

Annual performance report for: **Ardley Energy from Waste Facility**

Permit Number: EPR/FP3134GU

Year: 2018

This report is required under the Industrial Emissions Directive's Article 55(2) requirements on reporting and public information on waste incineration plants and co-incineration plants, which require the operator to produce an annual report on the functioning and monitoring of the plant and make it available to the public.

1. Introduction

Name and address of plant	Ardley ERF Middleton Stoney Road Ardley Oxfordshire OX27 7AA
Description of waste input	Residual domestic and commercial & industrial waste.
Operator contact details if members of the public have any questions	Helen Edwards (EHS Manager) Middleton Stoney Road Ardley Oxfordshire OX27 7AA

2. Plant description

Ardley Energy from Waste (EFW) facility is located close to junction 10 of the M40. The facility has a design capacity to process 300,000 tonnes per year of residual municipal waste and has the capability of generating 26.9MW of electricity.

In accordance with the requirements of Condition 4.2.3, Schedule 4 and Table S5.1 of Permit EPR/FP3134GU issued by Environment Agency to Viridor Waste Management Limited (Viridor) on 29 September 2010, Viridor is required to submit a summary of the environmental monitoring works undertaken at the site on a quarterly basis. Such reports will form the basis of the annual environmental review report, which is to be submitted to the Environment Agency by 31 March as agreed in writing with the Environment Agency of each year in accordance with Condition 4.2.2 of the Permit.

Viridor note, in line with Permit variation dated 21 April 2015; 30 minute carbon monoxide (CO) average monitoring was replaced with CO 10 minute average monitoring.

This report summarises the environmental and performance data collected at the site 1st January – 31st December 2018 and fulfils the requirement of Chapter IV Article 55(2) of the Industrial Emissions Directive.

3. Summary of Plant Operation

Municipal waste received	141,737.48 tonnes
Commercial and industrial waste received	148,341.84 tonnes
Total waste received	290,079.32 tonnes
Total plant operational hours	7046.22 hours
Total hours of “abnormal operation” (see permit for definition)	2 hours 46 minutes (27/02/2018)
Total quantity of incinerator bottom ash (IBA) produced	59,299 tonnes
Disposal or recovery route for IBA	All IBA reprocessed to IBAA (IBA Aggregate, with recovery of metal) by Fortis IBA Limited, Ardley, Middleton Stoney.
Did any batches of IBA test as hazardous? If yes, state quantity	None
Total quantity of air pollution control (APC) residues produced	6074.36 tonnes
Disposal or recovery route for APC residues	Grundon Waste Management. Processed for recovery via carbonation to produce aggregates at Carbon 8 facility, Brandon, Suffolk. Small quantities to Grundon hazardous waste landfill at Bishops Cleeve, Cheltenham due to operational reasons at disposal site.
Mains water Usage	43,410 m3

Energy 1

Parameter	Total (MWh)	Specific Usage (MWh / tonne incinerated)
Electricity generated	209,097	0.74
Electricity exported to the National Grid	187,494	0.66
Energy exported as heat (if any)	0	0
Energy usage (imported and parasitic)	23,375	0.08

Performance 1

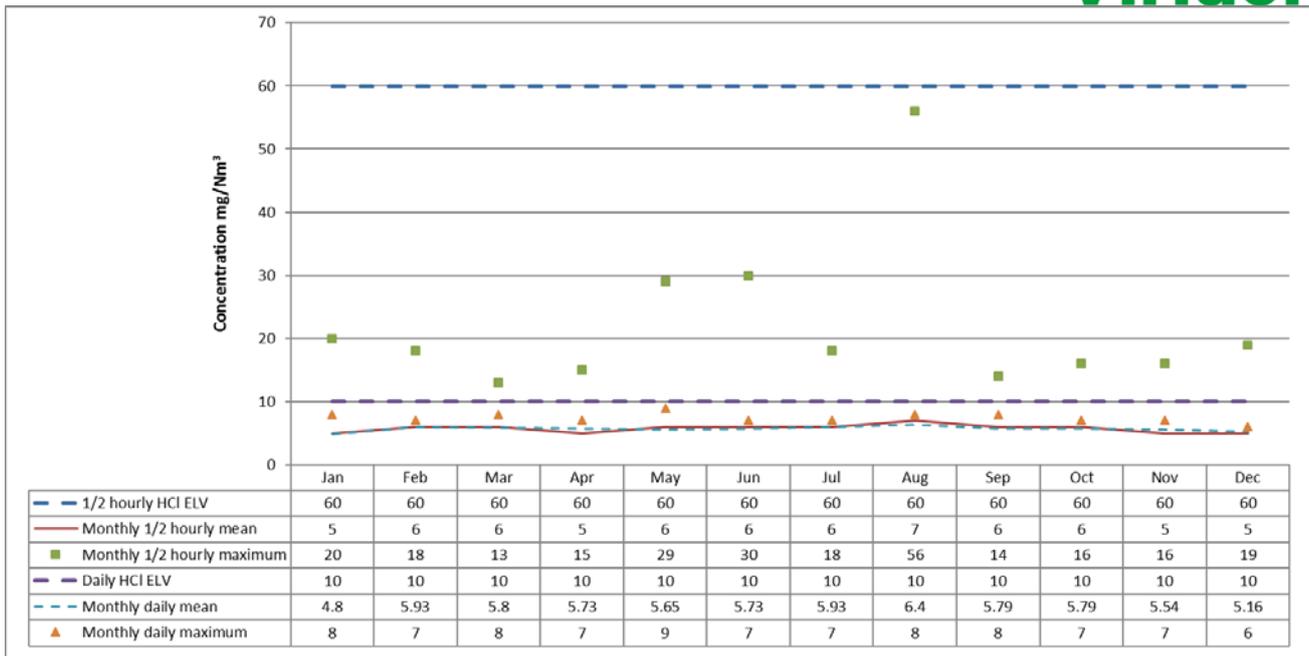
Parameter	Units	
Water Usage	M3/tonne waste incinerated	0.153
Gas Oil consumption	Kg/tonne waste incinerated	1.81
Total Urea Used	Kg/tonne waste incinerated	1.73
Total acid abatement reagent used	Kg/tonne waste incinerated	12.26
Total Powdered Activated Carbon used	Kg/tonne waste incinerated	0.26
Total Air Pollution Control Residues disposed of	Kg/tonne waste incinerated	21.4
Total bottom Ash generated	Kg/tonne waste incinerated	208.9
Total bottom ash recycled	Kg/tonne waste incinerated	All bottom ash is recycled
Total bottom ash disposed of	Kg/tonne waste incinerated	0

