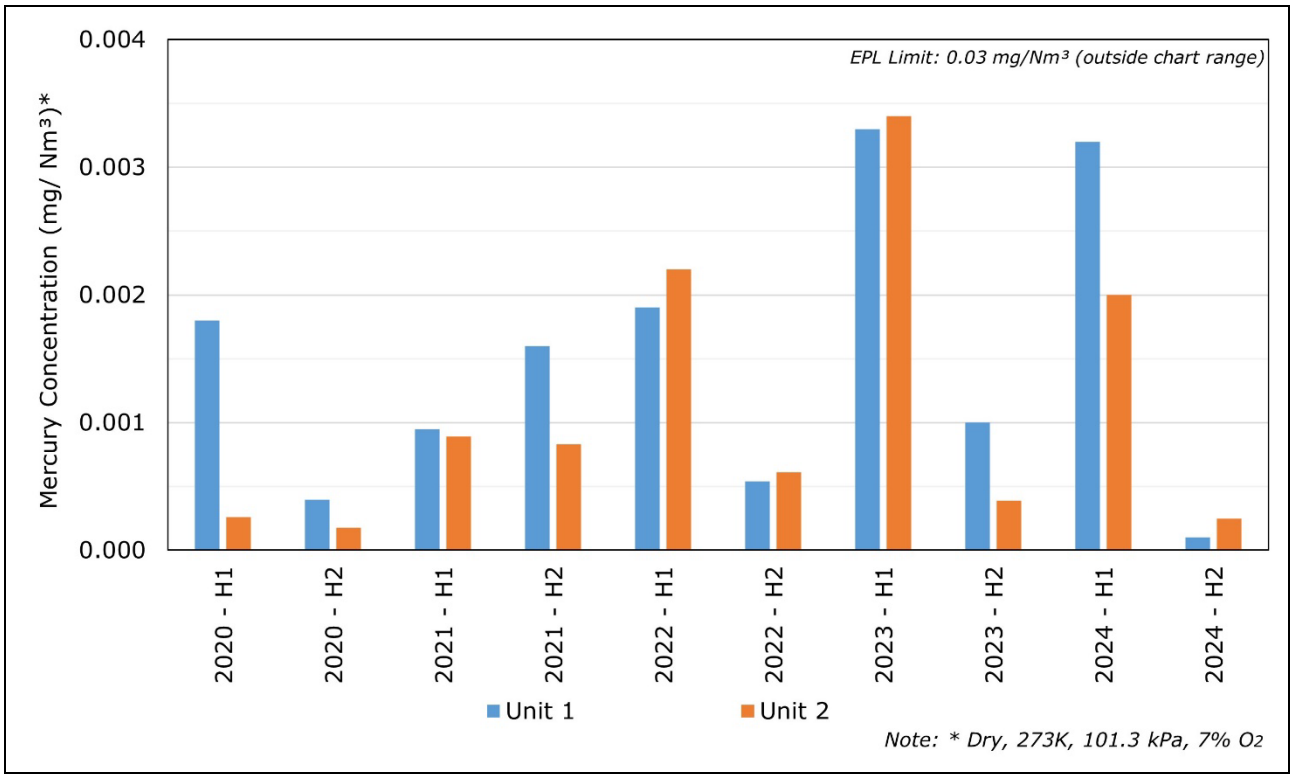
FIGURE 3-10 2020 – 2024 STACK TESTING RESULTS – CADMIUM



3.2.8 MERCURY

Figure 3-11 shows mercury concentrations measured between 2020 and 2024. The mercury limit reduced from 0.05 mg/Nm³ to 0.03 mg/Nm³ in the current EPL, measured six-monthly. All reported concentrations were below the EPL limit as shown in Figure 3-11.

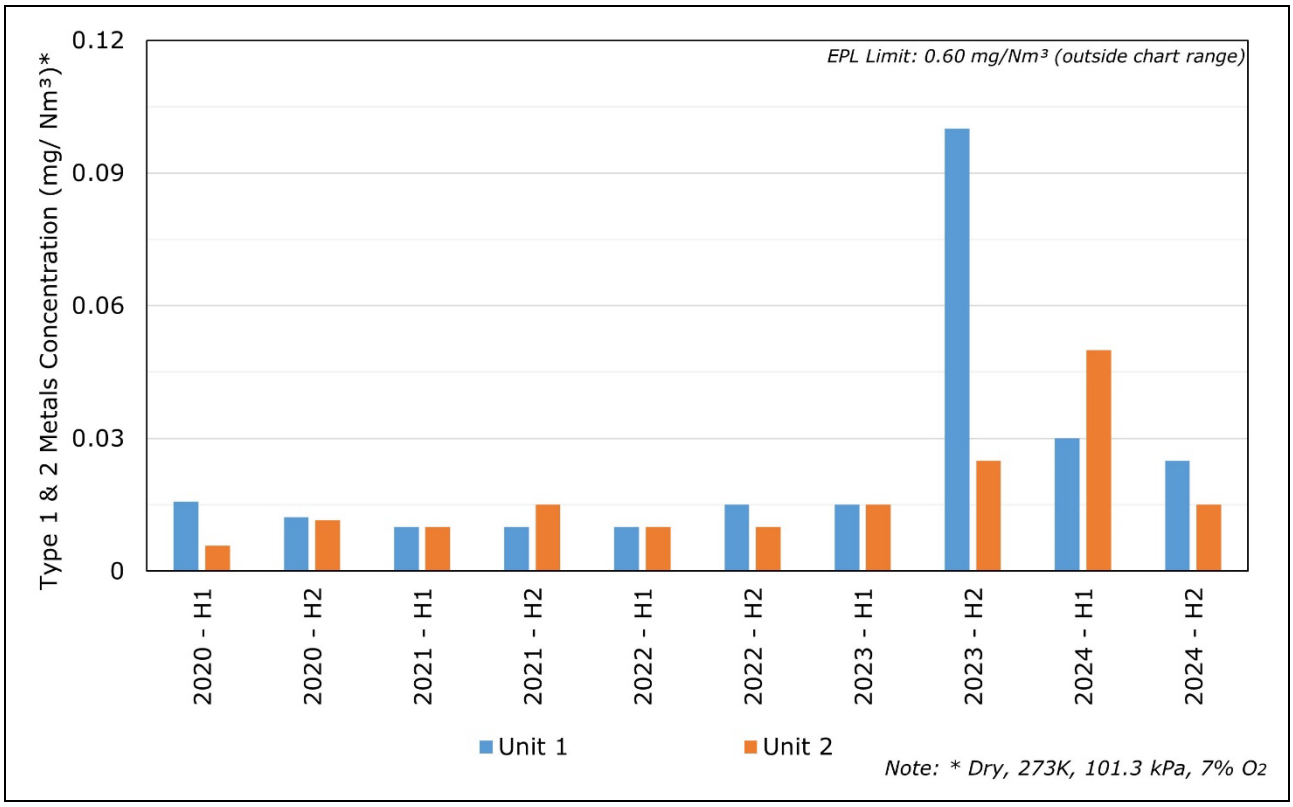
FIGURE 3-11 2020 – 2024 STACK TESTING RESULTS – MERCURY



3.2.9 TYPE 1 & 2 METALS

Figure 3-12 shows type 1 & 2 metals concentrations measured between 2020 and 2024. The type 1 & 2 metals limit reduced from 0.75 mg/Nm³ to 0.60 mg/Nm³ in the current EPL, measured six-monthly. All reported concentrations were below the EPL limit as shown in Figure 3-12.

FIGURE 3-12 2020 – 2024 STACK TESTING RESULTS – TYPE 1 & 2 METALS



3.2.10 NO_X AND SO_2 MONITORING REVIEW

NO_x and SO_2 (including SO_2 and sulfuric acid/sulfuric trioxide) are the assessable pollutants emitted in greatest quantity by the MPPS facility via the two boiler stacks. The licence has required SO_2 and NO_x to be monitored using CEMS since 2019.

Table 3-2 summarises the statistics of the CEMS monitoring results for the period of 2020 – 2024 (inclusive). Figure 3-13 and Figure 3-14 provide hourly monitoring data plots for this period for NO_x and SO_2, respectively. In addition to Figure 3-15 and Figure 3-16, which present the quarterly average CEMS NO_x and SO_2 concentration to visually assess long term trends.

TABLE 3-2 STATISTICS OF 2020 TO 2024 CEMS MONITORING RESULTS

Unit	Year	Data Capture	Concentration (mg/Nm³)*		
			Minimum	Average	Maximum
NO_x (as NO_2)					
Unit 1 (Point 2)	2020	100%	185	728	1,121
	2021	98%	230	627	1,072
	2022	99%	202	694	1,193
	2023	95%	182	695	1,187
	2024	99%	172	584	1,178
Unit 2 (Point 3)	2020	100%	131	686	1,265
	2021	100%	178	619	1,133
	2022	99%	224	624	1,260
	2023	99%	247	697	1,201
	2024	98%	207	559	1,193
SO_2					
Unit 1 (Point 2)	2020	100%	506	1,177	1,436
	2021	98%	1,006	1,185	1,381
	2022	99%	885	1,238	1,402
	2023	95%	644	1,115	1,378
	2024	99%	887	1,170	1,358
Unit 2 (Point 3)	2020	100%	678	1,189	1,597
	2021	100%	906	1,203	1,417
	2022	99%	1,002	1,229	1,399
	2023	97%	730	1,121	1,311
	2024	98%	830	1,148	1,320

Note: *Reported as dry, 0°C, 101.325 kPa and corrected to 7% O_2.

FIGURE 3-13 2020 TO 2024 CEMS RESULTS – NO_X

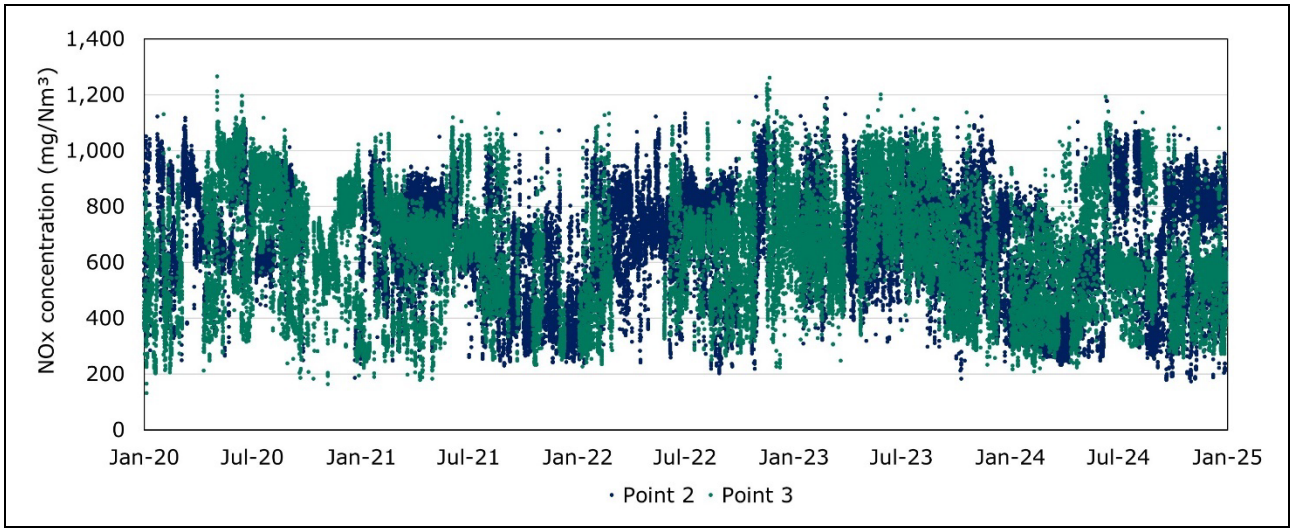


FIGURE 3-14 2020 TO 2024 CEMS RESULTS – SO_2

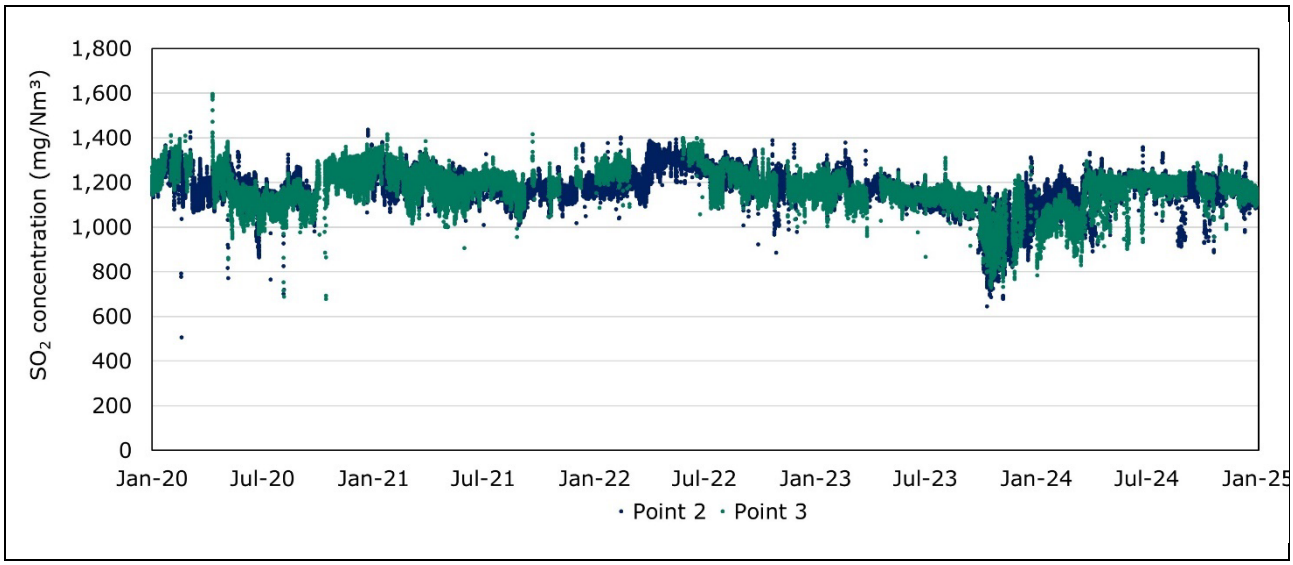


FIGURE 3-15 QUARTERLY AVERAGE CEMS MONITORING RESULTS – NO_X

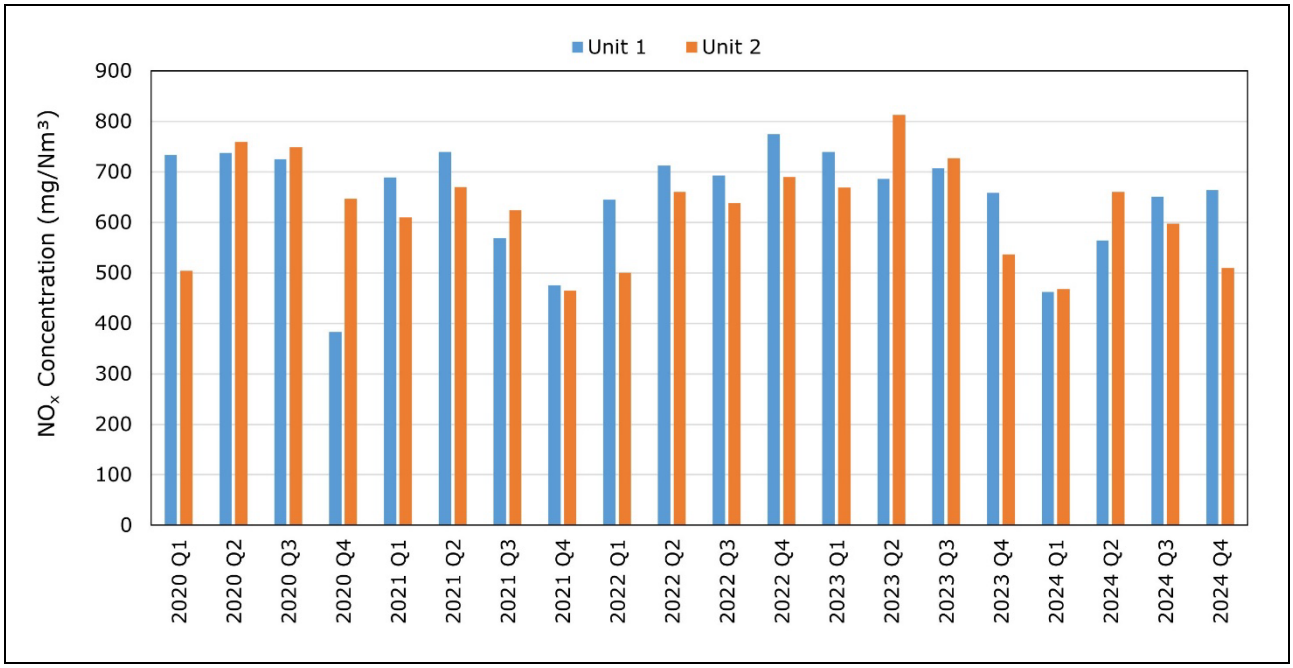
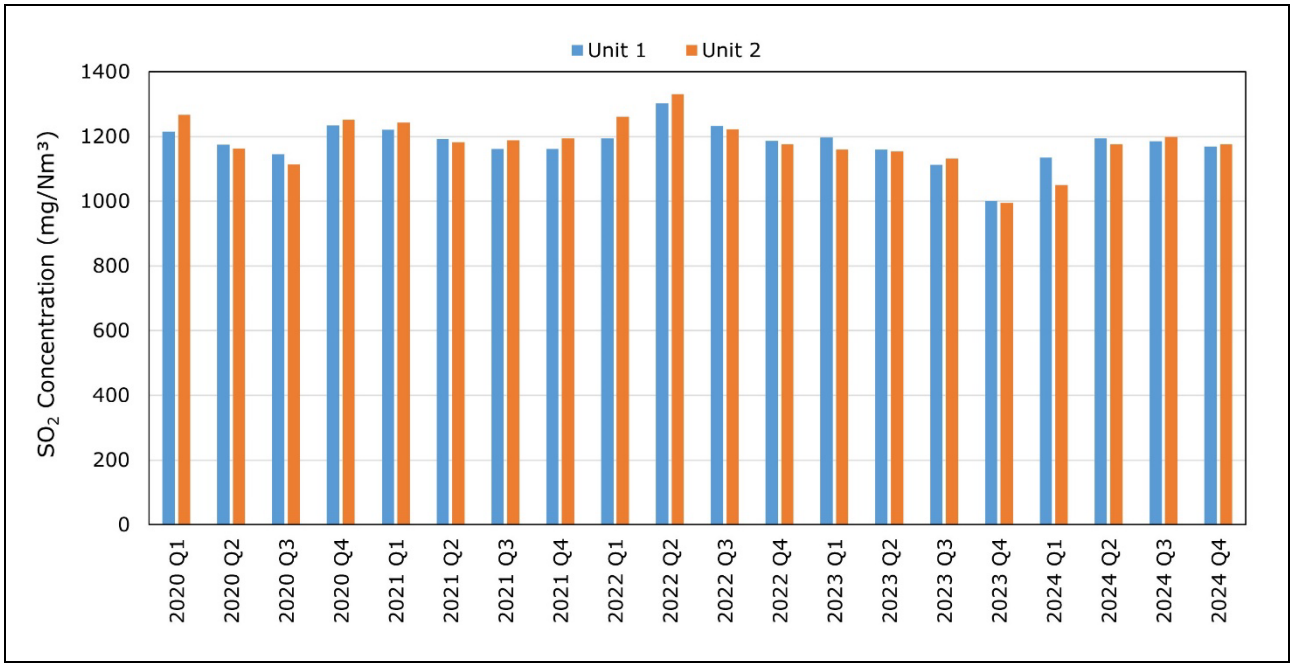


FIGURE 3-16 QUARTERLY AVERAGE CEMS MONITORING RESULTS – SO_2



3.3 AMBIENT AIR MONITORING REVIEW

EnergyAustralia monitors ambient air quality at three locations, Blackmans Flat (continuously), Wallerawang (continuously) and Newnes Plateau (monthly), (monitoring Points 8, 9 and 10, respectively in the EPL). To analyse the long-term trends of the ambient air monitoring, the available monitoring results for the current year (2024) and previous four years are reviewed and analysed in this section.

Statistics of the hourly ambient air monitoring results for Points 8 & 9 and monthly ambient air monitoring results for Point 10 are summarised in Table 3-3. The annual average concentrations are shown in Figure 3-17 and Figure 3-18 for NO_2 and SO_2, respectively. Blackmans Flat (Point 8) and Wallerawang (Point 9) have similar NO_2 concentrations over the past 5 years inclusive of 2024, fluctuating between 0.2 – 0.4 pphm.

Blackmans Flat (Point 8) and Wallerawang (Point 9) had similar SO_2 concentrations in 2020. However, Blackmans Flat has then recorded higher SO_2 concentrations since, being over double the concentration recorded at both Wallerawang and Newnes Plateau, which is possibly due to a change in the instrumentation noise floor, as indicated in Figure 3.19.

When reviewing annual average trends and patterns in data at Point 10, it should be noted that samples that registered results below the LOR have been reported at half of the LOR (e.g. Figure 3-21).

The daily average concentrations for Point 8 and Point 9 are plotted in Figure 3-19 and Figure 3-20, respectively. The monthly concentrations for Point 10 are provided in Figure 3-21.

TABLE 3-3 SUMMARY OF AMBIENT AIR MONITORING RESULTS BETWEEN 2020 AND 2024

Pollutant	Year	Data Capture	Concentration (pphm)					
			Min	Average	Max	50th percentile	70th percentile	99th percentile
Point 8 (Blackmans Flat) – 1-hour average								
NO_2	2020	95%	0.000	0.319	3.03	0.200	0.367	1.33
	2021	96%	0.000	0.256	2.42	0.150	0.283	1.15
	2022	94%	0.000	0.242	2.45	0.150	0.250	1.13
	2023	95%	-0.045	0.359	2.45	0.245	0.420	1.48
	2024	91%	-0.083	0.273	2.55	0.187	0.315	1.33
SO_2	2020	93%	0.000	0.062	3.87	0.000	0.033	1.13
	2021	95%	0.000	0.185	4.60	0.172	0.200	1.26
	2022	95%	0.000	0.191	3.80	0.183	0.200	1.15
	2023	95%	-0.100	0.158	3.50	0.127	0.150	1.07
	2024	92%	-0.193	0.152	3.95	0.123	0.155	1.20
Point 9 (Wallerawang) – 1-hour average								
NO_2	2020	97%	0.000	0.409	4.77	0.283	0.450	1.73
	2021	90%	0.000	0.308	3.80	0.202	0.367	1.38
	2022	87%	0.000	0.213	2.33	0.117	0.250	1.20
	2023	92%	-0.136	0.297	2.66	0.161	0.339	1.44
	2024	90%	-0.014	0.327	2.76	0.189	0.368	1.50

Pollutant	Year	Data Capture	Concentration (pphm)					
			Min	Average	Max	50th percentile	70th percentile	99th percentile
SO_2	2020	91%	0.000	0.041	3.71	0.000	0.013	0.80
	2021	90%	0.000	0.073	3.37	0.017	0.083	0.60
	2022	99%	0.000	0.077	2.60	0.000	0.033	0.47
	2023	92%	-0.059	0.021	2.05	0.013	0.020	0.30
	2024	89%	-0.093	0.035	2.80	0.016	0.027	0.63
Point 10 (Newnes Plateau) – Monthly averaged								
NO_2	2020	100%	0.030	0.038	0.080	0.030	0.030	0.079
	2021	100%	0.030	0.030	0.030	0.030	0.030	0.030
	2022	100%	0.030	0.055	0.330	0.030	0.030	0.297
	2023	100%	0.030	0.034	0.075	0.030	0.030	0.070
	2024	100%	0.030	0.030	0.030	0.030	0.030	0.030
SO_2	2020	100%	0.045	0.051	0.120	0.045	0.045	0.112
	2021	100%	0.045	0.091	0.435	0.045	0.045	0.411
	2022	100%	0.045	0.065	0.185	0.045	0.045	0.181
	2023	100%	0.045	0.045	0.045	0.045	0.045	0.045
	2024	100%	0.045	0.061	0.213	0.045	0.045	0.197

FIGURE 3-17 AMBIENT AIR MONITORING RESULTS – ANNUAL AVERAGE NO_2

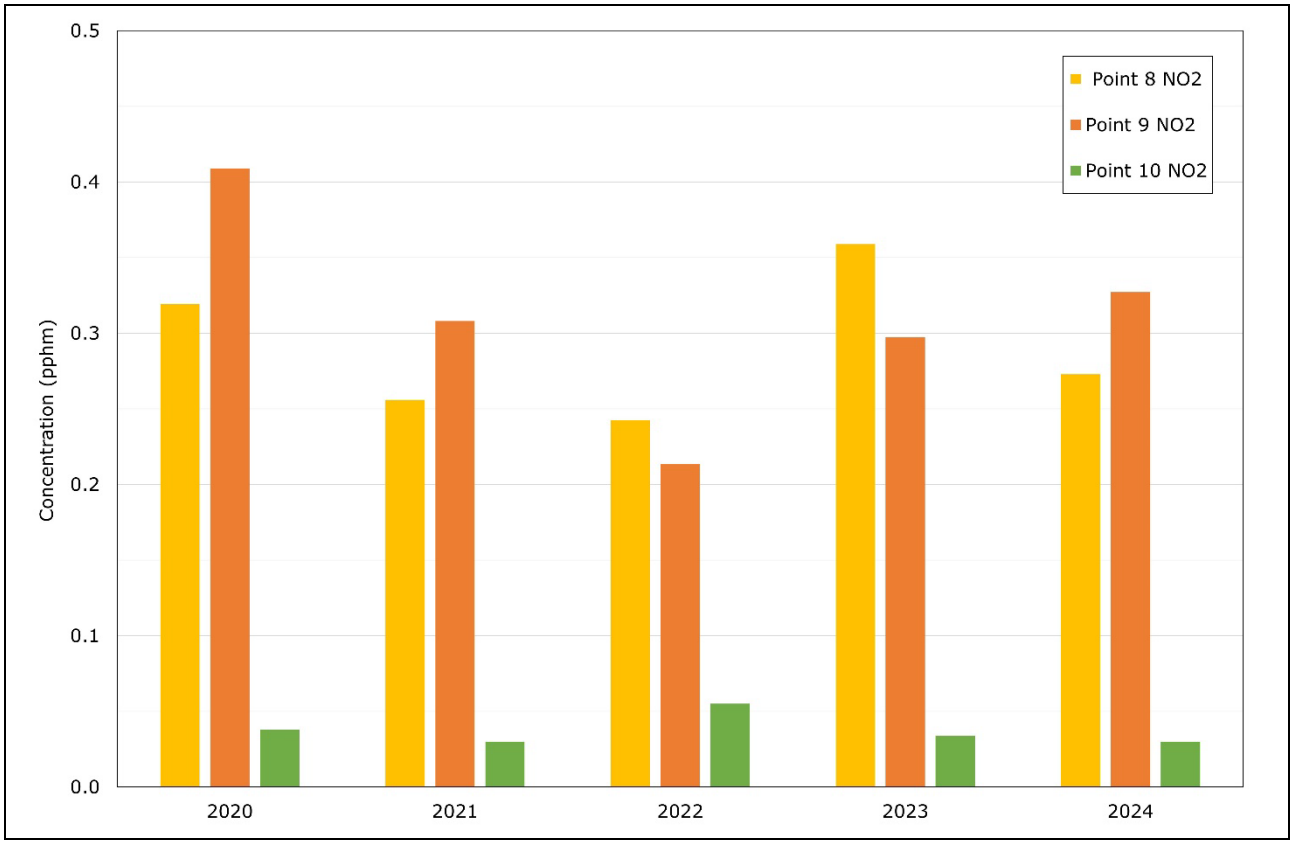


FIGURE 3-18 AMBIENT AIR MONITORING RESULTS – ANNUAL AVERAGE SO_2

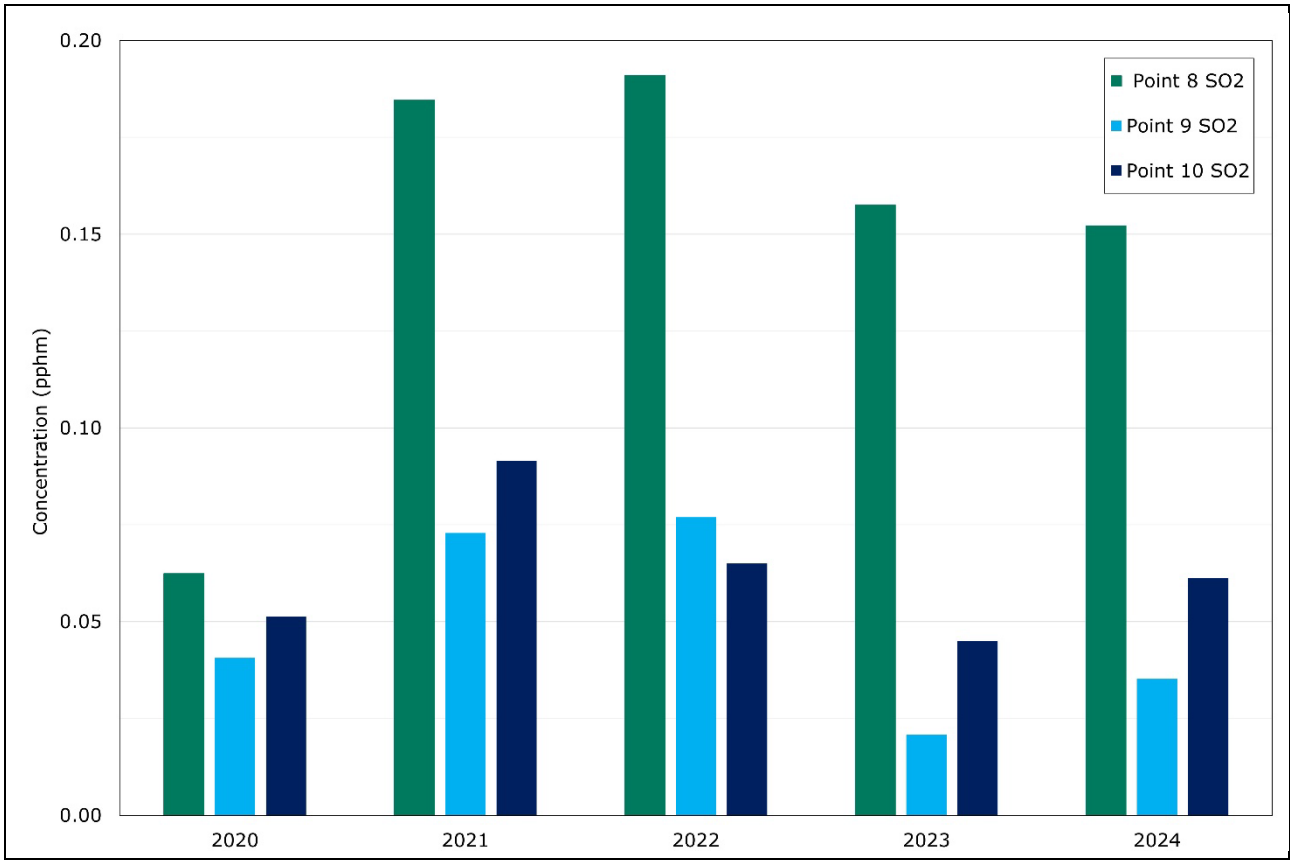


FIGURE 3-19 AMBIENT AIR MONITORING – POINT 8 (BLACKMANS FLAT)

