Hillside Aluminium Proprietary Limited
9 West Central Arterial
Richards Bay, 3900
South Africa

P O Box 897
Richards Bay, 3900
South Africa

T +27 35 908 8111
south32.net

20 August 2018

Climate Change Mitigation
Department of Environmental Affairs
Environment House
473 Steve Biko Road
Pretoria, 0002
REF: PPP Hillside Aluminum

Dear Ms M Tshangela,

RE: RESPONSE TO LETTER RECEIVED FROM DEA ON 20 JULY 2018, REGARDING HILLSIDE'S SUBMITTED POLLUTION PREVENTION PLAN

With reference to the letter received from the Department of Environmental Affairs (DEA) dated 20 July 2018, Hillside Aluminium subsequently provides the following response.

Hillside Aluminium submitted the Pollution Prevention Plan (PPP) on 21 June 2018. It is noted that the DEA rejected the PPP due to missing information. Upon investigation it was found that the submitted document was missing pages as well as the table for reporting 2016 emission data was incorrect.

Subsequently, Hillside hereby wishes to submit the corrected PPP for your consideration.

Yours Sincerely

POLLUTION PREVENTION PLAN

Hillside Aluminium (Pty) Ltd

August 2018

Initial submission: 21 June 2018

Resubmission: 20 August 2018

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CONTACT DETAILS	
Name	[redacted]
Contact Number	[redacted]
Email Address	[redacted]
Company Name	*Hillside Aluminium (Pty) Ltd*
Registration Number	**2001/004091/06**
Physical Address	**9 WEST CENTRAL ARTERIAL, RICHARDS BAY, 3900**
Postal Address	**PO BOX 897, RICHARDS BAY, 3900**

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DECLARATION

DECLARATION OF ACCURACY OF INFORMATION

Name of Company: Hillside Aluminium

Declaration of accuracy of information provided:

I, [redacted], declare that the information provided in this report is in all respects factually true and correct to the best of my knowledge and as at the date of signature.

Signed at Richards Bay on this 20 day of August 2018

[redacted]

Signature

[redacted]

Capacity of Signatory

DESCRIPTION OF THE OPERATION

PROCESS DESCRIPTION

The raw materials, alumina and coke, which are used in the production of aluminium are shipped to Richards Bay harbour. These are unloaded from the ships by means of a special gantry and transported from the quayside to harbour storage silos on conveyor belts. Alumina and coke are transported to Hillside by conveyor belts and stored in silos onsite.

The third raw material, liquid pitch is delivered by sea. Tankers berth at the harbour where liquid pitch is pumped direct from the ship to holding tanks. Pitch is transported to Hillside holding tanks via road tanker.

Aluminium is produced by electrolysis, and carbon anodes are part of this process. Anodes are made in the following way:

- Coke enters the paste plant into a pre-heated chamber and then transferred into a Buss Mixer where it is mixed with liquid pitch to form a paste
- The paste is then moulded into anodes in the form of large blocks. This process takes place in a Vibro compactor mould
- The anode is then ejected and enters a cooling tunnel where is it sprayed with water
- These green anodes are now ready for baking
- Green anodes are placed 3 deep in a gas fired baking furnace, baking takes place for approximately 20 days.
- Fumes from the bake furnace are treated in the Fume Treatment Centre (FTC) to remove dust and other impurities such as fluoride and tars by adsorption on alumina and condensation.
- The baked anodes enter the rodding shop where anode stem attachment takes place. An iron hexapod is cemented in place on the anodes with molten iron.
- Rodded anodes are then transported to Reduction.

Reduction is an electrolysis process whereby fluorinated alumina is converted to molten aluminium in special containers called pots. The electrolyte, otherwise known as Bath, contains ingredients essential to the production of aluminium, alumina powder, aluminium tri-fluoride and cryolite, which is used as a catalyst, which reduced the melting point of alumina.

