Appendix N. Reference Plant Report

Prospect Hill EfW Project

BREF 2019 Compliant Flue Gas Treatment Reference Plants

Draft Rev0

25 September 2020

Prospect Hill International Pty Ltd

Document history and status

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Author:	John O'Kane
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Jacobs U.K. Limited

7th Floor, 2 Colmore Square
38 Colmore Circus, Queensway
Birmingham, B4 6BN
United Kingdom
T +44 (0)121 237 4000
F +44 (0)121 237 4001
www.jacobs.com

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Executive Summary

In Europe, emissions to air from EfW plants are regulated by the European Union (EU) Industrial Emissions Directive (IED) 2010/75/EU (EU, 2010; EC, 2019b). A similar, high level of protection is anticipated for the Australian environment where the IED is applied; e.g., EPA (2017a). The BREF (2019) requirements will be included in the next version of the IED, which will most likely be released before the construction/operation of the Prospect Hill Plant. Therefore, the EPA will be seeking compliance with BREF 2019. These requirements have more onerous daily average emissions limits for NOx, HCl, SO_2 and dust and heavy metals.

This report provides information on six EfW plants, provided by two technology suppliers, that are currently in operation and have reported historical emissions to air over the past three years. Their capability to achieve BREF 2019 guidelines is also discussed and both suppliers advise they are able to meet the guideline emission limits. The NOx, HCl and SO_2 emissions would need to be reduced to achieve compliance consistently with BREF 2019 and the approach to achieving this is described.

It is recognized that other suppliers will equally be able to achieve BREF 2019 and they will be invited to provide their proposals at the detailed design stage of the project.

Important note about your report

The sole purpose of this report and the associated services performed by Jacobs is to provide a technical review of typical operational plants that can comply with BREF 2019 guidelines. The work has been undertaken in accordance with the scope of services set out in the contract between Jacobs and Prospect Hill International Pty Ltd.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by various technology suppliers and plant operators. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

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1. Introduction

In Europe, emissions to air from EfW plants are regulated by the European Union (EU) Industrial Emissions Directive (IED) 2010/75/EU (EU, 2010; EC, 2019b). The IED aims to achieve a high level of general protection for human health and the environment by reducing harmful industrial emissions across the EU, in particular through the application of Best Available Techniques (BAT) for air emissions controls. A similar, high level of protection is anticipated for the Australian environment where the IED is applied; e.g., EPA (2017a).

The original BAT reference document on Waste Incineration was adopted by the European Commission (2006); EU (2010) set out BAT-Associated Emissions Limits (AEL); EC (2019a) presents the results of a review and update of BAT reference documents; and EC (2019b) sets out the updated BAT-AEL. The key references are listed here for convenience:

(1) EC (2006): European Commission, *Integrated Pollution Prevention and Control, Reference Document on the Best Available Techniques for Waste Incineration*, August 2006.

(2) EU (2010): The European Parliament and the Council of the European Union, *Directive EC2010/75/EU of the European Parliament and of the Council on industrial emissions (integrated pollution prevention and control) (Recast)*, Official Journal of the European Union, pp. L 334/17-119, 17.12.2010.

(3) EC (2019a): European Commission, JRC Policy for Science Report, *Best Available Techniques (BAT) Reference Document for Waste Incineration*, Industrial Emissions Directive 2010/75/EU, Integrated Pollution Prevention and Control, EUR 29971 EN, 2019.

(4) EC (2019b): European Commission, *Commission Implementing Decision (EU) 2019/2010 of 12 November 2019 establishing the best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for waste incineration*. Official Journal of the European Union, L 312/55, 3 December 2019.

EU (2010) set out a comprehensive list of emissions limits for EfW facilities. EC (2019a) included a review of emissions measurements and provided recommendations for updates to the emissions limits as data ranges rather than fixed maxima. EC (2019b) adopted the EC (2019a) recommendations for BAT-AEL (Table 1-1).

Emissions limits from EU (2010) and EC (2019b), and the EC (2019a) review of measurements, were analysed and used for this Project. The reason for this was some EU (2010) averaging periods were a better match with the averaging periods of the SEPP (AQM) design criteria used to assess modelling results. A conservative approach was taken in each case for the assessment of each substance. The EU (2010) and EC (2019b) emissions limits are listed side-by-side in Table 1-1.

Table 1-1: European Union EfW Emissions Limits: EU (2010) and EC (2019b)

Pollutant	IED 2010/75/EU (EC, 2010)			IED 2010/75/EU (EU, 2019b)	
	Emission Limit (mg/Nm^3)	Emission Limit (mg/Nm^3) 97th percentile	Averaging time	BAT- associated emission levels (BAT-AELs) (mg/Nm^3)	Averaging time
Pollutants (general)					
Total dust	10	–	24 hours	< 2-5	24 hours
TVOC	–	–	–	< 3-10	24 hours
Hydrogen chloride (HCl)	10	–	24 hours	< 2-6	24 hours
Hydrogen fluoride (HF)	1	–	24 hours	< 1	24 hour or average over the sampling period

Pollutant	IED 2010/75/EU (EC, 2010)			IED 2010/75/EU (EU, 2019b)	
	Emission Limit (mg/Nm^3)	Emission Limit (mg/Nm^3) 97th percentile	Averaging time	BAT- associated emission levels (BAT-AELs) (mg/Nm^3)	Averaging time
Sulfur dioxide (SO_2)	50	–	24 hours	5 – 30	24 hours
Oxides of nitrogen (NOx) as nitrogen dioxide (NO_2)	200	–	24 hours	50 – 120	24 hours
Carbon monoxide (CO)	50	–	24 hours	10 – 50	24 hours
Total dust	30	10	0.5 hour	–	–
Total organic carbon (TOC)	20	10	0.5 hour	–	–
Hydrogen chloride (HCl)	60	10	0.5 hour	–	–
Hydrogen fluoride (HF)	4	2	0.5 hour	–	–
Sulfur dioxide (SO2)	200	50	0.5 hour	–	–
Oxides of nitrogen (NOx) as nitrogen dioxide (NO2)	400	200	0.5 hour	–	–
Carbon monoxide (CO)	100	–	0.5 hour	–	–
Carbon monoxide (CO)	150	–	10-minute	–	–
Pollutants (heavy metal)					
Cd + Tl	0.05	–	0.5 hours	0.005-0.02	Average over the sampling period$
Hg	0.05	–	0.5 hours	<0.005 - 0.02	24 hour or average over the sampling period$
Hg	–	–	–	0.001 - 0.01	Long term sampling period*
Sb+As+Pb+Cr+Co+Cu+Mn +Ni+V	0.5	–	0.5 hours	0.01-0.3	Average over the sampling period$

* Defined in EC (2019b) as a sampling period of 2 to 4 weeks.

$ Defined in EC (2019b) as average value of three consecutive measurements of at least 30 minutes each, unless a longer period is required due to sampling or analytical limitations.

In the assumptions section of the environmental assessments for this project, the following statement is made:

"It will be necessary that the Technology Partner will be able to comply with and supply equipment that is in line with the Industrial Emissions Directive (IED) 2010/75/EU which the Victorian EPA have adopted for local regulation. Demonstrating compliance with the recently released 2019 European Commission Waste Incineration Best Available Techniques (BAT) Reference Document (2019 WI BREF) will be critical in terms of a successful outcome with the EPA."

The BREF (2019) requirements will be included in the next version of the IED, which will most likely be released before the construction/operation of the Prospect Hill Plant. Therefore, the EPA will be seeking compliance with BREF 2019.

New plants in Europe (not yet in operation) are now designed to fulfil the BREF guidelines 2019. For existing plants, either current emissions are already very low and no retrofit is required or, for plants which would need upgrading, projects have been delayed due to the current Covid-19 situation and are not yet in operation in the new configuration.

This report provides information on six EfW plants, provided by two technology suppliers, that are currently in operation and have reported historical emissions to air over the past three years. Their capability to achieve BREF 2019 guidelines is also discussed and both suppliers advise they are able to meet the guideline emission limits. It is recognized that other suppliers will equally be able to achieve BREF 2019 and they will be invited to provide their proposals at the detailed design stage of the project.

1.1 Waste Composition

Each EfW plant referenced in this report has waste streams that are either mostly or completely composed of municipal solid waste (MSW). The EfW plants are subject to permit conditions which specify the waste types, raw materials and fuels that are permitted to be processed by the plant.

Table 1.2 below provides national waste composition estimates for England in 2017, which is considered to be representative of the feedstock used in the reference plants detailed in this document. *Source: WRAP (2019) National municipal waste composition, England 2017.*

Table 1.3 provides a comparison of the waste composition of the reference plants to the anticipated waste composition for the Prospect Hill EfW Plant.

Table 1.2 National waste composition estimates for England, all municipal residual waste (2017)

Category	Household residual total (tpa)	Commercial municipal residual total (tpa)	Municipal residual total (tpa)	Composition (%)
Earth based, Masonry	188,487	388,038	576,525	2.3
E-waste	159,219	108,796	268,015	1.1
Glass	384,066	272,420	656,486	2.6
Hazardous & Fines	281,429	397,931	679,359	2.7
Metals, Ferrous	243,437	351,625	595,062	2.4
Metals, Non-Ferrous	152,931	133,728	286,659	1.1
Miscellaneous, non-combustibles	639,212	270,142	909,355	3.6
Miscellaneous, combustibles	1,755,396	578,382	2,333,778	9.3
Organics, food	3,852,077	2,928,375	6,780,452	27
Organics, garden	557,208	118,053	675,261	2.7
Organics, timber	-	-	-	-
Organics, soil & other	509,145	75,908	585,053	2.3
Other	59,756	0	59,756	0.2
Other, inert	-	-	-	-
Paper & Cardboard	1,656,896	3,628,256	5,285,152	21.1
Plastic	1,704,948	2,313,562	4,018,509	16
Textiles	992,597	379,767	1,372,364	5.5
Total	**13,136,804**	**11,944,983**	**25,081,786**	**100**

Source: WRAP (2019) National municipal waste composition, England 2017.

Table 1.3: Comparison of waste composition of Reference plants and Prospect Hill EfW Plant

	Total expected feedstock as a percentage from each category per annum (%)	
Category	**Prospect Hill EfW Project**	**Reference Plants**
Earth based, Masonry	0.5	2.3
E-waste	0.9	1.1
Glass	5.1	2.6
Hazardous & Fines	4.6	2.7
Metals, Ferrous	1.3	2.4
Metals, Non-Ferrous	0.6	1.1
Miscellaneous, non-combustibles	0.3	3.6
Miscellaneous, combustibles	5.0	9.3
Organics, food	35.8	27
Organics, garden	9.0	2.7
Organics, timber	0.9	-
Organics, soil & other	3.4	2.3
Other	4.3	0.2
Other, inert	2.0	-
Paper & Cardboard	13.1	21.1
Plastic	12.9	16
Textiles	0.2	5.5
Total	**100**	**100**

2. FGT Plants using HZI CFB technology

2.1 Greatmoor (UK)

2.1.1 General plant information

Table 2.1 provides the general plant information for the Greatmoor EFW plant in the United Kingdom.

Table 2.1: Greatmoor (UK) general plant information

Plant component	Description
Typical waste composition	Residual MSW
Basic plant capacity information	345 ktpa, Single line 1 x 37.5tph
Commencement of operations	2016
Basic plant boiler & FGT	HZI reciprocating grate Recirculating flue gas SNCR Semi-dry CFB reactor utilising lime & PAC (for description refer to Appendix A)
Emissions standard met	IED 2010/75/EU (EC, 2010)
Design changes required for BREF 2019 emissions	NOx: DyNOR system (for description refer to Appendix A) Acid gases: increased consumption of reagents, option to use sodium bicarbonate in lieu of lime. The acid gas loading of the raw flue gas will need to be assessed to finalise the optimum design.
Emissions reports available	For continuous emissions reports 2017 – 2020, refer to Appendix B. For periodic sampling results, these can be seen within the Greatmoor Annual Performance Reports in Appendices B2, B3 & B4.

2.1.2 Continuously monitored emissions reported results

The Greatmoor EfW publicly reported continuously monitored emissions values provided in Appendix B are summarised in Table 2.2 below for the four pollutants for which BREF 2019 has more onerous requirements than IED 2010; these are NOx, HCl, SO_2 and particulates. The annual averages of the monthly half-hourly averaged emissions are compared to the present day Environmental Permit limits (which are in turn based on the IED 2010/75/ EU (EC, 2010) limits).

Table 2.2: Greatmoor EFW publicly reported monitored emissions summary

Year	Annual average of reported daily emissions (mg/Nm^3)							
	NOx		HCl		SO_2		Particulates	
	Limit	Annual average emission	Limit	Annual average emission	Limit	Annual average emission	Limit	Annual average emission
2020 (to date)	200	179.6	10	4.1	50	3.9	10	4.6
2019		180.2		5.5		3.5		5.1
2018		179.8		6.1		1.7		2.6

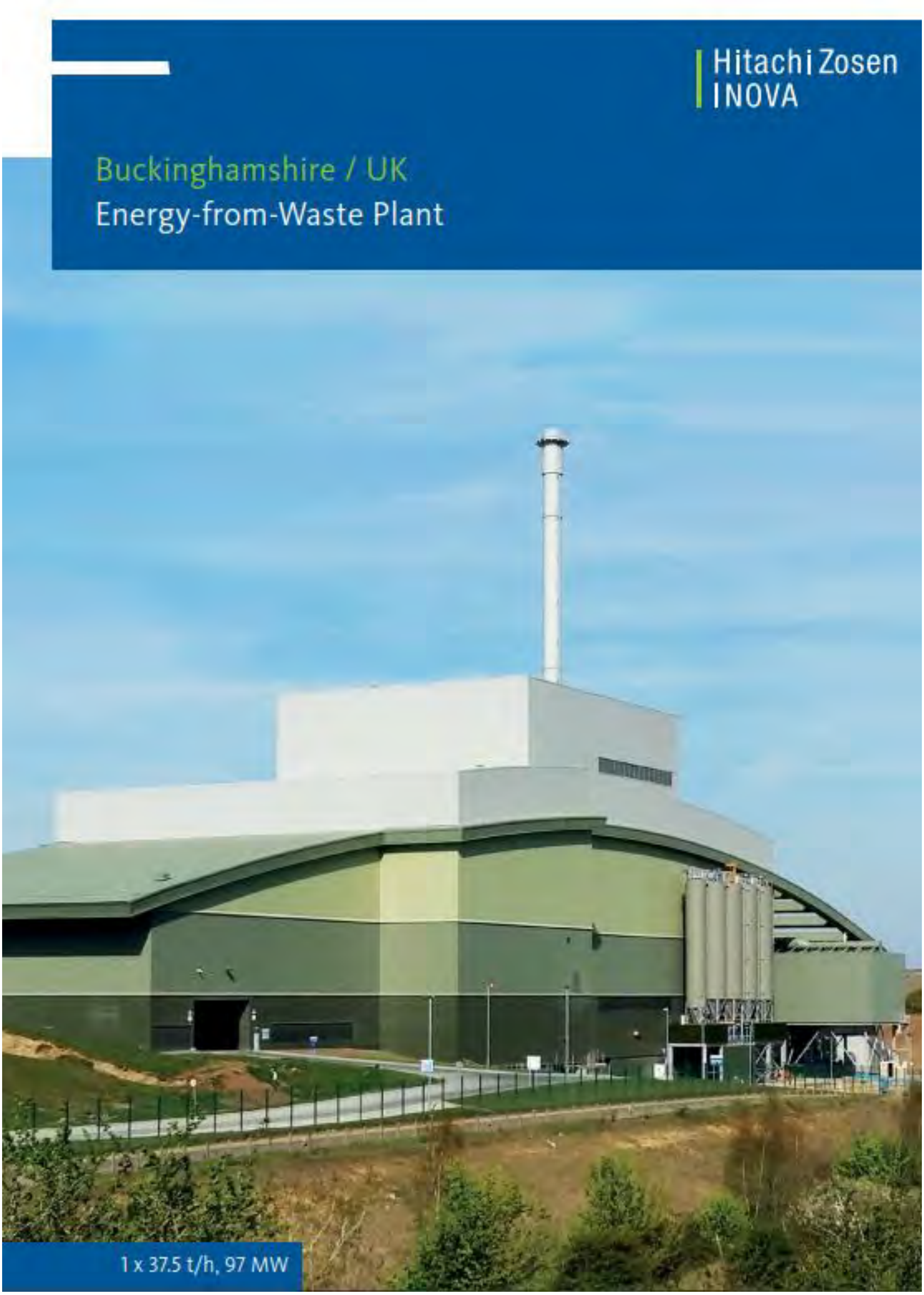
Year	Annual average of reported daily emissions (mg/Nm^3)							
	NOx		HCl		SO_2		Particulates	
	Limit	Annual average emission	Limit	Annual average emission	Limit	Annual average emission	Limit	Annual average emission
2017		180.6		7.4		5.9		2.3

The NOx and HCl emissions would need to be reduced to achieve compliance consistently with BREF 2019 and the approach to achieving this is as described in the General plant information table above.

It is assessed that present designs are capable of achieving the BREF 2019 guidelines for heavy metals.

2.1.3 Plant supplier's information

The plant supplier was Hitachi Zosen Innova (HZI). The information provided by HZI below includes a schematic of the EfW plant grate, boiler and FGT utilising a semi-dry circulating fluidised bed (CFB) reactor. Also provided are some general and technical data of the plant.


Hitachi Zosen
INOVA
Buckinghamshire / UK
Energy-from-Waste Plant
1 x 37.5 t/h, 97 MW

Buckinghamshire / UK Energy-from-Waste Plant

Greatmoor Energy-from-Waste Facility: Achieving Budget Cuts with Cutting-Edge Technology

In times of significant budget cuts, authorities are looking for sustainable solutions that also make economic sense. Against this backdrop Buckinghamshire County Council and HZI's long-term partner, FCC Environment, have signed a 30-year residual waste treatment contract. HZI provides the technology that will save the local community GBP 150 million over this period.

Moving Away from Landfill

The energy-from-waste (EfW) facility in Greatmoor has the capacity to handle up to 300,000 tonnes of Buckinghamshire's residual household and commercial waste every year – waste that would otherwise be disposed of in landfill sites. The plant thus helps the county minimize the "waste miles" and achieve its waste diversion targets.

Energy Efficiency from Transport to Processing

A new, custom-built access road opened in 2014 leads direct to the EfW facility, helping keep HGV traffic out of surrounding villages. Two waste transfer stations make transportation arrangements even more efficient and environmentally friendly. Steam conditions of 52 bar and 402°C and the plant's single-line design provide the optimal balance between investment and operating costs within the given project framework. HZI's single lines assure high availability, crucial in terms of ensuring continuity in the waste management process. With a nominal thermal capacity of 96.9 MW and net efficiency in excess of 25 %, the plant has an electric power generation of 27.7 MW, providing enough electricity to power the equivalent of 36,000 homes. The design ensures that the facility exceeds the EU R1 requirement and therefore fully qualifies as a recovery facility providing renewable energy.

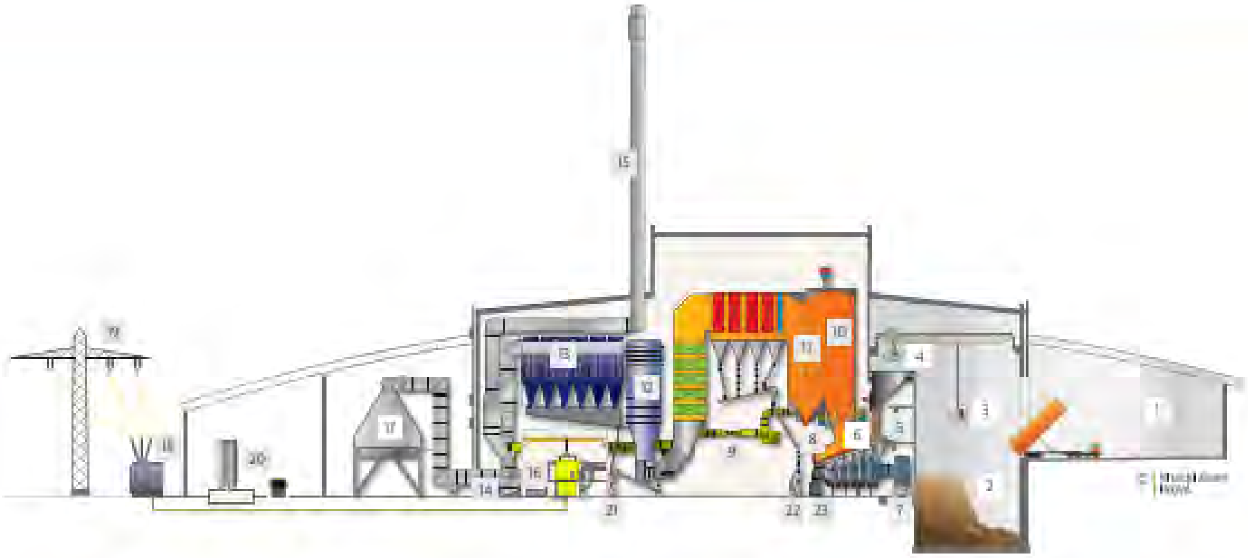
The Process for Safe Thermal Treatment

A fully automatic crane delivers the thoroughly mixed waste from a bunker enabling around seven days of storage into the feed hopper. The waste in the feed hopper provides the air seal for the controlled combustion process. Once the waste has been pushed onto the Hitachi Zosen Inova grate via a ram feeder, it passes through the different combustion phases: drying, ignition, combustion, and burnout. Five individually controllable grate zones guarantee optimum combustion, regardless of the composition and calorific value of the waste. The combustion process is further controlled by the injection of primary air from underneath the grate and taken from the bunker area, while secondary air and recirculated flue gas are also tangentially injected at high velocity into the secondary combustion chamber above the grate. This results in intensive mixing and thorough burnout of flue gases. The energy released during combustion is transferred to the water steam cycle in the downstream five-pass boiler.

Complying with Strict Emission Limit Values

The plant fully complies with the EU emission limit values as a matter of course. Its flue gas treatment system operates reliably, and is designed to cope with any future changes in legislation. The flue gas treatment philosophy

Hitachi Zosen INOVA



Waste Delivery and Storage

1 Tipping hall
2 Waste bunker
3 Waste crane

Combustion and Boiler

4 Feed hopper
5 Ram feeder
6 Hitachi Zosen Inova grate
7 Primary air fan
8 Secondary air fan
9 Flue gas recirculation
10 SNCR
11 Five-pass boiler

Flue Gas Treatment

12 SemiDry reactor
13 Fabric filter
14 Induced draft fan
15 Stack

Energy Recovery

16 Turbine
17 Air cooled condenser
18 Transformer
19 Electricity export

Residue Handling and Treatment

20 Auxiliary tanks
21 FGT residue discharge
22 Boiler ash discharge
23 Bottom ash discharge

is based on a selective non-catalytic reduction (SNCR) DeNOx system, a Hitachi Zosen Inova SemiDry system consisting of a fluid bed reactor with lime and activated carbon injection, and a bag house filter. Water injection cools the flue gas down to approximately 145°C and at the same time reactivates unused lime from the recirculated material. After safe removal of any pollutants, an induced draft fan blows the clean flue gas into the 95-meter-high stack. Before leaving the stack, a continuous measurement system with online connection to the environmental agency checks conformity with the stringent emissions legislation.

From Residue to Product

The bottom ash from the process is taken directly from the plant by belt conveyors to an adjacent storage area, from where it leaves the plant for further use, for example as filling material for road construction.

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Hitachi Zosen INOVA

Buckinghamshire / UK Energy-from-Waste Plant

Hitachi Zosen Inova AG | Hardturmstrasse 127 | P.O. Box 680 | 8037 Zurich | Switzerland
Phone +41 44 277 11 11 | Fax +41 44 277 13 13 | info@hz-inova.com | www.hz-inova.com

General Project Data	
Owner and operator	FCC Environment
Commissioned	2016
Total investment	CHF 210 million
General contractor	Hitachi Zosen Inova
Plant design	Hitachi Zosen Inova

Technical Data	
Annual capacity	300,000 t (nom)
Number of lines	1
Throughput	37.5 t/h (nom) – 39.4 t/h (max)
Calorific value of waste	7.5 MJ/kg (min) – 12.5 MJ/kg (max)
Thermal capacity	96.9 MW (nom) – 101.8 MW (max)
Waste type	Municipal and commercial waste

Combustion System	
Grate type	Hitachi Zosen Inova grate
Grate size	Length: 10 m, width: 12 m
Grate cooling	Air cooled

Boiler	
Type	Five-pass boiler, horizontal
Steam quantity	120.3 t/h (nom)
Steam pressure	52 bar
Steam temperature	402°C

Flue Gas Treatment	
Concept	SNCR, Hitachi Zosen Inova SemiDry system
Flue gas volume	187,860 m^3/h (nom)
Flue gas temperature	150 °C (stack)

Energy Recovery	
Concept	Condensation turbine
Electric power generation	27.7 MW (nom) – 29.4 MW (max)
District heating output	6.6 MW (max)

Residues	
Bottom ash	77,600 t/a
Special feature	Transport by conveyor system to adjacent storage area

2.2 Newhaven (UK)

2.2.1 General plant information

Table 2.3 provides the general plant information for the Newhaven EfW plant in the United Kingdom.

Table 2.3: Newhaven (UK) general plant information

Plant component	Description
Typical waste composition	MSW with up to 10% clinical
Basic plant capacity information	226 ktpa, Two lines 2 x 14.5 tph
Commencement of operations	2011
Basic plant boiler & FGT	HZI reciprocating grate Recirculating flue gas SNCR Semi-dry CFB reactor utilising lime & PAC (for description refer to Appendix A)
Emissions standard met	IED 2010/75/EU (EC, 2010)
Design changes required for BREF 2019 emissions	NOx: DyNOR system (for description refer to Appendix A) Acid gases: increased consumption of reagents, option to use sodium bicarbonate in lieu of lime. The acid gas loading of the raw flue gas will need to be assessed to finalise the optimum design.
Emissions reports available	For continuous emissions reports January 2019 – July 2020, refer to Appendix C. For periodic sampling results, these can be seen within the Newhaven Annual Performance Report in Appendix C2.

2.2.2 Continuously monitored emissions reported results

The Newhaven EfW publicly reported continuously monitored emissions values provided in Appendix C are summarised in Table 2.4 below for the four pollutants for which BREF 2019 has more onerous requirements than IED 2010; these are NOx, HCl, SO_2 and particulates. The annual averages of the monthly half-hourly averaged emissions are compared to the present day Environmental Permit limits (which are in turn based on the IED 2010/75/ EU (EC, 2010) limits).

Table 2.4: Newhaven EfW publicly reported monitored emissions summary

Year	Annual average of reported daily emissions (mg/Nm^3)							
	NOx		HCl		SO_2		Particulates	
	Limit	Annual average emission	Limit	Annual average emission	Limit	Annual average emission	Limit	Annual average emission
2020 (to date)	200	181.8	10	1.9	50	8.3	10	2.1
2019		185.7		3.7		0.6		1.6

2018		190 (max)*		4.5 (max)*		1.0 (max)*		1.1 (max)*
2017		190 (max)*		8.0 (max)*		1.0 (max)*		1.4 (max)*

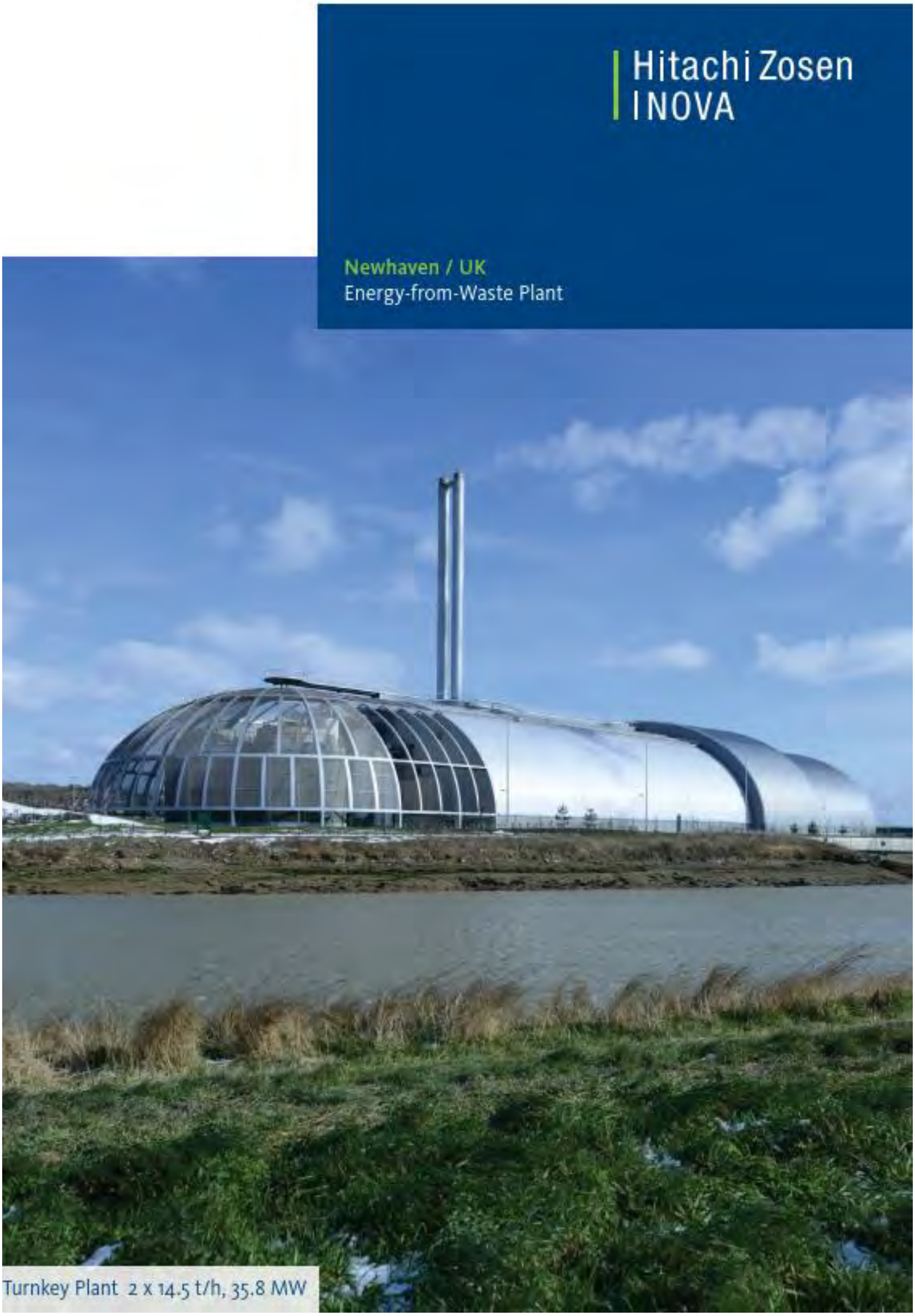
* – detailed emissions reports not available, maximum daily average in year quoted.

The NOx and HCl emissions would need to be reduced to achieve compliance consistently with BREF 2019 and the approach to achieving this is as described in the General plant information table above.

It is assessed that present designs are capable of achieving the BREF 2019 guidelines for heavy metals.

2.2.3 Plant supplier's information

The plant supplier was Hitachi Zosen Innova (HZI). The information provided by HZI below includes a schematic of the EfW plant grate, boiler and FGT utilising a semi-dry circulating fluidised bed (CFB) reactor. Also provided are some general and technical data of the plant.


Hitachi Zosen
INOVA
Newhaven / UK
Energy-from-Waste Plant
Turnkey Plant 2 x 14.5 t/h, 35.8 MW

Newhaven / UK Energy-from-Waste Plant

Newhaven energy recovery facility – an integrated waste management solution for East Sussex and Brighton & Hove.

With a view to divert residual municipal waste from landfill, the energy recovery facility at Newhaven provides a state of the art integrated waste management solution for East Sussex County Council and Brighton & Hove City Council in the South East of England. The energy-from-waste plant will be capable of treating up to 210,000 tons a year of domestic waste and in so doing will export enough electricity to power the equivalent of more than 25,000 homes.

Planning for this project was achieved by the owner and operator, Veolia ES South Downs Ltd., a subsidiary of Veolia Environmental Services. Von Roll Inova, today's Hitachi Zosen Inova AG, has assumed the role of leader in a consortium with Hochtief UK and provides the complete electro-mechanical part of the facility. Construction started in 2008 and the facility will be handed-over in 2011.

| Modern architecture minimises the visual impact.

The focus was on creating a high quality innovative proposal that recognises the character and sensitivity of its landscape setting by minimising the visual impact. The location and orientation of the building on the site, the curved profile of the building and the retention of the flood bunds along the river were all taken into consideration. Most of the building will be at a maximum height of 24 m with an arch rising to 27 m. This was achieved by burying major components of the plant below ground.

| The technical set-up for safe waste treatment and economical energy recovery.

The plant has two identical process lines with state of the art technology, each one consisting of combustion system, boiler and flue gas treatment. It fully complies with the EU Waste Incineration Directive.

After kerbside separation of recyclable materials, the residual municipal waste is delivered by collecting vehicles and tipped into the bunker, where it is mixed by the waste crane. The waste is fed by the crane via the feed hopper into the combustion chamber. The reciprocating grate conveys it through the chamber while it is burned without any additional fuels. The preheated combustion air is injected below the grate. The process reduces the waste volume received by up to 90%. The bottom ash passes through the ash discharger onto an ash handling system where ferrous materials are recycled: all within enclosed areas. The remaining inert material is sent for processing and reuse within the construction industry for cover material or for disposal.

The secondary air and recirculated flue gas are injected into the hot combustion gases resulting in intensive mixing and complete burnout of the gas. The gas passes through a 4-pass water tube boiler where it is cooled while the water of the closed steam condensate cycle is vaporised and superheated. In the first vertical pass, the NOx reduction is provided by the Selective Non-Catalytic Reduction (SNCR) system using injected aqueous ammonia as the reducing agent.

Hitachi Zosen INOVA

Waste Receiving and Storage	Combustion and Boiler		Flue Gas Treatment	Residue Handling and Treatment
1 Tiping hall	5 Feed hopper	10 Primary air distribution	15 SNCR injection levels	20 Ash conveying system
2 Waste pit	6 Ram feeder	11 Secondary air / flue gas recirculation fan	16 Semi-dry reactor	21 Residue conveying system
3 Waste crane	7 Hitachi Zosen Inova grate	12 Secondary air / flue gas recirculation injection	17 Fabric filter	22 Feed water tank
4 Crane control cabin	8 Bottom ash discharger	13 Start-up burner	18 Induced draft fan	23 Hydrated lime silo
	9 Bottom ash conveyor	14 Four-pass boiler	19 Stack	24 Residue silo

After leaving the horizontal last pass of the boiler, further flue gas cleaning takes place in the semi-dry flue gas treatment system consisting of a reactor in combination with a fabric filter. This well proven technology removes the acidic pollutants by absorption on hydrated lime and heavy metals and organic pollutants (dioxins/furans) by adsorption on activated carbon. The small particles are removed in the fabric filter.

The residues resulting from the flue gas treatment are then sent for safe disposal by an appropriate facility.
The cleaned flue gas is finally released into the atmosphere through the twin stack.

The whole process is under continuous control to ensure optimum combustion, low emissions, overall efficiency, and improved quality of the residual materials.

Turning waste into a resource.
The superheated steam is expanded in the steam condensing turbine. The produced electricity is fed into the national grid after plant service power is drawn.
The Newhaven Energy Recovery Facility is designed to export around 16.5 megawatts of electricity, which is equivalent to powering more than 25,000 homes.

Newhaven / UK Energy-from-Waste Plant

Hitachi Zosen INOVA

Hitachi Zosen Inova AG | Hardturmstrasse 127 | P.O. Box 680 | 8037 Zurich | Switzerland
T +41 44 277 11 11 | F +41 44 277 13 13 | info@hz-inova.com | www.hz-inova.com

General project data	Owner and operator	Veolia ES South Downs Ltd
	Start of operation	2011
	Total investment	EUR 260 million
	Scope of Hitachi Zosen Inova AG	General contractor in consortium with Hochtief UK for civil works
	Plant design	Hitachi Zosen Inova AG
Technical data	Annual capacity	226,000 t/a
	Number of trains	2
	Throughput per train	14.5 t/h (nom)
	Calorific value of waste	7.0 MJ/kg (min) – 12.5 MJ/kg (max)
	Thermal capacity per train	35.85 MW
	Waste type	Municipal solid waste, clinical waste
	Special waste fractions	Clinical waste max. 10 %
Combustion system	Grate type	Hitachi Zosen Inova grate
	Grate design	2 rows with 5 zones per row
	Grate size	Length: 10.26 m, width: 4.8 m
	Grate cooling	Air-cooled
Boiler	Type	Four-pass boiler, horizontal
	Steam quantity per train	43.5 t/h
	Steam pressure	50 bar
	Steam temperature	400 °C
	Flue gas outlet temperature	190 °C
Flue gas treatment	Concept	SNCR, semi-dry system
	Flue gas volume per train	68,000 m³/h
Energy recovery	Type	Extraction-condensation turbine
	Electric power output	19.25 MW
Residue treatment	Concept	Metal separation
Residues	Bottom ash	55,725 t/a
	Flue gas treatment	3,350 t/a

2.3 Riverside (UK)

2.3.1 General plant information

Table 2.5 provides the general plant information for the Riverside EfW plant in the United Kingdom.

Table 2.5: Riverside (UK) general plant information

Plant component	Description
Typical waste composition	MSW, C&I mixture
Basic plant capacity information	585ktpa, Three lines, 3 x 31.8tph
Commencement of operations	2011
Basic plant boiler & FGT	HZI reciprocating grate Recirculating flue gas SNCR utilising aqueous ammonia Semi-dry CFB reactor utilising lime & PAC (for description refer to Appendix A)
Emissions standard met	IED 2010/75/EU (EC, 2010)
Design changes required for BREF 2019 emissions	NOx:- DyNOR system (for description refer to Appendix A) Acid gases:- increased consumption of reagents, option to use sodium bicarbonate in lieu of lime. The acid gas loading of the raw flue gas will need to be assessed to finalise the optimum design.
Emissions reports available	For continuous emissions reports 2017 – 2020, refer to Appendix D. For periodic sampling results, these can be seen within the Riverside Annual Performance Reports in Appendices D2 & D3.

2.3.2 Continuously monitored emissions reported results

The Riverside EfW publicly reported continuously monitored emissions values provided in Appendix D are summarised in Table 2.6 below for the four pollutants for which BREF 2019 has more onerous requirements than IED 2010; these are NOx, HCl, SO_2 and particulates. The annual averages of the monthly half-hourly averaged emissions are compared to the present day Environmental Permit limits (which are in turn based on the IED 2010/75/ EU (EC, 2010) limits).

Table 2.6: Riverside EfW publicly reported monitored emissions summary

Year	Annual average of reported daily emissions (mg/Nm^3)							
	NOx		HCl		SO_2		Particulates	
	Limit	Annual average emission	Limit	Annual average emission	Limit	Annual average emission	Limit	Annual average emission
2020 (to date)	200	179.6	10	4.1	50	3.9	10	4.6
2019		180.2		5.5		3.5		5.1
2018		179.8		6.1		1.7		2.6

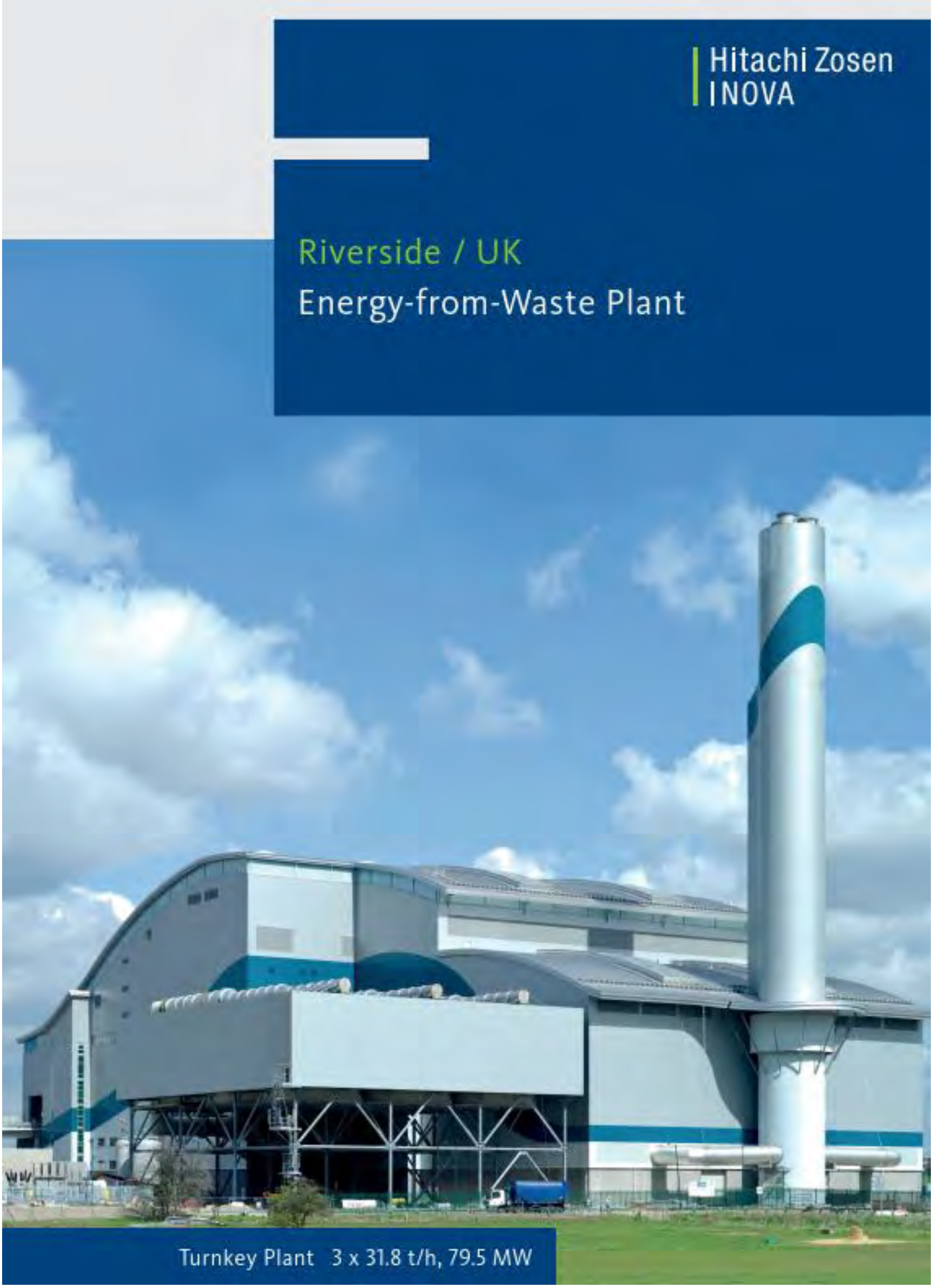
2017		180.6		7.4		5.9		2.3

The NOx and HCl emissions would need to be reduced to achieve compliance consistently with BREF 2019 and the approach to achieving this is as described in the General plant information table above.

It is assessed that present designs are capable of achieving the BREF 2019 guidelines for heavy metals.

2.3.3 Plant supplier's information

The plant supplier was Hitachi Zosen Innova (HZI). The information provided by HZI below includes a schematic of the EfW plant grate, boiler and FGT utilising a semi-dry circulating fluidised bed (CFB) reactor. Also provided are some general and technical data of the plant.


Hitachi Zosen
INOVA
Riverside / UK
Energy-from-Waste Plant
Turnkey Plant 3 x 31.8 t/h, 79.5 MW

Riverside / UK Energy-from-Waste Plant

Riverside resource recovery facility – a successful end to a long road to an integrated waste management solution for London.

The Riverside energy-from-waste plant at Belvedere in the London borough of Bexley is Hitachi Zosen Inova's most recent reference project in the UK. With an average annual capacity of 585,000 tonnes, it will be an important strategic river-served waste management facility for London, helping the capital to manage its own waste, keeping over 100,000 HGVs off the capital's congested roads each year and making a real contribution to London's ability to meet its landfill diversion targets while at the same time producing electricity for more than 66,000 homes.

The project is successfully being developed by Cory Environmental after achieving planning in 2006 followed by a two-stage tender process, which Hitachi Zosen Inova AG could secure in early 2007. The second stage consisted of an open book tender process for the civil works in cooperation with the client. With the decision on the civil sub-contractor at the end of 2007, financial close was later achieved on 31st July 2008. The facility will be owned and operated by Riverside Resource Recovery Ltd, a subsidiary of Cory Environmental. Hitachi Zosen Inova AG has assumed in the role of an EPC contractor. Moreover O&M services are part of Hitachi Zosen Inova AG's delivery, which gave funders comfort with regard to a safe start-up of the plant and a smooth continuation into the operational phase. Construction start was in 2008 and the hot commissioning phase is about to be completed.

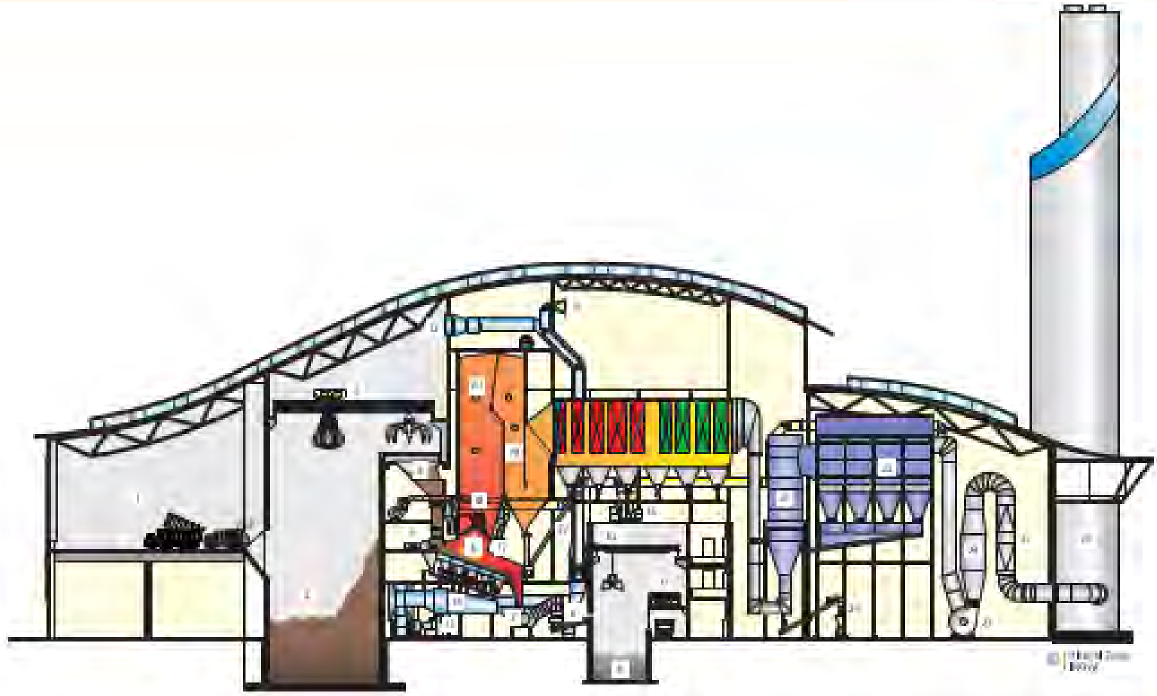
Renewable energy for UK's capital.

As with Hitachi Zosen Inova's reference in Paris, the Isséane energy recovery plant, the Riverside energy-from-waste facility is another example of an Energy Recovery concept in one of the major capitals in Europe. Both projects prove today's careful consideration with regard to integration and environmentally friendly concepts, not only through safe operation but also security in fulfilment of emissions legislation. Moreover, the focus is energy recovery and the Riverside facility is the only energy-from-waste plant in Europe which is obliged to reach a net electrical efficiency of 27%. The plant is expected to exceed this limit by implementing multiple recovery technologies as well as high steam conditions. Since the plant is also located in a developing area, the water-steam cycle of the plant was designed for future possible heat off-take for local district heating schemes. The Hitachi Zosen Inova AG expertise with such highly complex process designs was a key element for its selection as EPC contractor.

The technical set-up for safe and economical energy recovery.

After various materials have been separated for recycling (in a new 85ktpa MRF currently under construction) via kerbside recycling schemes and the network of Household Waste Recycling Sites, the residual waste can be delivered to the plant. Only 15% of the waste will be delivered to the site directly by lorries. The remaining 85% of the waste is delivered to the site by barges. At the jetty, the containers are unloaded onto lorries, which will then tip-off the residual waste into a bunker within the waste reception hall. The waste is thoroughly mixed in the bunker by a crane and then fed into one of the feed hoppers of the three process trains. Each train has a four-pass boiler with a thermal capacity of 79.5 MW. The waste passes down a feed chute onto the four-row Hitachi Zosen Inova grate. The moving grate mixes and agitates the waste to allow an optimal burnout of the diverse waste fractions. In addition to this, a fully integrated control system allows for continuous adjustments of combustion conditions for the safest and most efficient operation possible. The process reduces the waste volume received by up to 90%. The burnt out ash passes through the ash discharger onto an ash handling system.

Hitachi Zosen INOVA



Waste receiving and storage

1 Tipping hall
2 Waste pit
3 Waste crane

Combustion and boiler

4 Feed hopper
5 Ram feeder
6 Hitachi Zosen Inova grate
7 Bottom ash discharger
8 Bottom ash conveyor
9 Bottom ash pit
10 Bottom ash crane
11 Bottom ash loading station
12 Primary air intake
13 Primary air fan
14 Primary air distribution
15 Secondary air intake
16 Secondary air / flue gas gas recirculation fan
17 Secondary air / flue gas recirculation injection
18 Start-up burner
19 Four-pass boiler

Flue gas treatment

20 SNCR injection levels
21 Semi-dry reactor
22 Fabric filter
23 Induced draft fan
24 Silencer
25 Condensate preheater
26 Stack

Residue handling and treatment

27 Ash conveying system
28 Residue conveying system

The bottom ash is loaded into special containers, which will be further transported by barges, using the same system of water transport as the waste when being delivered to the facility. All these processes take place within enclosed areas. The bottom ash is sent for processing and reuse within the construction industry, for cover material or for disposal. By means of a metal separation process, ferrous and nonferrous material is also gained for recycling purposes.

Pyrolytic gas produced in the combustion process pass is mixed with secondary air and recirculated flue gas, which are injected tangentially at high velocity into the secondary combustion chamber above the grate, resulting in intensive mixing and the complete burnout of the pyrolytic gas. This is a first step in reducing emission levels. In parallel, the NOx-levels are maintained by means of Selective Non-Catalytic Reduction. The raw gas then passes through a water tube boiler where it is cooled while the water of the closed water-steam cycle is superheated. The superheated steam is then expanded by means of a turbo-generator. As a result, electricity is produced to supply the facility thereby allowing island operation as well as the export for over 90% of the produced energy to the national grid.

The energy recovery concept of the facility is also designed for potential off-take of steam or hot water for district heating purposes for future developments.

After leaving the horizontal last pass of the boiler and having extracted as much energy as possible by still maintaining sufficient temperature levels for efficient and reliable removal of pollutents, the cleaning takes place in the semi-dry system consisting of a reactor in combination with a fabric filter. The well proven semi-dry system technology keeps the plant in safe compliance with the Emission limits of the European Union by operating below them.

As reagents, lime and activated carbon are used for the removal of gaseous pollutants, including heavy metals and dioxins. Small particles are separated in the fabric filter. The facility is also prepared to be operated with bicarbonate as the reagent in the event that this would prove to be suitable in the future.

