Appendix A: Emission Estimation

Point Source Emissions

Source	Units	Oxy-cutter(1)	Hammermill(2)
Easting	m	306 613	306 567
Northing	m	6 263 608	6 263 613
Elevation	m	44.73	44.21
Start time	hh:mm	09:00	06:00
End time	hh:mm	15:00	21:00
Stack height	m AGL	1	16.7
Diameter at point of discharge	m ID	0.05	0.440
Emission temperature	°C	31	27
Emission velocity	$m \cdot s^{-1}$	14.00	44.06
Gas flow	$Nm^3 \cdot s^{-1}$	0.1	6.7
ER (odour)	$OU \cdot m^3 \cdot s^{-1}$	6.0E-01	1.216E+04
ER (TSP)	$g \cdot s^{-1}$	1.37E-02	7.50E-02
ER (PM_{10})	$g \cdot s^{-1}$	-	5.33E-02
ER ($PM_{2.5}$)	$g \cdot s^{-1}$	-	3.33E-02
ER (NO_X)	$g \cdot s^{-1}$	5.50E-02	3.33E-02
ER (Ag)	$g \cdot s^{-1}$	1.500E-07	-
ER (Al)	$g \cdot s^{-1}$	2.833E-05	-
ER (As)	$g \cdot s^{-1}$	3.333E-06	1.667E-05
ER (Ba)	$g \cdot s^{-1}$	5.000E-05	-
ER (Be)	$g \cdot s^{-1}$	1.333E-07	6.667E-06
ER (Ca)	$g \cdot s^{-1}$	5.000E-05	-
ER (Cd)	$g \cdot s^{-1}$	1.167E-07	5.000E-06
ER (Co)	$g \cdot s^{-1}$	3.333E-07	6.667E-06
ER (CO II)	$g \cdot s^{-1}$	6.333E-06	-
ER (Cr)	$g \cdot s^{-1}$	1.267E-06	1.833E-05
ER (CrVI)	$g \cdot s^{-1}$	-	3.333E-05
ER (Cu)	$g \cdot s^{-1}$	5.167E-06	2.000E-05
ER (Fe)	$g \cdot s^{-1}$	5.500E-03	2.333E-04
ER (FE II,III)	$g \cdot s^{-1}$	2.333E-02	-
ER (Hg)	$g \cdot s^{-1}$	8.333E-08	2.167E-05
ER (K)	$g \cdot s^{-1}$	3.333E-05	-
ER (Li)	$g \cdot s^{-1}$	1.500E-07	-
ER (Mg)	$g \cdot s^{-1}$	3.333E-05	-

Source	Units	Oxy-cutter(1)	Hammermill(2)
ER (Mg IV)	$g{\cdot}s^{-1}$	1.467E-04	-
ER (Mn)	$g{\cdot}s^{-1}$	9.167E-05	2.000E-05
ER (Mo)	$g{\cdot}s^{-1}$	8.333E-07	-
ER (Na)	$g{\cdot}s^{-1}$	3.333E-05	-
ER (Ni)	$g{\cdot}s^{-1}$	1.567E-06	1.667E-05
ER (P)	$g{\cdot}s^{-1}$	1.517E-05	-
ER (Pb)	$g{\cdot}s^{-1}$	3.333E-06	2.000E-05
ER (Sb)	$g{\cdot}s^{-1}$	1.167E-06	5.000E-05
ER (Se)	$g{\cdot}s^{-1}$	1.167E-06	5.000E-05
ER (Sn)	$g{\cdot}s^{-1}$	5.333E-07	1.667E-05
ER (Ti)	$g{\cdot}s^{-1}$	-	1.267E-05
ER (Th)	$g{\cdot}s^{-1}$	5.000E-07	-
ER (V)	$g{\cdot}s^{-1}$	-	3.333E-05
ER (W)	$g{\cdot}s^{-1}$	-	1.167E-05
ER (Zn)	$g{\cdot}s^{-1}$	1.833E-04	1.500E-03

Note: (1) Source data derived from Ektimo Emission Test Report (Ektimo, Sep 2019) as appended to (ERM, Sep 2019). The tests were performed in duplicate, and the maximum value has been used to quantify the emission rates

(2) Source data derived from Ektimo Emission Test Reports (Ektimo, May 2017), (Ektimo, Sep 2018), (Ektimo, Oct 2019), (Ektimo, Sep 2020). The maximum measured emission rate from all test reports has been adopted in this supplementary AQIA. Emission conditions, including flow rates, temperatures etc., were derived from (Ektimo, Sep 2020).

Volume Source Emissions

Material Handling

Emissions for material handling and transfer points have been estimated using the US EPA batch drop equations.

Sources modelled as wind speed dependent volume sources during hours of operation.

$$ER = EF \times A \times (1 - CF) \times \frac{1000}{3600}$$

$$EF = k \times 0.0016 \times \frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

where:

ER = emission rate ($g \cdot s^{-1}$)

EF = emission factor ($kg \cdot t^{-1}$)

A = throughput ($t \cdot hr^{-1}$)

CF = control factor

k = particle size multiplier

(TSP: 0.74; PM_{10}: 0.35; $PM_{2.5}$: 0.053)

U = hourly wind speed ($m \cdot s^{-1}$) (ave 2.48 $m \cdot s^{-1}$)

M = moisture content (assumed 2 %)

Wind Erosion Sources

Emissions for wind erosion sources (i.e. material stockpiles) have been modelled as wind speed varying volume sources using the NPI Wind Erosion equation.

$$ER_{TSP,hr} = WF_{hr} \times ER_{TSP}$$

$$ER_{PM10,hr} = WF_{hr} \times ER_{PM10}$$

$$ER_{PM2.5,hr} = WF_{hr} \times ER_{PM2.5}$$

$$WF_{hr} = \begin{cases} 0 & U \leq 3.1 \\ \dfrac{(U^* - U_t^*)^3}{\sum_{hr=1}^{8760} ({U^*}_{hr} - U_t^*)^3} & U > 3.1 \end{cases}$$

where:

ER = emission rate ($g \cdot s^{-1}$)

WF = hourly weighting factor

U = hourly wind speed ($m \cdot s^{-1}$) (ave 2.48 $m \cdot s^{-1}$)

U^* = threshold friction velocity (assumed 0.11 U)

U^*_t = threshold friction vel. ($m \cdot s^{-1}$) for 3.1 $m \cdot s^{-1}$

Paved Roads at Industrial Sites

$$E = k(sL)^{0.91} \times (W)^{1.02}$$

where:

E = particulate emission factor

k = particle size multiplier

sL = road silt loading (9.7 $g \cdot m^{-2}$)

W = average weight (15 t) of the vehicles

Controls

Material handling points MH1-MH14, truck dumping points TRKD01 and TRK02 and transfer points TP 01-08 have been assumed to be controlled by 70 % through water sprays.

Conveyor points CV1-CV33 are considered to be controlled by water sprays (50 %) and by enclosure (70 %).

Volume Source Emissions – Activity Rates

Source ID	Co-ordinates		Description	Source Type	Emissions	Time		Source Group	Activity Rates		
	mE	mS				Start	Stop		t.day^{-1}	hr.day^{-1}	t.hr^{-1}
MH01	306,607	6,263,635	Non ferrous metal transferred to the non-ferrous processing building	volume	Constant	6am	9pm	MH	150	15	10.0
MH02	306,519	6,263,572	Transfer of raw material directly to the inspected stockpile of scrap metal (bypass pre-shredder)	volume	Constant	6am	9pm	MH	1500	15	100.0
MH03	306,503	6,263,664	Transfer of raw material directly to the inspected stockpile of scrap metal (bypass pre-shredder)	volume	Constant	6am	9pm	MH	1500	15	100.0
MH04	306,509	6,263,576	Transfer of raw material from stockpile to pre-shredder	volume	Constant	6am	9pm	MH	600	15	40.0
MH05	306,522	6,263,569	Transfer of raw material from stockpile to pre-shredder	volume	Constant	6am	9pm	MH	600	15	40.0
MH06	306,523	6,263,581	Transfer of pre-shredder output to a truck to inspected stockpile of scrrap metal close to the conveyor into the hammer mill	volume	Constant	6am	9pm	MH	600	15	40.0
MH07	306,503	6,263,664	Transfer of pre-shredder output to a truck to inspected stockpile of scrrap metal close to the conveyor into the hammer mill	volume	Constant	6am	9pm	MH	600	15	40.0
MH08	306,503	6,263,664	Transfer of the inspected stockpile of scrap metal close to the conveyor onto the hammer mill conveyor	volume	Constant	6am	9pm	MH	2100	15	140.0
MH09	306,483	6,263,652	Transfer of the inspected stockpile of scrap metal close to the conveyor onto the hammer mill conveyor	volume	Constant	6am	9pm	MH	2100	15	140.0
MH10	306,542	6,263,691	Ferrous metals are collected from the stockpile by FEL and loaded into trucks	volume	Constant	6am	9pm	MH	1050	15	70.0
MH11	306,533	6,263,680	Ferrous metals are collected from the stockpile by FEL and loaded into trucks	volume	Constant	6am	9pm	MH	1050	15	70.0
MH12	306,633	6,263,573	Heavy ferrous pick up	volume	Constant	6am	9pm	MH	384	15	25.6
MH13	306,561	6,263,643	Non ferrous material collected and loaded into trucks	volume	Constant	6am	9pm	MH	150	15	10.0
MH14	306,603	6,263,616	Heavy ferrous drop point	volume	Constant	6am	9pm	MH	384	15	25.6
TP01	306,525	6,263,577	Pre-shredder drop point	volume	Constant	6am	9pm	TP	600	15	40.0

Source ID	Co-ordinates		Description	Source Type	Emissions	Time		Source Group	Activity Rates		
	mE	mS				Start	Stop		$t.day^{-1}$	$hr.day^{-1}$	$t.hr^{-1}$
TP02	306,517	6,263,691	The cleaned fragmented material (on a conveyor C1) passes under a drum magnet, where ferrous metals are dropped onto the picking conveyor (C2)	volume	Constant	6am	9pm	TP	1610	15	107.3
TP03	306,529	6,263,701	Ferrous metals transferred from C2, where operators remove remaining non ferrous materials to C3	volume	Constant	6am	9pm	TP	1610	15	107.3
TP04	306,541	6,263,711	Ferrous metals are conveyed to the product stockpile	volume	Constant	6am	9pm	TP	1550	15	103.4
TP05	306,512	6,263,687	Non ferrous materials drop beneath the drum magnet to a conveyor (C4) that runs perpendicular to the ferrous product	volume	Constant	6am	9pm	TP	79	15	5.2
TP06	306,494	6,263,732	Transfer point at conveyor bend 1	volume	Constant	6am	9pm	TP	471	15	31.4
TP07	306,563	6,263,721	Transfer point at conveyor bend 2	volume	Constant	6am	9pm	TP	471	15	31.4
TP08	306,551	6,263,643	Transfer point at conveyor bend 3	volume	Constant	6am	9pm	TP	471	15	31.4
CV01	306,484	6,263,660	Material from the stockpiles is conveyed into the hammer mill (1/4)	volume	Constant	6am	9pm	Con	1800	15	120.0
CV02	306,486	6,263,672	Material from the stockpiles is conveyed into the hammer mill (2/4)	volume	Constant	6am	9pm	Con	1800	15	120.0
CV03	306,489	6,263,687	Material from the stockpiles is conveyed into the hammer mill (3/4)	volume	Constant	6am	9pm	Con	1800	15	120.0
CV04	306,489	6,263,694	Material from the hammer mill is carried upward by an incline conveyor and dropped into a chute (4/4)	volume	Constant	6am	9pm	Con	1800	15	120.0
CV05	306,513	6,263,691	The cleaned fragmented material from the cascade chute passes under the drum magnet and ferrous metals are removed (1/5)	volume	Constant	6am	9pm	Con	1354	15	90.3
CV06	306,520	6,263,693	Operators remove remaining non ferrous materials (2/5)	volume	Constant	6am	9pm	Con	1354	15	90.3
CV07	306,527	6,263,699	Operators remove remaining non ferrous materials (3/5)	volume	Constant	6am	9pm	Con	1354	15	90.3
CV08	306,534	6,263,704	Ferrous materials are taken and dropped onto a conveyor, which are conveyed to the product stockpile (4/5)	volume	Constant	6am	9pm	Con	1354	15	90.3
CV09	306,538	6,263,708	Ferrous materials are taken and dropped onto a conveyor, which are conveyed to the product stockpile (5/5)	volume	Constant	6am	9pm	Con	1354	15	90.3
CV10	306,514	6,263,695	Non-ferrous materials are dropped onto a conveyor, which transports material to the conveyor before the non-ferrous processing building (1/3)	volume	Constant	6am	9pm	Con	69	15	4.6

Source ID	Co-ordinates		Description	Source Type	Emissions	Time		Source Group	Activity Rates		
	mE	mS				Start	Stop		t.day^{-1}	hr.day^{-1}	t.hr^{-1}
CV11	306,515	6,263,702	Non-ferrous materials are dropped onto a conveyor, which transports material to the conveyor before the non-ferrous processing building (2/3)	volume	Constant	6am	9pm	Con	69	15	4.6
CV12	306,516	6,263,711	Conveys non-ferrous material into the non-ferrous recovery plant (3/3)	volume	Constant	6am	9pm	Con	69	15	4.6
CV13	306,491	6,263,710	Floc product is transferred onto conveyor (1/3)	volume	Constant	6am	9pm	Con	377	15	25.1
CV14	306,492	6,263,718	Floc product is transferred onto conveyor (2/3)	volume	Constant	6am	9pm	Con	377	15	25.1
CV15	306,493	6,263,727	Floc product is transferred onto conveyor (3/3)	volume	Constant	6am	9pm	Con	377	15	25.1
CV16	306,503	6,263,732	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (1/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV17	306,512	6,263,731	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (2/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV18	306,522	6,263,729	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (3/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV19	306,533	6,263,727	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (4/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV20	306,542	6,263,726	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (5/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV21	306,551	6,263,725	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (6/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV22	306,558	6,263,724	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (7/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV23	306,558	6,263,713	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (8/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV24	306,556	6,263,703	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (9/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV25	306,555	6,263,693	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (10/18)	volume	Constant	6am	9pm	Con	411	15	27.4