Chemical reactions: $2Al2O3 + 3C = 4Al + 3CO2$

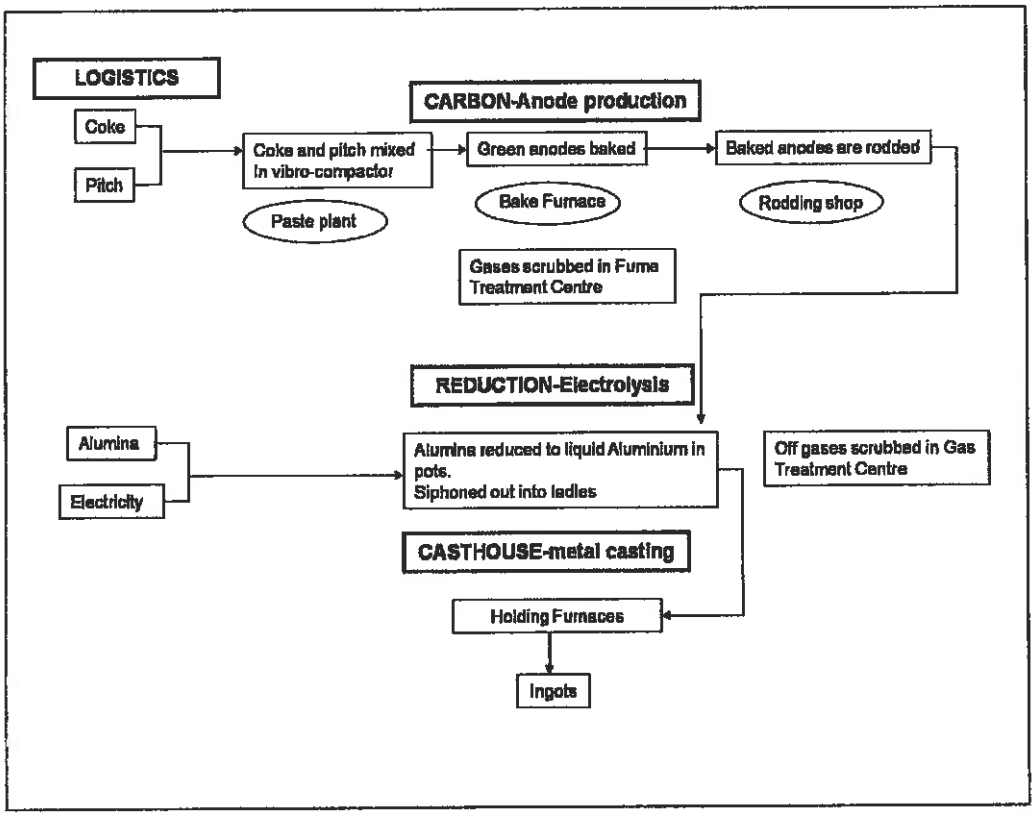
Another essential ingredient in the reduction is electricity, which is purchased in bulk from Eskom and fed directly to the plant via overhead power lines.

Hillside has three pot-lines with 720 pots connected in series. Each pot contains 20 anode assemblies. The electrical charge passes from the anode through the electrolyte into a negatively charged cathode, situated at the base of the pot. Heat is generated in the process, which reduce alumina to molten aluminium which collects at the bottom of the pot. This is syphoned out into a ladle every 32 hours and transported to the Casthouse. Anodes are replaced every 27 days.

Hot gases from the pots are removed to the Gas Treatment Centre (GTC) so that impurities and fluoride can be trapped onto fresh alumina powder. The fluoride from the pot gases attaches itself

to the alumina. Fabric filter trap dust and any remaining impurities before residual gases are allowed to escape to the stack.

At the Casthouse, the door of the aluminium holding furnaces opens; the ladle is tilted so that liquid aluminium flows into the furnace. The aluminium is kept molten by gas burners which heat the inside of the furnace. Each furnace has a capacity of 60 tons. When the holding furnace is full, the furnace tilts and aluminium runs into a launder and flows to the casting wheel. The casting wheel feeds into an ingot mould, where the aluminium solidifies. The ingots are cooled in a cooling tunnel and thereafter stacked by a robot, and strapped in 1 ton bundles. These bundles are then transported to the harbour for export.