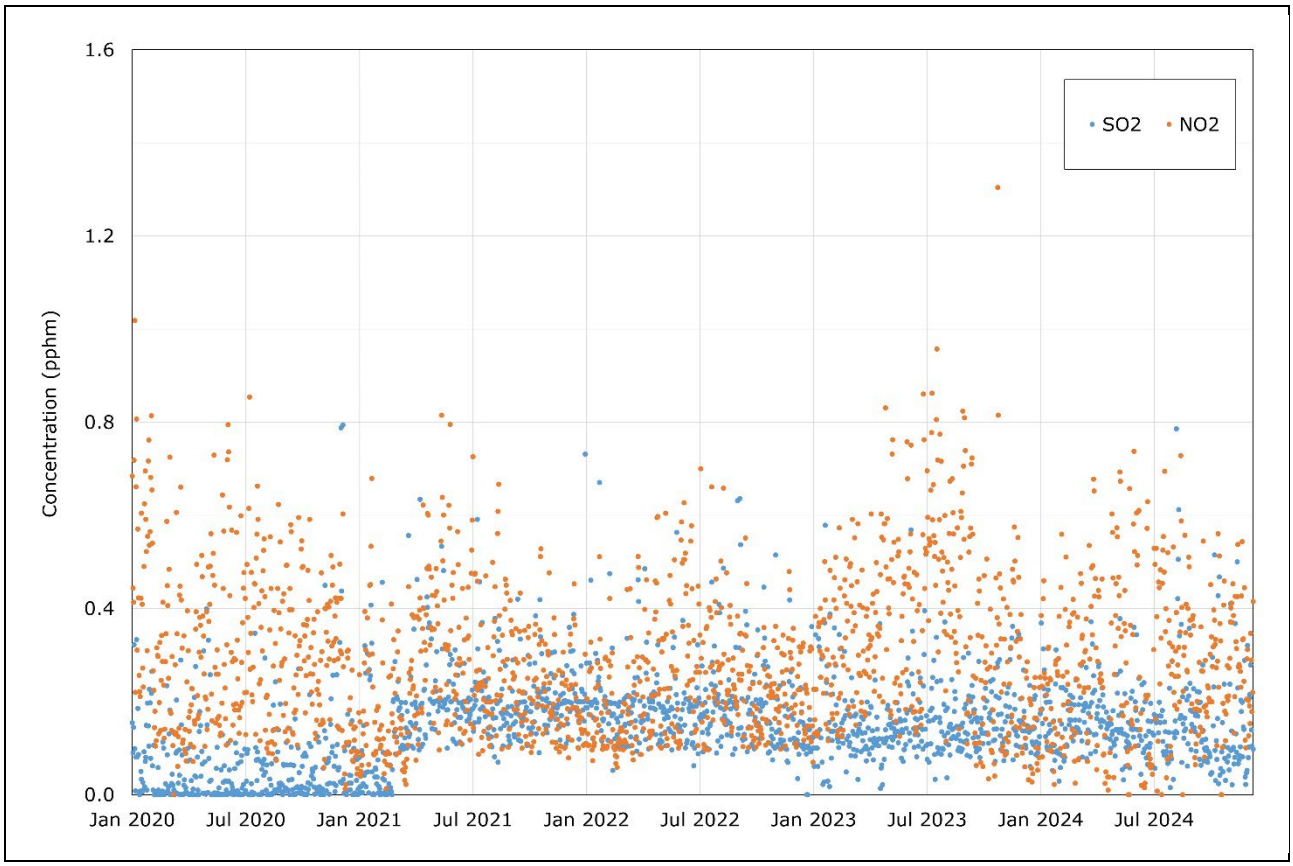


FIGURE 3-20 AMBIENT AIR MONITORING – POINT 9 (WALLERAWANG)

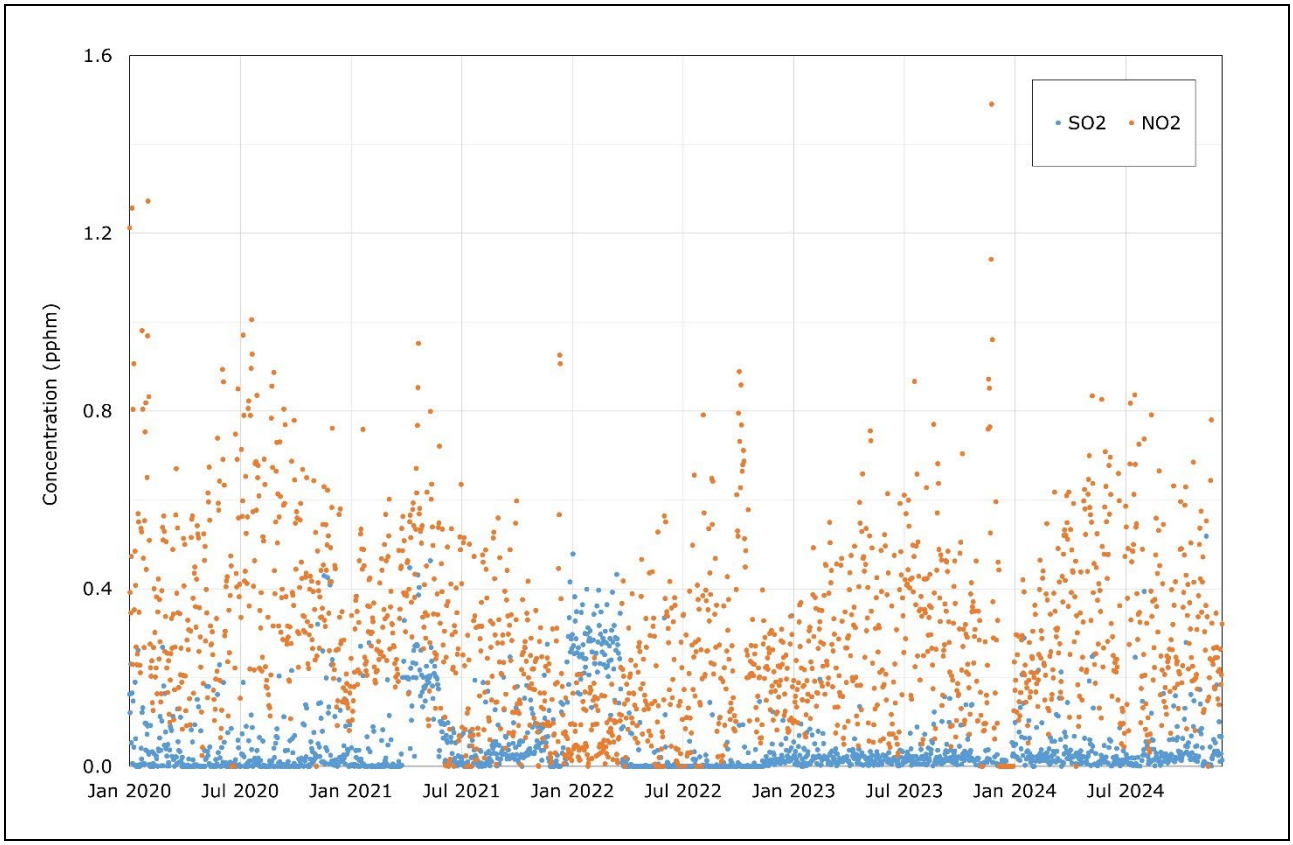
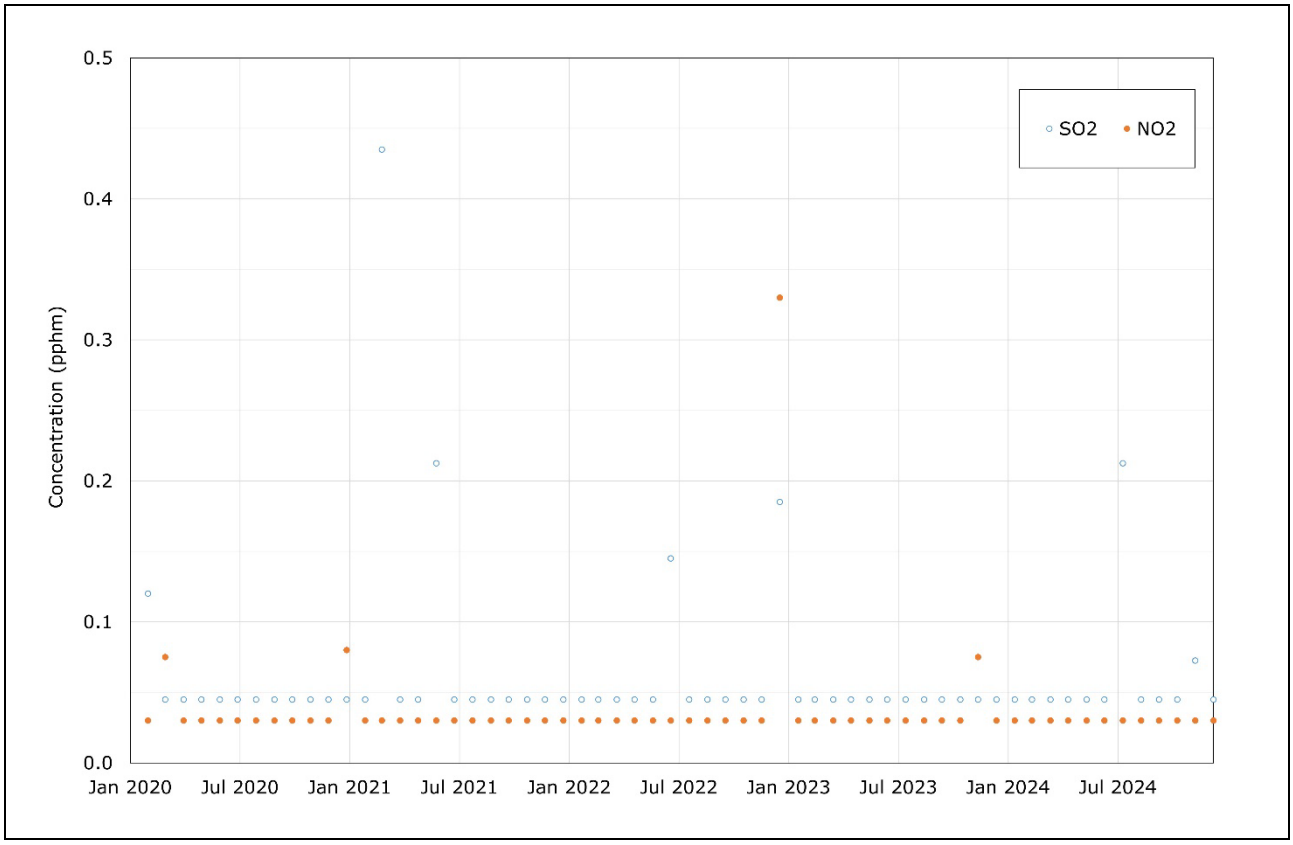


FIGURE 3-21 AMBIENT AIR MONITORING – POINT 10 (NEWNES PLATEAU)



4. DETAILED CALCULATIONS OF 2024 BOILER EMISSIONS

The annual emissions associated with the stack emission listed in R1.9 are detailed in this section. The annual emissions are either estimated from the CEMS data or the stack test results. The calculation method of annual emissions, based on data type, are detailed in the sections below.

4.1 NO_X AND SO_2 – CEMS

NO_x and SO_2 annual emission are determined using CEMS data. Monthly emissions are determined then summed for the annual reporting periods. The monthly emissions are calculated based on:

- Unit 1 and Unit 2's CEMS daily monitoring concentration were used to obtain monthly weighted average (based on MWh) stack concentrations in dry, STP, 7% O_2 part per millions (ppm);
- The monthly volume of flue gas emitted from the stacks is calculated by EnergyAustralia based on the combustion reaction stoichiometry, i.e. based on gases present in the combustion air, elements present in the coal and fuel oil, and combustion products and by-products. The volume is calculation at dry, STP and 7% O_2 conditions;
- The monthly emissions are calculated by multiplying the CEMS ppm and the calculated volume of flue gas, divided by the ideal gas molar density and converted to the units of kilograms; and
- The average CEMS value is determined from the average monthly values. The sums of the monthly values are reported as the annual emissions and the reported maximum and minimum are based on the hourly data.

4.2 OTHER POLLUTANTS – STACK TESTS

Stack test data and flue gas volumes were used by EnergyAustralia to estimate the 2024 annual pollutant loads for the majority of applicable pollutants. It is noted that in the annual returns TVOCs are reported using the NPI EET Manual emission factor that estimates emissions due to fuel storage only. The estimated PAH emissions were based on a site-specific emission factor (i.e. 5.90 x 10^{-08} kg/tonne of coal as received), which has been used since 2007.

Metal emissions are estimated as the product of measured flue gas concentrations and corresponding flue gas volumes. For each boiler, the flue gas volume is estimated as an output-weighted (MWh) proportion of the combined MPPS flue gas volume. The in-stack concentration for each 6-month period is assumed equal to the average of the two (A and B) duct measurements.

5. COAL ASH MONITORING

This section has been prepared to satisfy conditions M9.1 and R4.4 under EPL13007. Coal ash from the Mt Piper Power Station is disposed of in the Mt Piper Ash Repository (MPAR) and the Lamberts North Ash Repository (LNAR) which are both dry ash repositories.

The MPAR is approved under Development Consent DA80/10060. Water conditioned ash (WCA) was placed at MPAR up to reduced level (RL) 946 m, brine condition ash (BCA) has been placed above RL 946 m up to the maximum approved height of RL 980 m. MPAR has reached its maximum approved ash storage capacity and is in the process of being decommissioned. The eastern batter has been capped with mine overburden and seeded to stabilise the landform. It is proposed to cap the top of MPAR with a high-density polyethylene (HDPE) liner or equivalent which is the subject of a Modification Application being prepared for submission to the Department of Planning, Housing and Infrastructure (DPHI).

The LNAR operates under Project Approval 09_0186 and LNAR is managed in accordance with its approved Operational Environment Management Plan (OEMP). The OEMP provides the framework to manage the environmental aspects associated with the operation of the LNAR. The OEMP can be found on the EnergyAustralia website[2]. LNAR has been lined with a leachate barrier management system. WCA was placed below the liner and BCA is placed above the liner on LNAR.

Solid salt and mixed lime salts from the Springvale Water Treatment Plant (SWTP) are approved to be co-disposed at the MPAR and LNAR. LNAR and parts of MPAR will be capped with a HDPE liner or equivalent that will allow for future access and beneficial reuse of the stored coal ash.

Table 5-1 and Table 5-2 provides a summary of coal ash quantities for the 2024 reporting period.

TABLE 5-1 SUMMARY OF COAL ASH QUANTITIES

Item	Coal Ash	Tonnes
1	Coal consumed for electricity generation at the premises	3,232,903
2	Fly ash generated at the premises	745,296
3	Fly ash deposited and/or stored at the premises	*621,542
4	Bottom ash generated at the premises	82,811
5	Bottom ash deposited and/or stored at the premises	82,811

Note: * Grade of fly ash is unknown.

[2] Lamberts North Ash Repository | EnergyAustralia

TABLE 5-2 TRANSPORTED COAL ASH

Item	Transported from the premises	Tonnes	Location
6	Fly ash	123,755	Fly Ash Australia Pty Ltd
7	Repository reclaimed fly ash	0	N/A
8	Repository reclaimed fly ash	0	N/A
9	Bottom ash	0	N/A

Note: N/A – Not Applicable.

It is noted that the sum of transported, stored and deposited fly ash does not directly add to the amount generated. Transported fly ash can include reclaimed fly ash that has been generated and stored in years prior to the current reporting period.

6. SUMMARY OF COMPLIANCE WITH REPORTING CONDITIONS

This report has been completed to comply with EPL13007 Conditions R1.9, M9.1 and R4.4. The study has reviewed stack test reports, CEMS monitoring results and ambient monitoring results from 2020 to 2024.

Table 6-1 summarises the study's findings in relation to the EPL13007 Conditions R1.9, M9.1 and R4.4 requirements and where additional detail can be found in this report.

TABLE 6-1 EPL13007 CONDITIONS AND STUDY SUMMARY

Conditions		Review Comment	Compliant
R1.9			
a)	*a comprehensive summary (tabulated and graphical) of all periodic and continuous monitoring data as required by condition M2.2 of this licence, including a comparison with the concentration limits specified in condition L3.2 and L3.3;*	All monitoring results were reviewed and summarised in tables and graphs.	Yes
b)	*analysis of trends in emission performance for all pollutants monitored as required under condition M2.2. Trend analysis must include comparison of emission performance during the reporting period with emission performance from the previous 4 years;*	Historical monitoring data and coal quality from the most recent five years (2020 to 2024) were reviewed and analysed. No significant changes were identified in emission performance over this time period. Coal quality in 2024 is generally consistent with the previous four years. The observed variability in the stack monitoring data for 2024 is within the range of variability observed over the previous four years.	Yes
c)	*details of any exceedances of air emission licence limits and details of plant operating conditions at the times the exceedances occurred;*	There were no exceedances of air emission licence limits during the reporting period.	Yes
d)	*details of plant operating conditions, including Boiler load (MW), during sampling for each Boiler;*	The operation condition, including boiler load, during sampling for each boiler is presented in Table 2-1.	Yes
e)	*demonstrated compliance with the CEMS Quality Assurance and Control Procedures prepared for the premises;*	The procedure was reviewed no non-compliances were found.	Yes
f)	*summary of fuel usage, including:* *i) total coal and other permitted fuels consumed in each Boiler (including start-up);* *ii) a statement about the representativeness of fuel quality during periodic air emission sampling compared to non-sampling periods;*	The total coal consumption and coal quality during the reporting period is summarised in Table 3-1. The daily fuel consumption during stack sampling is shown in Table 2-1. Based on the review of the coal composition during 2024 and the long-term trends of coal quality, the coal quality during stack testing is	Yes

Conditions		Review Comment	Compliant
	ii) total fuel consumed by each Boiler during times when periodic air emission sampling was undertaken; *and*	representative of typical operating conditions.	
g)	*detailed calculations used to determine the aggregated pollutant emission rates for each boiler.*	The detailed methodology to determine the pollutant emission rates for each boiler has been presented in this report. Methods used to determine annual emission for reporting to the annual returns have also been provided.	Yes
M9.1			
a)	*Quantity of coal used for electricity generation at the premises;*	Quantities provided in Table 5-1.	Yes
b)	*Quantity of bottom ash; and quantity of fly ash, generated at the premises and the grade of fly ash produced (if the grade is known);*		
c)	*Quantity of bottom ash; and quantity of fly ash, deposited, and/or stored at the premises with a description of how it is stored and the processes for managing the storage;*		
d)	*Quantity of bottom ash; and quantity of fly ash, transported from the premises together with identification of the destination; and*	Quantities provided in Table 5-2.	Yes
e)	*Management measures used for coal ash repositories on the premises to maintain the viability of ash reuse, including identification of any other materials being stored concurrently with newly deposited coal ash.*	Description of management measures provided in Section 5.	Yes
R4.4			
The licensee must prepare an Annual Coal Ash Monitoring Report that details information required under condition M9.1 in respect of generation, deposition, storage, transport and reuse of coal ash generated at the premises for each Annual Return reporting period.		Provided in Section 5.	Yes

7. STATEMENT OF LIMITATIONS

1. This report is based solely on the scope of work described in our proposal P0659049 dated 30 May 2024 (Scope of Work) and performed by Environmental Resources Management Australia Pty Ltd (ERM) for EnergyAustralia NSW Pty Ltd (the Client). The Scope of Work was governed by a contract between ERM and the Client (Contract).

1. No limitation, qualification or caveat set out below is intended to derogate from the rights and obligations of ERM and the Client under the Contract.

2. The findings of this report are solely based on, and the information provided in this report is strictly limited to that required by, the Scope of Work. Except to the extent stated otherwise, in preparing this report ERM has not considered any question, nor provides any information, beyond that required by the Scope of Work.

3. This report was prepared between December 2024 and February 2025 and is based on conditions encountered and information reviewed at the time of preparation. The report does not, and cannot, take into account changes in law, factual circumstances, applicable regulatory instruments or any other future matter. ERM does not, and will not, provide any on-going advice on the impact of any future matters unless it has agreed with the Client to amend the Scope of Work or has entered into a new engagement to provide a further report.

2. This report is based on analyses described in the report, and information provided by the Client or third parties (including regulatory agencies). All conclusions and recommendations made in the report are the professional opinions of the ERM personnel involved. Whilst normal checking of data accuracy was undertaken, except to the extent expressly set out in this report ERM:

   a. did not, nor was able to, make further enquiries to assess the reliability of the information or independently verify information provided by;

   b. assumes no responsibility or liability for errors in data obtained from,

   c. the Client, any third parties or external sources (including regulatory agencies).

4. Although the data that has been used in compiling this report is generally based on actual circumstances, if the report refers to hypothetical examples those examples may, or may not, represent actual existing circumstances.

5. Only the environmental conditions and or potential contaminants specifically referred to in this report have been considered. To the extent permitted by law and except as is specifically stated in this report, ERM makes no warranty or representation about:

   d. the suitability of the site(s) for any purpose or the permissibility of any use;

   e. the presence, absence or otherwise of any environmental conditions or contaminants at the site(s) or elsewhere; or

   f. the presence, absence or otherwise of asbestos, asbestos containing materials or any hazardous materials on the site(s).

6. This report should be read in full and no excerpts are to be taken as representative of the whole report. To ensure its contextual integrity, the report is not to be copied, distributed or referred to in part only. No responsibility or liability is accepted by ERM for use of any part of this report in any other context.

3. Except to the extent that ERM has agreed otherwise with the Client in the Scope of Work or the Contract, this report:
   a. has been prepared and is intended only for the exclusive use of the Client;
   b. must not to be relied upon or used by any other party;
   c. has not been prepared nor is intended for the purpose of advertising, sales, promoting or endorsing any Client interests including raising investment capital, recommending investment decisions, or other publicity purposes;
   d. does not purport to recommend or induce a decision to make (or not make) any purchase, disposal, investment, divestment, financial commitment or otherwise in or in relation to the site(s); and
   e. does not purport to provide, nor should be construed as, legal advice.

8. REFERENCES

DSEWPC 2012, NPI Emission Estimation technique Manual for Fossil Fuel Electric Power Generation Version 3.0, January 2012.

Ektimo 2020a, Annual Emission Testing Report Energy Australia - Mt Piper Power Station, Report Number R009203, Ektimo.

Ektimo 2020b, Annual Emission Testing Report Energy Australia - Mt Piper Power Station, Report Number R009204, Ektimo.

Ektimo 2020c, Annual Emission Testing Report Energy Australia - Mt Piper Power Station, Report Number R009599, Ektimo.

Ektimo 2021a, Annual Emission Testing Report Energy Australia - Mt Piper Power Station, Report Number R009826, Ektimo.

Ektimo 2021b, Emission Testing Report Energy Australia NSW Pty Ltd - Mt Piper Power Station, Report Number R010363a, Ektimo.

Ektimo 2021c, Emission Testing Report Energy Australia NSW Pty Ltd - Mt Piper Power Station, Report Number R010887 (Draft 3), Ektimo.

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Ektimo 2022c, Quarterly (Q2) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station, Report number R012769ar, Ektimo.

Ektimo 2022d, Quarterly (Q3) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station, Report number R013250, Ektimo.

Ektimo 2022e, Quarterly (Q4) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station, Report number R013949, Ektimo.

Ektimo 2022f, Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station, Report number R013819, Ektimo.

Ektimo 2022g, Quarterly (Q4) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station, Report number R013593, Ektimo.

Ektimo 2023a, Quarterly (Q1) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station, Report number R014323, Ektimo.

Ektimo 2023b, Quarterly (Q1) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station, Report number R014518, Ektimo.

Ektimo 2023c, Quarterly (Q3) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station, Report number R015163, Ektimo.

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Ektimo 2024a, Quarterly (Q2) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station, Report number R014882a, Ektimo, 15 January 2024;

Ektimo 2024b, Quarterly (Q1) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station, Report number R016420, Ektimo, 1 March 2024.

Ektimo 2024c, Quarterly (Q2) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station, Report number R016840, Ektimo, 6 June 2024.

Ektimo 2024d, Quarterly (Q3) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station, Report number R017264, Ektimo, 12 August 2024.

Ektimo 2024e, Quarterly (Q4) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station, Report number R017581, Ektimo, 5 December 2024.

Ektimo 2025, Quarterly (Q4) Emission Testing Report – Energy Australia NSW Pty Ltd – Mt Piper Power Station, Report number R017581-1a2r, Ektimo, 5 February 2025.

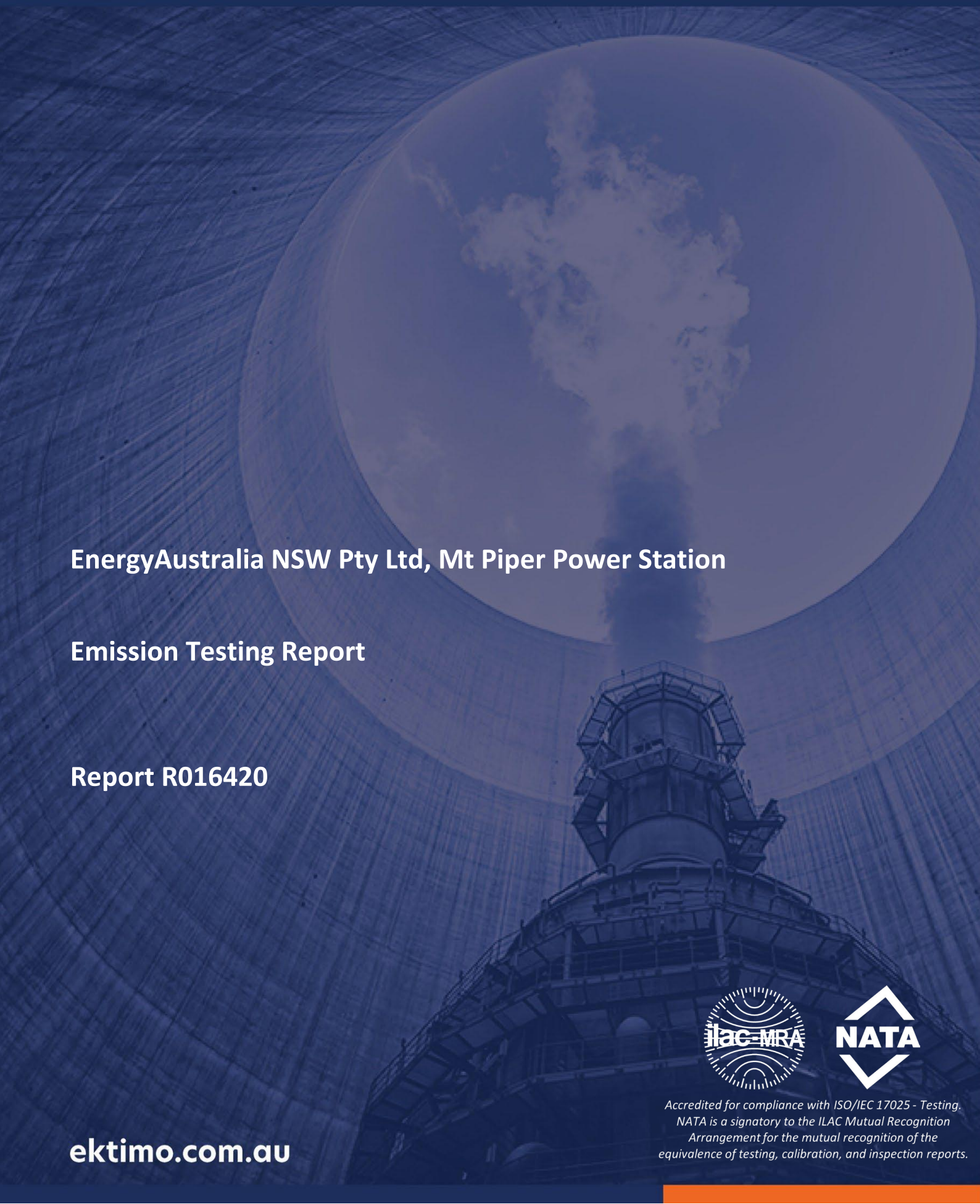
HRL 2022, *ENERGYAUSTRALIA NSW Mt Piper Power Station – Continuous Emissions Monitoring Plan Quality Assurance and Control Procedures*, Version 1.1, HRL, August 2022.

NSW EPA 2022, Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales, NSW Environment Protection Authority, January 2022.

NSW EPA 2024, Environment Protection Licence 13007, NSW Environment Protection Authority, July 2024.

