

SUFFOLK

Energy from Waste Facility

2018 ANNUAL PERFORMANCE REPORT

DOCUMENT TITLE:	Suffolk – Energy from Waste Facility 2018 Annual Performance Report
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APPENDIX 1. 2018 AIR EMISSIONS GRAPHS

1. INTRODUCTION

Table 1: Plant details	
Name of Company	SUEZ Recycling and Recovery UK
Name of Plant	SUEZ Suffolk – Energy from Waste Facility
Permit Number	WP3438HZ
Address	Lodge Lane Great Blakenham Ipswich IP6 0JE
Phone	01473 839149
Contact Name/Position	Paul Newby – EfW Plant Manager
Further information, description of waste types burned and origin	Municipal household waste Commercial and Industrial waste

1. PLANT DESCRIPTION

This non-hazardous waste incinerator operates 24/7 and can receive up to 269,000 tonnes of municipal waste and commercial/Industrial waste. The plant has two furnace lines with a processing capacity of 269,000 tonnes per annum. The heat produced by waste incineration is used to raise superheated steam which generates 177,000 MWh/annum of electricity.

Activities associated with the incineration are receipt and storage of municipal waste and commercial/industrial waste, production of steam and electricity, abatement of flue gas and handling of Incinerator Bottom Ash (IBA) and Air Pollution Control Residue (APCR).

Suffolk EfW commissioning finished on 1st December 2014, when the plant was handed over from the EPC contractor to SUEZ UK. Permit conditions apply since then. The data included in this report corresponds to the following period: 1st January 2018 to 31st December 2018.

2. SUMMARY OF PLANT OPERATION

Incoming waste is delivered to site by refuse collection trucks. It is then checked in, weighed and delivered into the reception hall.

RECEPTION HALL

A large reception hall allows for refuse collection trucks to manoeuvre and tip waste safely. Air needed for combustion is drawn into the furnace from here so that negative pressure is maintained in order to avoid odour and dust escaping the building.

BUNKER

Waste vehicles reverse to a wheel stop and tip their loads into a large concrete bunker. Mixing of waste occurs as the cranes driver sorts the waste looking for unsuitable material to be removed, and to improve the homogeneity of the incinerator feedstock.

CONTROL ROOM

The plant's control room centralises the operation of all equipment, including the grab cranes used to mix and load waste into a hopper that feeds the furnace. All on-site functions are monitored automatically and manually. Its systems verify in real time that equipment is functioning properly, continuously monitor the combustion gas, and maximise the efficiency of the entire EfW process.

GRATE AND BOILER

Waste is lifted into the charging hoppers by the crane. From here it falls into the furnace-charging chute and then is introduced onto the grate system by hydraulic feeders for incineration. An auxiliary burner can be used to help keeping the temperature above 850°C if required. The thermal energy released from the burning is used to convert water to super-heated steam along a boiler composed of 6 vertical passes. At high pressure, this steam drives a turbine to generate electricity.

ELECTRICITY GENERATION

Electricity is generated at 11kv, with an electric production of 170,461 MWh/annum and exporting 150,127 MWh/annum to the national grid.

INCINERATOR BOTTOM ASH (IBA)

Ash left on the grate after incineration is carried by conveyor, after quenching, to the IBA processing facility. Up to 65,000 tonne of IBA is processed on site by the removal of ferrous and non-ferrous metal, stabilised and separated into fraction sizes of IBA prior to the export from site of the processed IBA and metals for re-use.

AIR-COOLED CONDENSERS

After exiting the turbine, the steam is cooled and condensed back into water through air condensers. This recovered water is treated and reused in the boilers to produce more steam.

EMISSION CONTROL

The gases from the furnace are subject to a rigorous cleaning process involving urea as selective non-catalytic reduction (SNCR), lime and active carbon injections. This removes oxides of nitrogen, acidic gases, dioxins, and heavy metals from the gas stream.

AIR POLLUTION CONTROL RESIDUE (APCR)

The cleaned gas passes through fine-fabric bag filters to remove solid particles before it is emitted through the stack. The resultant APCR residue, or fly-ash, contains particles from the incineration process, lime used in the flue gas treatment, salts and carbon dust. It is stored in a sealed silo until it is tankered away for recycling.

EMISSIONS MONITORING

As they pass through the stack, the residual flue gases from the process are continuously monitored before release. This data is relayed automatically to the control room.

Table 2: Plant key parameters				
Plant size, including number of lines	269,000 t/yr Two lines			
Annual waste throughputs	Mixed Municipal Waste Commercial and Trade Waste Not to exceed a combined total of 269,000t/yr			
Total plant operational hours in the year	Operating hours: Line 1 – 7834 h Line 2 – 7956 h			
Residues produced	Bottom ash	APCR	Metals	Other waste
Amount of each residue, including metals (where appropriate) recycled/land filled	62,881.86 t	6,508.28 t	9,752 t	0 t
Electricity	Produced: 181,837.50 MWh Exported: 161,189.18 MWh Parasitic load: 20,648.32 MWh			

Table 3: Annual waste throughput		
Waste types	EWC code	Tonnes
Mixed Municipal Waste	20 03 01	231,780
Other	20 03 03	1,285
	19 12 12	30,757
	18 01 04	2,345

3. PERMIT VARIATION

The current Permit WP3438HZ/V006 was issued in May 2017. No permit variation applications were made during 2018.