The residues resulting from the flue gas treatment are then either recycled (in the case of bicarbonate) or sent for safe disposal by an appropriate facility. The cleaned flue gas is finally released into the atmosphere through the stack.

Hitachi Zosen Inova AG
Hardturmstrasse 127
P.O. Box 680
8037 Zurich
Switzerland

Phone +41 44 277 11 11
Fax +41 44 277 13 13
info@hz-inova.com
www.hz-inova.com

Hitachi Zosen INOVA

Riverside / UK Energy-from-Waste Plant

General project data		
	Owner and operator	Riverside Resource Recovery Ltd., subsidiary of Cory Environmental
	Start of operation	2011
	Total investment	EUR 400 million
	Scope of Hitachi Zosen Inova AG	General contractor for entire plant, including civil works and jetty
	Plant design	Hitachi Zosen Inova AG
Technical data		
	Annual capacity	585,000 t/a
	Number of trains	3
	Throughput per train	31.8 t/h
	Calorific value of waste	7.0 MJ/kg (min), 13 MJ/kg (max)
	Thermal capacity per train	79.5 MW
	Waste type	Domestic solid waste
Combustion system		
	Grate type	Hitachi Zosen Inova grate R-100104
	Grate design	4 rows with 5 zones per row
	Grate size	Length: 10.25 m, width: 10.40 m
	Grate cooling	Air-cooled
Boiler		
	Type	Four-pass boiler, horizontal
	Steam quantity per train	96.5 t/h
	Steam pressure	72 bar
	Steam temperature	427°C
	Flue gas outlet temperature	190°C
Flue gas treatment		
	Concept	SNCR, semi-dry system
	Flue gas volume per train	170,000 m³/h
Energy recovery		
	Type	Extraction-condensation turbine
	Electric power	65 MW at 100%
Residues		
	Bottom ash	146,250 t/a
	Flue gas treatment	10,015 t/a
Special features		
	Waste deliveries	By barges via the river Thames
	Bottom ash transport	By barges

3. FGT plants using CNIM-LAB loop reactor technology

3.1 Battlefield (UK)

3.1.1 General plant information

Table 3.1 provides the general plant information for the Battlefield EfW plant in the United Kingdom.

Table 3.1: Battlefield (UK) general plant information

Plant	Description
Typical waste composition	MSW, small quantity of C&I
Basic plant capacity information	102ktpa, Single line 1 x 12tph
Commencement of operations	2015
Basic plant boiler & FGT	CNIM-Martin reverse acting grate Recirculating flue gas SNCR utilising urea injection Dry system, VapoLAB with LABLoop reactor utilising lime & PAC (for supplier's brochure refer to Appendix A.4)
Emissions standard met	IED 2010/75/EU (EC, 2010)
Design changes required for BREF 2019 emissions	NOx: advanced system with improved control system and increased number of reagent injection points. Acid gases: increased consumption of reagents, option to use sodium bicarbonate in lieu of lime. The acid gas loading of the raw flue gas will need to be assessed to finalise the optimum design.
Emissions reports available	For continuous emissions reports 2017 – 2020, refer to Appendix E. For periodic sampling results, these can be seen within the Battlefield Annual Performance Reports in Appendices E2 & E3

3.1.2 Continuously monitored emissions reported results

The Battlefield EfW publicly reported continuously monitored emissions values provided in Appendix E are summarised in Table 3.2 below for the four pollutants for which BREF 2019 has more onerous requirements than IED 2010; these are NOx, HCl, SO_2 and particulates. The annual averages of the monthly half-hourly averaged emissions are compared to the present day Environmental Permit limits (which are in turn based on the IED 2010/75/ EU (EC, 2010) limits).

Table 3.2: Battlefield EfW publicly reported emissions summary

Year	Annual average of reported daily emissions (mg/Nm^3)							
	NOx		HCl		SO_2		Particulates	
	Limit	Annual average emission	Limit	Annual average emission	Limit	Annual average emission	Limit	Annual average emission
2020 (to date)	200	172.0	10	5.2	50	18.8	10	0.3
2019		172.8		6.3		22.8		0.3

2018		171.8		6.4		16.2		0.4
2017		171.5		3.3		29.1		1.1

The NOx, HCl and SO_2 emissions would need to be reduced to achieve compliance consistently with BREF 2019 and the approach to achieving this is as described in the General plant information table above.

It is assessed that present designs are capable of achieving the BREF 2019 guidelines for heavy metals.

3.1.3 Plant supplier's information

The plant supplier was Constructions Industrielles de la Mediterranee (CNIM), with the flue gas treatment provided by LAB (a CNIM subsidiary).

Please refer to Section 3.2 (Leeds EfW) for a description of the EfW thermal treatment and flue gas cleaning processes as the plant design is very similar and using CNIM/LAB technology.

3.2 Leeds (UK)

3.2.1 General plant information

Table 3.3 provides the general plant information for the Leeds EfW plant in the United Kingdom.

Table 3.3: Leeds (UK) general plant information

Plant component	Description
Typical waste composition	MSW, small quantity of C&I
Basic plant capacity information	164ktpa, Single line 1 x 20.5tph
Commencement of operations	2016
Basic plant boiler & FGT	CNIM-Martin reverse acting grate Recirculating flue gas SNCR utilising urea injection Dry system, SecoLAB with LABLoop reactor utilising lime & PAC (for supplier's brochure refer to Appendix A.4)
Emissions standard met	IED 2010/75/EU (EC, 2010)
Design changes required for BREF 2019 emissions	NOx:- advanced system with improved control system and increased number of reagent injection points. Acid gases:- increased consumption of reagents, option to use sodium bicarbonate in lieu of lime. The acid gas loading of the raw flue gas will need to be assessed to finalise the optimum design.
Emissions reports available	For continuous emissions 2017 – 2020, refer to Appendix F. For periodic sampling results, these can be seen within the Leeds Annual Performance Reports in Appendices F2 & F3

3.2.2 Continuously monitored emissions reported results

The Leeds EfW publicly reported continuously monitored emissions values provided in Appendix F are summarised in Table 3.4 below for the four pollutants for which BREF 2019 has more onerous requirements than IED 2010; these are NOx, HCl, SO_2 and particulates. The annual averages of the monthly half-hourly averaged emissions are compared to the present day Environmental Permit limits (which are in turn based on the IED 2010/75/ EU (EC, 2010) limits).

Table 3.4: Leeds EfW publicly reported monitored emissions summary

Year	Annual average of reported daily emissions (mg/Nm^3)							
	NOx		HCl		SO_2		Particulates	
	Limit	Annual average emission	Limit	Annual average emission	Limit	Annual average emission	Limit	Annual average emission
2020 (to date)	200	176.0	10	5.5	50	42.1	10	0.5
2019		175.5		5.5		40.9		0.9
2018		173.4		4.4		24.7		0.4
2017		160.5		6.3		25.3		0.3

The NOx, HCl and SO_2 emissions would need to be reduced to achieve compliance consistently with BREF 2019 and the approach to achieving this is as described in the General plant information table above.

It is assessed that present designs are capable of achieving the BREF 2019 guidelines for heavy metals.

3.2.3 Plant supplier's information

The plant supplier was Constructions Industrielles de la Mediterranee (CNIM), with the flue gas treatment provided by LAB (a CNIM subsidiary). The overall EfW thermal treatment process is described by the schematic diagram show in Figure 3.1 below.

The flue gas treatment process is described by the schematic diagram shown on Figure 3.2.

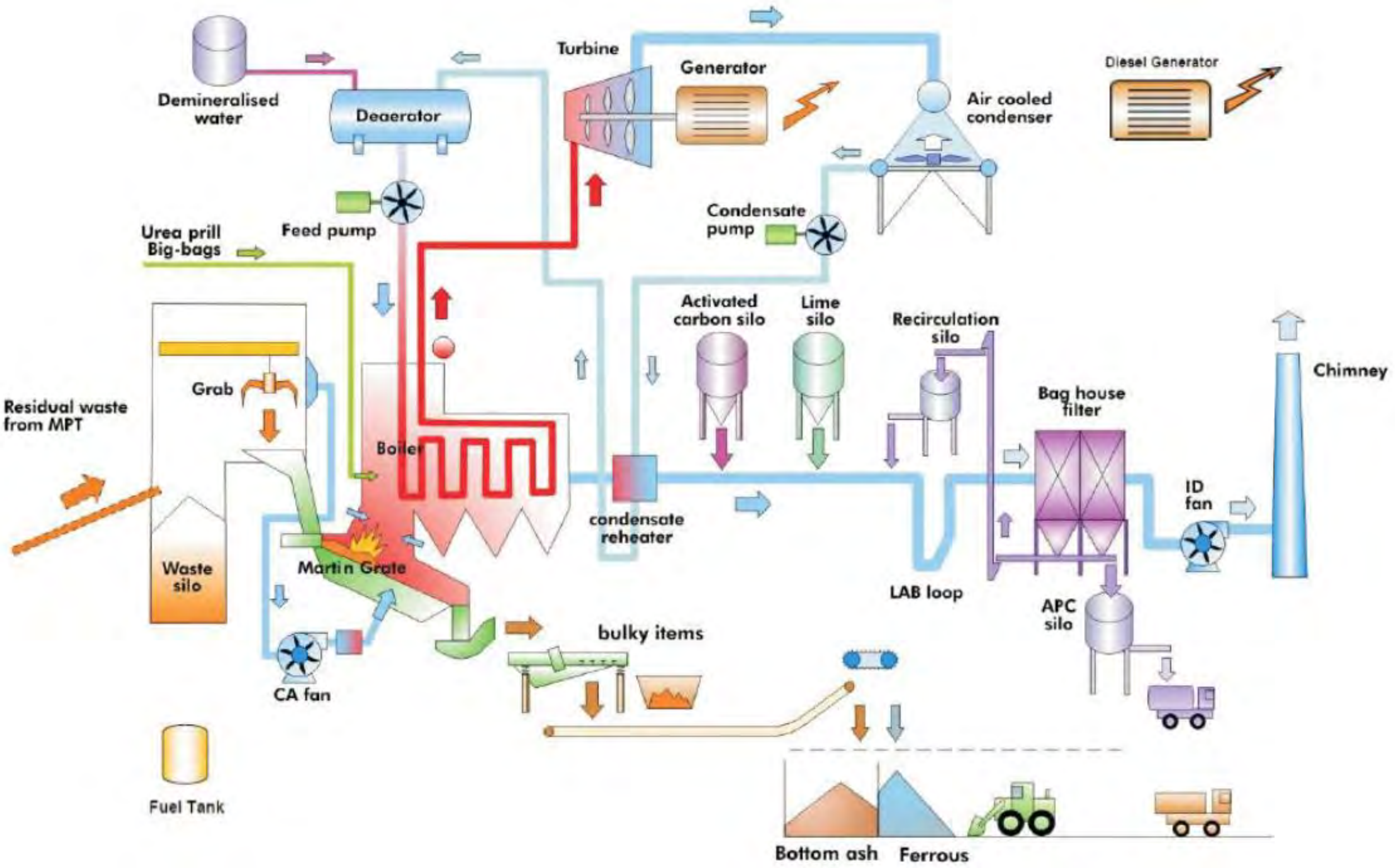


Figure 3.1: EfW thermal treatment process schematic

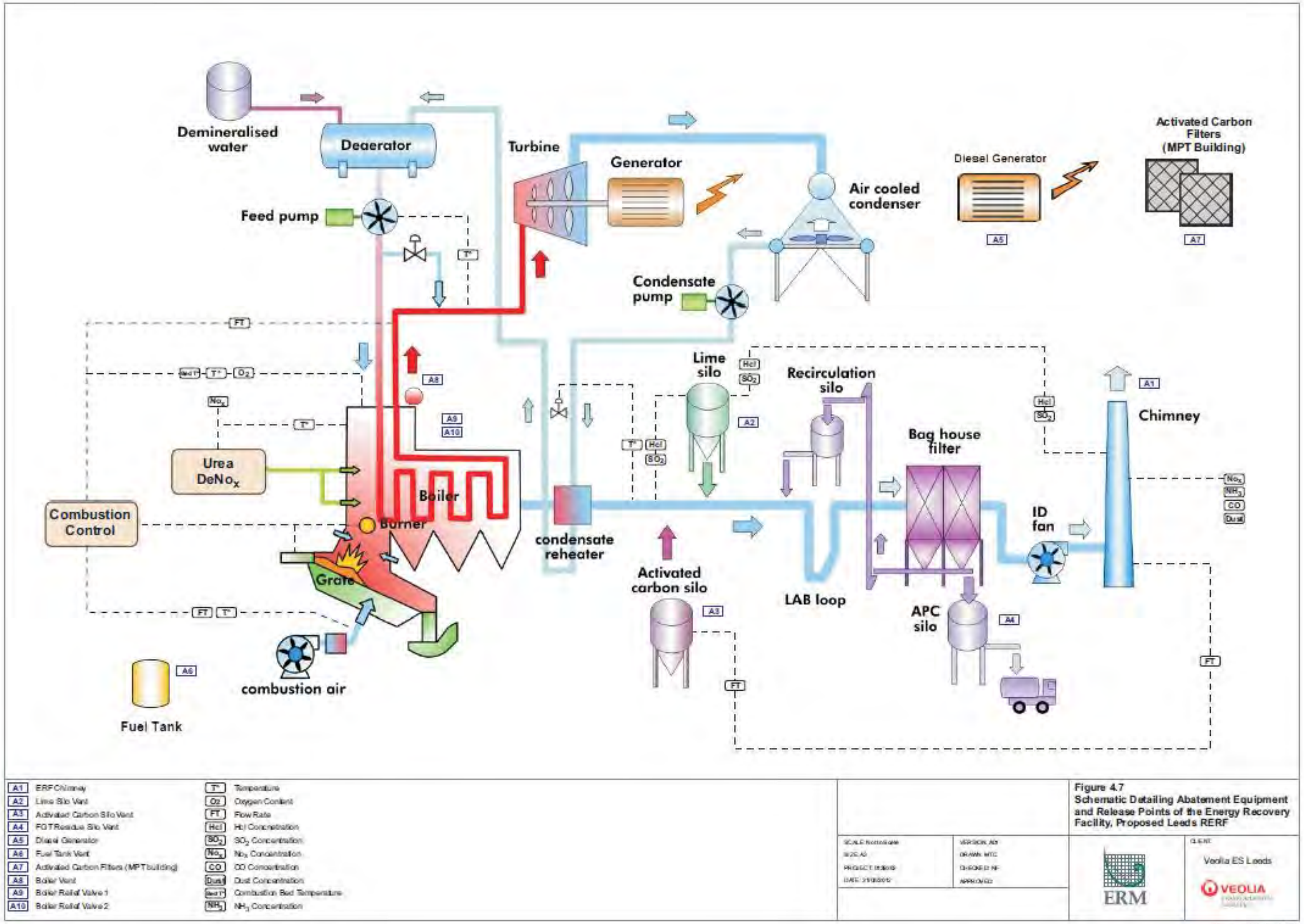


Figure 3.2: Flue gas treatment process

3.2.4 NOx reduction system

Reduction of nitrogen oxides is achieved by means of a selective non-catalytic reduction (SNCR) system using dry urea as the reducing agent. The two key parameters that affect the process performance are the flue gas temperature and the reagent distribution. To optimise the NOx reduction, the reagent needs to be distributed within the optimum temperature zone of the boiler/furnace assembly. The injection and feed rate are adjusted according to the furnace operating conditions. Duty and standby urea injection systems are provided. The whole of the installation is controlled from an electrical control and distribution cabinet. The final choice of urea injection levels and positions is made during commissioning and fine tuning at the site.

3.2.5 Acid gases treatment

The treatment of acid gases (HCl, HF and SO_2) consists of neutralising them by the addition of a dry alkaline reagent (e.g. hydrated lime). In the dry process the alkaline reagent is injected into the flue gases to be treated via a pneumatic conveying system. The acid pollutants in the flue gases are neutralised by contact and reaction with the fine particles of the reagent downstream of the injection point in the flue gas ducting and subsequently in the fabric filter.

The flue gases from the boiler outlet pass through the final economiser, where the gas temperature is rapidly reduced to around 140°C - 150°C. The speed of cooling is designed to minimise the reformation of dioxins (which occurs in approximately between 200 –400°C).

The gases leave the final economiser and pass through a reaction duct, into which fresh lime and activated carbon is injected along with recirculated reagents (lime and activated carbon). The fresh reagents are transported from storage silos to the injector by a pneumatic conveyor line and thoroughly mixed with the flue gases in the ducting. After the reaction duct the mixture passes to a downstream fabric filter.

To optimise the utilisation of the reagents some of the residue is collected in a recirculation silo and from there fed back to the injection point. This recirculation system supports diffusion of reaction products within the particles, thereby presenting a more active surface for the HCl/SO_2 when re-injected.

3.2.6 Heavy metals and dioxins treatment

Plants incinerating residual municipal waste also generate small amounts of dioxins, furans and heavy metals in the flue gas. To abate these pollutants, activated carbon is added to the flue gas. Note that whilst a portion of the heavy metals present in the flue gas will condense onto the dry alkaline reagent (lime) used to abate the acid gases; activated carbon is needed to reduce the emissions of mercury to WID limits.

Dioxins, furans and heavy metals present in the gas stream will be adsorbed onto the activated carbon. The activated carbon particles are dry solids which are entrained by the flue gases and separated out by a downstream fabric filter.

3.2.7 Fabric filter

The fabric filter unit comprises compartments each containing several rows of filter bags. These bags are closed at the bottom, open at the top, and are installed over a cage structure that maintains their shape. The bags/cages are fitted into a division plate which separates the inlet and outlet sections of the casing.

The flue gas enters the low part of the casing below the division plate and flows through the bags from the outside to inside with the resultant clean gases emerging from the open top of the bag above the division plate. The particulate matter collects on the outer surface of the fabric filter bags where a layer of particulate matter builds up to form a filter cake.

The pressure drop across the filter bag increases due to build-up of filter cake. This is continuously monitored and controlled so that when it reaches the set point a bag cleaning sequence is automatically initiated.

The filter cleaning operation is performed online by sending a pulse of compressed air down the inside of each bag in a row by row sequence. This causes the filter cake to be released from the surface of the fabric filter and collected in the hopper below. Filter cleaning cycles times are fully adjustable over a wide range of conditions. Manual initiation of filter cleaning is also possible.

Bag failure is detected as an increase in particulates emissions. Individual filter compartments can be systematically isolated to identify the one containing the failed bag(s). During filter maintenance, the isolation of a compartment does not impair the overall performance of the filter unit and the plant will continue to operate within the guaranteed limits.

3.3 Staffordshire (UK)

3.3.1 General plant information

Table 3.5 provides the general plant information for the Staffordshire EfW plant in the United Kingdom.

Table 3.5: Staffordshire (UK) general plant information

Plant component	Description
Typical waste composition	MSW
Basic plant capacity information	340ktpa, Two lines 2 x 20tph
Commencement of operations	2014
Basic plant boiler & FGT	CNIM-Martin reverse acting grate Recirculating flue gas SNCR utilising ammonia injection Dry system, SecoLAB with LABLoop reactor utilising lime & PAC (for supplier's brochure refer to Appendix A.4)
Emissions standard met	IED 2010/75/EU (EC, 2010)
Design changes required for BREF 2019 emissions	NOx:- advanced system with improved control system and increased number of reagent injection points. Acid gases:- increased consumption of reagents, option to use sodium bicarbonate in lieu of lime. The acid gas loading of the raw flue gas will need to be assessed to finalise the optimum design.
Emissions reports available	For continuous emissions 2017 – 2020, refer to Appendix G. For periodic sampling results, these can be seen within the Staffordshire Annual Performance Reports in Appendices G2 & G3.

3.3.2 Continuously monitored emissions reported results

The Staffordshire EfW publicly reported continuously monitored emissions values provided in Appendix G are summarised in Table 3.6 below for the four pollutants for which BREF 2019 has more onerous requirements than IED 2010; these are NOx, HCl, SO_2 and particulates. The annual averages of the monthly half-hourly averaged emissions are compared to the present day Environmental Permit limits (which are in turn based on the IED 2010/75/ EU (EC, 2010) limits).

Table 3.6: Staffordshire EfW publicly reported monitored emissions summary

	Annual average of reported daily emissions (mg/Nm^3)							
Year	NOx		HCl		SO_2		Particulates	
	Limit	Annual average emission	Limit	Annual average emission	Limit	Annual average emission	Limit	Annual average emission
2020 (to date)	200	173.7	10	6.8	50	35.5	10	0.2
2019		175.2		6.8		37.0		0.3
2018		166.8		6.1		31.4		0.1

2017		171.5		1.5		35.8		0.2

The NOx, HCl and SO_2 emissions would need to be reduced to achieve compliance consistently with BREF 2019 and the approach to achieving this is as described in the General plant information table above.

It is assessed that present designs are capable of achieving the BREF 2019 guidelines for heavy metals.

3.3.3 Plant supplier's information

The plant supplier was Constructions Industrielles de la Mediterranee (CNIM), with the flue gas treatment provided by LAB (a CNIM subsidiary). The overall EfW thermal treatment process is described by the schematic diagram shown on Figure 3.3.

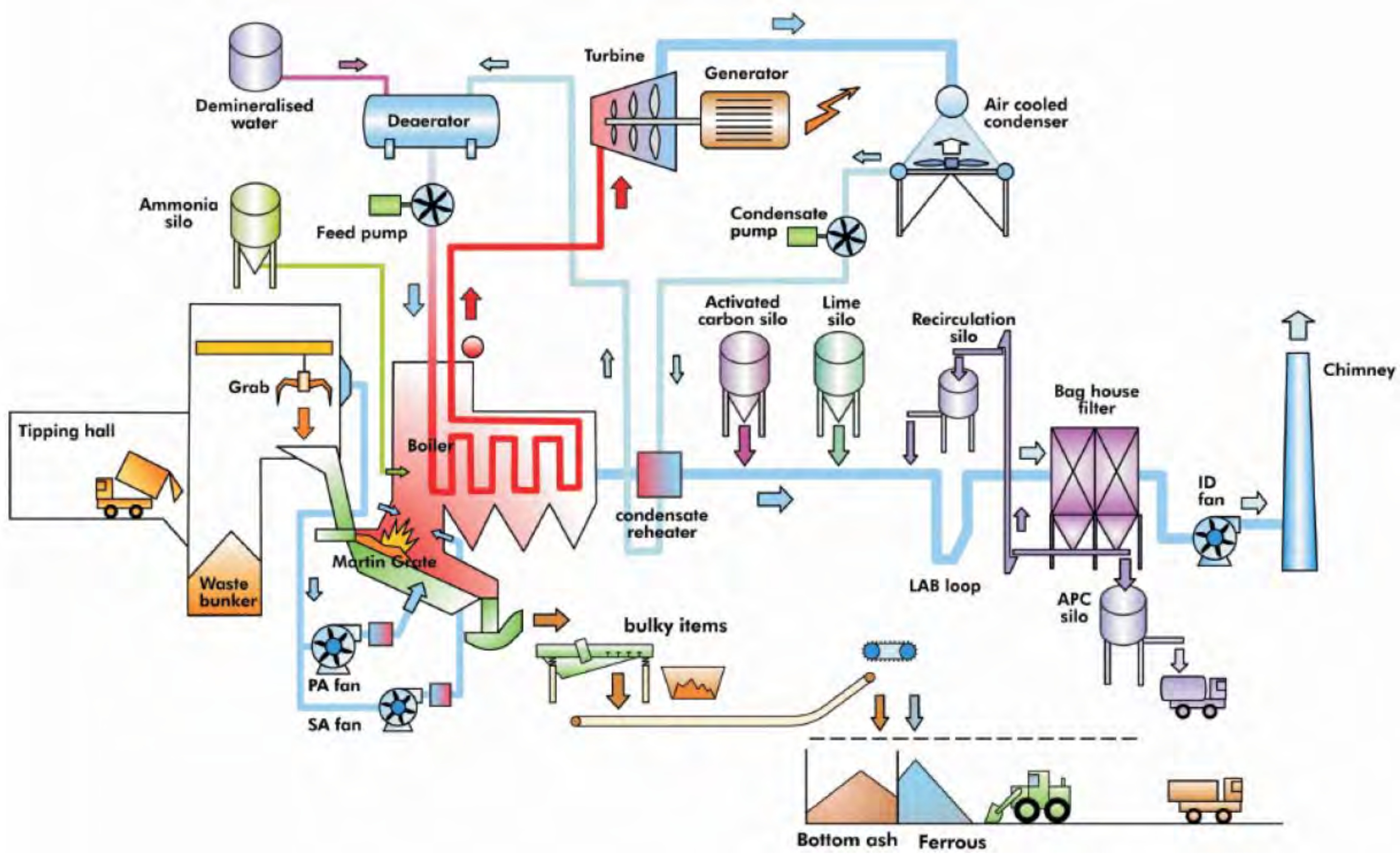


Figure 3.3: EfW thermal treatment process schematic

A description of the flue gas treatment system is as follows:

The flue gas treatment process is described by the Leeds EfW schematic diagram, though for this application using ammonia in lieu of urea for the SNCR process, refer Section 3.2:

3.3.4 NOx reduction system

Reduction of nitrogen oxides is achieved by means of a selective non-catalytic reduction (SNCR) system using ammonia as the reducing agent. The two key parameters that affect the process performance are the flue gas temperature and the reagent distribution. To optimise the NOx reduction, the reagent needs to be distributed within the optimum temperature zone of the boiler/furnace assembly. The injection and feed rate are adjusted according to the furnace operating conditions. Duty and standby ammonia injection systems are provided. The whole of the installation is controlled from an electrical control and distribution cabinet. The final choice of ammonia injection levels and positions is made during commissioning and fine tuning at the site.

3.3.5 Acid gases treatment

The treatment of acid gases (HCl, HF and SO_2) consists of neutralising them by the addition of a dry alkaline reagent (e.g. hydrated lime). In the dry process the alkaline reagent is injected into the flue gases to be treated via a pneumatic conveying system. The acid pollutants in the flue gases are neutralised by contact and reaction with the fine particles of the reagent downstream of the injection point in the flue gas ducting and subsequently in the fabric filter.

The flue gases from the boiler outlet pass through the final economiser, where the gas temperature is rapidly reduced to around 140°C - 150°C. The speed of cooling is designed to minimise the reformation of dioxins (which occurs in approximately between 200 –400°C).

The gases leave the final economiser and pass through a reaction duct, into which fresh lime and activated carbon is injected along with recirculated reagents (lime and activated carbon). The fresh reagents are transported from storage silos to the injector by a pneumatic conveyor line and thoroughly mixed with the flue gases in the ducting. After the reaction duct the mixture passes to a downstream fabric filter.

To optimise the utilisation of the reagents some of the residue is collected in a recirculation silo and from there fed back to the injection point. This recirculation system supports diffusion of reaction products within the particles, thereby presenting a more active surface for the HCl/SO_2 when re-injected.

3.3.6 Heavy metals and dioxins treatment

Plants incinerating residual municipal waste also generate small amounts of dioxins, furans and heavy metals in the flue gas. To abate these pollutants, activated carbon is added to the flue gas. Note that whilst a portion of the heavy metals present in the flue gas will condense onto the dry alkaline reagent (lime) used to abate the acid gases; activated carbon is needed to reduce the emissions of mercury to WID limits.

Dioxins, furans and heavy metals present in the gas stream will be adsorbed onto the activated carbon. The activated carbon particles are dry solids which are entrained by the flue gases and separated out by a downstream fabric filter.

3.3.7 Fabric filter

The fabric filter unit comprises compartments each containing several rows of filter bags. These bags are closed at the bottom, open at the top, and are installed over a cage structure that maintains their shape. The bags/cages are fitted into a division plate which separates the inlet and outlet sections of the casing.

The flue gas enters the low part of the casing below the division plate and flows through the bags from the outside to inside with the resultant clean gases emerging from the open top of the bag above the division plate.

The particulate matter collects on the outer surface of the fabric filter bags where a layer of particulate matter builds up to form a filter cake.

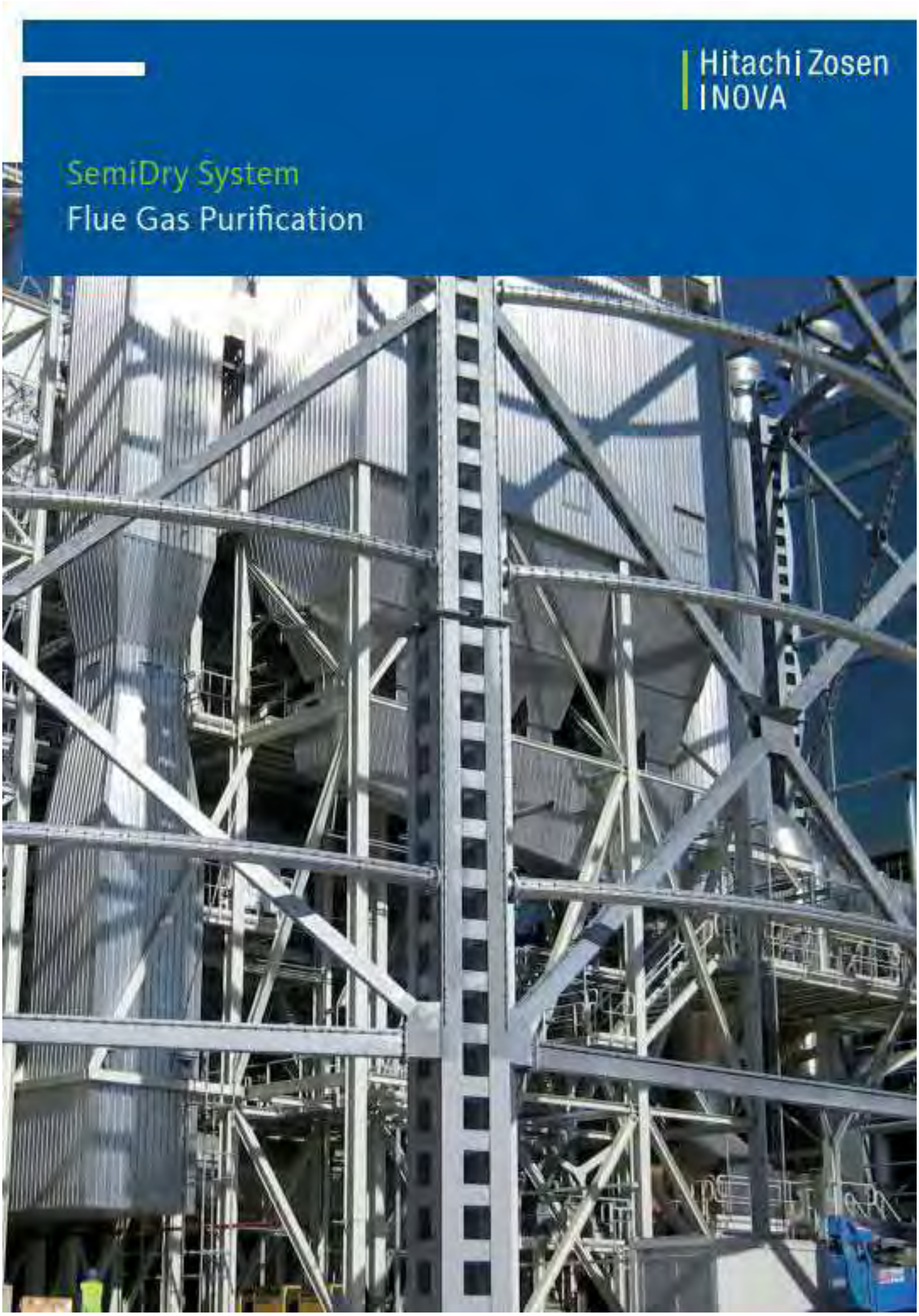
The pressure drop across the filter bag increases due to build-up of filter cake. This is continuously monitored and controlled so that when it reaches the set point a bag cleaning sequence is automatically initiated.

The filter cleaning operation is performed online by sending a pulse of compressed air down the inside of each bag in a row by row sequence. This causes the filter cake to be released from the surface of the fabric filter and collected in the hopper below. Filter cleaning cycles times are fully adjustable over a wide range of conditions. Manual initiation of filter cleaning is also possible.

Bag failure is detected as an increase in particulates emissions. Individual filter compartments can be systematically isolated to identify the one containing the failed bag(s). During filter maintenance, the isolation of a compartment does not impair the overall performance of the filter unit and the plant will continue to operate within the guaranteed limits.

Appendix A. Technology Supplier Equipment Descriptions

A.1 HZI CFB Semi-Dry FGT Brochure



SemiDry system Flue Gas Purification

SemiDry System
Flue Gas Purification.

Less reagent consumption, lower emissions, lower residue levels, zero wastewater.

Emphasizing on Economics and Reliability

When compact design, minimal investment, and compliance with stringent emission standards are crucial, the SemiDry system is the technology of choice for treating flue gases at Energy-from-Waste plants. It goes without saying that high availability and low residue levels are among the assets of this proven process.

Proven Technology

The SemiDry system technology employs the principle of the circulating fluidized bed, which has been used with success for many years in flue gas purification. The process has demonstrated its simplicity and efficiency in a multitude of Energy-from-Waste plants.

Simplicity and Efficiency

Briefly, the SemiDry system process works as follows: Downstream of the combustion section and steam generator, flue gases are channeled directly into the SemiDry reactor without pretreatment. Reagents for separation – hydrated lime or calcined lime and activated carbon – are metered into the stream here, and water is injected at the same time. The temperature drops below 160 °C as a result, improving separation while activating the lime. Pollutants react with the additives in the SemiDry reactor, forming products that can be trapped by the downstream fabric filter.

Low Emissions, Low Residue Levels

The residue collected on the fabric filter is recycled to the SemiDry reactor in order to boost separation efficiency and hold emissions low even when feed gas composition is variable. Recycling also ensures that the reagents are used more than once, so that their consumption is minimized. Since the metering system always delivers the reagents in exactly the right quantity, the SemiDry system process guarantees low emissions, low reagent consumption, and low residue levels.

Reactor (foreground) and fabric filter

Hitachi Zosen INOVA

Two-line SemiDry FGT system erection

Versatility in Process Layout

The SemiDry system can be integrated with other flue gas treatment processes in any desired way. For example, NOx reduction can be effected with an upstream catalyzer or a downstream low-temperature SCR system. Combining the SemiDry system process with a wet scrubber allows a further reduction in emissions and reagent consumption. Most of the pollutants are removed by the SemiDry system unit, while the scrubber acts as a "polishing" stage. The system discharges no waste water because the spent scrubber liquor is recycled to the SemiDry reactor. Depending on the size of the plant, the reactor is equipped with four or six chambers.

Compact Design, Minimal Investment

Equipment volume is minimized due to the simple process design and the optimized interaction of the components. The compactness of the system keeps process investments low and minimizes infrastructure costs.

Low Maintenance, High Availability

The SemiDry system process uses proven apparatus and requires hardly any moving components, so maintenance costs are low. These features, together with generous design margins, guarantee high system availability.

Key Advantages

- It uses proven technology and has a long record of success
- It is an efficient process requiring minimal investment
- Equipment design is compact and retrofitting is simple
- The apparatus is simple and needs minimal maintenance
- Generous design margins lead to high availability
- Reagent consumption and residue levels are low
- Separation efficiency is high and emissions are low
- The system discharges no waste water and is up-gradable as required

SemiDry System Functional Diagram

1 Lime Activated Carbon
2 Water
3 Raw gas
4 Clean gas
5 Recirculation
6 Residues

A.2 HZI DyNOR Brochure

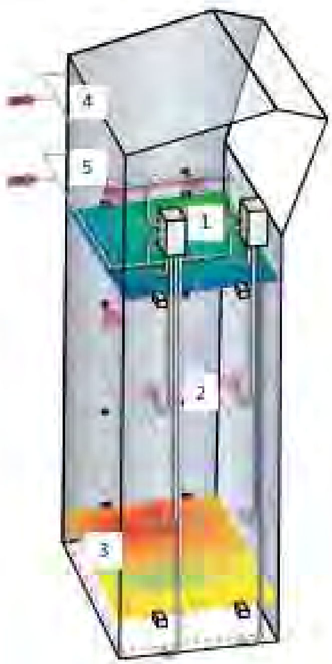
The SNCR Process That Fulfils Europe's Strict Nitrogen Oxide Standards

DyNOR® – The SNCR Process That Fulfils Europe's Strict Nitrogen Oxide Standards

DyNOR® is the answer to Europe's tightened nitrogen oxide limits. Simple in design and easy to install, the non-catalytic DyNOR® process closes the gap between the costly SCR process and the conventional SNCR process. It is an investment that pays off.

The DyNOR® process offers decisive advantages. Harmful nitrogen oxides (NOx) are produced in every combustion process; however, they can be converted into their basic elements – nitrogen and water – through a so-called deNOx process. Developed by Hitachi Zosen Inova engineers, DyNOR® (dynamic NOx reduction) is an improved SNCR process that succeeds in doing what previously was only possible with a SCR process: It reduces nitrogen oxides to very low levels with minimised ammonia slip. With DyNOR®, operators can leverage a moderate investment to benefit from the monetary incentives offered by various European countries.

Virtual segregation of combustion zone into vertical segments, independent temperature measurement and selection of injection level



DyNOR® Functional Diagram

1 DyNOR® distributor
2 Nozzles
3 IR pyrometers
4 Air/steam injection
5 Feed of ammonia water/ urea solution

Your Benefits

Low nitrogen oxide levels with minimal ammonia slip
Successful deployment in several energy-from-waste plants has confirmed the functionality of DyNOR® in full-scale, long-term trials.

Cost reduction
The precise and dynamic DyNOR® process delivers the desired performance with significantly lower investment costs and energy consumption than the SCR process.

Energy efficiency
Minimal atomising media consumption and the elimination of additional dilution water guarantee the highest possible steam production and make DyNOR® the leading SNCR process with respect to energy efficiency.

Minimised maintenance
The use of undiluted reagents allows high nozzle exit velocities and thus prevents fouling at the nozzles.

Simple design
The proven Hitachi Zosen Inova nozzles and the simple design of the DyNOR® distributor account for the system's dependability, cost-effectiveness, and low maintenance requirements.

Simple installation
The simple modular design makes the process ideal for integration in new plants as well as for retrofits in existing ones.

Hitachi Zosen INOVA

Efficiency Thanks to Precisely Interacting Systems

In the SNCR process, the reactant must be injected into the secondary combustion chamber within the optimised temperature range of 850° C to 950° C. Although modern combustion systems react to different waste qualities, it is not possible to totally prevent short-term temperature fluctuations and asymmetries. The key advantage of DyNOR® is that reagents are always injected at the precise right location.

Modular Technology

With DyNOR®, the first pass of the boiler is virtually divided into vertical segments. Each segment is equipped with a DyNOR® module, which consists of a DyNOR® distributor, four injection points (one per level), and an infrared pyrometer. As a rule, four modules are sufficient for medium-sized plants rated at about 40 MW/th.

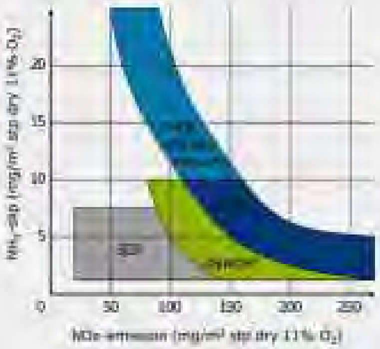
Precise Functionality

An accurately metered amount of reagent, based on NOx emission measurements, is injected via the DyNOR® distributors. The distributors are independently controlled in response to temperature measurements in the respective segments. They ensure the split-second, continuous, spike-free switching across four levels in each segment and the sufficient cooling of the idle nozzles. In this way, the reagent is injected at the right location even in the event of temperature asymmetries.

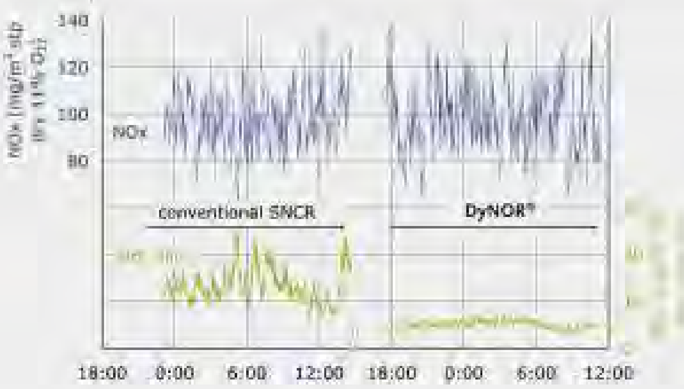
The Answer to Europe's Tightened Nitrogen Oxide Limits

Due to the independent segments and continuous level selection, the full potential of the SNCR process is tapped and very low nitrogen oxide limits are attained with minimal ammonia slip. The patented DyNOR® process thus fulfils the world's strictest nitrogen oxide standards in a reliable and cost-effective manner. Thanks to the simple installation concept, the process is ideal for both retrofits and for integration in new plants.

DyNOR® distributor

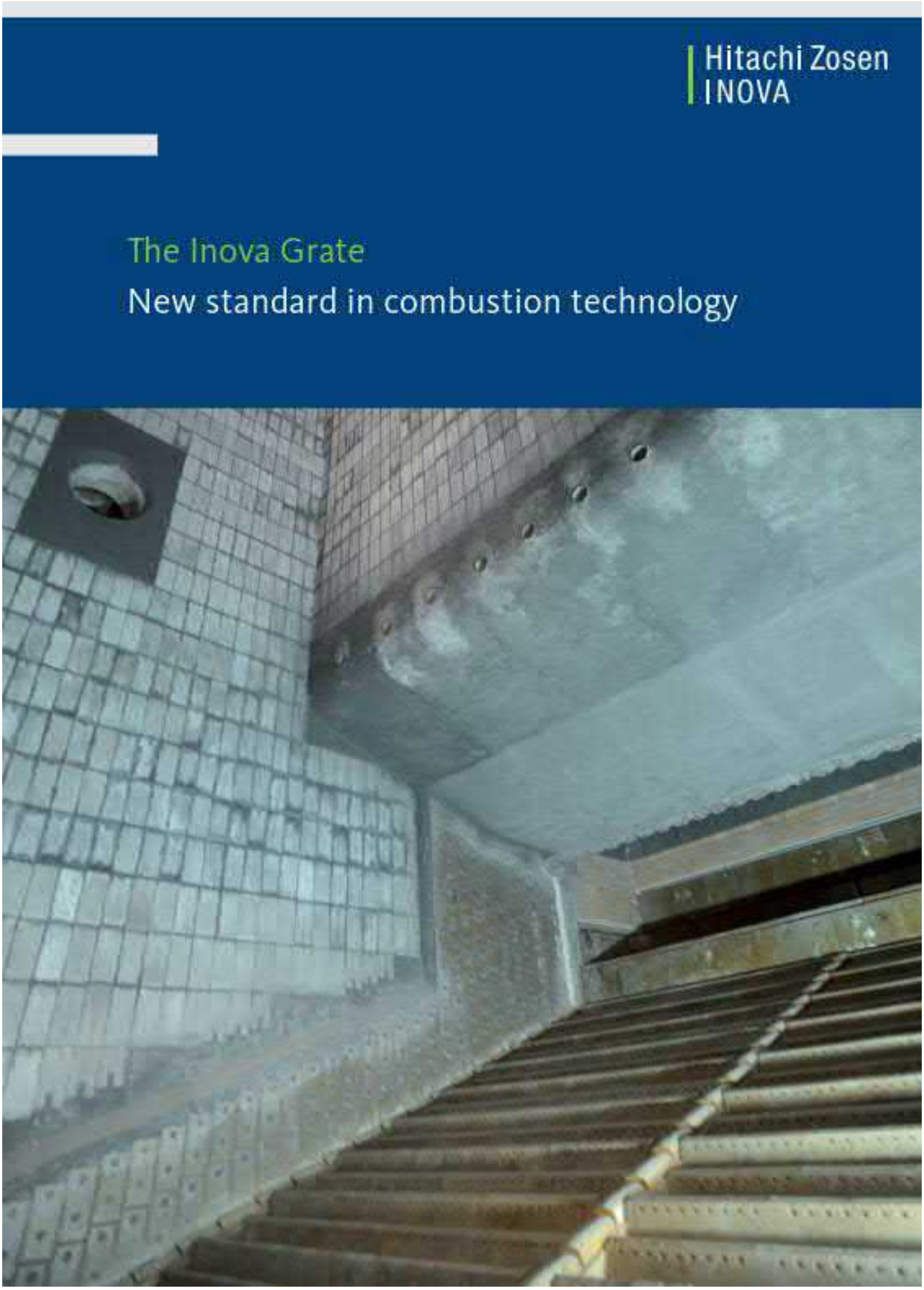


The DyNOR® process closes the gap between the conventional SNCR and the costly SCR process.



Minimised ammonia slip with DyNOR®

A.3 HZI Grate Brochure



The Inova Grate New standard in combustion technology

The Inova Grate – new standard in combustion technology

Designed for superior cost-effectiveness and comprehensive environmental soundness, the latest Hitachi Zosen Inova grate fulfils all customer requirements expected from an efficient, state-of-the-art combustion system for energy-from-waste applications.

Backed by the know-how and decades of experience accrued by the Hitachi Zosen Inova Group's leading combustion specialists, the Inova grate defines the new benchmark in combustion technology for energy-from-waste plants.

The Inova grate: cost-effective, simple and reliable

The Inova grate element: robust and maintenance-friendly

The key enhancements at a glance

Improved cost-effectiveness thanks to optimised design and improved materials

- Improved materials and design modifications to critical wear parts ensure a longer service life, higher availability, and simplified maintenance procedures.
- Longer grate bars result in better space utilisation and simplify access to moving parts. This expedites assembly, maintenance, and service work.
- The smaller inclination angle of the grate reduces the overall height of the structure as well as construction costs.
- Smart assembly procedures make overhaul work easier.

Thanks to these optimisation measures, the Inova grate is a future-oriented, modern and effective high-performance combustion system.

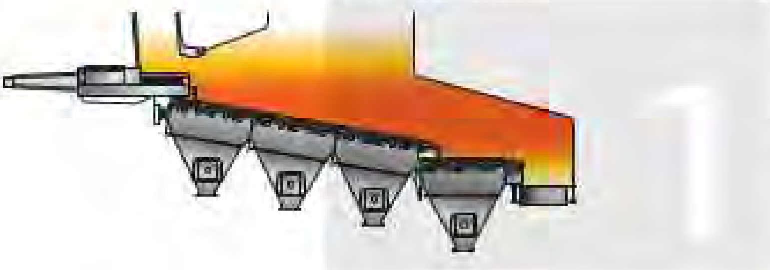
The Inova grate – reliable and stable in operation

The fuel from the waste pit is fed to the combustion chamber via the feed hopper. The ram feeder uniformly distributes the fuel across the four-zone grate. The process steps – drying, ignition, combustion, and burnout – can be controlled separately. Swift adjustment of airflows and grate motion in every zone at all times responds to process fluctuations. The inclination of the grate, the drop-off after the main combustion zone, and the horizontal burnout zone ensure excellent burnout of all waste fractions.

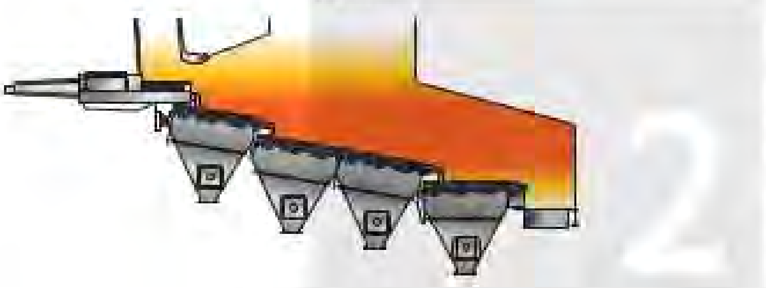
Hitachi Zosen INOVA

Three configurations for optimised burnout

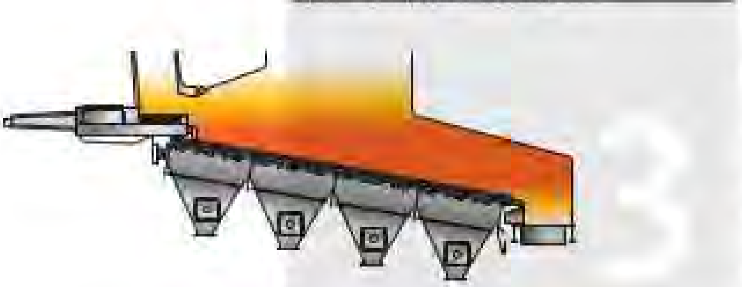
The **basic variant for calorific values between approx. 8 and 14 MJ/kg** consists of three grate zones with an inclination of 10°, followed by a drop-off at the end of the third zone, and a horizontal burnout zone.



If calorific values are low, **ranging from 4.5 to 11 MJ/kg**, a further drop-off between zones 1 and 2 promotes drying and timely ignition.



For **high calorific values between 10 and 18 MJ/kg**, typically found in Refuse Derived Fuel (RDF), the Inova grate is built with a full length inclination of 10°, without drop-offs.



Excellent burnout quality for every fuel quality

The Inova grate is customized so that it can continually guarantee excellent combustion control and burnout quality to match the respective calorific value range.

Three configurations ensure the reliable treatment of fuels with different calorific value. With an inclination of 10° in the drying and main combustion zone as well as the horizontal burnout zone, fuels are continuously conveyed and treated according to the process needs. This results in homogeneous combustion and optimised burnout of different waste qualities.

Combustion is controlled even when fuel compositions fluctuate

Regardless of the quality of the waste, the individually controllable ram feeders ensure consistent fuel bed thickness on the grate resulting in a uniform thermal load on the grate, a more stable combustion process, and a long grate service life.