APPENDIX A 2024 EMISSION TESTING REPORTS

Ektimo



EnergyAustralia NSW Pty Ltd, Mt Piper Power Station

Emission Testing Report

Report R016420

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.

ektimo.com.au

Document Information

Client Name:	EnergyAustralia NSW Pty Ltd (Mt Piper)
Report Number:	R016420
Date of Issue:	1 March 2024
Attention:	Kane Hoskins
Address:	Mt Piper Power Station, Locked Mail Bag 1 Portland NSW 2847
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation

Aaron Davis
Ektimo Signatory

NATA Accredited Laboratory
No. 14601

Table of Contents

1 Executive Summary

1.1 Background

Ektimo was engaged by Energy Australia NSW Pty Ltd (Mt Piper) to perform emission testing at Mt Piper Power Station. Testing was carried out in accordance with Licence 13007.

1.2 Project Objective & Overview

The objective of the project was to quantify emissions from four (4) discharge points to determine compliance with Energy Australia NSW Pty Ltd (Mt Piper) 's Environmental Licence.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
EPA 4 – Unit 1, Duct B	16 January 2024	Solid particles (total) Coarse particulates Metals type 1 and 2 substances, copper, zinc Particulate matter < 10µm (PM_{10})
EPA 5 – Unit 1, Duct A	17 January 2024	Solid particles (total) Metals type 1 and 2 substances, copper, zinc
EPA 6– Unit 2, Duct A	18 January 2024	Solid particles (total) Coarse particulates Metals type 1 and 2 substances, copper, zinc Particulate matter < 10µm (PM_{10})
EPA 7 – Unit 2, Duct B	19 January 2024	Solid particles (total) Coarse particulates Metals type 1 and 2 substances, copper, zinc Particulate matter < 10µm (PM_{10})

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

All results are reported on a dry basis at STP (Dry, 273 K, 101.3 kPa).

Plant operating conditions have been noted in this report.

1.3 Results Summary

All analytes are within the licence limit set by the NSW EPA as per licence 13007 (last amended on 1 November 2023).

Report Number			R016420	R016420	
Test Date			17/01/24	16/01/24	
EPA			5	4	
Unit			Unit 1 Duct A	Unit 1 Duct B	
					EPA 2
	LIMIT	**UNITS**	*Measured Results*		*Combined Ducts*
Type 1 and Type 2 substances in aggregate	**0.75**	**mg/m³**	<0.089	<0.021	**<0.06**
Antimony		mg/m³	<0.002	<0.003	<0.002
Arsenic (LBL)		mg/m³	<0.001	<0.001	<0.001
Beryllium		mg/m³	<0.0003	<0.0003	<0.0003
Cadmium	**0.2**	mg/m³	0.001	0.0012	**0.0012**
Chromium		mg/m³	<0.0004	0.0028	<0.001
Cobalt		mg/m³	<0.0004	<0.0004	<0.0004
Copper		mg/m³	0.00077	0.00093	0.00084
Lead (LBL)		mg/m³	<0.0006	<0.0008	<0.0007
Manganese		mg/m³	0.074	<0.001	<0.04
Mercury	**0.05**	mg/m³	0.0032	0.0031	**0.0032**
Nickel		mg/m³	<0.0009	0.0018	<0.001
Selenium		mg/m³	0.0029	<0.003	<0.003
Tin		mg/m³	<0.001	<0.001	<0.001
Vanadium		mg/m³	<0.0006	<0.0007	<0.0006
Zinc		mg/m³	0.0028	0.0032	0.003
Solid particles	**50**	**mg/m³**	**1.9**	**1.4**	**1.7**
PM10		mg/m³	-	<1	-
Coarse particulates		mg/m³	-	<1	-

*Combined air emissions from **boiler 1** via points 4 & 5 (except for PM_{10} and Coarse Particulates)*
All results corrected to 7% oxygen correction.

Ektimo

Report Number			R016420	R016420	
Test Date			18/01/24	19/01/24	
EPA			6	7	
Unit			Unit 2 Duct A	Unit 2 Duct B	
					EPA 3
	LIMIT	**UNITS**	*Measured Results*		*Combined Ducts*
Type 1 and Type 2 substances in aggregate	**0.75**	**mg/m³**	<0.17	<0.025	**<0.1**
Antimony		mg/m³	<0.002	<0.003	<0.002
Arsenic (LBL)		mg/m³	<0.0009	<0.001	<0.0009
Beryllium		mg/m³	<0.0003	<0.0003	<0.0003
Cadmium	**0.2**	mg/m³	0.0008	0.0011	**0.00094**
Chromium		mg/m³	0.00039	0.00048	0.00043
Cobalt		mg/m³	<0.0003	<0.0004	<0.0003
Copper		mg/m³	0.00086	<0.0005	<0.0007
Lead (LBL)		mg/m³	<0.0008	<0.0006	<0.0007
Manganese		mg/m³	0.16	0.011	0.09
Mercury	**0.05**	mg/m³	0.0022	0.0017	**0.002**
Nickel		mg/m³	0.0011	<0.0006	<0.0009
Selenium		mg/m³	<0.003	<0.003	<0.003
Tin		mg/m³	<0.0009	<0.001	<0.0009
Vanadium		mg/m³	<0.0005	<0.0006	<0.0005
Zinc		mg/m³	0.007	0.0018	0.0046
Solid particles	**50**	**mg/m³**	**<0.9**	**1.4**	**<1**
PM10		mg/m³	<1	<1	-
Coarse Particulates		mg/m³	<1	<1	-

*Combined air emissions from **boiler 2** via points 6 & 7*
All results corrected to 7% oxygen correction.

*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 EPA 4 – Unit 1, Duct B

Date	16/01/2024	**Client**	EnergyAustralia
Report	R016420	**Stack ID**	Mt Piper Power Station - EPA 4 Unit 1 Duct B (Lower)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Adnan Latif / Ahmad Ramiz	**State**	NSW
Process Conditions	Boiler load stable at 220MW		*231213*

Stack Parameters		
Moisture content, %v/v	5.2	
Gas molecular weight, g/g mole	29.4 (wet)	30.1 (dry)
Gas density at STP, kg/m³	1.31 (wet)	1.34 (dry)
Gas density at discharge conditions, kg/m³	0.85	
% Oxygen correction & Factor	7 %	1.39
Gas Flow Parameters		
Temperature, °C	106	
Temperature, K	379	
Velocity at sampling plane, m/s	7.9	
Volumetric flow rate, actual, m³/s	280	
Volumetric flow rate (wet STP), m³/s	180	
Volumetric flow rate (dry STP), m³/s	170	
Mass flow rate (wet basis), kg/h	860000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	0822 - 1159	0822 - 1159	0822 - 1159
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	9.4	8.8	10.4
Oxygen	10.9	10.1	11.7

Isokinetic Results	Results		
Sampling time	0820-1159		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	0.99	1.4	10
Antimony	<0.002	<0.003	<0.02
Arsenic	<0.0008	<0.001	<0.009
Beryllium	<0.0002	<0.0003	<0.003
Cadmium	**0.00087**	**0.0012**	**0.0091**
Chromium	**0.002**	**0.0028**	**0.021**
Cobalt	<0.0003	<0.0004	<0.003
Copper	**0.00067**	**0.00093**	**0.007**
Lead	<0.0006	<0.0008	<0.006
Manganese	<0.0009	<0.001	<0.009
Mercury	**0.0023**	**0.0031**	**0.023**
Nickel	**0.0013**	**0.0018**	**0.014**
Selenium	<0.002	<0.003	<0.03
Tin	<0.0008	<0.001	<0.009
Vanadium	<0.0005	<0.0007	<0.005
Zinc	**0.0023**	**0.0032**	**0.024**
Type 1 & 2 Substances			
Upper Bound			
Total Type 1 Substances	≤0.0065	≤0.0091	≤0.068
Total Type 2 Substances	≤0.0085	≤0.012	≤0.089
Total Type 1 & 2 Substances	≤0.015	≤0.021	≤0.16
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		100	
Gravimetric analysis date (total particulate)		23-01-2024	

Ektimo

Date	16/01/2024	**Client**	EnergyAustralia
Report	R016420	**Stack ID**	Mt Piper Power Station - EPA 4 Unit 1 Duct B (Lower)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Adnan Latif / Ahmad Ramiz	**State**	NSW
Process Conditions	Boiler load stable at 280MW		231213

Stack Parameters		
Moisture content, %v/v	5	
Gas molecular weight, g/g mole	29.4 (wet)	30.0 (dry)
Gas density at STP, kg/m³	1.31 (wet)	1.34 (dry)
Gas density at discharge conditions, kg/m³	0.84	
% Oxygen correction & Factor	7 %	1.30
Gas Flow Parameters		
Temperature, °C	110	
Temperature, K	383	
Velocity at sampling plane, m/s	9	
Volumetric flow rate, actual, m³/s	320	
Volumetric flow rate (wet STP), m³/s	210	
Volumetric flow rate (dry STP), m³/s	200	
Mass flow rate (wet basis), kg/h	970000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	1245 - 1619	1245 - 1619	1245 - 1619
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	9.3	8.7	9.8
Oxygen	10.2	9.7	10.9

Isokinetic Results	Results		
Sampling time	1242-1620 (PM10)		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Fine particulates (PM10)	<1	<1	<10
Coarse Particulates*	<1	<1	**
D50 cut size, 10µm		10.1	
Isokinetic Sampling Parameters			
Sampling time, min		211	
Isokinetic rate, %		100	
Gravimetric analysis date (PM_{10})		23-01-2024	

** Due to the inability for two x 6m sampling probes to be used simultaneously at the sampling plane, monitoring for Fine Particulates (PM_{10}) was not conducted simultaneously with monitoring for Solid Particles (Total). Accordingly, Coarse Particulate reported concentration is indicative only.*

*** Due to differing volumetric gas flowrates measured during monitoring for Solid Particles (Total) and Fine Particulates (PM_{10}) mass rate of Coarse Particulates has not been reported.*

2.2 EPA 5 – Unit 1, Duct A

Date	17/01/2024	**Client**	EnergyAustralia
Report	R016420	**Stack ID**	Mt Piper Power Station - EPA 5 Unit 1 Duct A (Upper)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Adnan Latif / Ahmad Ramiz	**State**	NSW
Process Conditions	Boiler load stable at 350MW		*231213*

Stack Parameters		
Moisture content, %v/v	6.6	
Gas molecular weight, g/g mole	29.4 (wet)	30.2 (dry)
Gas density at STP, kg/m³	1.31 (wet)	1.35 (dry)
Gas density at discharge conditions, kg/m³	0.81	
% Oxygen correction & Factor	7 %	1.16
Gas Flow Parameters		
Temperature, °C	119	
Temperature, K	392	
Velocity at sampling plane, m/s	11	
Volumetric flow rate, actual, m³/s	400	
Volumetric flow rate (wet STP), m³/s	250	
Volumetric flow rate (dry STP), m³/s	230	
Mass flow rate (wet basis), kg/h	1200000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	0806 - 1144	0806 - 1144	0806 - 1144
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	11	10.4	12.1
Oxygen	9	8	9.7

Isokinetic Results	Results		
Sampling time	0805-1144		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	1.7	1.9	23
Antimony	<0.002	<0.002	<0.03
Arsenic	<0.0009	<0.001	<0.01
Beryllium	<0.0003	<0.0003	<0.004
Cadmium	**0.00086**	**0.001**	**0.012**
Chromium	<0.0004	<0.0004	<0.005
Cobalt	<0.0003	<0.0004	<0.005
Copper	**0.00066**	**0.00077**	**0.0091**
Lead	<0.0005	<0.0006	<0.007
Manganese	**0.063**	**0.074**	**0.87**
Mercury	**0.0028**	**0.0032**	**0.038**
Nickel	<0.0008	<0.0009	<0.01
Selenium	**0.0025**	**0.0029**	**0.034**
Tin	<0.0009	<0.001	<0.01
Vanadium	<0.0005	<0.0006	<0.007
Zinc	**0.0024**	**0.0028**	**0.033**
Type 1 & 2 Substances			
Upper Bound			
Total Type 1 Substances	≤0.0073	≤0.0085	≤0.1
Total Type 2 Substances	≤0.069	≤0.081	≤0.95
Total Type 1 & 2 Substances	≤0.076	≤0.089	≤1
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		105	
Gravimetric analysis date (total particulate)		23-01-2024	

2.3 EPA 6– Unit 2, Duct A

Date	18/01/2024	**Client**	EnergyAustralia
Report	R016420	**Stack ID**	Mt Piper Power Station - EPA 6 Unit 2 Duct A (Lower)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Adnan Latif / Ahmad Ramiz	**State**	NSW
Process Conditions	Boiler load stable at 280MW		*231213*

Stack Parameters		
Moisture content, %v/v	5.7	
Gas molecular weight, g/g mole	29.5 (wet)	30.2 (dry)
Gas density at STP, kg/m³	1.32 (wet)	1.35 (dry)
Gas density at discharge conditions, kg/m³	0.83	
% Oxygen correction & Factor	7 %	1.20
Gas Flow Parameters		
Temperature, °C	111	
Temperature, K	384	
Velocity at sampling plane, m/s	9.2	
Volumetric flow rate, actual, m³/s	330	
Volumetric flow rate (wet STP), m³/s	210	
Volumetric flow rate (dry STP), m³/s	200	
Mass flow rate (wet basis), kg/h	990000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	0800 - 1137	0800 - 1137	0800 - 1137
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	10.6	9.9	11.4
Oxygen	9.3	8.6	10

Isokinetic Results	Results		
Sampling time	0800-1138		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	<0.8	<0.9	<9
Antimony	<0.002	<0.002	<0.02
Arsenic	<0.0008	<0.0009	<0.009
Beryllium	<0.0002	<0.0003	<0.003
Cadmium	**0.00067**	**0.0008**	**0.0078**
Chromium	**0.00033**	**0.00039**	**0.0039**
Cobalt	<0.0003	<0.0003	<0.003
Copper	**0.00072**	**0.00086**	**0.0085**
Lead	<0.0007	<0.0008	<0.008
Manganese	**0.13**	**0.16**	**1.6**
Mercury	**0.0019**	**0.0022**	**0.022**
Nickel	**0.00096**	**0.0011**	**0.011**
Selenium	<0.002	<0.003	<0.03
Tin	<0.0008	<0.0009	<0.009
Vanadium	<0.0004	<0.0005	<0.005
Zinc	**0.0059**	**0.007**	**0.069**
Type 1 & 2 Substances			
Upper Bound			
Total Type 1 Substances	≤0.0057	≤0.0068	≤0.067
Total Type 2 Substances	≤0.14	≤0.16	≤1.6
Total Type 1 & 2 Substances	≤0.14	≤0.17	≤1.7
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		98	
Gravimetric analysis date (total particulate)		23-01-2024	

Ektimo

Date	18/01/2024	**Client**	EnergyAustralia
Report	R016420	**Stack ID**	Mt Piper Power Station - EPA 6 Unit 2 Duct A (Lower)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Adnan Latif / Ahmad Ramiz	**State**	NSW
Process Conditions	Boiler load varries between 350-370MW		*231213*

Stack Parameters		
Moisture content, %v/v	6.8	
Gas molecular weight, g/g mole	29.5 (wet)	30.3 (dry)
Gas density at STP, kg/m³	1.31 (wet)	1.35 (dry)
Gas density at discharge conditions, kg/m³	0.81	
% Oxygen correction & Factor	7 %	1.13
Gas Flow Parameters		
Temperature, °C	117	
Temperature, K	390	
Velocity at sampling plane, m/s	11	
Volumetric flow rate, actual, m³/s	400	
Volumetric flow rate (wet STP), m³/s	250	
Volumetric flow rate (dry STP), m³/s	230	
Mass flow rate (wet basis), kg/h	1200000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	1240 - 1612	1240 - 1612	1240 - 1612
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	11.4	10.7	11.9
Oxygen	8.6	8.2	9.4

Isokinetic Results	Results		
Sampling time	1240-1615 (PM10)		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Fine particulates (PM10)	<1	<1	<20
Coarse Particulates*	<1	<1	**
D50 cut size, 10µm		9.9	
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		100	
Gravimetric analysis date (PM_{10})		23-01-2024	

** Due to the inability for two x 6m sampling probes to be used simultaneously at the sampling plane, monitoring for Fine Particulates (PM_{10}) was not conducted simultaneously with monitoring for Solid Particles (Total). Accordingly, Coarse Particulate reported concentration is indicative only.*

*** Due to differing volumetric gas flowrates measured during monitoring for Solid Particles (Total) and Fine Particulates (PM_{10}) mass rate of Coarse Particulates has not been reported.*

2.4 EPA 7 – Unit 2, Duct B

Date	19/01/2024	**Client**	EnergyAustralia
Report	R016420	**Stack ID**	Mt Piper Power Station - EPA 7 Unit 2 Duct B (Upper)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Adnan Latif / Ahmad Ramiz	**State**	NSW
Process Conditions	Boiler load stable at 220MW		*231213*

Stack Parameters		
Moisture content, %v/v	5.2	
Gas molecular weight, g/g mole	29.3 (wet)	29.9 (dry)
Gas density at STP, kg/m³	1.31 (wet)	1.33 (dry)
Gas density at discharge conditions, kg/m³	0.84	
% Oxygen correction & Factor	7 %	1.35
Gas Flow Parameters		
Temperature, °C	103	
Temperature, K	376	
Velocity at sampling plane, m/s	7.9	
Volumetric flow rate, actual, m³/s	280	
Volumetric flow rate (wet STP), m³/s	180	
Volumetric flow rate (dry STP), m³/s	170	
Mass flow rate (wet basis), kg/h	850000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	0807 - 1144	0807 - 1144	0807 - 1144
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	8.5	7.7	9.3
Oxygen	10.6	9.8	11.3

Isokinetic Results	Results		
Sampling time	0805-1144		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	1.1	1.4	11
Antimony	<0.002	<0.003	<0.02
Arsenic	<0.0008	<0.001	<0.009
Beryllium	<0.0002	<0.0003	<0.002
Cadmium	**0.0008**	**0.0011**	**0.0082**
Chromium	**0.00035**	**0.00048**	**0.0037**
Cobalt	<0.0003	<0.0004	<0.003
Copper	<0.0003	<0.0005	<0.003
Lead	<0.0005	<0.0006	<0.005
Manganese	**0.0082**	**0.011**	**0.085**
Mercury	**0.0013**	**0.0017**	**0.013**
Nickel	<0.0005	<0.0006	<0.005
Selenium	<0.002	<0.003	<0.02
Tin	<0.0008	<0.001	<0.009
Vanadium	<0.0005	<0.0006	<0.005
Zinc	**0.0014**	**0.0018**	**0.014**
Type 1 & 2 Substances			
Upper Bound			
Total Type 1 Substances	≤0.0053	≤0.0071	≤0.055
Total Type 2 Substances	≤0.013	≤0.018	≤0.14
Total Type 1 & 2 Substances	≤0.018	≤0.025	≤0.19
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		104	
Gravimetric analysis date (total particulate)		23-01-2024	

Ektimo

Date	19/01/2024	**Client**	EnergyAustralia
Report	R016420	**Stack ID**	Mt Piper Power Station - EPA 7 Unit 2 Duct B (Upper)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Adnan Latif / Ahmad Ramiz	**State**	NSW
Process Conditions	Boiler load stable at 220MW		*231213*

Stack Parameters		
Moisture content, %v/v	5.5	
Gas molecular weight, g/g mole	29.3 (wet)	30.0 (dry)
Gas density at STP, kg/m³	1.31 (wet)	1.34 (dry)
Gas density at discharge conditions, kg/m³	0.84	
% Oxygen correction & Factor	7 %	1.32
Gas Flow Parameters		
Temperature, °C	104	
Temperature, K	378	
Velocity at sampling plane, m/s	8.2	
Volumetric flow rate, actual, m³/s	300	
Volumetric flow rate (wet STP), m³/s	190	
Volumetric flow rate (dry STP), m³/s	180	
Mass flow rate (wet basis), kg/h	890000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	1205 - 1541	1205 - 1541	1205 - 1541
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	8.9	8.3	9.3
Oxygen	10.3	9.8	10.9

Isokinetic Results	Results		
Sampling time	1205-1544 (PM10)		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Fine particulates (PM10)	1.2	1.6	13
Coarse Particulates*	<1	<1	**
D50 cut size, 10µm		10.0	
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		92	
Gravimetric analysis date (PM_{10})		23-01-2024	

** Due to the inability for two x 6m sampling probes to be used simultaneously at the sampling plane, monitoring for Fine Particulates (PM_{10}) was not conducted simultaneously with monitoring for Solid Particles (Total). Accordingly, Coarse Particulate reported concentration is indicative only.*

*** Due to differing volumetric gas flowrates measured during monitoring for Solid Particles (Total) and Fine Particulates (PM_{10}) mass rate of Coarse Particulates has not been reported.*

3 Sample Plane Compliance

3.1 EPA 4 – Unit 1, Duct B

Sampling Plane Details	
Source tested	Power plant - coal-fired
Pollution control equipment	Filter baghouse
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method 1	Conforming (alternative procedure)

3.2 EPA 5 – Unit 1, Duct A

Sampling Plane Details	
Source tested	Power plant - coal-fired
Pollution control equipment	Filter baghouse
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method 1	Conforming (alternative procedure)

3.3 EPA 6– Unit 2, Duct A

Sampling Plane Details	
Source tested	Power plant - coal-fired
Pollution control equipment	Filter baghouse
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method 1	Conforming (alternative procedure)

3.4 EPA 7 – Unit 2, Duct B

Sampling Plane Details	
Source tested	Power plant - coal-fired
Pollution control equipment	Filter baghouse
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method 1	Conforming (alternative procedure)

4 Plant Operating Conditions

See Energy Australia NSW Pty Ltd (Mt Piper) records for complete process conditions.

Based on information received from Energy Australia NSW Pty Ltd (Mt Piper) personnel, it is our understanding that samples were collected during typical plant operations.

5 Test Methods

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

Parameter	Sampling method	Analysis method	Uncertainty*	NATA accredited Sampling	NATA accredited Analysis
Sampling points - Selection	NSW EPA TM-1 (USEPA Method 1)	NA	NA	✓	NA
Flow rate, temperature & velocity	NSW EPA TM-2 (USEPA Method 2)	NSW EPA TM-2 (USEPA Method 2)	8%, 2%, 7%	NA	✓
Moisture content	NSW EPA TM-22 (USEPA Method 4)	NSW EPA TM-22 (USEPA Method 4)	8%	✓	✓
Molecular weight	NA	NSW EPA TM-23 (USEPA Method 3)	not specified	NA	✓
Dry gas density	NA	NSW EPA TM-23 (USEPA Method 3)	not specified	NA	✓
Carbon dioxide	NSW EPA TM-24 (USEPA Method 3A)	NSW EPA TM-24 (USEPA Method 3A)	13%	✓	✓
Oxygen	NSW EPA TM-25 (USEPA Method 3A)	NSW EPA TM-25 (USEPA Method 3A)	13%	✓	✓
Particulate matter (PM_{10} & $PM_{2.5}$)	NSW EPA OM-5 (USEPA Method 201A)	NSW EPA OM-5 (USEPA Method 201A)	6%	✓	✓††
Coarse particulates	NSW EPA OM-9	NSW EPA OM-9	not specified	✓	✓††
Solid particles (total)	NSW EPA TM-15 (AS 4323.2)	NSW EPA TM-15 (AS 4323.2)	3%	✓	✓††
Total (gaseous & particulate) metals & metallic compounds	NSW EPA TM-12, NSW EPA TM-13, NSW EPA TM-14 (USEPA Method 29)	Envirolab in-house methods Metals-020/021/022	15%	✓	✓‡
Type 1 substances (As, Cd, Hg, Pb, Sb)	NSW EPA TM-12 (USEPA Method 29)	Envirolab in-house methods Metals-020/021/022	15%	✓	✓‡
Type 2 substances (Be, Cr, Co, Mn, Ni, Se, Sn, V)	NSW EPA TM-13 (USEPA Method 29)	Envirolab in-house methods Metals-020/021/022	15%	✓	✓‡

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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).

†† Gravimetric analysis conducted at the Ektimo NSW laboratory.

‡ Analysis performed by Envirolab, NATA accreditation number 2901. Results were reported to Ektimo on 1 February 2024 in report 342231.

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
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
AS	Australian Standard
CTM	Conditional test method
D	Duct diameter or equivalent duct diameter for rectangular ducts
D_{50}	'Cut size' of a cyclone is defined as the particle diameter at which the cyclone achieves a 50% collection efficiency i.e. half of the particles are retained by the cyclone and half pass through it. The D_{50} method simplifies the capture efficiency distribution by assuming that a given cyclone stage captures all of the particles with a diameter equal to or greater than the D_{50} of that cyclone and less than the D_{50} of the preceding cyclone.
DECC	Department of Environment & Climate Change (NSW)
Disturbance	A flow obstruction or instability in the direction of the flow which may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter.
EPA	Environment Protection Authority
FTIR	Fourier transform infra-red
ISC	Intersociety Committee, Methods of Air Sampling and Analysis
ISO	International Organisation for Standardisation
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
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).
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
Upper bound	When an analyte is not present above the detection limit, the result is assumed to be equal to the detection limit.
95% confidence interval	Range of values that contains the true result with 95% certainty. This means there is a 5% risk that the true result is outside this range.

8 Appendices

Appendix A: Laboratory Results

Envirolab Metals samples IDs

Location ID	Sampling Date	Ektimo Sample ID	Envirolab sample ID
EPA 4 – Unit 1, Duct B	16 January 2024	N21017	342231-2
		N21022	342231-7
		N21027	342231-12
		N21016	342231-1
		N21021	342231-6
		N21026	342231-11
EPA 5 – Unit 1, Duct A	17 January 2024	N21018	342231-3
		N21023	342231-8
		N21028	342231-13
		N21016	342231-1
		N21021	342231-6
		N21026	342231-11
EPA 6– Unit 2, Duct A	18 January 2024	N21019	342231-4
		N21024	342231-9
		N21029	342231-14
		N21016	342231-1
		N21021	342231-6
		N21026	342231-11
EPA 7 – Unit 2, Duct B	19 January 2024	N21020	342231-5
		N21025	342231-10
		N21030	342231-15
		N21016	342231-1
		N21021	342231-6
		N21026	342231-11

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 342231

Client Details

Client	Ektimo (Unanderra)
Attention	Rick Peralta
Address	1/251 Princes Hwy, Unanderra, NSW, 2526

Sample Details

Your Reference	**R016420**
Number of Samples	5 Filter, 10 Water
Date samples received	24/01/2024
Date completed instructions received	24/01/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

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

Report Details

Date results requested by	01/02/2024
Date of Issue	01/02/2024

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

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

Results Approved By
Hannah Nguyen, Metals Supervisor

Authorised By
Nancy Zhang, Laboratory Manager

Metals on filters						
Our Reference		342231-1	342231-2	342231-3	342231-4	342231-5
Your Reference	UNITS	N21016	N21017	N21018	N21019	N21020
Type of sample		Filter	Filter	Filter	Filter	Filter
Date prepared	-	31/01/2024	31/01/2024	31/01/2024	31/01/2024	31/01/2024
Date analysed	-	01/02/2024	01/02/2024	01/02/2024	01/02/2024	01/02/2024
Antimony	µg/filter	<5	<5	<5	<5	<5
Arsenic	µg/filter	<2	<2	<2	<2	<2
Cadmium	µg/filter	<0.5	<0.5	<0.5	<0.5	<0.5
Lead	µg/filter	<1	<1	<1	<1	<1
Mercury	µg/filter	<0.2	<0.2	<0.2	<0.2	<0.2
Beryllium	µg/filter	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg/filter	2	7.6	2	3	3
Cobalt	µg/filter	<0.5	<0.5	<0.5	<0.5	<0.5
Manganese	µg/filter	<0.5	0.8	0.5	2	<0.5
Nickel	µg/filter	<1	3	<1	2	1
Selenium	µg/filter	<5	<5	<5	<5	<5
Vanadium	µg/filter	<1	<1	<1	<1	<1
Tin	µg/filter	<2	<2	<2	<2	<2
Copper	µg/filter	<0.5	1	0.8	1	0.6
Zinc	µg/filter	2	4	3	10	4

Metals in water - mass units						
Our Reference		342231-6	342231-7	342231-8	342231-9	342231-10
Your Reference	UNITS	N21021	N21022	N21023	N21024	N21025
Type of sample		Water	Water	Water	Water	Water
Volume	mL	139	325	327	334	342
Antimony	µg	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic	µg	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	µg	<0.05	2.4	2.2	2.0	2.3
Lead	µg	<0.5	0.6	<0.5	0.8	<0.5
Mercury	µg	<10	<10	<10	<10	<10
Beryllium	µg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg	0.6	0.7	1	0.7	0.6
Cobalt	µg	<0.5	<0.5	<0.5	<0.5	<0.5
Manganese	µg	<3	<3	160	400	20
Nickel	µg	<0.5	1	1	1	0.8
Selenium	µg	<0.5	2	6.1	2	1
Vanadium	µg	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	µg	7.4	1	0.8	0.8	1
Copper	µg	<0.5	1	0.8	1	<0.5
Zinc	µg	0.5	5	5.5	10	2
Date prepared	-	31/01/2024	31/01/2024	31/01/2024	31/01/2024	31/01/2024
Date analysed	-	31/01/2024	31/01/2024	31/01/2024	31/01/2024	31/01/2024
Antimony-Dissolved	µg/L	<1	<1	<1	<1	<1
Arsenic-Dissolved	µg/L	<1	<1	<1	<1	<1
Cadmium-Dissolved	µg/L	0.1	7.4	6.6	6.1	6.6
Lead-Dissolved	µg/L	<1	2	1	3	1
Mercury-Dissolved	µg/L	<1.0	19	20	16	10
Beryllium-Dissolved	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium-Dissolved	µg/L	4	2	3	2	2
Cobalt-Dissolved	µg/L	<1	<1	<1	<1	<1
Manganese-Dissolved	µg/L	<5	<5	480	1,200	68
Nickel-Dissolved	µg/L	3	3	4	4	2
Selenium-Dissolved	µg/L	<1	5	19	6	4
Vanadium-Dissolved	µg/L	<1	<1	<1	<1	<1
Tin-Dissolved	µg/L	53	4	3	2	4
Copper-Dissolved	µg/L	1	3	3	4	1
Zinc-Dissolved	µg/L	4	15	17	31	7