4. Summary of Plant Emissions

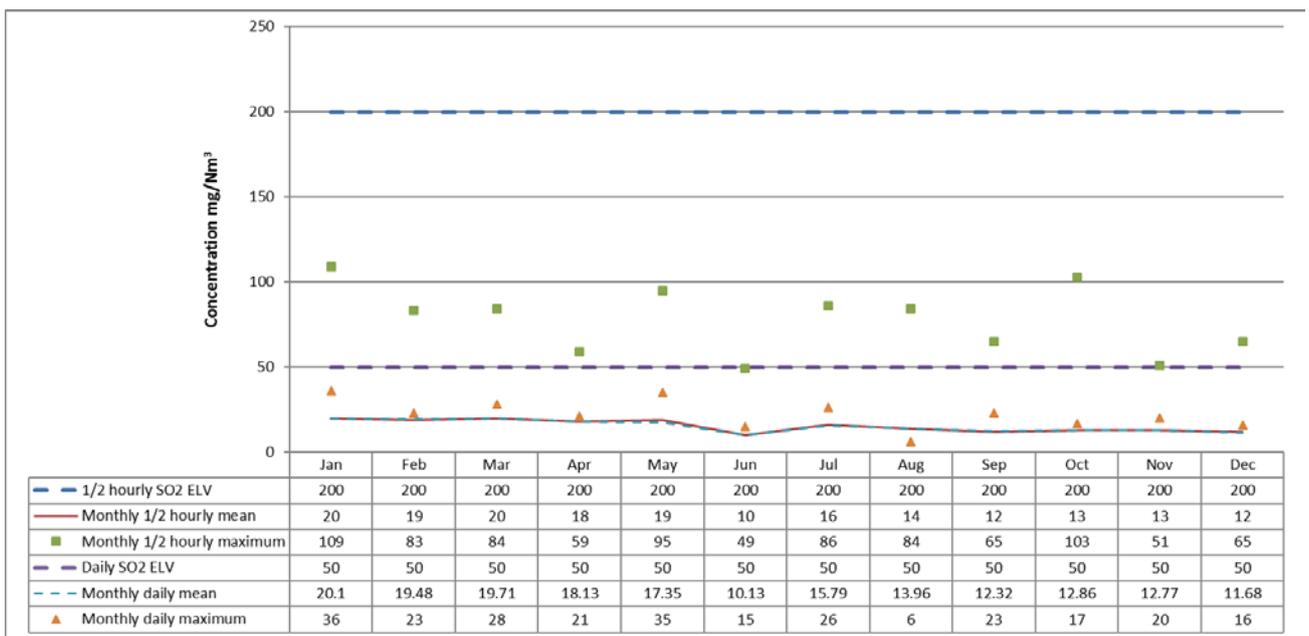
4.1 Summary of continuous emissions monitoring results for emissions to air

The following charts show the performance of the plant against its emission limit values (ELVs) for substances that are continuously monitored.