Source ID	Co-ordinates		Description	Source Type	Emissions	Time		Source Group	Activity Rates		
	mE	mS				Start	Stop		$t.day^{-1}$	$hr.day^{-1}$	$t.hr^{-1}$
CV26	306,553	6,263,683	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (11/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV27	306,552	6,263,674	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (12/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV28	306,551	6,263,663	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (13/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV29	306,550	6,263,653	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (14/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV30	306,551	6,263,643	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (15/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV31	306,557	6,263,635	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (16/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV32	306,562	6,263,625	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (17/18)	volume	Constant	6am	9pm	Con	411	15	27.4
CV33	306,567	6,263,617	Conveyor transports floc product to the post shredder processing building. Conveyor is enclosed (18/18)	volume	Constant	6am	9pm	Con	411	15	27.4
TRKD01	306,502	6,263,580	Truck dumping at raw material delivery	volume	Constant	6am	9pm	Truck	2634	15	175.6
TRKD02	306,503	6,263,664	Truck carries pre-shredder output to the inspected stockpile of scrap metal close to the conveyor into the hammer mill.	volume	Constant	6am	9pm	Truck	600	15	40

Volume Source Emissions – Emission Rates

Source ID	Emission Factor (AP42 batch drop)			Emission Rate (Uncontrolled)						Emission Rate (Controlled)						
	EF TSP	EF PM_{10}	EF $PM_{2.5}$	ERu TSP	ERu PM_{10}	ERu $PM_{2.5}$	ERu TSP	ERu PM_{10}	ERu $PM_{2.5}$	CF	ERc TSP	ERc PM_{10}	ERc $PM_{2.5}$	ERc TSP	ERc PM_{10}	ERc $PM_{2.5}$
	$kg.t^{-1}$	$kg.t^{-1}$	$kg.t^{-1}$	$g.s^{-1}$	$g.s^{-1}$	$g.s^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$	%	$g.s^{-1}$	$g.s^{-1}$	$g.s^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$
MH01	0.0014	0.0007	0.0001	3.843E-03	1.818E-03	2.753E-04	7.575E+01	3.583E+01	5.425E+00	70	1.153E-03	5.453E-04	8.258E-05	2.272E+01	1.075E+01	1.628E+00
MH02	0.0014	0.0007	0.0001	3.843E-02	1.818E-02	2.753E-03	7.575E+02	3.583E+02	5.425E+01	70	1.153E-02	5.453E-03	8.258E-04	2.272E+02	1.075E+02	1.628E+01
MH03	0.0014	0.0007	0.0001	3.843E-02	1.818E-02	2.753E-03	7.575E+02	3.583E+02	5.425E+01	70	1.153E-02	5.453E-03	8.258E-04	2.272E+02	1.075E+02	1.628E+01
MH04	0.0014	0.0007	0.0001	1.537E-02	7.271E-03	1.101E-03	3.030E+02	1.433E+02	2.170E+01	70	4.612E-03	2.181E-03	3.303E-04	9.090E+01	4.299E+01	6.510E+00
MH05	0.0014	0.0007	0.0001	1.537E-02	7.271E-03	1.101E-03	3.030E+02	1.433E+02	2.170E+01	70	4.612E-03	2.181E-03	3.303E-04	9.090E+01	4.299E+01	6.510E+00
MH06	0.0014	0.0007	0.0001	1.537E-02	7.271E-03	1.101E-03	3.030E+02	1.433E+02	2.170E+01	70	4.612E-03	2.181E-03	3.303E-04	9.090E+01	4.299E+01	6.510E+00
MH07	0.0014	0.0007	0.0001	1.537E-02	7.271E-03	1.101E-03	3.030E+02	1.433E+02	2.170E+01	70	4.612E-03	2.181E-03	3.303E-04	9.090E+01	4.299E+01	6.510E+00
MH08	0.0014	0.0007	0.0001	5.380E-02	2.545E-02	3.854E-03	1.060E+03	5.016E+02	7.595E+01	70	1.614E-02	7.634E-03	1.156E-03	3.181E+02	1.505E+02	2.279E+01
MH09	0.0014	0.0007	0.0001	5.380E-02	2.545E-02	3.854E-03	1.060E+03	5.016E+02	7.595E+01	70	1.614E-02	7.634E-03	1.156E-03	3.181E+02	1.505E+02	2.279E+01
MH10	0.0014	0.0007	0.0001	2.690E-02	1.272E-02	1.927E-03	5.302E+02	2.508E+02	3.798E+01	70	8.071E-03	3.817E-03	5.780E-04	1.591E+02	7.524E+01	1.139E+01
MH11	0.0014	0.0007	0.0001	2.690E-02	1.272E-02	1.927E-03	5.302E+02	2.508E+02	3.798E+01	70	8.071E-03	3.817E-03	5.780E-04	1.591E+02	7.524E+01	1.139E+01
MH12	0.0014	0.0007	0.0001	9.838E-03	4.653E-03	7.046E-04	1.939E+02	9.172E+01	1.389E+01	70	2.952E-03	1.396E-03	2.114E-04	5.817E+01	2.752E+01	4.167E+00
MH13	0.0014	0.0007	0.0001	3.843E-03	1.818E-03	2.753E-04	7.575E+01	3.583E+01	5.425E+00	70	1.153E-03	5.453E-04	8.258E-05	2.272E+01	1.075E+01	1.628E+00

Source ID	Emission Factor (AP42 batch drop)			Emission Rate (Uncontrolled)						Emission Rate (Controlled)						
	EF TSP	EF PM_{10}	EF $PM_{2.5}$	ERu TSP	ERu PM_{10}	ERu $PM_{2.5}$	ERu TSP	ERu PM_{10}	ERu $PM_{2.5}$	CF	ERc TSP	ERc PM_{10}	ERc $PM_{2.5}$	ERc TSP	ERc PM_{10}	ERc $PM_{2.5}$
	$kg.t^{-1}$	$kg.t^{-1}$	$kg.t^{-1}$	$g.s^{-1}$	$g.s^{-1}$	$g.s^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$	%	$g.s^{-1}$	$g.s^{-1}$	$g.s^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$
MH14	0.0014	0.0007	0.0001	9.838E-03	4.653E-03	7.046E-04	1.939E+02	9.172E+01	1.389E+01	70	2.952E-03	1.396E-03	2.114E-04	5.817E+01	2.752E+01	4.167E+00
TP01	0.0014	0.0007	0.0001	1.537E-02	7.271E-03	1.101E-03	3.030E+02	1.433E+02	2.170E+01	0	1.537E-02	7.271E-03	1.101E-03	3.030E+02	1.433E+02	2.170E+01
TP02	0.0014	0.0007	0.0001	4.125E-02	1.951E-02	2.954E-03	8.130E+02	3.845E+02	5.823E+01	0	4.125E-02	1.951E-02	2.954E-03	8.130E+02	3.845E+02	5.823E+01
TP03	0.0014	0.0007	0.0001	4.125E-02	1.951E-02	2.954E-03	8.130E+02	3.845E+02	5.823E+01	0	4.125E-02	1.951E-02	2.954E-03	8.130E+02	3.845E+02	5.823E+01
TP04	0.0014	0.0007	0.0001	3.972E-02	1.879E-02	2.845E-03	7.830E+02	3.703E+02	5.608E+01	0	3.972E-02	1.879E-02	2.845E-03	7.830E+02	3.703E+02	5.608E+01
TP05	0.0014	0.0007	0.0001	2.011E-03	9.513E-04	1.441E-04	3.964E+01	1.875E+01	2.839E+00	0	2.011E-03	9.513E-04	1.441E-04	3.964E+01	1.875E+01	2.839E+00
TP06	0.0014	0.0007	0.0001	1.207E-02	5.708E-03	8.643E-04	2.379E+02	1.125E+02	1.704E+01	0	1.207E-02	5.708E-03	8.643E-04	2.379E+02	1.125E+02	1.704E+01
TP07	0.0014	0.0007	0.0001	1.207E-02	5.708E-03	8.643E-04	2.379E+02	1.125E+02	1.704E+01	0	1.207E-02	5.708E-03	8.643E-04	2.379E+02	1.125E+02	1.704E+01
TP08	0.0014	0.0007	0.0001	1.207E-02	5.708E-03	8.643E-04	2.379E+02	1.125E+02	1.704E+01	0	1.207E-02	5.708E-03	8.643E-04	2.379E+02	1.125E+02	1.704E+01
CV01	0.0014	0.0007	0.0001	1.153E-02	5.453E-03	8.258E-04	2.272E+02	1.075E+02	1.628E+01	85	1.729E-03	8.180E-04	1.239E-04	3.409E+01	1.612E+01	2.441E+00
CV02	0.0014	0.0007	0.0001	1.153E-02	5.453E-03	8.258E-04	2.272E+02	1.075E+02	1.628E+01	85	1.729E-03	8.180E-04	1.239E-04	3.409E+01	1.612E+01	2.441E+00
CV03	0.0014	0.0007	0.0001	1.153E-02	5.453E-03	8.258E-04	2.272E+02	1.075E+02	1.628E+01	85	1.729E-03	8.180E-04	1.239E-04	3.409E+01	1.612E+01	2.441E+00
CV04	0.0014	0.0007	0.0001	1.153E-02	5.453E-03	8.258E-04	2.272E+02	1.075E+02	1.628E+01	85	1.729E-03	8.180E-04	1.239E-04	3.409E+01	1.612E+01	2.441E+00
CV05	0.0014	0.0007	0.0001	6.940E-03	3.282E-03	4.970E-04	1.368E+02	6.469E+01	9.796E+00	85	1.041E-03	4.923E-04	7.455E-05	2.052E+01	9.704E+00	1.469E+00
CV06	0.0014	0.0007	0.0001	6.940E-03	3.282E-03	4.970E-04	1.368E+02	6.469E+01	9.796E+00	85	1.041E-03	4.923E-04	7.455E-05	2.052E+01	9.704E+00	1.469E+00

Source ID	Emission Factor (AP42 batch drop)			Emission Rate (Uncontrolled)						Emission Rate (Controlled)						
	EF TSP	EF PM_{10}	EF $PM_{2.5}$	ERu TSP	ERu PM_{10}	ERu $PM_{2.5}$	ERu TSP	ERu PM_{10}	ERu $PM_{2.5}$	CF	ERc TSP	ERc PM_{10}	ERc $PM_{2.5}$	ERc TSP	ERc PM_{10}	ERc $PM_{2.5}$
	$kg.t^{-1}$	$kg.t^{-1}$	$kg.t^{-1}$	$g.s^{-1}$	$g.s^{-1}$	$g.s^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$	%	$g.s^{-1}$	$g.s^{-1}$	$g.s^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$
CV07	0.0014	0.0007	0.0001	6.940E-03	3.282E-03	4.970E-04	1.368E+02	6.469E+01	9.796E+00	85	1.041E-03	4.923E-04	7.455E-05	2.052E+01	9.704E+00	1.469E+00
CV08	0.0014	0.0007	0.0001	6.940E-03	3.282E-03	4.970E-04	1.368E+02	6.469E+01	9.796E+00	85	1.041E-03	4.923E-04	7.455E-05	2.052E+01	9.704E+00	1.469E+00
CV09	0.0014	0.0007	0.0001	6.940E-03	3.282E-03	4.970E-04	1.368E+02	6.469E+01	9.796E+00	85	1.041E-03	4.923E-04	7.455E-05	2.052E+01	9.704E+00	1.469E+00
CV10	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV11	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV12	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV13	0.0014	0.0007	0.0001	3.221E-03	1.523E-03	2.307E-04	6.348E+01	3.003E+01	4.547E+00	85	4.831E-04	2.285E-04	3.460E-05	9.523E+00	4.504E+00	6.820E-01
CV14	0.0014	0.0007	0.0001	3.221E-03	1.523E-03	2.307E-04	6.348E+01	3.003E+01	4.547E+00	85	4.831E-04	2.285E-04	3.460E-05	9.523E+00	4.504E+00	6.820E-01
CV15	0.0014	0.0007	0.0001	3.221E-03	1.523E-03	2.307E-04	6.348E+01	3.003E+01	4.547E+00	85	4.831E-04	2.285E-04	3.460E-05	9.523E+00	4.504E+00	6.820E-01
CV16	0.0014	0.0007	0.0001	1.054E-02	4.986E-03	7.550E-04	2.078E+02	9.827E+01	1.488E+01	85	1.581E-03	7.479E-04	1.132E-04	3.117E+01	1.474E+01	2.232E+00
CV17	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV18	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV19	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV20	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV21	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01

Source ID	Emission Factor (AP42 batch drop)			Emission Rate (Uncontrolled)						Emission Rate (Controlled)						
	EF TSP	EF PM_{10}	EF $PM_{2.5}$	ERu TSP	ERu PM_{10}	ERu $PM_{2.5}$	ERu TSP	ERu PM_{10}	ERu $PM_{2.5}$	CF	ERc TSP	ERc PM_{10}	ERc $PM_{2.5}$	ERc TSP	ERc PM_{10}	ERc $PM_{2.5}$
	$kg.t^{-1}$	$kg.t^{-1}$	$kg.t^{-1}$	$g.s^{-1}$	$g.s^{-1}$	$g.s^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$	%	$g.s^{-1}$	$g.s^{-1}$	$g.s^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$	$kg.yr^{-1}$
CV22	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV23	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV24	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV25	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV26	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV27	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV28	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV29	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV30	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV31	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV32	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
CV33	0.0014	0.0007	0.0001	5.856E-04	2.770E-04	4.194E-05	1.154E+01	5.459E+00	8.267E-01	85	8.784E-05	4.155E-05	6.291E-06	1.731E+00	8.189E-01	1.240E-01
TRKD01	0.0014	0.0007	0.0001	6.749E-02	3.192E-02	4.833E-03	1.330E+03	6.291E+02	9.527E+01	70	2.025E-02	9.576E-03	1.450E-03	3.990E+02	1.887E+02	2.858E+01
TRKD02	0.0014	0.0007	0.0001	1.537E-02	7.271E-03	1.101E-03	3.030E+02	1.433E+02	2.170E+01	70	4.612E-03	2.181E-03	3.303E-04	9.090E+01	4.299E+01	6.510E+00