The selection of the most suitable grate optimises the interaction of ram feeder elements, grate advance speeds, dwell times and stroke lengths, and the distribution of primary and secondary airflows. This guarantees:

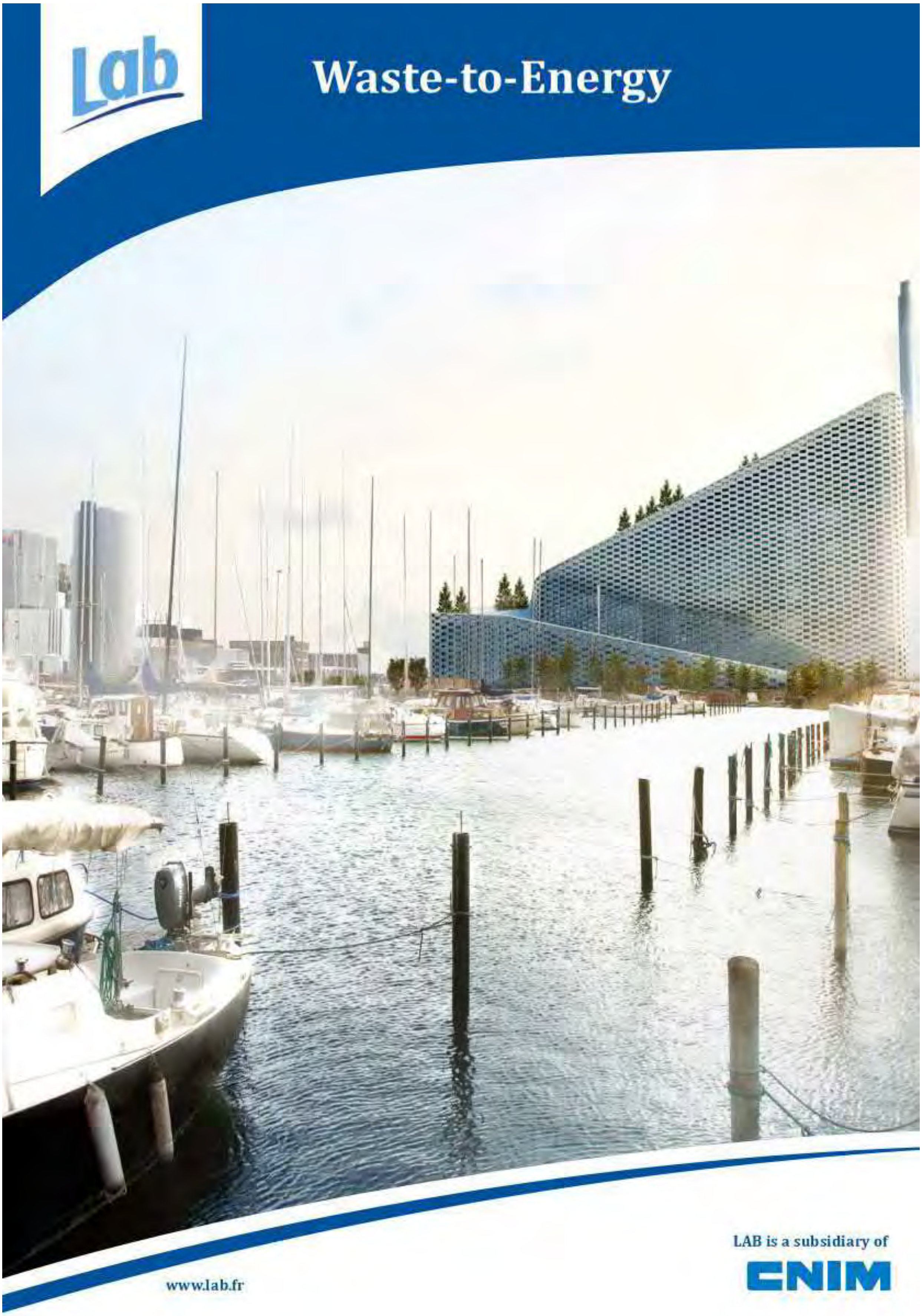
- Smooth plant operation with constant steam production
- Uniform temperature profiles and low NOx generation
- Low local thermal loads
- Excellent bottom ash quality
- Total burnout of flue gas

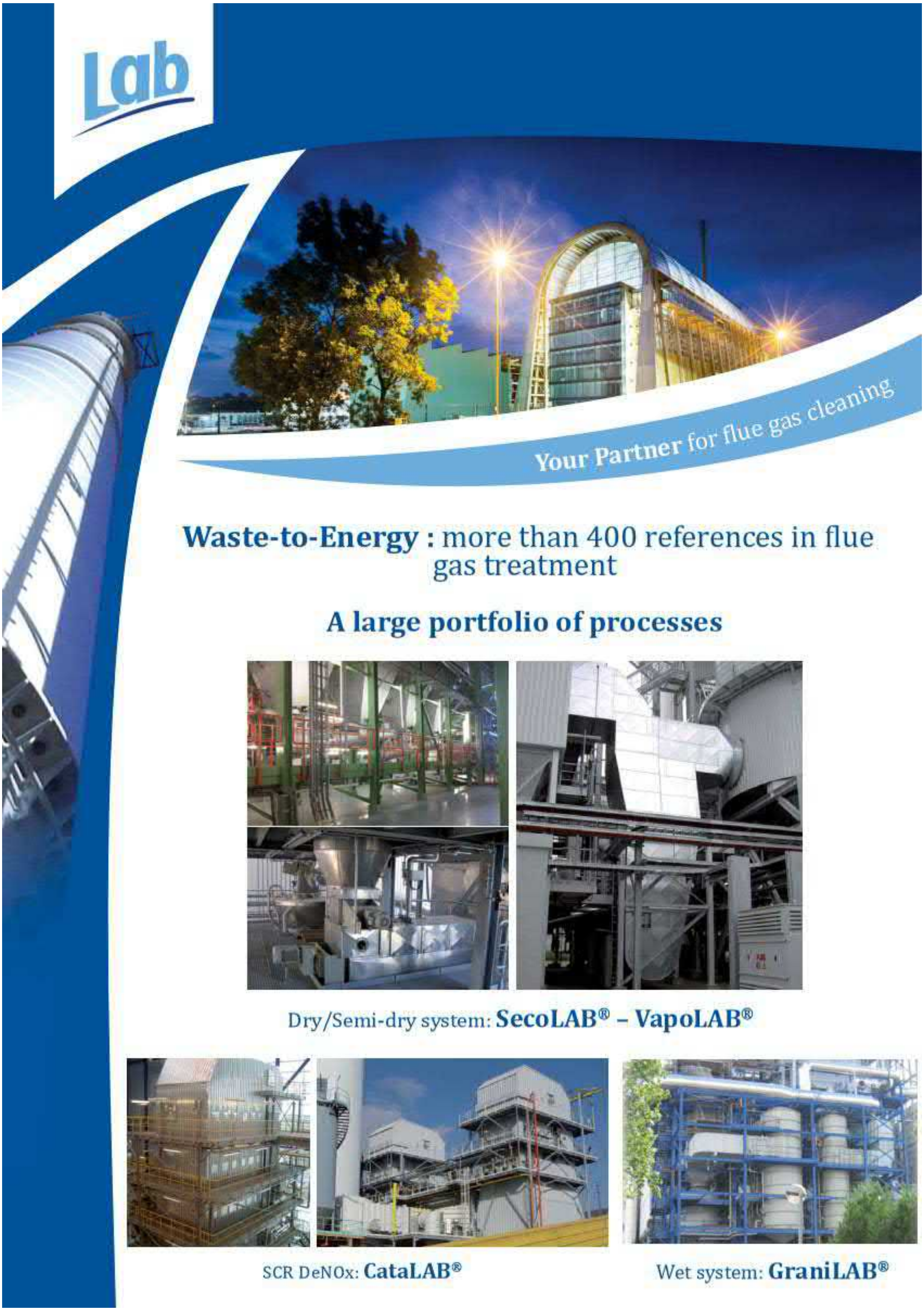
An optional array of pyrodetectors in the roof of the burnout zone monitors the quality of bottom ash and the location of the principal combustion zone on the grate. A computer determines the optimum combination of process interventions to consistently ensure high bottom ash quality.

Flexible grate cooling optimises operating costs

Depending on the requirements, the grate is either air-cooled or configured for combined water/air cooling. While the air-cooled grate is adequate for low calorific values, water-cooled grate elements in the first two zones ensure more precise process control for high calorific values, resulting in a longer service life. The coolant piping is optimally integrated into the design of the grate.

A.4 LAB VapoLAB Brochure




Lab
Your Partner for flue gas cleaning
Waste-to-Energy : more than 400 references in flue gas treatment
A large portfolio of processes
Dry/Semi-dry system: SecoLAB® – VapoLAB®
SCR DeNOx: CataLAB®
Wet system: GraniLAB®

VapoLAB® : an innovative high performance dry system developed and patented by LAB

25 LINES BUILT IN THE LAST 7 YEARS

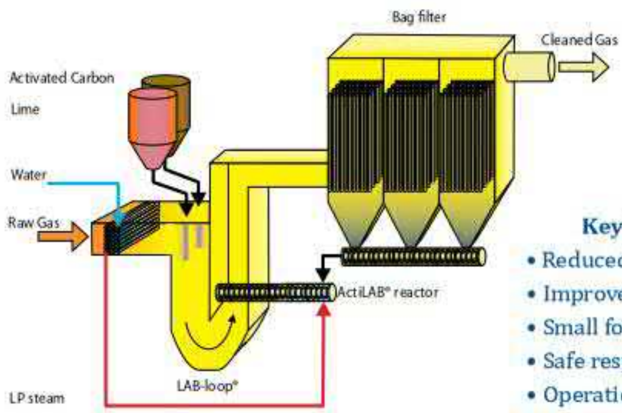
VapoLAB® is a conditioned dry sorption process comprising 3 steps:

Flue gas cooling
A steam generator / water heater is located in the flue gas ducts upstream the **LAB-loop** reactor and bag house filter

Residues reactivation
The generated steam is put in contact with the recirculated unused reagent in the ActiLAB® reactor boosting the reagent activity

Residues recycling
Reactivated residues are reinjected in the LABLoop® reactor

BEDDINGTON / Viridor - UK	2 x 18 tph
LEUNA / MVV Umwelt - GE	2 x 25 tph
WILTON / Suez – UK	2 x 31 tph
SHROPSHIRE / Veolia - UK	1 x 12 tph
HELSINKI / Vantaan Energia Oy – FI	2 x 20 tph
BRIVE / Syctom 19 - FR	3 x 3 tph
TEESSIDE / Sita - UK	2 x 10 tph



Key benefits of VapoLAB®

- Reduced operating cost (low stoichiometric ratio)
- Improved energy recovery
- Small footprint
- Safe respect of emission limits
- Operation with quick or hydrated lime

For over sixty years LAB has been designing and building **turnkey Flue Gas Cleaning (FGC)** covering three main activities : **Waste**, **Power / Biomass** and **Marine Industry**.

Offering state-of-the-art turnkey solutions, LAB has joined the Environment Division of **CNIM** in 2001. **200** highly skilled specialists & engineers work all over the world, and LAB is **ISO** and **OHSAS** quality certified.

LAB devotes considerable efforts in **R&D** offering the complete portofolio of advanced **Flue Gas Cleaning (FGC)** systems from dry to semi-dry and wet technologies including catalytic systems and condensation units, thanks to numerous patents.

LAB **Air Pollution Control (APC)** expertise is backed up by more than **400 lines in Waste to Energy** application being **number 1 in Europe** for the Flue Gas Treatment with more than **20 % of the market share**.

LAB is very active in the **most stringent countries** like Scandinavia, Switzerland, the Netherlands and well implemented in large countries like Germany, France, and UK.

Waste-to-Energy lines fitted with LAB FGC represent an equivalent of waste coming from more than **150 Million** inhabitants.

Address : LAB - 259 Avenue Jean Jaures – 69007 LYON - FRANCE
Phone : + 33 (0)4 26 23 36 00 www.lab.fr Linkedin
Contact : lab@lab.fr

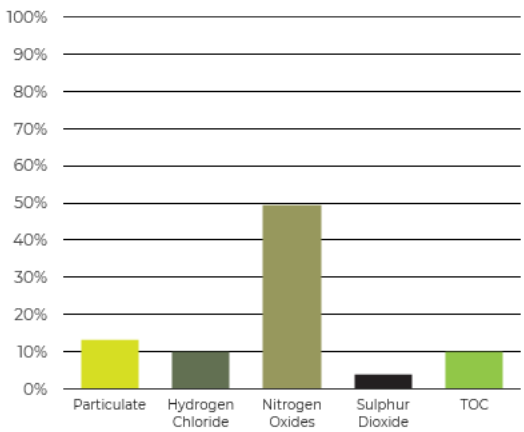
Appendix B. Greatmoor EfW emissions data

B.1 2020 Emissions

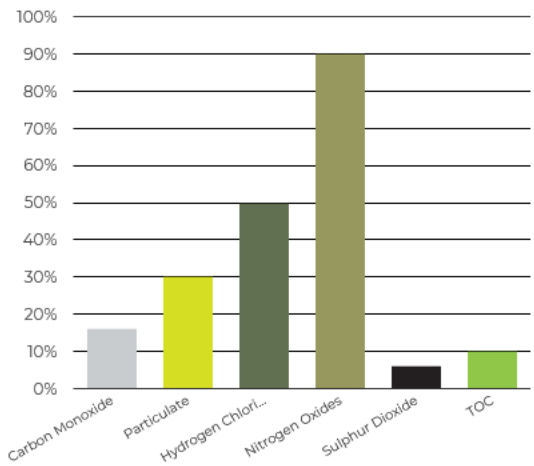
1. <u>Publicly reported continuously monitored emissions reports</u>

January 2020

Maximum Emission as a % of ½ hour ELV January 2020

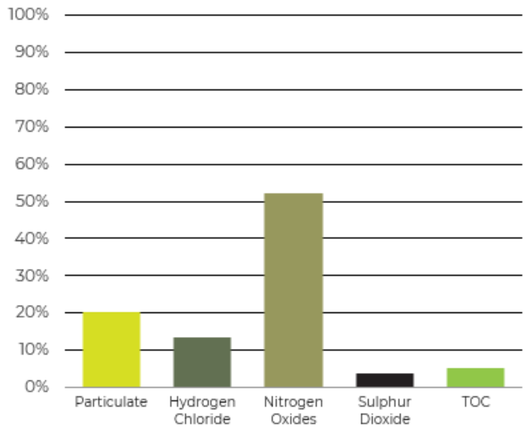


Maximum Emission as a % of Daily ELV January 2020

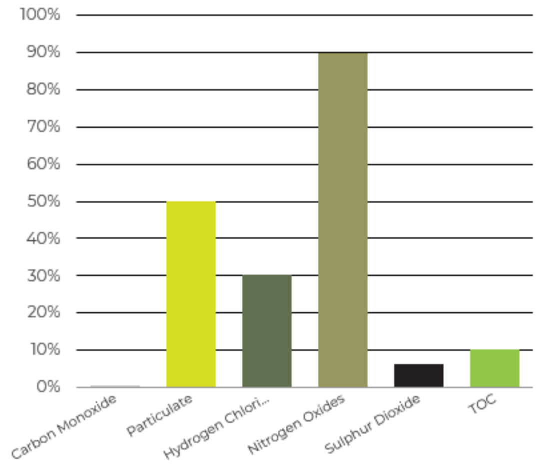


February 2020

Maximum Emission as a % of ½ hour ELV February 2020

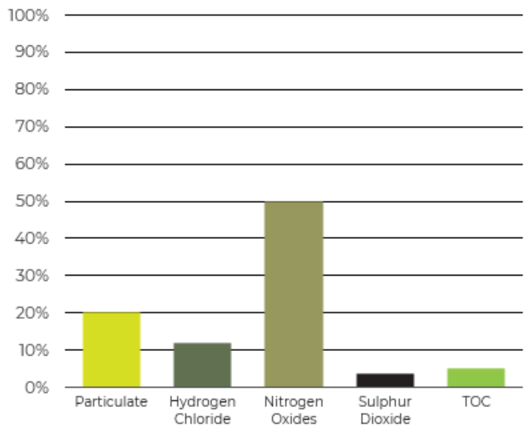


Maximum Emission as a % of Daily ELV February 2020

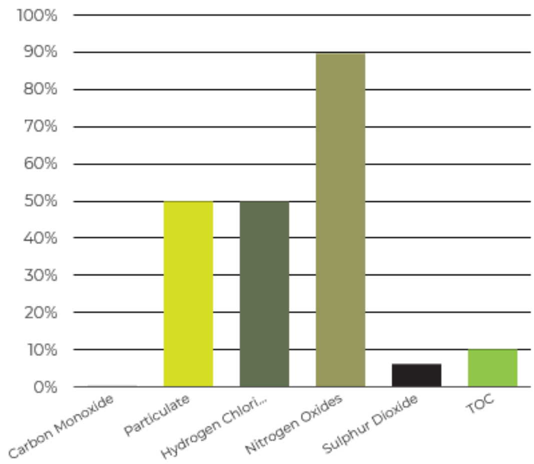


March 2020

Maximum Emission as a % of ½ hour ELV March 2020

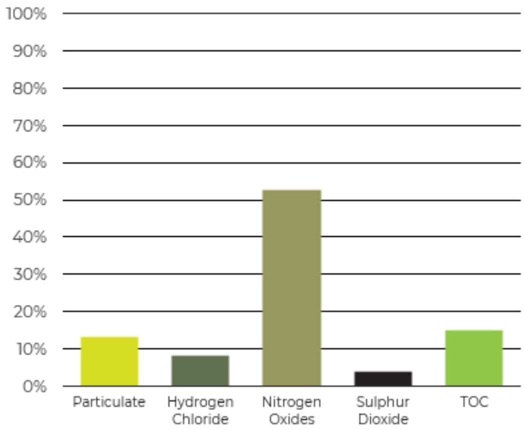


Maximum Emission as a % of Daily ELV March 2020

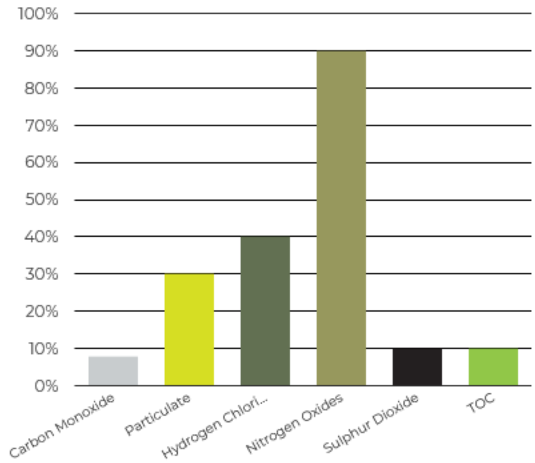


April 2020

Maximum Emission as a % of ½ hour ELV April 2020

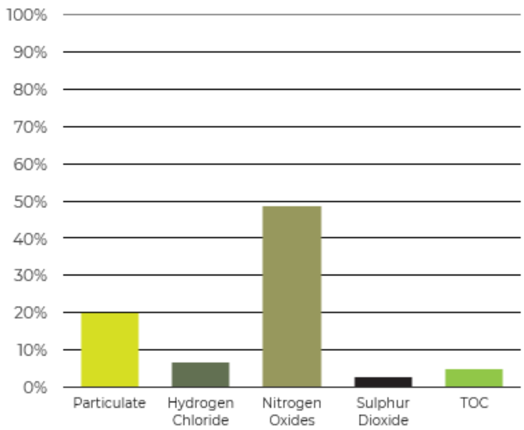


Maximum Emission as a % of Daily ELV April 2020

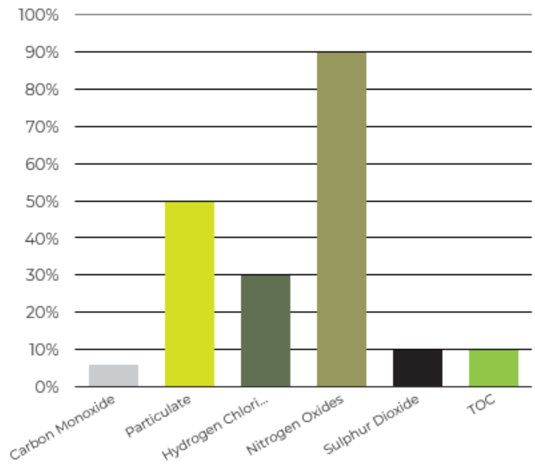


May 2020

Maximum Emission as a % of ½ hour ELV May 2020

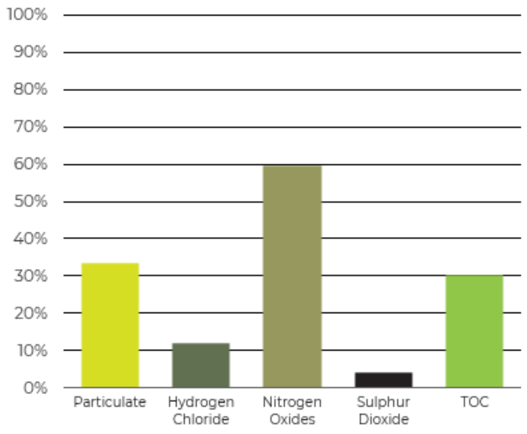


Maximum Emission as a % of Daily ELV May 2020

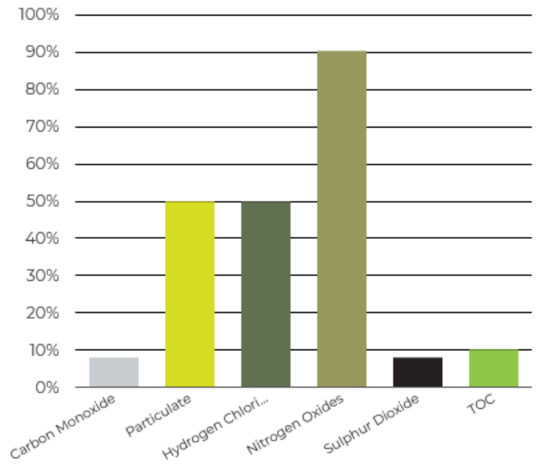


June 2020

Maximum Emission as a % of ½ hour ELV June 2020

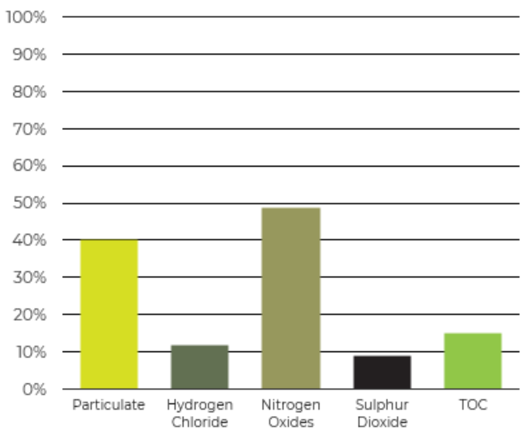


Maximum Emission as a % of Daily ELV June 2020

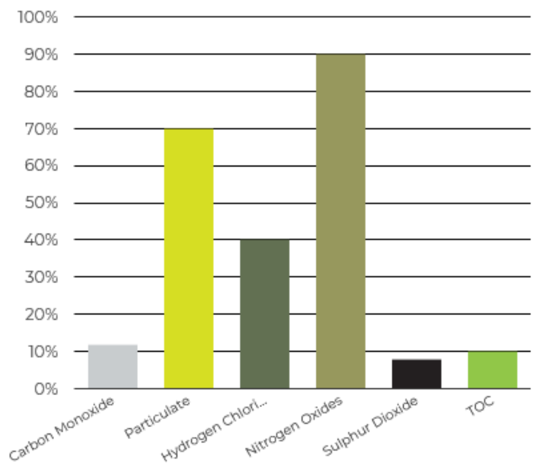


July 2020

Maximum Emission as a % of ½ hour ELV July 2020

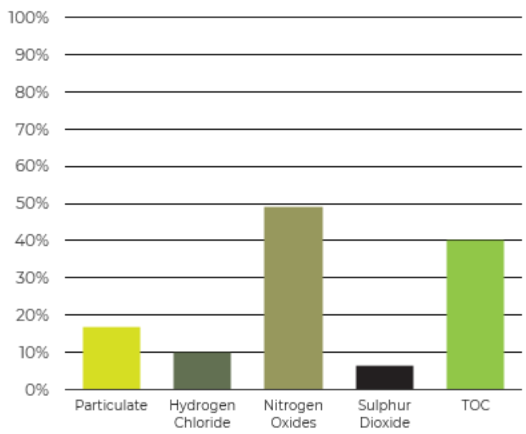


Maximum Emission as a % of Daily ELV July 2020

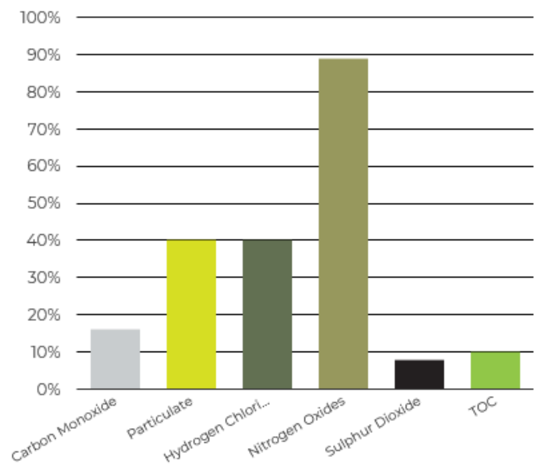


August 2020

Maximum Emission as a % of ½ hour ELV August 2020



Maximum Emission as a % of Daily ELV August 2020



B.2 2019 Emissions

1. <u>Extracts of Emissions Information from Greatmoor Annual Performance Report 2019</u>

4.4 Environmental management

Greatmoor EfW is regulated by the Environment Agency under the Environmental Permitting Regulations; this integrates various European Commission (EC) directives such as the Industrial Emissions Directive into British law.

EC directives are European Legislation that all member states are required to comply with, under European Law. Under this law, FCC are required to have an Environmental Permit in place for the operations carried out at Greatmoor EfW and the facility must comply with the conditions of the permit.

Greatmoor EfW has robust emissions control technologies in place in order to comply with the permit requirements. Gas and ash by products generated from burning waste pass through modern, reliable and well understood combustion and pollution abatement technologies where filters and chemical neutralising systems are used to clean the emissions before leaving the stack and entering the atmosphere. The emissions are closely monitored to ensure compliance with legislation and the requirements of the Environmental Permit is maintained.

Under the Environmental Permit UP3734HT, FCC is obliged to submit an annual report to the Environment Agency detailing compliance with emissions data. This section provides a summary of requirements within the Permit and monitoring data from the second contract year. The report demonstrates there were no Permit breaches at Greatmoor during this period.

For more information on emissions data including detailed charts for each substance please visit www.greatmoor.co.uk/emissions-reports

Full details of the Environmental Permit (UP3734HT) can be found here

Permit monitoring requirements

The monitoring requirements are set out in Schedule 3 of the Environmental Permit. There are continuous and periodic monitoring requirements for various substance emissions displayed in Table 6.

Table 6 - Emission monitoring requirements

Substance	Continuously	Periodically
Particulates	✔	
Total organic carbon	✔	
Hydrogen chloride	✔	
Carbon monoxide	✔	
Sulphur dioxide	✔	
Nitrogen oxides	✔	
Ammonia	✔	
Nitrous oxide		✔
Hydrogen fluoride		✔
Cadmium & Thallium		✔
Mercury		✔
Heavy metals		✔
Dioxins and furans		✔

Monitoring methodology of the criteria included in Table 6 includes:

Continuously monitored substances are measured using continuous emissions monitoring system (CEMs) technology. Gas samples are extracted using a sample probe and analysers used to measure concentrations of each parameter. This information updates on the plant control system that is constantly recorded and monitored by the operations team.

Periodic monitoring is carried out twice a year by competent contractors who are accredited by the Environment Agency which is a highly regulated method of emissions testing. Gas samples are taken from the emissions stack and sent for laboratory analysis.

In addition to monitoring emissions, ash residues from the combustion process including Incinerator Bottom Ash (IBA) and Air Pollution Control Residues (APCr) are tested to identify the concentrations of various substances set out in the permit. This information is submitted to the EA as part of the emission reports to gather and monitor data for further investigation if deviations occur. IBA undergoes further testing twice per month for waste characterisation to determine whether it can continue to be classified as non-hazardous.

Emissions limits

The Environmental Permit specifies Emission Limit Values (ELV) for all of the monitoring criteria. The plant emissions must not exceed these limits to ensure compliance is maintained and if emissions limits are exceeded, notification must be submitted to the Environment Agency. There were no exceedances of emissions limits throughout operation of the plant during the contract year.

Continuous monitoring limits

The limits specified in the Environmental Permit refer to averages of a half hour and a 24 hours period and are displayed in Table 7. Emission limit values are therefore reported using these metrics.

Table 7 – Half hourly average and daily average Emission Limit Values (ELV) by Substance

Substance	Half hour average (mg/m^3)	Daily average (mg/m^3)
Particulates	30	10
Hydrogen chloride	60	10
Nitrogen oxides	400	200
Sulphur dioxide	200	50
Total organic carbon	20	10
Substance	**10 min average (mg/m^3)**	**Daily average (mg/m^3)**
Carbon monoxide	150	50

The graph in Figure 4 shows the combined results for the operational period for each criterion that requires continuous monitoring displayed as half hour maximum and maximum average measured over a 24 hour period as a percentage of the specified Emission Limit Value (ELV).

Figure 4 – Maximum emission value shown as a percentage limit during the contract year

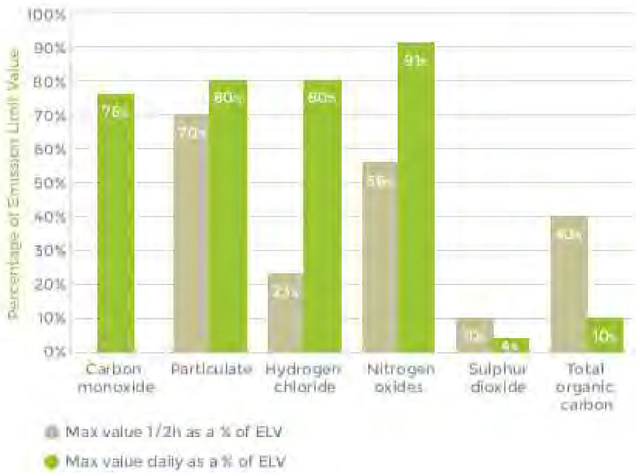


Figure 4 shows that the maximum half hourly and daily emissions were all within the limits as the chart displays each value as a percentage of the limits specified in the Environmental Permit. Therefore, each limit was 100% compliant during the contract year which can also be shown in the compliance summary in Table 8.

Table 8 – Summary of Emission Limit Value Compliance

Monitoring Element	Compliance
Particulates	100%
Carbon monoxide	100%
Total organic carbon	100%
Hydrogen chloride	100%
Sulphur dioxide	100%
Nitrogen oxides	100%

Periodic monitoring

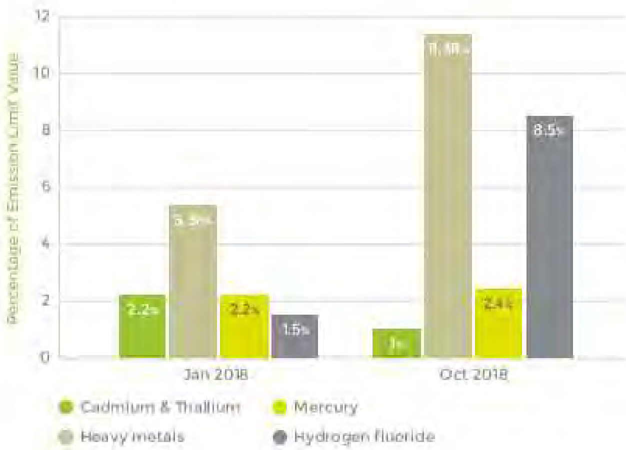
Under the Environmental Permit, FCC is also required to undertake quarterly stack emission testing which is part of the emissions monitoring requirements as shown in Table 6. Results of the periodic monitoring are displayed in Figures 5 and 6.

Figure 5 shows the highest levels of dioxins and furans are at 12.74% of the limit. Figure 6 shows the levels of Cadmium and Thallium, Heavy metals, Mercury and Hydrogen fluoride as a percentage of the limit and all levels are within the limits specified within the permit, all of them being below 11.38% of the limit. This data demonstrates that all the quarterly emission values are significantly less than the 100% limits specified in the Permit.

Figure 5 – Bi-annual Emission values for Dioxins and Furans during the contract year shown as a percentage of the Emission Limit Value specified in the Environmental Permit

In addition to emissions to air; the site also has limits relating to the quality of Incinerator Bottom Ash (IBA) to demonstrate that the process provides good levels of combustion. All data taken and submitted during the contract year showed good levels of compliance for Ash residues; with analysis also demonstrating the Ash to be non-hazardous in nature.

Figure 6 – Bi-annual Emission values for Cadmium & Thallium, Heavy metals, Mercury and Hydrogen fluoride during the contract year shown as a percentage of the Emission Limit Value specified in the Environmental Permit



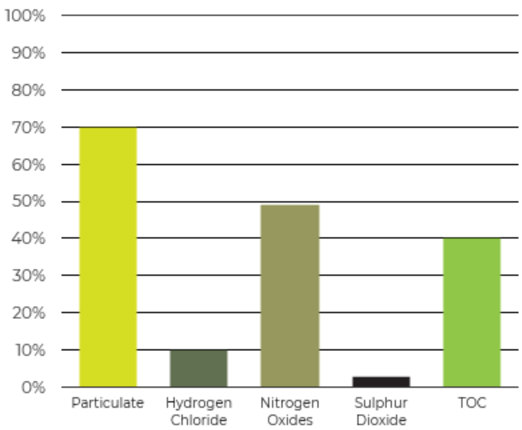
Summary of Plant compliance

There were no notifications of emission exceedances throughout the contract year. The results of the emissions monitoring requirements as above show emissions performance was below limits for all criteria for both continuous and periodic monitoring and therefore compliant with the environmental permit.

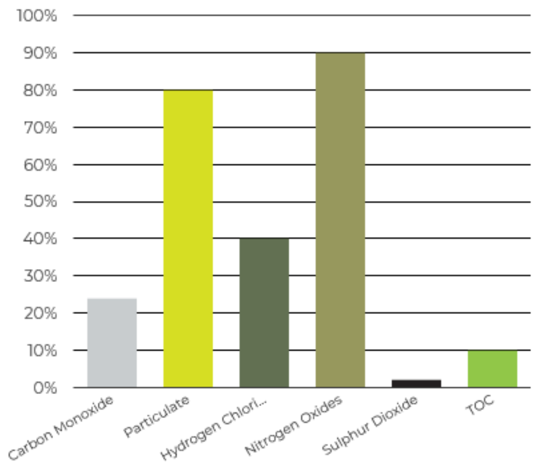
2. Publicly reported continuously monitored emissions reports

February 2019

Maximum Emission as a % of ½ hour ELV February 2019

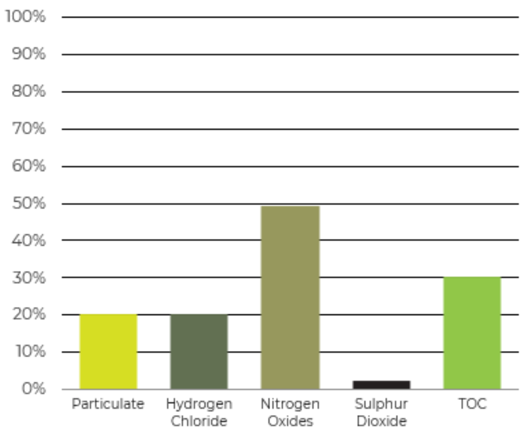


Maximum Emission as a % of Daily ELV February 2019

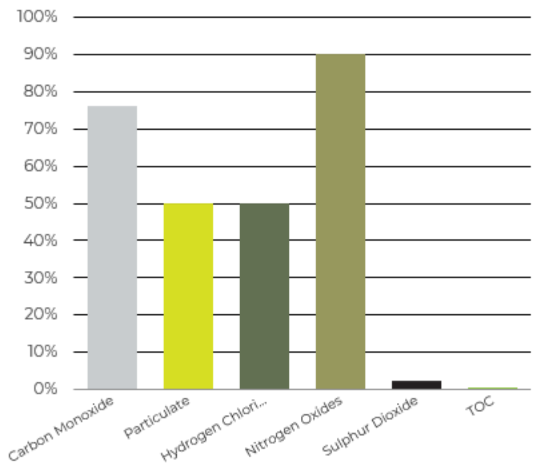


March 2019

Maximum Emission as a % of ½ hour ELV March 2019

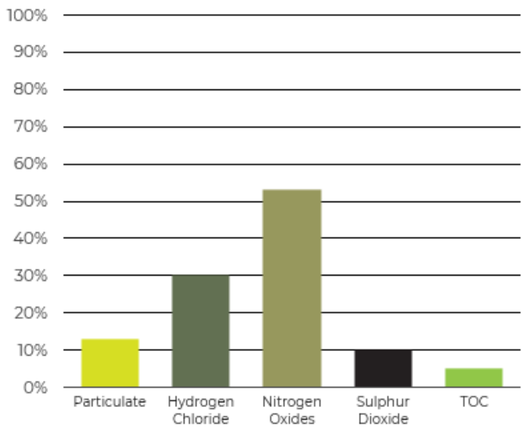


Maximum Emission as a % of Daily ELV March 2019

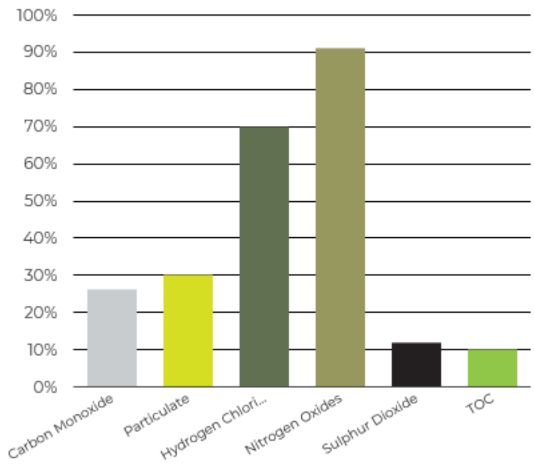


April 2019

Maximum Emission as a % of ½ hour ELV April 2019

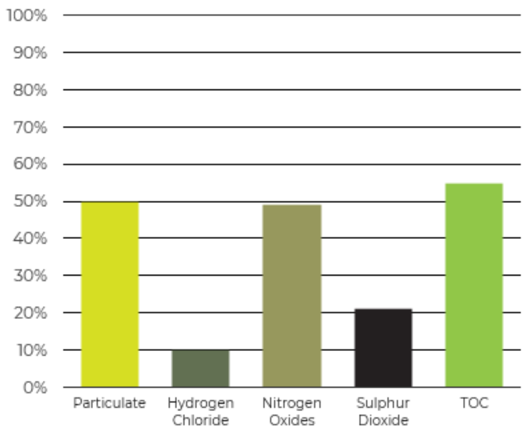


Maximum Emission as a % of Daily ELV April 2019

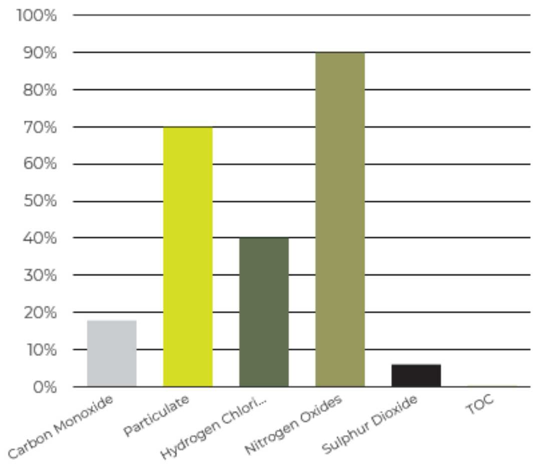


May 2019

Maximum Emission as a % of ½ hour ELV May 2019

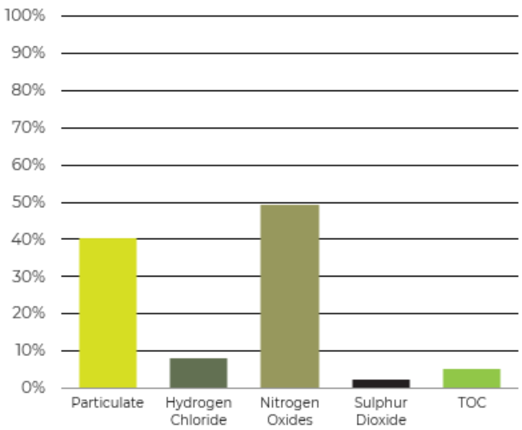


Maximum Emission as a % of Daily ELV May 2019

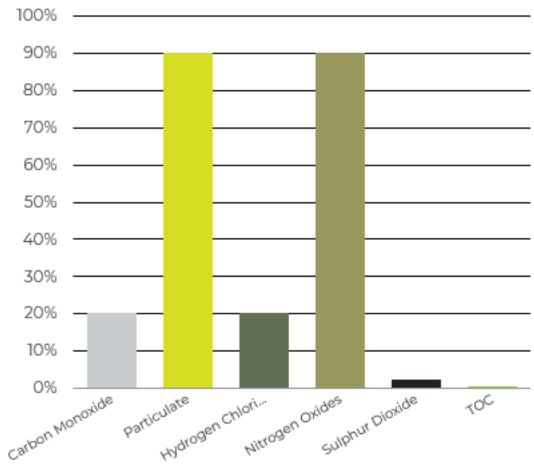


June 2019

Maximum Emission as a % of ½ hour ELV June 2019

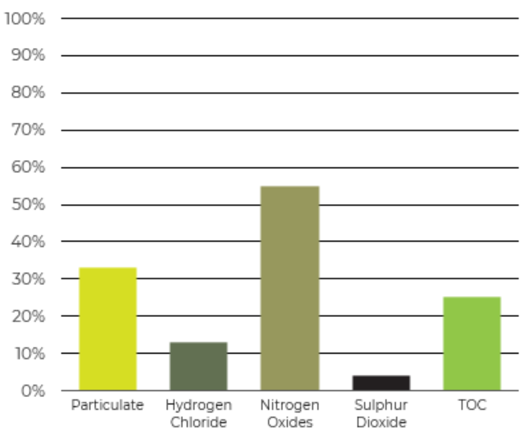


Maximum Emission as a % of Daily ELV June 2019

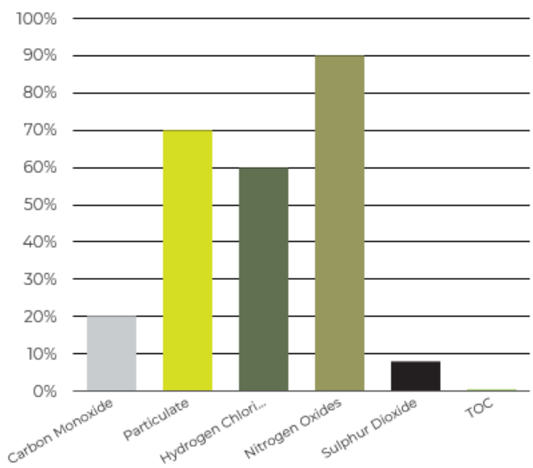


July 2019

Maximum Emission as a % of ½ hour ELV July 2019

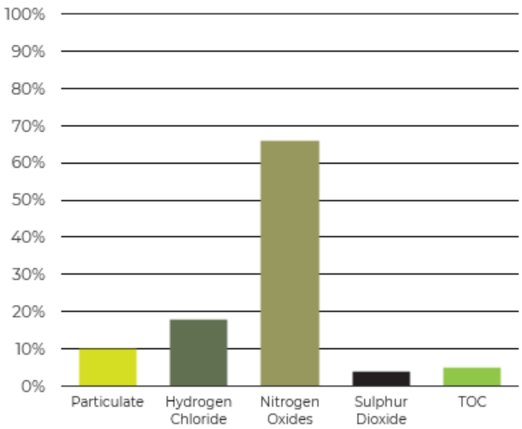


Maximum Emission as a % of Daily ELV July 2019

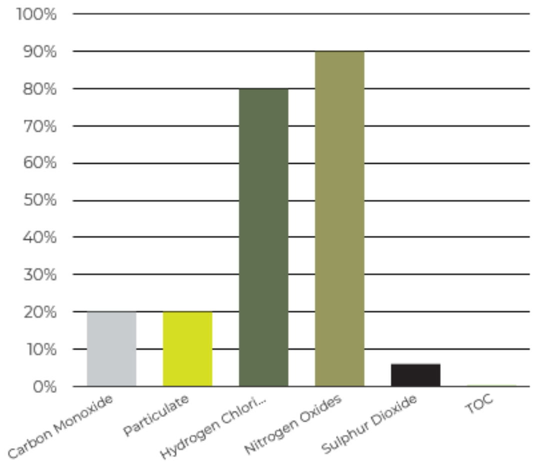


August 2019

Maximum Emission as a % of ½ hour ELV August 2019

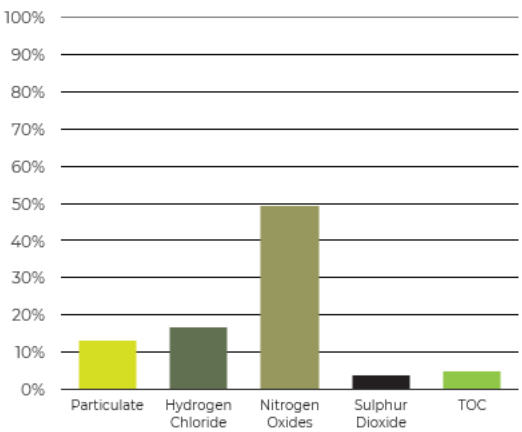


Maximum Emission as a % of Daily ELV August 2019

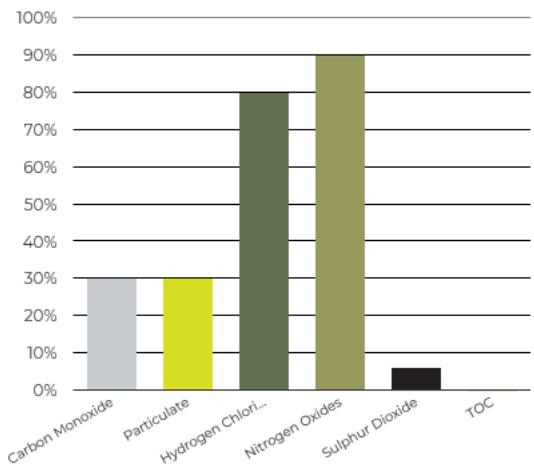


September 2019

Maximum Emission as a % of ½ hour ELV September 2019

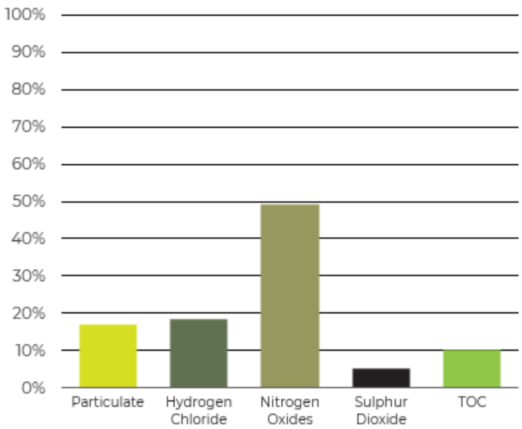


Maximum Emission as a % of Daily ELV September 2019

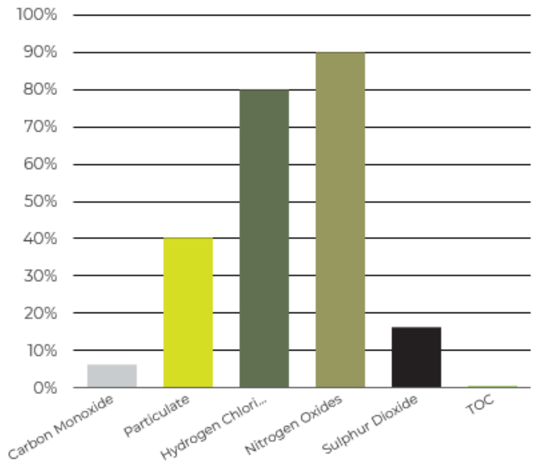


October 2019

Maximum Emission as a % of ½ hour ELV October 2019

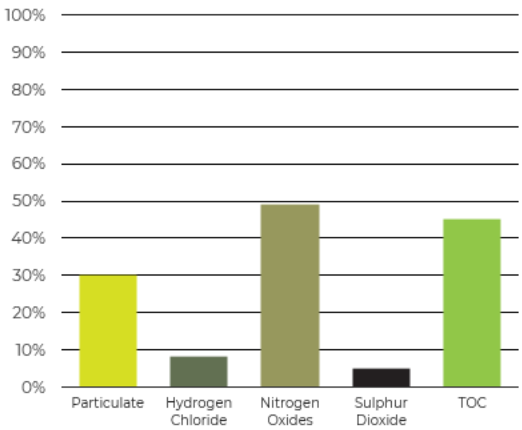


Maximum Emission as a % of Daily ELV October 2019

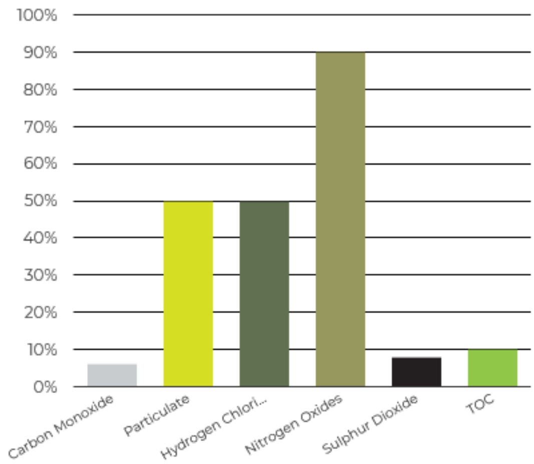


November 2019

Maximum Emission as a % of ½ hour ELV November 2019



Maximum Emission as a % of Daily ELV November 2019



B.3 2018 Emissions

1. **Extracts of Emissions Information from Greatmoor Annual Performance Report 2018**

4.4 Environmental management

Greatmoor EFW is regulated by the Environment Agency under the Environmental Permitting Regulations; this integrates various European Commission (EC) directives such as the Industrial Emissions Directive into British law.

EC directives are European Legislation that all member states are required to comply with, under European Law. Under this law, FCC are required to have an Environmental Permit in place for the operations carried out at Greatmoor EfW and the facility must comply with the conditions of the permit.

Greatmoor EfW has robust emissions control technologies in place in order to comply with the permit requirements. Gas and ash by products generated from burning waste pass through modern, reliable and well understood combustion and pollution abatement technologies where filters and chemical neutralising systems are used to clean the emissions before leaving the stack and entering the atmosphere. The emissions are closely monitored to ensure compliance with legislation and the requirements of the Environmental Permit is maintained.

Under the Environmental Permit UP3734HT, FCC is obliged to submit an annual report to the Environment Agency detailing compliance with emissions data. This section provides a summary of requirements within the Permit and monitoring data from the second contract year. The report demonstrates there were no Permit breaches at Greatmoor during this period.

FCC applied to increase the permitted annual capacity for the Facility. As the original Permit capacity was not consistent with the maximum design capacity of the Facility. Following the firing diagram, the maximum design capacity of the Facility should be calculated from the design calorific value (9.3 MJ/kg) of the waste – processing 39.4 tonnes per hour of waste – with an operational availability of 8,760 hours per annum. This is equivalent to a maximum capacity of 345,000 tonnes per annum.

Taking the above into consideration, a new Environmental Permit UP3734HT/V004 was granted by the Environment Agency on the 19th of January 2018 with an increased throughput to 345,000 tonnes per year.

For more information on emissions data including detailed charts for each substance please visit www.greatmoor.co.uk/emissions-reports

Full details of the Environmental Permit (UP3734HT) can be found here

Permit monitoring requirements

The monitoring requirements are set out in Schedule 3 of the Environmental Permit. There are continuous and periodic monitoring requirements for various substance emissions displayed in table 6.

Table 6 – Emission Monitoring Requirements

Substance	Continuously	Periodically
Particulates	✓	
Total organic carbon	✓	
Hydrogen chloride	✓	
Carbon monoxide	✓	
Sulphur dioxide	✓	
Nitrogen oxides	✓	
Ammonia	✓	
Nitrous oxide		✓
Hydrogen fluoride		✓
Cadmium & thallium		✓
Mercury		✓
Heavy metals		✓
Dioxins and furans		✓

Periodic monitoring is undertaken quarterly. With the new Environmental Permit there is a different requirement for Nitrous Oxides to be monitored periodically instead of continuous.

Monitoring methodology of the criteria included in table 6 includes:

Continuously monitored substances are measured using continuous emissions monitoring system (CEMs) technology. Gas samples are extracted using a sample probe and analysers used to measure concentrations of each parameter. This information updates on the plant control system that is constantly recorded and monitored by the operations team.

Periodic monitoring is carried out twice a year by competent contractors who are accredited by the Environment Agency which is a highly regulated method of emissions testing. Gas samples are taken from the emissions stack and sent for laboratory analysis.

In addition to monitoring emissions, ash residues from the combustion process including Incinerator Bottom Ash (IBA) and Air Pollution Control Residues (APCr) are tested to identify the concentrations of various substances set out in the permit. This information is submitted to the EA as part of the emission reports to gather and monitor data for further investigation if deviations occur. Testing of residues is required to be carried out monthly during the first year of operation and then quarterly thereafter. IBA undergoes further testing twice per month for waste characterisation to determine whether it can be classified for non-hazardous landfill disposal.