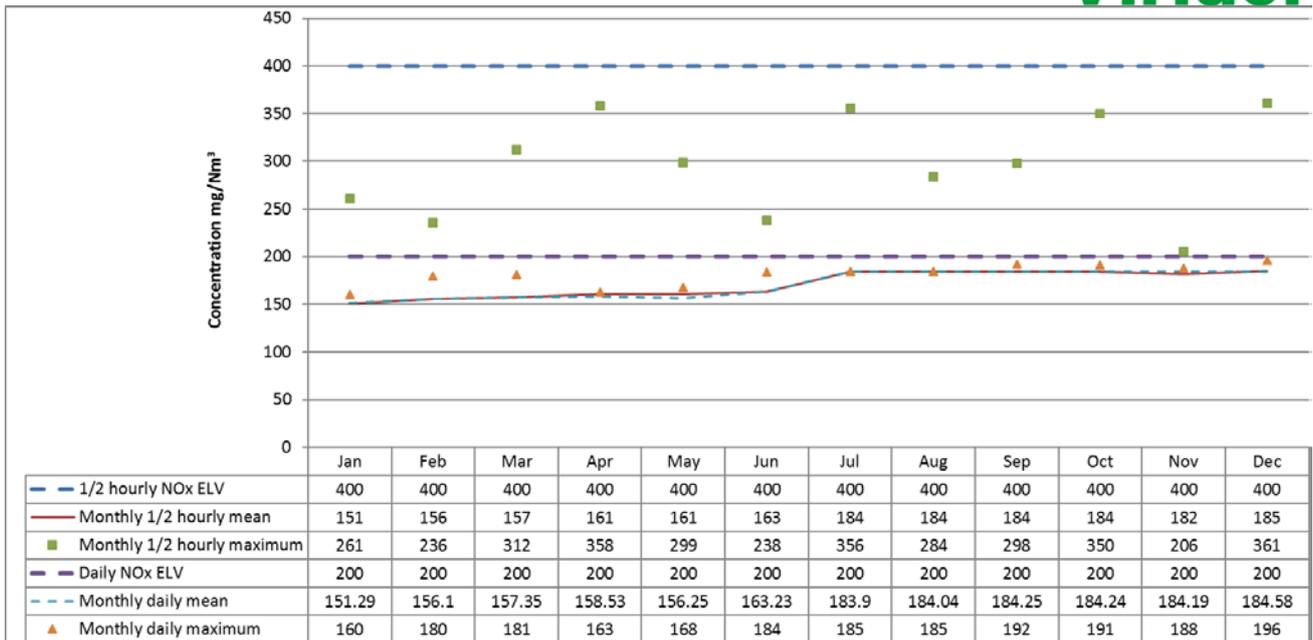
Line 1 - Hydrogen chloride



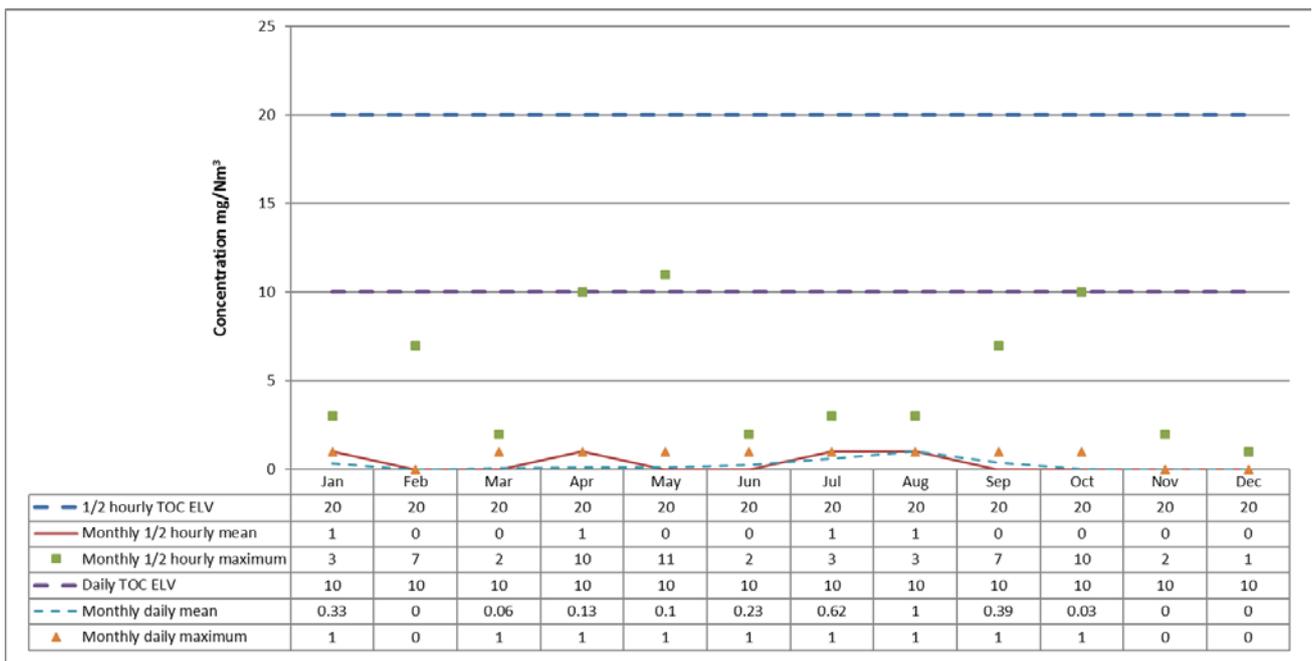
Line 1 – Sulphur dioxide



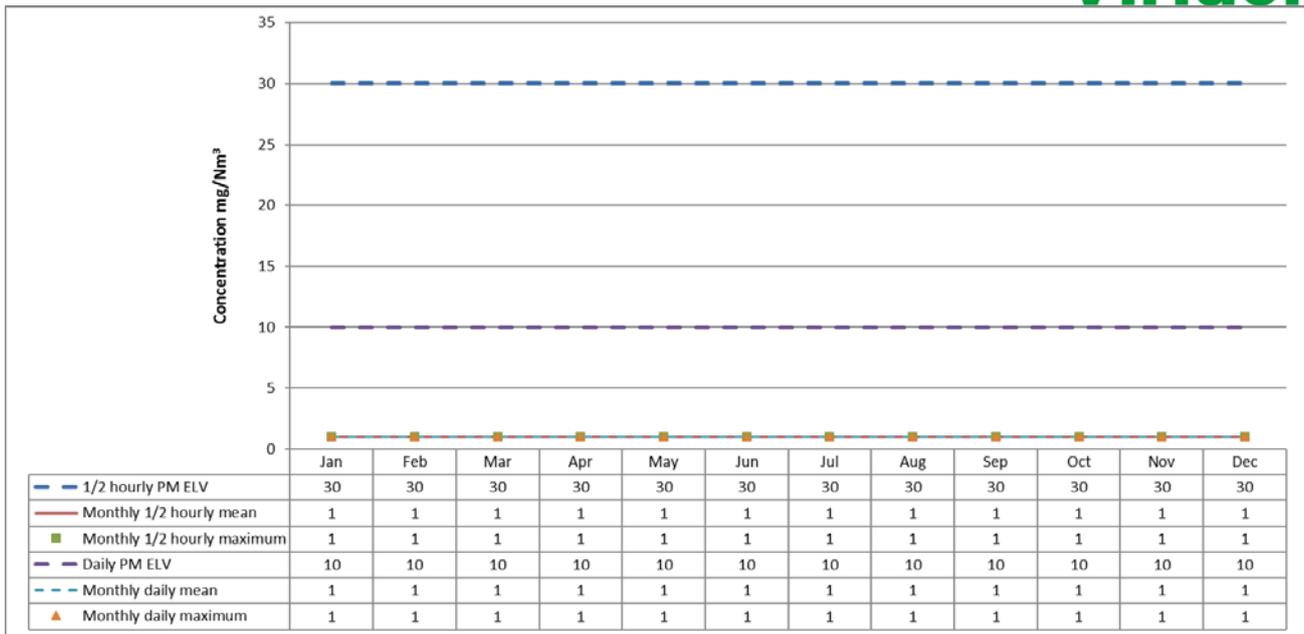
Line 1 – Oxides of nitrogen



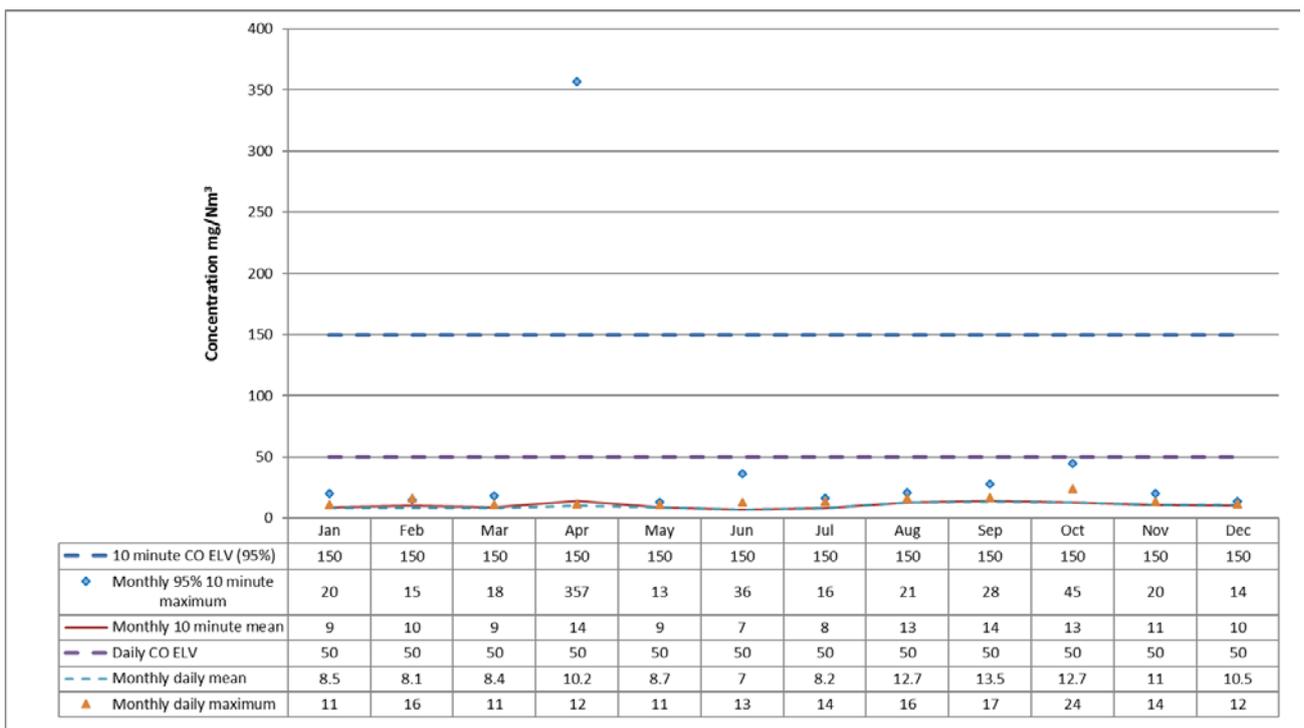
Line 1 – Total organic carbon



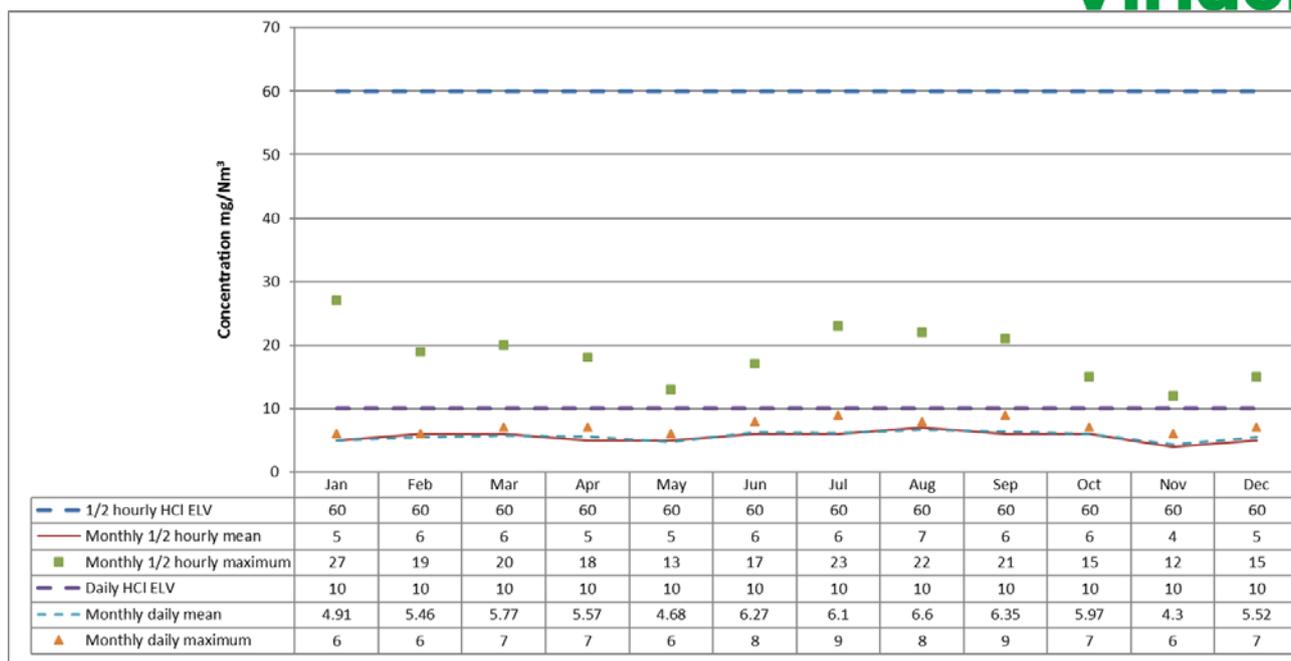
Line 1 – Particulates



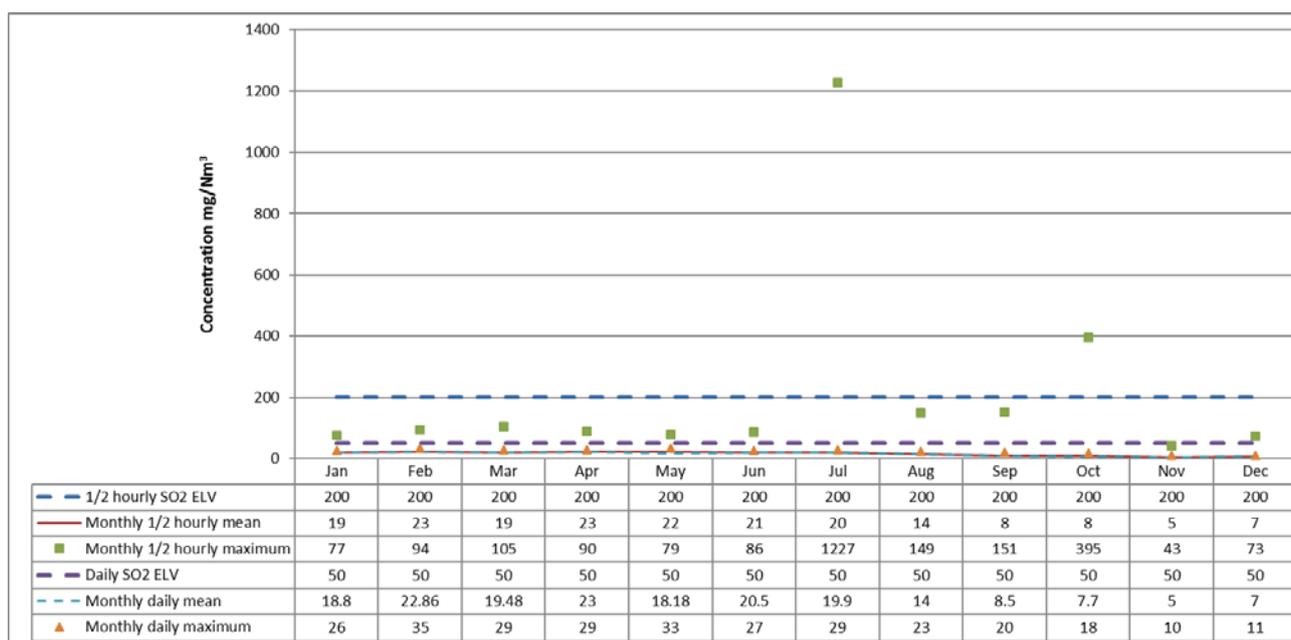
Line 1 – Carbon monoxide



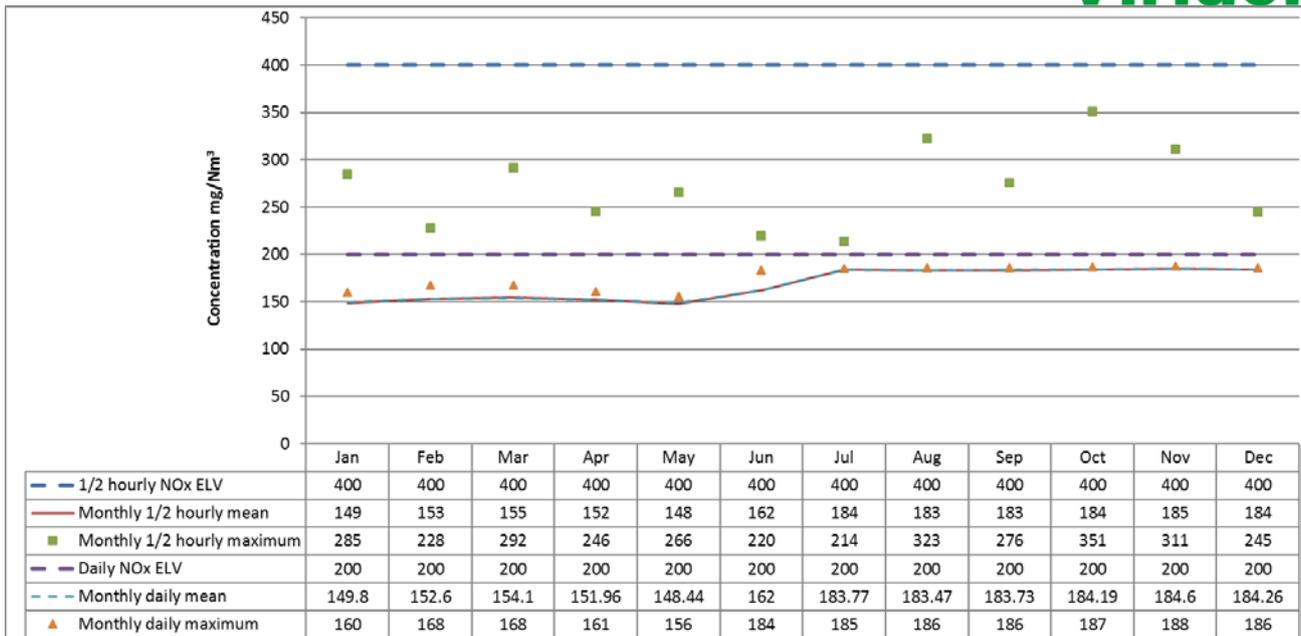
Line 2 - Hydrogen chloride



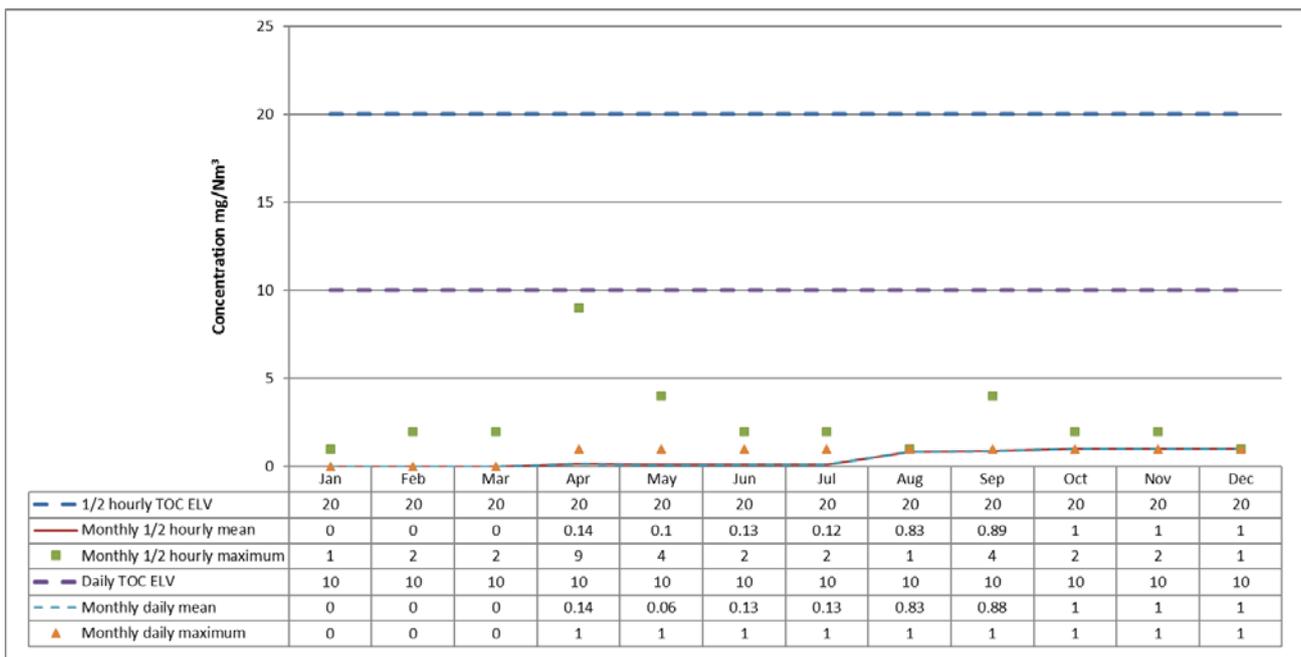
Line 2 – Sulphur dioxide



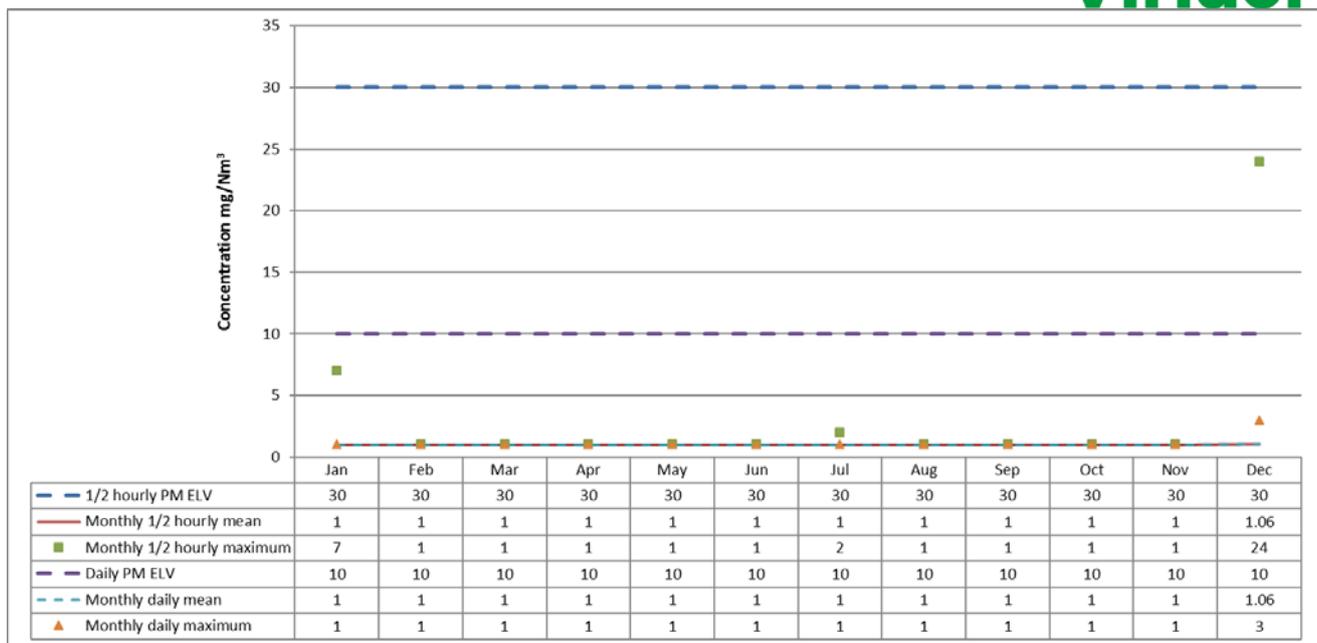
Line 2 – Oxides of nitrogen



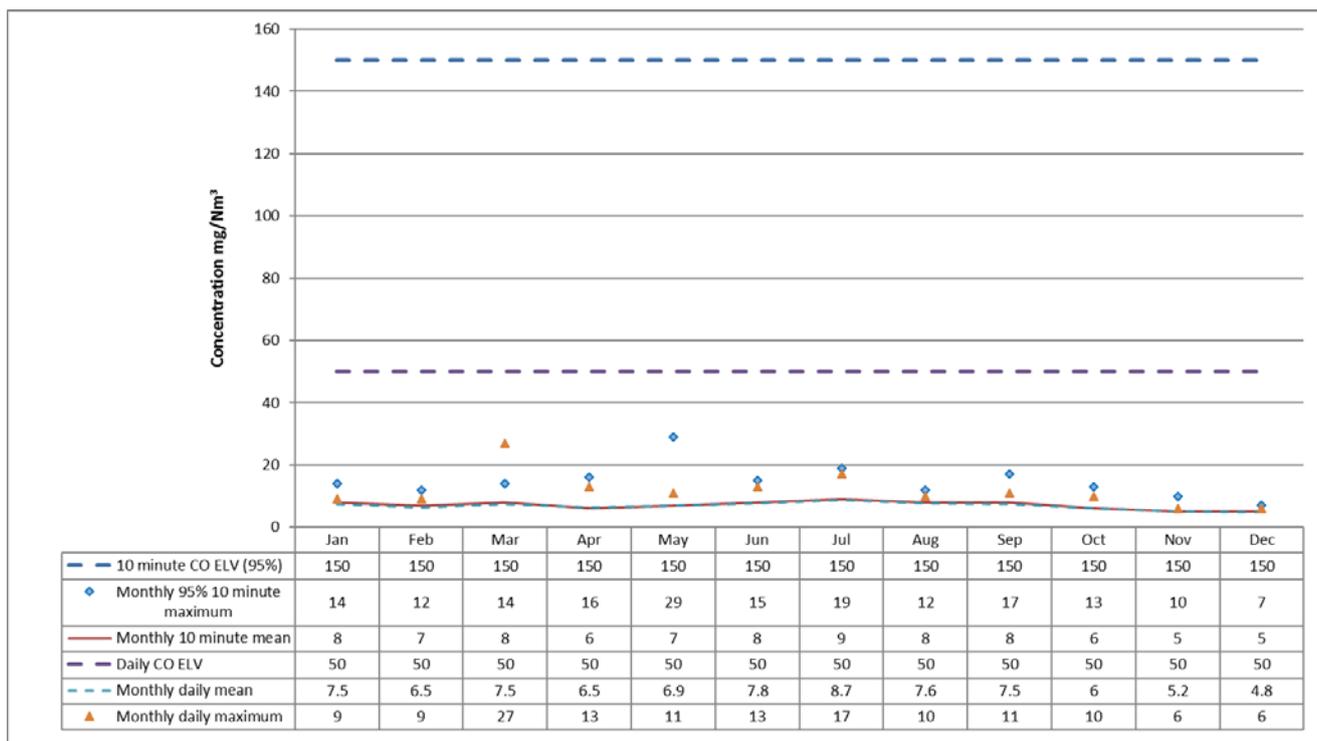
Line 2 – Total organic carbon



Line 2 – Particulates



Line 2 – Carbon monoxide



4.2 Summary of periodic monitoring results for emissions to air