4. SUMMARY OF PLANT MONITORING

Table 4: Emission limits to air and monitoring during normal operation

A1 & A2	Particulate matter	30 mg/m ³ (½-hr average)	Continuous measurement
A1 & A2		10 mg/m ³ (Daily average)	Continuous measurement
A1 & A2	Total Organic Carbon (TOC)	20 mg/m ³ (½-hr average)	Continuous measurement
A1 & A2		10 mg/m ³ (Daily average)	Continuous measurement
A1 & A2	Hydrogen chloride	60 mg/m ³ (½-hr average)	Continuous measurement
A1 & A2		10 mg/m ³ (Daily average)	Continuous measurement
A1 & A2	Hydrogen fluoride	2 mg/m ³ (Periodic over min 1-hr period)	Bi-annual
A1 & A2	Carbon monoxide	150 mg/m ³ (95% of 10-minute averages in any 24-hr period)	Continuous measurement
A1 & A2		50 mg/m ³ (Daily average)	Continuous measurement
A1 & A2	Sulphur dioxide	200 mg/m ³ (½-hr average)	Continuous measurement
A1 & A2		50 mg/m ³ (Daily average)	Continuous measurement
A1 & A2	Oxides of nitrogen (NO & NO ₂ expressed as NO ₂)	400 mg/m ³ (½-hr average)	Continuous measurement
A1 & A2		200 mg/m ³ (Daily average)	Continuous measurement
A1 & A2	Cadmium & thallium and their compounds (total)	0.05 mg/m ³ (periodic over min 30 minute, max 8 hr period)	Bi-annual
A1 & A2	Mercury & its compounds		Bi-annual
A1 & A2	Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V & their compounds (total)	0.5 mg/m ³ (periodic over min 30 minute, max 8 hr period)	Bi-annual
A1 & A2	Dioxins / furans (I-TEQ)	0.1 ng/m ³ (periodic over min 6 hr, max 8 hr period)	Bi-annual

Table 5: Annual mass emissions of monitored pollutants				
Pollutant	Reporting Threshold	Line 1	Line 2	Notifiable releases
Carbon Dioxide CO ₂	10,000,000kg	263,990,370 kg		Appendix 2
Ammonia NH ₃	10,000kg	brt	brt	
Arsenic As	20kg	brt	brt	
Cadmium Cd	10kg	brt	brt	
Chromium Cr	100kg	brt	brt	
Copper Cu	100kg	brt	brt	
Lead Pb	200kg	brt	brt	
Mercury Hg	10kg	brt	brt	
Nickel Ni	50kg	brt	brt	
Chlorine & inorganic chlorine compounds – as HCL	10,000kg	brt	brt	
Dioxins & furans (PCDDs/PCDFs) as I-TEQ	0.0001 g	brt	brt	
Dioxins & furans (PCDDs/PCDFs) as WHO-TEQ	0.0001kg	brt	brt	
Fluorine & inorganic fluorine compounds – as HF	5,000kg	brt	brt	
Nitrogen oxides (NO and NO ₂) as NO ₂	100,000kg	brt	brt	
Nitrous oxide N ₂ O	10,000kg	brt	brt	
Non-methane VOCs	100,000kg	brt	brt	
Particulate matter	50,000kg	brt	brt	
Polychlorinated biphenyls (PCBs)	0.0001kg	brt	brt	
Sulphur oxides (SO ₂ and SO ₃) as SO ₂	150,000kg	brt	brt	
Carbon monoxide CO	500,000Kg	brt	brt	
Naphthalene	100Kg	brt	brt	

Note: (Data was taken from Pollution Inventory reporting Form); *below reporting threshold

5. SUMMARY OF PLANT COMPLIANCE

Summary of Breaches Reported During 2018			
Date of Part A	Line 1 or 2	Parameter(s)	Date of Part B
01/01/2018	Line 2	TOC & SO ₂	08/01/2018
28/01/2018	Line 2	TOC	09/02/2018
26/03/2018	Line 2	TOC	28/03/2018
02/04/2018	Line 1	TOC	03/04/2018
09/04/2018	Line 1	TOC	21/05/2018
13/04/2018	Line 1	TOC	21/05/2018
30/04/2018	Line 1	Heavy metals	-
08/05/2018	Line 2	NO _x daily	17/05/2018
17/06/2018	Line 1	NO _x 1/2 hour	05/07/2018
27/07/2018	Line 2	HCl 1/2 hour	28/09/2018*
21/10/2018	Line 2	2 x TOC 1/2 hour	18/01/2019
30/10/2018	Line 2	HCl 1/2 hour, SO ₂ 1/2 hour, HCl daily	18/01/2019

Note: * Resubmitted 18/01/2018

6. SUMMARY OF PLANT IMPROVEMENTS

Table 7: Plant improvements/Changes

Ref	Improvement/change	Status
PI1	<p>Sootblower trial – an inspection of the final ECO was carried out during the September outage. Following a 6 month trial with no cleaning equipment in place, no hard build ups were found, most of the ash being soft and easy to remove.</p> <p>The shutdown cleaning method for the final ECO is still under discussion. The cleaning method used during Sep 17 (manual rodding) led to early fouling due to compacted residues and inspections in October revealed that a third of the flue gas path was blocked. A specific grit blasting method with a bespoke nozzle and different grit will be trialled during the planned shutdown in April 2018. This method has successfully been trialled at Wilton. A test with Shock Pulse Generators was initially considered in order to try different online cleaning methods to replace the current rake sootblowers. However, the brittle nature of the final ECO cast iron fins does not allow for this method. Clyde-Bergemann rake sootblowers were installed at Wilton and they are experiencing similar problems. There is no current intention to replace the Comeco rake sootblowers with another cleaning equipment. The current rake sootblowers will be removed during the April 2018 shut down.</p> <p><u>Jan 2019 Update</u></p> <p>Final Economiser – Comeco sootblowers removed due to unreliability and causing increasing corrosion of the final economiser. Final economiser inspected in Nov 18. Multiple leaks found. Leaks repaired and decision made to replace final economisers in May 2019.</p>	Ongoing
PI2	<p>Carbon change - We are looking at changing our carbon supplier from Cabot Norit GL50 to CPL Carbon Link Filtracarb FGT+. There is no discernible difference between the two products. The benefits to us from using CPL Carbon Link are the following:</p> <ul style="list-style-type: none"> - British supplier – reducing travel miles - Explosibility data has been provided which has been analysed and reduces our risk through DSEAR and explosive atmospheres <p>This is the same product that is used at our sister site at Wilton (Teesside) and they have the same flue gas treatment technology provider as ourselves and it is a recommended product by them.</p>	Ongoing
PI3	<p>Alternative fuel - an alternative fuel for the auxiliary burner was briefly trialled at Suffolk EfW during start-up following the September 2017 planned shutdown. This alternative fuel had previously been successfully trialled at other Suez EfW plants. Due to some problems with the fuel truck supply line first and with the start-up process later, the test was not fully completed. For this reason, a new trial has been scheduled for the next planned shutdown in April 2018. If successful, the permanent implementation of the new fuel will be assessed. This will lead to further modifications on the fuel delivery and storage systems. The modifications will be controlled via the company's management of change procedure which will include the pertinent environment risk assessment. The EA will be notified in writing at least 14 days prior to the change being implemented.</p> <p><u>Jan 2019 Update</u></p> <p>Minor modifications required to fuel skid in May 2019 with the aspiration to accept alternative fuel in 2019.</p>	Ongoing