Emissions limits

The Environmental Permit specifies Emission Limit Values (ELV) for all of the monitoring criteria. The plant emissions must not exceed these limits to ensure compliance is maintained and if emissions limits are exceeded, notification must be submitted to the Environment Agency. There were no exceedances of emissions limits throughout operation of the plant during the contract year.

Continuous monitoring limits

The limits specified in the Environmental Permit refer to averages of a half hour and a 24 hours period and are displayed in table 7. Emission limit values are therefore reported using these metrics.

Table 7 - Half hourly average and daily average Emission Limit Values (ELV) by Substance

Substance	Half hour average (mg/m^3)	Daily average (mg/m^3)
Particulates	30	10
Hydrogen chloride	60	10
Nitrogen oxides	400	200
Sulphur dioxide	200	50
Total organic carbon	20	10
Substance	**10 min average (mg/m^3)**	**Daily average (mg/m^3)**
Carbon monoxide	150	50

The graph in figure 4 shows the combined results for the operational period for each criterion that requires continuous monitoring displayed as half hour maximum and maximum average measured over a 24 hour period as a percentage of the specified Emission Limit Value (ELV).

Figure 4 – Maximum half hour and daily average emissions shown as a percentage of the Emission Limit Value for each substance that was continuously monitored during the contract year

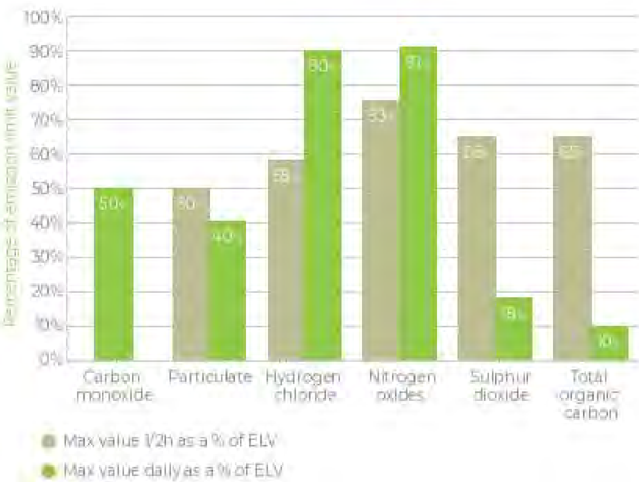


Figure 5 shows that the maximum half hourly and daily emissions were all within the limits as the chart displays each value as a percentage of the limits specified in the Environmental Permit. Therefore, each limit was 100% compliant during the contract year which can also be shown in the compliance summary in table 8.

Table 8 - Summary of Emission Limit Value Compliance

Monitoring Element	Compliance
Particulates	100%
Carbon monoxide	100%
Total organic carbon	100%
Hydrogen chloride	100%
Sulphur dioxide	100%
Nitrogen oxides	100%

Periodic monitoring

Under the Environmental Permit, FCC is also required to undertake quarterly stack emission testing which is part of the emissions monitoring requirements as shown in table 6. Results of the periodic monitoring are displayed in figures 5 and 6.

Figure 5 shows the highest levels of dioxins and furans are at 9.80% of the limit. Figure 6 shows the levels of Cadmium and Thallium, Heavy metals, Mercury and Hydrogen Fluoride as a percentage of the limit and all levels are within the limits specified within the permit, all of them been below 10% of the limit. This data demonstrates that all the quarterly emission values are significantly less than the 100% limits specified in the Permit.

Figure 5 – Quarterly Emission values for Dioxins and Furans during the contract year shown as a percentage of the Emission Limit Value specified in the Environmental Permit

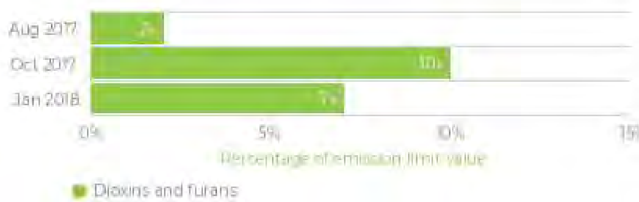
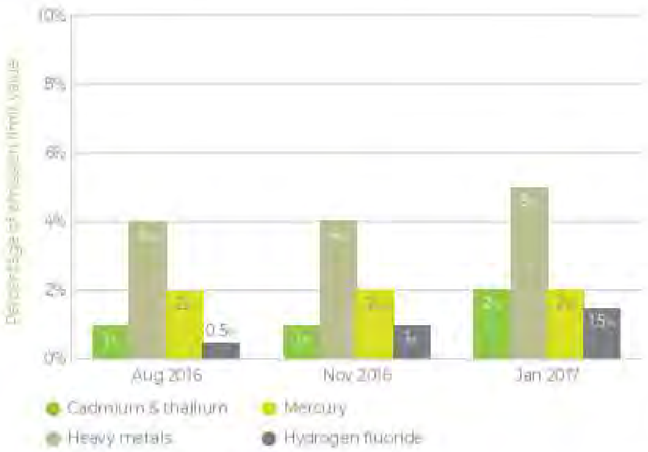


Figure 6 – Quarterly Emission values for Cadmium & Thallium, Heavy Metals, Mercury and Hydrogen Fluoride during the contract year shown as a percentage of the Emission Limit Value specified in the Environmental Permit



Summary of plant compliance

There were no notifications of emission exceedances throughout the contract year. The results of the emissions monitoring requirements as above show emissions performance was below limits for all criteria for both continuous and periodic monitoring and therefore compliant with the environmental permit. However the facility received 2 x Compliance Classification Scheme category 3 scores for a breach of condition 3.3.1 of the permit: Monitoring of table 3.1(a) Emission Limits during Abnormal Operation. There were no Total Organic Carbon measurements during plant Start-up following a shutdown for 3 hours on the 29th of May 2017. The double scoring corresponds to a lack of monitoring and lack of competency and training.

CCS score: the Compliance Classification Scheme (CCS) is the approach the Environment Agency uses to classify permit breaches. The compliance band you fall into is determined by your Compliance Classification Scheme score accumulated over the previous calendar year. A good compliance record means you will pay a lower subsistence charge than if you have a poor compliance record. Each CCS score 3 is 4 points, a total of 8 points put Greatmoor into a Compliance Band B.

Once the year ends the site will return to Band A and the scoring system will start again.

To eliminate the possibility of this happening in the future the following actions have been put in place:

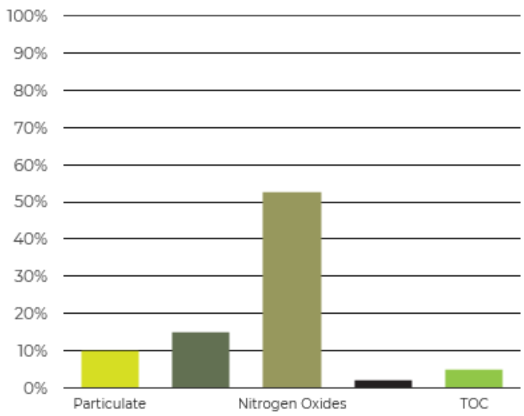
- The start-up procedure has been updated with 3 additional steps to ensure the MIR-FT and FID is in service and recording.
- Local procedures have been put in the CEMs cabinet explaining what to do and how to restart the monitoring equipment.
- A CEMs specific toolbox talk was written and delivered to all of the operations team indicating the importance of ensuring the system is running.

After the first year of operation, the testing for IBA and APCr has reduced from monthly to quarterly. All data has been submitted to the EA as part of the emissions reports and there was no concern raised regarding the results. IBA was continuously classified as non-hazardous waste throughout the waste characterisation testing carried out over the course of the contract year and was therefore suitable for non-hazardous landfill disposal.

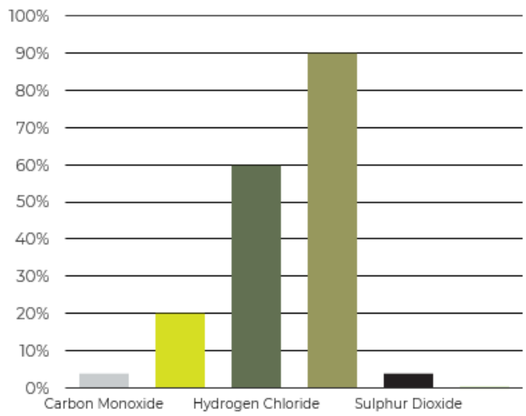
2. <u>Publicly reported continuously monitored emissions reports</u>

February 2018

Maximum Emission as a % of ½ hour ELV February 2018

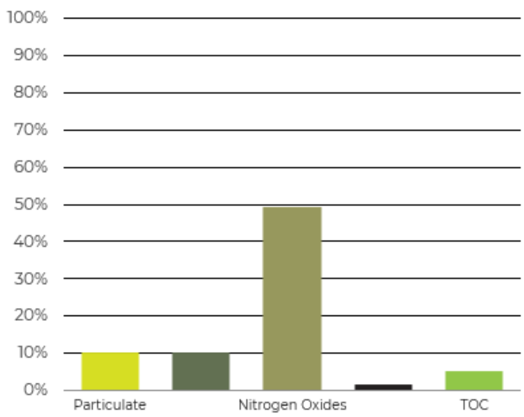


Maximum Emission as a % of Daily ELV February 2018

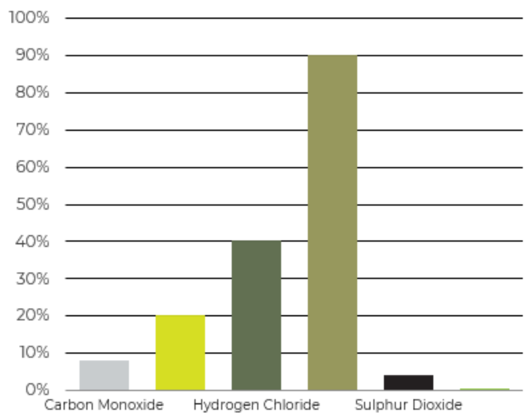


March 2018

Maximum Emission as a % of ½ hour ELV March 2018

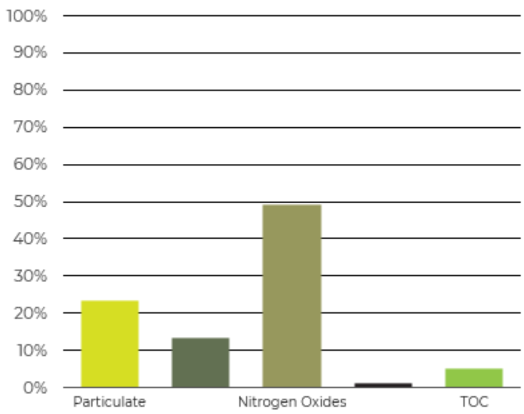


Maximum Emission as a % of Daily ELV March 2018

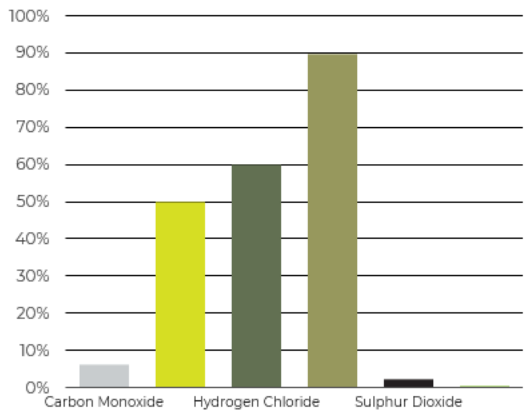


April 2018

Maximum Emission as a % of ½ hour ELV April 2018

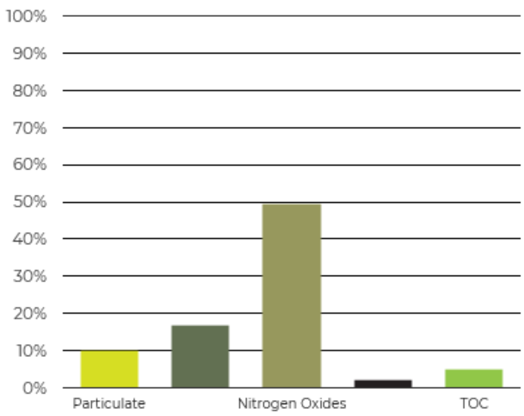


Maximum Emission as a % of Daily ELV April 2018

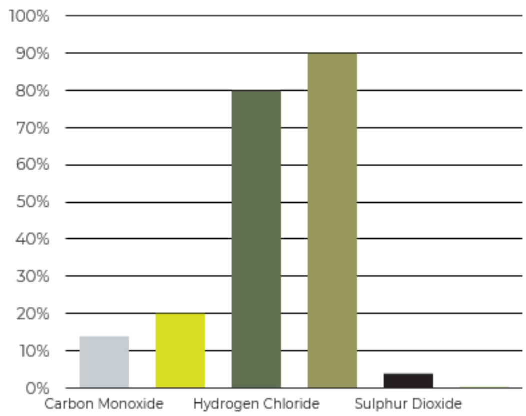


May 2018

Maximum Emission as a % of ½ hour ELV May 2018

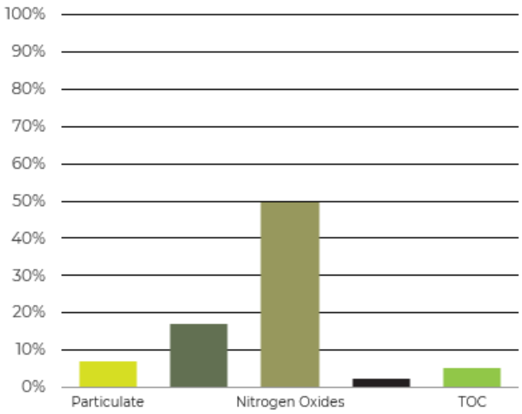


Maximum Emission as a % of Daily ELV May 2018

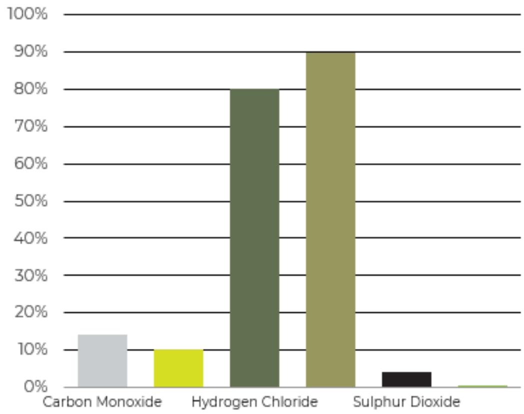


June 2018

Maximum Emission as a % of ½ hour ELV June 2018

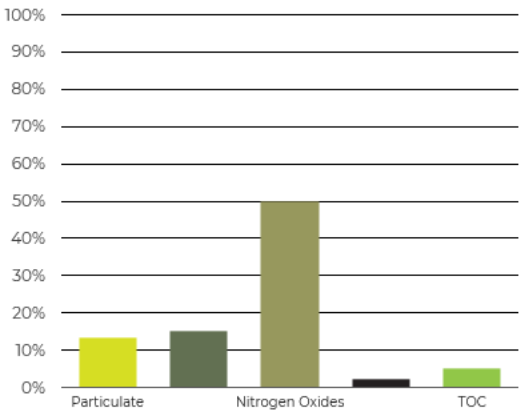


Maximum Emission as a % of Daily ELV June 2018

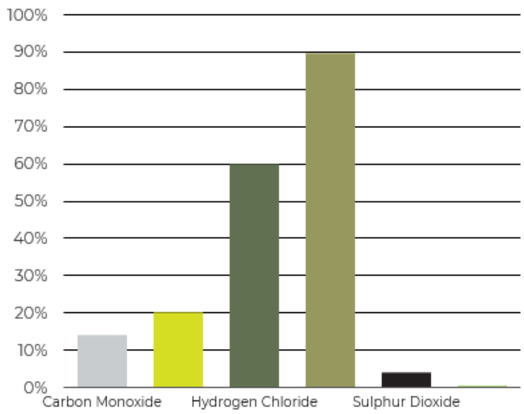


July 2018

Maximum Emission as a % of ½ hour ELV July 2018

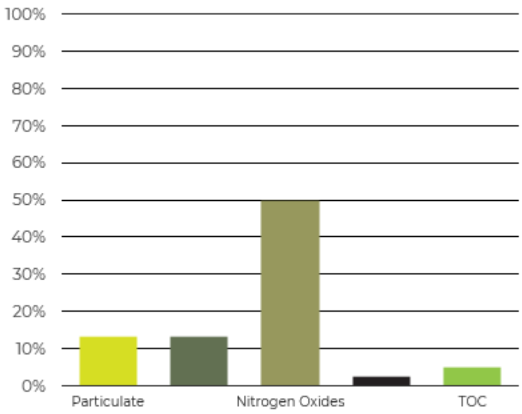


Maximum Emission as a % of Daily ELV July 2018

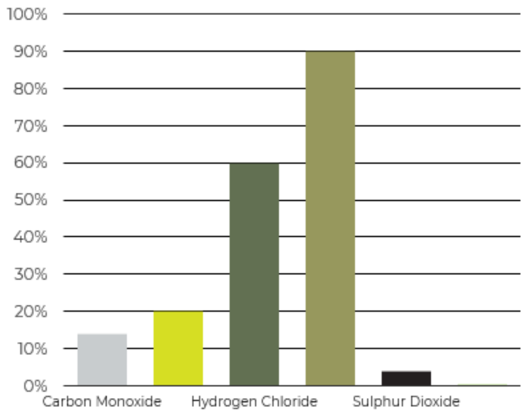


August 2018

Maximum Emission as a % of ½ hour ELV August 2018

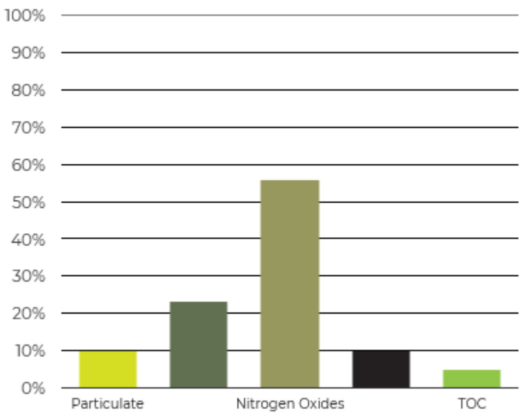


Maximum Emission as a % of Daily ELV August 2018

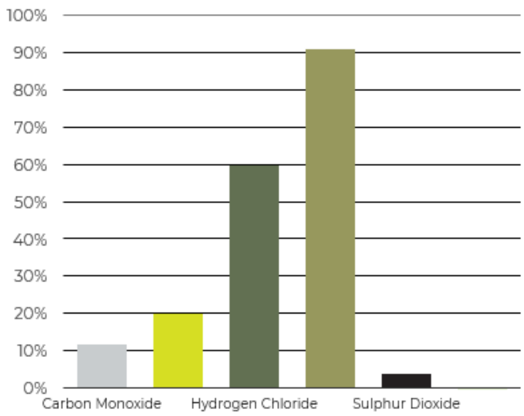


September 2018

Maximum Emission as a % of ½ hour ELV September 2018

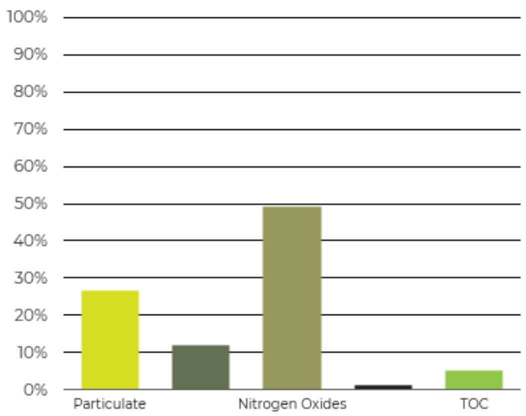


Maximum Emission as a % of Daily ELV September 2018

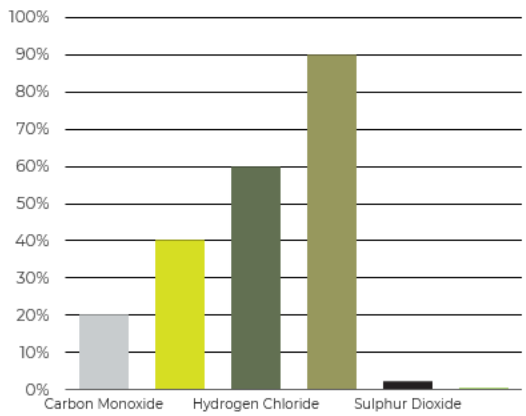


October 2018

Maximum Emission as a % of ½ hour ELV October 2018

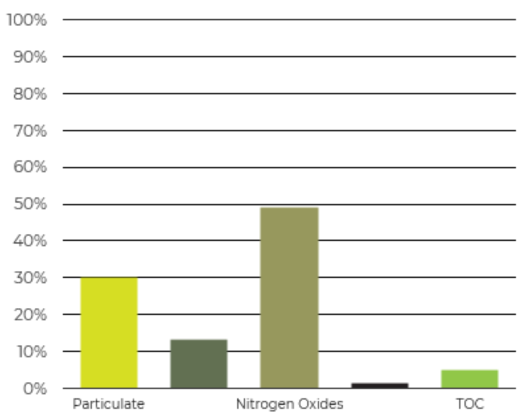


Maximum Emission as a % of Daily ELV October 2018

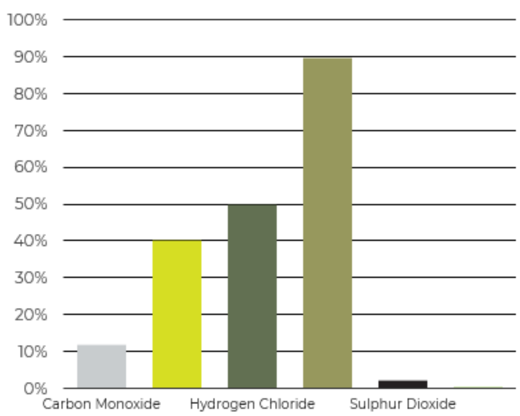


November 2018

Maximum Emission as a % of ½ hour ELV November 2018



Maximum Emission as a % of Daily ELV November 2018



B.4 2017 Emissions

1. <u>Extracts of Emissions Information from Greatmoor Annual Performance Report 2017</u>

4.4 Environmental Management

Greatmoor EFW is regulated by the Environment Agency under the Environmental Permitting Regulations, this integrates various European Commission (EC) directives such as the Industrial Emissions Directive into British law.

EC directives are European Legislation that all member states are required to comply with under European Law. Under this law, FCC are required to have an Environmental Permit in place for the operations carried out at Greatmoor EfW and the facility must comply with the conditions of the permit.

Greatmoor EfW has robust emissions control technologies in place in order to comply with the permit requirements. Gas and ash by-products generated from burning waste pass through modern, reliable and well understood combustion and pollution abatement technologies where filters and chemical neutralising systems are used to clean the emissions before leaving the stack and entering the atmosphere. The emissions are closely monitored to ensure compliance with legislation and the requirements of the Environmental Permit is maintained.

Under the Environmental Permit (the Permit) (UP3734HT), FCC is obliged to submit an annual report to the Environment Agency detailing compliance with emissions data. This section provides a summary of requirements within the Permit and monitoring data from the first contract year. The data presented in the report demonstrates that there have been no Permit breaches at Greatmoor EfW during this period.

For more information on emissions data including detailed charts for each substance please visit www.greatmoor.co.uk

Full details of the Environmental Permit (UP3734HT) can be found here

Permit monitoring requirements

The monitoring requirements are set out in Schedule 3 of the Environmental Permit. There are continuous and periodic monitoring requirements for various substance emissions displayed in Table 6. Periodic monitoring is undertaken quarterly.

Table 6 Emission Monitoring Requirements

Substance	Continuously	Periodically
Particulates	✓	
Total Organic Carbon	✓	
Hydrogen Chloride	✓	
Carbon Monoxide	✓	
Sulphur Dioxide	✓	
Nitrogen Oxides	✓	
Ammonia	✓	
Nitrous Oxide	✓	
Hydrogen Fluoride		✓
Cadmium & Thallium		✓
Mercury		✓
Heavy Metals		✓
Dioxins and Furans		✓

Monitoring methodology of the criteria included in Table 6 includes:

Continuously monitored substances are measured using continuous emissions monitoring system (CEMs) technology. Gas samples are extracted using a sample probe and analysers used to measure concentrations of each parameter. This information updates on the plant control system that is constantly recorded and monitored by the operations team.

Periodic monitoring is carried out on a quarterly basis by competent contractors who are accredited by the Environment Agency which is a highly regulated method of emissions testing. Gas samples are taken from the emissions stack and sent for laboratory analysis. The required frequency of periodic monitoring is quarterly during the first year of operation and then twice per year thereafter.

In addition to monitoring emissions, ash residues from the combustion process including Incinerator Bottom Ash (IBA) and Air Pollution Control Residues (APCr) are tested to identify the concentrations of various substances set out in the permit. This information is submitted to the EA as part of the emission reports to gather and monitor data for further investigation if deviations occur. Testing of residues is required to be carried out monthly during the first year of operation and then quarterly thereafter. IBA undergoes further testing twice per month for waste characterisation to determine whether it can be classified for non-hazardous landfill disposal.

Emissions Limits

The Environmental Permit specifies Emission Limit Values (ELV) for all of the monitoring criteria. The plant emissions must not exceed these limits to ensure compliance is maintained and if emissions limits are exceeded, notification must be submitted to the Environment Agency. There were no exceedances of emissions limits throughout operation of the plant during the contract year.

Continuous monitoring limits

The limits specified in the Environmental Permit refer to averages of a half hour and a 24 hours period and are displayed in Table 7. Emission limit values are therefore reported using these metrics.

Table 7 Half hourly average and daily average Emission Limit Values (ELV) by Substance

Substance	Half hour average (mg/m³)	Daily average (mg/m³)
Particulate	30	10
Hydrogen Chloride	60	10
Nitrogen Oxides	400	200
Sulphur Dioxide	200	50
Total Organic Carbon	20	10
Substance	**10 min average (mg/m³)**	**Daily average (mg/m³)**
Carbon Monoxide	150	50

The graph in Figure 4 shows the combined results for the operational period for each criterion that requires continuous monitoring displayed as half hour maximum and maximum average measured over a 24 hour period as a percentage of the specified Emission Limit Value (ELV).

Figure 4 Maximum half hour and daily average emissions shown as a percentage of the Emission Limit Value for each substance that was continuously monitored during the contract year

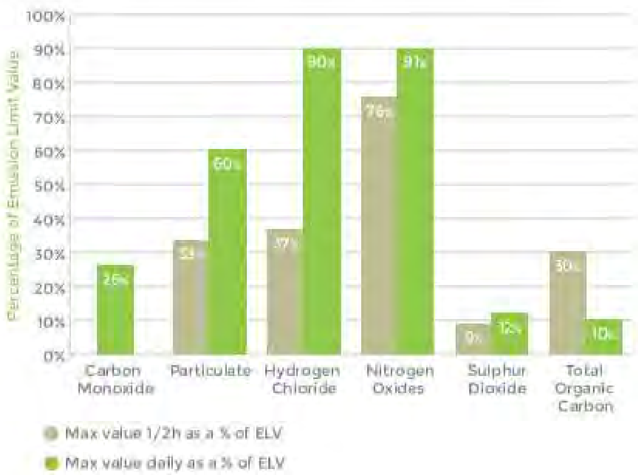


Figure 4 shows that the maximum half hourly and daily emissions were all within the limits as the chart displays each value as a percentage of the limits specified in the Environmental Permit. Therefore, each limit was 100% compliant during the contract year which can also be shown in the compliance summary in Table 8.

Table 8 Summary of Emission Limit Value Compliance

Monitoring Element	Particulate Matter	Carbon Monoxide	Total Organic Carbon
Compliance	100%	100%	100%

Hydrogen Chloride	Sulphur Dioxide	Nitrogen Oxides
100%	100%	100%

Periodic monitoring

Under the Environmental Permit, FCC is also required to undertake quarterly stack emission testing which is part of the emissions monitoring requirements as shown in Table 6. Results of the periodic monitoring are displayed in Figures 5 and 6.

Figure 5 shows the highest levels of dioxins and furans are at 19% of the limit. Figure 6 shows the levels of Cadmium and Thallium, Heavy metals, Mercury and Hydrogen Fluoride as a percentage of the limit and all levels are within the limits specified within the permit. This data demonstrates that all the quarterly emission values are significantly less than the 100% limits specified in the Permit.

Figure 5 Quarterly Emission values for Dixons and Furans during the contract year shown as a percentage of the Emission Limit Value specified in the Environmental Permit

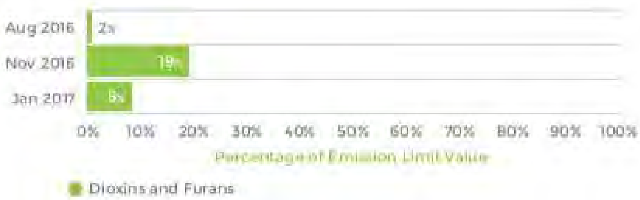
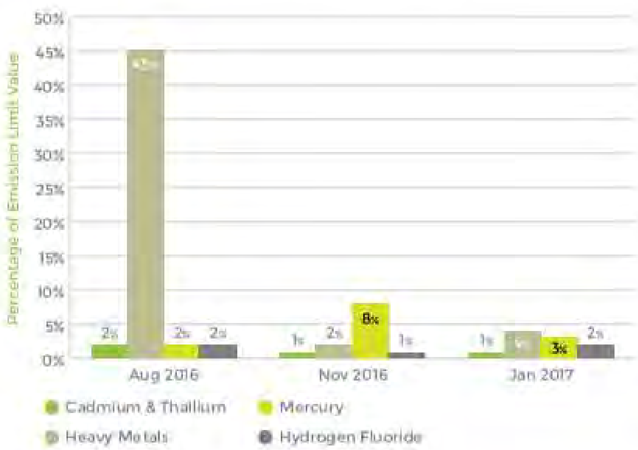


Figure 6 Quarterly Emission values for Cadmium & Thallium, Heavy Metals, Mercury and Hydrogen Fluoride during the contract year shown as a percentage of the Emission Limit Value specified in the Environmental Permit



Summary of Plant Compliance

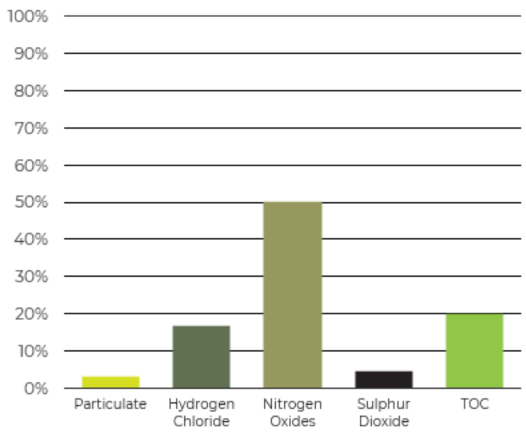
No notifications of emission exceedances were required to be submitted to the EA throughout the contract year. The results of the emissions monitoring requirements as above show emissions performance was below limits for all criteria for both continuous and periodic monitoring and therefore compliant with the environmental permit.

IBA and APCr have been tested monthly throughout the contract year and all data submitted to the EA as part of the emissions reports and there was no concern raised regarding the results. IBA was continuously classified as non-hazardous waste throughout the waste characterisation testing carried out over the course of the contract year and was therefore suitable for non-hazardous landfill disposal.

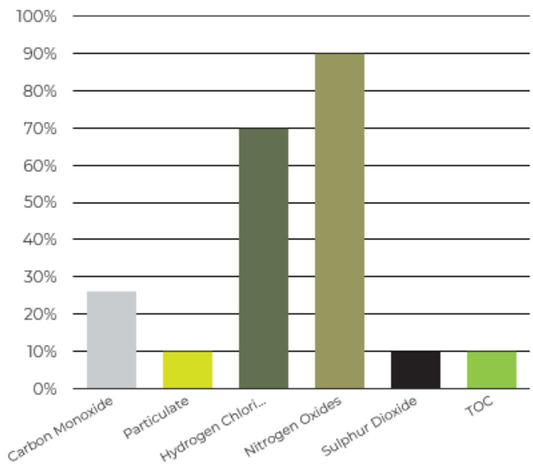
2. <u>Publicly reported continuously monitored emissions reports</u>

