



Stephenson

Environmental Management Australia

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EMISSION TEST REPORT (ETR) No. 7035

COMPLIANCE EMISSION SURVEY - EPL 5803

BATTERY ENERGY POWER SOLUTIONS PTY LTD

96 FAIRFIELD STREET, FAIRFIELD, NSW

PROJECT No.: 7035/S25489/19

DATE OF SURVEY: 10 DECEMBER 2019

DATE OF ISSUE: 28 JANUARY 2020



NATA accredited laboratory number 15043.

Accredited for Compliance with ISO/IEC 17025 - Testing

SUMMARY OF EMISSION TEST RESULTS – 10 DECEMBER 2019

Parameter	Unit	Location	EPL 5803 Point 1 100 Percentile Concentration Limit
		Battery Fabrication Baghouse	
Stack Temperature	°C	32	--
Velocity	m/s	5.1	--
Volumetric Flow	m ³ /s	0.6	--
Moisture	%	1.5	--
Molecular Weight Dry Stack Gas	g/g mole	28.8	--
Gas Density	kg/m ³	1.29	--
Stack pressure	kPa	101.3	--
Oxygen	%	20.9	--
Cadmium (Cd)	mg/m ³	0.28	--
Lead (Pb)	mg/m ³	0.0019	--
Type I & II Substances in Aggregate	mg/m ³	0.29	10
Total Solid Particulates	mg/m ³	0.3	250

NOTE: On the day of testing the atmosphere was significantly contaminated with smoke from bush fires

Key:

°C	=	degrees Celsius
m/s	=	metres per second
m ³ /s	=	dry cubic metre per second 0°C and 101.3 kilopascals (kPa)
g/g mole	=	grams per gram mole
kg/m ³	=	Kilograms per cubic metre
kPa	=	Kilo Pascals
%	=	percentage
mg/m ³	=	milligrams per cubic metre at 0°C and 101.3 kilopascals (kPa)
--	=	not specified
<	=	less than

DETAILED EMISSION TEST RESULTS – TSP AND METALS

Emission Test Results	TSP	Metals - Type I & II
Project Number	7035	7035
Project Name	Battery Energy	Battery Energy
Test Location	Battery Fabrication baghouse stack	Battery Fabrication baghouse stack
Date	10-Dec-19	10-Dec-19
RUN	1	1
Sample Start Time (hrs)	9:41	9:41
Sample Finish Time (hrs)	11:01	11:01
Sample Location (Inlet/Exhaust)	Exhaust	Exhaust
Stack Temperature (°C)	32	32
Stack Cross-Sectional area (m ²)	0.135	0.135
Average Stack Gas Velocity (m/s)	5.1	5.1
Actual Gas Flow Volume (am ³ /min)	41	41
Total Normal Gas Flow Volume (m ³ /min)	36	36
Total Normal Gas Flow Volume (m ³ /sec)	0.6	0.6
Total Stack Pressure (kPa)	101.3	101.3
Analysis	TSP	Metals
Method	TM-15	TM-12,13,14 (USEPA M29)
SEMA Lab Number	727767	727768
Mass In Sample (mg)	0.32	0.30
Air Volume Sampled (am ³)	1.164	1.148
Normal Sample Volume (m ³)	1.06	1.04
Concentration at Stack O₂ (mg/m³)	0.3	0.29
Mass Emission Rate (g/s)	0.00018	0.00017
Moisture Content (% by volume)	1.5	2.1
Molecular Weight Dry Stack Gas (g/g-mole)	28.8	28.8
Dry Gas Density (kg/m ³)	1.29	1.29
EPL Limit (mg/m³)	No Limit	10
Isokinetic Sampling Rate (%)	99.6	98.4
Sample Storage Period	3 months	Consumed in Analysis
Sampling Performed by	JW, PWS	JW, PWS
Sample Analysed by (Laboratory)	SEMA	Envirolab
Calculations Entered by	JW	JW
Calculations Checked by	PWS	PWS

Abbreviations of Personnel

PWS = Peter W Stephenson

JW = Jay Weber

ESTIMATED UNCERTAINTY OF MEASUREMENT

Pollutant	Methods	Uncertainty
Metals	NSW TM-12,13 & 14, USEPA 29	100% (50-200%)
Moisture	AS4323.2, NSW TM-22, USEPA 4	25%
Oxygen	NSW TM-24, USEPA 3A	1% actual
Particulate > 20 mg/m ³	NSW TM-15, AS4323.2	15%
Particulate < 20 mg/m ³	NSW TM-15, AS4323.2	50%
Velocity	AS4323.1, NSW TM-2, USEPA 2	5%

Key:

Unless otherwise indicated the uncertainties quoted have been determined @ 95% level of Confidence level (i.e. by multiplying the repeatability standard deviation by a co-efficient equal to 1.96) (Source - Measurement Uncertainty)

Sources: *Measurement Uncertainty – implications for the enforcement of emission limits* by Maciek Lewandowski (Environment Agency) & Michael Woodfield (AEAT) UK

Technical Guidance Note (Monitoring) M2 Monitoring of stack emissions to air Environment Agency Version 3.1 June 2005.

Note: ISO 9096 is for 20-1000 mg/m³ which AS4323.2 is based on.

Note DSEN 13284-1 testing for < 5 mg/m³ correlates to 5 mg/m³ with most quoted uncertainties of ± 5.3 mg/m³ @ 6.4 mg/m³. From Clean Air Engineering in the United States the lowest practical limit of USEPA M5 is 5 mg/m³ under lab conditions.