Metals in water - mass units						
Our Reference		342231-11	342231-12	342231-13	342231-14	342231-15
Your Reference	UNITS	N21026	N21027	N21028	N21029	N21030
Type of sample		Water	Water	Water	Water	Water
Volume	mL	125	210	216	209	226
Mercury	µg	<1	<1	<1	<1	<1
Date prepared	-	31/01/2024	31/01/2024	31/01/2024	31/01/2024	31/01/2024
Date analysed	-	31/01/2024	31/01/2024	31/01/2024	31/01/2024	31/01/2024
Mercury-Dissolved	µg/L	<0.1	<0.1	1.7	1.7	0.87

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

QUALITY CONTROL: Metals on filters					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			31/01/2024	[NT]	[NT]	[NT]	[NT]	31/01/2024	[NT]
Date analysed	-			01/02/2024	[NT]	[NT]	[NT]	[NT]	01/02/2024	[NT]
Antimony	µg/filter	5	Metals-020/021/022	<5	[NT]	[NT]	[NT]	[NT]	99	[NT]
Arsenic	µg/filter	2	Metals-020/021/022	<2	[NT]	[NT]	[NT]	[NT]	111	[NT]
Cadmium	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	103	[NT]
Lead	µg/filter	1	Metals-020/021/022	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Mercury	µg/filter	0.2	Metals-020/021/022	<0.2	[NT]	[NT]	[NT]	[NT]	107	[NT]
Beryllium	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	109	[NT]
Chromium	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	102	[NT]
Cobalt	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	103	[NT]
Manganese	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	105	[NT]
Nickel	µg/filter	1	Metals-020/021/022	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Selenium	µg/filter	5	Metals-020/021/022	<5	[NT]	[NT]	[NT]	[NT]	97	[NT]
Vanadium	µg/filter	1	Metals-020/021/022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Tin	µg/filter	2	Metals-020/021/022	<2	[NT]	[NT]	[NT]	[NT]	115	[NT]
Copper	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	105	[NT]
Zinc	µg/filter	1	Metals-020/021/022	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: Metals in water - mass units						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	342231-8
Antimony	µg	0.5	Metals-022	<0.5	7	<0.5	<0.5	0	[NT]	[NT]
Arsenic	µg	0.5	Metals-022	<0.5	7	<0.5	<0.5	0	[NT]	[NT]
Cadmium	µg	0.05	Metals-022	<0.05	7	2.4	2.4	0	[NT]	[NT]
Lead	µg	0.5	Metals-022	<0.5	7	0.6	0.6	0	[NT]	[NT]
Mercury	µg	0.5	Metals-021	<0.5	7	<10	<10	0	[NT]	[NT]
Beryllium	µg	0.5	Metals-022	<0.5	7	<0.5	<0.5	0	[NT]	[NT]
Chromium	µg	0.5	Metals-022	<0.5	7	0.7	0.7	0	[NT]	[NT]
Cobalt	µg	0.5	Metals-022	<0.5	7	<0.5	<0.5	0	[NT]	[NT]
Manganese	µg	3	Metals-022	<3	7	<3	<3	0	[NT]	[NT]
Nickel	µg	0.5	Metals-022	<0.5	7	1	1	0	[NT]	[NT]
Selenium	µg	0.5	Metals-022	<0.5	7	2	2	0	[NT]	[NT]
Vanadium	µg	0.5	Metals-022	<0.5	7	<0.5	<0.5	0	[NT]	[NT]
Tin	µg	0.5	Metals-022	<0.5	7	1	1	0	[NT]	[NT]
Copper	µg	0.5	Metals-022	<0.5	7	1	1	0	[NT]	[NT]
Zinc	µg	0.5	Metals-022	<0.5	7	5	4	22	[NT]	[NT]
Date prepared	-			31/01/2024	7	31/01/2024	31/01/2024		31/01/2024	31/01/2024
Date analysed	-			31/01/2024	7	31/01/2024	31/01/2024		31/01/2024	31/01/2024
Antimony-Dissolved	µg/L	1	Metals-022	<1	7	<1	<1	0	102	88
Arsenic-Dissolved	µg/L	1	Metals-022	<1	7	<1	<1	0	100	110
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	7	7.4	7.3	1	100	100
Lead-Dissolved	µg/L	1	Metals-022	<1	7	2	2	0	98	96
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	7	19	20	5	102	106
Beryllium-Dissolved	µg/L	0.5	Metals-022	<0.5	7	<0.5	<0.5	0	106	87
Chromium-Dissolved	µg/L	1	Metals-022	<1	7	2	2	0	120	94
Cobalt-Dissolved	µg/L	1	Metals-022	<1	7	<1	<1	0	105	83
Manganese-Dissolved	µg/L	5	Metals-022	<5	7	<5	<5	0	103	#
Nickel-Dissolved	µg/L	1	Metals-022	<1	7	3	3	0	101	99
Selenium-Dissolved	µg/L	1	Metals-022	<1	7	5	5	0	94	127
Vanadium-Dissolved	µg/L	1	Metals-022	<1	7	<1	<1	0	102	94
Tin-Dissolved	µg/L	1	Metals-022	<1	7	4	3	29	102	102
Copper-Dissolved	µg/L	1	Metals-022	<1	7	3	3	0	105	83
Zinc-Dissolved	µg/L	1	Metals-022	<1	7	15	13	14	103	91

QUALITY CONTROL: Metals in water - mass units						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Antimony	µg	0.5	Metals-022	[NT]	10	<0.5	[NT]		[NT]	[NT]
Arsenic	µg	0.5	Metals-022	[NT]	10	<0.5	[NT]		[NT]	[NT]
Cadmium	µg	0.05	Metals-022	[NT]	10	2.3	[NT]		[NT]	[NT]
Lead	µg	0.5	Metals-022	[NT]	10	<0.5	[NT]		[NT]	[NT]
Mercury	µg	0.5	Metals-021	[NT]	10	<10	<10	0	[NT]	[NT]
Beryllium	µg	0.5	Metals-022	[NT]	10	<0.5	[NT]		[NT]	[NT]
Chromium	µg	0.5	Metals-022	[NT]	10	0.6	[NT]		[NT]	[NT]
Cobalt	µg	0.5	Metals-022	[NT]	10	<0.5	[NT]		[NT]	[NT]
Manganese	µg	3	Metals-022	[NT]	10	20	[NT]		[NT]	[NT]
Nickel	µg	0.5	Metals-022	[NT]	10	0.8	[NT]		[NT]	[NT]
Selenium	µg	0.5	Metals-022	[NT]	10	1	[NT]		[NT]	[NT]
Vanadium	µg	0.5	Metals-022	[NT]	10	<0.5	[NT]		[NT]	[NT]
Tin	µg	0.5	Metals-022	[NT]	10	1	[NT]		[NT]	[NT]
Copper	µg	0.5	Metals-022	[NT]	10	<0.5	[NT]		[NT]	[NT]
Zinc	µg	0.5	Metals-022	[NT]	10	2	[NT]		[NT]	[NT]
Date prepared	-			[NT]	10	31/01/2024	31/01/2024		[NT]	[NT]
Date analysed	-			[NT]	10	31/01/2024	31/01/2024		[NT]	[NT]
Antimony-Dissolved	µg/L	1	Metals-022	[NT]	10	<1	[NT]		[NT]	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	[NT]	10	<1	[NT]		[NT]	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	[NT]	10	6.6	[NT]		[NT]	[NT]
Lead-Dissolved	µg/L	1	Metals-022	[NT]	10	1	[NT]		[NT]	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	[NT]	10	10	11	10	[NT]	[NT]
Beryllium-Dissolved	µg/L	0.5	Metals-022	[NT]	10	<0.5	[NT]		[NT]	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	[NT]	10	2	[NT]		[NT]	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	[NT]	10	<1	[NT]		[NT]	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	[NT]	10	68	[NT]		[NT]	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	[NT]	10	2	[NT]		[NT]	[NT]
Selenium-Dissolved	µg/L	1	Metals-022	[NT]	10	4	[NT]		[NT]	[NT]
Vanadium-Dissolved	µg/L	1	Metals-022	[NT]	10	<1	[NT]		[NT]	[NT]
Tin-Dissolved	µg/L	1	Metals-022	[NT]	10	4	[NT]		[NT]	[NT]
Copper-Dissolved	µg/L	1	Metals-022	[NT]	10	1	[NT]		[NT]	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	[NT]	10	7	[NT]		[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Metals in water:
- The PQL has been raised for Hg due to the sample matrix requiring dilution.
- # Percent recovery is not applicable due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Appendix B: Chain of Custody

Ektimo

Checked at Ektimo Dispatch by: Sam 23/01
Sign/Date

Samples received in good order: _____
Sign/Date

	Sample ID	Job No.	Analysis Required	Units Required	Analytical Lab	Purchase Order No.	Ektimo Contact	Notes	TAT Required (days)
1	N 21016	R016420	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) + Cu, Zu	ug/sample	Envirolab	W012996	Rick Peralta	Blank Filter	
2	N 21017	R016420	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) + Cu, Zu	ug/sample	Envirolab	W012996	Rick Peralta	Filter A	
3	N 21018	R016420	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) + Cu, Zu	ug/sample	Envirolab	W012996	Rick Peralta	Filter A	
4	N 21019	R016420	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) + Cu, Zu	ug/sample	Envirolab	W012996	Rick Peralta	Filter A	
5	N 21020	R016420	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) + Cu, Zu	ug/sample	Envirolab	W012996	Rick Peralta	Blank Solution	
6	N 21021	R016420	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) + Cu, Zu	ug/litre	Envirolab	W012996	Rick Peralta	Imp A+B	
7	N 21022	R016420	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) + Cu, Zu	ug/litre	Envirolab	W012996	Rick Peralta	Imp A+B	
8	N 21023	R016420	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) + Cu, Zu	ug/litre	Envirolab	W012996	Rick Peralta	Imp A+B	
9	N 21024	R016420	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) + Cu, Zu	ug/litre	Envirolab	W012996	Rick Peralta	Imp A+B	
10	N 21025	R016420	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) + Cu, Zu	ug/litre	Envirolab	W012996	Rick Peralta	Blank Solution	
11	N 21026	R016420	Hg	ug/litre	Envirolab	W012996	Rick Peralta	Imp A+B	
12	N 21027	R016420	Hg	ug/litre	Envirolab	W012996	Rick Peralta	Imp A+B	
13	N 21028	R016420	Hg	ug/litre	Envirolab	W012996	Rick Peralta	Imp A+B	
14	N 21029	R016420	Hg	ug/litre	Envirolab	W012996	Rick Peralta	Imp A+B	
15	N 21030	R016420	Hg	ug/litre	Envirolab	W012996	Rick Peralta	Imp A+B	

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

Job No: 342231
Date Received: 24/1/24
Time Received: 1015
Received By: Stephanie
Temp: Cool/Ambient/ 25°C
Cooling: Ice/Icepack None
Security: Intact/Broken/None

Ektimo

ektimo.com.au
1300 364 005

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

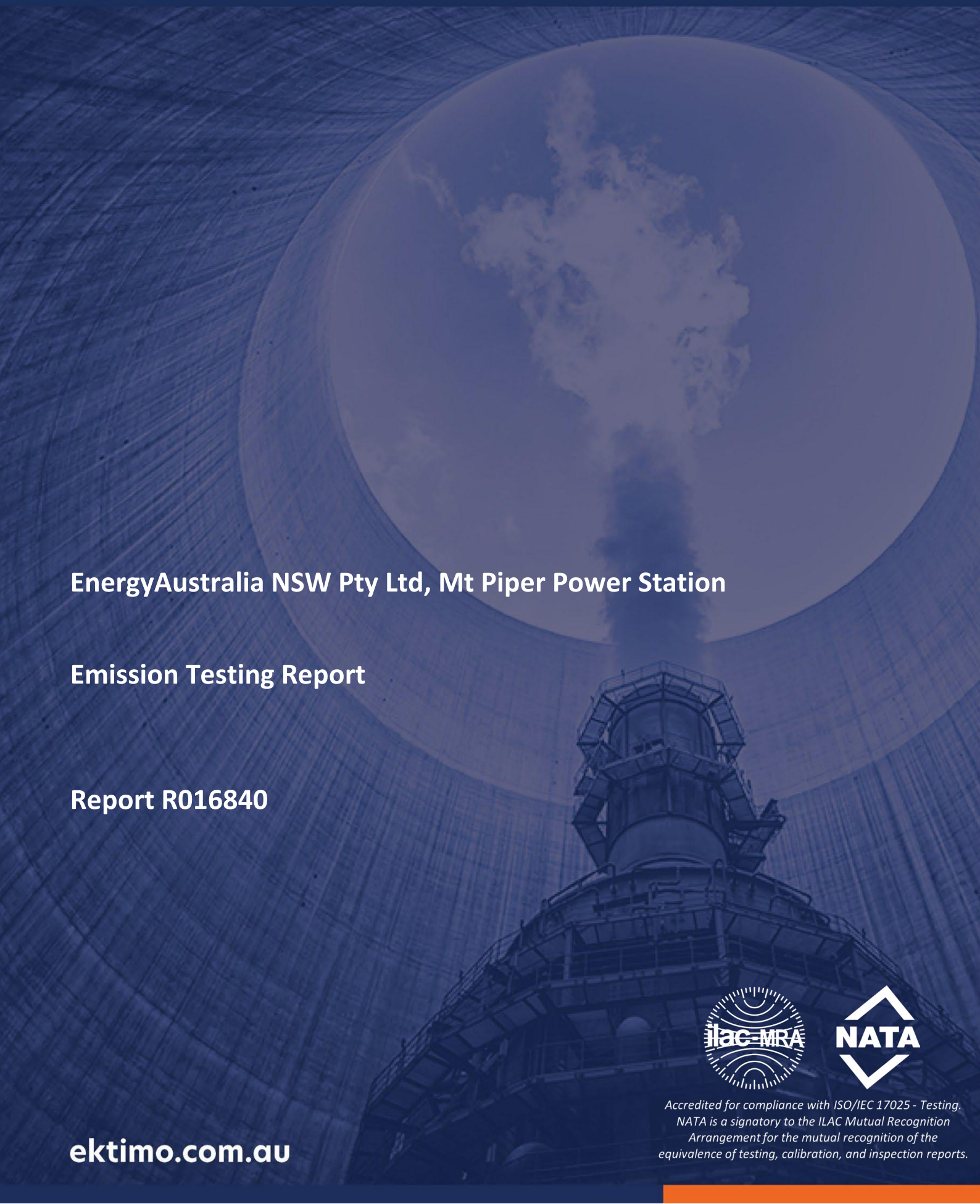
SYDNEY
6/78 Reserve Road
Artarmon
NSW 2064
AUSTRALIA

WOLLONGONG
1/251 Princes Highway
Unanderra
NSW 2526
AUSTRALIA

PERTH
52 Cooper Road
Cockburn Central
WA 6164
AUSTRALIA

BRISBANE
3/109 Riverside Place
Morningside
QLD 4170
AUSTRALIA

Ektimo



EnergyAustralia NSW Pty Ltd, Mt Piper Power Station

Emission Testing Report

Report R016840

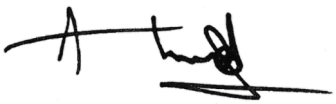
Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, calibration, and inspection reports.

ektimo.com.au

Document Information

Client Name:	EnergyAustralia NSW Pty Ltd (Mt Piper)
Report Number:	R016840
Date of Issue:	6 June 2024
Attention:	Jarvis Lulham
Address:	Mt Piper Power Station, Locked Mail Bag 1 Portland NSW 2847
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation



Ahmad Ramiz
Air Monitoring Consultant

NATA Accredited Laboratory
No. 14601

Aaron Davis
Ektimo Signatory

Table of Contents

1 Executive Summary

1.1 Background

Ektimo was engaged by EnergyAustralia NSW Pty Ltd (Mt Piper) to perform emission testing at Mt Piper Power Station, Portland, NSW. Testing was carried out in accordance with Environment Protection Licence 13007.

1.2 Project Objective & Overview

The objective of the project was to conduct a monitoring programme to quantify emissions from four (4) discharge points to determine compliance with EnergyAustralia NSW Pty Ltd (Mt Piper)'s Environmental Licence.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
EPA 4 – Unit 1, Duct B	9 May 2024	Solid particles (total) Sulfur trioxide (as SO_3) Oxygen (O_2), Carbon dioxide (CO_2)
		Fluorine and fluorine compounds as (as total fluoride) Hydrogen chloride (HCl) Chlorine and chlorine compounds (as Cl_2) Volatile organic compounds (VOCs) Oxygen (O_2), Carbon dioxide (CO_2) Nitrogen oxides (NO_x) Sulfur dioxide (SO_2)
EPA 5 – Unit 1, Duct A	10 May 2024	Solid particles (total) Oxygen (O_2), Carbon dioxide (CO_2)
		Fine particulate matter (PM_{10}) Oxygen (O_2), Carbon dioxide (CO_2)
EPA 6 – Unit 2, Duct A	11 May 2024	Solid particles (total) Sulfur trioxide (as SO_3) Oxygen (O_2), Carbon dioxide (CO_2)
		Fluorine and fluorine compounds as (as total fluoride) Hydrogen chloride (HCl) Chlorine and chlorine compounds (as Cl_2) Volatile organic compounds (VOCs) Oxygen (O_2), Carbon dioxide (CO_2) Nitrogen oxides (NO_x), Sulfur dioxide (SO_2)
EPA 7 – Unit 2, Duct B	12 May 2024	Solid particles (total) Oxygen (O_2), Carbon dioxide (CO_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 Results Summary

All analytes are within the licence limit set by the NSW EPA as per licence 13007 (last amended on 1 March 2024).

Report Number			R016840	R016840	
Test Date			10/04/24	9/04/24	
EPA			5	4	
Unit			Unit 1 Duct A	Unit 1 Duct B	
					EPA 2
	LIMIT	**UNITS**	*Measured Results*		*Combined Ducts*
Volatile organic compounds as n-propane equivalent	**10**	**mg/m³**	-	0.23	-
Fluorine	**30**	**mg/m³**	-	11	-
Hydrogen chloride	**50**	**mg/m³**	-	2.2	-
Chlorine	**20**	**mg/m³**	-	<0.02	-
Sulfuric acid mist and sulfur trioxide (as SO_3)	**100**	**mg/m³**	-	2.1	-
Solid particles	**50**	**mg/m³**	**1.6**	**1.7**	**1.7**
PM10		mg/m³	<1	-	

*Combined air emissions from **boiler 1** via points 4 & 5 (except for PM_{10} and Coarse Particulates)*
All results corrected to 7% oxygen correction.

Report Number			R016840	R016840	
Test Date			11/04/24	12/04/24	
EPA			6	7	
Unit			Unit 2 Duct A	Unit 2 Duct B	
					EPA 3
	LIMIT	**UNITS**	*Measured Results*		*Combined Ducts*
Volatile organic compounds as n-propane equivalent	**10**	**mg/m³**	0.31	-	-
Fluorine	**30**	**mg/m³**	11	-	-
Hydrogen chloride	**50**	**mg/m³**	3	-	-
Chlorine	**20**	**mg/m³**	<0.03	-	-
Sulfuric acid mist and sulfur trioxide (as SO_3)	**100**	**mg/m³**	3.3	-	-
Solid particles	**50**	**mg/m³**	**<1**	**<2**	**<1**

*Combined air emissions from **boiler 2** via points 6 & 7*
All results corrected to 7% oxygen correction.

*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 EPA 4 - Unit 1, Duct B

Date	9/04/2024	**Client**	EnergyAustralia
Report	R016840	**Stack ID**	Mt Piper Power Station - EPA 4 Unit 1 Duct B (Lower)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Mohamed Trabelsi, Sahad Musthafa	**State**	NSW
Process Conditions	Load stable at 220 MW		240322

Stack Parameters		
Moisture content, %v/v	3.2	
Gas molecular weight, g/g mole	28.6 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	0.80	
% Oxygen correction & Factor	7 %	1.58
Gas Flow Parameters		
Temperature, °C	113	
Temperature, K	386	
Velocity at sampling plane, m/s	8.7	
Volumetric flow rate, actual, m³/s	310	
Volumetric flow rate (wet STP), m³/s	200	
Volumetric flow rate (dry STP), m³/s	190	
Mass flow rate (wet basis), kg/h	900000	

Gas Analyser Results	Average			Minimum			Maximum		
Sampling time	0815 - 1150			0815 - 1150			0815 - 1150		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Combustion Gases									
Nitrogen oxides (as NO_2)	260	410	3000	150	230	1700	280	440	3200
Sulfur dioxide	990	1600	11000	820	1300	9400	1000	1700	12000
	Concentration % v/v			Concentration % v/v			Concentration % v/v		
Carbon dioxide	2.2			0.9			2.4		
Oxygen	12.1			11.7			15.8		

Isokinetic Results	Results		
Sampling time	0815-1157		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	1.1	1.7	12
Sulfur trioxide and/or Sulfuric acid (as SO3)	1.3	2.1	15
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		101	
Gravimetric analysis date (total particulate)		24-04-2024	

Ektimo

Date	9/04/2024	**Client**	EnergyAustralia
Report	R016840	**Stack ID**	Mt Piper Power Station - EPA 4 Unit 1 Duct B (Lower)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Mohamed Trabelsi, Sahad Musthafa	**State**	NSW
Process Conditions	Load Stable at 220 MW		240322

Stack Parameters		
Moisture content, %v/v	3.9	
Gas molecular weight, g/g mole	28.6 (wet)	29.1 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.30 (dry)
Gas density at discharge conditions, kg/m³	0.81	
% Oxygen correction & Factor	7 %	1.54
Gas Flow Parameters		
Temperature, °C	111	
Temperature, K	385	
Velocity at sampling plane, m/s	8.6	
Volumetric flow rate, actual, m³/s	310	
Volumetric flow rate (wet STP), m³/s	190	
Volumetric flow rate (dry STP), m³/s	190	
Mass flow rate (wet basis), kg/h	900000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	1238 - 1616	1238 - 1616	1238 - 1616
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	2.8	1.9	5.4
Oxygen	11.9	10.2	13.1

Isokinetic Results	Results		
Sampling time	1235-1615		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Chlorine	<0.01	<0.02	<0.2
Total fluoride (as HF)	7.2	11	81
Hydrogen chloride	1.4	2.2	16
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		102	

Total VOCs (as n-Propane)	Results		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Total	0.15	0.23	1.7

VOC (speciated)	Results		
Sampling time	1305-1405		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Detection limit(1)	<0.08	<0.1	<0.9
Acetone	0.2	0.31	2.2

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

2.2 EPA 5 - Unit 1, Duct A

Date	10/04/2024	**Client**	EnergyAustralia
Report	R016840	**Stack ID**	Mt Piper Power Station - EPA 5 Unit 1 Duct A (Upper)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Mohamed Trabelsi, Sahad Musthafa	**State**	NSW
Process Conditions	Load stable at 220 MW		240322

Stack Parameters		
Moisture content, %v/v	4.2	
Gas molecular weight, g/g mole	28.5 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.27 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	0.81	
% Oxygen correction & Factor	7 %	1.44
Gas Flow Parameters		
Temperature, °C	110	
Temperature, K	383	
Velocity at sampling plane, m/s	7.7	
Volumetric flow rate, actual, m³/s	280	
Volumetric flow rate (wet STP), m³/s	180	
Volumetric flow rate (dry STP), m³/s	170	
Mass flow rate (wet basis), kg/h	810000	

Gas Analyser Results	Average			Minimum			Maximum		
Sampling time	0757 - 1151			0757 - 1151			0757 - 1151		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Combustion Gases									
Nitrogen oxides (as NO_2)	320	460	3200	270	390	2700	370	530	3700
Sulfur dioxide	1100	1600	11000	960	1400	9700	1200	1700	12000
	Concentration % v/v			Concentration % v/v			Concentration % v/v		
Carbon dioxide	2.6			2.3			2.8		
Oxygen	11.3			10.9			13.2		

Isokinetic Results	Results		
Sampling time	0810-1150		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	1.1	1.6	11
Isokinetic Sampling Parameters			
Sampling time, min	210		
Isokinetic rate, %	102		
Gravimetric analysis date (total particulate)	24-04-2024		

Ektimo

Date	10/04/2024	**Client**	EnergyAustralia
Report	R016840	**Stack ID**	Mt Piper Power Station - EPA 5 Unit 1 Duct A (Upper)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Mohamed Trabelsi, Sahad Musthafa	**State**	NSW
Process Conditions	Load stable at 220 MW		*240322*

Stack Parameters		
Moisture content, %v/v	4.4	
Gas molecular weight, g/g mole	28.5 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.27 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	0.81	
% Oxygen correction & Factor	7 %	1.39
Gas Flow Parameters		
Temperature, °C	110	
Temperature, K	383	
Velocity at sampling plane, m/s	8.1	
Volumetric flow rate, actual, m³/s	290	
Volumetric flow rate (wet STP), m³/s	190	
Volumetric flow rate (dry STP), m³/s	180	
Mass flow rate (wet basis), kg/h	850000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	1212 - 1551	1212 - 1551	1212 - 1551
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	2.8	2.7	3
Oxygen	10.9	10.7	11.3

Isokinetic Results	Results		
Sampling time	1215-1555 (PM10)		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Fine particulates (PM10)	<0.9	<1	<9
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		111	

Ektimo

2.3 EPA 6 - Unit 2, Duct A

Date	11/04/2024	**Client**	EnergyAustralia
Report	R016840	**Stack ID**	Mt Piper Power Station - EPA 6 Unit 2 Duct A (Lower)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Mohamed Trabelsi, Sahad Musthafa	**State**	NSW
Process Conditions	Load stable at 220 MW		240322

Stack Parameters		
Moisture content, %v/v	3.6	
Gas molecular weight, g/g mole	28.6 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	0.82	
% Oxygen correction & Factor	7 %	1.49
Gas Flow Parameters		
Temperature, °C	110	
Temperature, K	383	
Velocity at sampling plane, m/s	9.5	
Volumetric flow rate, actual, m³/s	340	
Volumetric flow rate (wet STP), m³/s	220	
Volumetric flow rate (dry STP), m³/s	210	
Mass flow rate (wet basis), kg/h	1000000	

Gas Analyser Results	Average			Minimum			Maximum		
Sampling time	0809 - 1145			0809 - 1145			0809 - 1145		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Combustion Gases									
Nitrogen oxides (as NO_2)	450	670	5700	360	530	4500	480	720	6100
Sulfur dioxide	1100	1600	14000	800	1200	10000	1100	1700	14000
	Concentration % v/v			Concentration % v/v			Concentration % v/v		
Carbon dioxide	2.6			2.3			2.8		
Oxygen	11.6			11.1			11.9		

Isokinetic Results	Results		
Sampling time	0809-1149		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	<0.8	<1	<10
Sulfur trioxide and/or Sulfuric acid (as SO3)	2.2	3.3	28
Isokinetic Sampling Parameters			
Sampling time, min	210		
Isokinetic rate, %	102		
Gravimetric analysis date (total particulate)	24-04-2024		

Ektimo

Date	11/04/2024	**Client**	EnergyAustralia
Report	R016840	**Stack ID**	Mt Piper Power Station - EPA 6 Unit 2 Duct A (Lower)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Mohamed Trabelsi, Sahad Musthafa	**State**	NSW
Process Conditions	Load stable at 220 MW		240322

Stack Parameters		
Moisture content, %v/v	4.4	
Gas molecular weight, g/g mole	28.6 (wet)	29.1 (dry)
Gas density at STP, kg/m³	1.27 (wet)	1.30 (dry)
Gas density at discharge conditions, kg/m³	0.82	
% Oxygen correction & Factor	7 %	1.42
Gas Flow Parameters		
Temperature, °C	110	
Temperature, K	383	
Velocity at sampling plane, m/s	9.4	
Volumetric flow rate, actual, m³/s	340	
Volumetric flow rate (wet STP), m³/s	220	
Volumetric flow rate (dry STP), m³/s	210	
Mass flow rate (wet basis), kg/h	990000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	1227 - 1537	1227 - 1537	1227 - 1537
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	2.9	2.6	3.1
Oxygen	11.1	10.8	12

Isokinetic Results	Results		
Sampling time	1210-1550		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Chlorine	<0.02	<0.03	<0.2
Total fluoride (as HF)	7.9	11	98
Hydrogen chloride	2.1	3	26
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		102	

Total VOCs (as n-Propane)	Results		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Total	0.22	0.31	2.7

VOC (speciated)	Results		
Sampling time	1328-1441		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Detection limit(1)	<0.07	<0.1	<0.9
Toluene	0.14	0.2	1.7
Residuals as Toluene	0.31	0.45	3.9

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

Ektimo

2.4 EPA 7 - Unit 2, Duct B

Date	12/04/2024	**Client**	EnergyAustralia
Report	R016840	**Stack ID**	Mt Piper Power Station - EPA 7 Unit 2 Duct B (Upper)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Mohamed Trabelsi, Sahad Musthafa	**State**	NSW
Process Conditions	Load stable at 150 MW		240322

Stack Parameters		
Moisture content, %v/v	4.4	
Gas molecular weight, g/g mole	28.5 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.27 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	0.82	
% Oxygen correction & Factor	7 %	1.79
Gas Flow Parameters		
Temperature, °C	109	
Temperature, K	382	
Velocity at sampling plane, m/s	7.7	
Volumetric flow rate, actual, m³/s	280	
Volumetric flow rate (wet STP), m³/s	180	
Volumetric flow rate (dry STP), m³/s	170	
Mass flow rate (wet basis), kg/h	820000	

Gas Analyser Results	Average			Minimum			Maximum		
Sampling time	0823 - 1201			0823 - 1201			0823 - 1201		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Combustion Gases									
Nitrogen oxides (as NO_2)	320	580	3300	110	190	1100	340	610	3500
Sulfur dioxide	800	1400	8200	610	1100	6300	850	1500	8800
	Concentration % v/v			Concentration % v/v			Concentration % v/v		
Carbon dioxide	2			<0.4			2.2		
Oxygen	13.1			12.6			20.6		

Isokinetic Results	Results		
Sampling time	0821-1201		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	<1	<2	<10
Isokinetic Sampling Parameters			
Sampling time, min	210		
Isokinetic rate, %	103		
Gravimetric analysis date (total particulate)	24-04-2024		

3 Sample Plane Compliance

3.1 EPA 4 - Unit 1, Duct B

Sampling Plane Details	
Source tested	Power plant - coal-fired
Pollution control equipment	Filter baghouse
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method 1	Conforming (alternative procedure)

3.2 EPA 5 - Unit 1, Duct A

Sampling Plane Details	
Source tested	Power plant - coal-fired
Pollution control equipment	Filter baghouse
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method 1	Conforming (alternative procedure)

3.3 EPA 6 - Unit 2, Duct A

Sampling Plane Details	
Source tested	Power plant - coal-fired
Pollution control equipment	Filter baghouse
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method 1	Conforming (alternative procedure)

3.4 EPA 7 - Unit 2, Duct B

Sampling Plane Details	
Source tested	Power plant - coal-fired
Pollution control equipment	Filter baghouse
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method 1	Conforming (alternative procedure)

4 Plant Operating Conditions

See Energy Australia NSW Pty Ltd (Mt Piper) records for complete process conditions.