February 2017

Maximum Emission as a % of ½ hour ELV February 2017

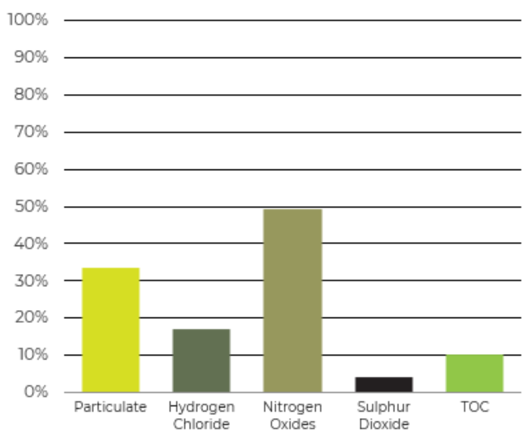


Maximum Emission as a % of Daily ELV February 2017

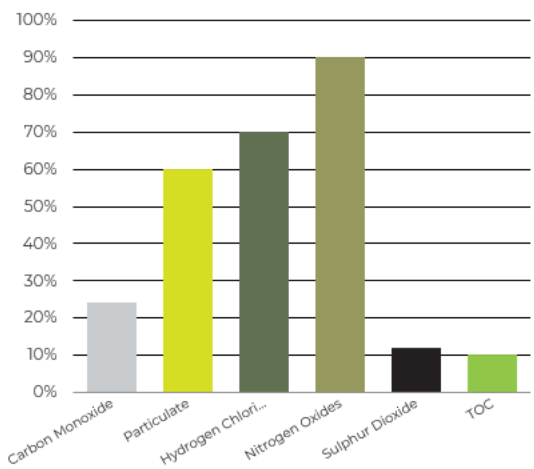


March 2017

Maximum Emission as a % of ½ hour ELV March 2017

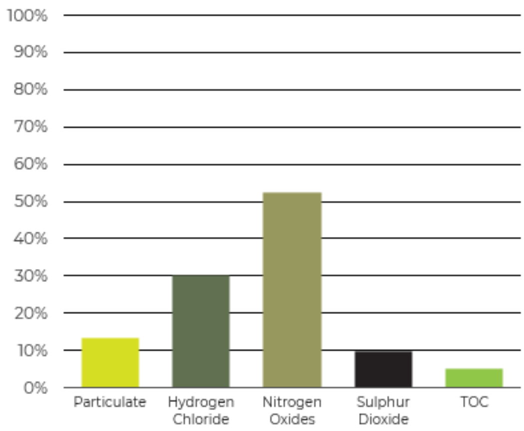


Maximum Emission as a % of Daily ELV March 2017

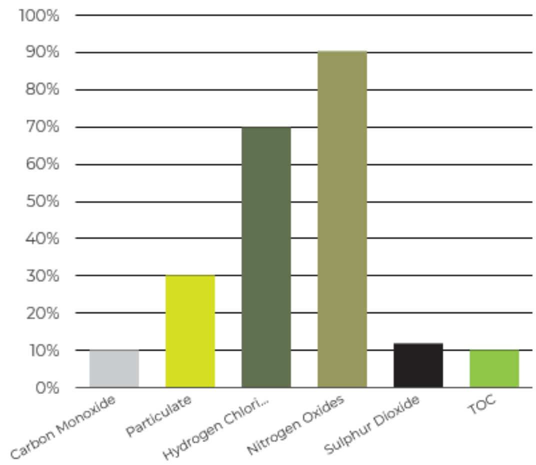


April 2017

Maximum Emission as a % of ½ hour ELV April 2017

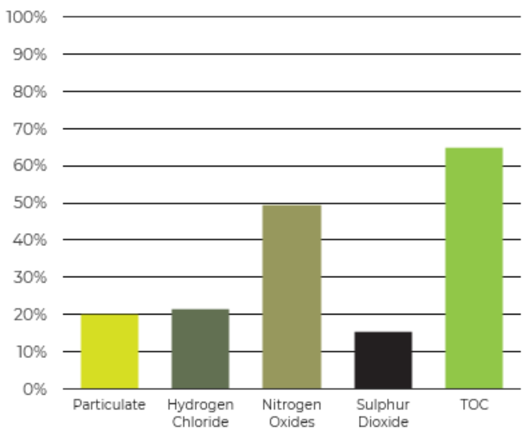


Maximum Emission as a % of Daily ELV April 2017

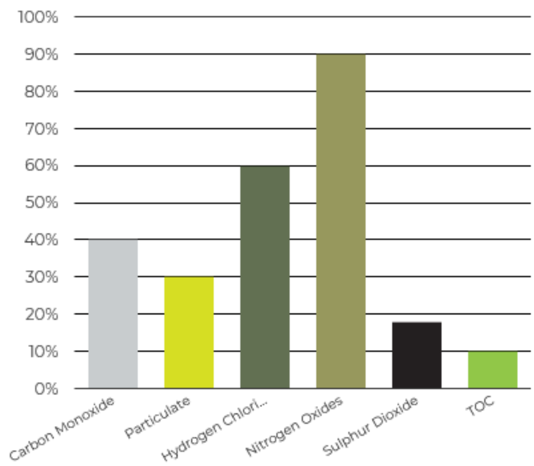


May 2017

Maximum Emission as a % of ½ hour ELV May 2017

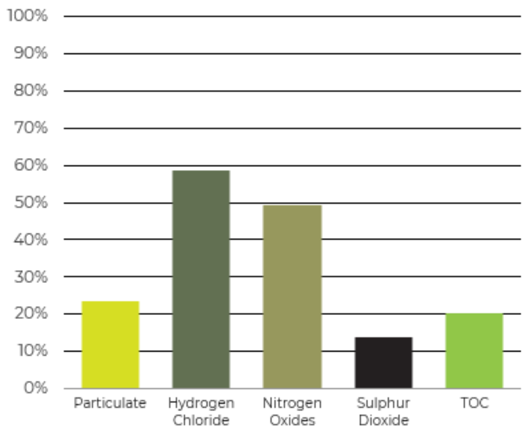


Maximum Emission as a % of Daily ELV May 2017

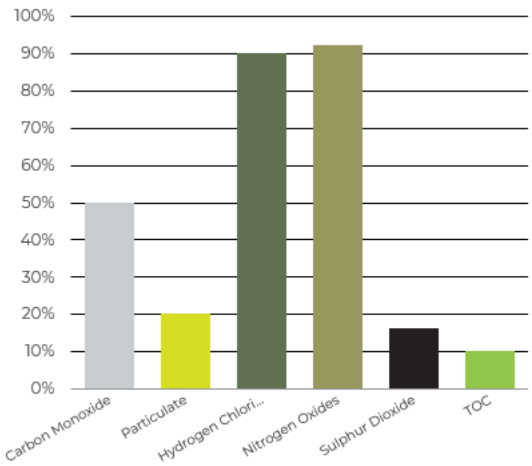


June 2017

Maximum Emission as a % of ½ hour ELV June 2017

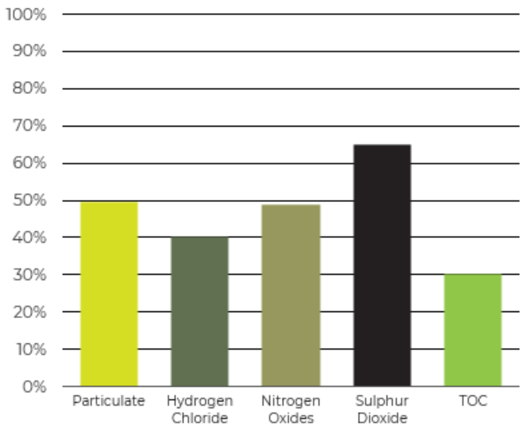


Maximum Emission as a % of Daily ELV June 2017

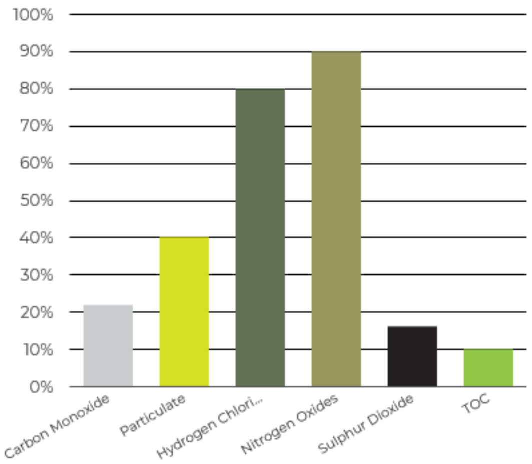


July 2017

Maximum Emission as a % of ½ hour ELV July 2017

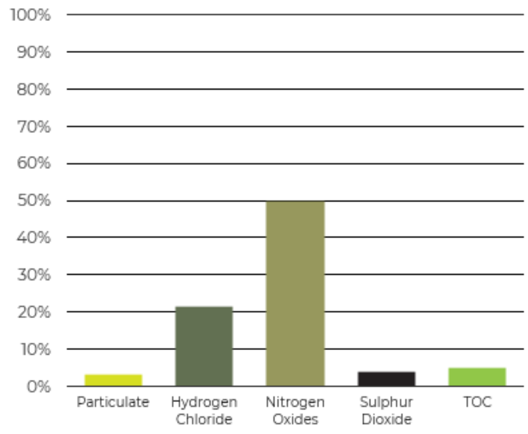


Maximum Emission as a % of Daily ELV July 2017

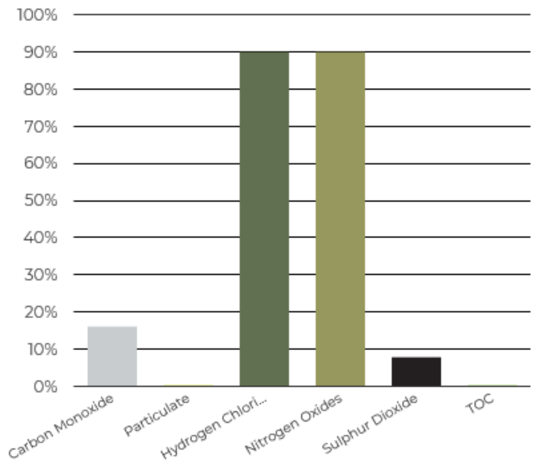


August 2017

Maximum Emission as a % of ½ hour ELV August 2017

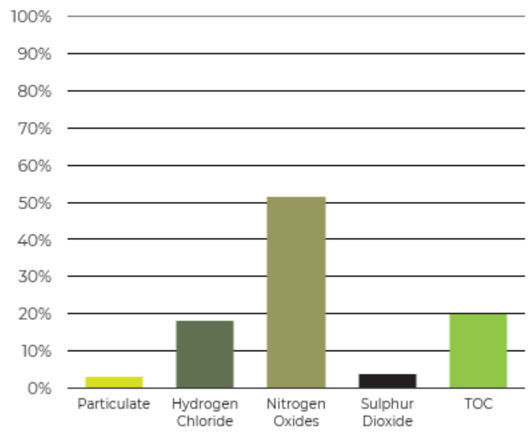


Maximum Emission as a % of Daily ELV August 2017

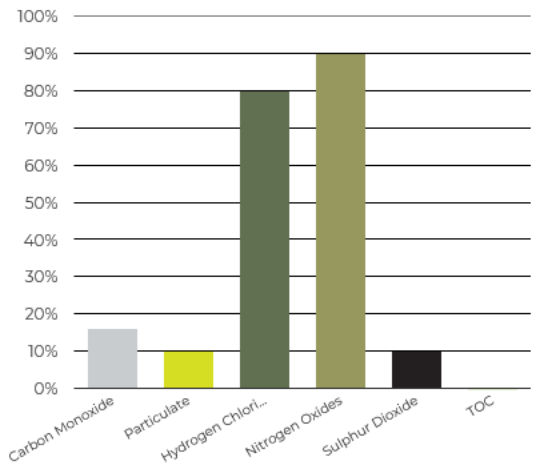


September 2017

Maximum Emission as a % of ½ hour ELV September 2017

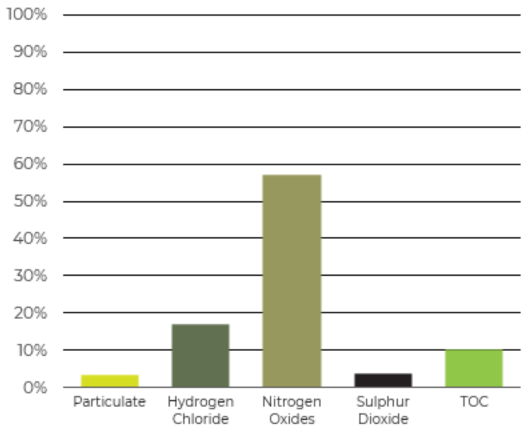


Maximum Emission as a % of Daily ELV September 2017

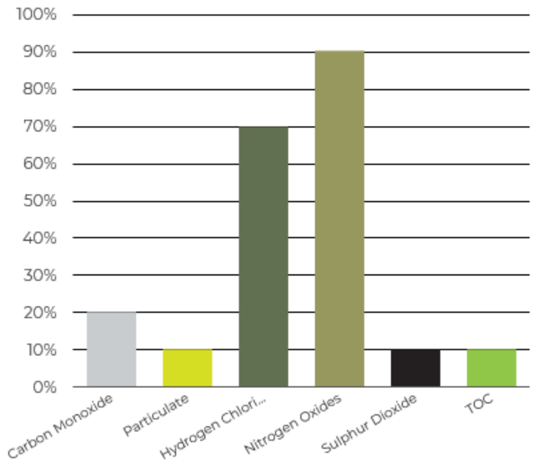


October 2017

Maximum Emission as a % of ½ hour ELV October 2017

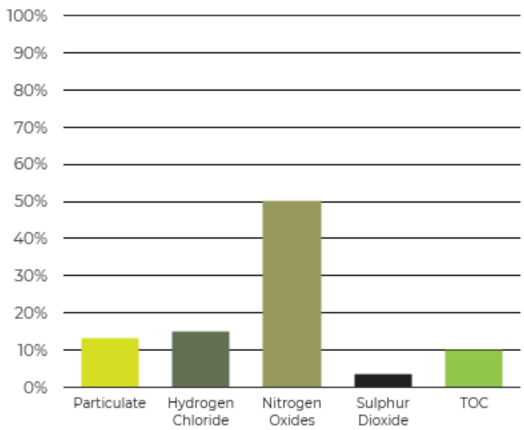


Maximum Emission as a % of Daily ELV October 2017

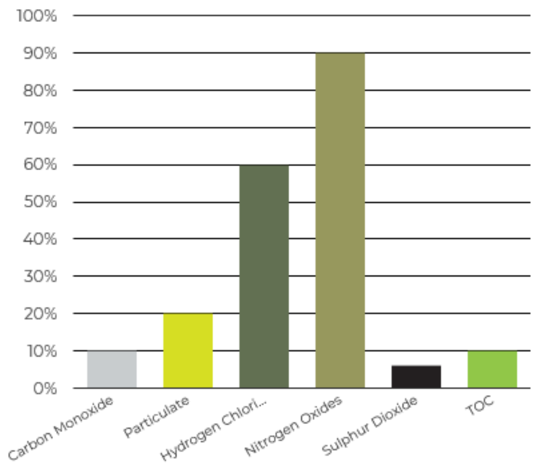


November 2017

Maximum Emission as a % of ½ hour ELV November 2017



Maximum Emission as a % of Daily ELV November 2017

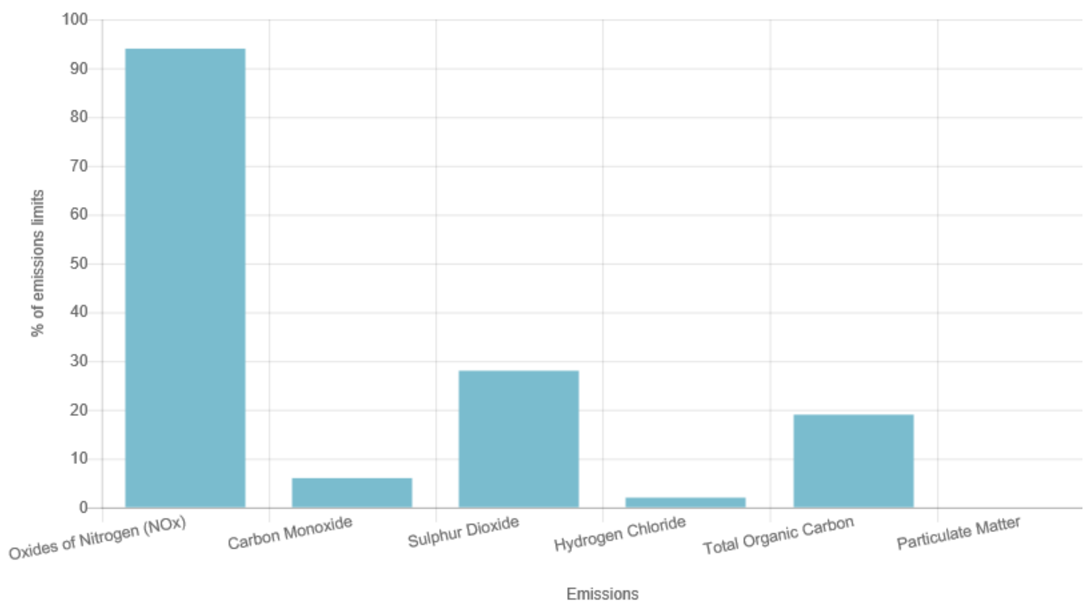


Appendix C. Newhaven EfW emissions data

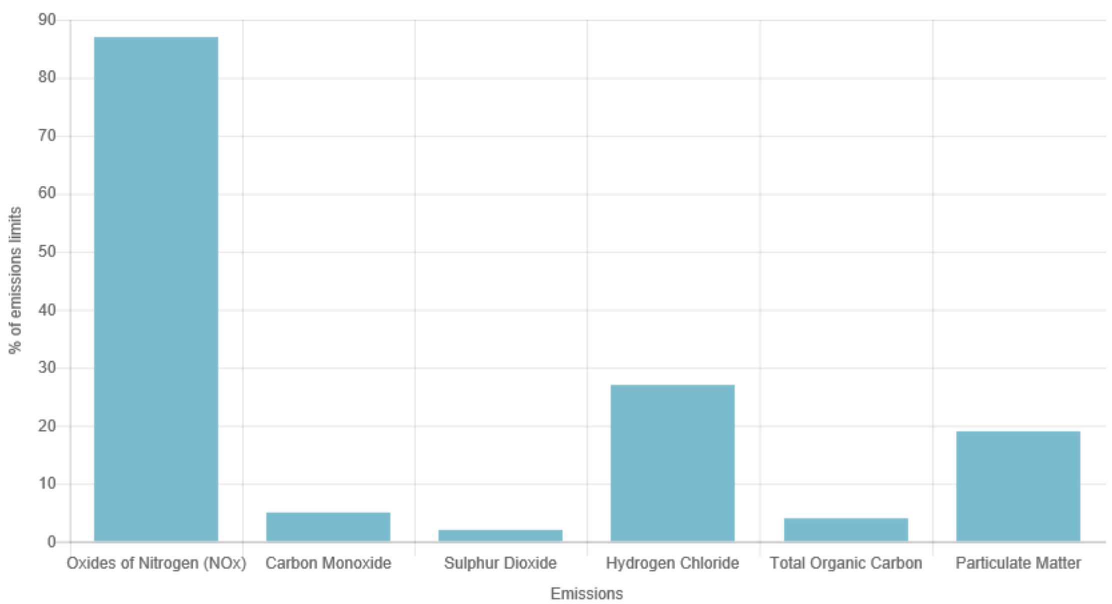
C.1 2020 Emissions

1. Publicly reported continuously monitored emissions reports

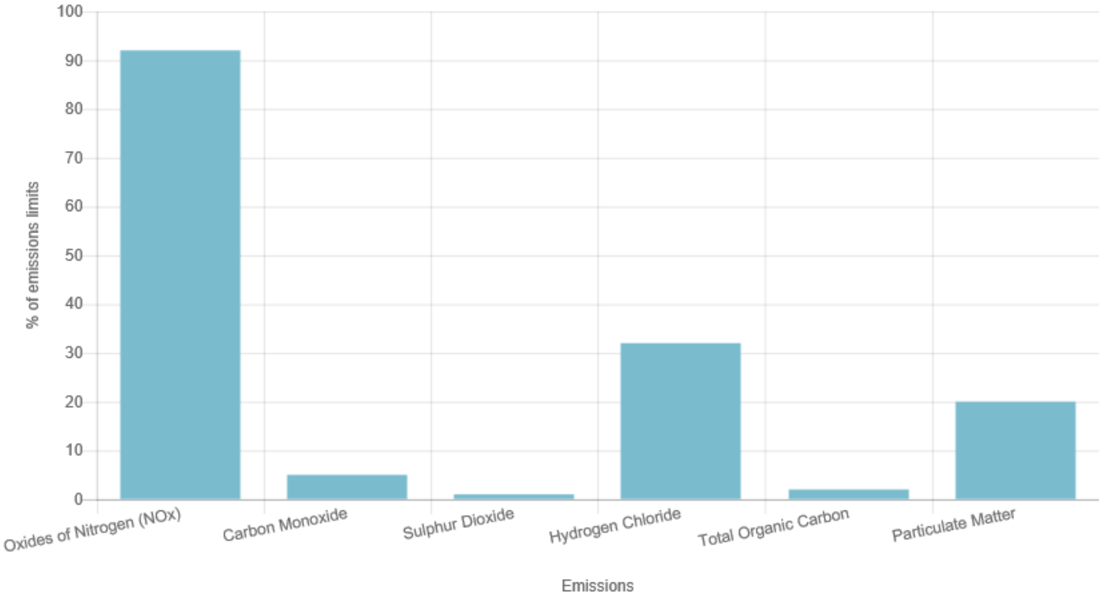
January 2020



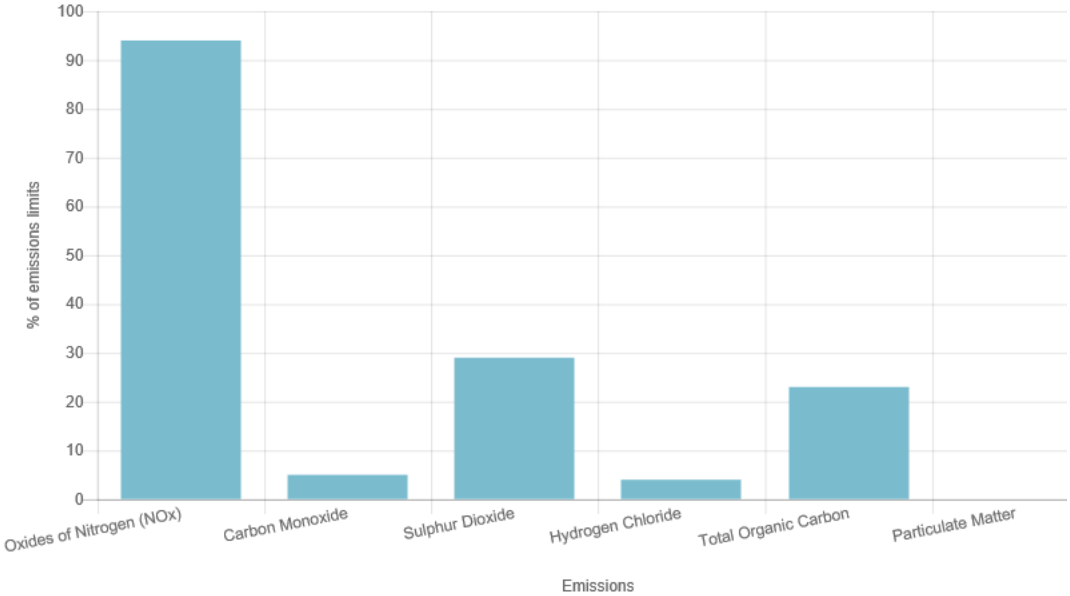
February 2020



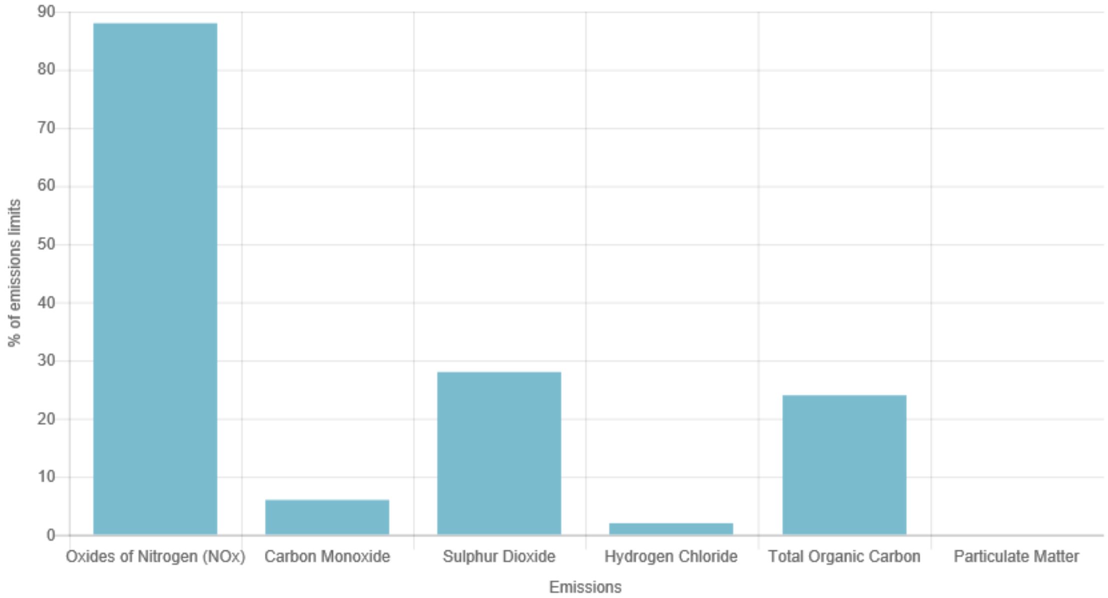
March 2020



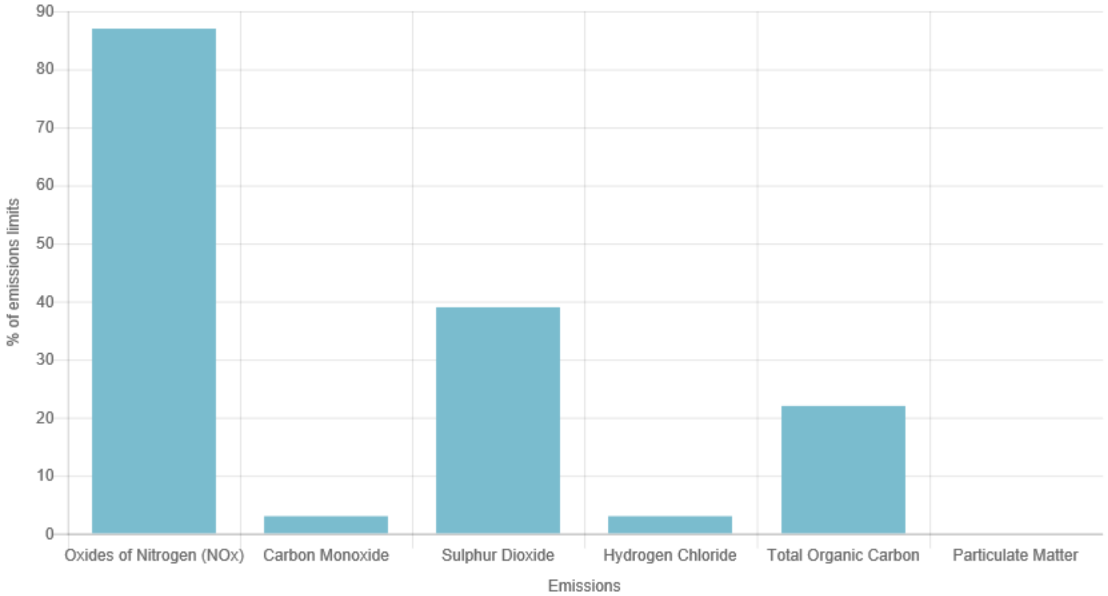
April 2020



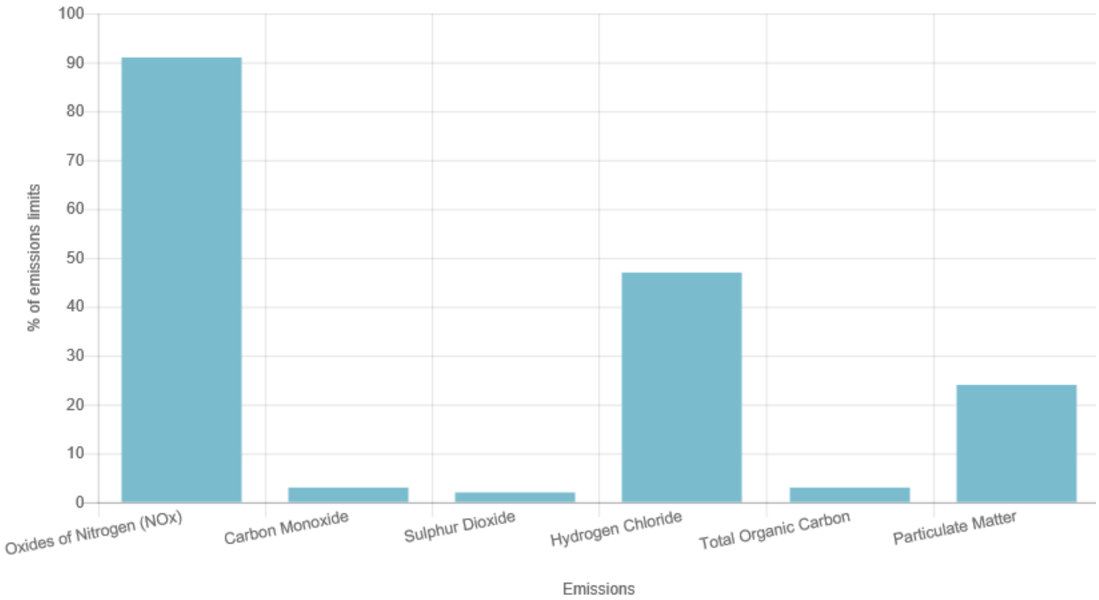
May 2020



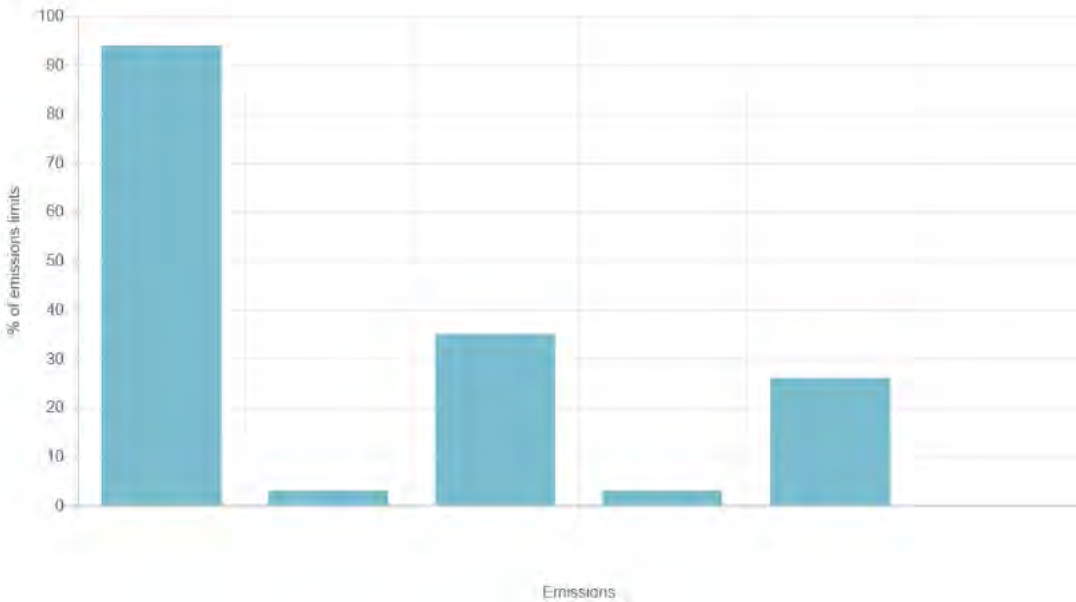
June 2020



July 2020



August 2020



C.2 2019 Emissions

1. **Extracts of Emissions Information from Newhaven Annual Performance Report 2019**

Annual Performance Report 2019

Permit EPR/BV8067IL

Newhaven Energy Recovery Facility

Veolia ES South Downs Ltd

Year:	2019		
Address:	North Quay Road, East Sussex, BN9 0AB		
Tel:	08453 550 550		
Email:			
Prepared by:	Naomi Gronn	Position:	Environmental Technician
Approved by:	Paul McMullen	Position:	Facility Manager
Version:	1		
Issue Date:	January 2020		

Six-monthly Reporting of Emissions to Air for the period: July to December 2019

Permit EPR/BV8067IL | Operator: Veolia ES South Downs L

Facility: Newhaven Energy Recovery Facility | Form: BV8067IL/A7

Emission Point	Substance / Parameter	Emission Limit Value	Result [1]	Test Method [2]	Sample Date and Times [3]	Accreditation/ Certification [4]	Uncertainty [5]
A1 A2	Hydrogen fluoride	2 mg/m3 over minimum 1 hour period	<0.036 0.053	BS ISO 15713	12/11/2019 16:47-17:47 13/11/2019 16:07-17:07	UKAS+MCERTS	0.002 0.003
A1 A2	Cadmium & thallium and their compounds (total)	0.5 mg/m3 over minimum 30 minute, maximum 8 hour period	0.00091 0.00072	BS EN 14385	12//11/2019 17:06-18:12 13/11/2019 16:07-17:13	UKAS+MCERTS	0.00015 0.00012
A1 A2	Mercury and its compounds	0.05 mg/m3 over minimum 30 minute, maximum 8 hour period	0.00074 0.00072	BS EN 13211	12//11/2019 17:06-18:12 13/11/2019 16:07-17:13	UKAS+MCERTS	0.00017 0.00017
A1 A2	Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m3 over minimum 30 minute, maximum 8 hour period	0.038 0.016	BS EN 14385	12//11/2019 17:06-18:12 13/11/2019 16:07-17:13	UKAS+MCERTS	0.007 0.003
A1 A2	Nitrous oxide (N2O)	No limit applies over minimum 1 hour period	2.8 2.0	BS EN ISO 21258	12/11/2019 11:00-13:00 13/11/2019 13:10-15:10	UKAS+MCERTS	3.8 3.5
A1 A2	Dioxins / furans (I-TEQ)6	0.1 ng/m3 over minimum 6 hour, maximum 8 hour period	0.00068 - 0.00072 0.0029 - 0.0030	BS EN 1948-1,2,3	12/11/2019 09:46-15:48 13/11/2019 09:06-15:09	UKAS+MCERTS	0.00014 - 0.00015 0.0006
A1 A2	Dioxins / furans (WHO-TEQ Humans / Mammals) 6	No limit applies, over minimum 6 hour 8 hour period	0.00062 - 0.00066 0.0028 - 0.0029	BS EN 1948-1,2,3	12/11/2019 09:46-15:48 13/11/2019 09:06-15:09	UKAS+MCERTS	0.00013 - 0.00014 0.0006
A1 A2	Dioxins / furans (WHO-TEQ Fish) 6	No limit applies, over minimum 6 hour 8 hour period	0.00062 - 0.00067 0.0023	BS EN 1948-1,2,3	12/11/2019 09:46-15:48 13/11/2019 09:06-15:09	UKAS+MCERTS	0.00013 - 0.00014 0.0005
A1 A2	Dioxins / furans (WHO-TEQ Birds) 6	No limit applies, over minimum 6 hour 8 hour period	0.0011 - 0.0012 0.0034 - 0.0035	BS EN 1948-1,2,3	12/11/2019 09:46-15:48 13/11/2019 09:06-15:09	UKAS+MCERTS	0.0002 0.0007
A1 A2	Dioxin-like PCBs (WHO-TEQ Humans / Mammals)6	No limit applies, over minimum 6 hour 8 hour period	0.000061 0.00016	BS EN 1948-4	12/11/2019 09:46-15:48 13/11/2019 09:06-15:09	UKAS+MCERTS	0.000013 0.00003-0.00002
A1 A2	Dioxin-like PCBs (WHO-TEQ Fish)6	No limit applies, over minimum 6 hour 8 hour period	0.000003 0.000007	BS EN 1948-4	12/11/2019 09:46-15:48 13/11/2019 09:06-15:09	UKAS+MCERTS	0.000001 0.000001
A1 A2	Dioxin-like PCBs (WHO-TEQ Birds)6	No limit applies, over minimum 6 hour 8 hour period	0.00022 0.00043	BS EN 1948-4	12/11/2019 09:46-15:48 13/11/2019 09:06-15:09	UKAS+MCERTS	0.00005 0.00009
A1 A2	Poly-cyclic aromatic hydrocarbons (PAHs) Total	No limit applies, over minimum 6 hour 8 hour period	0.062 0.12	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.013 0.02
A1 A2	Anthanthrene	No limit applies, over minimum 6 hour 8 hour period	<0.0008 <0.0007	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0002 0.0022
A1 A2	Benzo[a]anthracene	No limit applies, over minimum 6 hour 8 hour period	<0.0008 <0.0007	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0002 0.0002
A1 A2	Benzo[a]pyrene	No limit applies, over minimum 6 hour 8 hour period	<0.0008 0.0013	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0002 0.0003
A1 A2	Benzo[b]fluoranthene	No limit applies, over minimum 6 hour 8 hour period	<0.0008 0.0013	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0002 0.0003
A1 A2	Benzo[b]naph(2,1-d)thiophene	No limit applies, over minimum 6 hour 8 hour period	0.0008 0.0009	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0002 0.0002
A1 A2	Benzo[c]phenanthrene	No limit applies, over minimum 6 hour 8 hour period	<0.0008 <0.0007	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0002 0.0002
A1 A2	Benzo[ghi]perylene	No limit applies, over minimum 6 hour 8 hour period	0.0008 0.0043	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0002 0.0009
A1 A2	Benzo[k]fluoranthene	No limit applies, over minimum 6 hour 8 hour period	<0.0008 0.0013	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0002 0.00028
A1 A2	Cholanthrene	No limit applies, over minimum 6 hour 8 hour period	<0.0008 <0.0007	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0002 0.00015
A1 A2	Chrysene	No limit applies, over minimum 6 hour 8 hour period	0.0008 0.0012	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0002 0.00024
A1 A2	Cyclopenta(c,d)pyrene	No limit applies, over minimum 6 hour 8 hour period	0.0008 0.0021	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0002 0.00043
A1 A2	Dibenzo[a,i]pyrene	No limit applies, over minimum 6 hour 8 hour period	<0.0008 <0.0007	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0002 0.00015
A1 A2	Dibenzo[ah]anthracene	No limit applies, over minimum 6 hour 8 hour period	<0.0008 <0.0007	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0002 0.00015
A1 A2	Fluoranthene	No limit applies, over minimum 6 hour 8 hour period	0.0066 0.061	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0014 0.013
A1 A2	Indo[1,2,3-cd]pyrene	No limit applies, over minimum 6 hour 8 hour period	0.0008 0.00089	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.0002 0.00018
A1 A2	Naphthalene	No limit applies, over minimum 6 hour 8 hour period	0.044 0.036	BS ISO 11338-1,2	12/11/2019 09:47-15:49 13/11/2019 09:08-15:11	UKAS+MCERTS	0.009 0.007

[1] The result given is the maximum value (or the minimum value in the case of a limit that is expressed as a minimum) obtained during the reporting period, expressed in the same terms as the emission limit value. Where the emission limit value is expressed as a range, the result is given as the 'minimum – maximum' measured values.

[2] Where an internationally recognised standard test method is used the reference number is given. Where another method that has been formally agreed with the Agency is used, then the appropriate identifier is given. In other cases the principal technique is stated, e.g. gas chromatography.

[3] For non-continuous measurements the date and time of the sample that produced the result is given. For continuous measurements the percentage of the process operating time covered by the result is given.

[4] The accreditation status of the equipment and/or the monitoring organisation, as appropriate, for the methods used for both sampling and analysis.

[5] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

[6] The result to be reported as a range based on: All congeners less than the detection limit assumed to be zero as a minimum, and all congeners less than the detection limit assumed to be at the detection limit as a maximum

Signed: ________________ Date: 24th January 202

Summary of Permit Compliance

Compliance with permit limits for continuously monitored pollutants

The plant met its emission limits as shown in the table below:

Substance	Percentage time compliant during operation	
	Half-hourly limit	**Daily limit**
Particulates	100%	100%
Oxides of nitrogen	100%	100%
Sulphur dioxide	100%	100%
Carbon monoxide	100% 95% of 10-min averages	100%
Total organic carbon	100%	100%
Hydrogen chloride	100%	100%
Hydrogen fluoride		
	100%	100%

Summary of any notifications or non-compliances under the permit

Date	Summary of notification or non-compliance [including Line/Reference]	Reason	Measures taken to prevent reoccurrence

Summary of any complaints received and actions to taken to resolve them.

Date	Summary of complaint [including Line/Reference]	Reason *	Measures taken to prevent reoccurrence

* including whether substantiated by the operator or the EA

Emissions to Air (periodically monitored)

Summary of monitoring undertaken, standards used and compliance

Results of emissions to air that are periodically monitored							
Substance	Ref. Period	Emission Limit Value	Average				
			A1	A2	A3	A4	A5
Hydrogen fluoride	1 hr	2 mg/m^3	0.036	0.042			
Cd and Th and their compounds	6-8hrs	0.05 mg/m^3	0.00084	0.00096			
Hg and its compounds	6-8hrs	0.05 mg/m^3	0.00252	0.006315			
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	6-8hrs	0.5 mg/m^3	0.033	0.0185			
Dioxins & Furans (I-TEQ)	6-8hrs	0.1 ng/m^3	0.00351	0.0036			
PCBs (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m^3	0.000126	0.000165			
PCBs (WHO-TEQ Fish)	6-8hrs	None set ng/m^3	6.5E-06	7.85E-06			
PCBs (WHO-TEQ Birds)	6-8hrs	None set ng/m^3	0.00047	0.0005			
Dioxins & Furans (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m^3	0.00348	0.00365			
Dioxins & Furans (WHO-TEQ Fish)	6-8hrs	None set ng/m^3	0.002735	0.0034			
Dioxins & Furans (WHO-TEQ Birds)	6-8hrs	None set ng/m^3	0.00425	0.00465			
Anthanthrene	6-8hrs	None set µg/m^3	0.0089	0.00835			
Benzo(a)anthracene	6-8hrs	None set µg/m^3	0.0089	0.00835			
Benzo(a)pyrene	6-8hrs	None set µg/m^3	0.0089	0.00835			
Benzo(b)fluoranthene	6-8hrs	None set µg/m^3	0.0089	0.00865			
Benzo(b)naptho(2,1-d) thiophene	6-8hrs	None set µg/m^3	0.0089	0.00845			
Benzo(c)phenanthrene	6-8hrs	None set µg/m^3	0.0089	0.00835			
Benzo(ghi)perylene	6-8hrs	None set µg/m^3	0.0089	0.00835			
Benzo(k)fluoranthene	6-8hrs	None set µg/m^3	0.0089	0.01015			
Cholanthrene	6-8hrs	None set µg/m^3	0.0089	0.00865			
Chrysene	6-8hrs	None set µg/m^3	0.0179	0.0086			
Cyclopenta(cd)pyrene	6-8hrs	None set µg/m^3	0.0089	0.00905			
Dibenzo(ai)pyrene	6-8hrs	None set µg/m^3	0.0089	0.00835			
Dibenzo(ah)anthracene	6-8hrs	None set µg/m^3	0.0089	0.00835			
Fluoranthene	6-8hrs	None set µg/m^3	0.0208	0.0385			
Indeno(123-cd) pyrene	6-8hrs	None set µg/m^3	0.0089	0.008445			
Naphthalene	6-8hrs	None set µg/m^3	0.6522	0.568			
Comments :							

Emissions to Air (continuously monitored)

Summary of monitoring undertaken, standards used and compliance
Monitoring undertaken in accordance with the standards listed in the Permit, compliance was maintained for 100% of 2019

Results of emissions to air that are continuously monitored

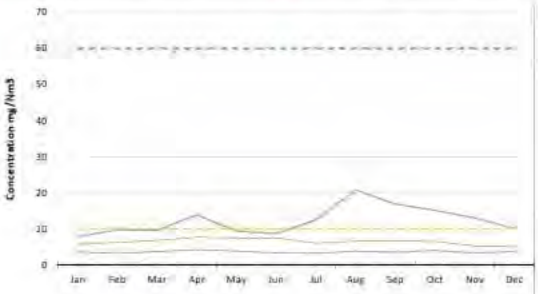
Substance	Reference Period	Emission Limit Value	A1		A2		A3		A4		A5	
			Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.
Oxides of nitrogen	Daily mean	200 mg/m³	193.50	189	192.40	189						
	½ hourly mean	400 mg/m³	247.50	189	248.00	189						
Particulates	Daily mean	10 mg/m³	6.00	2.12	4.40	0.98						
	½ hourly mean	30 mg/m³	13.80	2.17	43.60	1.02						
Total Organic Carbon	Daily mean	10 mg/m³	1.10	0.23	0.70	0.23						
	½ hourly mean	20 mg/m³	9.10	0.25	6.50	0.26						
Hydrogen chloride	Daily mean	10 mg/m³	6.50	2.80	7.80	4.59						
	½ hourly mean	60 mg/m³	20.80	2.86	20.00	4.63						
Sulphur dioxide	Daily mean	50 mg/m³	17.40	0.60	20.30	0.13						
	½ hourly mean	200 mg/m³	35.70	0.69	54.30	0.22						
Carbon monoxide	Daily mean	50 mg/m³	8.00	1.60	23.50	3.80						
	95%ile 10-min avg *	150 mg/m³ *	9.16	9.16	687.20	18.11						
Ammonia	Daily mean	No limit set	0.70	0.25	1.00	0.25						

* = delete or amend as appropriate

Comments :

Monitoring of Hydrogen Chloride emission: Whole Installatior *See Notes in Cell Q3*

mg/Nm³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	**1/2 hourly HCl ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily HCl ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	60	3.70	7.90	10	3.65	5.80
Feb	60	3.30	9.70	10	3.20	6.30
Mar	60	3.80	9.60	10	3.75	6.90
Apr	60	4.35	14.00	10	4.30	7.80
May	60	3.95	9.40	10	4.00	7.50
Jun	60	3.50	8.80	10	3.50	7.50
Jul	60	3.30	12.50	10	3.30	6.10
Aug	60	3.90	20.80	10	3.90	6.70
Sep	60	3.70	16.90	10	3.55	6.80
Oct	60	4.15	15.20	10	4.00	6.50
Nov	60	3.50	13.10	10	3.40	5.30
Dec	60	3.80	10.20	10	3.80	5.30



Monitoring of Hydrogen Chloride emission: Per Combustion Line

2019	mg/Nm3	Monthly 1/2 hourly mean	Monthly 1/2 hourly maximum	Monthly daily mean	Monthly daily maximum
A1	Jan	2.80	7.10	2.80	4.70
	Feb	2.10	3.90	2.00	2.80
	Mar	2.40	6.50	2.30	3.50
	Apr	2.60	4.70	2.50	3.70
	May	2.90	5.40	2.90	4.20
	Jun	2.00	3.30	2.00	2.80
	Jul	2.00	12.50	2.00	4.70
	Aug	2.90	20.80	2.90	4.80
	Sep	2.70	10.30	2.40	3.80
	Oct	4.20	8.70	4.20	6.50
	Nov	3.60	10.20	3.50	5.20
	Dec	4.10	7.10	4.10	5.30
	Annual	2.86	20.80	2.80	6.50

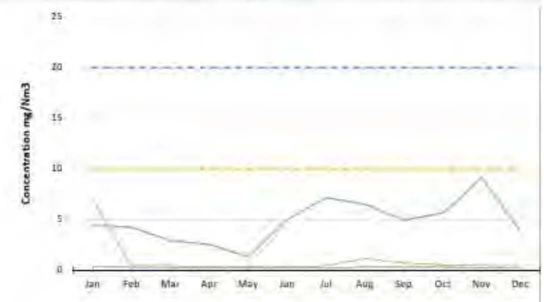
2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A2	Jan	4.60	7.90	4.50	5.80
	Feb	4.50	9.70	4.40	6.30
	Mar	5.20	9.60	5.20	6.90
	Apr	6.10	14.00	6.10	7.80
	May	5.00	9.40	5.10	7.50
	Jun	5.00	8.80	5.00	7.50
	Jul	4.60	7.90	4.60	6.10
	Aug	4.90	20.00	4.90	6.70
	Sep	4.70	16.90	4.70	6.80
	Oct	4.10	15.20	3.80	6.20
	Nov	3.40	13.10	3.30	5.30
	Dec	3.50	10.20	3.50	5.00
	Annual	4.63	20.00	4.59	7.80

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A3	Jan				
	Feb				
	Mar				
	Apr				
	May				
	Jun				
	Jul				
	Aug				
	Sep				
	Oct				
	Nov				
	Dec				
	Annual	#DIV/0!	0	#DIV/0!	0

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A4	Jan				
	Feb				
	Mar				
	Apr				
	May				
	Jun				
	Jul				
	Aug				
	Sep				
	Oct				
	Nov				
	Dec				
	Annual	#DIV/0!	0	#DIV/0!	0

Monitoring of Total organic carbon emissions Whole Installation — See *Notes in Cell Q3*

mg/Nm³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly TOC ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily TOC ELV	Monthly daily mean	Highest daily maximum
Jan	20	0.35	4.40	10	0.30	7.00
Feb	20	0.30	4.20	10	0.25	0.40
Mar	20	0.25	2.90	10	0.20	0.40
Apr	20	0.20	2.50	10	0.20	0.30
May	20	0.20	1.30	10	0.20	0.30
Jun	20	0.20	5.00	10	0.20	0.30
Jul	20	0.20	7.10	10	0.20	0.40
Aug	20	0.30	6.50	10	0.30	1.10
Sep	20	0.35	4.90	10	0.20	0.70
Oct	20	0.30	5.60	10	0.25	0.50
Nov	20	0.20	9.10	10	0.20	0.40
Dec	20	0.20	3.80	10.00	0.20	0.40



Monitoring of Total organic carbon emissions Per Combustion Line

2019	mg/Nm3	Monthly 1/2 hourly mean	Monthly 1/2 hourly maximum	Monthly daily mean	Monthly daily maximum
A1	Jan	0.30	1.80	0.30	0.60
	Feb	0.30	4.20	0.20	0.40
	Mar	0.20	2.40	0.20	0.30
	Apr	0.20	2.50	0.20	0.30
	May	0.20	0.90	0.20	0.30
	Jun	0.20	2.70	0.20	0.30
	Jul	0.20	7.10	0.20	0.40
	Aug	0.30	3.50	0.30	1.10
	Sep	0.40	2.20	0.20	0.70
	Oct	0.30	4.20	0.30	0.50
	Nov	0.20	9.10	0.20	0.40
	Dec	0.20	3.80	0.20	0.40
	Annual	0.25	9.10	0.23	1.10

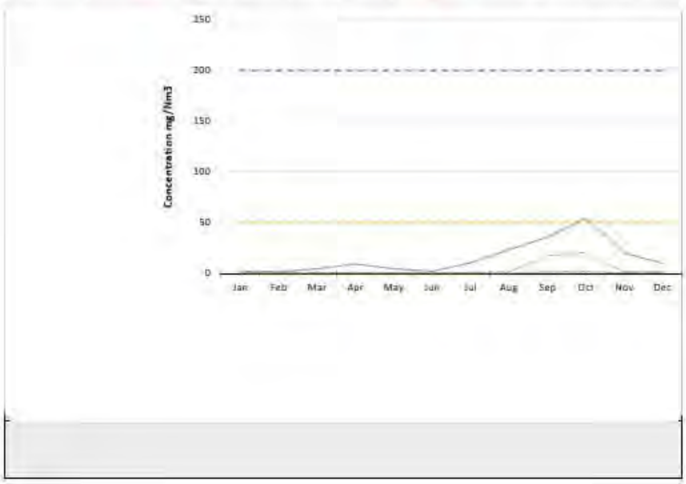
2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A2	Jan	0.40	4.40	0.30	0.70
	Feb	0.30	1.00	0.30	0.40
	Mar	0.30	2.90	0.20	0.40
	Apr	0.20	0.60	0.20	0.30
	May	0.20	1.30	0.20	0.30
	Jun	0.20	5.00	0.20	0.30
	Jul	0.20	3.00	0.20	0.30
	Aug	0.30	6.50	0.30	0.50
	Sep	0.30	4.90	0.20	0.60
	Oct	0.30	5.60	0.20	0.50
	Nov	0.20	0.70	0.20	0.30
	Dec	0.20	2.10	0.20	0.30
	Annual	0.26	6.50	0.23	0.70

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A3	Jan				
	Feb				
	Mar				
	Apr				
	May				
	Jun				
	Jul				
	Aug				
	Sep				
	Oct				
	Nov				
	Dec				
	Annual	#DIV/0!	0	#DIV/0!	0

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A4	Jan				
	Feb				
	Mar				
	Apr				
	May				
	Jun				
	Jul				
	Aug				
	Sep				
	Oct				
	Nov				
	Dec				
	Annual	#DIV/0!	0	#DIV/0!	0

Monitoring of Sulphur dioxide emissions Whole Installatior *See Notes in Cell Q3*

mg/Nm¹	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly SO2 ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily SO2 ELV	Monthly daily mean	Highest daily maximum
Jan	200	0.20	1.90	50	0.15	0.50
Feb	200	0.20	1.80	50	0.15	0.50
Mar	200	0.20	4.50	50	0.20	0.70
Apr	200	0.15	9.10	50	0.15	0.50
May	200	0.20	4.60	50	0.15	0.50
Jun	200	0.20	2.00	50	0.20	0.60
Jul	200	0.25	10.50	50	0.20	0.90
Aug	200	0.20	23.30	50	0.20	1.10
Sep	200	1.50	35.70	50	1.10	17.40
Oct	200	1.65	54.30	50	1.20	20.30
Nov	200	0.40	19.80	50	0.40	1.40
Dec	200	0.30	10.00	50	0.30	1.60



Monitoring of Sulphur dioxide emissions Per Combustion Line

2019	mg/Nm3	Monthly 1/2 hourly mean	Monthly 1/2 hourly maximum	Monthly daily mean	Monthly daily maximum
A1	Jan	0.40	1.90	0.30	0.50
	Feb	0.40	1.80	0.30	0.50
	Mar	0.40	4.50	0.40	0.70
	Apr	0.30	2.10	0.30	0.50
	May	0.40	4.60	0.30	0.50
	Jun	0.40	1.00	0.40	0.60
	Jul	0.50	10.50	0.40	0.90
	Aug	0.40	23.20	0.40	1.10
	Sep	2.90	35.70	2.20	17.40
	Oct	1.00	23.50	1.00	3.40
	Nov	0.70	19.80	0.70	1.40
	Dec	0.50	10.00	0.50	1.00
	Annual	0.69	35.70	0.60	17.40

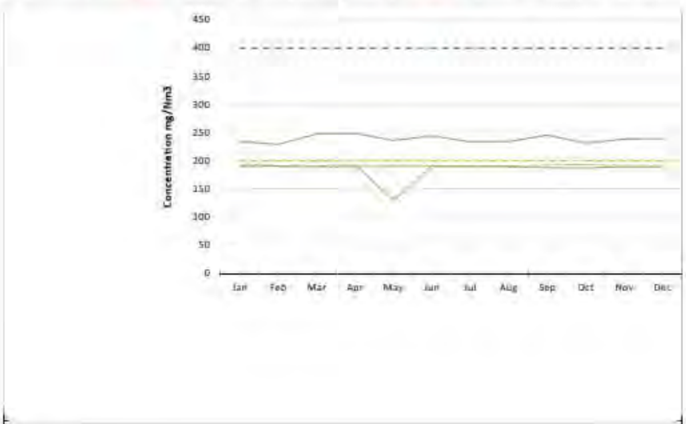
2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A2	Jan	0.00	1.00	0.00	0.00
	Feb	0.00	1.10	0.00	0.00
	Mar	0.00	2.90	0.00	0.30
	Apr	0.00	9.10	0.00	0.10
	May	0.00	0.40	0.00	0.00
	Jun	0.00	2.00	0.00	0.00
	Jul	0.00	0.40	0.00	0.00
	Aug	0.00	15.20	0.00	0.60
	Sep	0.10	16.50	0.00	0.50
	Oct	2.30	54.30	1.40	20.30
	Nov	0.10	15.80	0.10	0.50
	Dec	0.10	8.30	0.10	1.60
	Annual	0.22	54.30	0.13	20.30

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A3	Jan				
	Feb				
	Mar				
	Apr				
	May				
	Jun				
	Jul				
	Aug				
	Sep				
	Oct				
	Nov				
	Dec				
	Annual	#DIV/0!	0	#DIV/0!	0

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A4	Jan				
	Feb				
	Mar				
	Apr				
	May				
	Jun				
	Jul				
	Aug				
	Sep				
	Oct				
	Nov				
	Dec				
	Annual	#DIV/0!	0	#DIV/0!	0

Monitoring of Oxides of Nitrogen emission: Whole Installatior *See Notes in Cell Q3*

mg/Nm³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly NOx ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily NOx ELV	Monthly daily mean	Highest daily maximum
Jan	400	190.15	233.70	200	190.10	193.50
Feb	400	189.95	229.30	200	189.95	191.50
Mar	400	189.20	247.50	200	189.25	191.30
Apr	400	189.40	248.00	200	189.40	191.80
May	400	189.70	236.30	200	189.70	129.40
Jun	400	189.90	243.90	200	189.80	191.20
Jul	400	189.40	233.40	200	189.30	190.70
Aug	400	189.35	234.10	200	189.30	190.70
Sep	400	187.20	245.40	200	188.40	192.00
Oct	400	186.85	231.40	200	187.15	192.40
Nov	400	188.80	238.30	200	188.75	191.00
Dec	400	188.85	238.80	200	188.85	191.50



Monitoring of Oxides of Nitrogen emission: Per Combustion Line

2019	mg/Nm3	Monthly 1/2 hourly mean	Monthly 1/2 hourly maximum	Monthly daily mean	Monthly daily maximum
	Jan	190.20	233.70	190.20	193.50
	Feb	190.10	219.40	190.10	191.50
	Mar	189.50	247.50	189.50	191.30
	Apr	189.50	231.80	189.50	190.80
	May	189.60	231.50	189.60	191.10
	Jun	189.90	220.10	189.80	191.00
A1	Jul	189.60	233.40	189.50	190.70
	Aug	189.50	220.80	189.50	190.70
	Sep	184.90	236.00	187.30	190.40
	Oct	188.40	231.40	188.60	192.40
	Nov	189.50	236.70	189.40	191.00
	Dec	189.00	227.80	189.00	190.30
	Annual	189.14	247.50	189.33	193.50

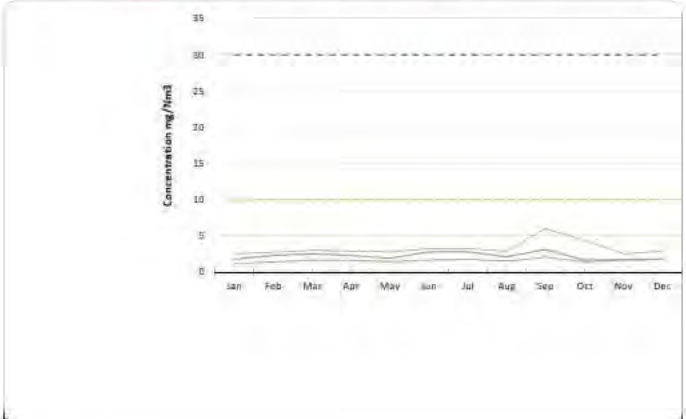
2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
	Jan	190.10	221.60	190.00	191.50
	Feb	189.80	229.30	189.80	191.20
	Mar	188.90	225.20	189.00	190.50
	Apr	189.30	248.00	189.30	191.80
	May	189.80	236.30	189.80	192.40
	Jun	189.90	243.90	189.80	191.20
A2	Jul	189.20	228.90	189.10	190.70
	Aug	189.20	234.10	189.10	190.70
	Sep	189.50	245.40	189.50	192.00
	Oct	185.30	227.20	185.70	190.20
	Nov	188.10	238.30	188.10	191.00
	Dec	188.70	238.80	188.70	191.50
	Annual	188.98	248.00	188.99	192.40

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
	Jan				
	Feb				
	Mar				
	Apr				
	May				
	Jun				
A3	Jul				
	Aug				
	Sep				
	Oct				
	Nov				
	Dec				
	Annual	#DIV/0!	0	#DIV/0!	0

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
	Jan				
	Feb				
	Mar				
	Apr				
	May				
	Jun				
A4	Jul				
	Aug				
	Sep				
	Oct				
	Nov				
	Dec				
	Annual	#DIV/0!	0	#DIV/0!	0

Monitoring of Particulate matter emissions — Whole Installation — See Notes in Cell Q3

mg/Nm³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly PM ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily PM ELV	Monthly daily mean	Highest daily maximum
Jan	30	1.15	1.80	10	1.10	2.50
Feb	30	1.40	2.30	10	1.40	2.70
Mar	30	1.65	2.50	10	1.55	3.00
Apr	30	1.60	2.30	10	1.55	2.90
May	30	1.45	1.90	10	1.35	2.80
Jun	30	1.65	2.80	10	1.60	3.20
Jul	30	1.80	2.80	10	1.75	3.20
Aug	30	1.50	2.10	10	1.50	2.90
Sep	30	2.05	3.10	10	2.00	6.00
Oct	30	1.45	1.60	10	1.40	4.40
Nov	30	1.65	1.70	10	1.60	2.50
Dec	30	1.75	1.80	10	1.75	2.90



Monitoring of Particulate matter emissions — Per Combustion Line

2019	mg/Nm3	Monthly 1/2 hourly mean	Monthly 1/2 hourly maximum	Monthly daily mean	Monthly daily maximum
A1	Jan	1.80	4.90	1.70	2.50
	Feb	2.30	3.50	2.30	2.70
	Mar	2.50	8.10	2.40	3.00
	Apr	2.30	6.00	2.30	2.90
	May	1.90	13.80	1.80	2.80
	Jun	2.60	4.10	2.50	3.20
	Jul	2.80	5.30	2.70	3.20
	Aug	2.10	5.50	2.10	2.90
	Sep	3.10	9.90	3.00	6.00
	Oct	1.30	2.30	1.30	1.50
	Nov	1.60	3.40	1.60	1.80
	Dec	1.70	6.00	1.70	2.90
	Annual	2.17	13.80	2.12	6.00

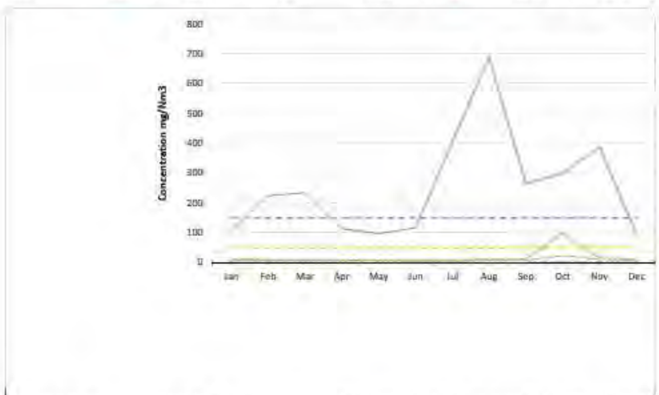
2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A2	Jan	0.50	1.20	0.50	0.70
	Feb	0.50	1.20	0.50	0.80
	Mar	0.80	43.60	0.70	1.70
	Apr	0.90	6.10	0.80	2.30
	May	1.00	4.60	0.90	1.90
	Jun	0.70	4.80	0.70	1.40
	Jul	0.80	3.00	0.80	1.30
	Aug	0.90	6.60	0.90	2.10
	Sep	1.00	3.10	1.00	2.30
	Oct	1.60	14.60	1.50	4.40
	Nov	1.70	3.00	1.60	2.50
	Dec	1.80	15.20	1.80	2.80
	Annual	1.02	43.60	0.98	4.40

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A3	Jan				
	Feb				
	Mar				
	Apr				
	May				
	Jun				
	Jul				
	Aug				
	Sep				
	Oct				
	Nov				
	Dec				
	Annual	#DIV/0!	0	#DIV/0!	0

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A4	Jan				
	Feb				
	Mar				
	Apr				
	May				
	Jun				
	Jul				
	Aug				
	Sep				
	Oct				
	Nov				
	Dec				
	Annual	#DIV/0!	0	#DIV/0!	0

Monitoring of Carbon Monoxide (10-minute avg) — Whole Installation — See Notes in Cell S3

mg/Nm³	10-minute Reference Periods				Daily Reference Periods		
2019	95%ile 10-min avg CO ELV	95%ile 10-min avg maximum	Monthly CO 10-min avg mean	10-min avg maximum	Daily CO ELV	Monthly daily mean	Highest daily maximum
Jan	150	12.60	3.60	107.20	50	3.60	8.10
Feb	150	10.30	3.25	224.10	50	3.25	6.70
Mar	150	10.40	2.50	234.40	50	2.50	8.10
Apr	150	9.10	2.10	113.20	50	2.10	5.40
May	150	8.20	1.95	97.80	50	1.95	5.50
Jun	150	8.30	1.55	116.60	50	1.55	4.50
Jul	150	8.20	1.45	403.80	50	1.45	4.40
Aug	150	12.40	1.90	687.20	50	1.85	7.80
Sep	150	11.50	1.80	265.40	50	1.65	7.30
Oct	150	98.60	4.60	298.50	50	4.50	23.50
Nov	150	14.70	4.55	388.20	50	4.55	10.20
Dec	150	13.00	3.45	96.30	50	3.45	8.50



Environment Agency explanatory note: The 10-minute average ELV is based on the "95th percentile". In this case this means that 95% of the 10 minute averages in the relevant 24-hour period (i.e. 137) must be below 150 mg/Nm3, and 5% (i.e. 7) are allowed to be any value above 150 mg/Nm3. Whilst we expect operators to minimise CO emissions at all times, it is perfectly acceptable for the value of the maximum 10-minute average to be above 150 mg/Nm3, provided the 95th percentile ELV has

Monitoring of Carbon Monoxide (10-minute avg) — Per Combustion Line — Notes:

2019	mg/Nm3	95%ile 10-min avg maximum	Monthly CO 10-min avg mean	10-min avg maximum	Monthly daily mean	Monthly daily maximum
A1	Jan	10.10	2.60	107.20	2.60	4.40
	Feb	7.80	2.00	39.70	2.00	3.90
	Mar	5.90	1.60	88.70	1.60	2.80
	Apr	6.30	1.60	113.20	1.60	3.60
	May	4.60	1.00	39.10	1.00	2.00
	Jun	6.40	0.80	62.40	0.80	2.10
	Jul	6.30	0.70	403.80	0.70	2.90
	Aug	4.50	0.60	89.00	0.60	1.80
	Sep	11.00	0.90	29.30	0.70	1.90
	Oct	32.70	2.60	256.20	2.60	8.00
	Nov	7.70	3.10	388.20	3.10	5.80
	Dec	6.60	1.90	71.60	1.90	3.50
	Annual	9.16	1.62	403.80	1.60	8.00

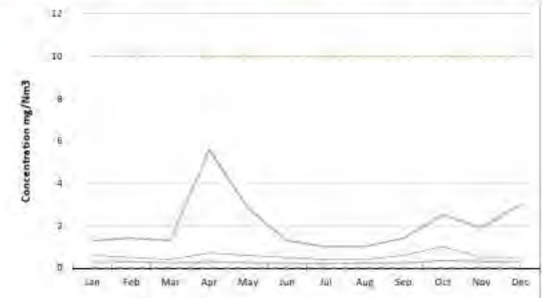
2019	mg/Nm3	95%ile 10-min	Monthly CO 10-	10-min avg	Monthly	Monthly daily
A2	Jan	12.60	4.60	66.10	4.60	8.10
	Feb	10.30	4.50	224.10	4.50	6.70
	Mar	10.40	3.40	234.40	3.40	8.10
	Apr	9.10	2.60	63.90	2.60	5.40
	May	8.20	2.90	97.80	2.90	5.50
	Jun	8.30	2.30	116.60	2.30	4.50
	Jul	8.20	2.20	261.40	2.20	4.40
	Aug	12.40	3.20	687.20	3.10	7.80
	Sep	11.50	2.70	265.40	2.60	7.30
	Oct	98.60	6.60	298.50	6.40	23.50
	Nov	14.70	6.00	41.20	6.00	10.10
	Dec	13.00	5.00	96.30	5.00	8.50
	Annual	18.11	3.83	687.20	3.80	23.50

2019	mg/Nm3	95%ile 10-min	Monthly CO 10-	10-min avg	Monthly	Monthly daily
A3	Jan					
	Feb					
	Mar					
	Apr					
	May					
	Jun					
	Jul					
	Aug					
	Sep					
	Oct					
	Nov					
	Dec					
	Annual	#DIV/0!		0	#DIV/0!	0

2019	mg/Nm3	95%ile 10-min	Monthly CO 10-	10-min avg	Monthly	Monthly daily
A4	Jan					
	Feb					
	Mar					
	Apr					
	May					
	Jun					
	Jul					
	Aug					
	Sep					
	Oct					
	Nov					
	Dec					
	Annual	#DIV/0!		0	#DIV/0!	0

Monitoring of Ammonia emissions **Whole Installatior** *See Notes in Cell Q3*

mg/Nm³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	**1/2 hourly NH3 ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily NH3 ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	0	0.30	1.30	10.00	0.25	0.60
Feb	0	0.30	1.40	10.00	0.30	0.50
Mar	0	0.25	1.30	10.00	0.20	0.40
Apr	0	0.30	5.60	10.00	0.25	0.70
May	0	0.25	2.80	10.00	0.25	0.80
Jun	0	0.25	1.30	10.00	0.20	0.50
Jul	0	0.20	1.00	10.00	0.20	0.40
Aug	0	0.25	1.00	10.00	0.25	0.40
Sep	0	0.25	1.40	10.00	0.20	0.60
Oct	0	0.35	2.50	10.00	0.35	1.00
Nov	0	0.30	1.90	10.00	0.30	0.50
Dec	0	0.30	3.00	10.00	0.25	0.50



An indicated ELV value of zero in the table above means that no ammonia limit is set in the permit.