The tables below shows the results of periodically monitored substances at sample point A1 and A2 as required by Permit Conditions 3.5.1(a) and Tables S4.1 and S4.1(a)

In line with the Permit and in agreement with the Agency, Viridor now carry out periodic testing of stack emissions biannually.

Substance	Emission limit value & unit	A1 Results	
		05/02/2018 - 07/02/2018	14/08/2018 – 15/08/2018 *10/10/2018 **15/10/2018
Nitrous Oxide	-	7.14	13.4**
Hydrogen Fluoride	2 mg/m ³	0.02	0.01
Mercury (Hg) and its compounds	0.05 mg/m ³	0.0010	0.0080
Cadmium & thallium and their compounds (total)	0.05 mg/m ³	0.0019	0.0005*
Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m ³	0.169	0.0475
Dioxins and furans (I-TEQ)	0.1 ng/m ³	0.0046	0.0145
PCBs (W/HO-TEQ Humans / Mammals)	None set ng/m ³	0.0004	0.0008
PCBs (WHO-TEQ Fish)	None set ng/m ³	0.0000	0.0001
PCBs (WHO-TEQ Birds)	None set ng/m ³	0.0046	0.0045
Anthanthrene	None set ng/m ³	<0.0129	0.05
Benzo(a)anthracene	None set ng/m ³	<0.0129	<0.0123
Benzo(a)pyrene	None set ng/m ³	<0.0129	<0.0123
Benzo(b)fluoranthene	None set ng/m ³	<0.0129	<0.0123
Benzo(b)naphtho(2,1-d)thiophene	None set ng/m ³	<0.0129	<0.0123
Benzo(c)phenanthrene	None set ng/m ³	<0.0129	<0.05

Benzo(ghi)perylene	None set ng/m ³	<0.0129	<0.0123
Benzo(k)fluoranthene	None set ng/m ³	0	<0.0123
Cholanthrene	None set ng/m ³	0	<0.0123
Chrysene	None set ng/m ³	0	<0.123
Cyclopenta(cd)pyrene	None set ng/m ³	<0.0129	<0.123
Dibenzo(ai)pyrene	None set ng/m ³	<0.0129	<0.123
Dibenzo(ah)anthracene	None set ng/m ³	<0.0129	<0.123
Fluoranthene	None set ng/m ³	0.06	<0.123
Indeno(123-cd)pyrene	None set ng/m ³	<0.0129	<0.123
Naphthalene	None set ng/m ³	1.29	<0.123