PI4	Bunker Repair - Consideration to carry out the bunker repair is now under discussion in alignment with the superheater replacement in April 2018. SUEZ are currently in discussion with Suffolk County Council and other waste management contractors on how to minimise any impact on the waste delivery partnership and traffic movements. Alternative solutions to waste treatment are currently being investigated.	Complete
PI5	Water Balance – Water balance on site had been an issue since plant handover. Project identified main water sources as passing valves and blocked pipework. A separate valve project focusing on upgrading isolation valves had a dramatic positive effect on the water balance. The blocked pipework was replaced in January 2019.	Complete
PI6	TOCs- A issue with frequent TOC exceedences was attributed to self-feeding of the waste onto the grate. Modification of the ‘shark fins’ designed to hold the waste resulted in stopping TOC issues related to self-feeding. Shark fins checked at every shutdown to prevent re-occurrence.	Complete

8. ENERGY EFFICIENCY UPDATE

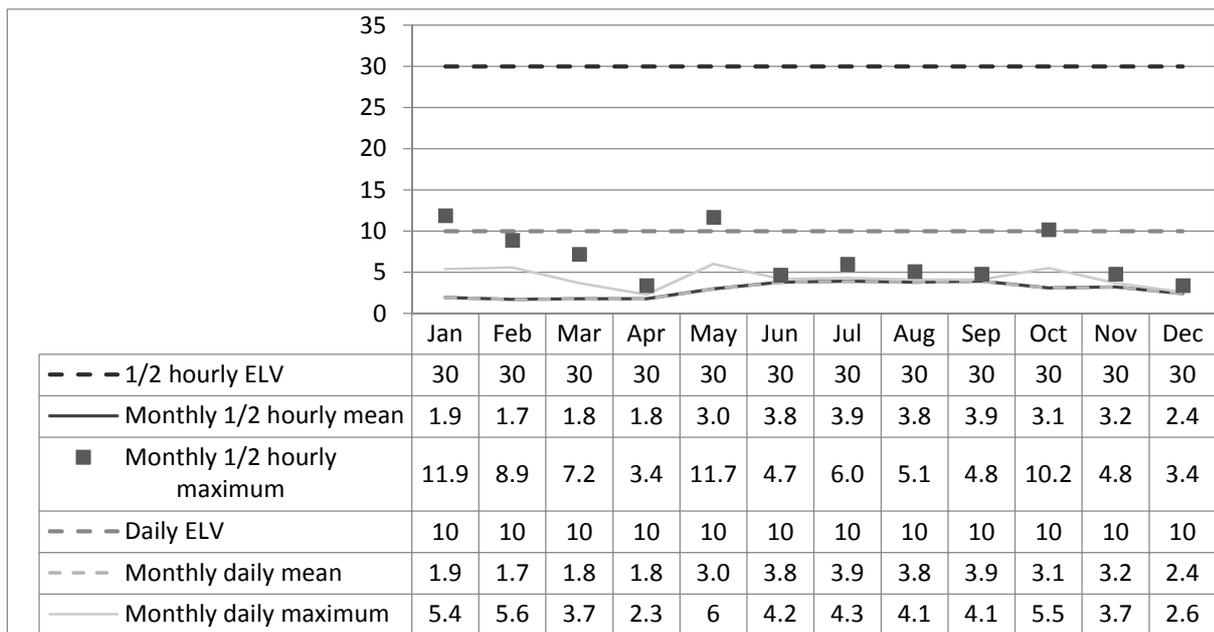
The SUEZ and Suffolk County Council Partnership continues to explore the potential for off takers of heat. Following the start of the construction of the Sterling UK Greenhouse Project in 2017 the partnership has been back in contact with Sterling UK to explore any opportunities. SUEZ and Suffolk County Council partnership have also opened discussions with the property developer of St. James Business Park relating to providing services of both heat and power.

9. FURTHER INFORMATION

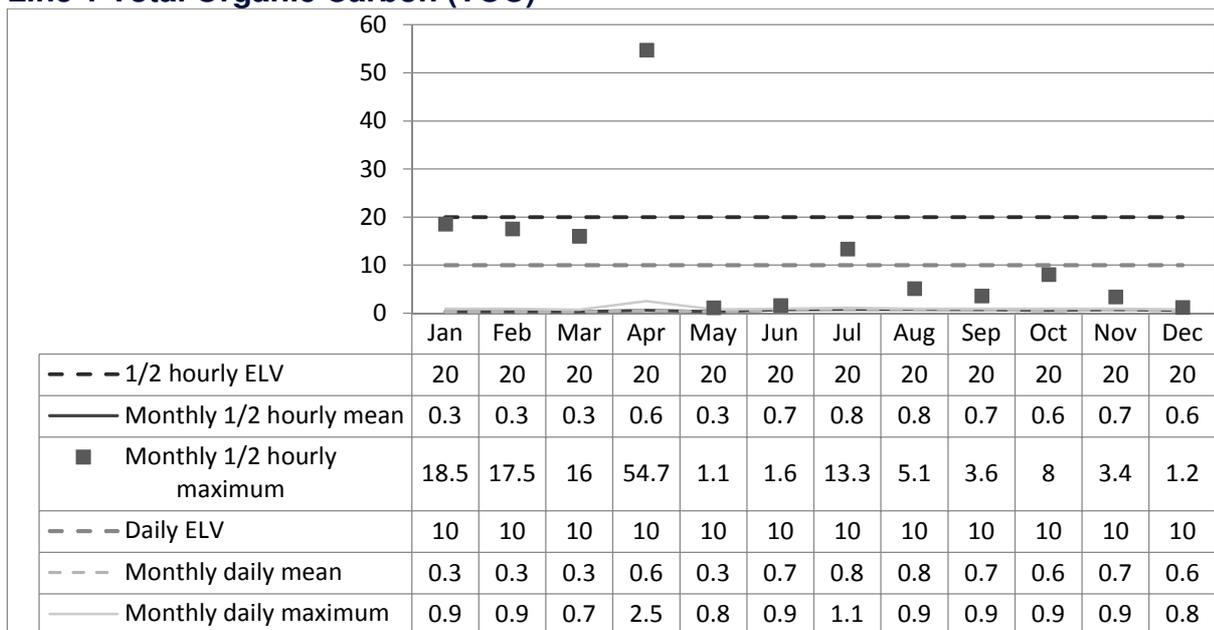
Further information available at: <http://www.suffolkefw.co.uk/>