Open Area Wind Erosion Sources – Activity Rates

Source ID	Co-ordinates		Description	Emissions	Time		Source Group	Activity Rates	
	mE	mS			Start	Stop		Area	$hr.day^{-1}$
WE01	306,494	6,263,578	Scrap stockpile	Hourly varying	12am	12am	WE	653 sqm	24
WE02	306,507	6,263,543	Scrap stockpile	Hourly varying	12am	12am	WE	428 sqm	24
WE03	306,631	6,263,571	Post pre-shredder stockpile 1- at pre-shredder	Hourly varying	12am	12am	WE	2100 sqm	24
WE04	306,503	6,263,664	Post pre-shredder stockpile 2- at hammer mill	Hourly varying	12am	12am	WE	2562 sqm	24
WE05	306,542	6,263,709	Ferrous product stockpile.	Hourly varying	12am	12am	WE	303 sqm	24
WE06	306,544	6,263,695	Ferrous product stockpile.	Hourly varying	12am	12am	WE	303 sqm	24
WE01	306,494	6,263,578	Scrap stockpile	Hourly varying	12am	12am	WE	653 sqm	24
WE02	306,507	6,263,543	Scrap stockpile	Hourly varying	12am	12am	WE	428 sqm	24
WE03	306,631	6,263,571	Post pre-shredder stockpile 1- at pre-shredder	Hourly varying	12am	12am	WE	2100 sqm	24
WE04	306,503	6,263,664	Post pre-shredder stockpile 2- at hammer mill	Hourly varying	12am	12am	WE	2562 sqm	24
WE05	306,542	6,263,709	Ferrous product stockpile.	Hourly varying	12am	12am	WE	303 sqm	24
WE06	306,544	6,263,695	Ferrous product stockpile.	Hourly varying	12am	12am	WE	303 sqm	24

Open Area (Stockpile) Wind Erosion Sources – Emission Rates

Source ID	Emission Factor	$kg.ha^{-1}.yr^{-1}$	$kg.ha^{-1}.yr^{-1}$	$kg.ha^{-1}.yr^{-1}$
WE01	NPI Mining	925.8	462.9	370.3
WE02	NPI Mining	925.8	462.9	370.3
WE03	NPI Mining	925.8	462.9	370.3
WE04	NPI Mining	925.8	462.9	370.3
WE05	NPI Mining	925.8	462.9	370.3
WE06	NPI Mining	925.8	462.9	370.3

Wheel Generated Dust – Activity Rates

Source	Gate in	Destination	Gate out	Dist. (m)	$Veh \cdot day^{-1}$	$VKT \cdot day^{-1}$	W (ave t)	sL
ROAD 1	Western	Shred/Floc	Eastern	457	92	42.044	15	9.7
ROAD 2	Cental	Non Ferrous	Eastern	336	103	34.608	15	9.7
ROAD 3	Western	Pre Shred	Eastern	604	24	14.496	15	9.7
ROAD 4	Western	Shear & Oxy	Eastern	564	23	12.972	15	9.7

Wheel Generated Dust – Emission rates

Source	EF TSP	EF PM_{10}	EF $PM_{2.5}$	ERu (TSP)	ERu (PM_{10})	ERu ($PM_{2.5}$)	CF	ERc (TSP)	ERc (PM_{10})	ERc ($PM_{2.5}$)
ROAD 1	0.404369	0.077619	0.018779	17.001	3.263	0.790	30	11.901	2.875	0.767
ROAD 2	0.404369	0.077619	0.018779	13.994	2.686	0.650	30	9.796	2.423	0.634
ROAD 3	0.404369	0.077619	0.018779	5.862	1.125	0.272	30	4.103	1.079	0.269
ROAD 4	0.404369	0.077619	0.018779	5.245	1.007	0.244	30	3.672	0.970	0.241

Note: the annual estimates ($kg \cdot yr^{-1}$) are based upon maximum daily emission rates and are therefore highly conservative.**:**

Appendix B: Modelling Results

The following section presents the results of the dispersion modelling exercise performed with the emission inventory presented in **Appendix A**.

This section presents the results of the dispersion modelling assessment and uses the following terminology:

- Incremental impact – relates to the concentrations predicted as a result of the construction and operation of the Proposal in isolation.
- Cumulative impact – relates to the incremental concentrations predicted as a result of the construction and operation of the Proposal PLUS the background air quality concentrations.

The results are presented in this manner to allow examination of the likely impact of the Proposal in isolation and the contribution to air quality impacts in a broader sense.

In the presentation of results, the tables included shaded cells which represent the following:

Model prediction	Pollutant concentration / deposition rate less than the relevant criterion	**Pollutant concentration / deposition rate equal to, or greater than the relevant criterion**

Where incremental impacts are predicts as less than (<) the relevant reporting range, the cumulative impact has been calculated at 100 % of the reporting threshold.

Annual Average TSP, PM_{10} and $PM_{2.5}$

Incremental and cumulative annual average TSP, PM_{10} and $PM_{2.5}$ impacts are presented in **Table 5** for R1-R9 and R20-R33. R10-R19 are fenceline receptors and are therefore not relevant to assess annual average impacts. Similarly, R34 and R35 are on-site monitoring locations and are therefore not relevant to assess annual average impacts.

Note: Annual average predictions are based upon maximum daily throughputs and are therefore highly conservative.

Table 5 Predicted incremental and cumulative annual average TSP, PM_{10} and $PM_{2.5}$ concentrations

Receptor	Annual Average Concentration ($\mu g \cdot m^{-3}$)								
	TSP			PM_{10}			$PM_{2.5}$		
	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact
R1	1.2	44.8	46.0	0.4	21.8	22.2	0.1	8.5	8.6
R2	1.1	44.8	45.9	0.4	21.8	22.2	<0.1	8.5	8.6
R3	0.9	44.8	45.7	0.3	21.8	22.1	<0.1	8.5	8.6
R4	0.6	44.8	45.4	0.2	21.8	22.0	<0.1	8.5	8.6
R5	0.5	44.8	45.3	0.2	21.8	22.0	<0.1	8.5	8.6
R6	0.4	44.8	45.2	0.2	21.8	22.0	<0.1	8.5	8.6
R7	0.3	44.8	45.1	0.1	21.8	21.9	<0.1	8.5	8.6
R8	0.4	44.8	45.2	0.2	21.8	22.0	<0.1	8.5	8.6
R9	0.4	44.8	45.2	0.2	21.8	22.0	<0.1	8.5	8.6
R20	0.2	44.8	45.0	<0.1	21.8	21.9	<0.1	8.5	8.6
R21	0.1	44.8	44.9	<0.1	21.8	21.9	<0.1	8.5	8.6
R22	0.4	44.8	45.2	0.2	21.8	22.0	<0.1	8.5	8.6
R23	0.2	44.8	45.0	<0.1	21.8	21.9	<0.1	8.5	8.6
R24	0.2	44.8	45.0	<0.1	21.8	21.9	<0.1	8.5	8.6
R25	0.4	44.8	45.2	0.1	21.8	21.9	<0.1	8.5	8.6
R26	0.3	44.8	45.1	0.1	21.8	21.9	<0.1	8.5	8.6
R27	0.4	44.8	45.2	0.1	21.8	21.9	<0.1	8.5	8.6
R28	0.4	44.8	45.2	0.1	21.8	21.9	<0.1	8.5	8.6
R29	0.9	44.8	45.7	0.3	21.8	22.1	<0.1	8.5	8.6
R30	0.5	44.8	45.3	0.2	21.8	22.0	<0.1	8.5	8.6
R31	0.4	44.8	45.2	0.2	21.8	22.0	<0.1	8.5	8.6
R32	0.3	44.8	45.1	0.1	21.8	21.9	<0.1	8.5	8.6
R33	0.3	44.8	45.1	0.1	21.8	21.9	<0.1	8.5	8.6
Criterion	-	90		-	25			8	

The results do not predict an exceedance of the annual average TSP or PM_{10} criteria. The annual average $PM_{2.5}$ criterion is predicted to be exceeded, but these impacts are associated with a background contribution already exceeding the criterion.

The assessment does not predict the operation of the Proposal would lead to any additional exceedances of the relevant criteria.

24-hour Average Incremental PM_{10} and $PM_{2.5}$

Maximum incremental 24-hour PM_{10} and $PM_{2.5}$ impacts are presented in **Table 6** for R1-R9 and R20-R33. R10-R19 are fenceline receptors and are therefore not relevant to assess 24-hour average impacts. Similarly, R34 and R35 are on-site monitoring locations and are therefore not relevant 24-hour average impacts as they do not evaluate potential exposure locations.

Table 6 Predicted incremental 24-hour average PM_{10} and $PM_{2.5}$ concentrations

Receptor	Maximum 24-hour average concentration ($\mu g \cdot m^{-3}$)	
	PM_{10}	$PM_{2.5}$
R1	4.7	1.2
R2	6.2	1.6
R3	4.5	1.2
R4	2.1	0.6
R5	1.8	0.5
R6	1.9	0.5
R7	1.9	0.5
R8	1.9	0.5
R9	1.9	0.5
R20	1.4	0.4
R21	1.2	0.3
R22	3.6	0.9
R23	2.0	0.5
R24	1.9	0.5
R25	1.8	0.5
R26	1.6	0.5
R27	2.1	0.6
R28	2.1	0.6
R29	4.3	1.2
R30	2.7	0.7
R31	2.4	0.6
R32	1.4	0.4
R33	1.1	0.3

The maximum incremental PM_{10} impact is predicted as 6.2 $\mu g \cdot m^{-3}$ (R2).

The maximum incremental $PM_{2.5}$ impact is predicted as 1.6 $\mu g \cdot m^{-3}$ (R2).

24-hour Average Cumulative PM_{10} and $PM_{2.5}$

Cumulative impacts are assessed as incremental impact aggregated with the background concentration assumptions.

Results are presented for the receptor at which the highest incremental PM_{10} and $PM_{2.5}$ impacts have been predicted, and also for the receptors at which the highest cumulative impacts (increment plus background) have been predicted.

The left side of the tables show the predicted concentration on days with the highest background, and the right side shows the total predicted concentration on days with the highest predicted incremental concentrations. Correspondingly, **Table 7** presents impacts at R2 for PM_{10} and $PM_{2.5}$.

The left side of the tables show the predicted concentration on days with the highest cumulative impacts (typically driven by high background concentrations), and the right side shows the total predicted concentration on days with the highest predicted incremental concentrations.

Table 7 Predicted cumulative 24-hour average PM_{10} concentrations

Date	24-hour average PM_{10} concentration R2 ($\mu g \cdot m^{-3}$)			Date	24-hour average PM_{10} concentration R2 ($\mu g \cdot m^{-3}$)		
	Incremental Impact	Background	Cumulative Impact		Incremental Impact	Background	Cumulative Impact
22/11/2018	1.4	113.3	114.7	12/07/2018	6.2	20.0	26.2
19/03/2018	<0.1	70.2	70.3	13/06/2018	4.2	14.1	18.3
28/05/2018	<0.1	65.8	65.9	21/05/2018	3.4	17.5	20.9
18/07/2018	3.3	61.9	65.2	18/07/2018	3.3	61.9	65.2
15/02/2018	<0.1	61.6	61.7	23/05/2018	2.9	29.3	32.2
29/05/2018	<0.1	58.7	58.8	17/08/2018	2.9	20.0	22.9
21/11/2018	0.7	55.7	56.4	4/08/2018	2.8	22.3	25.1
19/07/2018	<0.1	54.4	54.5	14/06/2018	2.8	12.6	15.4
18/03/2018	1.3	47.9	49.2	27/07/2018	2.8	31.2	34.0
14/04/2018	<0.1	47.8	47.9	14/08/2018	2.5	18.6	21.1
These data represent the highest Cumulative Impact 24-hour PM_{10} predictions outlined in red as a result of the operation of the project.				These data represent the highest Incremental Impact 24-hour PM_{10} predictions outlined in blue as a result of the operation of the project.			

The results predict exceedances of the 24-hour PM_{10} criterion, although these are shown to be driven by elevated background concentrations already exceeding the criterion.

Critically, the assessment does not predict the operation of the Proposal would lead to any additional exceedances of the relevant 24-hour PM_{10} criterion.

Table 8 Predicted cumulative 24-hour average $PM_{2.5}$ concentrations

Date	24-hour average $PM_{2.5}$ concentration R2 ($\mu g \cdot m^{-3}$)			Date	24-hour average $PM_{2.5}$ concentration R2 ($\mu g \cdot m^{-3}$)		
	Incremental Impact	Background	Cumulative Impact		Incremental Impact	Background	Cumulative Impact
29/05/2018	<0.1	47.5	47.6	12/07/2018	1.6	13.8	15.4
28/05/2018	<0.1	42.5	42.6	13/06/2018	1.1	6.9	8.0
6/05/2018	0.3	27.1	27.4	27/07/2018	0.8	19.5	20.3
27/05/2018	<0.1	27.0	27.1	21/05/2018	0.8	7.4	8.2
15/07/2018	0.4	23.1	23.5	23/05/2018	0.8	11.3	12.1
9/05/2018	<0.1	21.7	21.8	18/07/2018	0.8	8.9	9.7
25/04/2018	<0.1	20.6	<20.7	17/08/2018	0.8	9.4	10.2
27/07/2018	0.8	19.5	20.3	14/06/2018	0.7	5.2	5.9
8/05/2018	0.1	19.9	20.0	4/08/2018	0.7	9.2	9.9
26/08/2018	0.6	18.4	19.0	22/06/2018	0.7	17.0	17.7
These data represent the highest Cumulative Impact 24-hour PM_{10} predictions outlined in red as a result of the operation of the project.				These data represent the highest Incremental Impact 24-hour PM_{10} predictions outlined in blue as a result of the operation of the project.			

The results predict exceedances of the 24-hour $PM_{2.5}$ criterion, although these are shown to be driven by elevated background concentrations already exceeding the criterion.

Critically, the assessment does not predict the operation of the Proposal would lead to any additional exceedances of the relevant 24-hour $PM_{2.5}$ criterion.

Nitrogen Dioxide

Incremental and cumulative 1-hour and annual average NO_2 impacts are presented in **Table 9**. The results schedules report concentrations at R1-R33, as those receptor locations are relevant to a 1-hour averaging period. The industrial receptor locations are shown in slightly different shading to assist with interpretation. The results at R34 and R35 are not shown as they are on-site monitoring locations and are not representative of potential off-site exposure locations.

It is noted that the assessment assumes a 100 % conversion of NO_X to NO_2.