Substance	Emission limit value	A2 Results	
		01/02/2018 – 02/02/2018	15/08/2018 – 16/08/2018 *10/10/2018 **15/10/2018
Nitrous Oxide	-	7.14	2.35*
Hydrogen Fluoride	2 mg/m ³	0.02	0.01
Mercury (Hg) and its compounds	0.05 mg/m ³	0.0010	0.0045
Cadmium & thallium and their compounds (total)	0.05 mg/m ³	0.0009	0.0007**

Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m ³	0.169	0.0323
Dioxins and furans (I-TEQ)	0.1 ng/m ³	0.0046	0.0033
PCBs (W/HO-TEQ Humans / Mammals)	None set ng/m ³	0.0004	0.00002
PCBs (WHO-TEQ Fish)	None set ng/m ³	0.0000	0.00001
PCBs (WHO-TEQ Birds)	None set ng/m ³	0.0046	0.0011
Anthanthrene	None set ng/m ³	<0.0129	<0.0113
Benzo(a)anthracene	None set ng/m ³	<0.0129	<0.0113
Benzo(a)pyrene	None set ng/m ³	<0.0129	<0.0103
Benzo(b)fluoranthene	None set ng/m ³	<0.0129	<0.0113
Benzo(b)naphtho(2,1-d)thiophene	None set ng/m ³	<0.0129	<0.0113
Benzo(c)phenanthrene	None set ng/m ³	<0.0129	0.06
Benzo(ghi)perylene	None set ng/m ³	<0.0129	<0.0103
Benzo(k)fluoranthene	None set ng/m ³	0	<0.0113
Cholanthrene	None set ng/m ³	0	<0.0113
Chrysene	None set ng/m ³	0	<0.0113
Cyclopenta(cd)pyrene	None set ng/m ³	<0.0129	<0.0113
Dibenzo(ai)pyrene	None set ng/m ³	<0.0129	<0.0113

Dibenzo(ah)anthracene	None set ng/m3	<0.0129	<0.0113
Fluoranthene	None set ng/m3	0.06	<0.0113
Indeno(123-cd)pyrene	None set ng/m3	<0.0129	<0.0113
Naphthalene	None set ng/m3	1.29	<0.0113

4.3 Summary of monitoring results for emissions to water

The following tables summarises the results of monitoring of emissions to water for each month:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sample point W1 is free of oil and grease.	Sample point W1 has remained free of oil and grease.											