APPENDIX 1. 2018 AIR EMISSIONS GRAPHS

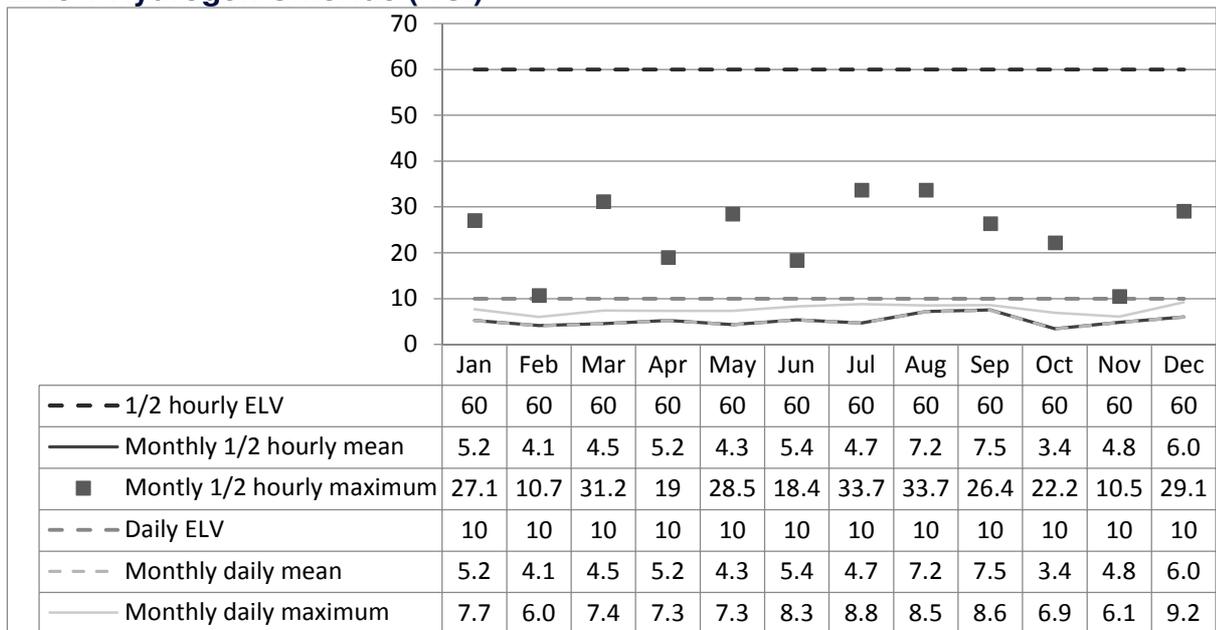
Line 1 Particulate Matter



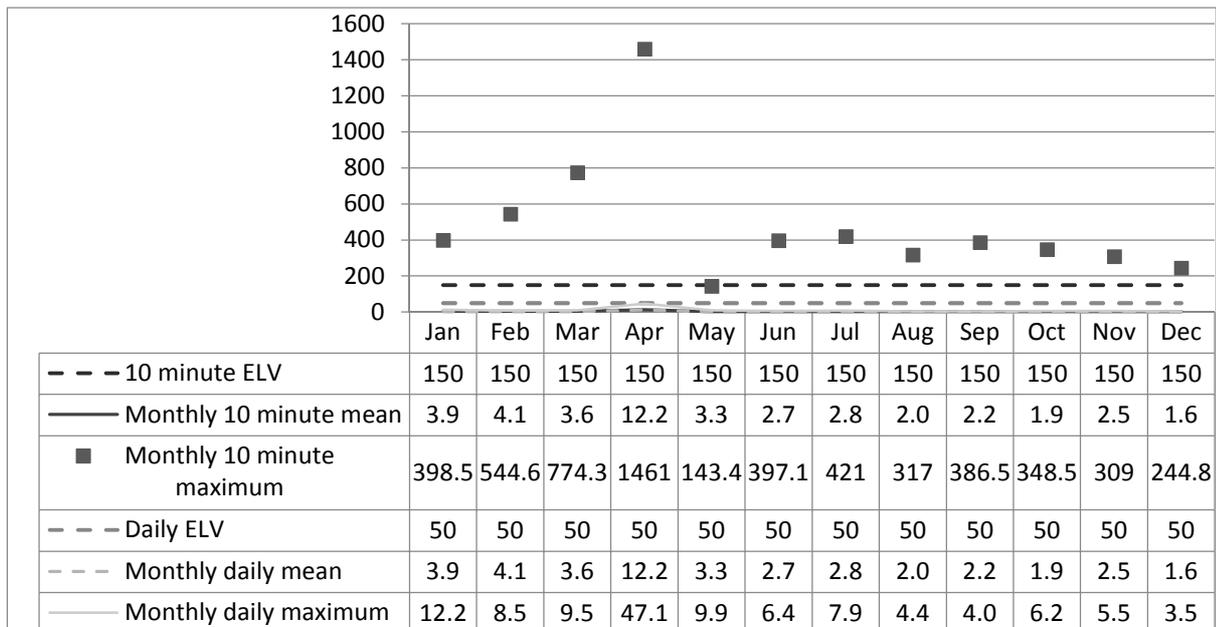
Line 1 Total Organic Carbon (TOC)