ANNUAL GREENHOUSE EMISSIONS

BASELINE EMISSIONS – YEAR PRECEDING IMPLEMENTATION OF THE REGULATION

Activity (IPCC Source Category)[1]	Year (Insert calendar years for which data is provided)[2]	GHG1 (CO_2)	GHG2 (CH_4)	GHG2 (CH_4) as CO2 eq	GHG3 (N_2O)	GHG3 (N_2O) as CO2 eq	GHG4 (HFCs)	GHG5 (PFCs) CF4	GHG5 (PFCs) C2F6	GHG5 (PFCs) as CO2 eq	GHG6 (SF_6)	Methodology and GHG emission factors used to estimate baseline emissions	Total GHG emissions in CO_2 equivalents (Tonnes)
1A2b (combustion of fuels- Non-ferrous Metals)	2016	89 889	1.60	37	0.16	47	N/A	N/A	N/A	N/A	N/A	Tier 1, CO2 - 56100, CH4 - 1, N2O - 0.1	89 975
1A3eii (Other transport - off road)	2016	3 570	0.20	5	1.38	408	N/A	N/A	N/A	N/A	N/A	Tier 1, CO2- 74100, CH4 - 4.15, N2O - 28.6	N/A
2C3 (Aliminium Industry)	2016	1 062 841	N/A	N/A	N/A	N/A	N/A	19.67	2.38	140 408	N/A	CO2 - Tier 3 PFC - Tier 2 Overvoltage coefficient - 1.16, Weighted Fraction C2F6/CF4 - 0.121	1 203 271
Total by gas		1 156 300	1.80	41	2	455	-	20	2	140 408	-		1 293 246

[1] Activities for which GHG data will be required for PPP reporting (activities are presented in the National GHG Reporting Regulations, 2017)
[2] Provide a baseline of the GHGs emissions for the year preceding the implementation of the Regulations, that is: from Jan 2016 to Dec 2016
[3] As per the National Greenhouse Gas Emission Reporting Regulations, 2017
[4] Aluminum process does not generate HFC and SF_6

MITIGATION PLAN

DETAIL OF PLANNED MITIGATION MEASURES

Mitigation measure	Description of mitigation measure	Anticipated implementation date	Assumptions used to estimate anticipated GHG emission reduction	Affected GHG	Anticipated emission reduction (tonnes CO_2e)					
					Y1	Y2	Y3	Y4	Y5	Total over 5 years
Anode Scallops Reduction Project	This project aims to reduce the size and frequency of "Anode scallops" on the recycled Anode Butts. This will reduce the quantity of carbon lost to Air burn in the reduction process	FY20	1) The size and frequency of scallops can be reduced. 2) All Carbon consumed is converted to CO2 in the reaction $C + O_2 = CO_2$. 3) Maximum saving possible is equivalent to 1.5 kg Nett Carbon Consumption.	GHG1	0					
Intelligent Bath Chisel Alumina feeders	Retrofit Reduction Cell feeders with Intelligent Crust breaking devices – Reduction in Anode effect frequency therefore PFC emissions	FY19 - 20	Anode effects in the Reductions cells are caused by a drop in the dissolved alumina concentration in the molten cryolite. One key contributor to this is blocked feeder holes or damaged feeders. The intelligent crust breakers are able to sense a blocked feeder hole and notify the operator before an anode effects occurs. It is estimated that	GHG5	0					

			the anode effect frequency can be reduced from current levels of 0.3 to 0.26 AE/pot/day.						
Alpsys pot controller upgrade	Upgrades to the reduction cell control algorithms will improve overall pot control and reduce anode effects in the pots	FY19	It is estimated that the anode effect frequency can be further reduced by 0.01 AE/pot/day.	GHG5					
Total (CO_{2eq})									84424

SUMMARY AND CONCLUSION

Hillside Aluminium remains committed to being a responsible corporate citizen and reducing our impact on our impact on the environment. To this end the projects will be prioritised for implementation over the next five years.