Based on information received from Energy Australia NSW Pty Ltd (Mt Piper) personnel, it is our understanding that samples were collected during typical plant operations.

5 Test Methods

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

Parameter	Sampling method	Analysis method	Uncertainty*	NATA accredited Sampling	NATA accredited Analysis
Sampling points - Selection	NSW EPA TM-1 (USEPA Method 1)	NA	NA	✓	NA
Flow rate, temperature & velocity	NSW EPA TM-2 (USEPA Method 2)	NSW EPA TM-2 (USEPA Method 2)	8%, 2%, 7%	NA	✓
Moisture content	NSW EPA TM-22 (USEPA Method 4)	NSW EPA TM-22 (USEPA Method 4)	8%	✓	✓
Molecular weight	NA	NSW EPA TM-23 (USEPA Method 3)	not specified	NA	✓
Dry gas density	NA	NSW EPA TM-23 (USEPA Method 3)	not specified	NA	✓
Carbon dioxide	NSW EPA TM-24 (USEPA Method 3A)	NSW EPA TM-24 (USEPA Method 3A)	13%	✓	✓
Oxygen	NSW EPA TM-25 (USEPA Method 3A)	NSW EPA TM-25 (USEPA Method 3A)	13%	✓	✓
Hydrogen halides & halogens∞	USEPA Method 26A	Ektimo 235	14%	✓	✓†
Hydrogen halides (including soluble fluoride)[2]	NSW EPA TM-8 (USEPA Method 26A)	Ektimo 235	not specified	✓	✓†i
Speciated volatile organic compounds (VOCs)	NSW EPA TM-34[d] (USEPA Method 18)	Ektimo 344	19%	✓	✓†
Particulate matter (PM_{10} & $PM_{2.5}$)	NSW EPA OM-5 (USEPA Method 201A)	NSW EPA OM-5 (USEPA Method 201A)	6%	✓	✓††
Solid particles (total)	NSW EPA TM-15 (AS 4323.2)	NSW EPA TM-15 (AS 4323.2)	3%	✓	✓††
Hydrogen chloride	NSW EPA TM-8 (USEPA Method 26A)	Ektimo 235	14%	✓	✓†i
Chlorine	NSW EPA TM-7 (USEPA Method 26A)	Ektimo 235	14%	✓	✓†i
Sulfuric acid mist and/or sulfur trioxide	NSW EPA TM-3 (USEPA Method 8)	Ektimo 235	16%	✓	✓†m

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

† Analysis performed by Ektimo. Results were reported to Ektimo on:

- 30 April 2024 in report LV-005699.
- 30 April 2024 in report LV-005704.
- 2 May 2024 in report LV-005712.
- 10 May 2024 in report LV-005731.

†† Gravimetric analysis conducted at the Ektimo NSW laboratory.

[2] Sampling follows USEPA Method 26A and analysis follows Ektimo 235 (ion chromatography) which uses the same principle as USEPA Method 26A. Includes sampling & analysis of soluble fluoride.

∞ Sampling follows USEPA Method 26A and analysis follows Ektimo 235 (ion chromatography) which uses the same principle as USEPA Method 26A and USEPA SW-846 Method 9056A (which is the NSW EPA approved alternative analysis method to USEPA Method 13B). Includes sampling &

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

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

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

6 Deviations to Test Methods

TM-9 FLUORINE

Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (NSW EPA) (2022) specifies TM-9 (USEPA 13B) for measurement of total fluoride emissions.

As per site-specific agreement between EnergyAustralia NSW and NSW EPA, Ektimo conducts sampling for particulate fluoride according to USEPA Method 26A (hydrogen halides and halogens) and analysis according to Ektimo Method 235 (ion chromatography). Ektimo Method 235 uses the same principle as USEPA SW-846 Method 9056A (which is the NSW EPA approved alternative analysis method to USEPA Method 13B).

Ektimo conducts sampling for soluble fluoride according to USEPA Method 26A (hydrogen halides and halogens) and analysis according to Ektimo Method 235 (ion chromatography) which uses the same principle as USEPA Method 26A.

NSW EPA TM-34 (USEPA 18)

Ektimo notes that the sampling and analysis of Volatile Organic Compounds (VOCs), per USEPA 18 has excluded the recovery study as specified in Section 8.4.3. Performing the recovery study described in Section 8.4.3 of USEPA Method 18 for analytes present at low levels is problematic. Given this, Ektimo applies a threshold of 50µg as a lower-bound mass, below which the 'spiking' of specific volatile organic compounds is not performed. For the purposes of this round of monitoring, no VOCs were detected above 10µg. Therefore, recovery studies were not deemed necessary for this sampling round.

7 Quality Assurance/Quality Control Information

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

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

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

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

8 Definitions

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

% v/v	Volume to volume ratio
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
APHA	American Public Health Association, Standard Methods for the Examination of Water and Waste Water
AS	Australian Standard
BaP-TEQ	Benzo(a)pyrene toxic equivalents
BSP	British standard pipe
CEM/CEMS	Continuous emission monitoring/Continuous emission monitoring system
CTM	Conditional test method
D	Duct diameter or equivalent duct diameter for rectangular ducts
D_{50}	'Cut size' of a cyclone is defined as the particle diameter at which the cyclone achieves a 50% collection efficiency i.e. half of the particles are retained by the cyclone and half pass through it. The D_{50} method simplifies the capture efficiency distribution by assuming that a given cyclone stage captures all of the particles with a diameter equal to or greater than the D_{50} of that cyclone and less than the D_{50} of the preceding cyclone.
DECC	Department of Environment & Climate Change (NSW)
Disturbance	A flow obstruction or instability in the direction of the flow which may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter.
DWER	Department of Water and Environmental Regulation (WA)
DEHP	Department of Environment and Heritage Protection (QLD)
EPA	Environment Protection Authority
FTIR	Fourier transform infra-red
ISC	Intersociety Committee, Methods of Air Sampling and Analysis
ISO	International Organisation for Standardisation
ITE	Individual threshold estimate
I-TEQ	International toxic equivalents
Lower bound	When an analyte is not present above the detection limit, the result is assumed to be equal to zero.
Medium bound	When an analyte is not present above the detection limit, the result is assumed to be equal to half of the detection limit.
NA	Not applicable
NATA	National Association of Testing Authorities
NIOSH	National Institute of Occupational Safety and Health
NT	Not tested or results not required
OM	Other approved method
OU	Odour unit. One OU is that concentration of odorant(s) at standard conditions that elicits a physiological response from a panel equivalent to that elicited by one Reference Odour Mass (ROM), evaporated in one cubic metre of neutral gas at standard conditions.
PM_{10}	Particulate matter having an equivalent aerodynamic diameter less than or equal to 10 microns (µm).
$PM_{2.5}$	Particulate matter having an equivalent aerodynamic diameter less than or equal to 2.5 microns (µm).
PSA	Particle size analysis. PSA provides a distribution of geometric diameters, for a given sample, determined using laser diffraction.
RATA	Relative accuracy test audit
Semi-quantified VOCs	Unknown VOCs (those for which an analytical standard is not available), are identified by matching the mass spectrum of the chromatographic peak to the NIST Standard Reference Database (version 14.0), with a match quality exceeding 70%. An estimated concentration is determined by matching the area of the peak with the nearest suitable compound in the analytical calibration standard mixture.
STP	Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0 °C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa.
TM	Test method
TOC	Total organic carbon. This is the sum of all compounds of carbon which contain at least one carbon-to-carbon bond, plus methane and its derivatives.
USEPA	United States Environmental Protection Agency
VDI	Verein Deutscher Ingenieure (Association of German Engineers)
Velocity difference	The percentage difference between the average of initial flows and after flows.
Vic EPA	Victorian Environment Protection Authority
VOC	Volatile organic compound. A carbon-based chemical compound with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the given conditions of use. VOCs may contain oxygen, nitrogen and other elements. VOCs do not include carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
WHO05-TEQ	World Health Organisation toxic equivalents
XRD	X-ray diffractometry
Upper bound	When an analyte is not present above the detection limit, the result is assumed to be equal to the detection limit.
95% confidence interval	Range of values that contains the true result with 95% certainty. This means there is a 5% risk that the true result is outside this range.

9 Appendices

Appendix A: Chains of Custody

Ektimo

Checked at Ektimo Dispatch by: Sign/Date 22/4/24

Samples received in good order: Sign/Date 24/4

Sample ID	Job No.	Analysis Required	Units Required	Analytical Lab	Purchase Order No.	Ektimo Contact	Notes	TAT Required (days)
N 21587	R016840	SO3	ug/litre	Ektimo		Rick Peralta	Imp 1-2 Blank	
N 21588	R016840	SO3	ug/litre	Ektimo		Rick Peralta	Imp 1-2	
N 21589	R016840	HF	ug/litre	Ektimo		Rick Peralta	Blank Filter	
N 21590	R016840	HF/HCl	ug/litre	Ektimo		Rick Peralta	Imp 1-2 Blank	
N 21591	R016840	Cl2	ug/litre	Ektimo		Rick Peralta	Imp 3-4 Blank	
N 21592	R016840	HF	ug/litre	Ektimo		Rick Peralta	Filter A	
N 21593	R016840	HF/HCL	ug/litre	Ektimo		Rick Peralta	Imp 1-2	
N 21594	R016840	Cl2	ug/litre	Ektimo		Rick Peralta	Imp 3-4	
N 21597	R016840	SO3	ug/litre	Ektimo		Rick Peralta	Imp A+B	
N 21598	R016840	HF	ug/litre	Ektimo		Rick Peralta	Filter A	
N 21599	R016840	HF/HCl	ug/litre	Ektimo		Rick Peralta	Imp A+B	
N 21600	R016840	Cl2	ug/litre	Ektimo		Rick Peralta	Imp A+B	

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Ektimo

Checked at Ektimo Dispatch by: Sign/Date 22/4/24

Samples received in good order: Sign/Date 24/4

Sample ID	Job No.	Analysis Required	Units Required	Analytical Lab	Purchase Order No.	Ektimo Contact	Notes	TAT Required (days)
N 21595	R016840	VOCs	ug/sample	Ektimo		Rick Peralta	Blank Tube	
N 21596	R016840	VOCs	ug/sample	Ektimo		Rick Peralta	Tube A	
N 21601	R016840	VOCs	ug/sample	Ektimo		Rick Peralta	Tube A	

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Appendix B: Laboratory Results

Ektimo

CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-005704
Job Number:	R016840
Date of Issue:	30/04/2024
Attention:	Energy Australia Mt Piper
Date samples received:	24/04/2024
Number of samples received:	3
Date samples analysed:	30/04/2024
No of samples analysed:	3
Test method(s) used:	Ektimo 235

Comments

QC Acceptance Criteria:

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

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

Ektimo

Analytical Results

Report No. LV-005704
Job No. R016840
Client Name: Energy Australia Mt Piper

Parameter	Analyte	Units	N 21589 Energy Australia Mt Piper All Locations Blank Filter (HF)	N 21592 Energy Australia Mt Piper EPA 4 Filter A	N 21598 Energy Australia Mt Piper EPA 6 Filter A
Sample Volume		mL	40	40	40
Hydrogen fluoride (HF)	F^-	µg/sample	16.65	111.75	171.73
PQL	<	µg/sample	4	4	4

Ektimo

CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-005699
Job Number:	R016840
Date of Issue:	30/04/2024
Attention:	Energy Australia Mt Piper
Date samples received:	24/04/2024
Number of samples received:	9
Date samples analysed:	30/04/2024
No of samples analysed:	9
Test method(s) used:	Ektimo 235

Comments

QC Acceptance Criteria:

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

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

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Ektimo

Analytical Results

Report No. LV-005699
Job No. R016840
Client Name: Energy Australia Mt Piper

Parameter	Analyte	Units	N 21589 Energy Australia Mt Piper All Locations Blank Filter (HF)	N 21592 Energy Australia Mt Piper EPA 4 Filter A	N 21598 Energy Australia Mt Piper EPA 6 Filter A	N 21590 Energy Australia Mt Piper All Locations Imp 1-2 Blank (HF/HCl)	N 21593 Energy Australia Mt Piper EPA 4 Imp 1-2	N 21599 Energy Australia Mt Piper EPA 6 Imp A+B	N 21591 Energy Australia Mt Piper All Locations Imp 3-4 Blank (Cl2)	N 21594 Energy Australia Mt Piper EPA 4 Imp 3-4
Sample Volume		mL	40	40	40	200	275	264	202	40
Hydrogen chloride (HCl)	Cl^-	mg/L				<0.1	15.19	16.72		
Chlorine (Cl_2)	Cl^-	mg/L							0.13	0.18
Hydrogen fluoride (HF)	F^-	mg/L	0.42	2.79	4.29	<0.1	73.60	60.45		
PQL	<	mg/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Parameter	Analyte	Units	N 21600 Energy Australia Mt Piper EPA 6 Imp A+B
Sample Volume		mL	196
Chlorine (Cl_2)	Cl^-	mg/L	0.21
PQL	<	mg/L	0.1

Ektimo

CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-005712
Job Number:	R016840
Date of Issue:	02/05/2024
Attention:	Energy Australia (Mt Piper)
Date samples received:	24/04/2024
Number of samples received:	3
Date samples analysed:	01/05/2024
No of samples analysed:	3
Test method(s) used:	Ektimo 235

Comments

QC Acceptance Criteria:

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

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

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Ektimo

Analytical Results

Report No. LV-005712
Job No. R016840
Client Name: Energy Australia (Mt Piper)

Parameter	Analyte	Units	N 21587 Energy Australia Mt Piper All Locations Imp 1-2 Blank (SO3)	N 21588 Energy Australia Mt Piper EPA 4 Imp 1-2	N 21597 Energy Australia Mt Piper EPA 6 Imp A+B
Sample Volume		mL	200	200	225
Sulfur trioxide (SO_3)	SO_4^{2-}	mg/L	<0.2	23.18	37.94
PQL	<	mg/L	0.2	0.2	0.2

Ektimo

CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-005731
Job Number:	R016840
Date of Issue:	10/05/2024
Attention:	Energy Australia (Mt Piper)
Date samples received:	24/04/2024
Number of samples received:	3
Date samples analysed:	10/05/2024
No of samples analysed:	3
Test method(s) used:	Ektimo 344

Comments

QC Acceptance Criteria:

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

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

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Ektimo

Analytical Results

Report No. LV-005731

Job No. R016840

Client Name: Energy Australia (Mt Piper)

Parameter	Units	N21595 R016840	N21596 R016840	N21601 R016840
	PQL	1.0	1.0	1.0
Ethanol	µg	<1	<1	<1
Acetone	µg	<1	2.5	<1
Isopropanol	µg	<1	<1	<1
Pentane	µg	<1	<1	<1
1,1-Dichloroethene	µg	<1	<1	<1
Acrylonitrile	µg	<1	<1	<1
Dichloromethane	µg	<1	<1	<1
trans-1,2-Dichloroethene	µg	<1	<1	<1
Methyl ethyl ketone	µg	<1	<1	<1
n-Hexane	µg	<1	<1	<1
cis-1,2-Dichloroethene	µg	<1	<1	<1
Ethyl acetate	µg	<1	<1	<1
Chloroform	µg	<1	<1	<1
1,1,1-Trichloroethane	µg	<1	<1	<1
1,2-Dichloroethane	µg	<1	<1	<1
Cyclohexane	µg	<1	<1	<1
Benzene	µg	<1	<1	<1
Carbon tetrachloride	µg	<1	<1	<1
Butanol	µg	<1	<1	<1
Isopropyl acetate	µg	<1	<1	<1
2-Methylhexane	µg	<1	<1	<1
2,3-Dimethylpentane	µg	<1	<1	<1
1-Methoxy-2-propanol	µg	<1	<1	<1
3-Methylhexane	µg	<1	<1	<1
Heptane	µg	<1	<1	<1
Trichloroethylene	µg	<1	<1	<1
Ethyl acrylate	µg	<1	<1	<1
Methyl methacrylate	µg	<1	<1	<1
Propyl acetate	µg	<1	<1	<1
Methylcyclohexane	µg	<1	<1	<1
Methyl Isobutyl Ketone	µg	<1	<1	<1
Toluene	µg	<1	<1	1.9
1,1,2-Trichloroethane	µg	<1	<1	<1
2-Hexanone	µg	<1	<1	<1
Octane	µg	<1	<1	<1
Tetrachloroethene	µg	<1	<1	<1
Butyl acetate	µg	<1	<1	<1
Chlorobenzene	µg	<1	<1	<1
Ethylbenzene	µg	<1	<1	<1
m + p-Xylene	µg	<1	<1	<1
1-Methoxy-2-propyl acetate	µg	<1	<1	<1
Styrene	µg	<1	<1	<1
o-Xylene	µg	<1	<1	<1
Butyl acrylate	µg	<1	<1	<1
Nonane	µg	<1	<1	<1

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

Ektimo

Analytical Results

Report No. LV-005731

Job No. R016840

Client Name: Energy Australia (Mt Piper)

Parameter	Units	N21595 R016840	N21596 R016840	N21601 R016840
	PQL	1.0	1.0	1.0
2-Butoxyethanol	µg	<1	<1	<1
Cellosolve acetate	µg	<1	<1	<1
1,1,2,2-Tetrachloroethane	µg	<1	<1	<1
Isopropylbenzene	µg	<1	<1	<1
alpha-Pinene	µg	<1	<1	<1
Propylbenzene	µg	<1	<1	<1
1,3,5-Trimethylbenzene	µg	<1	<1	<1
beta-Pinene	µg	<1	<1	<1
tert-Butylbenzene	µg	<1	<1	<1
1,2,4-Trimethylbenzene	µg	<1	<1	<1
Decane	µg	<1	<1	<1
3-Carene	µg	<1	<1	<1
1,2,3-Trimethylbenzene	µg	<1	<1	<1
D-Limonene	µg	<1	<1	<1
Undecane	µg	<1	<1	<1
Dodecane	µg	<1	<1	<1
Tridecane	µg	<1	<1	<1
Tetradecane	µg	<1	<1	<1
Residuals as Toluene	µg	<1	<1	4.3

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

Ektimo

ektimo.com.au
1300 364 005

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

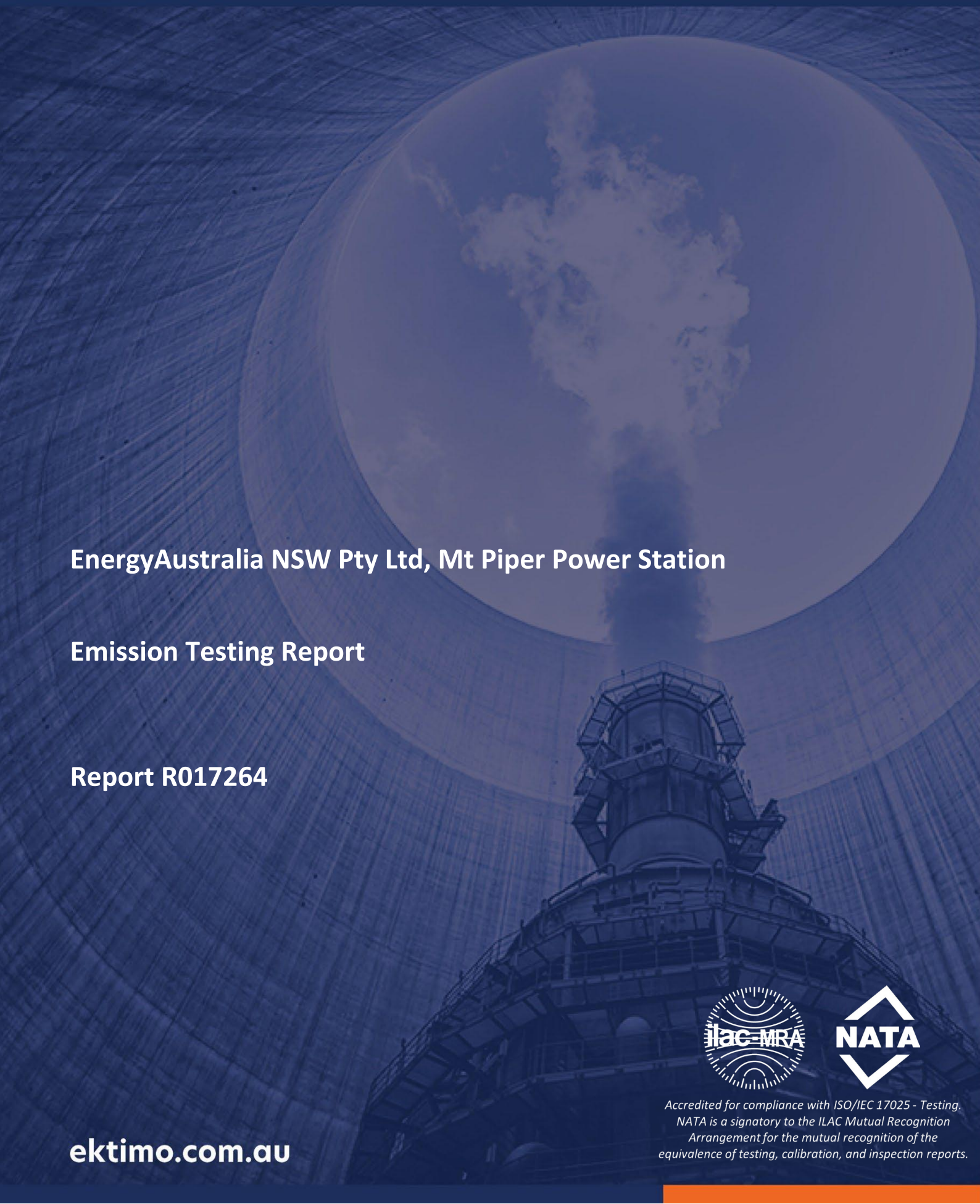
SYDNEY
6/78 Reserve Road
Artarmon
NSW 2064
AUSTRALIA

WOLLONGONG
1/251 Princes Highway
Unanderra
NSW 2526
AUSTRALIA

PERTH
52 Cooper Road
Cockburn Central
WA 6164
AUSTRALIA

BRISBANE
3/109 Riverside Place
Morningside
QLD 4170
AUSTRALIA

Ektimo



EnergyAustralia NSW Pty Ltd, Mt Piper Power Station

Emission Testing Report

Report R017264

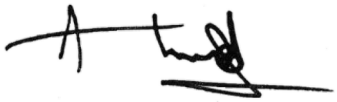
Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, calibration, and inspection reports.

ektimo.com.au

Document Information

Client Name:	EnergyAustralia NSW Pty Ltd (Mt Piper)
Report Number:	R017264
Date of Issue:	12 August 2024
Attention:	Jarvis Lulham
Address:	Mt Piper Power Station, Locked Mail Bag 1 Portland NSW 2847
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation



Ahmad Ramiz
Air Monitoring Consultant

NATA Accredited Laboratory
No. 14601

Aaron Davis
Ektimo Signatory

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.

Ektimo

Table of Contents

1 Executive Summary

1.1 Background

Ektimo was engaged by EnergyAustralia NSW Pty Ltd (Mt Piper) to perform emission testing at Mt Piper Power Station, Portland, NSW. Testing was carried out in accordance with Environment Protection Licence 13007.

1.2 Project Objective & Overview

The objective of the project was to conduct a monitoring programme to quantify emissions from four (4) discharge points to determine compliance with Energy Australia NSW Pty Ltd (Mt Piper)'s Environmental Licence.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
EPA 4 – Unit 1, Duct B	02 July 2024	Solid particles (total) Metals type 1 and 2 substances, copper, zinc
EPA 5 – Unit 1, Duct A	03 July 2024	Solid particles (total) Metals type 1 and 2 substances, copper, zinc
EPA 6 – Unit 2, Duct A	04 July 2024	Solid particles (total) Metals type 1 and 2 substances, copper, zinc
EPA 7 – Unit 2, Duct B	05 July 2024	Solid particles (total) Metals type 1 and 2 substances, copper, zinc

* 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 Results Summary

All analytes are within the licence limit set by the NSW EPA as per licence 13007 (last amended on 3 July 2024).

Report Number			R017264	R017264	
Test Date			3/07/24	2/07/24	
EPA			5	4	
Unit			Unit 1 Duct A	Unit 1 Duct B	
					EPA 2
	LIMIT	**UNITS**	*Measured Results*		*Combined Ducts*
Type 1 and Type 2 substances in aggregate	**0.6**	**mg/m³**	≤0.042	≤0.054	**≤0.05**
Antimony		mg/m³	<0.002	<0.002	<0.002
Arsenic (LBL)		mg/m³	<0.001	<0.0007	<0.0008
Beryllium		mg/m³	<0.0003	<0.0002	<0.0002
Cadmium	**0.03**	mg/m³	0.00084	0.001	**0.00093**
Chromium		mg/m³	0.011	0.0011	0.0055
Cobalt		mg/m³	<0.0004	<0.0003	<0.0003
Copper		mg/m³	0.0018	0.00061	0.0011
Lead (LBL)		mg/m³	<0.001	0.0012	<0.001
Manganese		mg/m³	0.0055	0.0011	0.0031
Mercury	**0.03**	mg/m³	0.00026	<0.0002	**<0.0002**
Nickel		mg/m³	0.0061	0.042	0.026
Selenium		mg/m³	0.012	0.0033	0.0072
Tin		mg/m³	<0.001	<0.0007	<0.0008
Vanadium		mg/m³	<0.0006	<0.0005	<0.0005
Zinc		mg/m³	0.0095	0.0037	0.0063
Flow rate (dry STP)		m³/s	267	333	-
Carbon dioxide		%	11.2	12.0	-
Oxygen		%	8.3	7.0	-
Solid particles	**50**	**mg/m³**	**3.0**	**1.6**	**2.2**

*Combined air emissions from **boiler 1** via points 4 & 5.*
All results corrected to 7% oxygen correction.

Ektimo

Report Number			R017264	R017264	
Test Date			4/07/24	3/07/24	
EPA			6	7	
Unit			Unit 2 Duct A	Unit 2 Duct B	
					EPA 3
	LIMIT	**UNITS**	*Measured Results*		*Combined Ducts*
Type 1 and Type 2 substances in aggregate	**0.6**	**mg/m³**	≤0.049	≤0.02	**≤0.03**
Antimony		mg/m³	<0.002	<0.002	<0.002
Arsenic (LBL)		mg/m³	<0.001	<0.001	<0.001
Beryllium		mg/m³	<0.0003	<0.0003	<0.0003
Cadmium	**0.03**	mg/m³	0.00097	0.00043	**0.00069**
Chromium		mg/m³	0.0015	0.0015	0.0015
Cobalt		mg/m³	<0.0004	<0.0004	<0.0004
Copper		mg/m³	0.0016	0.00069	0.0011
Lead (LBL)		mg/m³	0.001	0.00068	0.00084
Manganese		mg/m³	0.035	0.0066	0.02
Mercury	**0.03**	mg/m³	<0.0004	0.00064	**<0.0005**
Nickel		mg/m³	0.0014	0.00069	0.001
Selenium		mg/m³	<0.003	0.004	<0.004
Tin		mg/m³	<0.001	<0.001	<0.001
Vanadium		mg/m³	<0.0006	<0.0006	<0.0006
Zinc		mg/m³	0.014	0.01	0.012
Flow rate (dry STP)		m³/s	285	301	-
Carbon dioxide		%	11.5	11.0	-
Oxygen		%	8.3	8.9	-
Solid particles	**50**	**mg/m³**	**0.95**	**<1**	**<1**

*Combined air emissions from **boiler 2** via points 6 & 7*
All results corrected to 7% oxygen correction.