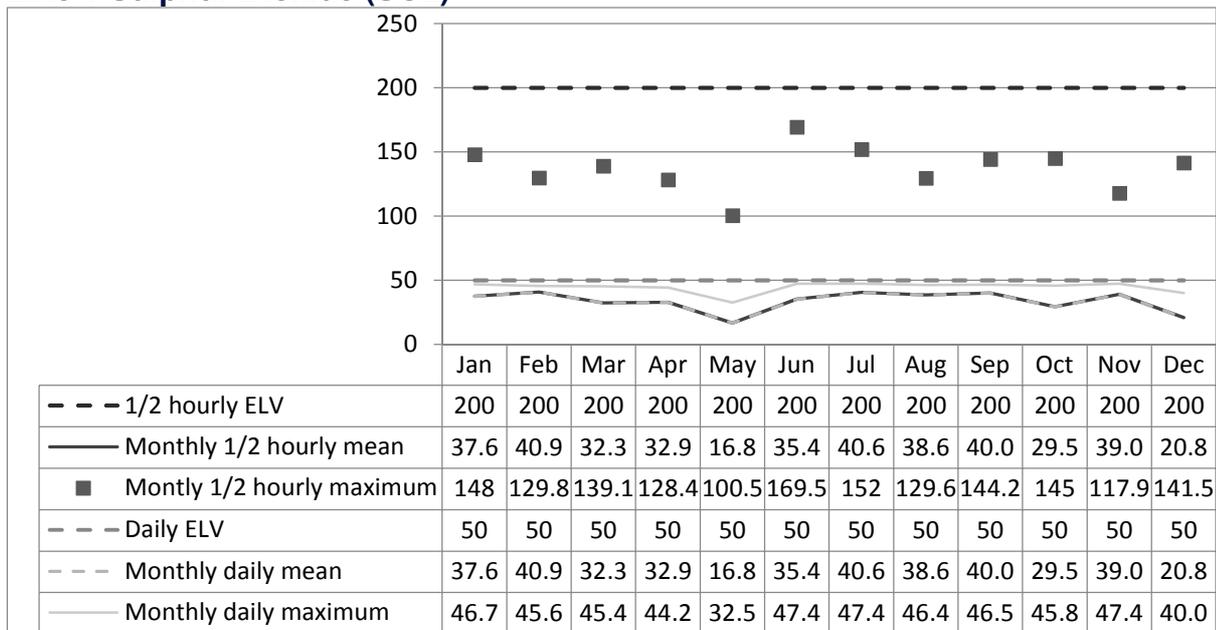
Line 1 Hydrogen Chloride (HCl)



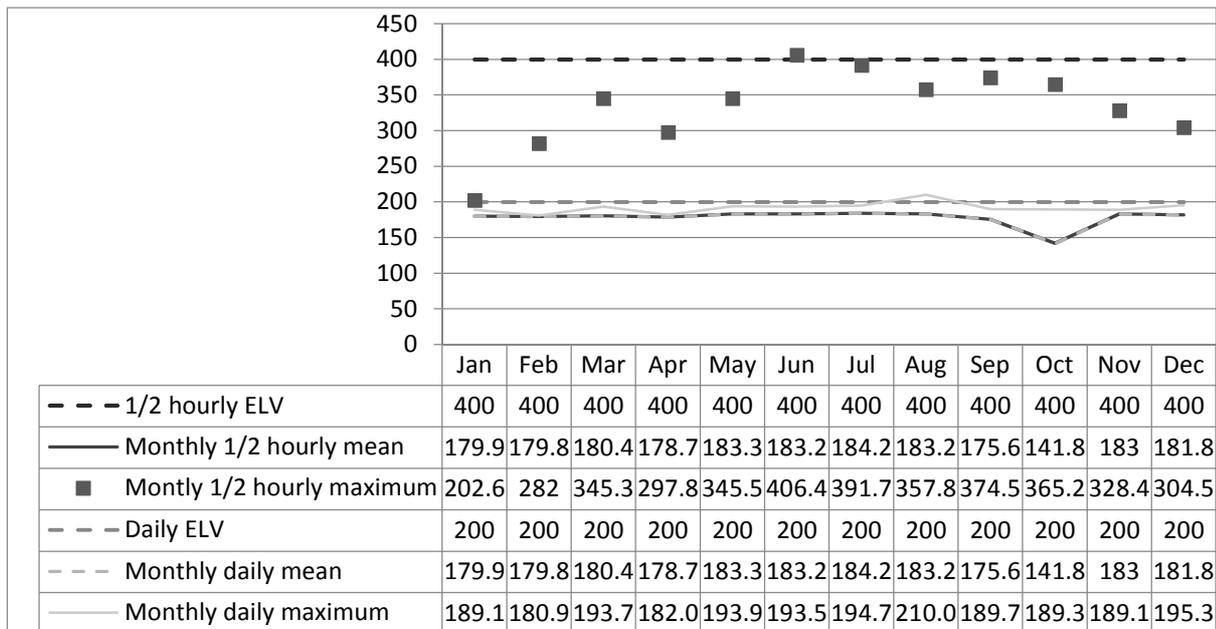
Line 1 Carbon Monoxide (CO)



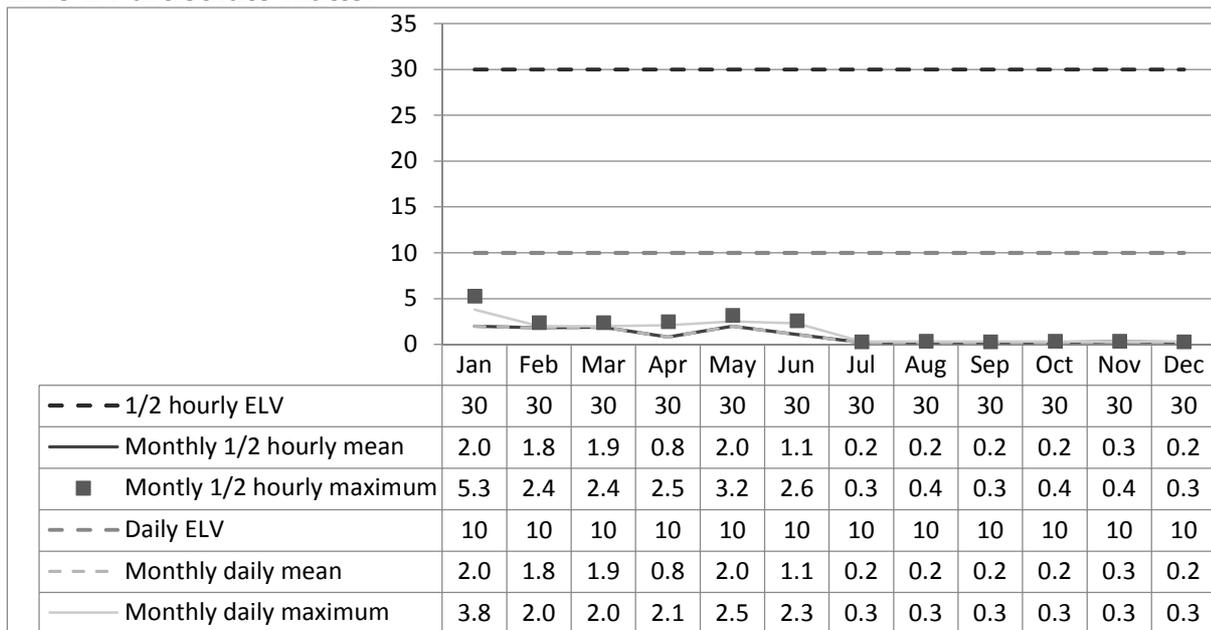
Line 1 Sulphur Dioxide (SO₂)