Table 9 Predicted incremental 1-hour and annual average NO_2 concentrations

Rec.	Nitrogen dioxide (NO_2) concentration ($\mu g{\cdot}m^{-3}$)					
	1 hour			Annual Average		
	Increment	Background	Cumulative	Increment	Background	Cumulative
R1	1.0	104.6	105.6	0.01	18.7	18.7
R2	0.9	105.6	106.5	0.01	19.7	19.7
R3	0.9	106.6	107.5	0.01	20.7	20.7
R4	0.5	107.6	108.1	0.01	21.7	21.7
R5	0.4	108.6	109.0	0.00	22.7	22.7
R6	0.4	109.6	110.0	0.00	23.7	23.7
R7	0.4	110.6	111.0	0.00	24.7	24.7
R8	0.8	111.6	112.4	0.01	25.7	25.7
R9	0.9	112.6	113.5	0.01	26.7	26.7
R10	*1.5*	*113.6*	*115.1*	*0.06*	*27.7*	*27.8*
R11	*1.8*	*114.6*	*116.4*	*0.08*	*28.7*	*28.8*
R12	*2.3*	*115.6*	*117.9*	*0.06*	*29.7*	*29.8*
R13	*2.4*	*116.6*	*119.0*	*0.06*	*30.7*	*30.8*
R14	*2.1*	*117.6*	*119.7*	*0.05*	*31.7*	*31.7*
R15	*2.2*	*118.6*	*120.8*	*0.04*	*32.7*	*32.7*
R16	*3.5*	*119.6*	*123.1*	*0.10*	*33.7*	*33.8*
R17	*1.8*	*120.6*	*122.4*	*0.05*	*34.7*	*34.8*
R18	*1.2*	*121.6*	*122.8*	*0.04*	*35.7*	*35.7*
R19	*2.2*	*122.6*	*124.8*	*0.06*	*36.7*	*36.8*
R20	0.5	123.6	124.1	0.00	37.7	37.7
R21	0.6	124.6	125.2	0.00	38.7	38.7
R22	0.7	125.6	126.3	0.01	39.7	39.7
R23	0.7	126.6	127.3	0.00	40.7	40.7
R24	0.6	127.6	128.2	0.01	41.7	41.7
R25	0.5	128.6	129.1	0.00	42.7	42.7
R26	0.5	129.6	130.1	0.01	43.7	43.7
R27	0.4	130.6	131.0	0.01	44.7	44.7

Rec.	Nitrogen dioxide (NO_2) concentration ($\mu g \cdot m^{-3}$)					
	1 hour			Annual Average		
	Increment	Background	Cumulative	Increment	Background	Cumulative
R28	0.6	131.6	132.2	0.01	45.7	45.7
R29	0.9	132.6	133.5	0.01	46.7	46.7
R30	0.6	133.6	134.2	0.01	47.7	47.7
R31	0.9	134.6	135.5	0.01	48.7	48.7
R32	0.5	135.6	136.1	0.00	49.7	49.7
R33	0.5	136.6	137.1	0.01	50.7	50.7
Criterion		246			62	

The results do not predict any exceedances of the 1-hour or annual average NO_2 criteria.

Annual Average Dust Deposition

Incremental and cumulative impacts are presented in **Table 10**.

Table 10 Predicted incremental & cumulative dust deposition rates

Receptor	Annual Average Dust Deposition ($g \cdot m^{-2} \cdot month^{-1}$)		
	Incremental Impact	Background	Cumulative Impact
R1	<0.1	2.0	2.1
R2	<0.1	2.0	2.1
R3	<0.1	2.0	2.1
R4	<0.1	2.0	2.1
R5	<0.1	2.0	2.1
R6	<0.1	2.0	2.1
R7	<0.1	2.0	2.1
R8	<0.1	2.0	2.1
R9	<0.1	2.0	2.1
R20	<0.1	2.0	2.1
R21	<0.1	2.0	2.1
R22	<0.1	2.0	2.1
R23	<0.1	2.0	2.1
R24	<0.1	2.0	2.1
R25	<0.1	2.0	2.1
R26	<0.1	2.0	2.1
R27	<0.1	2.0	2.1
R28	<0.1	2.0	2.1
R29	<0.1	2.0	2.1
R30	<0.1	2.0	2.1
R31	<0.1	2.0	2.1
R32	<0.1	2.0	2.1
R33	<0.1	2.0	2.1
Criterion	2	-	4

The results do not predict any exceedances of the annual average dust deposition rate.

Other Pollutants

Metals and other pollutants (including Cl_2 and HF) for which there are a published criterion in the Approved Methods (NSW EPA, 2017) are summarised in **Table 11** and **Table 12**.

The predicted impacts are not predicted to exceed the relevant impact assessment criteria for any pollutants.

Table 11 Predicted incremental impacts (1 of 2)

Receptor	Predicted Impact (µg·m⁻³)								
	Ag	As	Ba	Cd	Cl_2	Cr(VI)	Cr	Cu	Fe
	1-hour	1-hour	1-hour	1-hour	1-hour	1-hour	1-hour	1-hour	1-hour
1	2.53E-06	4.92E-04	8.42E-04	1.47E-04	2.46E-03	9.82E-04	5.40E-04	5.90E-04	9.48E-02
2	2.46E-06	4.46E-04	8.21E-04	1.34E-04	2.22E-03	8.89E-04	4.89E-04	5.34E-04	9.24E-02
3	2.19E-06	4.35E-04	7.30E-04	1.30E-04	2.17E-03	8.68E-04	4.77E-04	5.21E-04	8.31E-02
4	7.13E-07	2.41E-04	2.38E-04	7.23E-05	1.20E-03	4.81E-04	2.64E-04	2.89E-04	2.73E-02
5	5.93E-07	2.09E-04	1.98E-04	6.24E-05	1.04E-03	4.16E-04	2.29E-04	2.50E-04	2.31E-02
6	5.73E-07	2.20E-04	1.91E-04	6.59E-05	1.10E-03	4.39E-04	2.41E-04	2.64E-04	2.24E-02
7	3.95E-07	2.21E-04	1.32E-04	6.62E-05	1.10E-03	4.41E-04	2.42E-04	2.65E-04	1.50E-02
8	5.17E-07	3.93E-04	1.72E-04	1.18E-04	1.96E-03	7.83E-04	4.30E-04	4.70E-04	1.97E-02
9	9.76E-07	4.42E-04	3.25E-04	1.32E-04	2.20E-03	8.81E-04	4.84E-04	5.29E-04	3.83E-02
10	8.14E-06	7.64E-04	2.71E-03	2.20E-04	3.67E-03	1.47E-03	8.06E-04	9.79E-04	3.07E-01
11	1.36E-05	9.05E-04	4.55E-03	2.71E-04	4.52E-03	1.81E-03	9.92E-04	1.14E-03	5.08E-01
12	1.74E-05	1.16E-03	5.81E-03	3.49E-04	5.81E-03	2.32E-03	1.28E-03	1.39E-03	6.43E-01
13	1.80E-05	1.21E-03	6.01E-03	3.61E-04	6.02E-03	2.41E-03	1.32E-03	1.45E-03	6.63E-01
14	2.04E-05	1.05E-03	6.79E-03	3.15E-04	5.25E-03	2.10E-03	1.15E-03	1.26E-03	7.47E-01
15	2.16E-05	1.12E-03	7.20E-03	3.34E-04	5.56E-03	2.22E-03	1.22E-03	1.36E-03	7.99E-01
16	1.26E-05	1.75E-03	4.21E-03	5.23E-04	8.71E-03	3.48E-03	1.91E-03	2.09E-03	4.66E-01
17	5.76E-06	8.81E-04	1.92E-03	2.64E-04	4.39E-03	1.76E-03	9.65E-04	1.06E-03	2.15E-01
18	3.27E-06	5.96E-04	1.09E-03	1.78E-04	2.97E-03	1.19E-03	6.53E-04	7.14E-04	1.23E-01
19	1.11E-05	1.15E-03	3.68E-03	3.31E-04	5.49E-03	2.19E-03	1.22E-03	1.39E-03	4.07E-01
20	3.44E-07	2.57E-04	1.15E-04	7.68E-05	1.28E-03	5.12E-04	2.81E-04	3.07E-04	1.29E-02
21	2.49E-07	2.97E-04	8.30E-05	8.89E-05	1.48E-03	5.92E-04	3.25E-04	3.55E-04	9.39E-03
22	8.85E-07	3.75E-04	2.95E-04	1.12E-04	1.87E-03	7.48E-04	4.11E-04	4.49E-04	3.33E-02

Receptor	Predicted Impact (µg·m⁻³)								
	Ag	As	Ba	Cd	Cl_2	Cr(VI)	Cr	Cu	Fe
	1-hour	1-hour	1-hour	1-hour	1-hour	1-hour	1-hour	1-hour	1-hour
23	3.04E-07	3.38E-04	1.01E-04	1.01E-04	1.69E-03	6.74E-04	3.70E-04	4.05E-04	1.15E-02
24	2.42E-07	2.79E-04	8.08E-05	8.34E-05	1.39E-03	5.55E-04	3.05E-04	3.34E-04	9.27E-03
25	4.79E-07	2.41E-04	1.60E-04	7.20E-05	1.20E-03	4.80E-04	2.64E-04	2.88E-04	1.82E-02
26	5.32E-07	2.41E-04	1.77E-04	7.22E-05	1.20E-03	4.81E-04	2.64E-04	2.89E-04	2.10E-02
27	3.64E-07	1.98E-04	1.21E-04	5.93E-05	9.88E-04	3.95E-04	2.17E-04	2.37E-04	1.39E-02
28	5.20E-07	3.16E-04	1.73E-04	9.46E-05	1.58E-03	6.30E-04	3.46E-04	3.78E-04	1.97E-02
29	1.86E-06	4.55E-04	6.21E-04	1.36E-04	2.27E-03	9.08E-04	4.99E-04	5.45E-04	6.95E-02
30	6.61E-07	3.04E-04	2.20E-04	9.11E-05	1.52E-03	6.07E-04	3.33E-04	3.64E-04	2.51E-02
31	8.97E-07	4.29E-04	2.99E-04	1.28E-04	2.14E-03	8.55E-04	4.70E-04	5.13E-04	3.50E-02
32	3.77E-07	2.49E-04	1.26E-04	7.46E-05	1.24E-03	4.97E-04	2.73E-04	2.98E-04	1.44E-02
33	3.84E-07	2.30E-04	1.28E-04	6.89E-05	1.15E-03	4.59E-04	2.52E-04	2.76E-04	1.46E-02
34	2.64E-05	1.16E-03	8.79E-03	3.48E-04	5.80E-03	2.32E-03	1.27E-03	1.43E-03	9.68E-01
35	9.61E-06	1.57E-03	3.20E-03	4.69E-04	7.82E-03	3.13E-03	1.72E-03	1.88E-03	3.58E-01
Max	2.64E-05	1.75E-03	8.79E-03	5.23E-04	8.71E-03	3.48E-03	1.91E-03	2.09E-03	9.68E-01
Criterion	1.8	0.09	9	0.018	50	0.09	9	3.7	90
Max/Crit.	<0.1%	1.9%	0.1%	2.9%	<0.1%	3.9%	<0.1%	0.1%	1.1%

Table 12 Predicted incremental impacts (2 of 2)

Receptor	Predicted Impact (µg·m^{-3})								
	Fe (II,III)	Hg	Mg	Mn	Pb	HF			
	1-hour	1-hour	1-hour	1-hour	Annual	24-hour	7-day	30-day	90-day
1	3.92E-01	6.40E-04	5.61E-04	1.73E-03	8.17E-06	3.10E-05	1.22E-04	8.53E-05	6.33E-05
2	3.83E-01	5.80E-04	5.47E-04	1.69E-03	7.26E-06	2.73E-05	1.24E-04	7.71E-05	5.38E-05
3	3.40E-01	5.66E-04	4.86E-04	1.58E-03	5.64E-06	2.11E-05	1.11E-04	5.29E-05	3.88E-05
4	1.11E-01	3.14E-04	1.58E-04	5.40E-04	3.76E-06	1.49E-05	5.34E-05	2.46E-05	2.32E-05
5	9.21E-02	2.71E-04	1.32E-04	4.80E-04	2.71E-06	1.07E-05	5.57E-05	1.86E-05	1.76E-05
6	8.91E-02	2.86E-04	1.27E-04	4.66E-04	2.53E-06	1.00E-05	4.21E-05	1.60E-05	1.53E-05
7	6.13E-02	2.87E-04	8.76E-05	2.85E-04	2.81E-06	1.11E-05	4.34E-05	3.03E-05	1.95E-05
8	8.03E-02	5.10E-04	1.15E-04	4.70E-04	4.73E-06	1.86E-05	7.16E-05	3.76E-05	2.84E-05
9	1.52E-01	5.74E-04	2.17E-04	8.12E-04	4.74E-06	1.88E-05	9.17E-05	4.67E-05	3.72E-05
10	1.26E+00	9.56E-04	1.81E-03	5.68E-03	4.31E-05	1.61E-04	5.51E-04	3.25E-04	2.62E-04
11	2.12E+00	1.18E-03	3.03E-03	9.01E-03	5.37E-05	1.89E-04	6.98E-04	3.45E-04	2.56E-04
12	2.71E+00	1.51E-03	3.87E-03	1.12E-02	4.68E-05	1.50E-04	4.60E-04	2.70E-04	2.09E-04
13	2.80E+00	1.57E-03	4.01E-03	1.12E-02	4.00E-05	1.38E-04	4.98E-04	2.92E-04	2.20E-04
14	3.16E+00	1.37E-03	4.52E-03	1.25E-02	3.56E-05	1.20E-04	5.49E-04	3.16E-04	2.36E-04
15	3.36E+00	1.45E-03	4.80E-03	1.38E-02	3.09E-05	9.92E-05	4.28E-04	2.54E-04	1.81E-04
16	1.96E+00	2.27E-03	2.80E-03	7.95E-03	6.41E-05	2.37E-04	9.19E-04	3.70E-04	3.14E-04
17	8.94E-01	1.14E-03	1.28E-03	3.86E-03	3.55E-05	1.35E-04	4.66E-04	2.26E-04	1.87E-04
18	5.07E-01	7.75E-04	7.25E-04	2.30E-03	2.62E-05	1.01E-04	3.43E-04	2.01E-04	1.43E-04
19	1.72E+00	1.43E-03	2.45E-03	6.88E-03	4.09E-05	1.52E-04	5.86E-04	3.10E-04	2.56E-04
20	5.34E-02	3.33E-04	7.63E-05	3.07E-04	2.67E-06	1.07E-05	4.90E-05	3.66E-05	1.93E-05
21	3.87E-02	3.86E-04	5.53E-05	3.55E-04	1.77E-06	7.15E-06	3.73E-05	2.25E-05	1.56E-05
22	1.37E-01	4.87E-04	1.96E-04	6.13E-04	3.42E-06	1.29E-05	5.85E-05	2.92E-05	2.04E-05
23	4.72E-02	4.39E-04	6.74E-05	4.05E-04	1.93E-06	7.61E-06	5.49E-05	1.77E-05	1.20E-05