*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 EPA 4 – Unit 1, Duct B

Date	2/07/2024	**Client**	EnergyAustralia
Report	R017264	**Stack ID**	Mt Piper Power Station - EPA 4 Unit 1 Duct B (Lower)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Ahmad Ramiz/ Rick Peralta	**State**	NSW
Process Conditions	Load stable at 450MW		240531

Stack Parameters		
Moisture content, %v/v	5.5	
Gas molecular weight, g/g mole	29.6 (wet)	30.3 (dry)
Gas density at STP, kg/m³	1.32 (wet)	1.35 (dry)
Gas density at discharge conditions, kg/m³	0.81	
% Oxygen correction & Factor	7 %	1.00
Gas Flow Parameters		
Temperature, °C	128	
Temperature, K	401	
Velocity at sampling plane, m/s	16	
Volumetric flow rate, actual, m³/s	570	
Volumetric flow rate (wet STP), m³/s	350	
Volumetric flow rate (dry STP), m³/s	330	
Mass flow rate (wet basis), kg/h	1700000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	0821 - 1202	0821 - 1202	0821 - 1202
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	12	11.4	12.6
Oxygen	7	6.7	7.5

Isokinetic Results	Results		
Sampling time	0826-1207		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	1.6	1.6	32
Antimony	<0.002	<0.002	<0.03
Arsenic	<0.0007	<0.0007	<0.01
Beryllium	<0.0002	<0.0002	<0.005
Cadmium	**0.001**	**0.001**	**0.02**
Chromium	**0.0011**	**0.0011**	**0.022**
Cobalt	<0.0003	<0.0003	<0.006
Copper	**0.00061**	**0.00061**	**0.012**
Lead	**0.0011**	**0.0012**	**0.023**
Manganese	**0.0011**	**0.0011**	**0.022**
Mercury	<0.0002	<0.0002	<0.005
Nickel	**0.042**	**0.042**	**0.84**
Selenium	**0.0033**	**0.0033**	**0.065**
Tin	<0.0007	<0.0007	<0.01
Vanadium	<0.0005	<0.0005	<0.009
Zinc	**0.0036**	**0.0037**	**0.073**
Type 1 & 2 Substances			
Upper Bound			
Total Type 1 Substances	≤0.0048	≤0.0048	≤0.096
Total Type 2 Substances	≤0.049	≤0.049	≤0.98
Total Type 1 & 2 Substances	≤0.054	≤0.054	≤1.1
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		101	
Gravimetric analysis date (total particulate)		15-07-2024	

2.2 EPA 5 – Unit 1, Duct A

Date	3/07/2024	**Client**	EnergyAustralia
Report	R017264	**Stack ID**	Mt Piper Power Station - EPA 5 Unit 1 Duct A (Upper)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Ahmad Ramiz/Rick Peralta	**State**	NSW
Process Conditions	Load is stable at 450MW		240531

Stack Parameters		
Moisture content, %v/v	5.9	
Gas molecular weight, g/g mole	29.5 (wet)	30.3 (dry)
Gas density at STP, kg/m³	1.32 (wet)	1.35 (dry)
Gas density at discharge conditions, kg/m³	0.82	
% Oxygen correction & Factor	7 %	1.10
Gas Flow Parameters		
Temperature, °C	123	
Temperature, K	396	
Velocity at sampling plane, m/s	13	
Volumetric flow rate, actual, m³/s	460	
Volumetric flow rate (wet STP), m³/s	280	
Volumetric flow rate (dry STP), m³/s	270	
Mass flow rate (wet basis), kg/h	1300000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	1028 - 1408	1028 - 1408	1028 - 1408
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	11.2	11	11.5
Oxygen	8.3	8	8.5

Isokinetic Results	Results		
Sampling time	1028-1408		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	2.7	3	43
Antimony	<0.002	<0.002	<0.03
Arsenic	<0.0009	<0.001	<0.01
Beryllium	<0.0003	<0.0003	<0.004
Cadmium	**0.00077**	**0.00084**	**0.012**
Chromium	**0.0098**	**0.011**	**0.16**
Cobalt	<0.0004	<0.0004	<0.006
Copper	**0.0017**	**0.0018**	**0.026**
Lead	<0.0009	<0.001	<0.01
Manganese	**0.005**	**0.0055**	**0.08**
Mercury	**0.00024**	**0.00026**	**0.0038**
Nickel	**0.0056**	**0.0061**	**0.089**
Selenium	**0.011**	**0.012**	**0.17**
Tin	<0.0009	<0.001	<0.01
Vanadium	<0.0006	<0.0006	<0.009
Zinc	**0.0087**	**0.0095**	**0.14**
Type 1 & 2 Substances			
Upper Bound			
Total Type 1 Substances	≤0.0049	≤0.0053	≤0.078
Total Type 2 Substances	≤0.033	≤0.037	≤0.53
Total Type 1 & 2 Substances	≤0.038	≤0.042	≤0.61
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		100	
Gravimetric analysis date (total particulate)		15-07-2024	

2.3 EPA 6 – Unit 2, Duct A

Date	4/07/2024	**Client**	EnergyAustralia
Report	R017264	**Stack ID**	Mt Piper Power Station - EPA 6 Unit 2 Duct A (Lower)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Ahmad Ramiz/Rick Peralta	**State**	NSW
Process Conditions	Load Stable at 450MW		240531

Stack Parameters		
Moisture content, %v/v	5.3	
Gas molecular weight, g/g mole	29.7 (wet)	30.3 (dry)
Gas density at STP, kg/m³	1.32 (wet)	1.35 (dry)
Gas density at discharge conditions, kg/m³	0.85	
% Oxygen correction & Factor	7 %	1.10
Gas Flow Parameters		
Temperature, °C	111	
Temperature, K	385	
Velocity at sampling plane, m/s	13	
Volumetric flow rate, actual, m³/s	470	
Volumetric flow rate (wet STP), m³/s	300	
Volumetric flow rate (dry STP), m³/s	290	
Mass flow rate (wet basis), kg/h	1400000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	0820 - 1200	0820 - 1200	0820 - 1200
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	11.5	10.9	12.1
Oxygen	8.3	7.6	9

Isokinetic Results	Results		
Sampling time	0820-1200		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	0.86	0.95	15
Antimony	<0.002	<0.002	<0.03
Arsenic	<0.0009	<0.001	<0.01
Beryllium	<0.0003	<0.0003	<0.005
Cadmium	**0.00088**	**0.00097**	**0.015**
Chromium	**0.0014**	**0.0015**	**0.024**
Cobalt	<0.0004	<0.0004	<0.006
Copper	**0.0015**	**0.0016**	**0.025**
Lead	**0.00094**	**0.001**	**0.016**
Manganese	**0.032**	**0.035**	**0.54**
Mercury	<0.0003	<0.0004	<0.006
Nickel	**0.0012**	**0.0014**	**0.021**
Selenium	<0.003	<0.003	<0.05
Tin	<0.0009	<0.001	<0.01
Vanadium	<0.0005	<0.0006	<0.009
Zinc	**0.012**	**0.014**	**0.21**
Type 1 & 2 Substances			
Upper Bound			
Total Type 1 Substances	≤0.0049	≤0.0054	≤0.085
Total Type 2 Substances	≤0.039	≤0.043	≤0.67
Total Type 1 & 2 Substances	≤0.044	≤0.049	≤0.76
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		100	
Gravimetric analysis date (total particulate)		15-07-2024	

2.4 EPA 7 – Unit 2, Duct B

Date	3/07/2024	**Client**	EnergyAustralia
Report	R017264	**Stack ID**	Mt Piper Power Station - EPA 7 Unit 2 Duct B (Upper)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Ahmad Ramiz/Rick Peralta	**State**	NSW
Process Conditions	Load is stable at 450MW		240531

Stack Parameters		
Moisture content, %v/v	5.5	
Gas molecular weight, g/g mole	29.6 (wet)	30.2 (dry)
Gas density at STP, kg/m³	1.32 (wet)	1.35 (dry)
Gas density at discharge conditions, kg/m³	0.85	
% Oxygen correction & Factor	7 %	1.16
Gas Flow Parameters		
Temperature, °C	111	
Temperature, K	384	
Velocity at sampling plane, m/s	14	
Volumetric flow rate, actual, m³/s	500	
Volumetric flow rate (wet STP), m³/s	320	
Volumetric flow rate (dry STP), m³/s	300	
Mass flow rate (wet basis), kg/h	1500000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	0800 - 1141	0800 - 1141	0800 - 1141
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	11	10.1	11.6
Oxygen	8.9	8.5	9.4

Isokinetic Results	Results		
Sampling time	800-1140		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	<0.9	<1	<20
Antimony	<0.002	<0.002	<0.03
Arsenic	<0.0008	<0.001	<0.01
Beryllium	<0.0002	<0.0003	<0.004
Cadmium	**0.00037**	**0.00043**	**0.0067**
Chromium	**0.0013**	**0.0015**	**0.024**
Cobalt	<0.0003	<0.0004	<0.006
Copper	**0.00059**	**0.00069**	**0.011**
Lead	**0.00059**	**0.00068**	**0.011**
Manganese	**0.0057**	**0.0066**	**0.1**
Mercury	**0.00055**	**0.00064**	**0.0099**
Nickel	**0.00059**	**0.00069**	**0.011**
Selenium	**0.0034**	**0.004**	**0.062**
Tin	<0.0008	<0.001	<0.01
Vanadium	<0.0005	<0.0006	<0.009
Zinc	**0.0089**	**0.01**	**0.16**
Type 1 & 2 Substances			
Upper Bound			
Total Type 1 Substances	≤0.0041	≤0.0048	≤0.075
Total Type 2 Substances	≤0.013	≤0.015	≤0.23
Total Type 1 & 2 Substances	≤0.017	≤0.02	≤0.31
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		100	
Gravimetric analysis date (total particulate)		15-07-2024	

3 Sample Plane Compliance

3.1 EPA 4 – Unit 1, Duct B

Sampling Plane Details	
Source tested	Power plant - coal-fired
Pollution control equipment	Filter baghouse
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method	Conforming (alternative procedure)

3.2 EPA 5 – Unit 1, Duct A

Sampling Plane Details	
Source tested	Power plant - coal-fired
Pollution control equipment	Filter baghouse
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method	Conforming (alternative procedure)

3.3 EPA 6 – Unit 2, Duct A

Sampling Plane Details	
Source tested	Power plant - coal-fired
Pollution control equipment	Filter baghouse
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method	Conforming (alternative procedure)

3.4 EPA 7 – Unit 2, Duct B

Sampling Plane Details	
Source tested	Power plant - coal-fired
Pollution control equipment	Filter baghouse
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method	Conforming (alternative procedure)

4 Plant Operating Conditions

See Energy Australia Pty Ltd (Mt Piper) records for complete process conditions.

Based on information received from Energy Australia Pty Ltd (Mt Piper) personnel, it is our understanding that samples were collected during typical plant operations.

5 Test Methods

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

Parameter	Sampling method	Analysis method	Uncertainty*	NATA accredited	
				Sampling	Analysis
Sampling points - Selection	NSW EPA TM-1 (USEPA Method 1)	NA	NA	✓	NA
Flow rate, temperature & velocity	NSW EPA TM-2 (USEPA Method 2)	NSW EPA TM-2 (USEPA Method 2)	8%, 2%, 7%	NA	✓
Moisture content	NSW EPA TM-22 (USEPA Method 4)	NSW EPA TM-22 (USEPA Method 4)	8%	✓	✓
Molecular weight	NA	NSW EPA TM-23 (USEPA Method 3)	not specified	NA	✓
Dry gas density	NA	NSW EPA TM-23 (USEPA Method 3)	not specified	NA	✓
Carbon dioxide	NSW EPA TM-24 (USEPA Method 3A)	NSW EPA TM-24 (USEPA Method 3A)	13%	✓	✓
Oxygen	NSW EPA TM-25 (USEPA Method 3A)	NSW EPA TM-25 (USEPA Method 3A)	13%	✓	✓
Solid particles (total)	NSW EPA TM-15 (AS 4323.2)	NSW EPA TM-15 (AS 4323.2)	3%	✓	✓††
Total (gaseous & particulate) metals & metallic compounds	NSW EPA TM-12, NSW EPA TM-13, NSW EPA TM-14 (USEPA Method 29)	Envirolab in-house methods Metals-020/021/022	15%	✓	✓‡
Type 1 substances (As, Cd, Hg, Pb, Sb)	NSW EPA TM-12 (USEPA Method 29)	Envirolab in-house methods Metals-020/021/022	15%	✓	✓‡
Type 2 substances (Be, Cr, Co, Mn, Ni, Se, Sn, V)	NSW EPA TM-13 (USEPA Method 29)	Envirolab in-house methods Metals-020/021/022	15%	✓	✓‡

310524

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

†† Gravimetric analysis conducted at the Ektimo NSW laboratory.

‡ Analysis performed by Envirolab, NATA accreditation number 2901. Results were reported to Ektimo on 23 July 2024 in report 356641.

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
~	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
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.
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
RATA	Relative accuracy test audit
STP	Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0 °C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa.
TM	Test method
USEPA	United States Environmental Protection Agency
VDI	Verein Deutscher Ingenieure (Association of German Engineers)
Velocity difference	The percentage difference between the average of initial flows and after flows.
XRD	X-ray diffractometry
Upper bound	When an analyte is not present above the detection limit, the result is assumed to be equal to the detection limit.
95% confidence interval	Range of values that contains the true result with 95% certainty. This means there is a 5% risk that the true result is outside this range.

8 Appendices

Appendix A: Chain(s) of Custody

Ektimo

Checked at Ektimo Dispatch by: _____ Sign/Date 15/7/24

Samples received in good order: _____ Sign/Date

Sample ID	Job No.	Analysis Required	Units Required	Analytical Lab	Purchase Order No.	Ektimo Contact	Notes	TAT Required (days)
1 N 21977	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/sample	Envirolab	W014227	Ahmad Ramiz	Filter Blank	
2 N 21978	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/litre	Envirolab	W014227	Ahmad Ramiz	Blank 2 - 5% HNO3 / 10% H2O2	
3 N 21979	R017264	Hg	ug/litre	Envirlab	W014227	Ahmad Ramiz	Blank 4 - KmnO4	
4 N 21980	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/litre	Envirolab	W014227	Ahmad Ramiz	Blank 3 - 0.1N HNO3	
5 N 21981	R017264	Hg	ug/litre	Envirolab	W014227	Ahmad Ramiz	Blank 5 - HCl	
6 N 21982	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/sample	Envirolab	W014227	Ahmad Ramiz	Sample Filter	
7 N 21983	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 2 - Impinger 1-4 Contents	
8 N 21984	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 3 - Front/back half & Impingers 1-4 Rinse	
9 N 21985	R017264	Hg	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 4 - Impingers 5 & 6 Contents + Rinse 1	
10 N 21986	R017264	Hg	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 5 - Impingers 5 & 6 Rinse 2	
11 N 21987	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/sample	Envirolab	W014227	Ahmad Ramiz	Sample 1 - Sample Filter	
12 N 21988	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 2 - Impingers 1-4 Contents	
13 N 21989	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 3 - Front/back half & Impingers 1-4 Rinse	
14 N 21990	R017264	Hg	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 4 - Impingers 5 & 6 Contents + Rinse 1	
15 N 21991	R017264	Hg	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 5 - Impingers 5 & 6 Rinse 2	
16 N 21992	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/sample	Envirolab	W014227	Ahmad Ramiz	Sample 1 - Sample Filter	
17 N 21993	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 2 - Impingers 1-4 Contents	
18 N 21994	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 3 - Front/Back half & Impingers 1-4 Rinse	
19 N 21995	R017264	Hg	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 4 - Impingers 5 & 6 Contents + Rinse 1	
20 N 21996	R017264	Hg	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 5 - Impingers 5 & 6 Rinse 2	
21 N 21997	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/sample	Envirolab	W014227	Ahmad Ramiz	Sample 1 - Sample Filter	
22 N 21998	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 2 - Impingers 1-4 Contents	
23 N 21999	R017264	Metals - Type 1 & 2 substances (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V, Sn) Cu + Zn	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 3 - Front/back half & Impingers 1-4 Rinse	
24 N 22000	R017264	Hg	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 4 - Impingers 5 & 6 Contents + Rinse 1	
25 N 22001	R017264	Hg	ug/litre	Envirolab	W014227	Ahmad Ramiz	Sample 5 - Impingers 5 & 6 Rinse 2	

ENVIROLAB GROUP

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

Job No: 356641

Date Received: 16/7/24
Time Received: 1015
Received By: SY
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Appendix B: Laboratory Results

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 356641

Client Details

Client	Ektimo (Unanderra)
Attention	Ahmad Ramiz
Address	1/251 Princes Hwy, Unanderra, NSW, 2526

Sample Details

Your Reference	**R017264**
Number of Samples	5 Filter, 20 Liquid
Date samples received	16/07/2024
Date completed instructions received	16/07/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

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

Report Details

Date results requested by	23/07/2024
Date of Issue	23/07/2024

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

Results Approved By
Giovanni Agosti, Group Technical Manager

Authorised By
Nancy Zhang, Laboratory Manager

Metals on filters						
Our Reference		356641-1	356641-6	356641-11	356641-16	356641-21
Your Reference	UNITS	N 21977	N 21982	N 21987	N 21992	N 21997
Type of sample		Filter	Filter	Filter	Filter	Filter
Date prepared	-	22/07/2024	22/07/2024	22/07/2024	22/07/2024	22/07/2024
Date analysed	-	22/07/2024	22/07/2024	22/07/2024	22/07/2024	22/07/2024
Antimony	µg/filter	<5	<5	<5	<5	<5
Arsenic	µg/filter	<2	<2	<2	<2	<2
Cadmium	µg/filter	<0.5	<0.5	<0.5	<0.5	<0.5
Lead	µg/filter	<1	2	<1	<1	<1
Mercury	µg/filter	<0.2	<0.2	<0.2	<0.2	<0.2
Beryllium	µg/filter	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg/filter	1	4	26	3	3
Cobalt	µg/filter	<0.5	<0.5	<0.5	<0.5	<0.5
Manganese	µg/filter	<0.5	<0.5	3	<0.5	<0.5
Nickel	µg/filter	<1	2	13	1	<1
Selenium	µg/filter	<5	<5	10	<5	5
Vanadium	µg/filter	<1	<1	<1	<1	<1
Tin	µg/filter	<2	<2	<2	<2	<2
Copper	µg/filter	<0.5	<0.5	1	<0.5	<0.5
Zinc	µg/filter	<1	2	9	2	2

Metals in water - mass units						
Our Reference		356641-2	356641-3	356641-4	356641-5	356641-7
Your Reference	UNITS	N 21978	N 21979	N 21980	N 21981	N 21983
Type of sample		Liquid	Liquid	Liquid	Liquid	Liquid
Volume	mL	221	227	228	220	383
Antimony	µg	<0.5	[NA]	<0.5	[NT]	<0.5
Arsenic	µg	<0.5	[NA]	<0.5	[NA]	<0.5
Cadmium	µg	0.08	[NA]	<0.05	[NA]	3.4
Lead	µg	<0.5	[NA]	<0.5	[NA]	2
Mercury	µg	<10	<1	<1	<0.5	<10
Beryllium	µg	<0.5	[NA]	<0.5	[NA]	<0.5
Chromium	µg	<0.5	[NA]	<0.5	[NA]	1
Cobalt	µg	<0.5	[NA]	<0.5	[NA]	<0.5
Manganese	µg	<3	[NA]	<3	[NA]	<3
Nickel	µg	<0.5	[NA]	<0.5	[NA]	120
Selenium	µg	<0.5	[NA]	<0.5	[NA]	11
Vanadium	µg	<0.5	[NA]	<0.5	[NA]	<0.5
Tin	µg	<0.5	[NA]	<0.5	[NA]	<0.5
Copper	µg	<0.5	[NA]	<0.5	[NA]	2
Zinc	µg	<0.5	[NA]	<0.5	[NA]	6.6
Date prepared	-	18/07/2024	18/07/2024	18/07/2024	18/07/2024	18/07/2024
Date analysed	-	18/07/2024	18/07/2024	18/07/2024	18/07/2024	18/07/2024
Antimony-Dissolved	µg/L	<1	[NA]	<1	[NA]	<1
Arsenic-Dissolved	µg/L	<1	[NA]	<1	[NA]	<1
Cadmium-Dissolved	µg/L	0.3	[NA]	<0.1	[NA]	9.0
Lead-Dissolved	µg/L	<1	[NA]	<1	[NA]	5
Mercury-Dissolved	µg/L	<1	<0.1	<1	<0.05	<1
Beryllium-Dissolved	µg/L	<0.5	[NA]	<0.5	[NA]	<0.5
Chromium-Dissolved	µg/L	2	[NA]	<1	[NA]	3
Cobalt-Dissolved	µg/L	<1	[NA]	<1	[NA]	<1
Manganese-Dissolved	µg/L	<5	[NA]	<5	[NA]	5
Nickel-Dissolved	µg/L	<1	[NA]	<1	[NA]	320
Selenium-Dissolved	µg/L	<1	[NA]	<1	[NA]	29
Vanadium-Dissolved	µg/L	<1	[NA]	<1	[NA]	<1
Tin-Dissolved	µg/L	<1	[NA]	<1	[NA]	<1
Copper-Dissolved	µg/L	<1	[NA]	<1	[NA]	5
Zinc-Dissolved	µg/L	2	[NA]	2	[NA]	17

Metals in water - mass units						
Our Reference		356641-8	356641-9	356641-10	356641-12	356641-13
Your Reference	UNITS	N 21984	N 21985	N 21986	N 21988	N 21989
Type of sample		Liquid	Liquid	Liquid	Liquid	Liquid
Volume	mL	166	377	214	328	181
Antimony	µg	<0.5	[NA]	[NA]	<0.5	<0.5
Arsenic	µg	<0.5	[NA]	[NA]	<0.5	<0.5
Cadmium	µg	0.1	[NA]	[NA]	1.4	0.75
Lead	µg	<0.5	[NA]	[NA]	1	<0.5
Mercury	µg	<10	<1	<0.5	<10	<10
Beryllium	µg	<0.5	[NA]	[NA]	<0.5	<0.5
Chromium	µg	<0.5	[NA]	[NA]	2	<0.5
Cobalt	µg	<0.5	[NA]	[NA]	<0.5	<0.5
Manganese	µg	<3	[NA]	[NA]	7	4
Nickel	µg	18	[NA]	[NA]	2	<0.5
Selenium	µg	<0.5	[NA]	[NA]	20	<0.5
Vanadium	µg	<0.5	[NA]	[NA]	<0.5	<0.5
Tin	µg	<0.5	[NA]	[NA]	<0.5	<0.5
Copper	µg	<0.5	[NA]	[NA]	3	0.6
Zinc	µg	5	[NA]	[NA]	13	3
Date prepared	-	18/07/2024	18/07/2024	18/07/2024	18/07/2024	18/07/2024
Date analysed	-	18/07/2024	18/07/2024	18/07/2024	18/07/2024	18/07/2024
Antimony-Dissolved	µg/L	<1	[NA]	[NA]	<1	<1
Arsenic-Dissolved	µg/L	<1	[NA]	[NA]	<1	<1
Cadmium-Dissolved	µg/L	0.6	[NA]	[NA]	4.3	4.1
Lead-Dissolved	µg/L	<1	[NA]	[NA]	4	<1
Mercury-Dissolved	µg/L	<1	0.2	<0.05	<1	1.3
Beryllium-Dissolved	µg/L	<0.5	[NA]	[NA]	<0.5	<0.5
Chromium-Dissolved	µg/L	<1	[NA]	[NA]	6	<1
Cobalt-Dissolved	µg/L	<1	[NA]	[NA]	<1	<1
Manganese-Dissolved	µg/L	11	[NA]	[NA]	20	22
Nickel-Dissolved	µg/L	110	[NA]	[NA]	6	1
Selenium-Dissolved	µg/L	<1	[NA]	[NA]	60	<1
Vanadium-Dissolved	µg/L	<1	[NA]	[NA]	<1	<1
Tin-Dissolved	µg/L	<1	[NA]	[NA]	<1	<1
Copper-Dissolved	µg/L	1	[NA]	[NA]	9	3
Zinc-Dissolved	µg/L	29	[NA]	[NA]	39	15

Metals in water - mass units						
Our Reference		356641-14	356641-15	356641-17	356641-18	356641-19
Your Reference	UNITS	N 21990	N 21991	N 21993	N 21994	N 21995
Type of sample		Liquid	Liquid	Liquid	Liquid	Liquid
Volume	mL	395	188	383	150	389
Antimony	µg	[NA]	[NA]	<0.5	<0.5	[NA]
Arsenic	µg	[NA]	[NA]	<0.5	<0.5	[NA]
Cadmium	µg	[NA]	[NA]	2.2	0.5	[NA]
Lead	µg	[NA]	[NA]	2	<0.5	[NA]
Mercury	µg	<1	<0.5	<10	<10	<1
Beryllium	µg	[NA]	[NA]	<0.5	<0.5	[NA]
Chromium	µg	[NA]	[NA]	2	<0.5	[NA]
Cobalt	µg	[NA]	[NA]	<0.5	<0.5	[NA]
Manganese	µg	[NA]	[NA]	85	7	[NA]
Nickel	µg	[NA]	[NA]	2	<0.5	[NA]
Selenium	µg	[NA]	[NA]	4	<0.5	[NA]
Vanadium	µg	[NA]	[NA]	<0.5	<0.5	[NA]
Tin	µg	[NA]	[NA]	<0.5	<0.5	[NA]
Copper	µg	[NA]	[NA]	4	<0.5	[NA]
Zinc	µg	[NA]	[NA]	28	6.5	[NA]
Date prepared	-	18/07/2024	18/07/2024	18/07/2024	18/07/2024	18/07/2024
Date analysed	-	18/07/2024	18/07/2024	18/07/2024	18/07/2024	18/07/2024
Antimony-Dissolved	µg/L	[NA]	[NA]	<1	<1	[NA]
Arsenic-Dissolved	µg/L	[NA]	[NA]	<1	<1	[NA]
Cadmium-Dissolved	µg/L	[NA]	[NA]	5.7	3.0	[NA]
Lead-Dissolved	µg/L	[NA]	[NA]	6	3	[NA]
Mercury-Dissolved	µg/L	1.0	0.05	<1	1.9	0.3
Beryllium-Dissolved	µg/L	[NA]	[NA]	<0.5	<0.5	[NA]
Chromium-Dissolved	µg/L	[NA]	[NA]	6	1	[NA]
Cobalt-Dissolved	µg/L	[NA]	[NA]	<1	<1	[NA]
Manganese-Dissolved	µg/L	[NA]	[NA]	220	50	[NA]
Nickel-Dissolved	µg/L	[NA]	[NA]	6	2	[NA]
Selenium-Dissolved	µg/L	[NA]	[NA]	10	1	[NA]
Vanadium-Dissolved	µg/L	[NA]	[NA]	<1	<1	[NA]
Tin-Dissolved	µg/L	[NA]	[NA]	<1	<1	[NA]
Copper-Dissolved	µg/L	[NA]	[NA]	10	3	[NA]
Zinc-Dissolved	µg/L	[NA]	[NA]	74	43	[NA]

Metals in water - mass units						
Our Reference		356641-20	356641-22	356641-23	356641-24	356641-25
Your Reference	UNITS	N 21996	N 21998	N 21999	N 22000	N 22001
Type of sample		Liquid	Liquid	Liquid	Liquid	Liquid
Volume	mL	233	390	127	388	225
Antimony	µg	[NA]	<0.5	<0.5	[NA]	[NA]
Arsenic	µg	[NA]	<0.5	<0.5	[NA]	[NA]
Cadmium	µg	[NA]	0.78	0.4	[NA]	[NA]
Lead	µg	[NA]	1	0.7	[NA]	[NA]
Mercury	µg	<0.5	<10	<10	<1	1
Beryllium	µg	[NA]	<0.5	<0.5	[NA]	[NA]
Chromium	µg	[NA]	2	<0.5	[NA]	[NA]
Cobalt	µg	[NA]	<0.5	<0.5	[NA]	[NA]
Manganese	µg	[NA]	10	4	[NA]	[NA]
Nickel	µg	[NA]	2	<0.5	[NA]	[NA]
Selenium	µg	[NA]	5.4	<0.5	[NA]	[NA]
Vanadium	µg	[NA]	<0.5	<0.5	[NA]	[NA]
Tin	µg	[NA]	<0.5	<0.5	[NA]	[NA]
Copper	µg	[NA]	1	<0.5	[NA]	[NA]
Zinc	µg	[NA]	20	6.8	[NA]	[NA]
Date prepared	-	18/07/2024	18/07/2024	18/07/2024	18/07/2024	18/07/2024
Date analysed	-	18/07/2024	18/07/2024	18/07/2024	18/07/2024	18/07/2024
Antimony-Dissolved	µg/L	[NA]	<1	<1	[NA]	[NA]
Arsenic-Dissolved	µg/L	[NA]	<1	<1	[NA]	[NA]
Cadmium-Dissolved	µg/L	[NA]	2.0	3.4	[NA]	[NA]
Lead-Dissolved	µg/L	[NA]	3	5	[NA]	[NA]
Mercury-Dissolved	µg/L	<0.05	<1	2.2	0.3	5.7
Beryllium-Dissolved	µg/L	[NA]	<0.5	<0.5	[NA]	[NA]
Chromium-Dissolved	µg/L	[NA]	6	1	[NA]	[NA]
Cobalt-Dissolved	µg/L	[NA]	<1	<1	[NA]	[NA]
Manganese-Dissolved	µg/L	[NA]	34	32	[NA]	[NA]
Nickel-Dissolved	µg/L	[NA]	4	2	[NA]	[NA]
Selenium-Dissolved	µg/L	[NA]	14	<1	[NA]	[NA]
Vanadium-Dissolved	µg/L	[NA]	<1	<1	[NA]	[NA]
Tin-Dissolved	µg/L	[NA]	<1	<1	[NA]	[NA]
Copper-Dissolved	µg/L	[NA]	4	2	[NA]	[NA]
Zinc-Dissolved	µg/L	[NA]	50	53	[NA]	[NA]

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

QUALITY CONTROL: Metals on filters					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			22/07/2024	[NT]	[NT]	[NT]	[NT]	22/07/2024	[NT]
Date analysed	-			22/07/2024	[NT]	[NT]	[NT]	[NT]	22/07/2024	[NT]
Antimony	µg/filter	5	Metals-020/021/022	<5	[NT]	[NT]	[NT]	[NT]	102	[NT]
Arsenic	µg/filter	2	Metals-020/021/022	<2	[NT]	[NT]	[NT]	[NT]	103	[NT]
Cadmium	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	98	[NT]
Lead	µg/filter	1	Metals-020/021/022	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Mercury	µg/filter	0.2	Metals-020/021/022	<0.2	[NT]	[NT]	[NT]	[NT]	87	[NT]
Beryllium	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	106	[NT]
Chromium	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	99	[NT]
Cobalt	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	101	[NT]
Manganese	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	102	[NT]
Nickel	µg/filter	1	Metals-020/021/022	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Selenium	µg/filter	5	Metals-020/021/022	<5	[NT]	[NT]	[NT]	[NT]	89	[NT]
Vanadium	µg/filter	1	Metals-020/021/022	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Tin	µg/filter	2	Metals-020/021/022	<2	[NT]	[NT]	[NT]	[NT]	105	[NT]
Copper	µg/filter	0.5	Metals-020/021/022	<0.5	[NT]	[NT]	[NT]	[NT]	108	[NT]
Zinc	µg/filter	1	Metals-020/021/022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]