Monitoring of Ammonia emissions **Per Combustion Line**

2019	mg/Nm3	Monthly 1/2 hourly mean	Monthly 1/2 hourly maximum	Monthly daily mean	Monthly daily maximum
A1	Jan	0.30	1.30	0.30	0.60
	Feb	0.30	1.40	0.30	0.50
	Mar	0.30	1.30	0.20	0.40
	Apr	0.30	5.60	0.30	0.70
	May	0.30	2.80	0.30	0.60
	Jun	0.20	0.90	0.20	0.40
	Jul	0.20	1.00	0.20	0.40
	Aug	0.20	0.60	0.20	0.40
	Sep	0.30	1.40	0.20	0.60
	Oct	0.30	1.90	0.30	0.60
	Nov	0.30	1.90	0.30	0.40
	Dec	0.30	0.60	0.20	0.40
	Annual	0.28	5.60	0.25	0.70

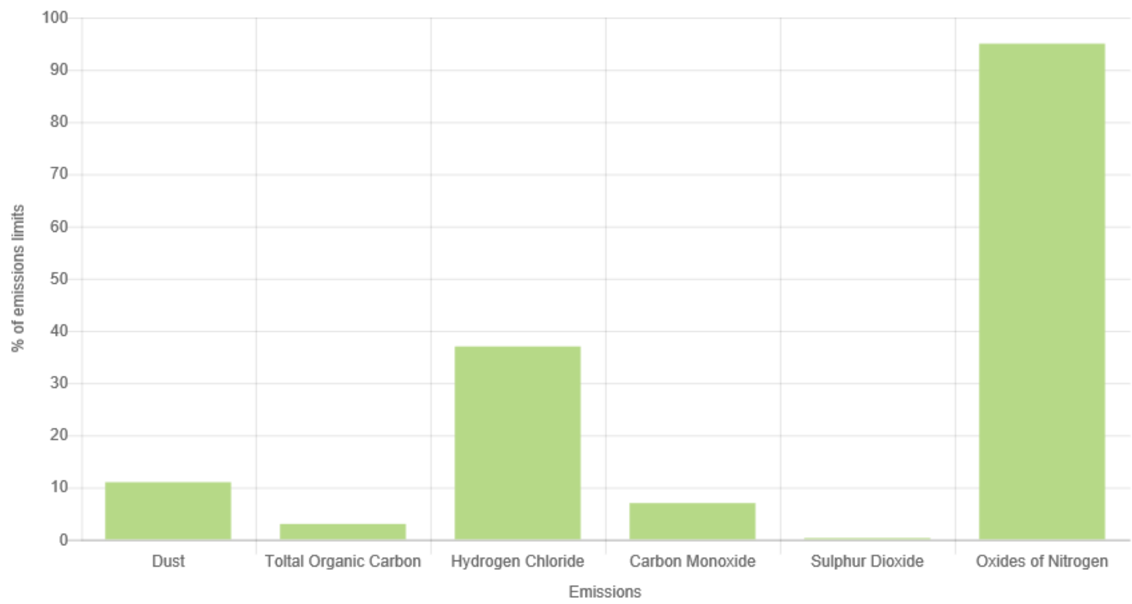
2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A2	Jan	0.30	0.70	0.20	0.40
	Feb	0.30	0.70	0.30	0.50
	Mar	0.20	0.80	0.20	0.40
	Apr	0.30	0.70	0.20	0.40
	May	0.20	0.60	0.20	0.30
	Jun	0.30	1.30	0.20	0.50
	Jul	0.20	0.80	0.20	0.40
	Aug	0.30	1.00	0.30	0.40
	Sep	0.20	0.70	0.20	0.30
	Oct	0.40	2.50	0.40	1.00
	Nov	0.30	1.50	0.30	0.50
	Dec	0.30	3.00	0.30	0.50
	Annual	0.28	3.00	0.25	1.00

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A3	Jan				
	Feb				
	Mar				
	Apr				
	May				
	Jun				
	Jul				
	Aug				
	Sep				
	Oct				
	Nov				
	Dec				
	Annual	#DIV/0!	0	#DIV/0!	0

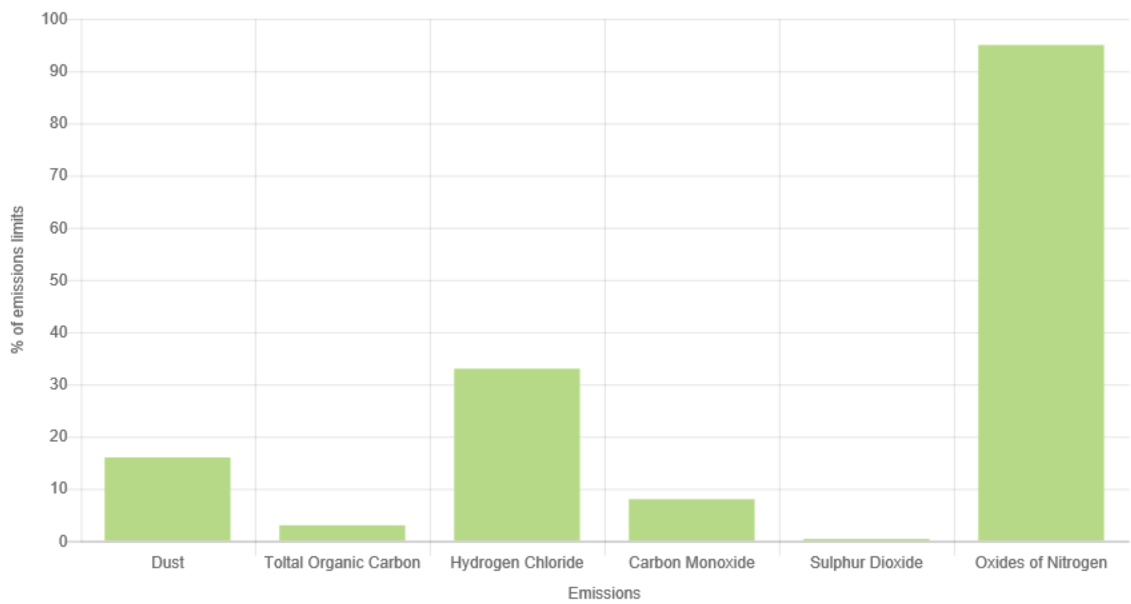
2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly	Monthly daily
A4	Jan				
	Feb				
	Mar				
	Apr				
	May				
	Jun				
	Jul				
	Aug				
	Sep				
	Oct				
	Nov				
	Dec				
	Annual	#DIV/0!	0	#DIV/0!	0

2. Publicly reported continuously monitored emissions reports

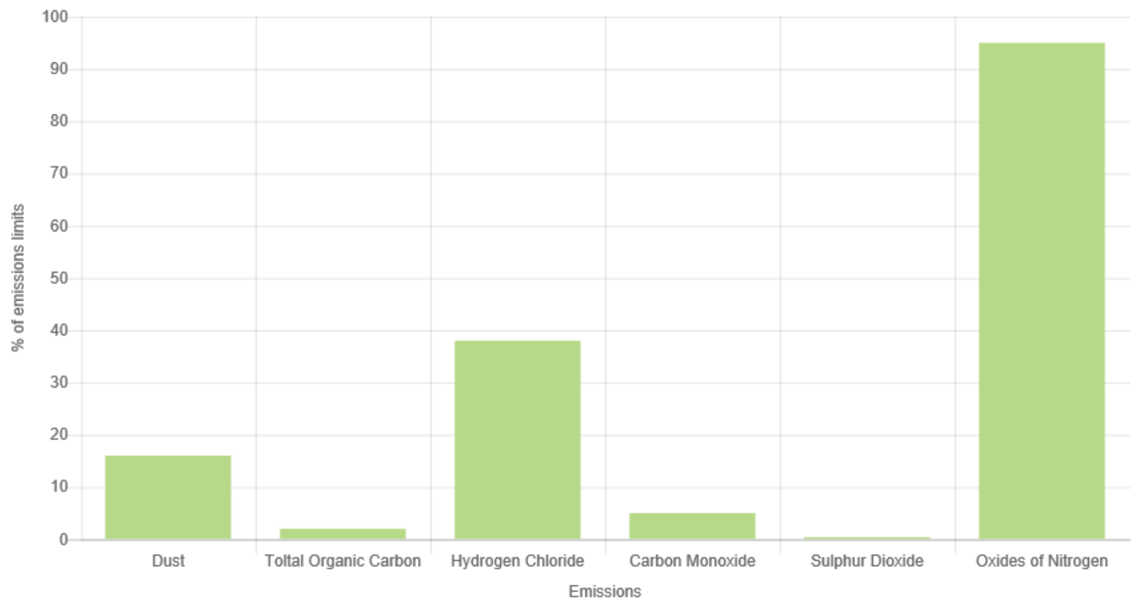
January 2019



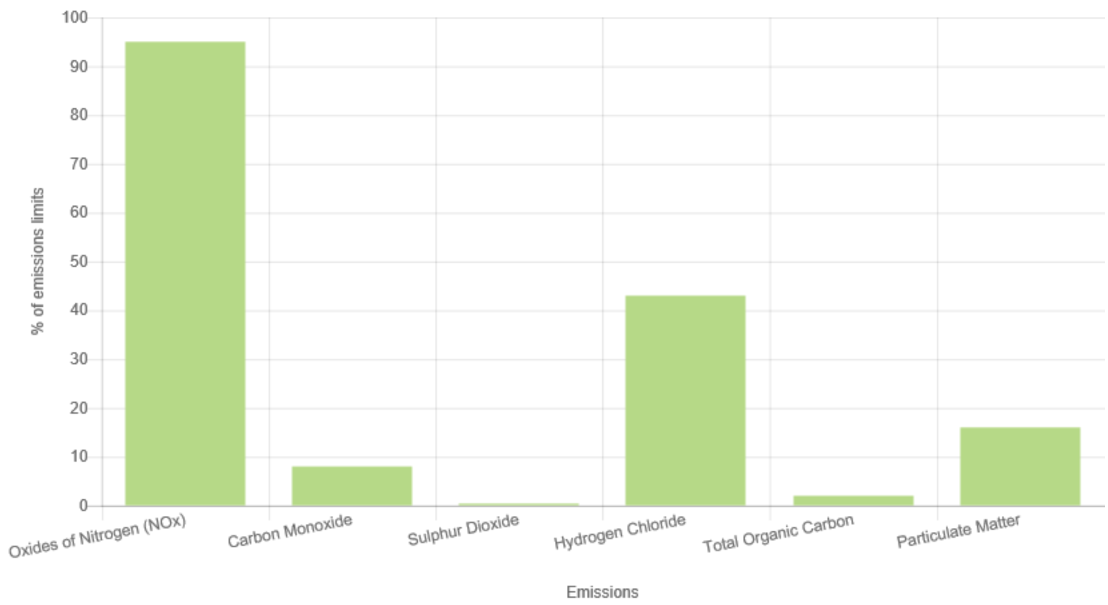
February 2019



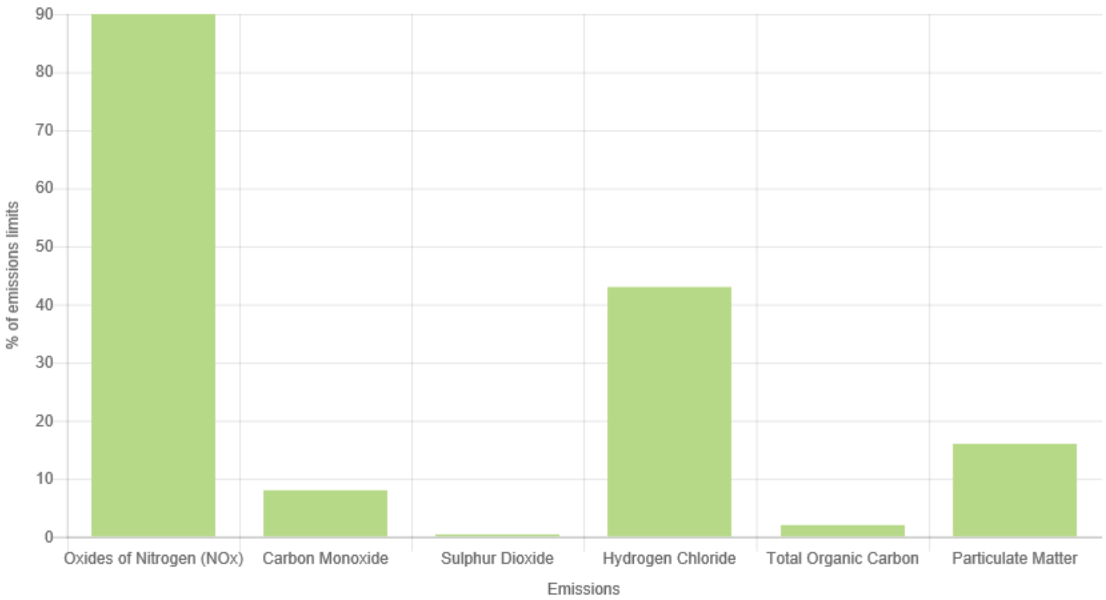
March 2019



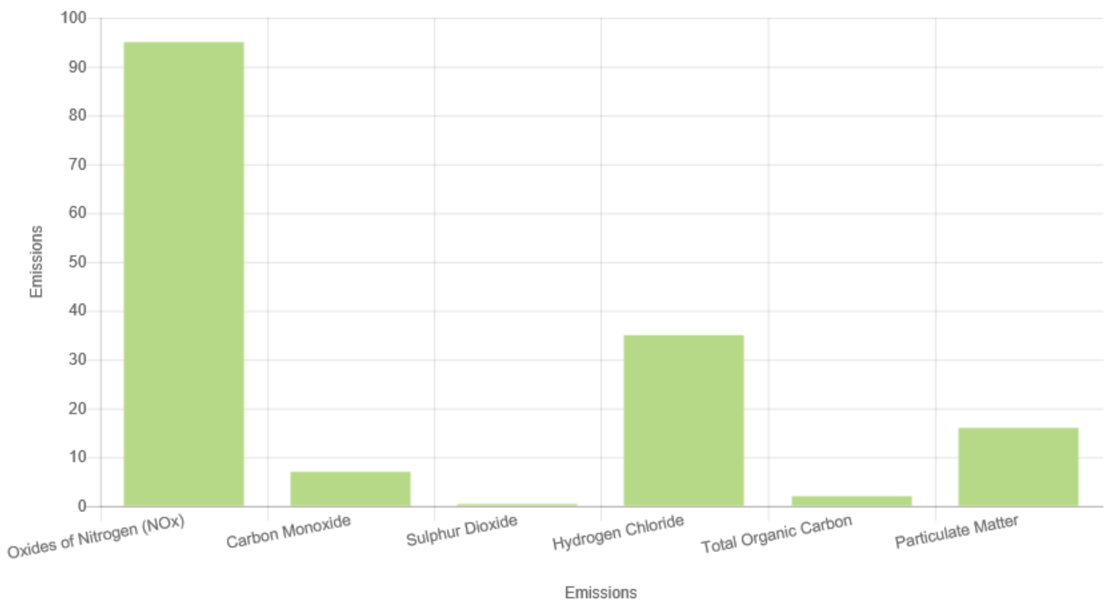
April 2019



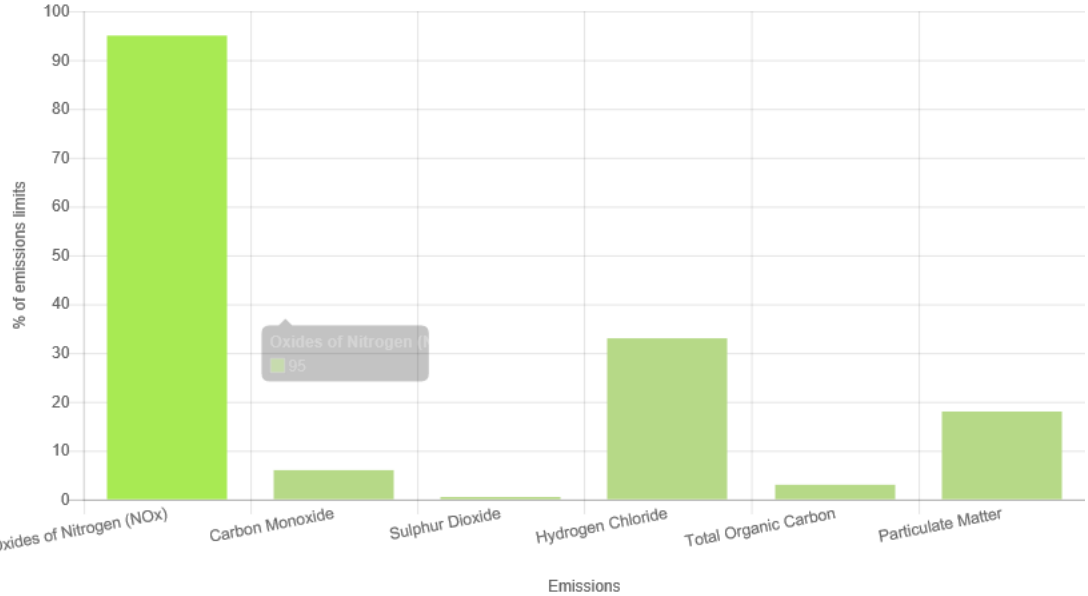
May 2019



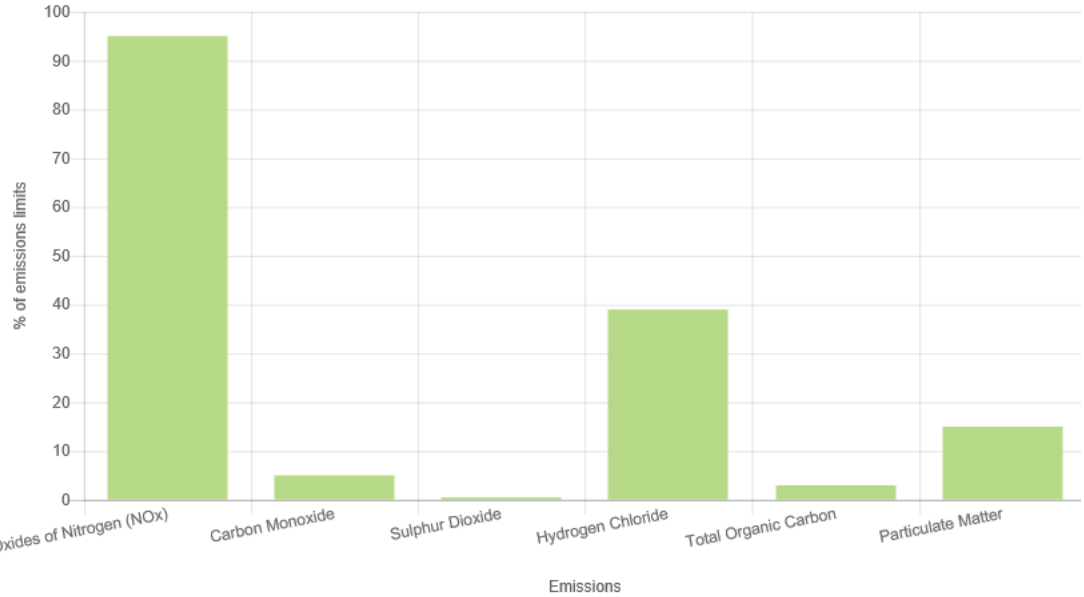
June 2019



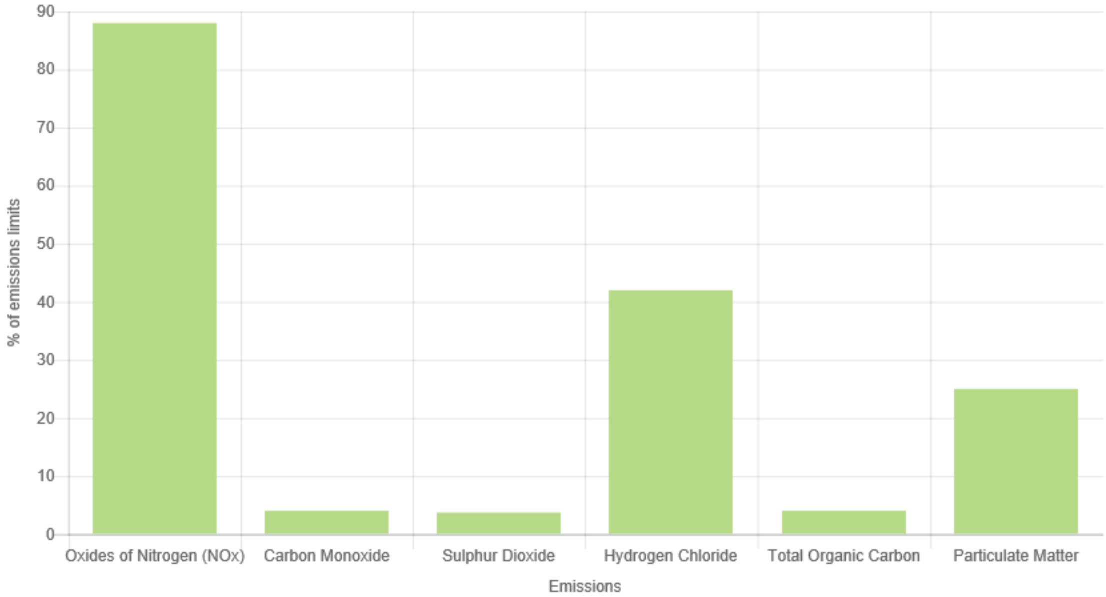
July 2019



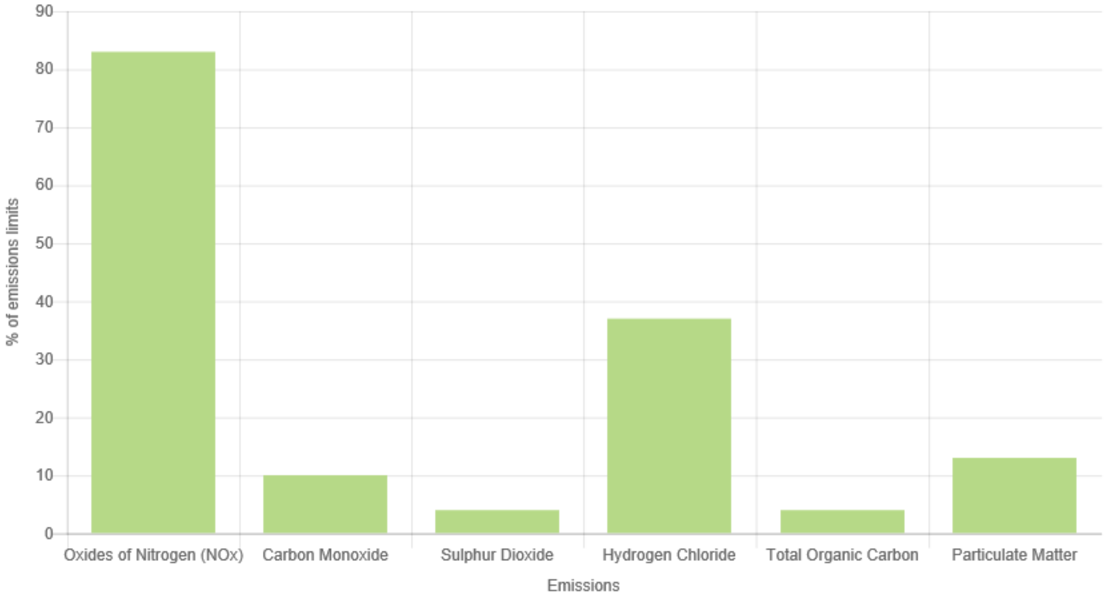
August 2019



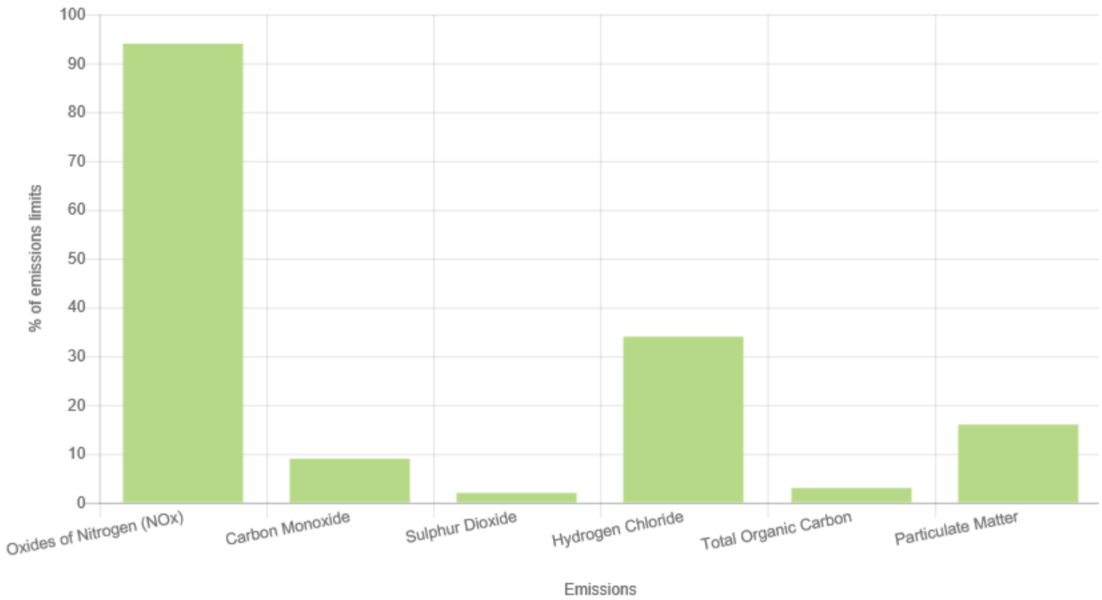
September 2019



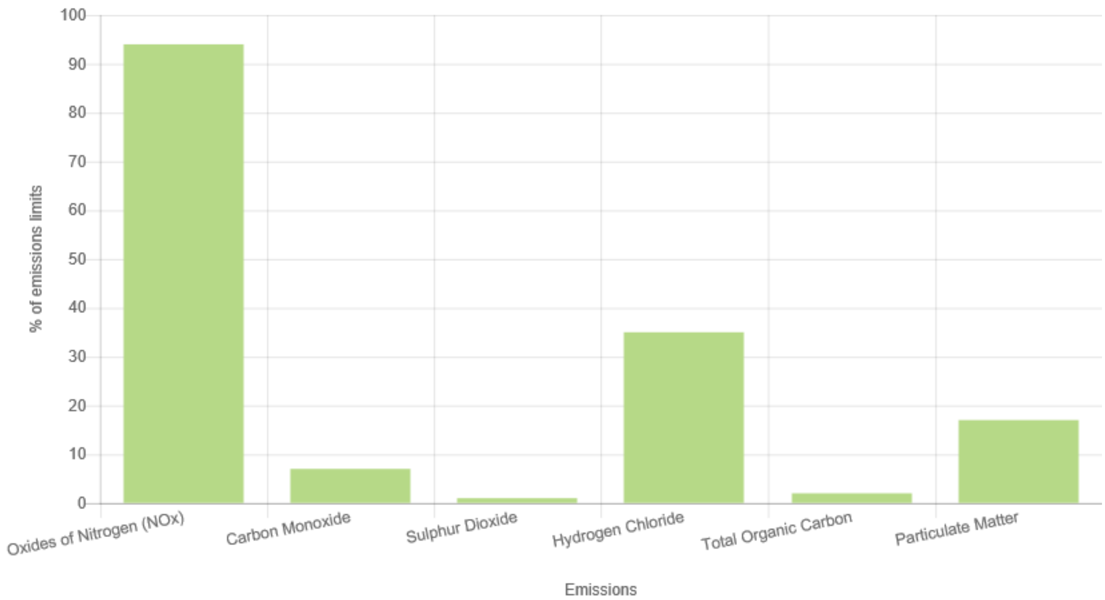
October 2019



November 2019

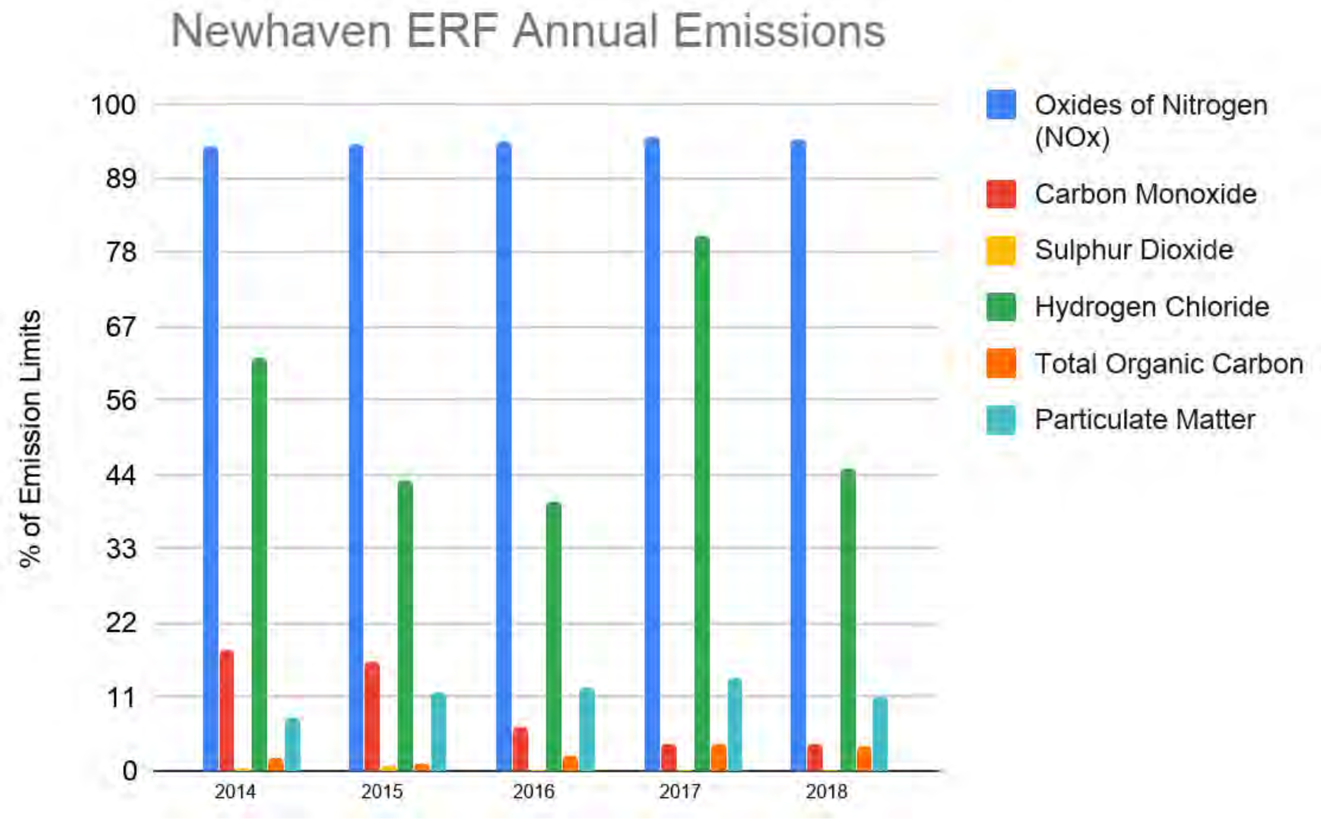


December 2019



C.3 2014 to 2018 Annual Emissions Data Summary

1. <u>Publicly reported continuously monitored emissions reports</u>



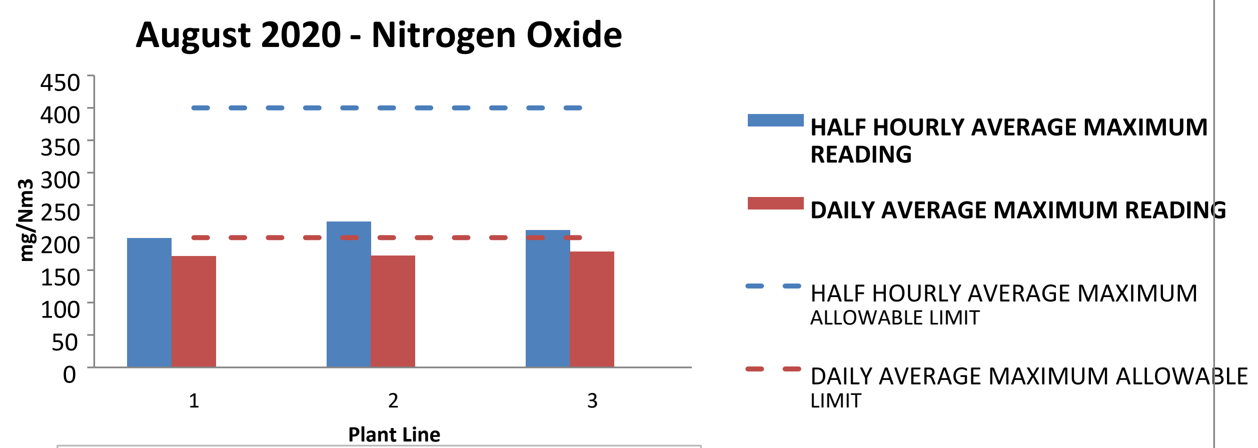
Appendix D. Riverside EfW emissions data

D.1 2020 Emissions

1. Publicly reported continuously monitored emissions reports

Riverside Resource Recovery emission report – August 2020

The following charts summarise the emission data for the Riverside Resource Recovery facility. The charts show the **MAXIMUM** readings taken during the month.

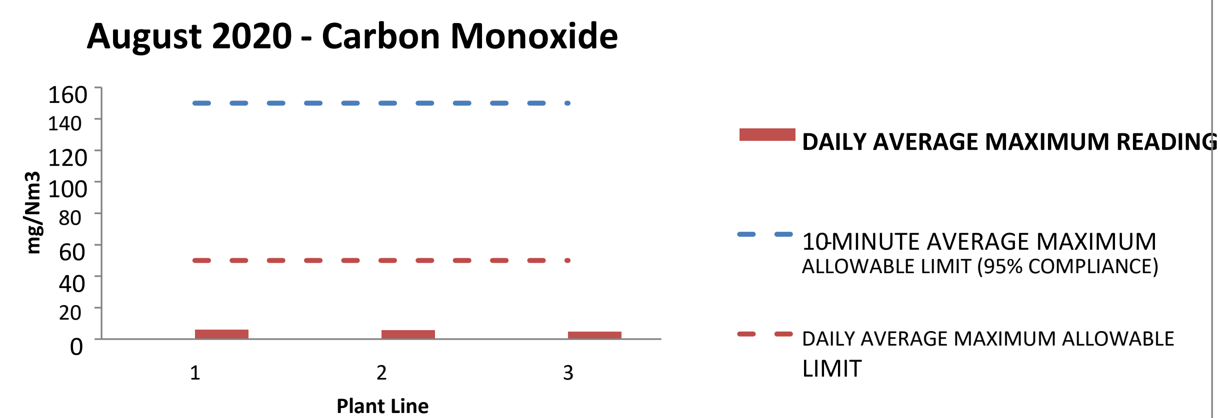


MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 170.0 mg/Nm3
Line 2 = 170.7 mg/Nm3
Line 3 = 170.7 mg/Nm3

Why do we control and monitor Oxides of Nitrogen (NOx)?

NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO).

These can be formed naturally, but are also formed from man-made processes like fuel combustion or biomass burning. There are a number of health and environmental issues attributed to NOx, including smog, acid rain, and possibly global warming.



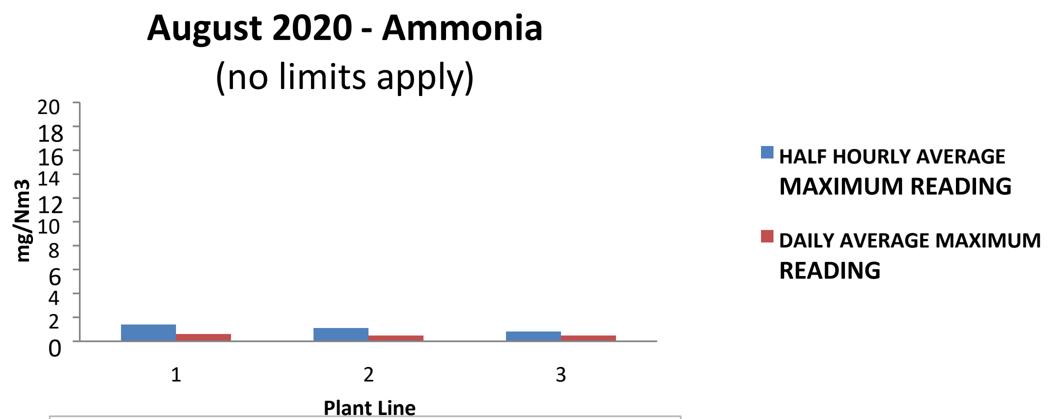
MONTHLY MEAN OF THE 10-MINUTE AVERAGE
Line 1 = 3.4 mg/Nm3
Line 2 = 4.4 mg/Nm3
Line 3 = 3.8 mg/Nm3

* seven, or more, 10 -minute period exceedances, within a 24 hour day. constitute an exceedance of the EA permit conditions.

Following EA guidance and approval in May 2019, RRRL no longer report carbon monoxide against a half-hourly emissions limit value. Carbon monoxide is now monitored against the requirement to be 95% compliant against a 10minute average value, of 150mg/Nm3, over a 24-hour period. Any 24-hour period where the 95% compliance level is breached will be highlighted in the chart above. The daily average emissions limit value of 50mg/Nm3 remains unchanged.

Why do we control and monitor Carbon Monoxide?
Carbon monoxide is both a common naturally occurring chemical and is manufactured by man. It is a colourless, odourless poisonous gas. Carbon monoxide is one of the eight substances for which the government has established an air quality standard as part of its national Air Quality Strategy.

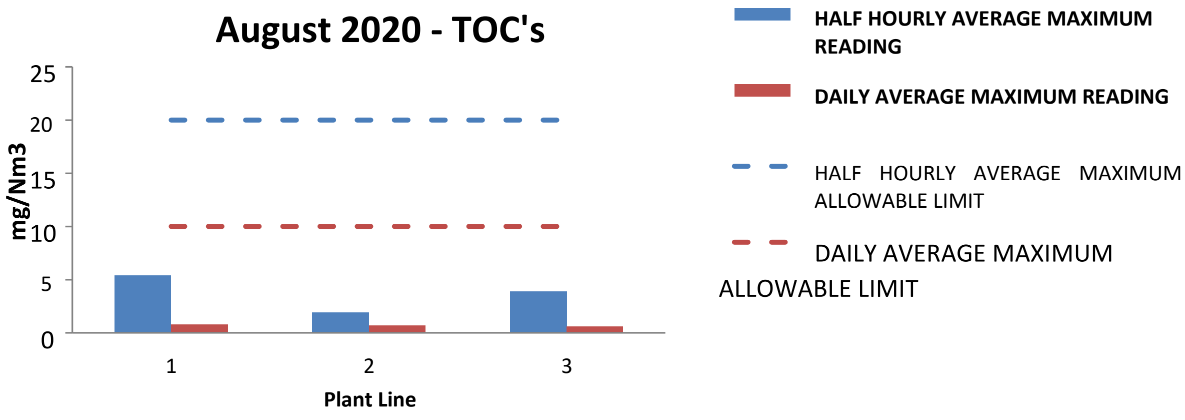
Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues.



MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 0.5 mg/Nm3
Line 2 = 0.4 mg/Nm3
Line 3 = 0.4 mg/Nm3

Why do we control and monitor Ammonia?
Although in wide-use in several industries, ammonia is both caustic and hazardous. It is a colourless gas with a characteristic pungent odour.

Ammonia, unlike the other species monitored, is not a product from the incineration of waste but is actually introduced into the furnace. Under the right conditions, ammonia is able to reduce oxides of nitrogen found in the flue gas by the chemical process Selective Non-Catalytic Reduction (SNCR) to nitrogen and water vapour which are both nonhazardous.

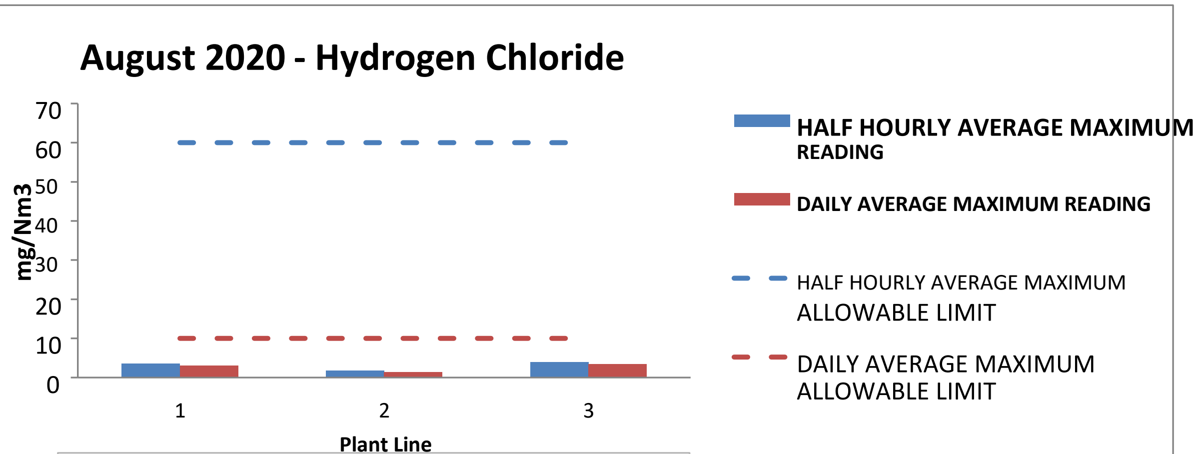


MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.1 g/Nm3
Line 2 = 0.4 g/Nm3
Line 3 = 0.2 mg/Nm3

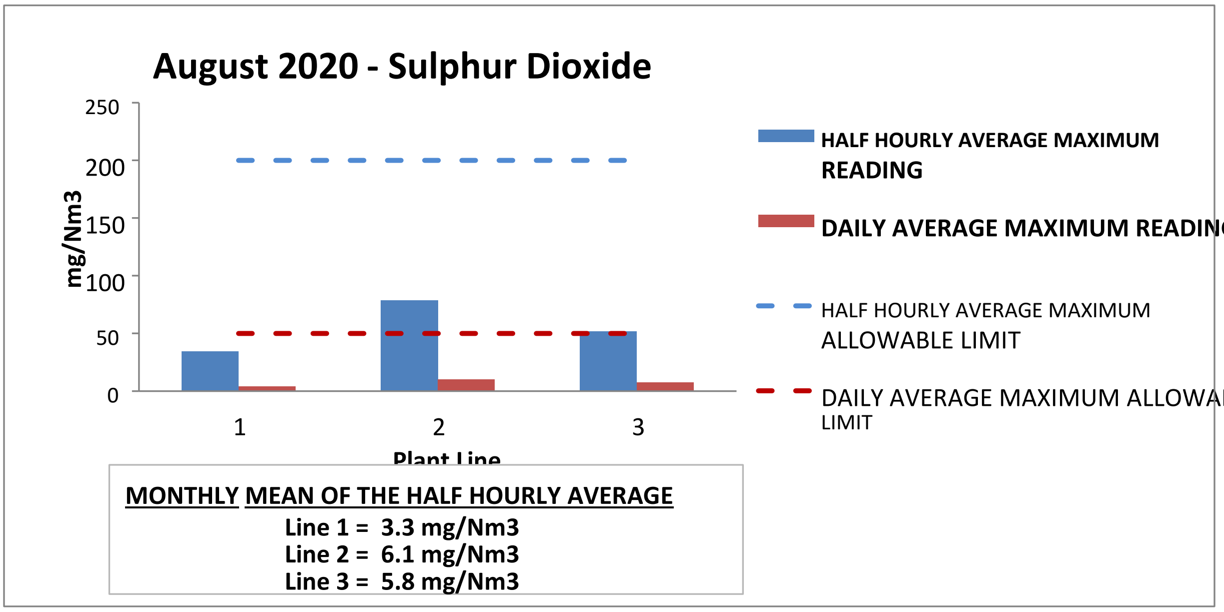
Why do we control and monitor Total Organic Carbon (TOC)?

Total Organic Carbon (TOC) consists of a wide range of organic compounds including Volatile Organic Compounds (VOCs). VOCs are numerous, varied and found everywhere. VOCs are of general concern because of their ability to react with other pollutants (such as nitrogen oxides) in the lower atmosphere to form ozone. High concentrations of ozone at ground level can harm human health, damage crops and affect materials such as rubber. Some VOCs may be directly harmful to human health, contribute to global warming or destroy stratospheric ozone needed to shield the earth's surface from harmful ultra violet radiation.



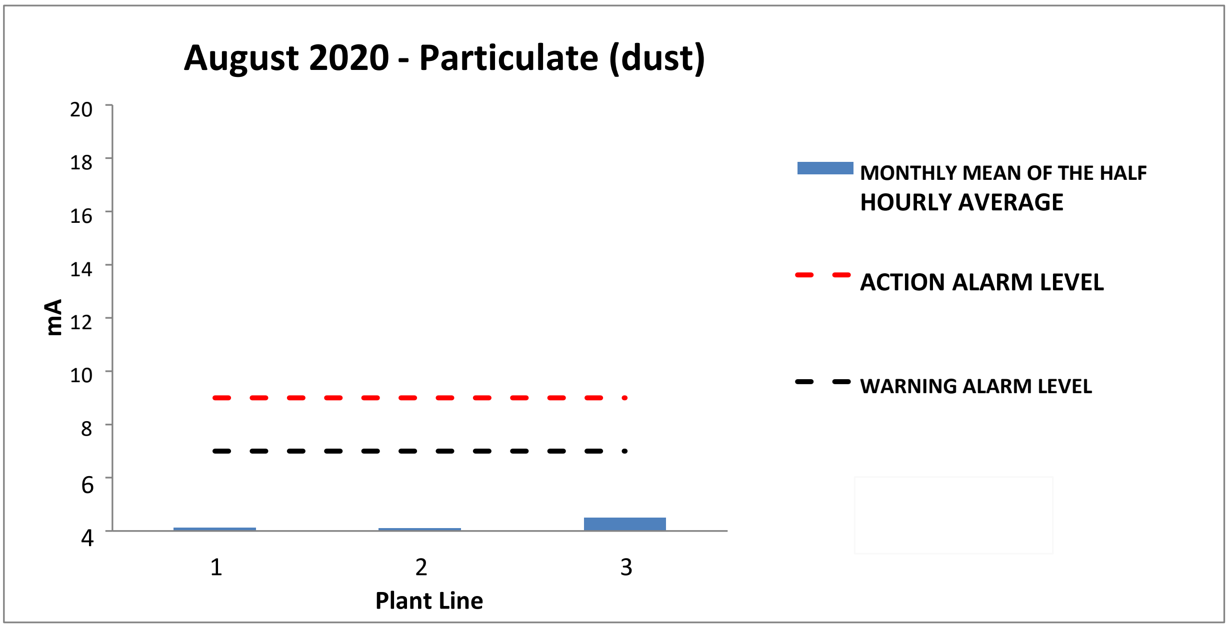
MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 1.3 mg/Nm3
Line 2 = 1.0 mg/Nm3
Line 3 = 2.3 mg/Nm3



<u>Why do we control and monitor Sulphur Dioxide and Hydrogen Chloride?</u>

Both gases dissolve in water to form strong acids and thus can contribute to the formation of acid rain. Acid rain is environmentally damaging to crops, soils and waters.



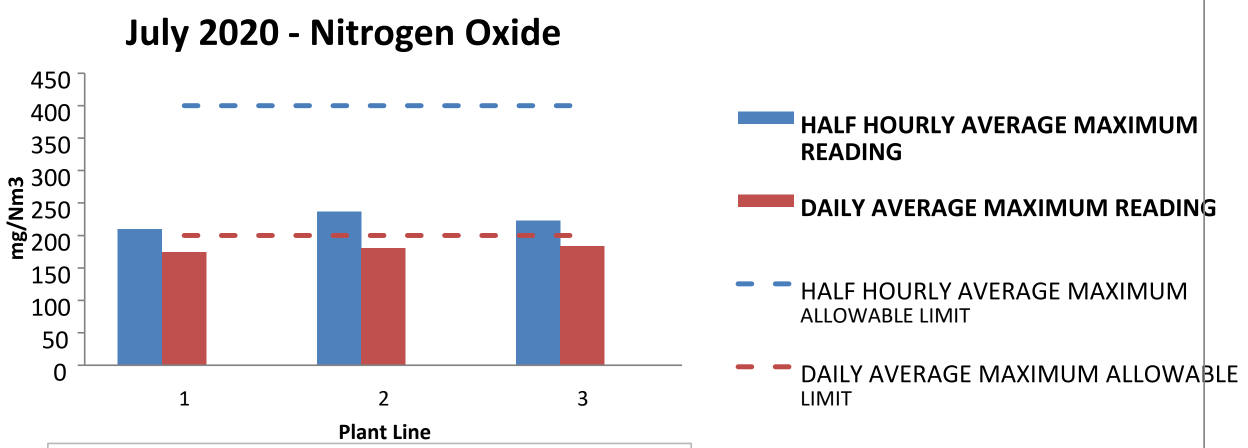
Following EA guidance and approval in July 2015, RRRL now monitor particulate emissions qualitatively as opposed to quantitatively. The particulate data is now reported in mA (milliamps) and the reporting range of the instrument is 4mA to 20mA where 4mA = 0 particles. The Half Hourly and Daily ELVs no longer apply, the ELVs have been replaced by two alarm levels that prompt the operator to start an investigation or take further action these are set at: 7mA – Warning Alarm and 9mA – Action Alarm.

<u>Why do we control and monitor Particulates (dust)?</u>

Particulates is the term used to describe tiny particles in the air, made up of a complex mixture of soot, organic and inorganic materials having a particle size less than or equal to 10 microns diameter (10 microns is equal to one hundredth part of a millimetre). Particulates is one of the eight substances for which the Government has established an air quality standard as part of its national Air Quality Strategy.

Riverside Resource Recovery emission report – July 2020

The following charts summarise the emission data for the Riverside Resource Recovery facility. The charts show the **MAXIMUM** readings taken during the month.

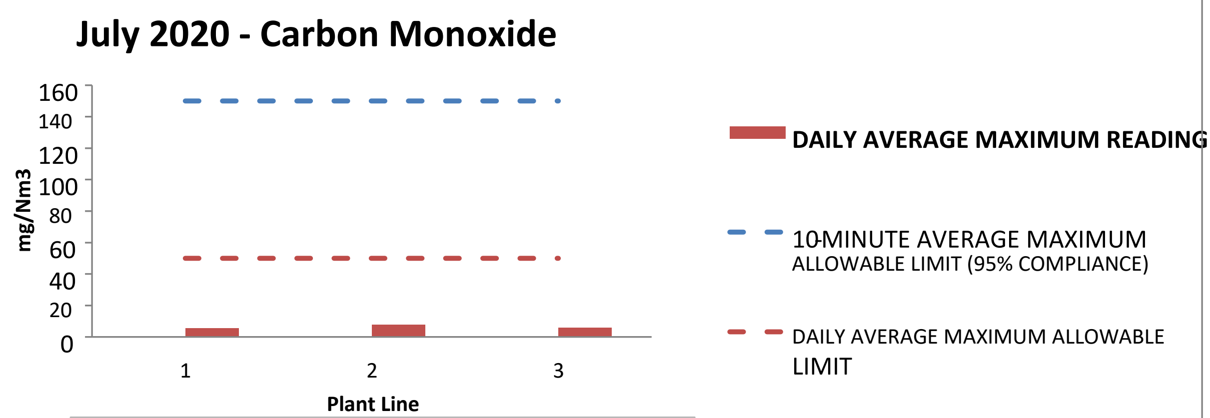


MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 170.8 mg/Nm3
Line 2 = 171.1 mg/Nm3
Line 3 = 175.0 mg/Nm3

Why do we control and monitor Oxides of Nitrogen (NOx)?

NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO).

These can be formed naturally, but are also formed from man-made processes like fuel combustion or biomass burning. There are a number of health and environmental issues attributed to NOx, including smog, acid rain, and possibly global warming.



MONTHLY MEAN OF THE 10-MINUTE AVERAGE
Line 1 = 4.3 mg/Nm3
Line 2 = 4.8 mg/Nm3
Line 3 = 4.1 mg/Nm3

* seven, or more, 10 -minute period exceedances, within a 24 hour day. constitute an exceedance of the EA permit conditions.

Following EA guidance and approval in May 2019, RRRL no longer report carbon monoxide against a half-hourly emissions limit value. Carbon monoxide is now monitored against the requirement to be 95% compliant against a 10minute average value, of 150mg/Nm3, over a 24-hour period. Any 24-hour period where the 95% compliance level is breached will be highlighted in the chart above. The daily average emissions limit value of 50mg/Nm3 remains unchanged.

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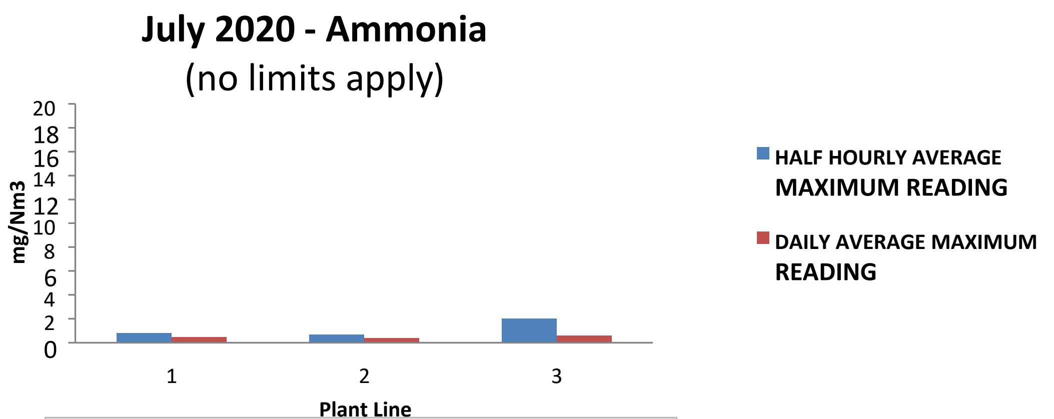
Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues.



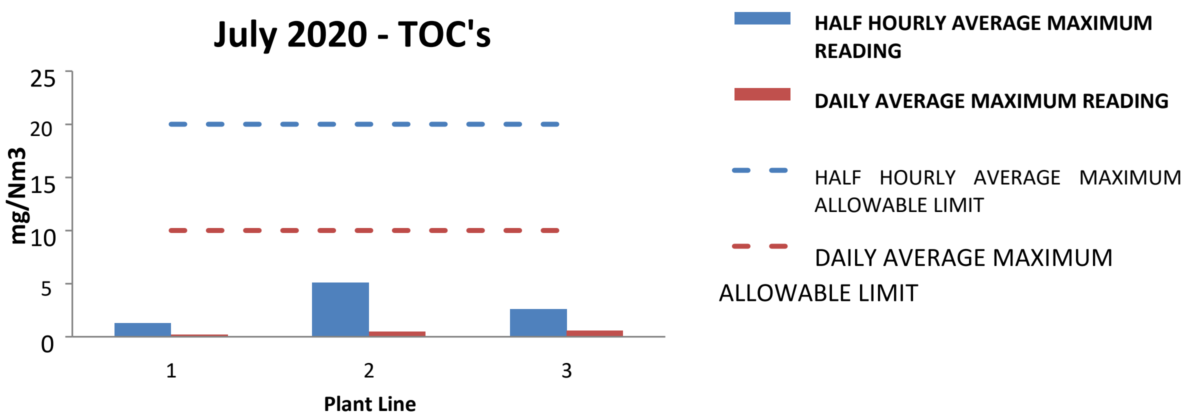
MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.5 mg/Nm3
Line 2 = 0.3 mg/Nm3
Line 3 = 0.4 mg/Nm3

Why do we control and monitor Ammonia?

Although in wide-use in several industries, ammonia is both caustic and hazardous. It is a colourless gas with a characteristic pungent odour.

Ammonia, unlike the other species monitored, is not a product from the incineration of waste but is actually introduced into the furnace. Under the right conditions, ammonia is able to reduce oxides of nitrogen found in the flue gas by the chemical process Selective Non-Catalytic Reduction (SNCR) to nitrogen and water vapour which are both nonhazardous.

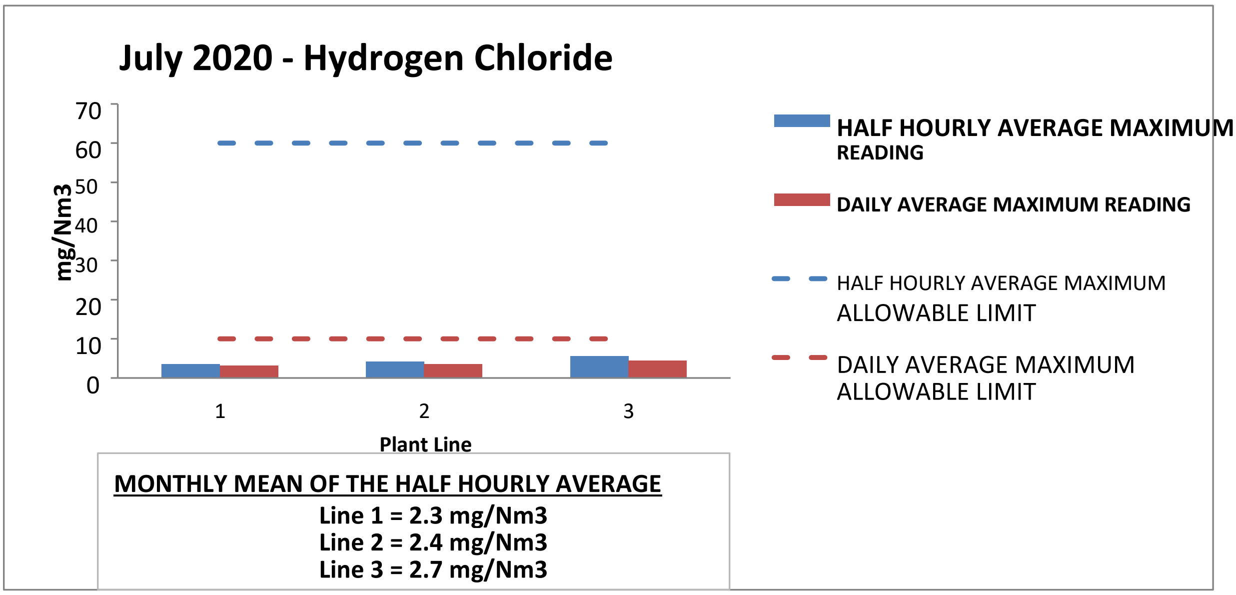


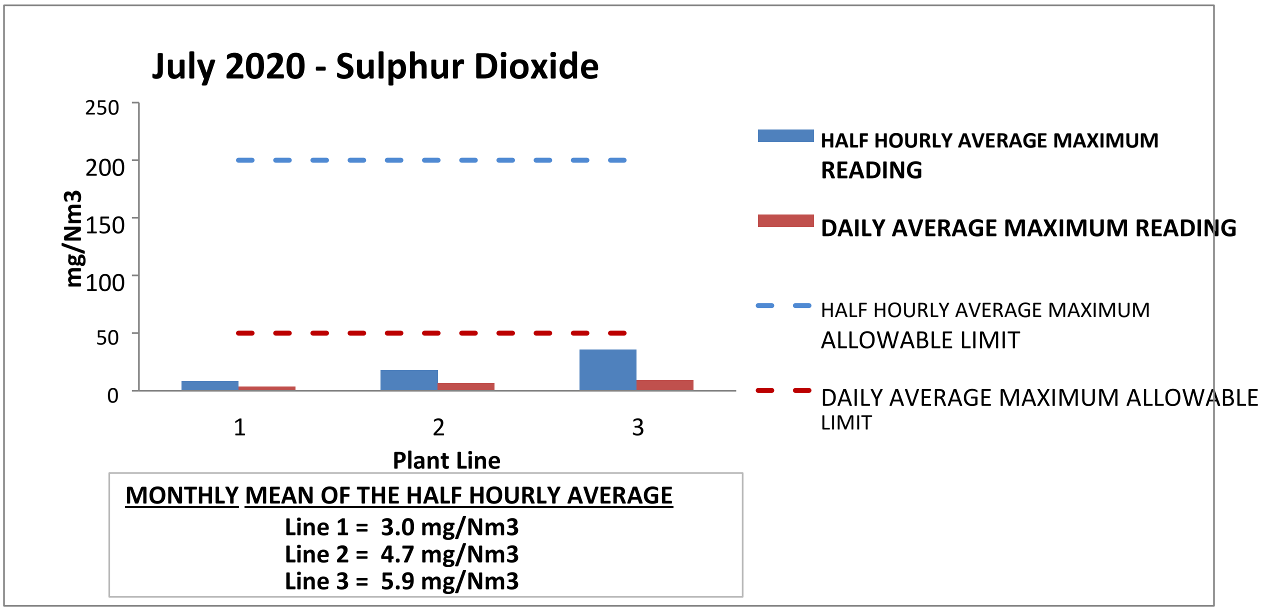
MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.1 mg/Nm3
Line 2 = 0.4 mg/Nm3
Line 3 = 0.2 mg/Nm3

<u>Why do we control and monitor Total Organic Carbon (TOC)?</u>

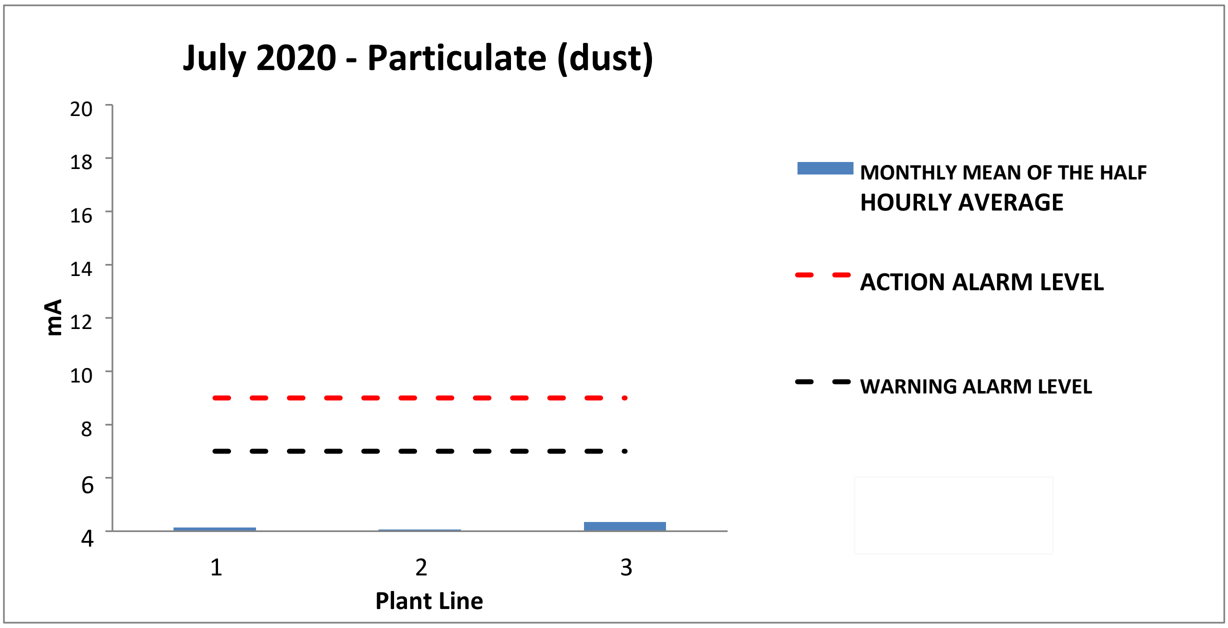
Total Organic Carbon (TOC) consists of a wide range of organic compounds including Volatile Organic Compounds (VOCs). VOCs are numerous, varied and found everywhere. VOCs are of general concern because of their ability to react with other pollutants (such as nitrogen oxides) in the lower atmosphere to form ozone. High concentrations of ozone at ground level can harm human health, damage crops and affect materials such as rubber. Some VOCs may be directly harmful to human health, contribute to global warming or destroy stratospheric ozone needed to shield the earth's surface from harmful ultra violet radiation.





<u>Why do we control and monitor Sulphur Dioxide and Hydrogen Chloride?</u>

Both gases dissolve in water to form strong acids and thus can contribute to the formation of acid rain. Acid rain is environmentally damaging to crops, soils and waters.



Following EA guidance and approval in July 2015, RRRL now monitor particulate emissions qualitatively as opposed to quantitatively. The particulate data is now reported in mA (milliamps) and the reporting range of the instrument is 4mA to 20mA where 4mA = 0 particles. The Half Hourly and Daily ELVs no longer apply, the ELVs have been replaced by two alarm levels that prompt the operator to start an investigation or take further action these are set at: 7mA – Warning Alarm and 9mA – Action Alarm.

Why do we control and monitor Particulates (dust)?

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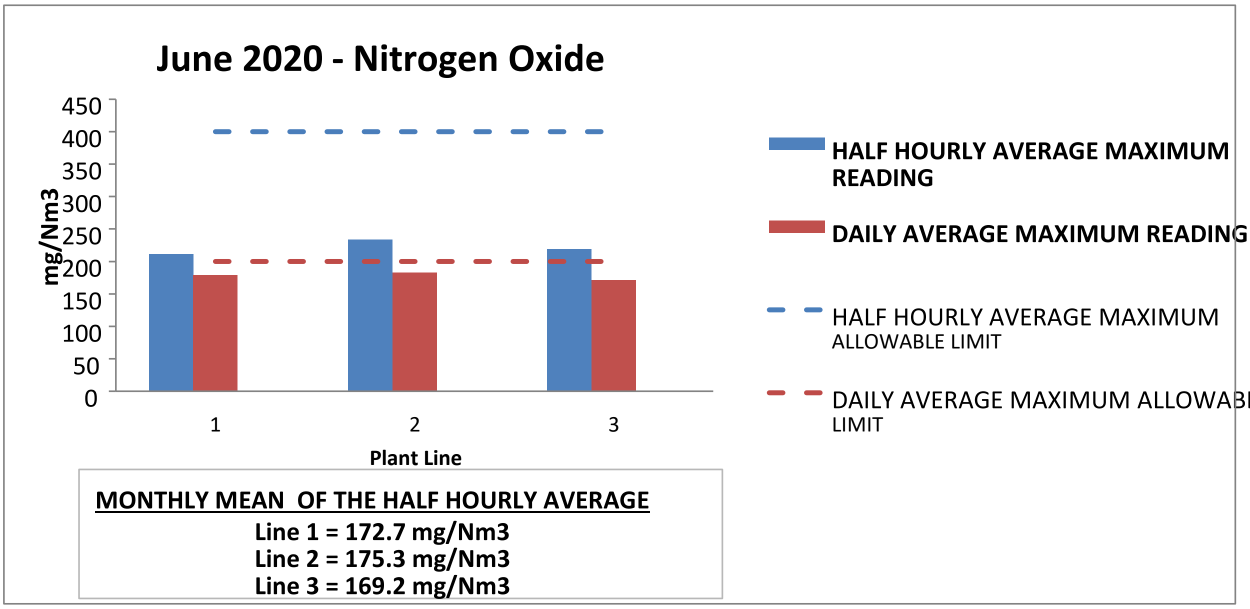
Riverside Resource Recovery emission report – June 2020

The following charts summarise the emission data for the Riverside Resource Recovery facility. The charts show the **MAXIMUM** readings taken during the month.



Why do we control and monitor Oxides of Nitrogen (NOx)?

NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO).

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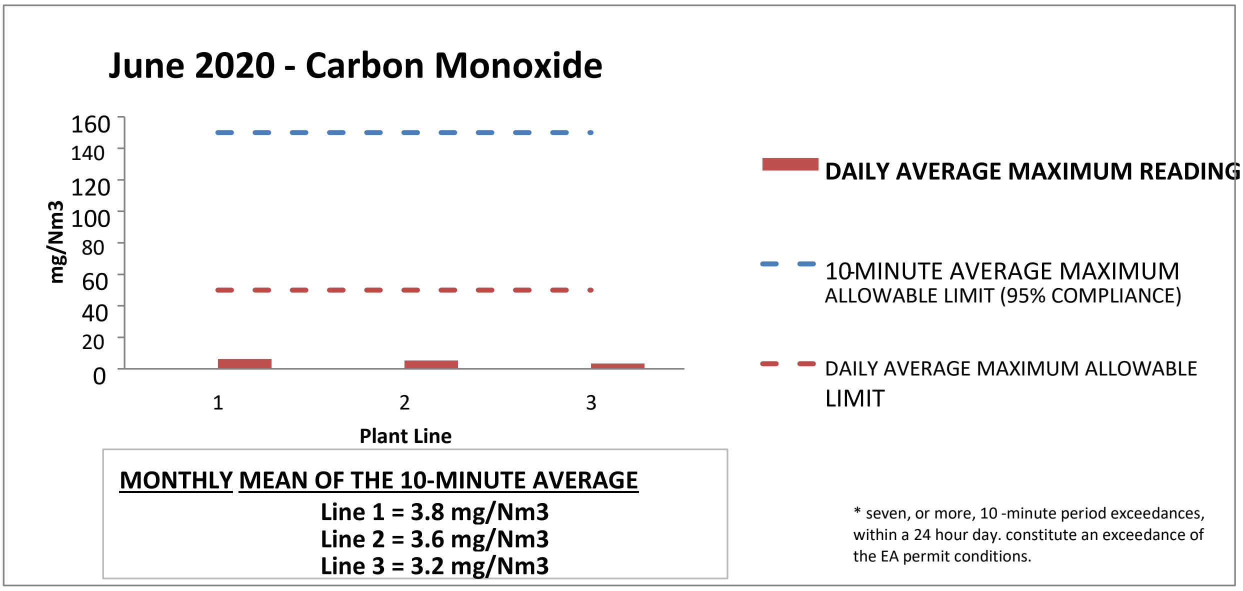

Following EA guidance and approval in May 2019, RRRL no longer report carbon monoxide against a half-hourly emissions limit value. Carbon monoxide is now monitored against the requirement to be 95% compliant against a 10minute average value, of 150mg/Nm3, over a 24-hour period. Any 24-hour period where the 95% compliance level is breached will be highlighted in the chart above. The daily average emissions limit value of 50mg/Nm3 remains unchanged.

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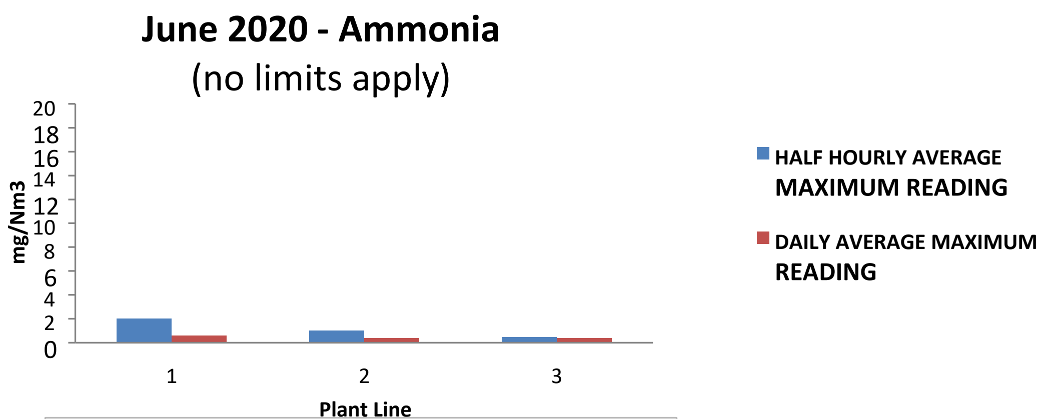
Carbon monoxide is both a common naturally occurring chemical and is manufactured by man. It is a colourless, odourless poisonous gas. Carbon monoxide is one of the eight substances for which the government has established an air quality standard as part of its national Air Quality Strategy.

Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues.



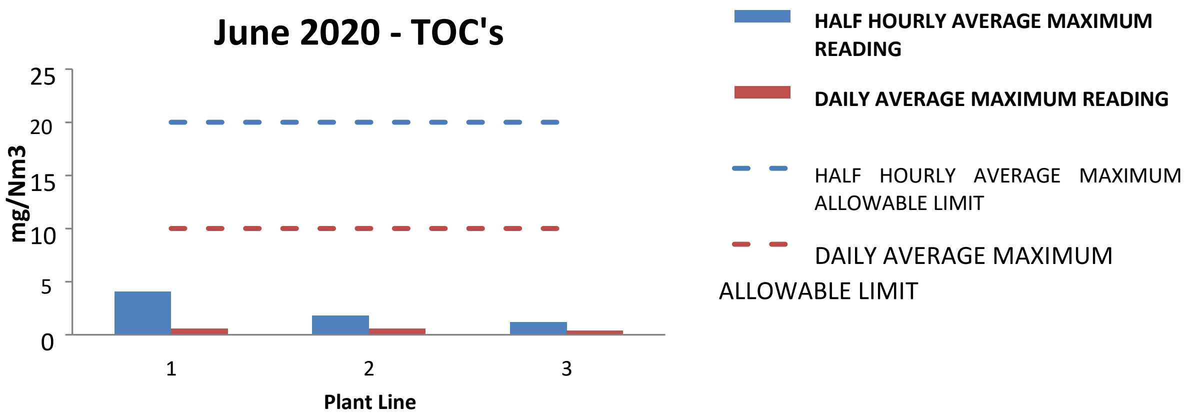
MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.5 mg/Nm3
Line 2 = 0.3 mg/Nm3
Line 3 = 0.3 mg/Nm3

Why do we control and monitor Ammonia?

Although in wide-use in several industries, ammonia is both caustic and hazardous. It is a colourless gas with a characteristic pungent odour.

Ammonia, unlike the other species monitored, is not a product from the incineration of waste but is actually introduced into the furnace. Under the right conditions, ammonia is able to reduce oxides of nitrogen found in the flue gas by the chemical process Selective Non-Catalytic Reduction (SNCR) to nitrogen and water vapour which are both nonhazardous.

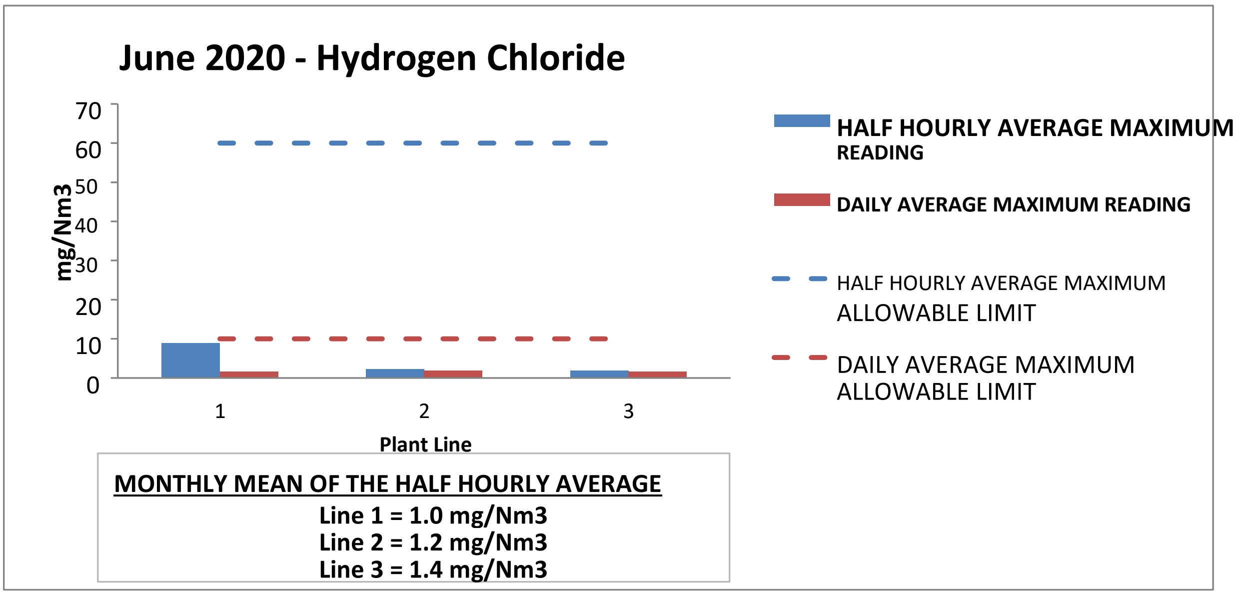


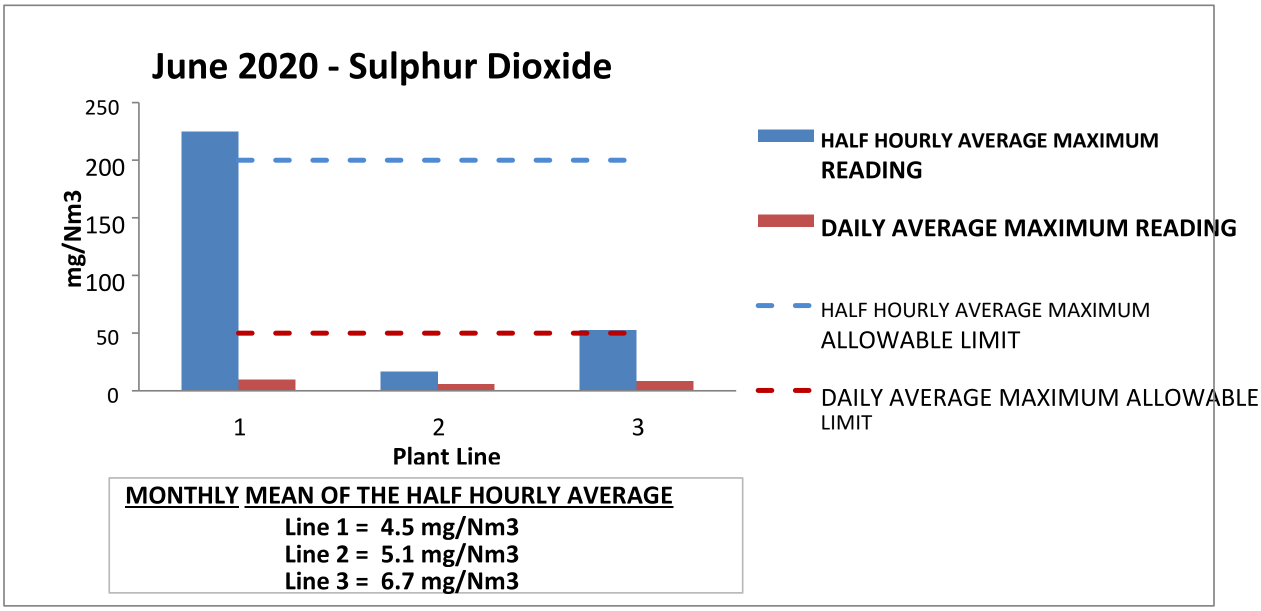
MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.3 mg/Nm3
Line 2 = 0.5 mg/Nm3
Line 3 = 0.3 mg/Nm3

Why do we control and monitor Total Organic Carbon (TOC)?

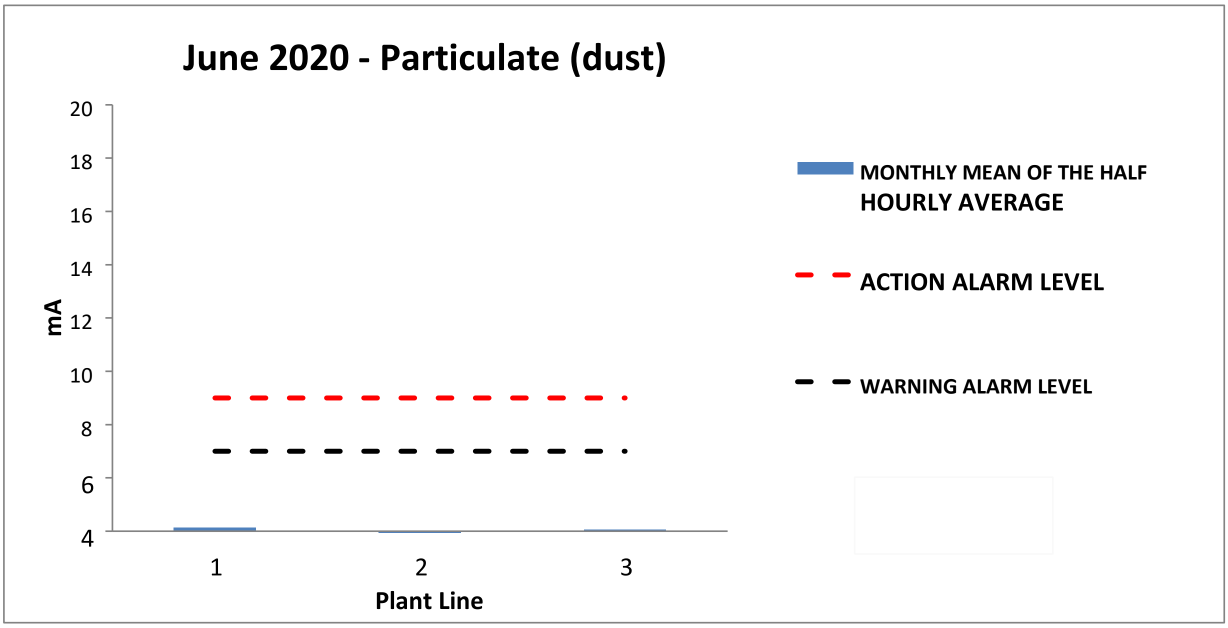
Total Organic Carbon (TOC) consists of a wide range of organic compounds including Volatile Organic Compounds (VOCs). VOCs are numerous, varied and found everywhere. VOCs are of general concern because of their ability to react with other pollutants (such as nitrogen oxides) in the lower atmosphere to form ozone. High concentrations of ozone at ground level can harm human health, damage crops and affect materials such as rubber. Some VOCs may be directly harmful to human health, contribute to global warming or destroy stratospheric ozone needed to shield the earth's surface from harmful ultra violet radiation.





Why do we control and monitor Sulphur Dioxide and Hydrogen Chloride?

Both gases dissolve in water to form strong acids and thus can contribute to the formation of acid rain. Acid rain is environmentally damaging to crops, soils and waters.



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Riverside Resource Recovery emission report – May 2020

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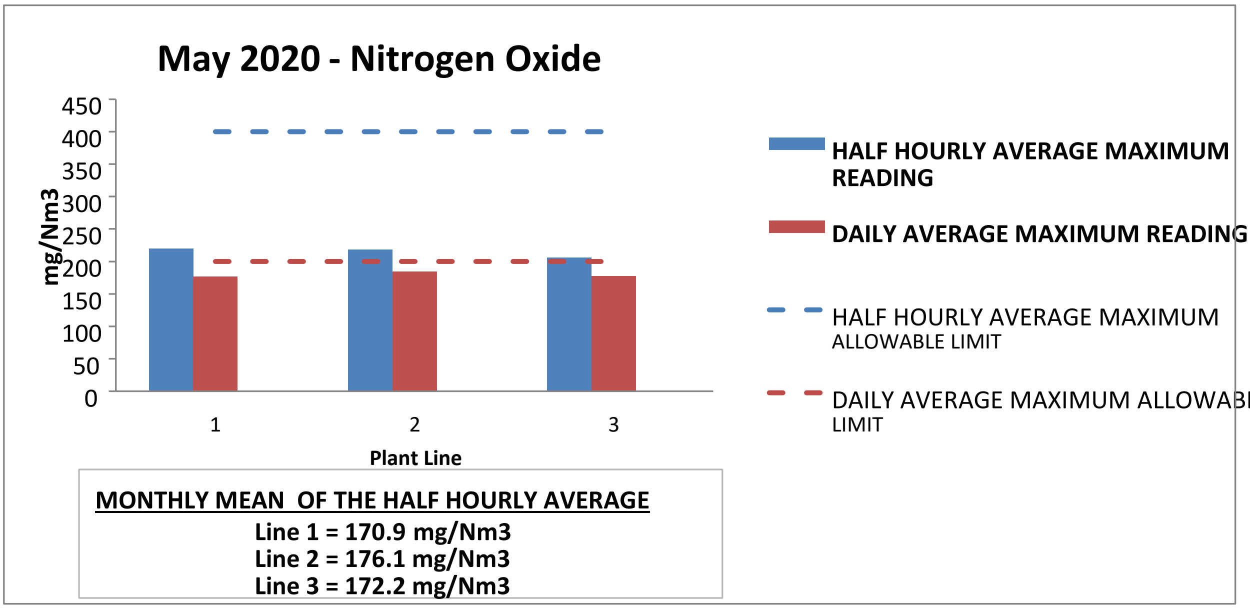

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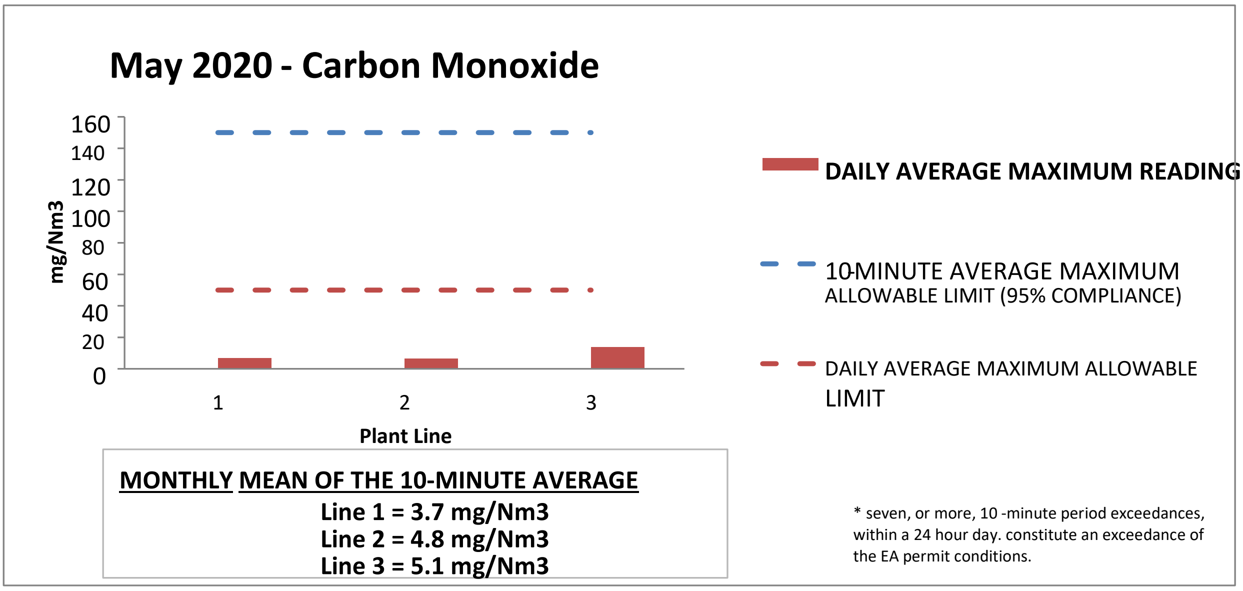

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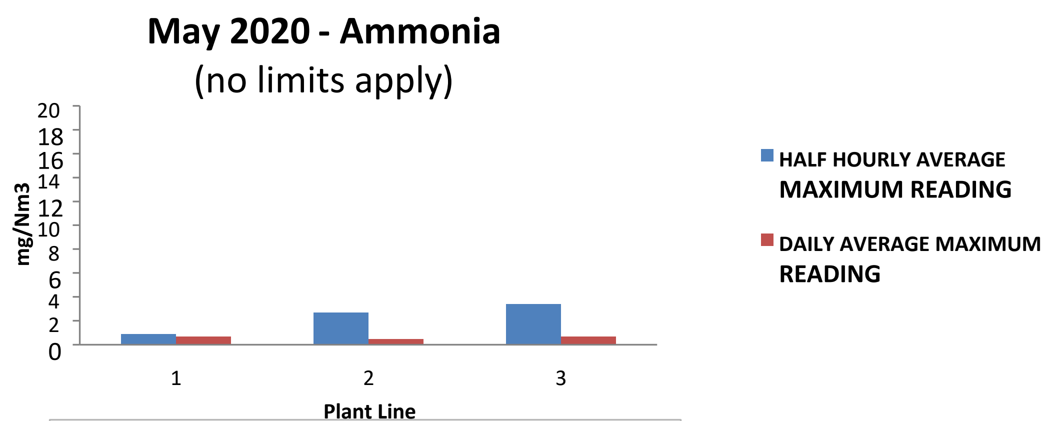
Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues.



MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.5 mg/Nm3
Line 2 = 0.4 mg/Nm3
Line 3 = 0.4 mg/Nm3

Why do we control and monitor Ammonia?

Although in wide-use in several industries, ammonia is both caustic and hazardous. It is a colourless gas with a characteristic pungent odour.

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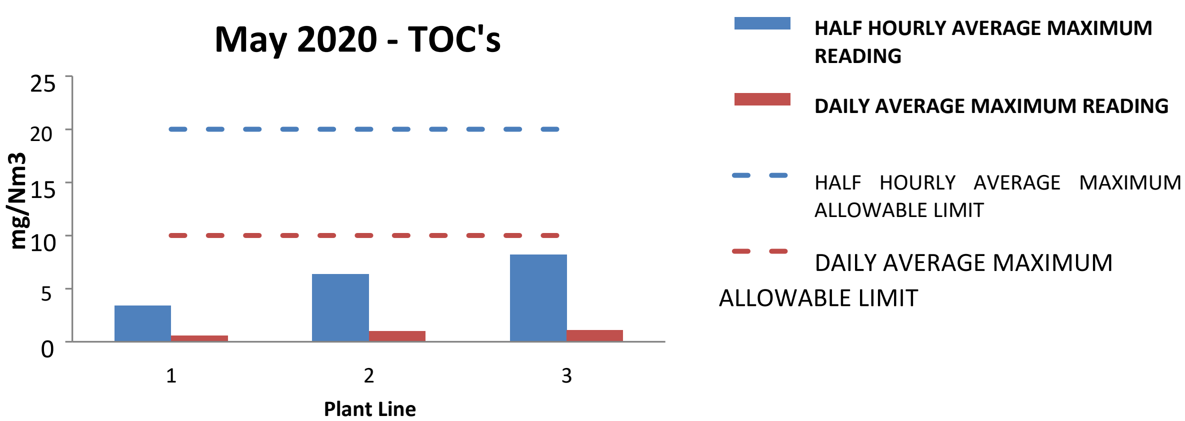
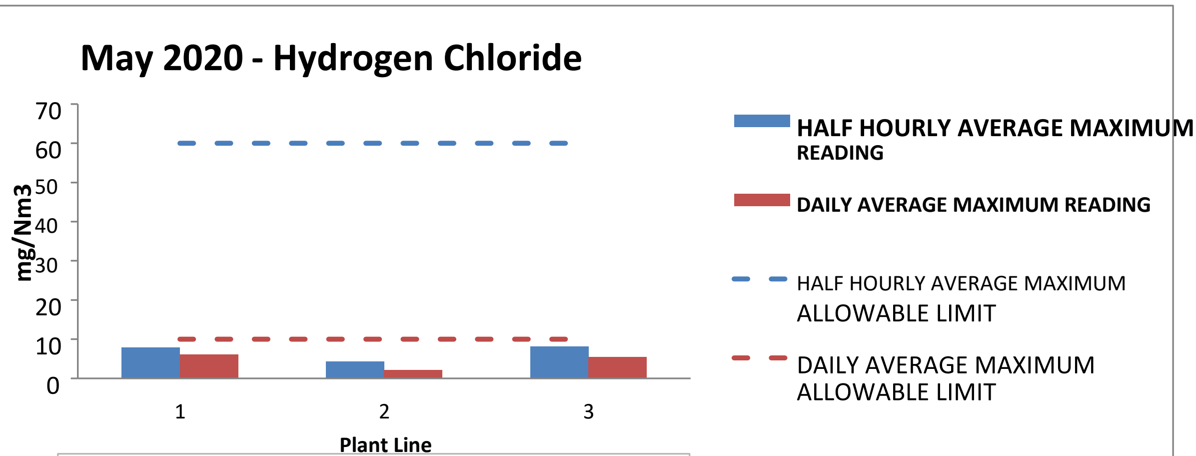


MONTHLY MEAN OF THE HALF HOURLY AVERAGE

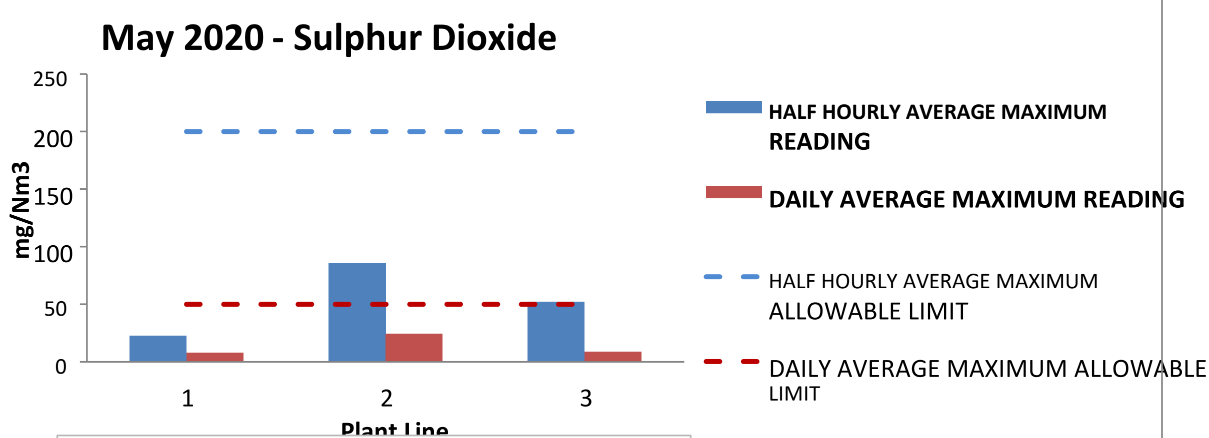
Line 1 = 0.2 mg/Nm3
Line 2 = 0.6 mg/Nm3
Line 3 = 0.5 mg/Nm3

Why do we control and monitor Total Organic Carbon (TOC)?

Total Organic Carbon (TOC) consists of a wide range of organic compounds including Volatile Organic Compounds (VOCs). VOCs are numerous, varied and found everywhere. VOCs are of general concern because of their ability to react with other pollutants (such as nitrogen oxides) in the lower atmosphere to form ozone. High concentrations of ozone at ground level can harm human health, damage crops and affect materials such as rubber. Some VOCs may be directly harmful to human health, contribute to global warming or destroy stratospheric ozone needed to shield the earth's surface from harmful ultra violet radiation.



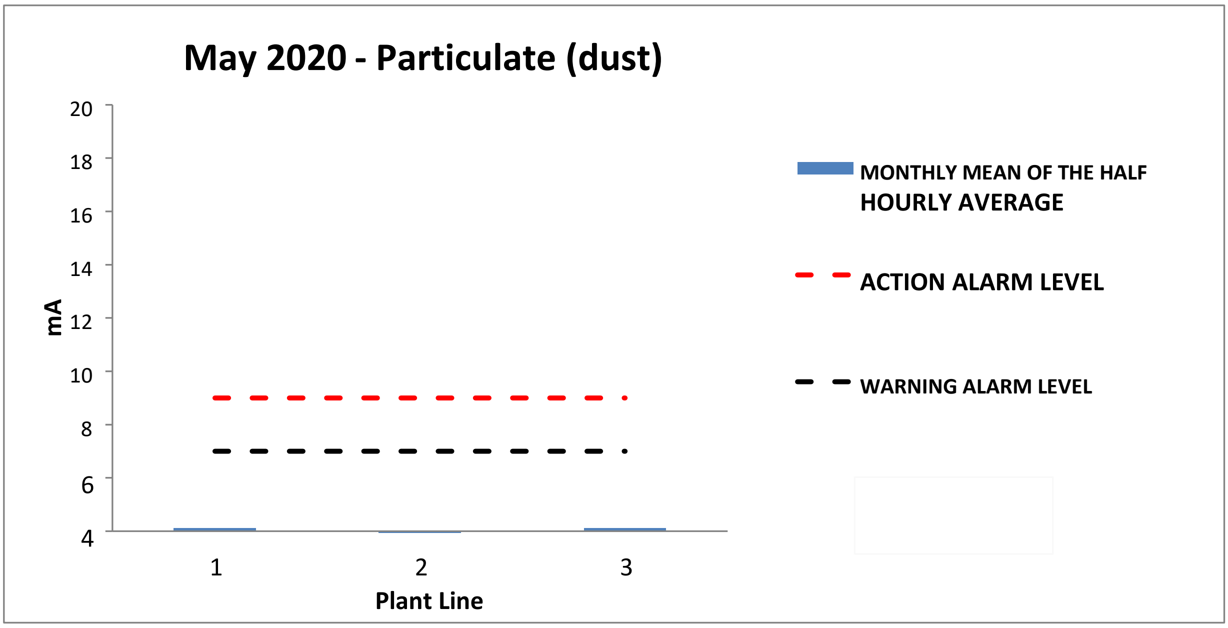
MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 3.5 mg/Nm3
Line 2 = 1.2 mg/Nm3
Line 3 = 3.6 mg/Nm3



MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 3.2 mg/Nm3
Line 2 = 8.3 mg/Nm3
Line 3 = 5.7 mg/Nm3

Why do we control and monitor Sulphur Dioxide and Hydrogen Chloride?

Both gases dissolve in water to form strong acids and thus can contribute to the formation of acid rain. Acid rain is environmentally damaging to crops, soils and waters.



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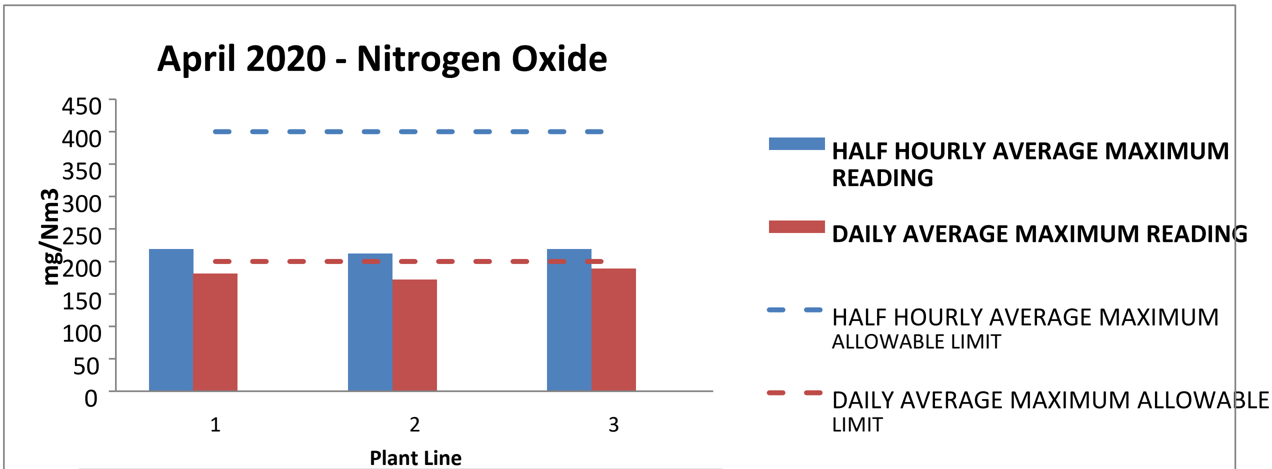
Why do we control and monitor Particulates (dust)?

Particulates is the term used to describe tiny particles in the air, made up of a complex mixture of soot, organic and inorganic materials having a particle size less than or equal to 10 microns diameter (10 microns is equal to one hundredth part of a millimetre). Particulates is one of the eight substances for which the Government has established an air quality standard as part of its national Air Quality Strategy.

Riverside Resource Recovery emission report – April 2020

The following charts summarise the emission data for the Riverside Resource Recovery facility. The charts show the **MAXIMUM** readings taken during the month.



MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 175.3 mg/Nm3
Line 2 = 170.6 mg/Nm3
Line 3 = 172.7 mg/Nm3

Why do we control and monitor Oxides of Nitrogen (NOx)?

NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO).

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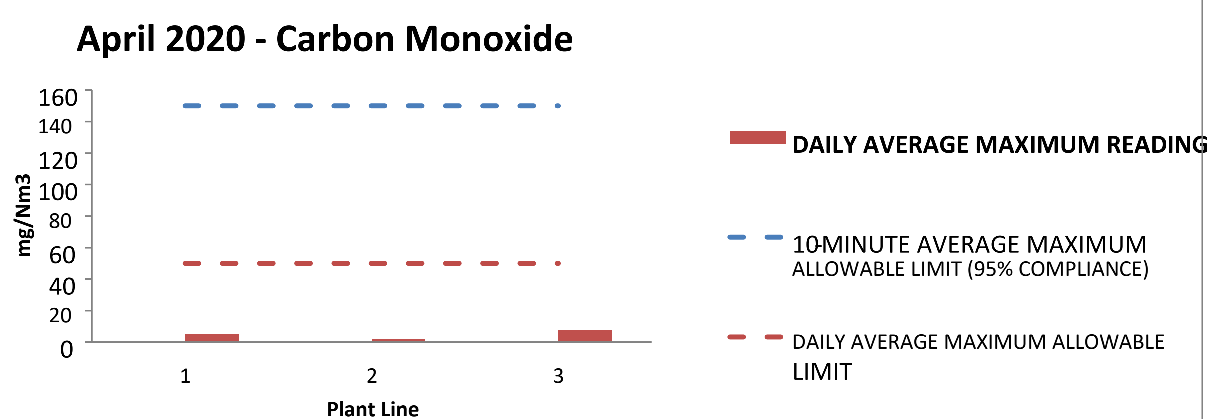

MONTHLY MEAN OF THE 10-MINUTE AVERAGE

Line 1 = 3.3 mg/Nm3
Line 2 = 1.5 mg/Nm3
Line 3 = 4.8 mg/Nm3

* seven, or more, 10 -minute period exceedances, within a 24 hour day. constitute an exceedance of the EA permit conditions.

Following EA guidance and approval in May 2019, RRRL no longer report carbon monoxide against a half-hourly emissions limit value. Carbon monoxide is now monitored against the requirement to be 95% compliant against a 10minute average value, of 150mg/Nm3, over a 24-hour period. Any 24-hour period where the 95% compliance level is breached will be highlighted in the chart above. The daily average emissions limit value of 50mg/Nm3 remains unchanged.