Receptor	Predicted Impact (µg·m^{-3})								
	Fe (II,III)	Hg	Mg	Mn	Pb	HF			
	1-hour	1-hour	1-hour	1-hour	Annual	24-hour	7-day	30-day	90-day
24	3.76E-02	3.62E-04	5.38E-05	3.34E-04	3.33E-06	1.32E-05	4.55E-05	2.85E-05	1.86E-05
25	7.44E-02	3.13E-04	1.06E-04	3.45E-04	2.94E-06	1.17E-05	4.69E-05	2.77E-05	1.82E-05
26	8.27E-02	3.13E-04	1.18E-04	4.51E-04	4.12E-06	1.61E-05	5.26E-05	2.43E-05	2.05E-05
27	5.65E-02	2.57E-04	8.08E-05	2.67E-04	3.41E-06	1.37E-05	4.00E-05	2.90E-05	2.21E-05
28	8.07E-02	4.10E-04	1.15E-04	3.78E-04	3.94E-06	1.51E-05	5.20E-05	3.75E-05	2.12E-05
29	2.89E-01	5.91E-04	4.13E-04	1.25E-03	7.84E-06	3.04E-05	1.20E-04	8.48E-05	5.50E-05
30	1.03E-01	3.95E-04	1.47E-04	4.88E-04	4.88E-06	1.90E-05	1.13E-04	3.51E-05	2.46E-05
31	1.39E-01	5.57E-04	1.99E-04	7.32E-04	4.42E-06	1.72E-05	8.83E-05	4.33E-05	3.03E-05
32	5.86E-02	3.24E-04	8.37E-05	2.98E-04	3.13E-06	1.24E-05	4.98E-05	2.58E-05	1.76E-05
33	5.97E-02	2.99E-04	8.53E-05	2.79E-04	3.23E-06	1.26E-05	4.35E-05	1.52E-05	1.43E-05
34	4.10E+00	1.51E-03	5.85E-03	1.62E-02	5.17E-05	1.47E-04	4.40E-04	2.27E-04	1.84E-04
35	1.49E+00	2.04E-03	2.13E-03	6.40E-03	6.04E-05	2.28E-04	8.46E-04	5.04E-04	3.40E-04
Max	4.10E+00	2.27E-03	5.85E-03	1.62E-02	6.41E-05	2.37E-04	9.19E-04	5.04E-04	3.40E-04
Criterion	90	0.18	180	18	0.5	1.5	0.8	0.4	0.25
Max/Crit.	4.6%	1.3%	<0.1%	0.1%	<0.1%	<0.1%	0.1%	0.1%	0.1%

Odour

Incremental 99th percentile odour impacts are presented in **Table 13** at receptors R1-R9 and R20-R33 representing locations where amenity impacts are to be managed. Results for R10-R19 (fenceline locations) are presented, although these should not be compared to the odour impact criterion of 2 OU with caution as they are not representative of typical sensitive exposure locations, although it is noted that the predictions are all lower than the odour criterion in any case.

Table 13 Predicted incremental 99th percentile odour impacts

Receptor	99th percentile nose response time odour concentration (OU)
R1	0.2
R2	0.2
R3	0.2
R4	0.1
R5	0.1
R6	0.1
R7	0.1
R8	0.1
R9	0.1
R10	*0.8*
R11	*0.9*
R12	*0.9*
R13	*0.8*
R14	*0.8*
R15	*0.7*
R16	*0.8*
R17	*0.5*
R18	*0.4*
R19	*0.9*
R20	0.1
R21	0.0
R22	0.1
R23	0.0
R24	0.1
R25	0.1
R26	0.1
R27	0.1
R28	0.1
R29	0.2
R30	0.1
R31	0.1
R32	0.1

Receptor	99th percentile nose response time odour concentration (OU)
R33	0.2
Criterion	2.0

The assessment does not predict any exceedance of the 2 OU odour impact criterion at any receptors, nor at any fenceline assessment locations.

In accordance with the requirements of the POEO odour is to be assessed and controlled from each premises to not give rise to offensive odour.

Correspondingly, odour is assessed as discrete emissions only although the potential cumulative impacts are discussed considering the AQIA supporting the neighbouring operations of Autorecyclers Pty Ltd.

Appendix C: Aggregated Impacts

Impacts aggregated with predicted impacts from Autorecyclers Pty Ltd, as reported in the AQIA Table 23 and Table 24 are presented below, updated with the results of the supplementary AQIA.

Table 14 Aggregated annual average impacts with Autorecyclers Pty Ltd

Rec	TAS Rec	Northstar (2020) (µg·m⁻³)						TAS (2019) (µg·m⁻³)			Estimated Aggregate (µg·m⁻³)		
		TSP		PM_{10}		$PM_{2.5}$		TSP	PM_{10}	$PM_{2.5}$	TSP	PM_{10}	$PM_{2.5}$
		Incr	BG	Inc	BG	Inc	BG	Inc	Inc	Inc	Aggr	Aggr	Aggr
R1	R3	1.2	45	0.4	21.9	0.1	8.5	0.3	0.2	0.1	46.5	22.5	8.7
R2	R4	1.1	45	0.4	21.9	<0.1	8.5	0.4	0.2	0.1	46.5	22.5	8.7
R3	R5	0.9	45	0.3	21.9	<0.1	8.5	0.5	0.2	0.1	46.4	22.4	8.7
R4	R13	0.6	45	0.2	21.9	<0.1	8.5	0.4	0.2	0.1	46.0	22.3	8.7
R6	R12	0.4	45	0.2	21.9	<0.1	8.5	0.3	0.1	<0.1	45.7	22.2	8.7
R7	R11	0.3	45	0.1	21.9	<0.1	8.5	0.2	0.1	<0.1	45.5	22.1	8.7
R8	R9	0.4	45	0.2	21.9	<0.1	8.5	0.3	0.1	<0.1	45.7	22.2	8.7
R22	R2	0.4	45	0.2	21.9	<0.1	8.5	0.2	0.1	<0.1	45.6	22.2	8.7
R28	R1	0.4	45	0.1	21.9	<0.1	8.5	0.2	0.1	<0.1	45.6	22.1	8.7
R29	R6	0.9	45	0.3	21.9	<0.1	8.5	0.6	0.3	0.1	46.5	22.5	8.7
R30	R8	0.5	45	0.2	21.9	<0.1	8.5	0.3	0.1	<0.1	45.8	22.2	8.7
R31	R7	0.4	45	0.2	21.9	<0.1	8.5	0.3	0.2	0.1	45.7	22.3	8.7
R32	R10	0.3	45	0.1	21.9	<0.1	8.5	0.2	0.1	<0.1	45.5	22.1	8.7
R33	R15	0.3	45	0.1	21.9	<0.1	8.5	0.3	0.1	<0.1	45.6	22.1	8.7

Table 15 Aggregated 24-hour average impacts with Autorecyclers Pty Ltd

Rec	TAS Rec	Northstar (2020)				TAS (2019)		Estimated Aggregate	
		PM_{10}		$PM_{2.5}$		PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
		Inc	BG	Inc	BG	Inc	Inc	Aggr	Aggr
R1	R3	4.7	20	1.2	13.8	3	1	27.7	16.0
R2	R4	6.2	20	1.6	13.8	3.4	1.2	29.6	16.6
R3	R5	4.5	20	1.2	13.8	3	1.1	27.5	16.1
R4	R13	2.1	22.9	0.6	10.7	2.3	0.8	27.3	12.1
R6	R12	1.9	18.4	0.5	13	2.4	0.9	22.7	14.4
R7	R11	1.9	22.1	0.5	13.3	2.1	0.8	26.1	14.6
R8	R9	1.9	13.9	0.5	6.6	1.9	0.7	17.7	7.8
R22	R2	3.6	8.9	0.9	6.8	1.5	0.5	14.0	8.2
R28	R1	2.1	58.7	0.6	47.5	1.8	0.5	62.6	48.6
R29	R6	4.3	18.9	1.2	16.1	2.9	0.9	26.1	18.2
R30	R8	2.7	11.3	0.7	7.7	2.1	0.8	16.1	9.2
R31	R7	2.4	20	0.6	6.9	2.4	0.8	24.8	8.3
R32	R10	1.4	22.1	0.4	13.3	1.4	0.6	24.9	14.3
R33	R15	1.1	17.9	0.3	11	1.7	0.6	20.7	11.9

Table 16 Aggregated 1-hour odour impacts with Autorecyclers Pty Ltd

REC	TAS Rec	Northstar (2020)	TAS (2019)	Estimated Aggregate
		OU (3-sec OU)		
R1	R3	0.2	0.2	0.4
R2	R4	0.2	0.2	0.4
R3	R5	0.2	0.2	0.4
R4	R13	0.1	0.3	0.4
R6	R12	0.1	0.2	0.3
R7	R11	0.1	0.2	0.3
R8	R9	0.1	0.2	0.3
R22	R2	0.1	0.1	0.2
R28	R1	0.1	0.1	0.2
R29	R6	0.2	0.3	0.5
R30	R8	0.1	0.2	0.3
R31	R7	0.1	0.2	0.3
R32	R10	0.1	0.2	0.3
R33	R15	0.1	0.1	0.2

Appendix D: Source Apportionment

Particulates (as PM_{10})

As presented in **Appendix B**, the most affected source from emissions of particulates (as PM_{10}) is identified as Receptor 2.

The 10 highest incremental impact days has been disaggregated by source contributions, and presented below:

Table 17 Source apportionment (PM_{10})

Date	Predicted PM_{10} Impacts at R2 ($\mu g \cdot m^{-3}$)								
	All Sources	Paved Roads	Materials Handling	Conveyors	Transfer Points	Trucks Dumping	Hammer mill	Oxycutter	Wind Erosion
12/07/2018	6.20	3.47	0.68	0.58	1.17	0.16	0.14	<0.01	<0.01
13/06/2018	4.15	2.39	0.40	0.38	0.79	0.09	0.11	<0.01	<0.01
21/05/2018	3.37	1.71	0.48	0.35	0.70	0.13	<0.01	<0.01	<0.01
18/07/2018	3.27	1.48	0.38	0.40	0.82	0.07	0.11	<0.01	<0.01
23/05/2018	2.88	1.97	0.25	0.20	0.39	0.06	0.01	<0.01	<0.01
17/08/2018	2.85	1.71	0.30	0.24	0.50	0.08	0.03	<0.01	<0.01
4/08/2018	2.83	1.41	0.33	0.29	0.59	0.08	0.13	<0.01	<0.01
14/06/2018	2.83	1.57	0.32	0.25	0.50	0.08	0.11	<0.01	<0.01
27/07/2018	2.76	2.12	0.15	0.14	0.28	0.04	0.04	<0.01	<0.01
14/08/2018	2.50	1.21	0.31	0.24	0.49	0.08	0.17	<0.01	<0.01
Contribution by Source (%)									
12/07/2018	-	56%	11%	9%	19%	3%	2%	<1%	<1%
13/06/2018	-	57%	10%	9%	19%	2%	3%	<1%	<1%
21/05/2018	-	51%	14%	10%	21%	4%	<1%	<1%	<1%
18/07/2018	-	45%	12%	12%	25%	2%	3%	<1%	<1%
23/05/2018	-	68%	9%	7%	14%	2%	<1%	<1%	<1%
17/08/2018	-	60%	10%	8%	18%	3%	1%	<1%	<1%
4/08/2018	-	50%	12%	10%	21%	3%	5%	<1%	<1%
14/06/2018	-	55%	11%	9%	18%	3%	4%	<1%	<1%
27/07/2018	-	77%	5%	5%	10%	1%	1%	<1%	<1%
14/08/2018	-	48%	12%	10%	20%	3%	7%	<1%	<1%

Particulates (as $PM_{2.5}$)

As presented in Appendix B, the most affected source from emissions of particulates (as $PM_{2.5}$) is identified as Receptor 2.

The 10 highest incremental impact days has been disaggregated by source contributions, and presented below:

Table 18 Source apportionment ($PM_{2.5}$)

Date	Predicted $PM_{2.5}$ Impacts at R2 ($\mu g{\cdot}m^{-3}$)								
	All Sources	Paved Roads	Materials Handling	Conveyors	Transfer Points	Trucks Dumping	Hammer mill	Oxycutter	Wind Erosion
12/07/2018	1.61	1.15	0.11	0.09	0.19	0.02	0.05	<0.01	<0.01
13/06/2018	1.09	0.79	0.06	0.06	0.13	0.01	0.04	<0.01	<0.01
27/07/2018	0.84	0.72	0.03	0.02	0.05	0.01	0.01	<0.01	<0.01
21/05/2018	0.82	0.56	0.08	0.06	0.11	0.02	<0.01	<0.01	<0.01
23/05/2018	0.82	0.67	0.04	0.03	0.06	0.01	<0.01	<0.01	<0.01
18/07/2018	0.78	0.48	0.06	0.06	0.13	0.01	0.04	<0.01	<0.01
17/08/2018	0.75	0.57	0.05	0.04	0.08	0.01	0.01	<0.01	<0.01
14/06/2018	0.74	0.52	0.05	0.04	0.08	0.01	0.03	<0.01	<0.01
4/08/2018	0.72	0.47	0.05	0.05	0.10	0.01	0.04	<0.01	<0.01
22/06/2018	0.69	0.59	0.02	0.02	0.04	0.01	<0.01	<0.01	<0.01
Contribution by Source (%)									
12/07/2018	-	72%	7%	6%	12%	2%	3%	<1%	<1%
13/06/2018	-	72%	6%	6%	12%	1%	3%	<1%	<1%
21/05/2018	-	86%	3%	3%	6%	1%	1%	<1%	<1%
18/07/2018	-	68%	9%	7%	13%	2%	<1%	<1%	<1%
23/05/2018	-	82%	5%	4%	8%	1%	<1%	<1%	<1%
17/08/2018	-	62%	8%	8%	17%	1%	5%	<1%	<1%
4/08/2018	-	75%	6%	5%	11%	2%	1%	<1%	<1%
14/06/2018	-	70%	7%	5%	11%	2%	5%	<1%	<1%
27/07/2018	-	65%	7%	6%	14%	2%	6%	<1%	<1%
14/08/2018	-	85%	4%	3%	6%	1%	1%	<1%	<1%

Appendix E: Emission Test Reports

Ektimo

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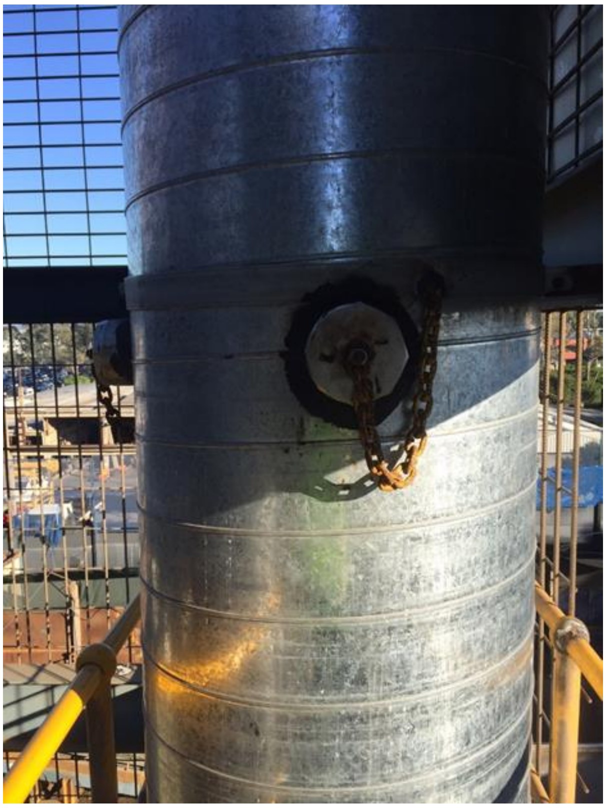
Report Number R003396

Emission Testing Report
Sell and Parker, Kings Park



Document Information

Client Name:	Sell and Parker
Report Number:	R003396
Date of Issue:	26 May 2017
Attention:	Howard Richards
Address:	46 Tattersall Road Kings Park NSW 2148
Testing Laboratory:	Ektimo (EML) ABN 98 006 878 342

Report Status

Format	Document Number	Report Date	Prepared By	Reviewed By (1)	Reviewed By (2)
Preliminary Report	-	-	-	-	-
Draft Report	R003396[DRAFT]	17/05/2017	JWe	ADa	ZXa
Final Report	R003396	26/05/2017	JWe	ADa	ZXa
Amend Report	-	-	-	-	-

Template Version: 170407

Amendment Record

Document Number	Initiator	Report Date	Section	Reason
Nil	-	-	-	-

Report Authorisation

Aaron Davis **Client Manager**	NATA Accredited Laboratory No. 2732	**Zac Xavier** **Ektimo Signatory**

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.