QUALITY CONTROL: Metals in water - mass units						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W8	356641-8
Antimony	µg	0.5	Metals-022	<0.5	7	<0.5	<0.5	0	[NT]	[NT]
Arsenic	µg	0.5	Metals-022	<0.5	7	<0.5	<0.5	0	[NT]	[NT]
Cadmium	µg	0.05	Metals-022	<0.05	7	3.4	3.3	3	[NT]	[NT]
Lead	µg	0.5	Metals-022	<0.5	7	2	2	0	[NT]	[NT]
Mercury	µg	0.5	Metals-021	<0.5	7	<10	<10	0	[NT]	[NT]
Beryllium	µg	0.5	Metals-022	<0.5	7	<0.5	<0.5	0	[NT]	[NT]
Chromium	µg	0.5	Metals-022	<0.5	7	1	1	0	[NT]	[NT]
Cobalt	µg	0.5	Metals-022	<0.5	7	<0.5	<0.5	0	[NT]	[NT]
Manganese	µg	3	Metals-022	<3	7	<3	<3	0	[NT]	[NT]
Nickel	µg	0.5	Metals-022	<0.5	7	120	120	0	[NT]	[NT]
Selenium	µg	0.5	Metals-022	<0.5	7	11	11	0	[NT]	[NT]
Vanadium	µg	0.5	Metals-022	<0.5	7	<0.5	<0.5	0	[NT]	[NT]
Tin	µg	0.5	Metals-022	<0.5	7	<0.5	<0.5	0	[NT]	[NT]
Copper	µg	0.5	Metals-022	<0.5	7	2	2	0	[NT]	[NT]
Zinc	µg	0.5	Metals-022	<0.5	7	6.6	6.3	5	[NT]	[NT]
Date prepared	-			18/07/2024	7	18/07/2024	18/07/2024		18/07/2024	18/07/2024
Date analysed	-			18/07/2024	7	18/07/2024	18/07/2024		18/07/2024	18/07/2024
Antimony-Dissolved	µg/L	1	Metals-022	<1	7	<1	<1	0	100	96
Arsenic-Dissolved	µg/L	1	Metals-022	<1	7	<1	<1	0	100	99
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	7	9.0	8.7	3	101	100
Lead-Dissolved	µg/L	1	Metals-022	<1	7	5	5	0	105	93
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	7	<1	<1	0	113	104
Beryllium-Dissolved	µg/L	0.5	Metals-022	<0.5	7	<0.5	<0.5	0	100	100
Chromium-Dissolved	µg/L	1	Metals-022	<1	7	3	3	0	95	88
Cobalt-Dissolved	µg/L	1	Metals-022	<1	7	<1	<1	0	102	88
Manganese-Dissolved	µg/L	5	Metals-022	<5	7	5	6	18	99	92
Nickel-Dissolved	µg/L	1	Metals-022	<1	7	320	310	3	99	93
Selenium-Dissolved	µg/L	1	Metals-022	<1	7	29	29	0	99	101
Vanadium-Dissolved	µg/L	1	Metals-022	<1	7	<1	<1	0	96	89
Tin-Dissolved	µg/L	1	Metals-022	<1	7	<1	<1	0	100	96
Copper-Dissolved	µg/L	1	Metals-022	<1	7	5	5	0	99	91
Zinc-Dissolved	µg/L	1	Metals-022	<1	7	17	17	0	101	97

QUALITY CONTROL: Metals in water - mass units					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Antimony	µg	0.5	Metals-022	[NT]	17	<0.5	[NT]		[NT]	[NT]
Arsenic	µg	0.5	Metals-022	[NT]	17	<0.5	[NT]		[NT]	[NT]
Cadmium	µg	0.05	Metals-022	[NT]	17	2.2	[NT]		[NT]	[NT]
Lead	µg	0.5	Metals-022	[NT]	17	2	[NT]		[NT]	[NT]
Mercury	µg	0.5	Metals-021	[NT]	17	<10	<10	0	[NT]	[NT]
Beryllium	µg	0.5	Metals-022	[NT]	17	<0.5	[NT]		[NT]	[NT]
Chromium	µg	0.5	Metals-022	[NT]	17	2	[NT]		[NT]	[NT]
Cobalt	µg	0.5	Metals-022	[NT]	17	<0.5	[NT]		[NT]	[NT]
Manganese	µg	3	Metals-022	[NT]	17	85	[NT]		[NT]	[NT]
Nickel	µg	0.5	Metals-022	[NT]	17	2	[NT]		[NT]	[NT]
Selenium	µg	0.5	Metals-022	[NT]	17	4	[NT]		[NT]	[NT]
Vanadium	µg	0.5	Metals-022	[NT]	17	<0.5	[NT]		[NT]	[NT]
Tin	µg	0.5	Metals-022	[NT]	17	<0.5	[NT]		[NT]	[NT]
Copper	µg	0.5	Metals-022	[NT]	17	4	[NT]		[NT]	[NT]
Zinc	µg	0.5	Metals-022	[NT]	17	28	[NT]		[NT]	[NT]
Date prepared	-			[NT]	17	18/07/2024	18/07/2024		[NT]	[NT]
Date analysed	-			[NT]	17	18/07/2024	18/07/2024		[NT]	[NT]
Antimony-Dissolved	µg/L	1	Metals-022	[NT]	17	<1	[NT]		[NT]	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	[NT]	17	<1	[NT]		[NT]	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	[NT]	17	5.7	[NT]		[NT]	[NT]
Lead-Dissolved	µg/L	1	Metals-022	[NT]	17	6	[NT]		[NT]	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	[NT]	17	<1	<1	0	[NT]	[NT]
Beryllium-Dissolved	µg/L	0.5	Metals-022	[NT]	17	<0.5	[NT]		[NT]	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	[NT]	17	6	[NT]		[NT]	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	[NT]	17	<1	[NT]		[NT]	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	[NT]	17	220	[NT]		[NT]	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	[NT]	17	6	[NT]		[NT]	[NT]
Selenium-Dissolved	µg/L	1	Metals-022	[NT]	17	10	[NT]		[NT]	[NT]
Vanadium-Dissolved	µg/L	1	Metals-022	[NT]	17	<1	[NT]		[NT]	[NT]
Tin-Dissolved	µg/L	1	Metals-022	[NT]	17	<1	[NT]		[NT]	[NT]
Copper-Dissolved	µg/L	1	Metals-022	[NT]	17	10	[NT]		[NT]	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	[NT]	17	74	[NT]		[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

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

Ektimo

ektimo.com.au
1300 364 005

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

SYDNEY
6/78 Reserve Road
Artarmon
NSW 2064
AUSTRALIA

WOLLONGONG
1/251 Princes Highway
Unanderra
NSW 2526
AUSTRALIA

PERTH
52 Cooper Road
Cockburn Central
WA 6164
AUSTRALIA

BRISBANE
3/109 Riverside Place
Morningside
QLD 4170
AUSTRALIA

Ektimo

Experts in air quality, odour and emission monitoring.

Emission Testing Report

Report: R017581

EnergyAustralia NSW Pty Ltd, Mt Piper Power Station

ilac-MRA NATA

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

Document Information

Client Name:	EnergyAustralia NSW Pty Ltd (Mt Piper)
Report Number:	R017581
Date of Issue:	5 December 2024
Attention:	Jarvis Lulham
Address:	Mt Piper Power Station, Locked Mail Bag 1 Portland NSW 2847
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation

Ahmad Ramiz
Air Monitoring Consultant

NATA Accredited Laboratory
No. 14601

Aaron Davis
Ektimo Signatory

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

Table of Contents

1 Executive Summary

1.1 Background

Ektimo was engaged by EnergyAustralia NSW Pty Ltd (Mt Piper) to perform emission testing at Mt Piper Power Station, Portland, NSW. Testing was carried out in accordance with Environment Protection Licence 13007.

1.2 Project Objective & Overview

The objective of the project was to conduct a monitoring programme to quantify emissions from two (2) discharge points to determine compliance with EnergyAustralia NSW Pty Ltd (Mt Piper)'s Environmental Licence.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
EPA 4 Unit 1B (Lower)	22/10/2024	Solid particles (Total) Sulfur trioxide (as SO_3) Oxygen (O_2) Carbon dioxide (CO_2)
		Fluorine and fluorine compounds as (as total fluoride) Hydrogen chloride (HCl) Chlorine and chlorine compounds (as Cl_2) Volatile organic compounds (VOCs) Oxygen (O_2) Carbon dioxide (CO_2) Nitrogen oxides (NO_x) Sulfur dioxide (SO_2)
EPA 5 Unit 1A (Upper)	23/10/2024	Solid Particles (Total) Oxygen (O_2) Carbon dioxide (CO_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 Results Summary

All analytes are within the licence limit set by the NSW EPA as per licence 13007 (last amended on 1 March 2024).

Report Number			R017581	R017581	
Test Date			23/10/24	22/10/24	
EPA			5	4	
Unit			Unit 1 Duct A	Unit 1 Duct B	
					EPA 2
	LIMIT	**UNITS**	*Measured Results*		*Combined Ducts*
Volatile organic compounds as n-propane equivalent	**10**	**mg/m³**	-	0.22	**-**
Fluorine	**30**	**mg/m³**	-	1.4	**-**
Hydrogen chloride	**50**	**mg/m³**	-	0.25	**-**
Chlorine	**20**	**mg/m³**	-	0.27	**-**
Sulfuric acid mist and sulfur trioxide (as SO_3)	**100**	**mg/m³**	-	2.1	**-**
Solid particles	**50**	**mg/m³**	**2.1**	**<1**	**<2**

*Combined air emissions from **boiler 1** via points 4 & 5 (except for PM10 and Coarse Particulates)*
All results corrected to 7% oxygen correction.

*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 EPA 4 - Unit 1, Duct B

Date	22/10/2024	**Client**	EnergyAustralia
Report	R017581	**Stack ID**	Mt Piper Power Station - EPA 4 Unit 1 Duct B (Lower)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Ahmad Ramiz/Morgan Knapton	**State**	NSW
Process Conditions	load stable at 350MW		241007

Stack Parameters		
Moisture content, %v/v	4.1	
Gas molecular weight, g/g mole	29.6 (wet)	30.1 (dry)
Gas density at STP, kg/m³	1.32 (wet)	1.34 (dry)
Gas density at discharge conditions, kg/m³	0.81	
% Oxygen correction & Factor	7 %	1.26
Gas Flow Parameters		
Temperature, °C	125	
Temperature, K	398	
Ambient pressure, kPa	91	
Stack pressure, kPa	90	
Velocity at sampling plane, m/s	12	
Volumetric flow rate, actual, m³/s	430	
Volumetric flow rate (wet STP), m³/s	260	
Volumetric flow rate (dry STP), m³/s	250	
Mass flow rate (wet basis), kg/h	1200000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	0855 - 1233	0855 - 1233	0855 - 1233
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	10.2	9.7	10.5
Oxygen	9.8	9.5	10.3

Isokinetic Results	Results		
Sampling time	0855-1233		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	<1	<1	<20
Sulfur trioxide and/or Sulfuric acid (as SO3)	1.7	2.1	25
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		99	
Gravimetric analysis date (total particulate)		28-10-2024	

Date	22/10/2024	**Client**	EnergyAustralia
Report	R017581	**Stack ID**	Mt Piper Power Station - EPA 4 Unit 1 Duct B (Lower)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Ahmad Ramiz/Morgan Knapton	**State**	NSW
Process Conditions	Load Stable at 280MW		241007

Stack Parameters		
Moisture content, %v/v	4	
Gas molecular weight, g/g mole	29.6 (wet)	30.1 (dry)
Gas density at STP, kg/m³	1.32 (wet)	1.34 (dry)
Gas density at discharge conditions, kg/m³	0.81	
% Oxygen correction & Factor	7 %	1.38
Gas Flow Parameters		
Temperature, °C	121	
Temperature, K	395	
Ambient pressure, kPa	91	
Stack pressure, kPa	90	
Velocity at sampling plane, m/s	10	
Volumetric flow rate, actual, m³/s	370	
Volumetric flow rate (wet STP), m³/s	230	
Volumetric flow rate (dry STP), m³/s	220	
Mass flow rate (wet basis), kg/h	1100000	

Gas Analyser Results	Average			Minimum			Maximum		
Sampling time	1304 - 1639			1304 - 1639			1304 - 1639		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Combustion Gases									
Nitrogen oxides (as NO_2)	400	550	5200	360	500	4700	430	590	5600
Sulfur dioxide	900	1200	12000	800	1100	10000	970	1300	13000
	Concentration % v/v			Concentration % v/v			Concentration % v/v		
Carbon dioxide	9.3			8.9			10		
Oxygen	10.9			10.1			11.4		

Isokinetic Results	Results		
Sampling time	1304-1639		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Chlorine	0.2	0.27	2.6
Total fluoride (as HF)	1	1.4	13
Hydrogen chloride	0.18	0.25	2.3
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		99	

Total VOCs (as n-Propane)	Results		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Total	0.16	0.22	2.1

VOC (speciated)	Results		
Sampling time	1343-1443		
( )	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Detection limit [1]	<0.06	<0.09	<0.8
Acetone	0.17	0.23	2.2
Toluene	0.077	0.11	1

(1) Unless otherwise reported, the following target compounds were found to be below detection:

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

2.2 EPA 5 - Unit 1, Duct A

Date	23/10/2024	**Client**	EnergyAustralia
Report	R017581	**Stack ID**	Mt Piper Power Station - EPA 5 Unit 1 Duct A (Upper)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Ahmad Ramiz/Morgan Knapton	**State**	NSW
Process Conditions	Load Stable at 350MW		*241007*

Stack Parameters		
Moisture content, %v/v	4.7	
Gas molecular weight, g/g mole	29.7 (wet)	30.2 (dry)
Gas density at STP, kg/m³	1.32 (wet)	1.35 (dry)
Gas density at discharge conditions, kg/m³	0.81	
% Oxygen correction & Factor	7 %	1.18
Gas Flow Parameters		
Temperature, °C	121	
Temperature, K	395	
Ambient pressure, kPa	90	
Stack pressure, kPa	90	
Velocity at sampling plane, m/s	10	
Volumetric flow rate, actual, m³/s	380	
Volumetric flow rate (wet STP), m³/s	230	
Volumetric flow rate (dry STP), m³/s	220	
Mass flow rate (wet basis), kg/h	1100000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	0928 - 1304	0928 - 1304	0928 - 1304
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	10.9	10.6	11.2
Oxygen	9.1	8.8	9.5

Isokinetic Results	Results		
Sampling time	0928-1304		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	1.7	2.1	23
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		100	
Gravimetric analysis date (total particulate)		28-10-2024	

3 Sample Plane Compliance

3.1 EPA 4 - Unit 1, Duct B

Sampling Plane Details	
Source tested	Power plant - coal-fired
Pollution control equipment	Filter baghouse
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method 1	Conforming (alternative procedure)

The sampling plane is deemed to be non-ideal 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

3.2 EPA 5 - Unit 1, Duct A

Sampling Plane Details	
Source tested	Power plant - coal-fired
Pollution control equipment	Filter baghouse
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method 1	Conforming (alternative procedure)

The sampling plane is deemed to be non-ideal 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

4 Plant Operating Conditions

See Energy Australia NSW Pty Ltd (Mt Piper) records for complete process conditions.

Based on information received from Energy Australia NSW Pty Ltd (Mt Piper) personnel, it is our understanding that samples were collected during typical plant operations.

5 Test Methods

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

Parameter	Sampling method	Analysis method	Uncertainty*	NATA accredited Sampling	NATA accredited Analysis
Sampling points - Selection	NSW EPA TM-1 (USEPA Method 1)	NA	NA	✓	NA
Flow rate, temperature & velocity	NSW EPA TM-2 (USEPA Method 2)	NSW EPA TM-2 (USEPA Method 2)	8%, 2%, 7%	NA	✓
Moisture content	NSW EPA TM-22 (USEPA Method 4)	NSW EPA TM-22 (USEPA Method 4)	8%	✓	✓
Molecular weight	NA	NSW EPA TM-23 (USEPA Method 3)	not specified	NA	✓
Dry gas density	NA	NSW EPA TM-23 (USEPA Method 3)	not specified	NA	✓
Carbon dioxide	NSW EPA TM-24 (USEPA Method 3A)	NSW EPA TM-24 (USEPA Method 3A)	13%	✓	✓
Oxygen	NSW EPA TM-25 (USEPA Method 3A)	NSW EPA TM-25 (USEPA Method 3A)	13%	✓	✓
Hydrogen halides & halogens∞	USEPA Method 26A	Ektimo 235	14%	✓	✓[†]
Hydrogen halides (including soluble fluoride)[2]	NSW EPA TM-8 (USEPA Method 26A)	Ektimo 235	not specified	✓	✓[†i]
Speciated volatile organic compounds (VOCs)	NSW EPA TM-34[d] (USEPA Method 18)	Ektimo 344	19%	✓	✓[†]
Solid particles (total)	NSW EPA TM-15 (AS 4323.2)	NSW EPA TM-15 (AS 4323.2)	3%	✓	✓[††]
Hydrogen chloride	NSW EPA TM-8 (USEPA Method 26A)	Ektimo 235	14%	✓	✓[†i]
Chlorine	NSW EPA TM-7 (USEPA Method 26A)	Ektimo 235	14%	✓	✓[†i]
Sulfuric acid mist and/or sulfur trioxide	NSW EPA TM-3 (USEPA Method 8)	Ektimo 235	16%	✓	✓[†m]

071124

* 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 November 2024 in report LV-006416.
11 November 2024 in report LV-006428.
11 November 2024 in report LV-006433.
13 November 2024 in report LV-006448.

†† Gravimetric analysis conducted at the Ektimo NSW laboratory.

[2] Sampling follows USEPA Method 26A and analysis follows Ektimo 235 (ion chromatography) which uses the same principle as USEPA Method 26A. Includes sampling & analysis of soluble fluoride.

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

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

∞ Sampling follows USEPA Method 26A and analysis follows Ektimo 235 (ion chromatography) which uses the same principle as USEPA Method 26A and USEPA SW-846 Method 9056A (which is the NSW EPA approved alternative analysis method to USEPA Method 13B). Includes sampling & analysis of particulate fluoride.

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

6 Deviations to Test Methods

TM-9 FLUORINE

Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (NSW EPA) (2022) specifies TM-9 (USEPA 13B) for measurement of total fluoride emissions.

As per site-specific agreement between EnergyAustralia NSW and NSW EPA, Ektimo conducts sampling for particulate fluoride according to USEPA Method 26A (hydrogen halides and halogens) and analysis according to Ektimo Method 235 (ion chromatography). Ektimo Method 235 uses the same principle as USEPA SW-846 Method 9056A (which is the NSW EPA approved alternative analysis method to USEPA Method 13B).

Ektimo conducts sampling for soluble fluoride according to USEPA Method 26A (hydrogen halides and halogens) and analysis according to Ektimo Method 235 (ion chromatography) which uses the same principle as USEPA Method 26A.

NSW EPA TM-34 (USEPA 18)

Ektimo notes that the sampling and analysis of Volatile Organic Compounds (VOCs), per USEPA 18 has excluded the recovery study as specified in Section 8.4.3. Performing the recovery study described in Section 8.4.3 of USEPA Method 18 for analytes present at low levels is problematic. Given this, Ektimo applies a threshold of 50µg as a lower-bound mass, below which the 'spiking' of specific volatile organic compounds is not performed. For the purposes of this round of monitoring, no VOCs were detected above 50µg. Therefore, recovery studies were not deemed necessary for this sampling round.

7 Quality Assurance/Quality Control Information

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

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

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

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

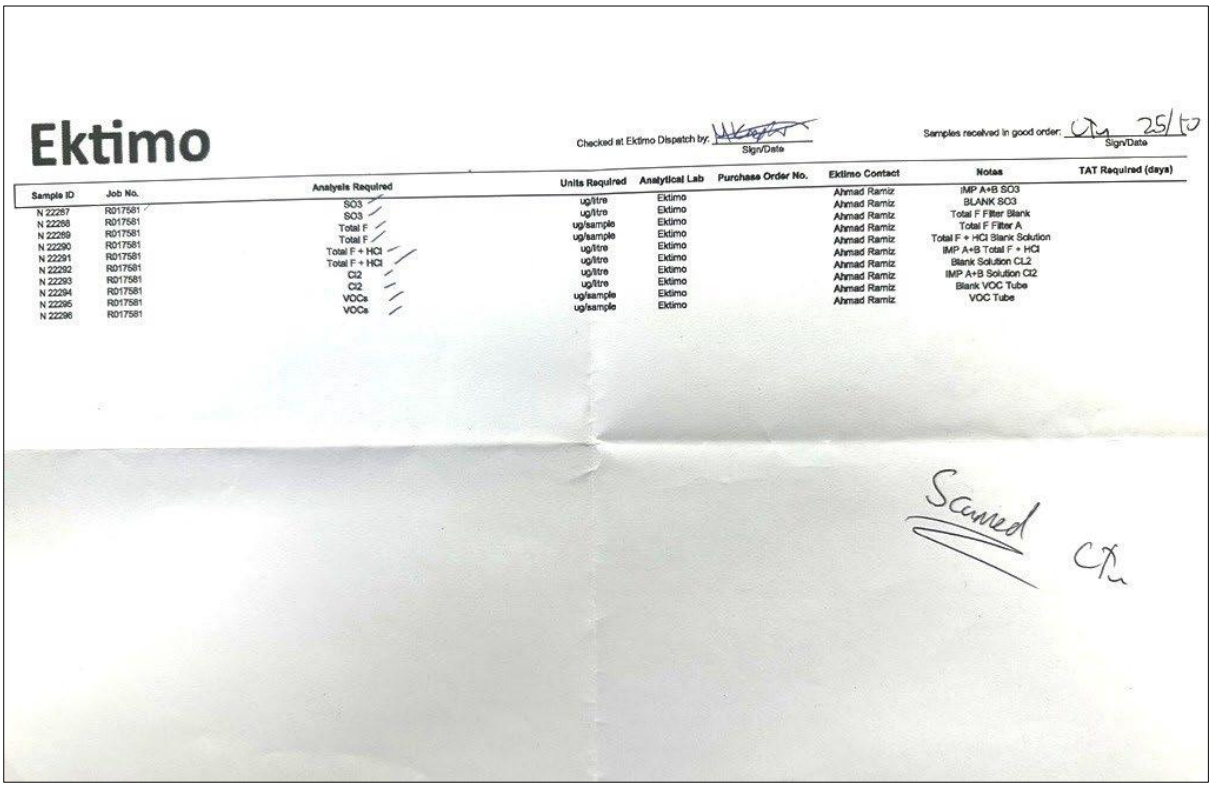
8 Definitions

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

% v/v	Volume to volume ratio, 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

9 Appendices

Appendix A: Chain(s) of Custody



Ektimo

Checked at Ektimo Dispatch by: _____ Sign/Date

Samples received in good order: _____ Sign/Date 25/12

Sample ID	Job No.	Analysis Required	Units Required	Analytical Lab	Purchase Order No.	Ektimo Contact	Notes	TAT Required (days)
N 22287	R017581	SO3	ug/litre	Ektimo		Ahmad Ramiz	IMP A+B SO3	
N 22288	R017581	SO3	ug/litre	Ektimo		Ahmad Ramiz	BLANK SO3	
N 22289	R017581	Total F	ug/sample	Ektimo		Ahmad Ramiz	Total F Filter Blank	
N 22290	R017581	Total F	ug/sample	Ektimo		Ahmad Ramiz	Total F Filter A	
N 22291	R017581	Total F + HCl	ug/litre	Ektimo		Ahmad Ramiz	Total F + HCl Blank Solution	
N 22292	R017581	Total F + HCl	ug/litre	Ektimo		Ahmad Ramiz	IMP A+B Total F + HCl	
N 22293	R017581	Cl2	ug/litre	Ektimo		Ahmad Ramiz	Blank Solution CL2	
N 22294	R017581	Cl2	ug/litre	Ektimo		Ahmad Ramiz	IMP A+B Solution Cl2	
N 22295	R017581	VOCs	ug/sample	Ektimo		Ahmad Ramiz	Blank VOC Tube	
N 22296	R017581	VOCs	ug/sample	Ektimo		Ahmad Ramiz	VOC Tube	

Scanned

Appendix B: Laboratory Results

1300 364 005
+61 2 4003 3296
info@ektimo.com.au
ektimo.com.au
ABN 86 600 381 413

CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-006416
Job Number:	R017581
Date of Issue:	6/11/2024
Attention:	Energy Australia (Mt Piper)
Address:	Mt Piper Power Station, Locked Mail Bag 1 Portland NSW 2847
Date samples received:	25/10/2024
Number of samples received:	2
Date samples analysed:	1/11/2024
No of samples analysed:	2
Test method(s) used:	Ektimo 235

Comments

QC Acceptance Criteria:

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

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

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REPORT AUTHORISATION

Version: 200924

Cappi Tuffery
Laboratory Chemist

Daniel Balaam
Senior Laboratory Chemist

NATA Accredited Laboratory 14601

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

Ektimo

Ektimo Analytical Results

Report No. LV-006416
Job No. R017581
Client Name: Energy Australia (Mt Piper)

Parameter	Analyte	Units	N 22287 Energy Australia (Mt Piper) EPA 4 U1B Imp A+B (SO3)	N 22288 Energy Australia (Mt Piper) EPA 4 U1B Blank Solution
Sample Volume		mL	128	174
Sulfur trioxide (SO_3)	SO_4^{2-}	mg/L	35.82	0.30
PQL	<	mg/L	0.2	0.2

1300 364 005
+61 2 4003 3296
info@ektimo.com.au
ektimo.com.au
ABN 86 600 381 413

CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-006428
Job Number:	R017581
Date of Issue:	11/11/2024
Attention:	Energy Australia (Mt Piper)
Address:	Mt Piper Power Station, Locked Mail Bag 1 Portland NSW 2847
Date samples received:	25/10/2024
Number of samples received:	4
Date samples analysed:	6/11/2024
No of samples analysed:	4
Test method(s) used:	Ektimo 235

Comments

QC Acceptance Criteria:

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

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

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Daniel Balaam
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Ektimo

Ektimo Analytical Results

Report No. LV-006428
Job No. R017581
Client Name: Energy Australia (Mt Piper)

Parameter	Analyte	Units	N 22291 Energy Australia (Mt Piper) EPA 4 U1B Blank Solution (HF + HCl)	N 22292 Energy Australia (Mt Piper) EPA 4 U1B Imp A+B	N 22293 Energy Australia (Mt Piper) EPA 4 U1B Blank Solution (Cl2)	N 22294 Energy Australia (Mt Piper) EPA 4 U1B Imp A+B
Sample Volume		mL	170	235	138	206
Hydrogen chloride (HCl)	Cl^-	mg/L	0.48	1.80		
Chlorine (Cl_2)	Cl^-	mg/L			2.93	2.91
Hydrogen fluoride (HF)	F^-	mg/L	0.13	7.32		
PQL	<	mg/L	0.1	0.1	0.1	0.1

1300 364 005
+61 2 4003 3296
info@ektimo.com.au
ektimo.com.au
ABN 86 600 381 413

CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-006433
Job Number:	R017581
Date of Issue:	11/11/2024
Attention:	Energy Australia (Mt Piper)
Address:	Mt Piper Power Station, Locked Mail Bag 1 Portland NSW 2847
Date samples received:	25/10/2024
Number of samples received:	2
Date samples analysed:	6/11/2024
No of samples analysed:	2
Test method(s) used:	Ektimo 235

Comments

QC Acceptance Criteria:

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

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

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REPORT AUTHORISATION

Version: 200924

Cappi Tuffery
Laboratory Chemist

Daniel Balaam
Senior Laboratory Chemist

NATA Accredited Laboratory 14601

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Ektimo

Ektimo Analytical Results

Report No. LV-006433
Job No. R017581
Client Name: Energy Australia (Mt Piper)

Parameter	Analyte	Units	N 22289 Energy Australia (Mt Piper) EPA 4 U1B Blank Filter (HF)	N 22290 Energy Australia (Mt Piper) EPA 4 U1B Filter A
Sample Volume		mL	40	40
Hydrogen fluoride (HF)	F^-	µg/sample	<4	196.96
PQL	<	µg/sample	4	4

1300 364 005
+61 2 4003 3296
info@ektimo.com.au
ektimo.com.au
ABN 86 600 381 413

CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-006448
Job Number:	R017581
Date of Issue:	13/11/2024
Attention:	Energy Australia (Mt Piper)
Address:	Mt Piper Power Station, Locked Mail Bag 1 Portland NSW 2847
Date samples received:	25/10/2024
Number of samples received:	2
Date samples analysed:	7/11/2024
No of samples analysed:	2
Test method(s) used:	Ektimo 344

Comments

QC Acceptance Criteria:

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

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

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REPORT AUTHORISATION

Version: 200924

Matthew Cook
Laboratory Manager

Daniel Balaam
Senior Laboratory Chemist

NATA Accredited Laboratory 14601

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Ektimo

Ektimo Analytical Results

Report No. LV-006448
Job No. R017581
Client Name: Energy Australia (Mt Piper)

Parameter	Units	N22295 R017581	N22296 R017581
	PQL	1.0	1.0
Ethanol	µg	<1	<1
Acetone	µg	<1	2.6
Isopropanol	µg	<1	<1
Pentane	µg	<1	<1
1,1-Dichloroethene	µg	<1	<1
Acrylonitrile	µg	<1	<1
Dichloromethane	µg	<1	<1
trans-1,2-Dichloroethene	µg	<1	<1
Methyl ethyl ketone	µg	<1	<1
n-Hexane	µg	<1	<1
cis-1,2-Dichloroethene	µg	<1	<1
Ethyl acetate	µg	<1	<1
Chloroform	µg	<1	<1
1,1,1-Trichloroethane	µg	<1	<1
1,2-Dichloroethane	µg	<1	<1
Cyclohexane	µg	<1	<1
Benzene	µg	<1	<1
Carbon tetrachloride	µg	<1	<1
Butanol	µg	<1	<1
Isopropyl acetate	µg	<1	<1
2-Methylhexane	µg	<1	<1
2,3-Dimethylpentane	µg	<1	<1
1-Methoxy-2-propanol	µg	<1	<1
3-Methylhexane	µg	<1	<1
Heptane	µg	<1	<1
Trichloroethylene	µg	<1	<1
Ethyl acrylate	µg	<1	<1
Methyl methacrylate	µg	<1	<1
Propyl acetate	µg	<1	<1
Methylcyclohexane	µg	<1	<1
Methyl Isobutyl Ketone	µg	<1	<1
Toluene	µg	<1	1.2
1,1,2-Trichloroethane	µg	<1	<1
2-Hexanone	µg	<1	<1
Octane	µg	<1	<1
Tetrachloroethene	µg	<1	<1
Butyl acetate	µg	<1	<1
Chlorobenzene	µg	<1	<1
Ethylbenzene	µg	<1	<1
m + p-Xylene	µg	<1	<1
1-Methoxy-2-propyl acetate	µg	<1	<1
Styrene	µg	<1	<1
o-Xylene	µg	<1	<1
Butyl acrylate	µg	<1	<1
Nonane	µg	<1	<1

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

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Results page 2 of 3

Ektimo

Ektimo Analytical Results

Report No. LV-006448
Job No. R017581
Client Name: Energy Australia (Mt Piper)

Parameter	Units	N22295 R017581	N22296 R017581
	PQL	1.0	1.0
2-Butoxyethanol	µg	<1	<1
Cellosolve acetate	µg	<1	<1
1,1,2,2-Tetrachloroethane	µg	<1	<1
Isopropylbenzene	µg	<1	<1
alpha-Pinene	µg	<1	<1
Propylbenzene	µg	<1	<1
1,3,5-Trimethylbenzene	µg	<1	<1
beta-Pinene	µg	<1	<1
tert-Butylbenzene	µg	<1	<1
1,2,4-Trimethylbenzene	µg	<1	<1
Decane	µg	<1	<1
3-Carene	µg	<1	<1
1,2,3-Trimethylbenzene	µg	<1	<1
D-Limonene	µg	<1	<1
Undecane	µg	<1	<1
Dodecane	µg	<1	<1
Tridecane	µg	<1	<1
Tetradecane	µg	<1	<1
Residuals as Toluene	µg	<1	<1

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

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Results page 3 of 3

Ektimo

Experts in air quality, odour and emission monitoring.