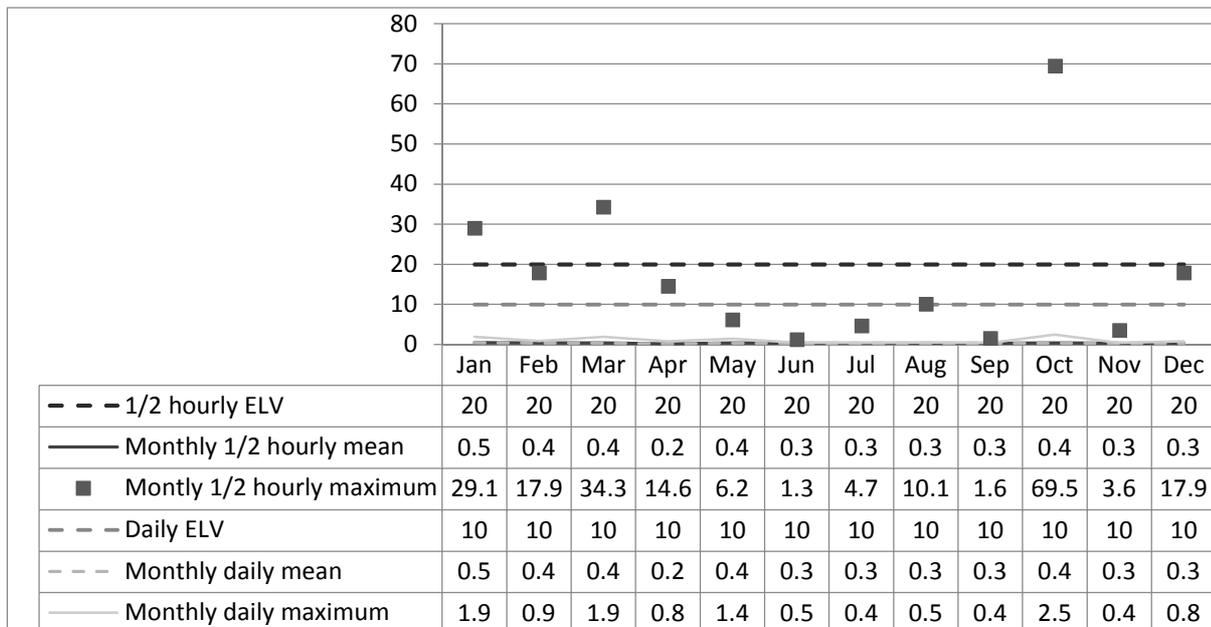
Line 1 Oxides of Nitrogen (NO_x)