Table of Contents

1 EXECUTIVE SUMMARY

Ektimo was engaged by Sell and Parker to perform air emission testing for various analytes from the Hammer Mill exhaust duct.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
EPA 3 Hammer Mill	27 April 2017	Solid particles (TPM), fine particulates (PM_{10} and $PM_{2.5}$), type 1 and type 2 substances in aggregate, hexavalent chromium (Cr6+), silver, tungsten, iron, titanium, copper, zinc, hydrogen sulfide (H_2S), nitrogen oxides (NOx), sulfur dioxide, sulfuric acid mist and sulfur trioxide (as SO_3), carbon dioxide, oxygen

* Flow rate, velocity, temperature and moisture were determined unless otherwise stated

The sampling methodologies chosen by Ektimo are those recommended by the NSW Office of Environment and Heritage (as specified in the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales, January 2007*).

All results are reported on a dry basis at STP. Unless otherwise indicated, the methods cited in this report have been performed without deviation.

Plant operating conditions have been noted in the report.

2 RESULTS SUMMARY

The following comparison table shows that all analytes highlighted in green are below the limits prescribed by the *Protection of Environment Operations (Clean Air) Regulation 2010; Schedule 4 Standards of Concentration for Scheduled Premises: General Activities and Plant (Group 6).*

Location	Pollutant	Units	POEO Reg Limit (Gp 6)	Detected values
EPA 3 Hammer Mill	Solid particles	mg/m^3	20	9.3
	Nitrogen oxides (NO_x)	mg/m^3	350	<3
	Sulfur dioxide (SO_2)	mg/m^3	1000	<0.01
	Sulfuric acid mist and sulfur trioxide (SO_3)	mg/m^3	100	<0.01
	Hydrogen sulfide (H_2S)	mg/m^3	5	<0.006
	Type 1 substances in aggregate (Sb, As, Cd, Pb, Hg)	mg/m^3	-	≤0.0072
	Type 1 and 2 substances in aggregate (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, N, Se, Sn, V)	mg/m^3	1	≤0.017
	Cadimum (Cd)	mg/m^3	0.2	<0.0004
	Mercury (Hg)	mg/m^3	0.2	0.00069
	Silver (Ag), tungsten (W), iron (Fe), titanium (Ti), Copper (Cu), Zinc (Zn)	mg/m^3	-	see report

3 RESULTS

3.1 EPA 3 Hammer Mill

Date	27-04-2017	**Client**	Sell & Parker
Report	R003396	**Stack ID**	EPA 3 Hammer Mill Stack
Licence No.	11555	**Location**	Kings Park
Ektimo Staff	Aaron Davis / Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		

Sampling Plane Details	
Sampling plane dimensions	680 mm
Sampling plane area	0.363 m²
Sampling port size, number	4" BSP (x2)
Access & height of ports	Stairs 15 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 4 D
Upstream disturbance	Bend 6 D
No. traverses & points sampled	2 8
Sample plane compliance to AS4323.1	Satisfactory

Stack Parameters		
Moisture content, %v/v	3.7 (saturated)	
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 Flow Parameters		
Flow measurement time(s) (hhmm)	1000	
Temperature, °C	28	
Temperature, K	301	
Velocity at sampling plane, m/s	25	
Volumetric flow rate, discharge, m³/s	9.2	
Volumetric flow rate (wet STP), m³/s	8.3	
Volumetric flow rate (dry STP), m³/s	8	
Mass flow rate (wet basis), kg/hour	38000	
Velocity difference, %	<1	

Gas Analyser Results	Average	
Sampling time	1030-1129	
	Concentration mg/m³	Mass Rate g/min
Combustion Gases		
Nitrogen oxides (as NO_2)	<3	<2
	Concentration %	
Carbon dioxide	<0.3	
Oxygen	20.9	

Isokinetic Results	Results	
Sampling time	1010 - 1115	
	Concentration mg/m³	Mass Rate g/min
Solid Particles	9.3	4.5
Fine particulates (PM10)	6.6	3.2
Fine particulates (PM2.5)	<4	<2
D50 cut size, 10µm	10.5	
D50 cut size, 2.5µm	2.20	
Sulfur dioxide	<0.01	<0.006
Sulfuric acid mist and sulfur trioxide (as SO_3)	<0.01	<0.005
Isokinetic Sampling Parameters	Isokinetic	PM10&2.5
Sampling time, min	64	64
Isokinetic rate, %	93	88

Date	27-04-2017	**Client**	Sell & Parker
Report	R003396	**Stack ID**	EPA 3 Hammer Mill Stack
Licence No.	11555	**Location**	Kings Park
Ektimo Staff	Aaron Davis / Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		

Sampling Plane Details	
Sampling plane dimensions	680 mm
Sampling plane area	0.363 m²
Sampling port size, number	4" BSP (x2)
Access & height of ports	Stairs 15 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 4 D
Upstream disturbance	Bend 6 D
No. traverses & points sampled	2 8
Sample plane compliance to AS4323.1	Satisfactory

Stack Parameters		
Moisture content, %v/v	3.7 (saturated)	
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 Flow Parameters		
Flow measurement time(s) (hhmm)	1000	
Temperature, °C	28	
Temperature, K	301	
Velocity at sampling plane, m/s	25	
Volumetric flow rate, discharge, m³/s	9.2	
Volumetric flow rate (wet STP), m³/s	8.3	
Volumetric flow rate (dry STP), m³/s	8	
Mass flow rate (wet basis), kg/hour	38000	
Velocity difference, %	<1	

Isokinetic Results	Results	
Sampling time	1230-1335	
	Concentration mg/m³	Mass Rate g/min
Antimony	<0.004	<0.002
Arsenic	<0.001	<0.0007
Beryllium	<0.0007	<0.0004
Cadmium	<0.0004	<0.0002
Chromium	0.00061	0.00029
Cobalt	<0.0005	<0.0002
Copper	0.0026	0.0012
Iron	0.028	0.014
Lead	0.0011	0.00052
Manganese	<0.001	<0.0005
Mercury	0.00069	0.00033
Nickel	<0.0009	<0.0004
Selenium	<0.004	<0.002
Silver	<0.0005	<0.0002
Tin	<0.001	<0.0007
Titanium	0.0016	0.00076
Tungsten	<0.001	<0.0007
Vanadium	<0.0008	<0.0004
Zinc	0.19	0.09
Type 1 & 2 Substances		
Upper Bound		
Total Type 1 Substances	≤0.0072	≤0.0034
Total Type 2 Substances	≤0.0096	≤0.0046
Total Type 1 & 2 Substances	≤0.017	≤0.0081
Isokinetic Sampling Parameters		
Sampling time, min	64	
Isokinetic rate, %	100	

Date	27-04-2017	**Client**	Sell & Parker
Report	R003396	**Stack ID**	EPA 3 Hammer Mill Stack
Licence No.	11555	**Location**	Kings Park
Ektimo Staff	Aaron Davis / Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		

Sampling Plane Details	
Sampling plane dimensions	680 mm
Sampling plane area	0.363 m²
Sampling port size, number	4" BSP (x2)
Access & height of ports	Stairs 15 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 4 D
Upstream disturbance	Bend 6 D
No. traverses & points sampled	2 8
Sample plane compliance to AS4323.1	Satisfactory

Stack Parameters		
Moisture content, %v/v	3.7 (saturated)	
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 Flow Parameters		
Flow measurement time(s) (hhmm)	1000	
Temperature, °C	28	
Temperature, K	301	
Velocity at sampling plane, m/s	25	
Volumetric flow rate, discharge, m³/s	9.2	
Volumetric flow rate (wet STP), m³/s	8.3	
Volumetric flow rate (dry STP), m³/s	8	
Mass flow rate (wet basis), kg/hour	38000	
Velocity difference, %	<1	

Hydrogen Sulfide	Results	
Sampling time	1130-1230	
	Concentration mg/m³	Mass Rate g/min
Hydrogen sulfide	<0.006	<0.003

Isokinetic Results	Results	
Sampling time	1120-1225	
	Concentration mg/m³	Mass Rate g/min
Hexavalent chromium	<0.004	<0.002
Isokinetic Sampling Parameters		
Sampling time, min	64	
Isokinetic rate, %	98	

4 PLANT OPERATING CONDITIONS

Unless otherwise stated, the plant operating conditions were normal at the time of testing. See Sell and Parker's records for complete process conditions.

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	Analysis
Sample plane criteria	NSW TM-1	NA	-	✓	NA
Moisture content	NSW TM-22	NSW TM-22	19%	✓	✓
Temperature	NSW TM-2	NA	2%	✓	NA
Flow rate	NSW TM-2	NA	8%	✓	NA
Velocity	NSW TM-2	NA	7%	✓	NA
Solid particles (TPM)	NSW TM-15	NSW TM-15	5%	✓	✓
Particulate matter < 2.5µm ($PM_{2.5}$)	USEPA 201A	USEPA 201A	9%	✓	✓
Particulate matter < 10µm (PM_{10})	NSW OM-5	NSW OM-5	6%	✓	✓
Type 1 substances (Sb, As, Cd, Pb, Hg)	NSW TM-12	Envirolab inhouse	15%	✓	✓[1]
Type 2 substances (Be, Cr, Co, Mn, Ni, Se, Sn, V)	NSW TM-13	Envirolab inhouse	15%	✓	✓[1]
Total (gaseous and particulate) metals & compounds incl Ag, Fe, W, Ti, Cu, Zn	NSW TM-12, NSW TM-13, NSW TM-14	Envirolab inhouse	15%	✓	✓[1]
Hexavalent chromium	NSW OM-4	Envirolab inhouse	16%	×	✓[1]
Sulfur dioxide and sulfur trioxide	NSW TM-3	Ektimo (EML Air) 235	16%	✓	✓
Hydrogen sulfide	NSW TM-5	NSW TM-5	19%	✓	✓
Nitrogen oxides (NOx)	NSW TM-11	NSW TM-11	12%	✓	✓
Carbon dioxide	NSW TM-24	NSW TM-24	13%	✓	✓
Oxygen	NSW TM-25	NSW TM-25	13%	✓	✓

* Uncertainty values cited in this table are calculated at the 95% confidence level (coverage factor = 2)

1. Analysis performed by Envirolab, NATA accreditation number 2901. Results were reported to Ektimo on 10 May 2017 in report number 166156.

6 QUALITY ASSURANCE/ QUALITY CONTROL INFORMATION

Ektimo (EML) and Ektimo (ETC) are 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 (EML) and Ektimo (ETC) are accredited by NATA (National Association of Testing Authorities) to ISO/IEC 17025. – General Requirements for the Competence of Testing and Calibration Laboratories. ISO/IEC 17025 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 Compliance Manager.

NATA is a member of APLAC (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.

7 DEFINITIONS

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

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, unless otherwise specified.
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.
VOC	Any chemical compound based on carbon with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the particular conditions of use. These compounds may contain oxygen, nitrogen and other elements, but specifically excluded are carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
TOC	The sum of all compounds of carbon which contain at least one carbon to carbon bond, plus methane and its derivatives.
OU	The number of odour units per unit of volume. The numerical value of the odour concentration is equal to the number of dilutions to arrive at the odour threshold (50% panel response).
$PM_{2.5}$	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 2.5 microns (µm).
PM_{10}	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 10 microns (µm).
BSP	British standard pipe
NT	Not tested or results not required
NA	Not applicable
D_{50}	'Cut size' of a cyclone defined as the particle diameter at which the cyclone achieves a 50% collection efficiency ie. half of the particles are retained by the cyclone and half are not and pass through it to the next stage. 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.
D	Duct diameter or equivalent duct diameter for rectangular ducts
$<$	Less than
$>$	Greater than
≥	Greater than or equal to
~	Approximately
CEM	Continuous Emission Monitoring
CEMS	Continuous Emission Monitoring System
DER	WA Department of Environment & Regulation
DECC	Department of Environment & Climate Change (NSW)
EPA	Environment Protection Authority
FTIR	Fourier Transform Infra Red
NATA	National Association of Testing Authorities
RATA	Relative Accuracy Test Audit
AS	Australian Standard
USEPA	United States Environmental Protection Agency
Vic EPA	Victorian Environment Protection Authority
ISC	Intersociety committee, Methods of Air Sampling and Analysis
ISO	International Organisation for Standardisation
APHA	American public health association, Standard Methods for the Examination of Water and Waste Water
CARB	Californian Air Resources Board
TM	Test Method
OM	Other approved method
CTM	Conditional test method
VDI	Verein Deutscher Ingenieure (Association of German Engineers)
NIOSH	National Institute of Occupational Safety and Health
XRD	X-ray Diffractometry

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Report Number R006468-1

Emission Testing
ERM Australia Pty Ltd, Docklands

Document Information

Client Name:	ERM Australia Pty Ltd
Report Number:	R006468-1
Date of Issue:	27 September 2018
Attention:	Iain Cowan
Address:	Level 3, Tower 3, World Trade Centre, 18-38 Siddeley Street DOCKLANDS VIC 3005
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Status

Format	Document Number	Report Date	Prepared By	Reviewed By (1)	Reviewed By (2)
Preliminary Report	-	-	-	-	-
Draft Report	R006468-1[DRAFT]	21/09/2018	ADo	ADa	SCo
Final Report	R006468-1	27/09/2018	ADo	ADa	SCo
Amend Report	-	-	-	-	-

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Amendment Record

Document Number	Initiator	Report Date	Section	Reason
Nil	-	-	-	-

Report Authorisation

Aaron Davis
Client Manager

NATA Accredited Laboratory
No. 14601

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

Table of Contents

1 EXECUTIVE SUMMARY

Ektimo was engaged by ERM Australia Pty Ltd to perform emission testing at Sell and Parker, Kings Park NSW.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
EPA 3 - Hammer Mill	11 September 2018	Total solid particles, type 1 and 2 substances, total fluoride, hydrogen chloride, chlorine, sulfur trioxide and sulfuric acid mist, hydrogen sulfide, nitrogen oxides, carbon dioxide, oxygen

* 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 the report.