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

Wollongong
1/10 Doyle Ave
Unanderra
NSW 2526

Brisbane
3/109 Riverside Pl
Morningside
QLD 4170

Perth
52 Cooper Rd
Cockburn Central
WA 6164

1300 364 005

ektimo.com.au

Ektimo

Experts in air quality, odour and emission monitoring.

Emission Testing Report

Report: R017581-1a2r

EnergyAustralia NSW Pty Ltd, Mt Piper Power Station

ilac-MRA NATA

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Document Information

Client Name:	EnergyAustralia NSW Pty Ltd (Mt Piper)
Report Number:	R017581-1a2r
Date of Issue:	5 February 2025
Attention:	Jarvis Lulham
Address:	Mt Piper Power Station, Locked Mail Bag 1 Portland NSW 2847
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Reissue Record

Original Document Number	Initiator	Original Report Date	Section (s)	Reason for reissue
R017581-1	Client	18 December 2024	2.1-EPA 6 – Unit 2, Duct A. 3.1-EPA 6 – Unit 2, Duct A.	Amend – Incorrect reference Unit 1 instead of Unit 2.
R017581-1a	Client	16 January 2025	2.1-EPA 6 – Unit 2, Duct A.	VOCs updated
R017581-1a2	Client	16 January 2025	Appendix B: Laboratory Results	VOCs note added.

Report Authorisation

Ahmad Ramiz
Air Monitoring Consultant

NATA Accredited Laboratory
No. 14601

Aaron Davis
Ektimo Signatory

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

Table of Contents

1 Executive Summary

1.1 Background

Ektimo was engaged by EnergyAustralia NSW Pty Ltd (Mt Piper) to perform emission testing at Mt Piper Power Station, Portland, NSW. Testing was carried out in accordance with Environment Protection Licence 13007.

1.2 Project Objective & Overview

The objective of the project was to conduct a monitoring programme to quantify emissions from two (2) discharge points to determine compliance with EnergyAustralia NSW Pty Ltd (Mt Piper)'s Environmental Licence.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
EPA 6 Unit 2A (Lower)	27/11/2024	Solid particles (Total) Sulfur trioxide (as SO_3) Oxygen (O_2) Carbon dioxide (CO_2)
		Fluorine and fluorine compounds as (as total fluoride) Hydrogen chloride (HCl) Chlorine and chlorine compounds (as Cl_2) Volatile organic compounds (VOCs) Oxygen (O_2) Carbon dioxide (CO_2) Nitrogen oxides (NO_x) Sulfur dioxide (SO_2)
EPA 7 Unit 2B (Upper)	28/11/2024	Solid Particles (Total) Oxygen (O_2) Carbon dioxide (CO_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 Results Summary

All analytes are within the licence limit set by the NSW EPA as per licence 13007 (last amended on 3 July 2024).

Report Number			R017581-1	R017581-1	
Test Date			27/11/24	28/11/24	
EPA			6	7	
Unit			Unit 2 Duct A	Unit 2 Duct B	
					EPA 3
	LIMIT	**UNITS**	*Measured Results*		*Combined Ducts*
Volatile organic compounds as n-propane equivalent	**8**	**mg/m³**	0.038	-	**-**
Fluorine	**30**	**mg/m³**	10	-	**-**
Hydrogen chloride	**50**	**mg/m³**	3	-	**-**
Chlorine	**4**	**mg/m³**	<0.01	-	**-**
Sulfuric acid mist and sulfur trioxide (as SO_3)	**100**	**mg/m³**	1.3	-	**-**
Solid particles	**50**	**mg/m³**	**2.2**	**4.6**	**3.4**

*Combined air emissions from **boiler 2** via points 6 & 7 (except for PM10 and Coarse Particulates)*
All results corrected to 7% oxygen correction.

*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 EPA 6 – Unit 2, Duct A

Date	27/11/2024	**Client**	EnergyAustralia
Report	R017581-1	**Stack ID**	Mt Piper Power Station - EPA 6 Unit 2 Duct A (Lower)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Ahmad ramiz/Sahad Musthafa	**State**	NSW
Process Conditions	Load Stabled at 450MW		241121

Stack Parameters		
Moisture content, %v/v	5.4	
Gas molecular weight, g/g mole	29.6 (wet)	30.3 (dry)
Gas density at STP, kg/m³	1.32 (wet)	1.35 (dry)
Gas density at discharge conditions, kg/m³	0.83	
% Oxygen correction & Factor	7 %	1.15
Gas Flow Parameters		
Temperature, °C	111	
Temperature, K	384	
Ambient pressure, kPa	90	
Stack pressure, kPa	90	
Velocity at sampling plane, m/s	14	
Volumetric flow rate, actual, m³/s	490	
Volumetric flow rate (wet STP), m³/s	310	
Volumetric flow rate (dry STP), m³/s	290	
Mass flow rate (wet basis), kg/h	1500000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	0830 - 1207	0830 - 1207	0830 - 1207
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	11.2	10.3	12.3
Oxygen	8.8	7.8	9.4

Isokinetic Results	Results		
Sampling time	0828-1207		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	1.9	2.2	34
Sulfur trioxide and/or Sulfuric acid (as SO3)	1.1	1.3	20
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		101	
Gravimetric analysis date (total particulate)		02-12-2024	

Date	27/11/2024	**Client**	EnergyAustralia
Report	R017581-1	**Stack ID**	Mt Piper Power Station - EPA 6 Unit 2 Duct A (Lower)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Ahmad ramiz/Sahad Musthafa	**State**	NSW
Process Conditions	Load Stabled at 500MW		241121

Stack Parameters		
Moisture content, %v/v	5.7	
Gas molecular weight, g/g mole	29.6 (wet)	30.4 (dry)
Gas density at STP, kg/m³	1.32 (wet)	1.35 (dry)
Gas density at discharge conditions, kg/m³	0.82	
% Oxygen correction & Factor	7 %	1.09
Gas Flow Parameters		
Temperature, °C	120	
Temperature, K	393	
Ambient pressure, kPa	90	
Stack pressure, kPa	90	
Velocity at sampling plane, m/s	16	
Volumetric flow rate, actual, m³/s	560	
Volumetric flow rate (wet STP), m³/s	350	
Volumetric flow rate (dry STP), m³/s	330	
Mass flow rate (wet basis), kg/h	1700000	

Gas Analyser Results	Average			Minimum			Maximum		
Sampling time	1230 - 1608			1230 - 1608			1230 - 1608		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Combustion Gases									
Nitrogen oxides (as NO_2)	450	490	8900	370	410	7300	610	670	12000
Sulfur dioxide	1100	1300	22000	1000	1100	20000	1200	1400	24000
	Concentration % v/v			Concentration % v/v			Concentration % v/v		
Carbon dioxide	11.8			10.7			13.3		
Oxygen	8.2			6.4			9.5		

Isokinetic Results	Results		
Sampling time	1230-1608		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Chlorine	<0.01	<0.01	<0.2
Total fluoride (as HF)	9.6	10	190
Hydrogen chloride	2.8	3	54
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		101	

Total VOCs (as n-Propane)	Results		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Total	0.035	0.038	0.68

VOC (speciated)	Results		
Sampling time	1240-1340		
( )	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Detection limit [1]	<0.07	<0.07	<1
Toluene	0.073	0.079	1.4

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

2.2 EPA 7 – Unit 2, Duct B

Date	28/11/2024	**Client**	EnergyAustralia
Report	R017581	**Stack ID**	Mt Piper Power Station - EPA 7 Unit 2 Duct B (Upper)
Licence No.	13007	**Location**	Portland
Ektimo Staff	Ahmad ramiz/Sahad Musthafa	**State**	NSW
Process Conditions	Load Stabled at 450MW		241121

Stack Parameters		
Moisture content, %v/v	6.5	
Gas molecular weight, g/g mole	29.5 (wet)	30.3 (dry)
Gas density at STP, kg/m³	1.32 (wet)	1.35 (dry)
Gas density at discharge conditions, kg/m³	0.81	
% Oxygen correction & Factor	7 %	1.09
Gas Flow Parameters		
Temperature, °C	123	
Temperature, K	396	
Ambient pressure, kPa	91	
Stack pressure, kPa	90	
Velocity at sampling plane, m/s	14	
Volumetric flow rate, actual, m³/s	500	
Volumetric flow rate (wet STP), m³/s	310	
Volumetric flow rate (dry STP), m³/s	290	
Mass flow rate (wet basis), kg/h	1500000	

Gas Analyser Results	Average	Minimum	Maximum
Sampling time	0759 - 1136	0759 - 1136	0759 - 1136
	Concentration % v/v	Concentration % v/v	Concentration % v/v
Carbon dioxide	11.6	10.6	12.4
Oxygen	8.1	7.2	8.6

Isokinetic Results	Results		
Sampling time	0759-1137		
	Concentration mg/m³	Corrected to 7% O2 mg/m³	Mass Rate g/min
Solid Particles	4.3	4.6	74
Isokinetic Sampling Parameters			
Sampling time, min		210	
Isokinetic rate, %		102	
Gravimetric analysis date (total particulate)		02-12-2024	

3 Sample Plane Compliance

3.1 EPA 6 – Unit 2, Duct A

Sampling Plane Details	
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Access & height of ports	Scissor lift 10 m
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method 1	Conforming (alternative procedure)

The sampling plane is deemed to be non-ideal 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

3.2 EPA 7 – Unit 2, Duct B

Sampling Plane Details	
Sampling plane dimensions	5460 x 6600 mm
Sampling plane area	36 m²
Sampling port size, number	6" Flange (x6)
Access & height of ports	Scissor lift 10 m
Duct orientation & shape	Horizontal Rectangular
Downstream disturbance	Junction 0.5 D
Upstream disturbance	Damper 0.6 D
No. traverses & points sampled	6 42
Sample plane conformance to USEPA Method 1	Conforming (alternative procedure)

The sampling plane is deemed to be non-ideal 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

4 Plant Operating Conditions

See EnergyAustralia NSW Pty Ltd (Mt Piper) records for complete process conditions.

Based on information received from EnergyAustralia NSW Pty Ltd (Mt Piper) personnel, it is our understanding that samples were collected during typical plant operations.

5 Test Methods

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

Parameter	Sampling method	Analysis method	Uncertainty*	NATA accredited Sampling	NATA accredited Analysis
Sampling points - Selection	NSW EPA TM-1 (USEPA Method 1)	NA	NA	✓	NA
Flow rate, temperature & velocity	NSW EPA TM-2 (USEPA Method 2)	NSW EPA TM-2 (USEPA Method 2)	8%, 2%, 7%	NA	✓
Moisture content	NSW EPA TM-22 (USEPA Method 4)	NSW EPA TM-22 (USEPA Method 4)	8%	✓	✓
Molecular weight	NA	NSW EPA TM-23 (USEPA Method 3)	not specified	NA	✓
Dry gas density	NA	NSW EPA TM-23 (USEPA Method 3)	not specified	NA	✓
Carbon dioxide	NSW EPA TM-24 (USEPA Method 3A)	NSW EPA TM-24 (USEPA Method 3A)	13%	✓	✓
Oxygen	NSW EPA TM-25 (USEPA Method 3A)	NSW EPA TM-25 (USEPA Method 3A)	13%	✓	✓
Hydrogen halides & halogens∞	USEPA Method 26A	Ektimo 235	14%	✓	✓†
Hydrogen halides (including soluble fluoride)[2]	NSW EPA TM-8 (USEPA Method 26A)	Ektimo 235	not specified	✓	✓†i
Speciated volatile organic compounds (VOCs)	NSW EPA TM-34[d] (USEPA Method 18)	Ektimo 344	19%	✓	✓†
Solid particles (total)	NSW EPA TM-15 (AS 4323.2)	NSW EPA TM-15 (AS 4323.2)	3%	✓	✓††
Hydrogen chloride	NSW EPA TM-8 (USEPA Method 26A)	Ektimo 235	14%	✓	✓†i
Chlorine	NSW EPA TM-7 (USEPA Method 26A)	Ektimo 235	14%	✓	✓†i
Sulfuric acid mist and/or sulfur trioxide	NSW EPA TM-3 (USEPA Method 8)	Ektimo 235	16%	✓	✓†m

071124

* 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.
- 13 December 2024 in report LV-006634.
- 16 December 2024 in report LV-006646.
- 16 December 2024 in report LV-006651.
- 16 December 2024 in report LV-006658.

†† Gravimetric analysis conducted at the Ektimo NSW laboratory.

[2] Sampling follows USEPA Method 26A and analysis follows Ektimo 235 (ion chromatography) which uses the same principle as USEPA Method 26A. Includes sampling & analysis of soluble fluoride.

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

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

∞ Sampling follows USEPA Method 26A and analysis follows Ektimo 235 (ion chromatography) which uses the same principle as USEPA Method 26A and USEPA SW-846 Method 9056A (which is the NSW EPA approved alternative analysis method to USEPA Method 13B). Includes sampling & analysis of particulate fluoride.

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

6 Deviations to Test Methods

TM-9 FLUORINE

Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (NSW EPA) (2022) specifies TM-9 (USEPA 13B) for measurement of total fluoride emissions.

As per site-specific agreement between EnergyAustralia NSW and NSW EPA, Ektimo conducts sampling for particulate fluoride according to USEPA Method 26A (hydrogen halides and halogens) and analysis according to Ektimo Method 235 (ion chromatography). Ektimo Method 235 uses the same principle as USEPA SW-846 Method 9056A (which is the NSW EPA approved alternative analysis method to USEPA Method 13B).

Ektimo conducts sampling for soluble fluoride according to USEPA Method 26A (hydrogen halides and halogens) and analysis according to Ektimo Method 235 (ion chromatography) which uses the same principle as USEPA Method 26A.

NSW EPA TM-34 (USEPA 18)

Ektimo notes that the sampling and analysis of Volatile Organic Compounds (VOCs), per USEPA 18 has excluded the recovery study as specified in Section 8.4.3. Performing the recovery study described in Section 8.4.3 of USEPA Method 18 for analytes present at low levels is problematic. Given this, Ektimo applies a threshold of 50µg as a lower-bound mass, below which the 'spiking' of specific volatile organic compounds is not performed. For the purposes of this round of monitoring, no VOCs were detected above 50µg. Therefore, recovery studies were not deemed necessary for this sampling round.

7 Quality Assurance/Quality Control Information

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

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

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

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

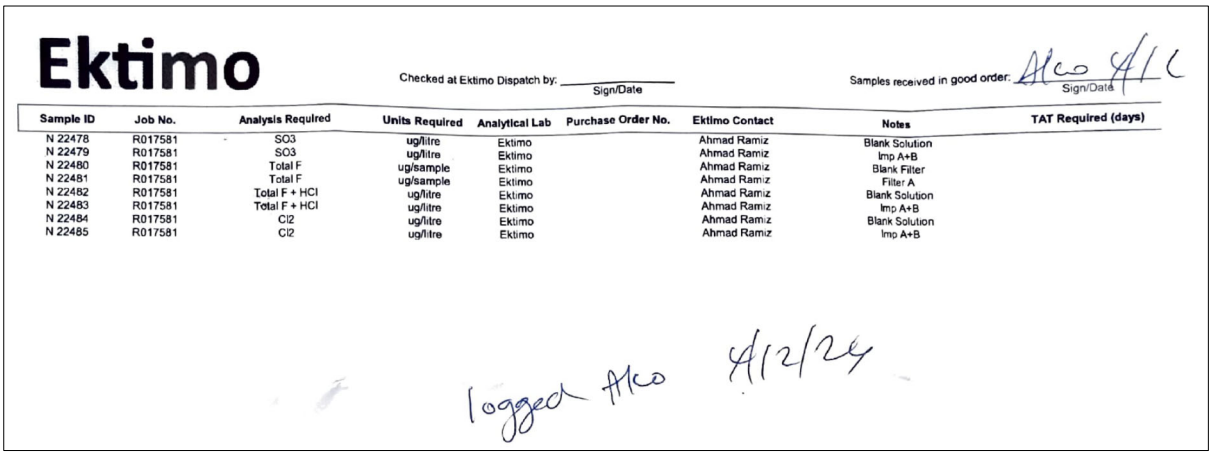
8 Definitions

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

% v/v	Volume to volume ratio, 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

9 Appendices

Appendix A: Chain(s) of Custody



Ektimo

Checked at Ektimo Dispatch by: _____ Sign/Date

Samples received in good order: Alco 4/12 Sign/Date

Sample ID	Job No.	Analysis Required	Units Required	Analytical Lab	Purchase Order No.	Ektimo Contact	Notes	TAT Required (days)
N 22478	R017581	SO3	ug/litre	Ektimo		Ahmad Ramiz	Blank Solution	
N 22479	R017581	SO3	ug/litre	Ektimo		Ahmad Ramiz	Imp A+B	
N 22480	R017581	Total F	ug/sample	Ektimo		Ahmad Ramiz	Blank Filter	
N 22481	R017581	Total F	ug/sample	Ektimo		Ahmad Ramiz	Filter A	
N 22482	R017581	Total F + HCl	ug/litre	Ektimo		Ahmad Ramiz	Blank Solution	
N 22483	R017581	Total F + HCl	ug/litre	Ektimo		Ahmad Ramiz	Imp A+B	
N 22484	R017581	Cl2	ug/litre	Ektimo		Ahmad Ramiz	Blank Solution	
N 22485	R017581	Cl2	ug/litre	Ektimo		Ahmad Ramiz	Imp A+B	

logged Alco 4/12/24

Appendix B: Laboratory Results

1300 364 005
+61 2 4003 3296
info@ektimo.com.au
ektimo.com.au
ABN 86 600 381 413

CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-006634
Job Number:	R017581
Date of Issue:	13/12/2024
Attention:	Energy Australia Mount Piper
Address:	Mt Piper Power Station, Locked Mail Bag 1 Portland NSW 2847
Date samples received:	4/12/2024
Number of samples received:	2
Date samples analysed:	11/12/2024
No of samples analysed:	2
Test method(s) used:	Ektimo 235

Comments

QC Acceptance Criteria:

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

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

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NATA is a member of APAC (Asia Pacific Laboratory Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through the mutual recognition arrangements with both of these organisations, NATA accreditation is recognised world -wide.
A formal Quality Control program is in place at Ektimo to monitor analyses performed in the laboratory and sampling conducted in the field. The program is designed to check where appropriate; the sampling reproducibility, analytical method, accuracy, precision and the performance of the analyst. The Laboratory Manager is responsible for the administration and maintenance of this program.

REPORT AUTHORISATION

Version: 141124

Annie Kolokithas
Laboratory Technician

Cappi Tuffery
Laboratory Chemist

NATA Accredited Laboratory 14601

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

Ektimo Analytical Results

Report No. LV-006634
Job No. R017581
Client Name: Energy Australia Mount Piper

Parameter	Analyte	Units	N 22478 Energy Australia Mount Piper EPA 6 U2A Blank Solution (SO3)	N 22479 Energy Australia Mount Piper EPA 6 U2A Imp A+B
Sample Volume		mL	121	134
Sulfur trioxide (SO_3)	SO_4^{2-}	mg/L	0.24	27.05
PQL	<	mg/L	0.2	0.2

1300 364 005
+61 2 4003 3296
info@ektimo.com.au
ektimo.com.au
ABN 86 600 381 413

CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-006646
Job Number:	R017581
Date of Issue:	16/12/2024
Attention:	Energy Australia Mount Piper
Address:	Mt Piper Power Station, Locked Mail Bag 1 Portland NSW 2847
Date samples received:	4/12/2024
Number of samples received:	4
Date samples analysed:	13/12/2024
No of samples analysed:	4
Test method(s) used:	Ektimo 235

Comments

QC Acceptance Criteria:

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

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

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REPORT AUTHORISATION

Version: 141124

Cappi Tuffery
Laboratory Chemist

Daniel Balaam
Senior Laboratory Chemist

NATA Accredited Laboratory 14601

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

Ektimo

Ektimo Analytical Results

Report No. LV-006646
Job No. R017581
Client Name: Energy Australia Mount Piper

Parameter	Analyte	Units	N 22482 Energy Australia Mount Piper EPA 6 U2A Blank Solution (HF / HCl)	N 22483 Energy Australia Mount Piper EPA 6 U2A Imp A+B	N 22484 Energy Australia Mount Piper EPA 6 U2A Blank Solution (Cl2)	N 22485 Energy Australia Mount Piper EPA 6 U2A Imp A+B
Sample Volume		mL	152	335	162	190
Hydrogen chloride (HCl)	Cl^-	mg/L	<0.1	24.09		
Chlorine (Cl_2)	Cl^-	mg/L			0.18	0.24
Hydrogen fluoride (HF)	F^-	mg/L	<0.1	81.20		
PQL	<	mg/L	0.1	0.1	0.1	0.1

1300 364 005
+61 2 4003 3296
info@ektimo.com.au
ektimo.com.au
ABN 86 600 381 413

CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-006651
Job Number:	R017581
Date of Issue:	16/12/2024
Attention:	Energy Australia Mount Piper
Address:	Mt Piper Power Station, Locked Mail Bag 1 Portland NSW 2847
Date samples received:	4/12/2024
Number of samples received:	2
Date samples analysed:	13/12/2024
No of samples analysed:	2
Test method(s) used:	Ektimo 235

Comments

QC Acceptance Criteria:

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

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REPORT AUTHORISATION

Version: 141124

Cappi Tuffery
Laboratory Chemist

Daniel Balaam
Senior Laboratory Chemist

NATA Accredited Laboratory 14601

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

Ektimo Analytical Results

Report No. LV-006651
Job No. R017581
Client Name: Energy Australia Mount Piper

Parameter	Analyte	Units	N 22480 Energy Australia Mount Piper EPA 6 U2A Blank Filter (HF)	N 22481 Energy Australia Mount Piper EPA 6 U2A Filter A
Sample Volume		mL	40	40
Hydrogen fluoride (HF)	F^-	µg/sample	10.10	148.64
PQL	<	µg/sample	4	4

1300 364 005
+61 2 4003 3296
info@ektimo.com.au
ektimo.com.au
ABN 86 600 381 413

CERTIFICATE OF ANALYSIS

Testing Laboratory:	Ektimo 26 Redland Drive Mitcham, VIC 3132
Report Number:	LV-006658
Job Number:	R017581
Date of Issue:	16/12/2024
Attention:	Energy Australia Mount Piper
Address:	Mt Piper Power Station, Locked Mail Bag 1 Portland NSW 2847
Date samples received:	4/12/2024
Number of samples received:	2
Date samples analysed:	13/12/2024
No of samples analysed:	2
Test method(s) used:	Ektimo 344

Comments

QC Acceptance Criteria:

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

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REPORT AUTHORISATION

Version: 141124

Matthew Cook
Laboratory Manager

Daniel Balaam
Senior Laboratory Chemist

NATA Accredited Laboratory 14601

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

Ektimo Analytical Results

Report No. LV-006658
Job No. R017581
Client Name: Energy Australia Mount Piper

Parameter	Units	N22486 R017581	N22487 R017581
	PQL	1.0	1.0
Ethanol	µg	<1	<1
Acetone	µg	<1	<1
Isopropanol	µg	<1	<1
Pentane	µg	<1	<1
1,1-Dichloroethene	µg	<1	<1
Acrylonitrile	µg	<1	<1
Dichloromethane	µg	<1	<1
trans-1,2-Dichloroethene	µg	<1	<1
Methyl ethyl ketone	µg	<1	<1
n-Hexane	µg	<1	<1
cis-1,2-Dichloroethene	µg	<1	<1
Ethyl acetate	µg	<1	<1
Chloroform	µg	<1	<1
1,1,1-Trichloroethane	µg	<1	<1
1,2-Dichloroethane	µg	<1	<1
Cyclohexane	µg	<1	<1
Benzene	µg	<1	<1
Carbon tetrachloride	µg	<1	<1
Butanol	µg	<1	<1
Isopropyl acetate	µg	<1	<1
2-Methylhexane	µg	<1	<1
2,3-Dimethylpentane	µg	<1	<1
1-Methoxy-2-propanol	µg	<1	<1
3-Methylhexane	µg	<1	<1
Heptane	µg	<1	<1
Trichloroethylene	µg	<1	<1
Ethyl acrylate	µg	<1	<1
Methyl methacrylate	µg	<1	<1
Propyl acetate	µg	<1	<1
Methylcyclohexane	µg	<1	<1
Methyl Isobutyl Ketone	µg	<1	<1
Toluene	µg	<1	1.1
1,1,2-Trichloroethane	µg	<1	<1
2-Hexanone	µg	<1	<1
Octane	µg	<1	<1
Tetrachloroethene	µg	<1	<1
Butyl acetate	µg	<1	<1
Chlorobenzene	µg	<1	<1
Ethylbenzene	µg	<1	<1
m + p-Xylene	µg	<1	<1
1-Methoxy-2-propyl acetate	µg	<1	<1
Styrene	µg	<1	<1
o-Xylene	µg	<1	<1
Butyl acrylate	µg	<1	<1
Nonane	µg	<1	<1

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

NATA Accredited Laboratory 14601

Results page 2 of 3

Ektimo

Ektimo Analytical Results

Report No. LV-006658
Job No. R017581
Client Name: Energy Australia Mount Piper

Parameter	Units	N22486 R017581	N22487 R017581
	PQL	1.0	1.0
2-Butoxyethanol	µg	<1	<1
Cellosolve acetate	µg	<1	<1
1,1,2,2-Tetrachloroethane	µg	<1	<1
Isopropylbenzene	µg	<1	<1
alpha-Pinene	µg	<1	<1
Propylbenzene	µg	<1	<1
1,3,5-Trimethylbenzene	µg	<1	<1
beta-Pinene	µg	<1	<1
tert-Butylbenzene	µg	<1	<1
1,2,4-Trimethylbenzene	µg	<1	<1
Decane	µg	<1	<1
3-Carene	µg	<1	<1
1,2,3-Trimethylbenzene	µg	<1	<1
D-Limonene	µg	<1	<1
Undecane	µg	<1	<1
Dodecane	µg	<1	<1
Tridecane	µg	<1	<1
Tetradecane	µg	<1	<1
Residuals as Toluene	µg	<1	52

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

NATA Accredited Laboratory 14601

Note:

Analysis of sample N22487 indicated a 'residuals' mass of 52ug expressed as toluene. Residuals are a sum of organic compounds detected in the activated charcoal tube sample for which Ektimo Laboratory does not possess an analytical standard. Library matching of the GC results indicated that the residuals likely comprise 2,2,4,6,6-Pentamethylheptane and 2,2,4,4,-Tetramethyloctane. Both of these compounds have a vapour pressure <0.27kPa when measured at an ambient temperature of 25°C and at a standard atmospheric pressure of 101.3 kilopascals. As per Protection of the Environment Operations (Clean Air) Regulation 2022, Schedule 2 Part 1 (Definitions) these compounds are not classified as 'Volatile Organic Compounds' (VOCs). Accordingly, the residuals have not been included in the sum of 'Total VOCs' for EPA 6 Unit 2 Duct A.

Ektimo

Experts in air quality, odour and emission monitoring.

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

Wollongong
1/10 Doyle Ave
Unanderra
NSW 2526

Brisbane
3/109 Riverside Pl
Morningside
QLD 4170

Perth
52 Cooper Rd
Cockburn Central
WA 6164

1300 364 005

ektimo.com.au

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ERM's Sydney Office
Level 14, 207 Kent Street
Sydney, NSW 2000

T: +61 2 8584 8888

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