4.4 Summary of periodic monitoring results for ash

The tables below shows the results of residue quality monitoring as required by Permit Conditions 3.5.1(c) and Tables S4.4.

In line with the Permit and in agreement with the Agency, Viridor carry out residue quality monitoring at quarterly intervals.

IBA Quality									
Parameter	Limit								
		Q1		Q2		Q3		Q4	
		L1	L2	L1	L2	L1	L2	L1	L2
Total Organic Carbon	3%	1.2%	0.8%	0.8%	0.9%	1.1%	0.9%	0.9%	0.9%
		Composite		Composite		Composite		Composite	
Antimony (mg/kg)	---	229		164		170		314	
Cadmium (mg/kg)	---	23.3		32		17.9		29.5	
Thallium (mg/kg)	---	0.17		0.14		<0.1		0.93	
Mercury (mg/kg)	---	<0.5		<0.5		<0.5		<0.5	
Lead (mg/kg)	---	502		504		473.6		547.9	
Chromium (mg/kg)	---	189		136		139		134	
Copper (mg/kg)	---	1580		1762		2238.4		1743.0	
Manganese (mg/kg)	---	986		1035		817		974	
Nickel (mg/kg)	---	74.9		81		81.5		61.3	
Arsenic (mg/kg)	---	28.6		24		17.1		26.9	
Cobalt (mg/kg)	---	27.3		34		34.8		29.1	
Vanadium (mg/kg)	---	54.5		48		27.5		34.6	
Zinc (mg/kg)	---	3046		3196		2903.7		3721.6	
Dioxins WHO-TEQ (ng/kg)	---	2.12		0.01248		0.49855		8.33155	
Furans (WHO-TEQ) (ng/kg)	---	1.40		0.00977		1.76081		5.35217	
PCB (WHO-TEQ) (ng/kg)	---	0.16		0.00136		0.09971		0.60244	

APCr Quality				
Parameter	Q1	Q2	Q3	Q4
	Composite	Composite	Composite	Composite
Antimony (mg/kg)	1060	927	923	1351
Cadmium (mg/kg)	292	365	301	343
Thallium (mg/kg)	1.2	1.4	1.1	1.1
Mercury (mg/kg)	9.91	12	9.68	14.2
Lead (mg/kg)	2072	1953	2092	2007
Chromium (mg/kg)	39.6	42	33.6	42.6
Copper (mg/kg)	647	640	588	661
Manganese (mg/kg)	337	314	305	360
Nickel (mg/kg)	16.3	15	10.5	26.0
Arsenic (mg/kg)	66.5	70	56.9	63.0
Cobalt (mg/kg)	5.4	6	4.4	6.3
Vanadium (mg/kg)	16.4	11	<10	<10
Zinc (mg/kg)	16290	16120	15340	17920
Dioxins WHO-TEQ (ng/kg)	150	640	94.75	132.4
Furans (WHO-TEQ) (ng/kg)	314	842	139.7	220.07
PCB (WHO-TEQ) (ng/kg)	17.3	70	2.1	11.7

5. Summary of Permit Compliance

5.1 Summary of any notifications or non-compliances under the permit

Date	Summary of notification or non-compliance	Reason	Measures taken to prevent reoccurrence
27/02/2018	Line 2 Abnormal Operation (Failure with the Carbon Dosing System)	Issue with the common safety page and the carbon injection authorisation needed to be reset.	Electrical and C&I team were brought in to track the problem which was resolved within the required 4-hour time period for abnormal operation.
16/04/2018	Boiler water (ultra-clean purified water to a given standard)	Hose was observed in a position different	Valve has been locked and tagged to prevent inadvertent movement

	discharged to site surface water system. Minimal impact to the Environment.	from the normal on daily walk round.	of hose. Testing was undertaken at W1, results were normal.
01/10/2018	An elevated level for 30 minute average of SO ₂ on Line 2 (A2) @ 19:00-19:30hrs with a measurement of 394.95mg/m ³ .	The elevated level is thought to be as a result of a high concentration of plastics processing across the grate.	Waste mixing in the bunker to prevent high concentrations of plastics being processed across the grate.
14/08/2018 - 16/08/2018	On receipt of periodic testing, it was identified that both A1 and A2 observed elevated Cadmium levels. Re-test results received from the laboratory fell within the limits set by the permit. Initial results are thought to be spurious.	Results are thought to be spurious.	Auditing Stack Monitoring activities

6. Summary of plant improvements

Summary of any permit improvement conditions that have been completed within the year and the resulting environmental benefits.
None, all completed.
Summary of any changes to the plant or operating techniques which required a variation to the permit and a summary of the resulting environmental impact.
None.
Summary of any other improvements made to the plant or planned to be made and a summary of the resulting environmental benefits.

After some preliminary works the mounting levels of the ammonia (SNCR) nozzles in the boiler were adjusted in spring 2018 on Line 1 and Line 2 will be done in early 2019 to reduce ammonia usage.

As the plant matures the temperature profile of the boiler changes slightly, the SNCR reaction of NO_x with ammonia has an optimum temperature range. The plant was designed with the ability to adjust the mounting levels of the nozzles to minimise ammonia usage whilst maximising NO_x control.

The upper two levels of nozzles have been moved up one level to provide the best reaction profile across the operating range.