2 POEO RESULTS COMPARISON

PROTECTION OF THE ENVIRONMENT OPERATIONS (CLEAN AIR) REGULATION 2010 - SCHEDULE 4 **GROUP 6**			
Air Impurity	**POEO Limit**	**Units**	**Detected Values 11/09/2018**
Total Solid Particles	50	mg/m^3	6.8
Nitrogen dioxide (NO_2) or Nitric oxide (NO) or both, as NO_2 equivalent	350	mg/m^3	<3
Sulfuric acid mist (H_2SO_4) or sulfur trioxide (SO_3) or both, as SO_3 equivalent	100	mg/m^3	<0.008
Hydrogen sulfide	5	mg/m^3	<0.009
Fluorine (F_2) and any compound containing fluorine, as total fluoride (HF equivalent)	50	mg/m^3	<0.01
Chlorine (Cl_2)	200	mg/m^3	<0.01
Hydrogen chloride (HCl)	100	mg/m^3	<0.01
Type 1 substances (in aggregate)	NA	NA	≤0.011
Type 1 substances and Type 2 substances (in aggregate)	1	mg/m^3	≤0.0076
Cadmium (Cd)	0.2	mg/m^3	0.00047
Mercury (Hg)	0.2	mg/m^3	0.0034

Note: All analytes highlighted in green are below the Group 6 - Protection of the Environment Operations (Clean Air) Regulation 2010 limits.

3 RESULTS

3.1 EPA 3 – Hammer Mill

Date	11/09/2018	**Client**	ERM
Report	R006468-1	**Stack ID**	EPA 3 - Hammer Mill
Licence No.	11555	**Location**	Kings Park
Ektimo Staff	Aaron Davis / Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		180831

Sampling Plane Details		
Sampling plane dimensions	595 mm	
Sampling plane area	0.278 m²	
Sampling port size, number	4" BSP (x2)	
Access & height of ports	Elevated work platform	20 m
Duct orientation & shape	Vertical	Circular
Downstream disturbance	Exit cone	3 D
Upstream disturbance	Bend	8 D
No. traverses & points sampled	2	8
Sample plane compliance to AS4323.1	Ideal	

Comments
An exit cone has been installed on the stack exit which measures 440mm in diameter

Stack Parameters		
Moisture content, %v/v	3.1	
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 Flow Parameters		
Flow measurement time(s) (hhmm)	0945 & 1115	
Temperature, °C	31	
Temperature, K	304	
Velocity at sampling plane, m/s	25	
Velocity at exit plane, m/s	46	
Volumetric flow rate, actual, m³/s	7	
Volumetric flow rate (wet STP), m³/s	6.3	
Volumetric flow rate (dry STP), m³/s	6.1	
Mass flow rate (wet basis), kg/hour	29000	

Gas Analyser Results	Average		Minimum		Maximum	
Sampling time	1007 - 1110		1007 - 1110		1007 - 1110	
Combustion Gases	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min
Nitrogen oxides (as NO_2)	<3	<1	<3	<1	<3	<1
	Concentration %		Concentration %		Concentration %	
Carbon dioxide	<0.1		<0.1		<0.1	
Oxygen	20.9		20.9		20.9	

Non-isokinetics	Results	
Sampling time	1009-1109	
	Concentration mg/m³	Mass Rate g/min
Hydrogen sulfide	<0.009	<0.003

Isokinetic Results	Results	
Sampling time	1003-1110	
	Concentration mg/m³	Mass Rate g/min
Sulfur trioxide and/or Sulfuric acid (as SO3)	<0.008	<0.003
Isokinetic Sampling Parameters		
Sampling time, min	64	
Isokinetic rate, %	100	
Velocity difference, %	<1	

Date	11/09/2018	**Client**	ERM
Report	R006468-1	**Stack ID**	EPA 3 - Hammer Mill
Licence No.	11555	**Location**	Kings Park
Ektimo Staff	Aaron Davis / Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		180831

Sampling Plane Details	
Sampling plane dimensions	595 mm
Sampling plane area	0.278 m²
Sampling port size, number	4" BSP (x2)
Access & height of ports	Elevated work platform 20 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit cone 3 D
Upstream disturbance	Bend 8 D
No. traverses & points sampled	2 8
Sample plane compliance to AS4323.1	Ideal

Comments

An exit cone has been installed on the stack exit which measures 440mm in diameter

Stack Parameters		
Moisture content, %v/v	3.1	
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 Flow Parameters		
Flow measurement time(s) (hhmm)	1550 & 1705	
Temperature, °C	33	
Temperature, K	306	
Velocity at sampling plane, m/s	25	
Velocity at exit plane, m/s	46	
Volumetric flow rate, actual, m³/s	7	
Volumetric flow rate (wet STP), m³/s	6.3	
Volumetric flow rate (dry STP), m³/s	6.1	
Mass flow rate (wet basis), kg/hour	29000	

Isokinetic Results	Results	
Sampling time	1557-1702	
	Concentration mg/m³	Mass Rate g/min
Solid Particles	6.8	2.5
Antimony	<0.003	<0.001
Arsenic	<0.001	<0.0005
Beryllium	<0.0007	<0.0003
Cadmium	0.00047	0.00017
Chromium	0.00068	0.00025
Cobalt	<0.0005	<0.0002
Lead	0.0018	0.00065
Manganese	<0.002	<0.0006
Mercury	0.0034	0.0013
Nickel	<0.0008	<0.0003
Selenium	<0.004	<0.001
Tin	<0.001	<0.0005
Vanadium	<0.0008	<0.0003
Type 1 & 2 Substances		
Upper Bound		
Total Type 1 Substances	≤0.011	≤0.0039
Total Type 2 Substances	≤0.01	≤0.0037
Total Type 1 & 2 Substances	≤0.021	≤0.0076
Isokinetic Sampling Parameters		
Sampling time, min	64	
Isokinetic rate, %	99	
Velocity difference, %	-1	

Date	11/09/2018	**Client**	ERM
Report	R006468-1	**Stack ID**	EPA 3 - Hammer Mill
Licence No.	11555	**Location**	Kings Park
Ektimo Staff	Aaron Davis / Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		180831

Sampling Plane Details	
Sampling plane dimensions	595 mm
Sampling plane area	0.278 m²
Sampling port size, number	4" BSP (x2)
Access & height of ports	Elevated work platform 20 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit cone 3 D
Upstream disturbance	Bend 8 D
No. traverses & points sampled	2 8
Sample plane compliance to AS4323.1	Ideal

Comments

An exit cone has been installed on the stack exit which measures 440mm in diameter

Stack Parameters		
Moisture content, %v/v	3	
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 Flow Parameters		
Flow measurement time(s) (hhmm)	0945 & 1115	
Temperature, °C	31	
Temperature, K	304	
Velocity at sampling plane, m/s	25	
Velocity at exit plane, m/s	46	
Volumetric flow rate, actual, m³/s	7	
Volumetric flow rate (wet STP), m³/s	6.3	
Volumetric flow rate (dry STP), m³/s	6.2	
Mass flow rate (wet basis), kg/hour	29000	

Isokinetic Results	Results	
Sampling time	1003-1110	
	Concentration mg/m³	Mass Rate g/min
Total fluoride (as HF)	<0.01	<0.005
Chloride (as HCl)	<0.01	<0.005
Chlorine	<0.01	<0.005
Isokinetic Sampling Parameters		
Sampling time, min	64	
Isokinetic rate, %	102	
Velocity difference, %	<1	

4 PLANT OPERATING CONDITIONS

Unless otherwise stated, the plant operating conditions were normal at the time of testing. See ERM Australia Pty Ltd's records for complete process conditions.

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	Analysis
Sample plane criteria	NSW TM-1	NA	-	✓	NA
Flow rate, temperature and velocity	NSW TM-2	NA	8%, 2%, 7%	✓	NA
Moisture content	NSW TM-22	NSW TM-22	8%	✓	✓
Carbon dioxide	NSW TM-24	NSW TM-24	13%	✓	✓
Nitrogen oxides (NO_X)	NSW TM-11	NSW TM-11	12%	✓	✓
Oxygen	NSW TM-25	NSW TM-25	13%	✓	✓
Hydrogen sulfide	NSW TM-5	NSW TM-5	not specified	✓	✓†
Chlorine	NSW TM-7	Ektimo 235	14%	✓	✓†
Total fluoride	NSW TM-9	ALS Method QWI-EN/EA144C & Ektimo 235	17%	✓	✓#,†
Hydrogen chloride	NSW TM-8	Ektimo 235	14%	✓	✓†
Particulate matter	NSW TM-15	NSW TM-15	5%	✓	✓
Sulfuric acid mist (including sulfur trioxide)	NSW TM-3	Ektimo 235	16%	✓	✓†
Type 1 substances (Sb, As, Cd, Pb, Hg)	NSW TM-12	Envirolab inhouse	15%	✓	✓‡
Type 2 substances (Be, Cr, Co, Mn, Ni, Se, Sn, V)	NSW TM-13	Envirolab inhouse	15%	✓	✓‡

180613

* Uncertainty values cited in this table are calculated at the 95% confidence level (coverage factor = 2)

† Analysis performed by Ektimo, NATA accreditation number 14601.
Laboratory analytical results were reported on 17 September 2018 in report number R006468-H2S
Laboratory analytical results were reported on 20 September 2018 in report number R006468-SOx_Halides_Halogens

‡ Analysis performed by Envirolab, NATA accreditation number 2901. Results were reported to Ektimo on 20 September 2018 in report number 200664

\# Analysis (solid fluoride only) performed by Australian Laboratory Services Pty Ltd, NATA accreditation number 825. Results were reported to Ektimo on 21 September 2018 in report number EN1805880

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.

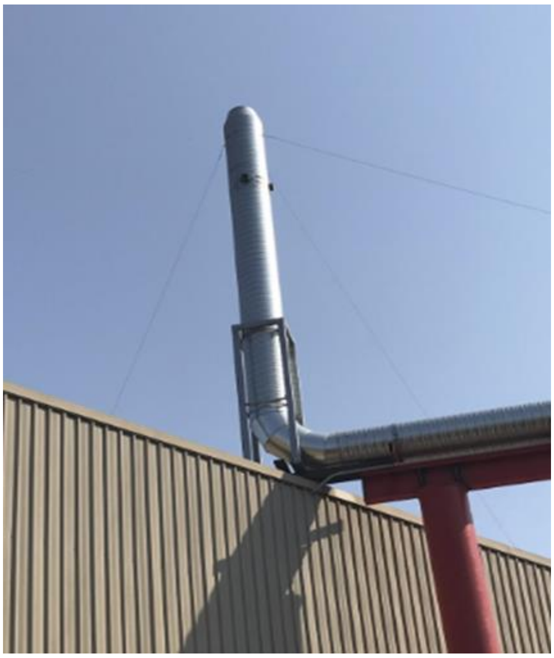
Ektimo is accredited by NATA (National Association of Testing Authorities) to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance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

NATA is a member of APLAC (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 worldwide.

7 DEFINITIONS

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

~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
APHA	American public health association, Standard Methods for the Examination of Water and Waste Water
AS	Australian Standard
BSP	British standard pipe
CARB	Californian Air Resources Board
CEM	Continuous Emission Monitoring
CEMS	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 defined as the particle diameter at which the cyclone achieves a 50% collection efficiency ie. half of the particles are retained by the cyclone and half are not and pass through it to the next stage. 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
EPA	Environment Protection Authority
FTIR	Fourier Transform Infra Red
ISC	Intersociety committee, Methods of Air Sampling and Analysis
ISO	International Organisation for Standardisation
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	The number of odour units per unit of volume. The numerical value of the odour concentration is equal to the number of dilutions to arrive at the odour threshold (50% panel response).
PM_{10}	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 10 microns (µm).
$PM_{2.5}$	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 2.5 microns (µm).
PSA	Particle size analysis
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, unless otherwise specified.
TM	Test Method
TOC	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)
Vic EPA	Victorian Environment Protection Authority
VOC	Any chemical compound based on carbon with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the particular conditions of use. These compounds may contain oxygen, nitrogen and other elements, but specifically excluded are carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.



REPORT NUMBER R008184

Annual Emission Testing
Sell and Parker, Kings Park

Document Information

Client Name:	Sell and Parker
Report Number:	R008184
Date of Issue:	11 October 2019
Attention:	Howard Richards
Address:	46 Tattersall Road Kings Park NSW 2148
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation

Aaron Davis
Client Manager

NATA Accredited Laboratory
No. 14601

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

Table of Contents

1 EXECUTIVE SUMMARY

1.1 Background

Ektimo was engaged by Sell and Parker to perform emission testing at their Kings Park plant. Testing was carried out in accordance with Environmental Licence 11555.

1.2 Project objectives

The objectives of the project were to conduct a monitoring programme to quantify emissions from one discharge point to determine whether it was in compliance with Sell and Parker's Environmental licence and the *Protection of Environment Operations (Clean Air) Regulation* 2010; Schedule 4 Standards of Concentration for Scheduled Premises: General Activities and Plant (Group 6)

Location	Test Date	Test Parameters*
EPA 3 – Hammer Mill Stack	26 September 2019	Solid particles, type 1 and 2 substances

* 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 the report.