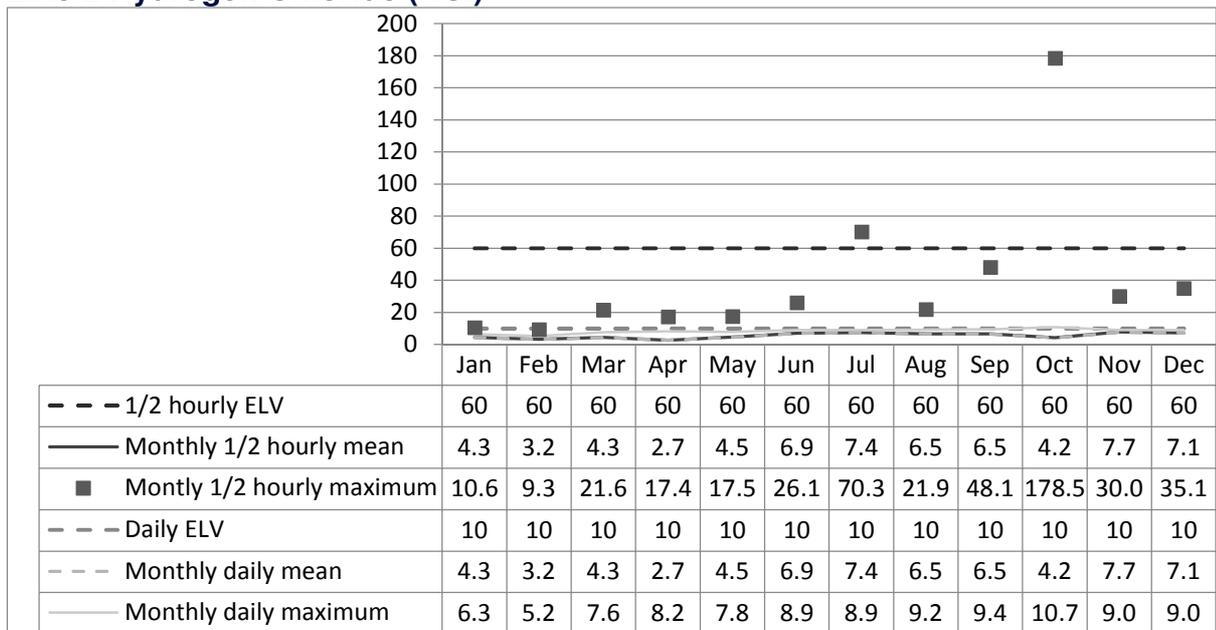
Line 2 Particulate Matter



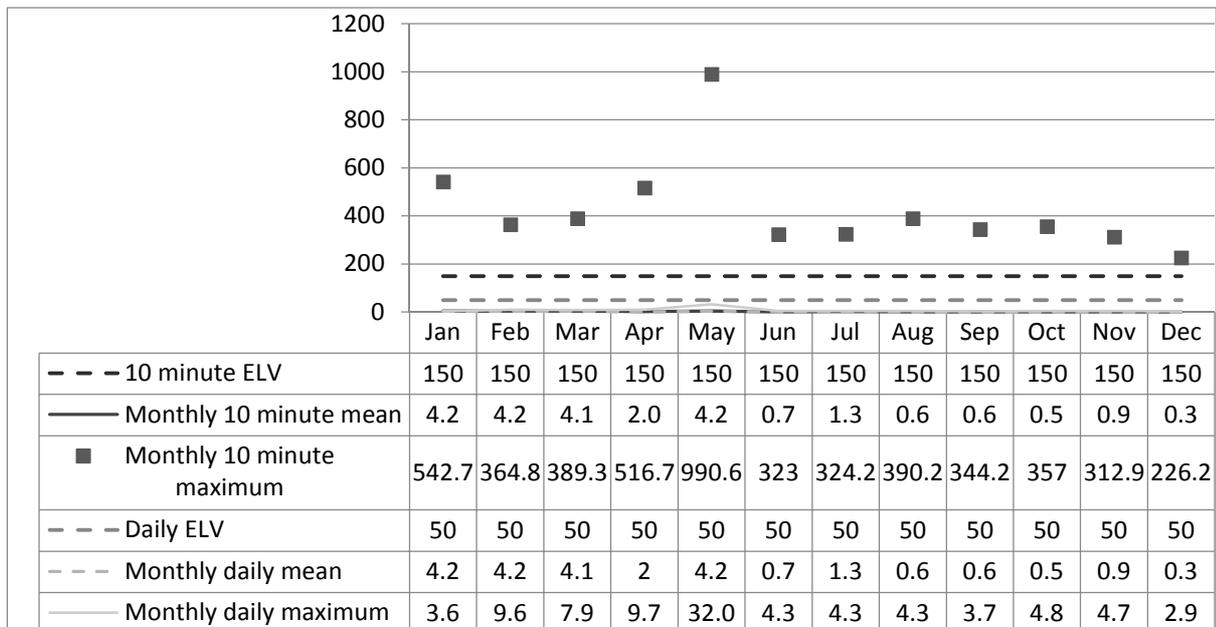
Line 2 Total Organic Carbon (TOC)



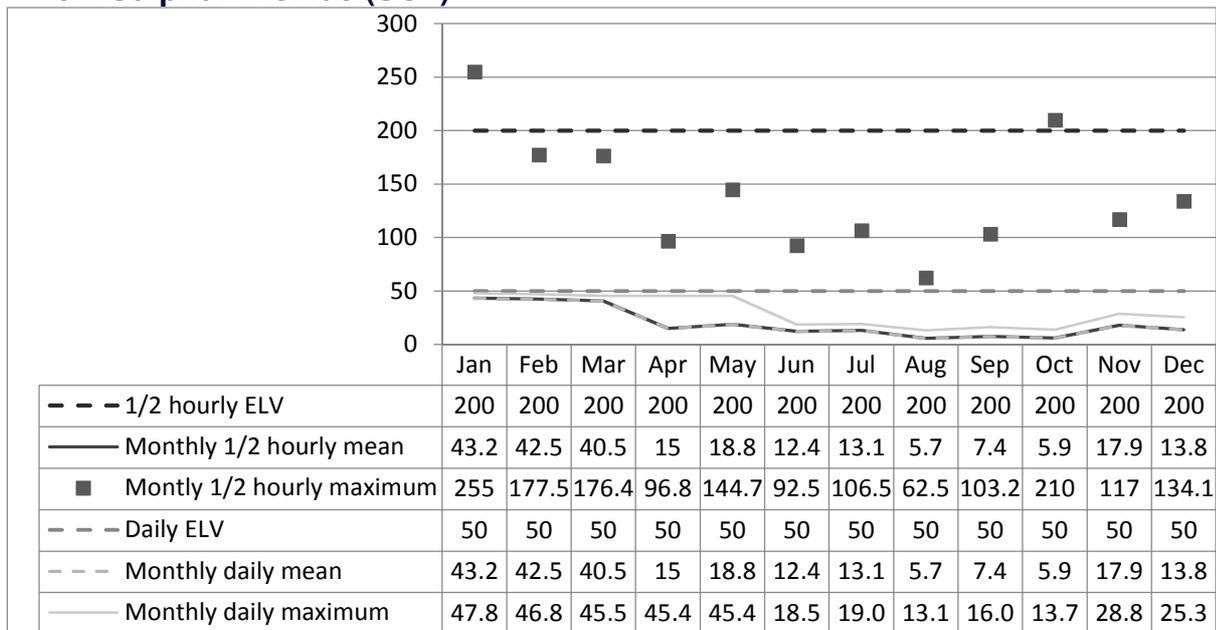
Line 2 Hydrogen Chloride (HCl)



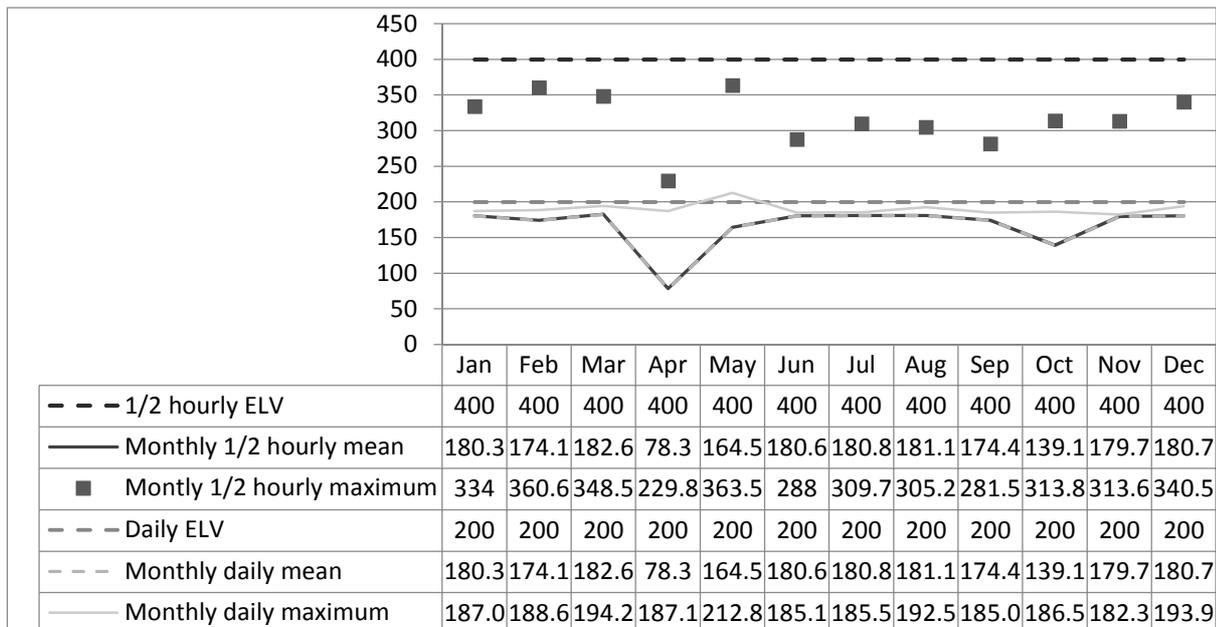
Line 2 Carbon Monoxide (CO)