1.3 Licence Comparison

The following licence comparison table shows that all analytes highlighted in green are within the licence limit set by:

- The *Protection of Environment Operations (Clean Air) Regulation* 2010; Schedule 4 Standards of Concentration for Scheduled Premises: General Activities and Plant (Group 6).
- the NSW EPA as per licence 11555 (last amended on 10 December 2018).

Monitoring results are summarized in the following table:

Location	Pollutant	Units	POEO Reg Limit (Gp 6)	Environment Protection Licence Limit	Detected values
EPA 3 Hammer Mill	Solid particles	mg/m^3	20	20	**3.7**
	Type 1 substances in aggregate (Sb, As, Cd, Pb, Hg)	mg/m^3	-	-	**≤0.017**
	Type 1 and 2 substances in aggregate (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, N, Se, Sn, V)	mg/m^3	1	1	**≤0.042**
	Cadimum (Cd)	mg/m^3	0.2	-	**<0.0009**
	Mercury (Hg)	mg/m^3	0.2	-	**0.0011**

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 3 – Hammer Mill Stack*

Date	26/09/2019	**Client**	Sell and Parker
Report	R008184	**Stack ID**	EPA 3 - Hammer Mill
Licence No.	11555	**Location**	Kings Park
Ektimo Staff	Aaron Davis / Hamish Proust	**State**	NSW
Process Conditions	Normal operating conditions for Hammer Mill		*190909*

Sampling Plane Details	
Sampling plane dimensions	595 mm
Sampling plane area	0.278 m²
Sampling port size, number	4" BSP (x2)
Access & height of ports	Elevated work platform 20 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit cone 3 D
Upstream disturbance	Bend 8 D
No. traverses & points sampled	2 8
Sample plane compliance to AS4323.1	Ideal

Comments
An exit cone has been installed on the stack which measures 440mm in diameter
The discharge is assumed to be composed of dry air and moisture

Stack Parameters		
Moisture content, %v/v	2	
Gas molecular weight, g/g mole	28.7 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.29 (dry)

Gas Flow Parameters	
Flow measurement time(s) (hhmm)	1140 & 1255
Temperature, °C	36
Temperature, K	309
Velocity at sampling plane, m/s	26
Volumetric flow rate, actual, m³/s	7.1
Volumetric flow rate (wet STP), m³/s	6.4
Volumetric flow rate (dry STP), m³/s	6.2
Mass flow rate (wet basis), kg/hour	29000

Date	26/09/2019	**Client**	Sell and Parker
Report	R008184	**Stack ID**	EPA 3 - Hammer Mill
Licence No.	11555	**Location**	Kings Park
Ektimo Staff	Aaron Davis / Hamish Proust	**State**	NSW
Process Conditions	Normal operating conditions for Hammer Mill		190909

Isokinetic Results	Results	
Sampling time	1145-1250	
	Concentration mg/m³	Mass Rate g/min
Solid Particles	3.7	1.4
Antimony	<0.009	<0.003
Arsenic	<0.004	<0.001
Beryllium	<0.001	<0.0004
Cadmium	**<0.0009**	**<0.0003**
Chromium	<0.001	<0.0005
Cobalt	<0.001	<0.0004
Lead	0.0033	0.0012
Manganese	<0.004	<0.001
Mercury	**0.0011**	**0.0004**
Nickel	<0.003	<0.001
Selenium	<0.009	<0.003
Tin	<0.004	<0.001
Vanadium	<0.002	<0.0008
Type 1 & 2 Substances		
Upper Bound		
Total Type 1 Substances	≤0.017	≤0.0065
Total Type 2 Substances	<0.02	<0.009
Total Type 1 & 2 Substances	**≤0.042**	**≤0.016**
Isokinetic Sampling Parameters		
Sampling time, min	64	
Isokinetic rate, %	93	
Velocity difference, %	<1	

3 PLANT OPERATING CONDITIONS

Normal operating conditions for Hammer Mill

4 TEST METHODS

All sampling and analysis will be 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
Sample plane criteria	NSW TM-1	NA	NA	✓	NA
Flow rate, temperature and velocity	NA	NSW TM-2	8%, 2%, 7%	NA	✓
Moisture content	NSW TM-22	NSW TM-22	8%	✓	✓
Molecular weight	NA	NSW TM-23	not specified	NA	✓
Solid particles (total)	NSW TM-15	NSW TM-15††	5%	✓	✓
Total (gaseous and particulate) metals and metallic compounds	NSW TM-12, NSW TM-13, NSW TM-14	Envirolab inhouse Metals-006, Metals-022, Metals-021	15%	✓	✓‡
Type 1 substances (Sb, As, Cd, Pb, Hg)	NSW TM-12	Envirolab inhouse Metals-006, Metals-022, Metals-021	15%	✓	✓‡
Type 2 substances (Be, Cr, Co, Mn, Ni, Se, Sn, V)	NSW TM-13	Envirolab inhouse Metals-006, Metals-022	15%	✓	✓‡

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* Uncertainty values cited in this table are calculated at the 95% confidence level (coverage factor = 2)

†† Gravimetric analysis conducted at the Ektimo Unanderra, NSW laboratory, NATA accreditation number 14601.

‡ Analysis performed by Envirolab, NATA accreditation number 2901.
Results were reported to Ektimo on 8 October 2019 in report number 227343.

5 QUALITY ASSURANCE/QUALITY CONTROL INFORMATION

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6 DEFINITIONS

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

% v/v	Volume to volume ratio, dry or wet basis
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
APHA	American public health association, Standard Methods for the Examination of Water and Waste Water
AS	Australian Standard
BSP	British standard pipe
CARB	Californian Air Resources Board
CEM	Continuous Emission Monitoring
CEMS	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 defined as the particle diameter at which the cyclone achieves a 50% collection efficiency ie. half of the particles are retained by the cyclone and half are not and pass through it to the next stage. 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
Lower Bound	Defines values reported below detection as equal to zero.
Medium Bound	Defines values reported below detection are equal to half 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	The number of odour units per unit of volume. The numerical value of the odour concentration is equal to the number of dilutions to arrive at the odour threshold (50% panel response).
PM_{10}	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 10 microns (µm).
$PM_{2.5}$	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 2.5 microns (µm).
PSA	Particle size analysis
RATA	Relative Accuracy Test Audit
Semi-quantified VOCs	Unknown VOCs (those not matching a standard compound), 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 will be determined by matching the integrated 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, unless otherwise specified.
TM	Test Method
TOC	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 afterflows.
Vic EPA	Victorian Environment Protection Authority
VOC	Any chemical compound based on carbon with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the particular conditions of use. These compounds may contain oxygen, nitrogen and other elements, but specifically excluded are carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
XRD	X-ray Diffractometry
Upper Bound	Defines values reported below detection are equal to the detection limit.
95% confidence interval	Range of values that contains the true result with 95% certainty. This means there is a 5% risk that the true result is outside this range.

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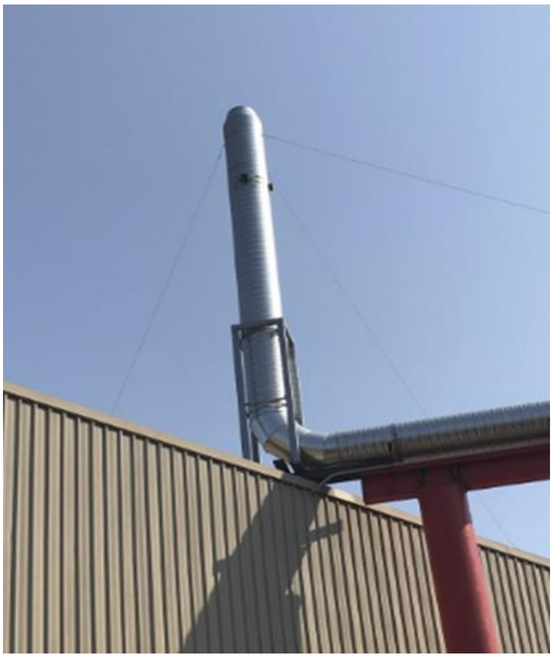

REPORT NUMBER R009653

Annual Emission Testing

Sell and Parker, Kings Park

Ektimo

Document Information

Template Version; 030620

Client Name:	Sell and Parker
Report Number:	R009653
Date of Issue:	4 September 2020
Attention:	Howard Richards
Address:	46 Tattersall Road Kings Park NSW 2148
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation

NATA

Aaron Davis
Client Manager

NATA Accredited Laboratory
No. 14601

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

Please note that only numerical results pertaining to measurements conducted directly by Ektimo are covered by Ektimo's terms of NATA accreditation. This does not include comments, conclusions or recommendations based upon the results. Refer to 'Test Methods' for full details of testing covered by NATA accreditation.

NATA

Table of Contents

1 EXECUTIVE SUMMARY

1.1 *Background*

Ektimo was engaged by Sell and Parker to perform emission testing at their Kings Park facility. Testing was carried out in accordance with the requirements of their Environmental Protection Licence 11555.

1.2 *Project Objectives*

The objectives of the project were to conduct monitoring to quantify emissions from one discharge point to determine whether it was in compliance with Sell and Parker's Environmental Protection licence and the *Protection of Environment Operations (Clean Air) Regulation* 2010; Schedule 4 Standards of Concentration for Scheduled Premises: General Activities and Plant (Group 6).

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
EPA 3 – Hammer Mill Stack	21 August 2020	Solid particles Metals type 1 and 2 substances

* Flow rate, velocity, temperature and moisture were also determined as per EPL 11555 requirements

All results are reported on a dry basis at STP.

Plant operating conditions have been noted in the report.

1.3 *Licence Comparison*

The following licence comparison table shows that all analytes highlighted in green are within the licence limit set by:

- The *Protection of Environment Operations (Clean Air) Regulation* 2010; Schedule 4 Standards of Concentration for Scheduled Premises: General Activities and Plant (Group 6).
- the NSW EPA as per licence 11555 (last amended on 24 April 2020).

Monitoring results are summarised in the following table:

Location	Pollutant	Units	POEO Reg Limit (Gp 6)	Environment Protection Licence Limit	Detected values
EPA 3 Hammer Mill	Solid particles	mg/m^3	20	20	<3
	Type 1 substances in aggregate (Sb, As, Cd, Pb, Hg)	mg/m^3	-	-	≤0.015
	Type 1 and 2 substances in aggregate (Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, N, Se, Sn, V)	mg/m^3	1	1	≤0.035
	Cadimum (Cd)	mg/m^3	0.2	-	<0.0007
	Mercury (Hg)	mg/m^3	0.2	-	<0.0009

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.

Ektimo

2 RESULTS

2.1 *EPA 3 – Hammer Mill Stack*

Date	21/08/2020	**Client**	Sell and Parker
Report	R009653	**Stack ID**	EPA 3 - Hammer Mill
Licence No.	11555	**Location**	Kings Park
Ektimo Staff	Aaron Davis / Joel Micale-David	**State**	NSW
Process Conditions	Normal operating conditions for Hammer Mill with expansion spray chamber system operational during commissioning.		200805

Sampling Plane Details		
Sampling plane dimensions	595 mm	
Sampling plane area	0.278 m²	
Sampling port size, number	4" BSP (x2)	
Access & height of ports	Elevated work platform	20 m
Duct orientation & shape	Vertical	Circular
Downstream disturbance	Exit cone	3 D
Upstream disturbance	Bend	8 D
No. traverses & points sampled	2	8
Sample plane compliance to AS4323.1	Ideal	

Comments
An exit cone has been installed on the stack which measures 440mm in diameter
The discharge is assumed to be composed of dry air and moisture

Stack Parameters		
Moisture content, %v/v	2.4	
Gas molecular weight, g/g mole	28.7 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.28 (wet)	1.29 (dry)
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0945 & 1055	
Temperature, °C	27	
Temperature, K	300	
Velocity at sampling plane, m/s	27	
Volumetric flow rate, actual, m³/s	7.6	
Volumetric flow rate (wet STP), m³/s	6.9	
Volumetric flow rate (dry STP), m³/s	6.7	
Mass flow rate (wet basis), kg/hour	32000	

NATA

Ektimo

Date	21/08/2020	**Client**	Sell and Parker
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Ektimo Staff	Aaron Davis / Joel Micale-David	**State**	NSW
Process Conditions	Normal operating conditions for Hammer Mill with expansion spray chamber system operational during commissioning.		200805

Isokinetic Results	Results	
Sampling time	0946-1051	
	Concentration mg/m³	Mass Rate g/min
Solid Particles	<3	<1
Antimony	<0.007	<0.003
Arsenic	<0.003	<0.001
Beryllium	<0.0008	<0.0003
Cadmium	<0.0007	<0.0003
Chromium	0.0027	0.0011
Cobalt	<0.001	<0.0004
Lead	0.003	0.0012
Manganese	0.003	0.0012
Mercury	<0.0009	<0.0004
Nickel	<0.002	<0.0007
Selenium	<0.007	<0.003
Tin	<0.003	<0.001
Vanadium	<0.002	<0.0007
Type 1 & 2 Substances		
Upper Bound		
Total Type 1 Substances	≤0.015	≤0.0059
Total Type 2 Substances	≤0.021	≤0.0084
Total Type 1 & 2 Substances	≤0.035	≤0.014
Isokinetic Sampling Parameters		
Sampling time, min	64	
Isokinetic rate, %	107	
Velocity difference, %	<1	

NATA

3 PLANT OPERATING CONDITIONS

See Sell and Parker records for complete process conditions.

Low magnesium steels and general black iron were being processed at the time of testing.

4 TEST METHODS

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

Parameter	Sampling Method	Analysis Method	Method Detection Limit	Uncertainty*	NATA Accredited	
					Sampling	Analysis
Sample plane criteria	NSW TM-1	NA	NA	NA	✓	NA
Flow rate, temperature and velocity	NA	NSW TM-2	Location specific	8%, 2%, 7%	NA	✓
Moisture content	NSW TM-22	NSW TM-22	0.1%	8%	✓	✓
Molecular weight	NA	NSW TM-23	not specified	not specified	NA	✓
Solid particles (total)	NSW TM-15	NSW TM-15††	0.001 g/m³	5%	✓	✓
Total (gaseous and particulate) metals and metallic compounds	NSW TM-12, NSW TM-13, NSW TM-14	Envirolab inhouse Metals-006, Metals-022, Metals-021	Analyte specific	15%	✓	✓‡
Type 1 substances (Sb, As, Cd, Pb, Hg)	NSW TM-12	Envirolab inhouse Metals-006, Metals-022, Metals-021	not specified	15%	✓	✓‡
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