Line 2 Sulphur Dioxide (SO₂)



Line 2 Oxides of Nitrogen (NO_x)



Permit Reference Number : WP3438HZ
Facility : SUEZ Suffolk Energy from Waste Facility

Operator : SUEZ Recycling and Recovery UK
Form Number : E1 / 01/09/11

Reporting of Energy Usage/Export for the year 2018

Energy Source	Energy Usage	Unit	Contained Energy (MWh)
Electricity produced	181,837.50	MWh	181,837.50
Electricity imported	731.01	MWh	731.01
Electricity Exported	161,189.18	MWh	161,189.18
Natural Gas	0	tonnes	0
Gas Oil	412	tonnes	-
Recovered Fuel Oil	0	tonnes	0
Steam/hot water exported	0	MWh	0

Operator's comments :

This report includes data from 1st January 2018 to 31st December 2018, the period under permit conditions.



Signed
(authorised to sign as representative of SUEZ Recycling and Recovery UK)

Date...28/01/18.....

Permit Number: WP3438HZ
 Facility: SUEZ Suffolk Energy from Waste Facility

Operator: SUEZ Recycling and Recovery UK
 Form Number: R1 / 01/09/11

Reporting of Waste Disposal and Recovery for the year 2018

Waste Description	Disposal Route	Tonnes	Recovery Tonnes
1) Hazardous Wastes			
APC Residues	Landfill Reprocessing	6508.28	0.00
IBA which is classified as hazardous waste	N/A		0.00
Total hazardous waste		6508.28	0.00
2) Non-Hazardous Wastes			
IBA	Reprocessing	62881.86	0.00
Other non-hazardous wastes	Metals Recycling	9752	0.00
Total non-hazardous waste		72663.86	0.00
TOTAL WASTE	-	79142.14	0.00

Operator's comments :

This report includes data from 1st January 2018 to 31st December 2018, the period under permit conditions.

SignedEmma Woollen.....
 (authorised to sign as representative of SUEZ Recycling and Recovery UK)

Date.....25/01/18.....

Permit Number : WP3438HZ
Facility : SUEZ Suffolk Energy from Waste Facility

Operator : SUEZ Recycling and Recovery UK
Form Number : WU/RM1 / 01/09/11

Reporting of Water and Other Raw Material Usage for the year 2018

Raw Material	Usage	Unit	Specific Usage	Unit
Mains water	96,192	m ³	0.36	m ³ /t
Site borehole	N/A	m ³	N/A	m ³ /t
River abstraction	N/A	m ³	N/A	m ³ /t
Total water usage	96,192	m ³	0.36	m ³ /t
Ammonia (or Urea)	548.58	Tonnes	2.08	kg/t
Activated carbon (or coke)	81.26	Tonnes	0.31	kg/t
Lime/hydrated lime or sodium bicarbonate	2,389.80	Tonnes	9.05	kg/t

Operator's comments :

This report includes data from 1st January 2018 to 31st December 2018, the period under permit conditions.

Signed



(authorised to sign as representative of SUEZ Recycling and Recovery UK)

Date.....28/01/19.....

Permit Reference Number: WP3438HZ

Operator: SUEZ Recycling and Recovery UK

Facility: SUEZ Suffolk Energy from Waste Facility

Schedule 4 – Reporting of performance data

Data required to be recorded and reported by Condition 4.2.2. The data should be assessed as the frequency given and reported annually to the Agency.

Permit conditions – 1st January 2018 to 31st December 2018

Table S4.2: Annual Production/Treatment	
Total Municipal Waste Incinerated – tonnes	263990.37
Total Commercial and Industrial Waste Incinerated – tonnes	
Electrical energy produced – MWhrs	181837.50
Thermal energy produced e.g. steam - KWhrs	N/A
Electrical energy exported – KWhrs	161189.18
Electrical energy used on installation – KWhrs	20648.32
Waste heat utilised by the installation - KWhrs	N/A

Performance Parameters assessed quarterly

1st January 2018 to 31st December 2018

Table S4.3: Performance parameters			
Parameter	Frequency of assessment	Result	Performance Indicator
Electrical energy exported	Quarterly	607.90	KWhrs/tonne of waste incinerated (dry basis)
Electrical energy imported	Quarterly	2.77	KWhrs/tonne of waste incinerated (dry basis)
Electrical energy used at the installation	Quarterly	78.22	KWhrs/tonne of waste incinerated (dry basis)
Fuel oil consumption	Quarterly	1.31	Kgs/tonne of waste incinerated (dry basis)
Mass of Bottom Ash produced	Quarterly	238.20	Kgs/tonne of waste incinerated (dry basis)
Mass of APC residues produced	Quarterly	24.65	Kgs/tonne of waste incinerated (dry basis)
Urea Consumption	Quarterly	2.08	Kgs/tonne of waste incinerated (dry basis)
Activated Carbon consumption	Quarterly	0.31	Kgs/tonne of waste incinerated (dry basis)
Lime consumption	Quarterly	9.05	Kgs/tonne of waste incinerated (dry basis)
Water consumption	Quarterly	364.38	Kgs/tonne of waste incinerated (dry basis)
Periods of WID abnormal operation	Quarterly	Line 1: 0 Line 2: 2 occasions (1.5 hours total)	No. of occasions and cumulative hours for current calendar year for each line.

Signed  Date.....28/03/18.....

(authorised to sign as representative of Operator)