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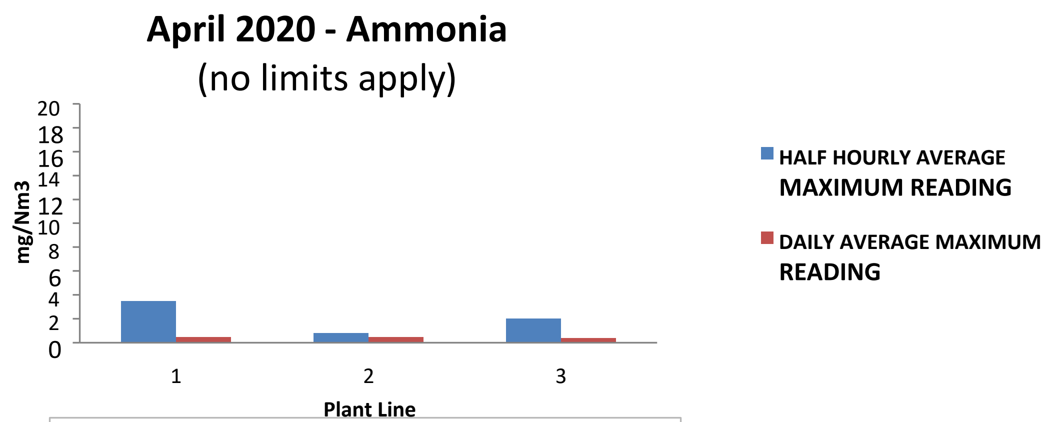
Carbon monoxide is both a common naturally occurring chemical and is manufactured by man. It is a colourless, odourless poisonous gas. Carbon monoxide is one of the eight substances for which the government has established an air quality standard as part of its national Air Quality Strategy.

Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues.



MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.5 mg/Nm3
Line 2 = 0.4 mg/Nm3
Line 3 = 0.4 mg/Nm3

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Although in wide-use in several industries, ammonia is both caustic and hazardous. It is a colourless gas with a characteristic pungent odour.

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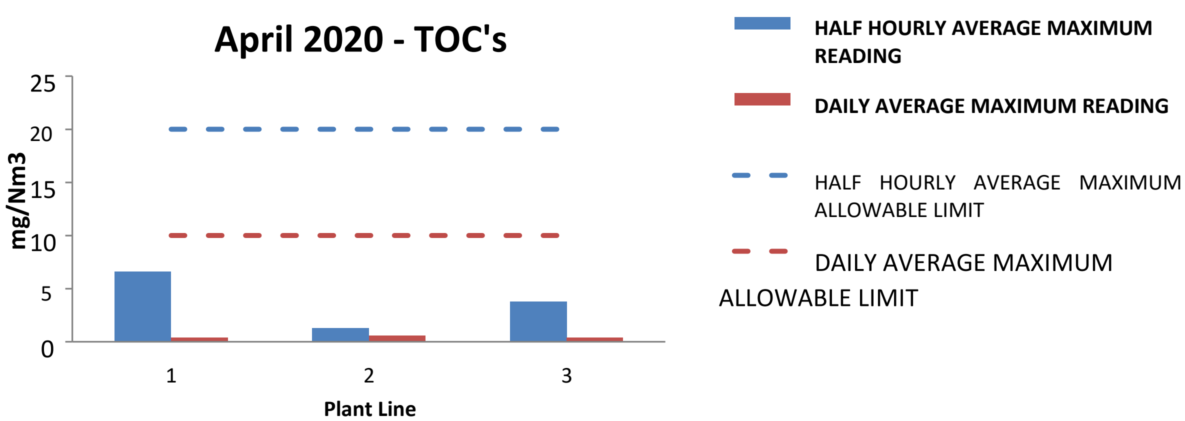

MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.2 mg/Nm3
Line 2 = 0.4 mg/Nm3
Line 3 = 0.2 mg/Nm3

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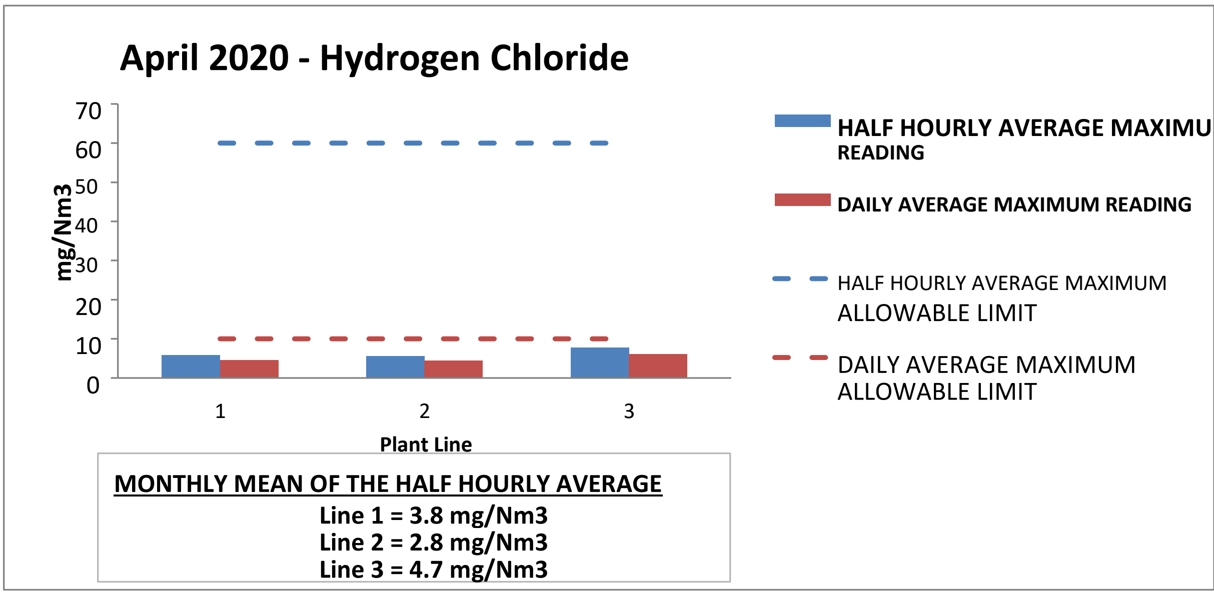
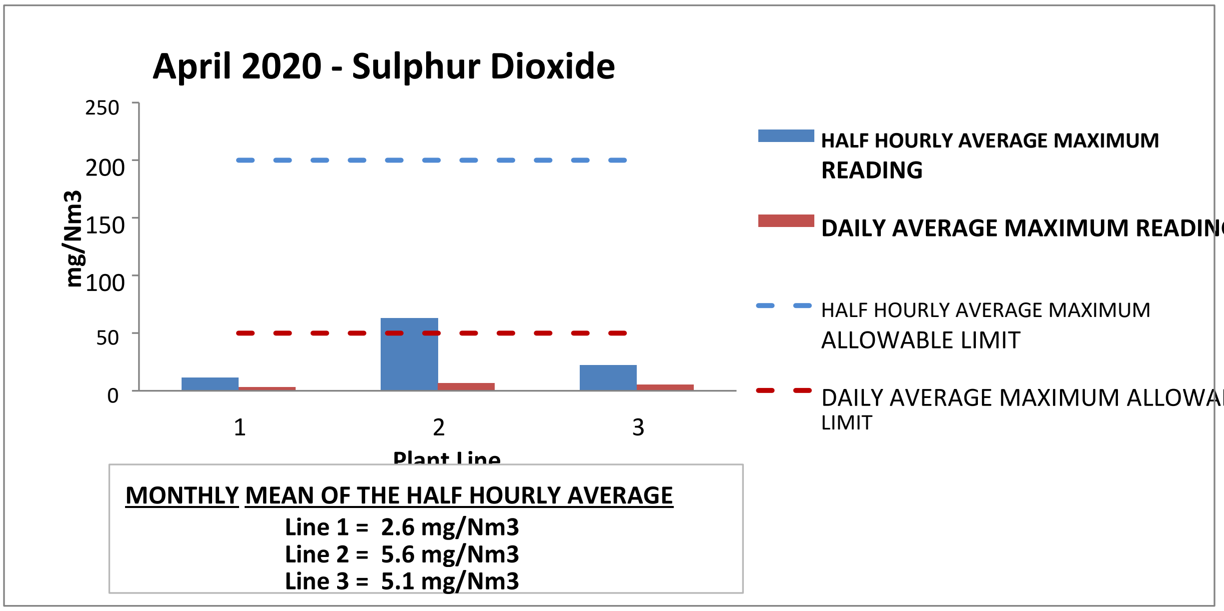
Total Organic Carbon (TOC) consists of a wide range of organic compounds including Volatile Organic Compounds (VOCs). VOCs are numerous, varied and found everywhere. VOCs are of general concern because of their ability to react with other pollutants (such as nitrogen oxides) in the lower atmosphere to form ozone. High concentrations of ozone at ground level can harm human health, damage crops and affect materials such as rubber. Some VOCs may be directly harmful to human health, contribute to global warming or destroy stratospheric ozone needed to shield the earth's surface from harmful ultra violet radiation.





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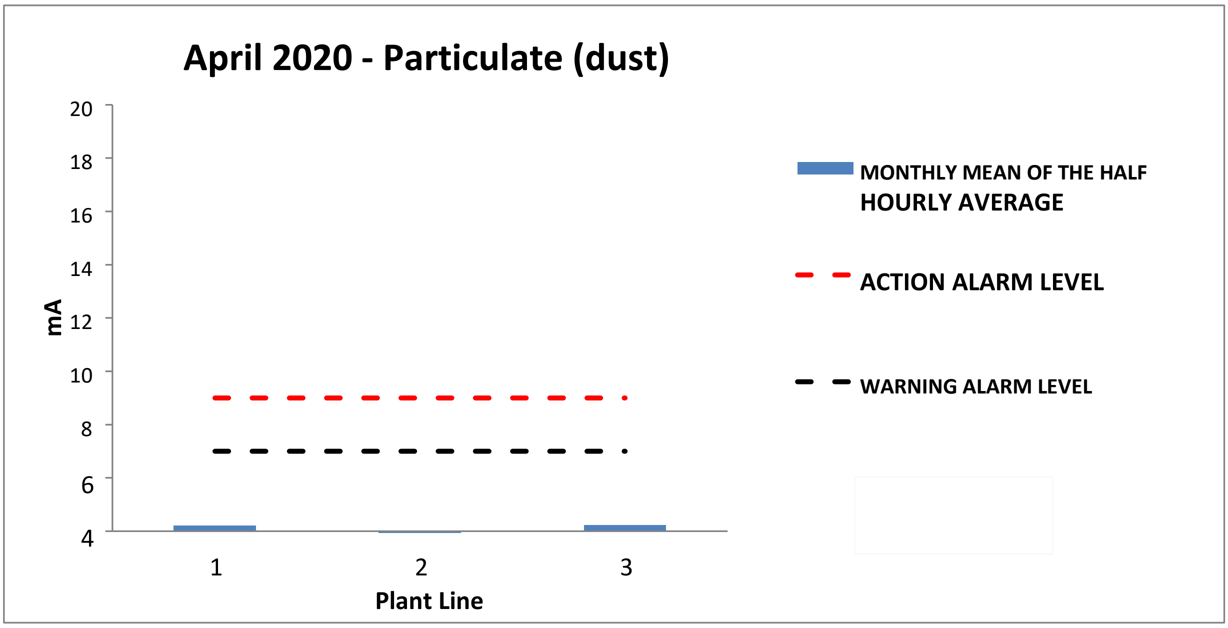

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Riverside Resource Recovery emission report – March 2020

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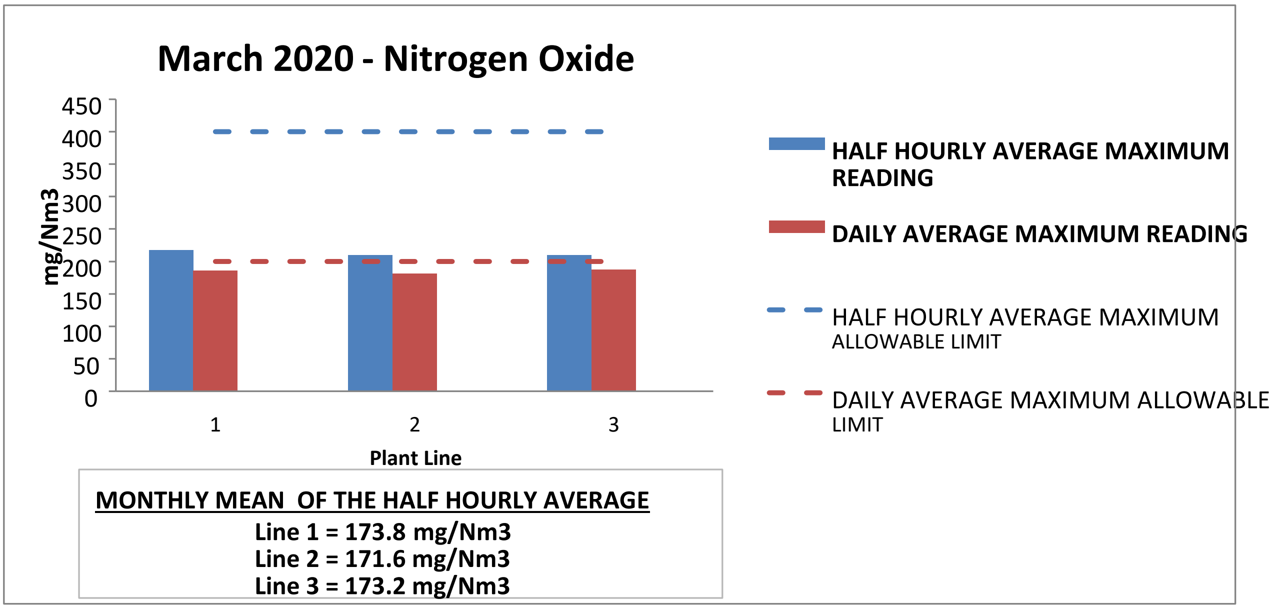

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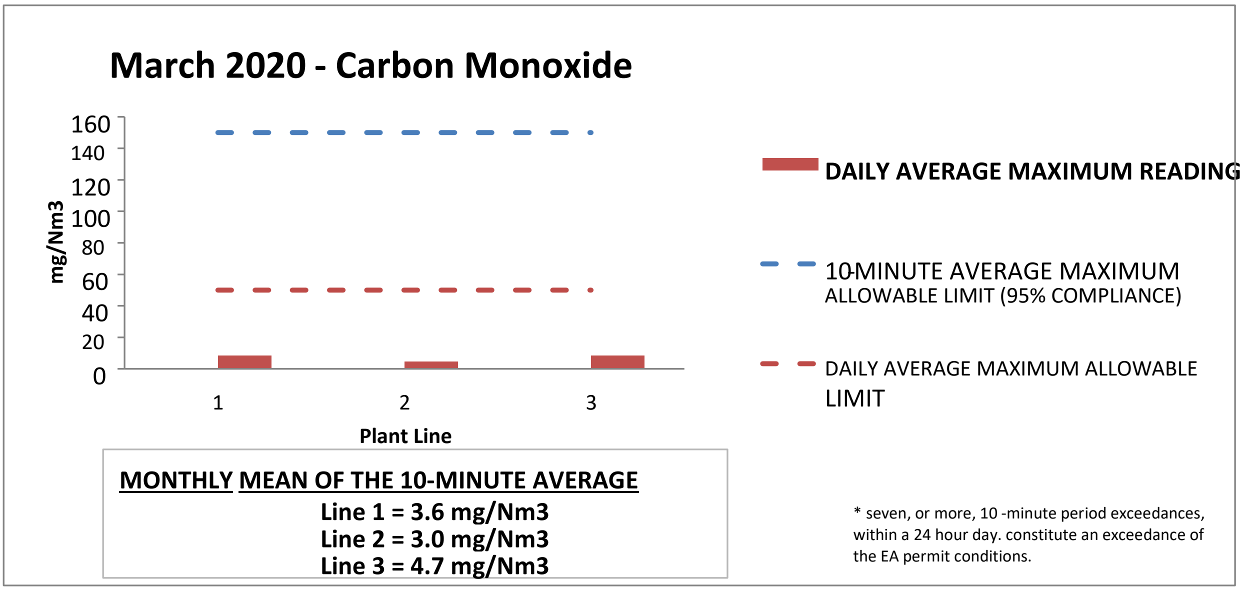

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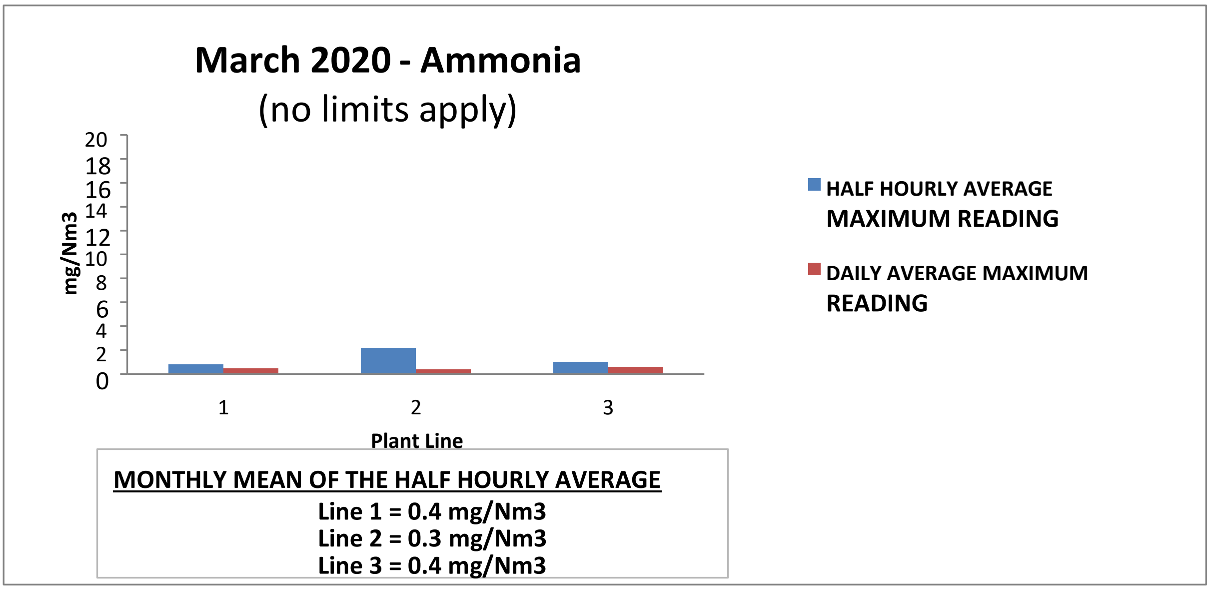

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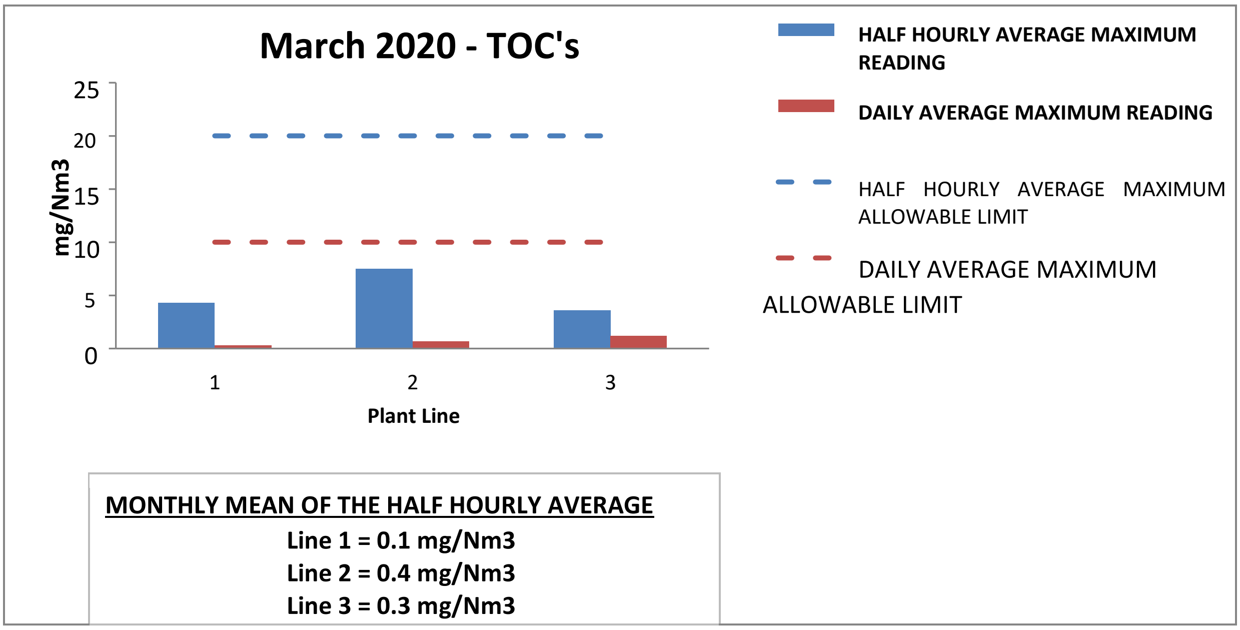

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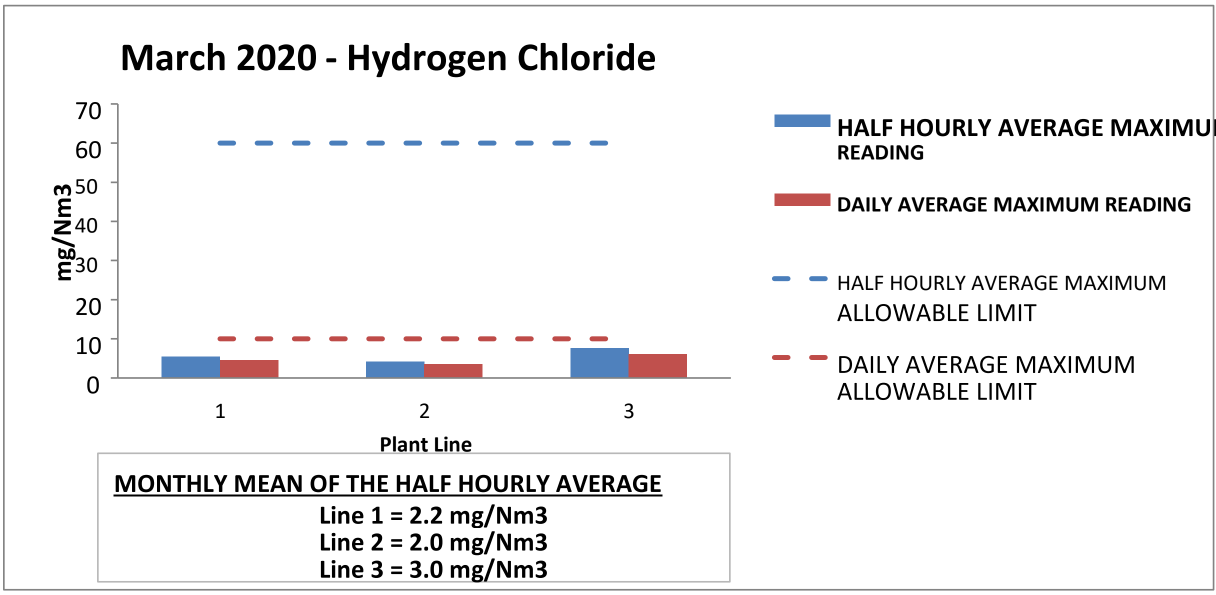

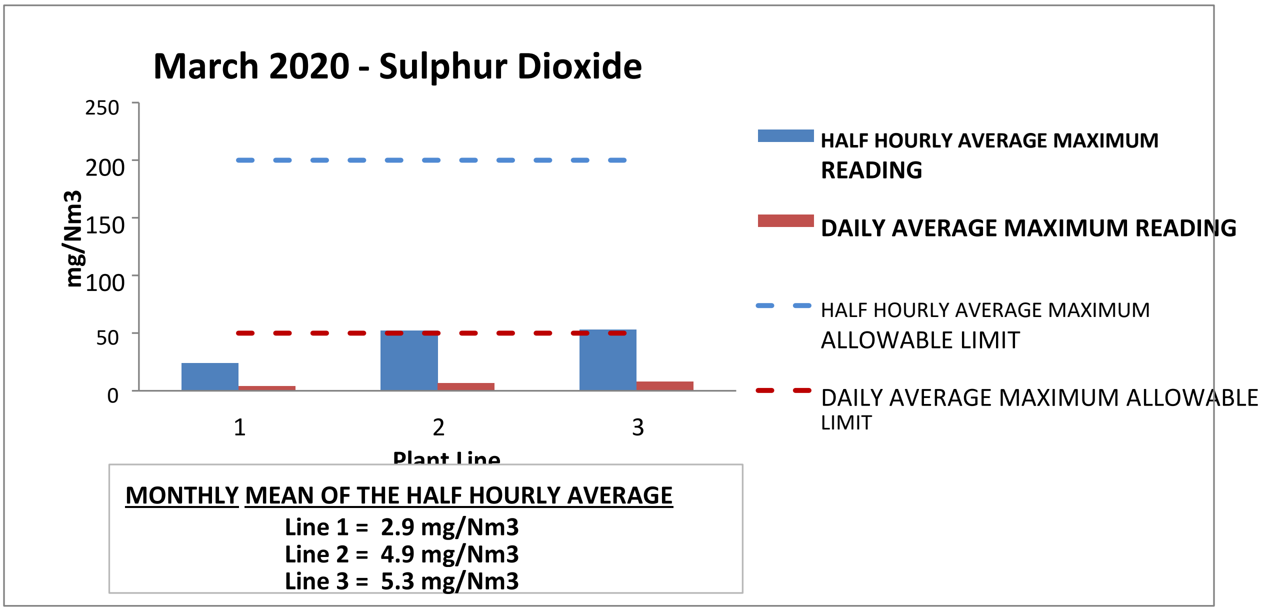

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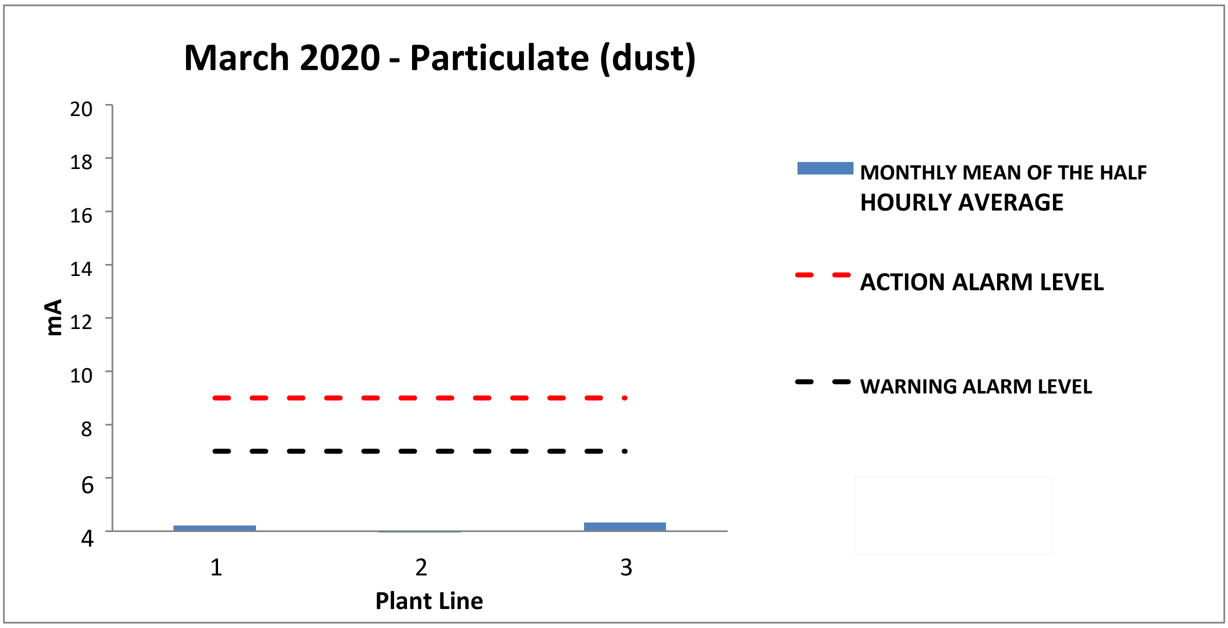

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Riverside Resource Recovery emission report – February 2020

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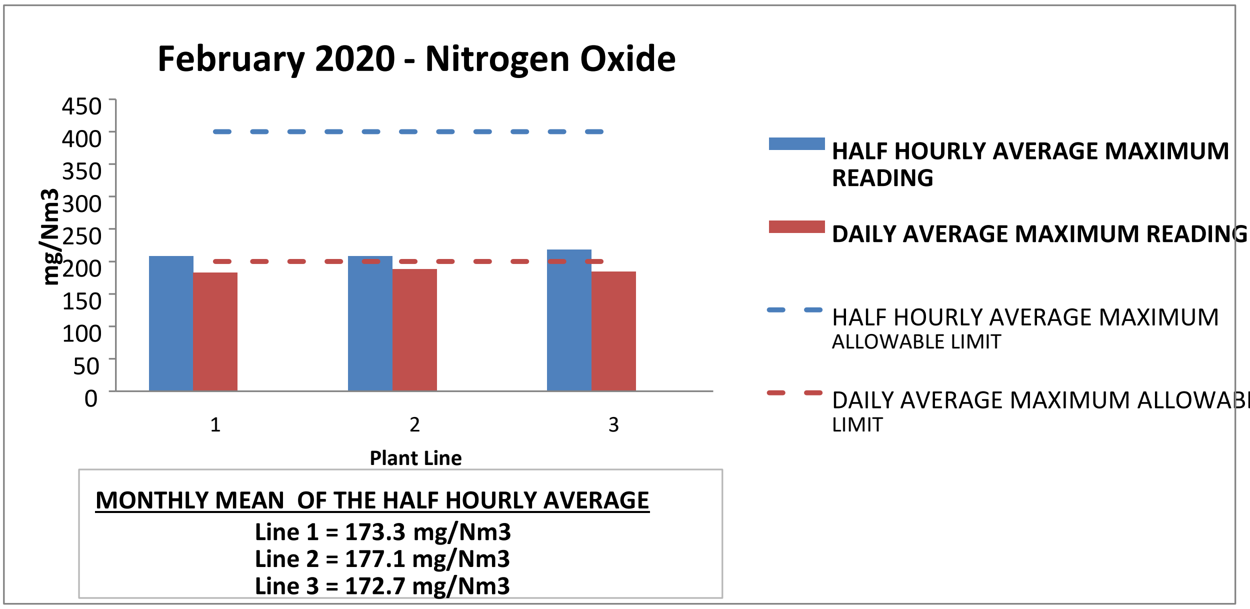

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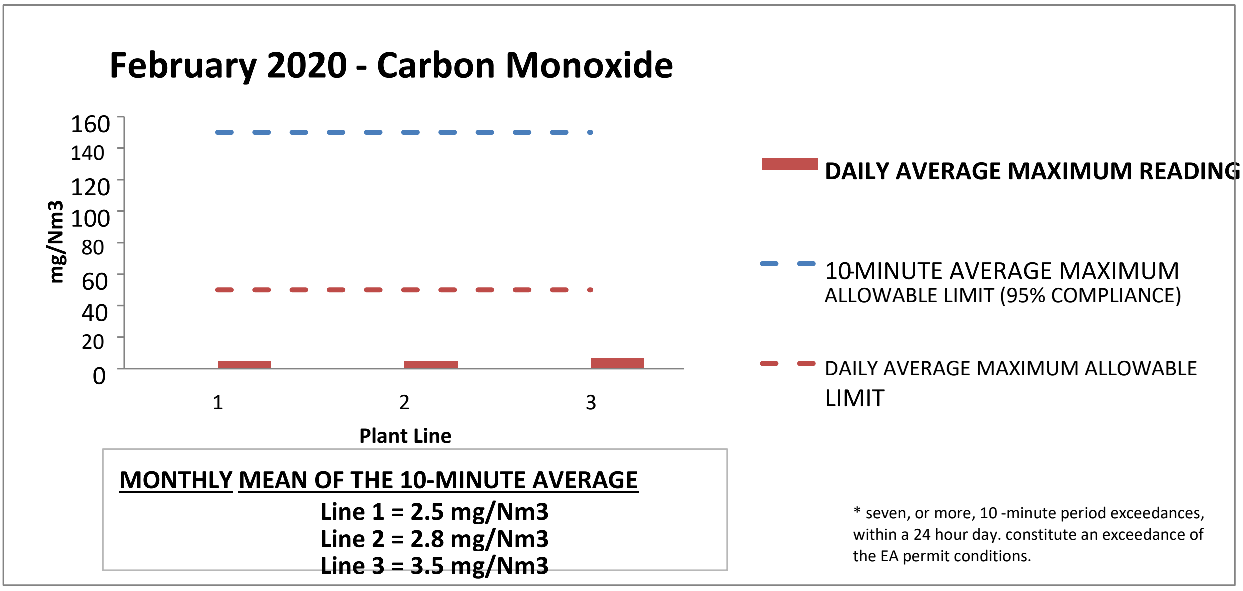

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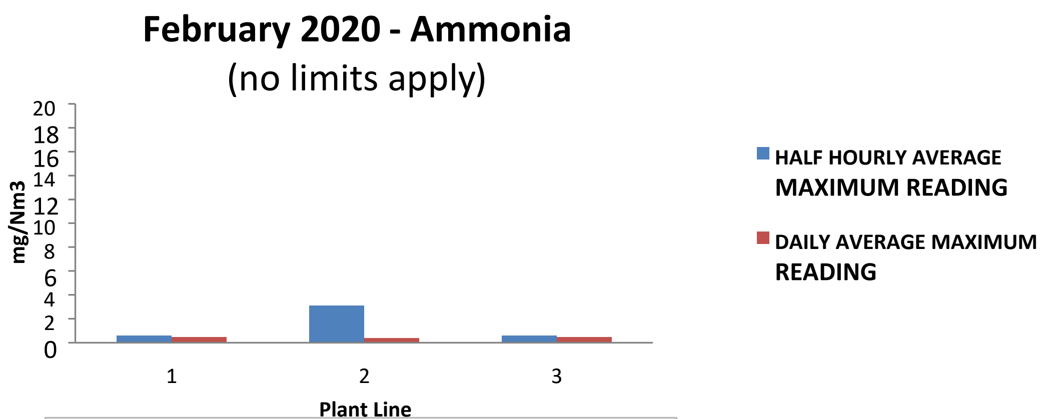

MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.4 mg/Nm3
Line 2 = 0.3 mg/Nm3
Line 3 = 0.4 mg/Nm3

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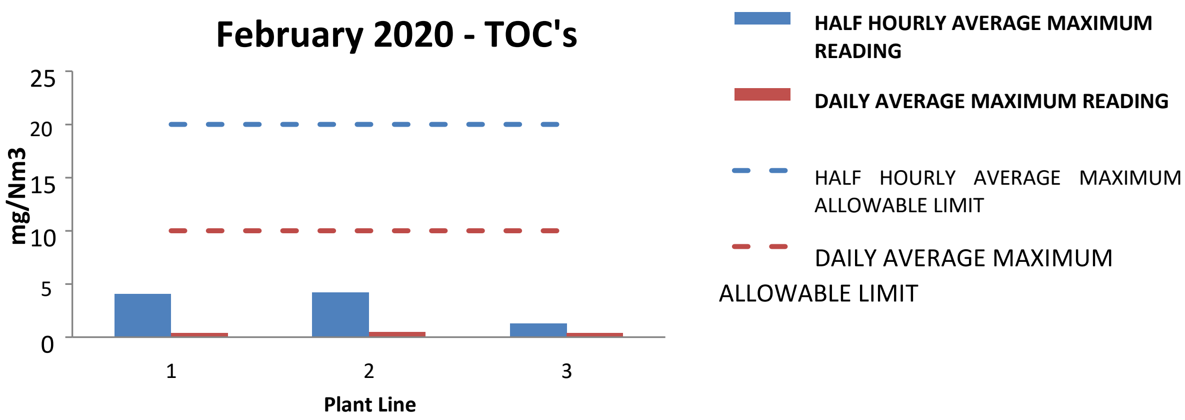
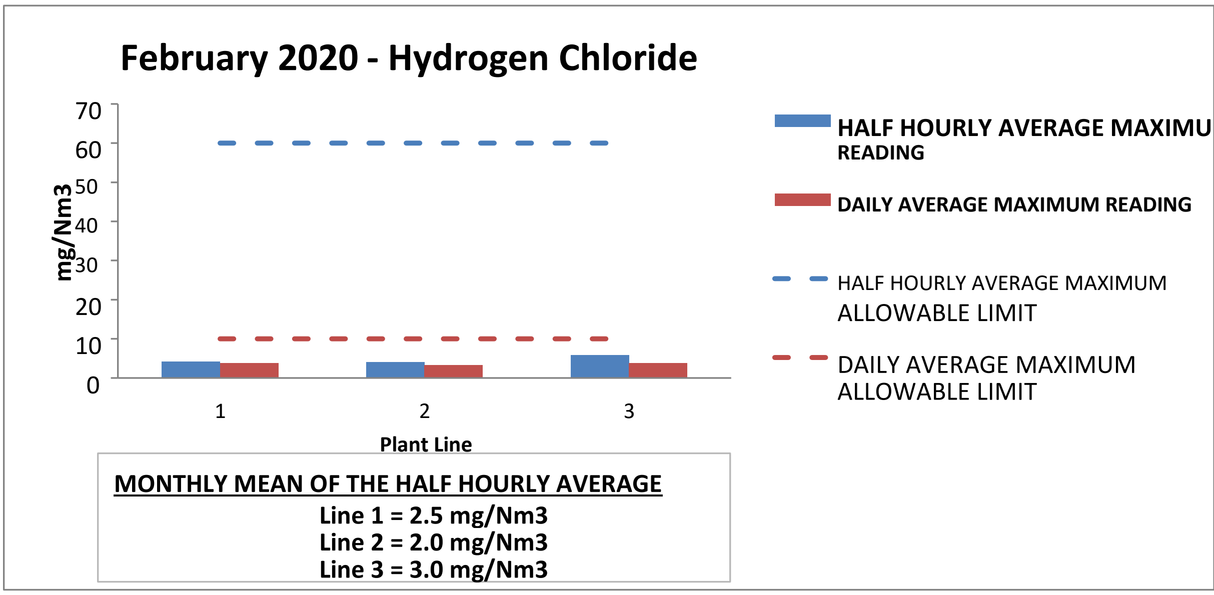


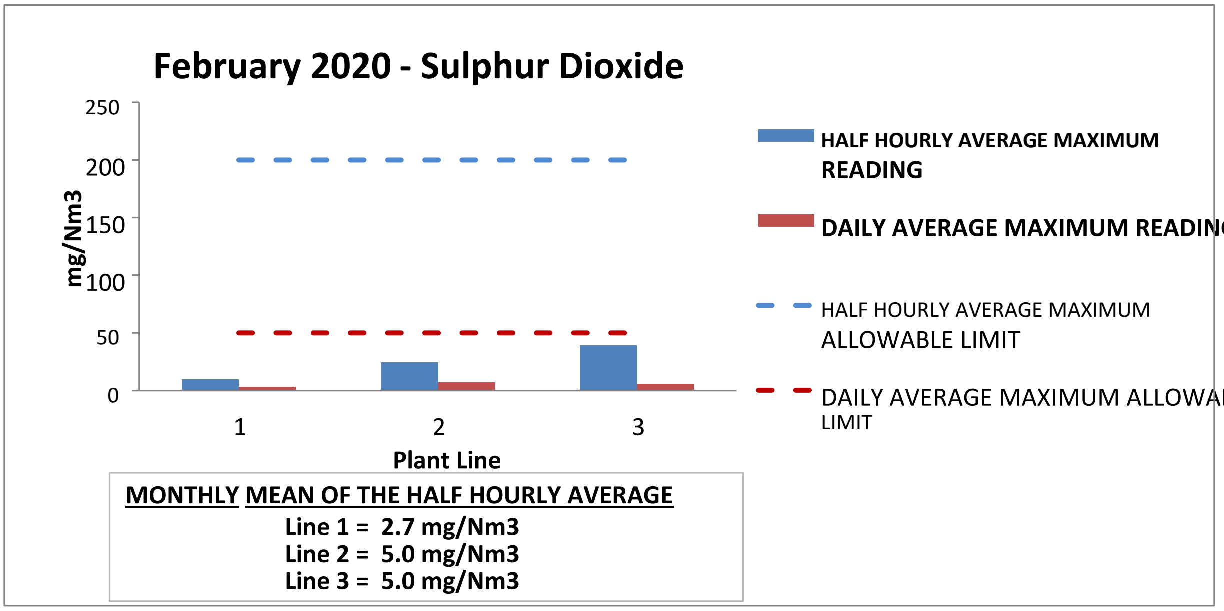
MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.2 mg/Nm3
Line 2 = 0.4 mg/Nm3
Line 3 = 0.2 mg/Nm3

Why do we control and monitor Total Organic Carbon (TOC)?

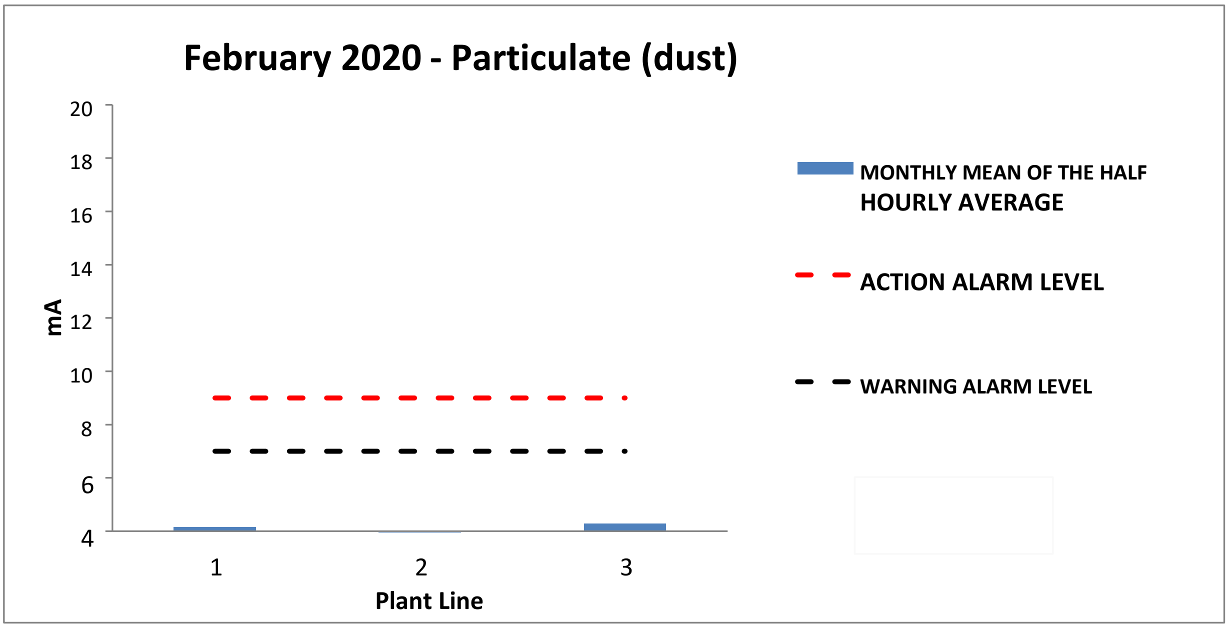
Total Organic Carbon (TOC) consists of a wide range of organic compounds including Volatile Organic Compounds (VOCs). VOCs are numerous, varied and found everywhere. VOCs are of general concern because of their ability to react with other pollutants (such as nitrogen oxides) in the lower atmosphere to form ozone. High concentrations of ozone at ground level can harm human health, damage crops and affect materials such as rubber. Some VOCs may be directly harmful to human health, contribute to global warming or destroy stratospheric ozone needed to shield the earth's surface from harmful ultra violet radiation.





Why do we control and monitor Sulphur Dioxide and Hydrogen Chloride?

Both gases dissolve in water to form strong acids and thus can contribute to the formation of acid rain. Acid rain is environmentally damaging to crops, soils and waters.



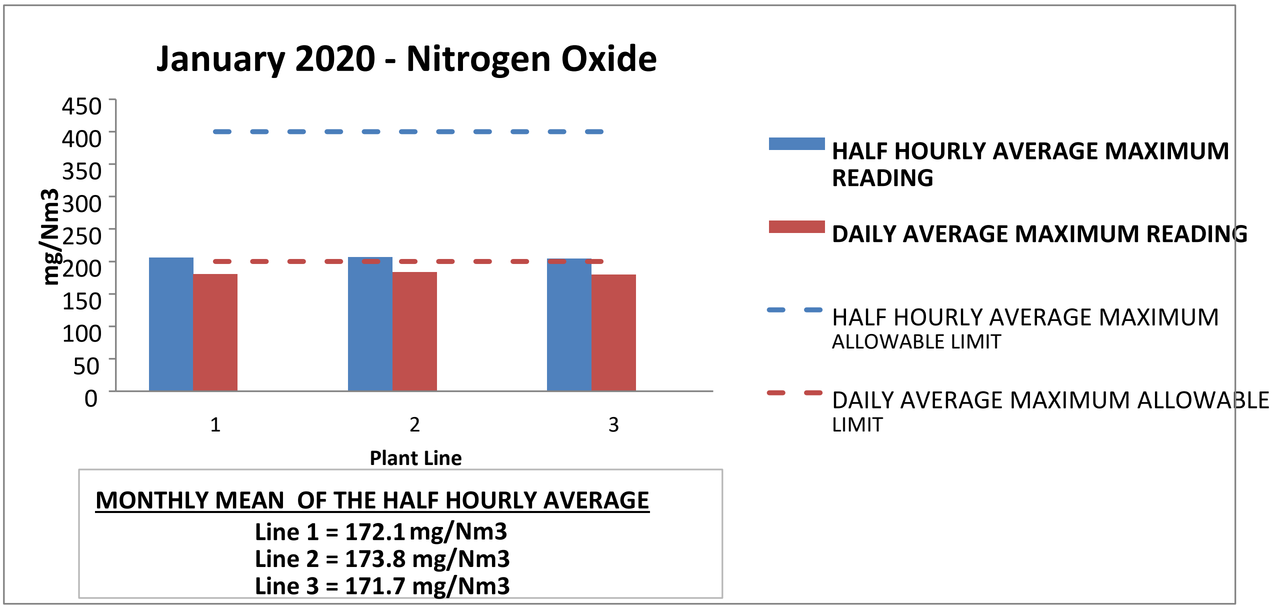
Following EA guidance and approval in July 2015, RRRL now monitor particulate emissions qualitatively as opposed to quantitatively. The particulate data is now reported in mA (milliamps) and the reporting range of the instrument is 4mA to 20mA where 4mA = 0 particles. The Half Hourly and Daily ELVs no longer apply, the ELVs have been replaced by two alarm levels that prompt the operator to start an investigation or take further action these are set at: 7mA – Warning Alarm and 9mA – Action Alarm.

Why do we control and monitor Particulates (dust)?

Particulates is the term used to describe tiny particles in the air, made up of a complex mixture of soot, organic and inorganic materials having a particle size less than or equal to 10 microns diameter (10 microns is equal to one hundredth part of a millimetre). Particulates is one of the eight substances for which the Government has established an air quality standard as part of its national Air Quality Strategy.

Riverside Resource Recovery emission report – January 2020

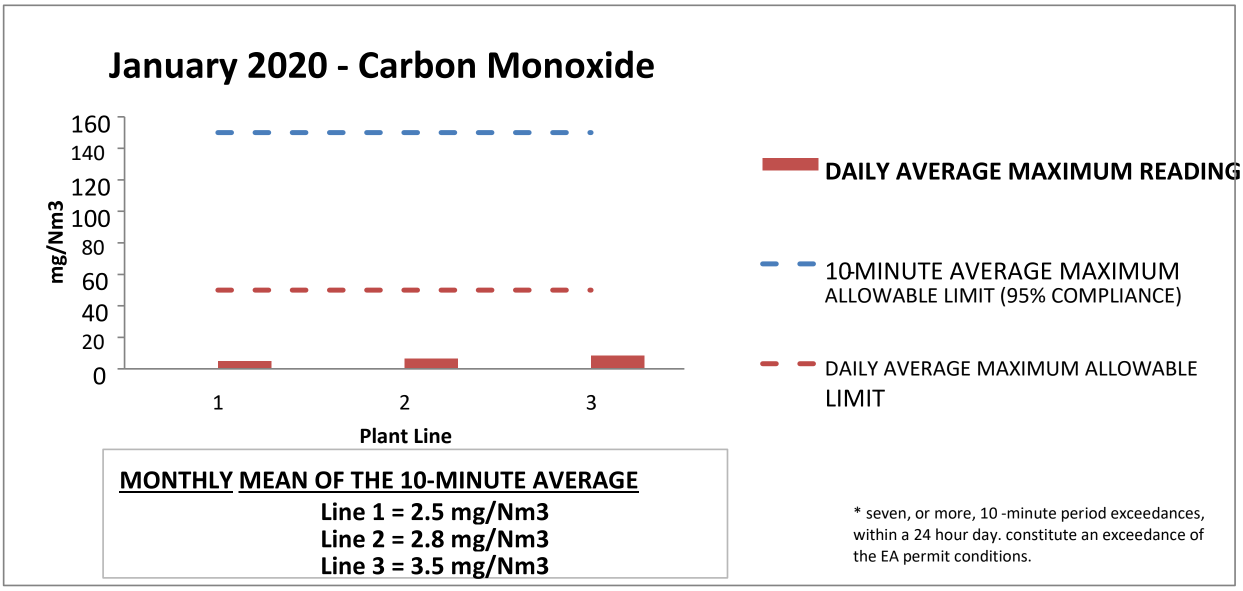
The following charts summarise the emission data for the Riverside Resource Recovery facility. The charts show the **MAXIMUM** readings taken during the month.



Why do we control and monitor Oxides of Nitrogen (NOx)?

NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO).

These can be formed naturally, but are also formed from man-made processes like fuel combustion or biomass burning. There are a number of health and environmental issues attributed to NOx, including smog, acid rain, and possibly global warming.

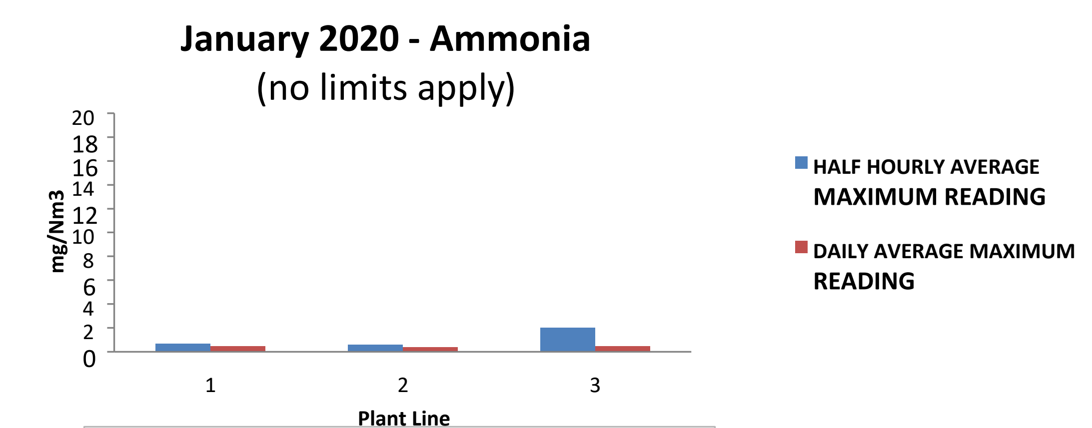


Following EA guidance and approval in May 2019, RRRL no longer report carbon monoxide against a half-hourly emissions limit value. Carbon monoxide is now monitored against the requirement to be 95% compliant against a 10minute average value, of 150mg/Nm3, over a 24-hour period. Any 24-hour period where the 95% compliance level is breached will be highlighted in the chart above. The daily average emissions limit value of 50mg/Nm3 remains unchanged.

Why do we control and monitor Carbon Monoxide?

Carbon monoxide is both a common naturally occurring chemical and is manufactured by man. It is a colourless, odourless poisonous gas. Carbon monoxide is one of the eight substances for which the government has established an air quality standard as part of its national Air Quality Strategy.

Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues.

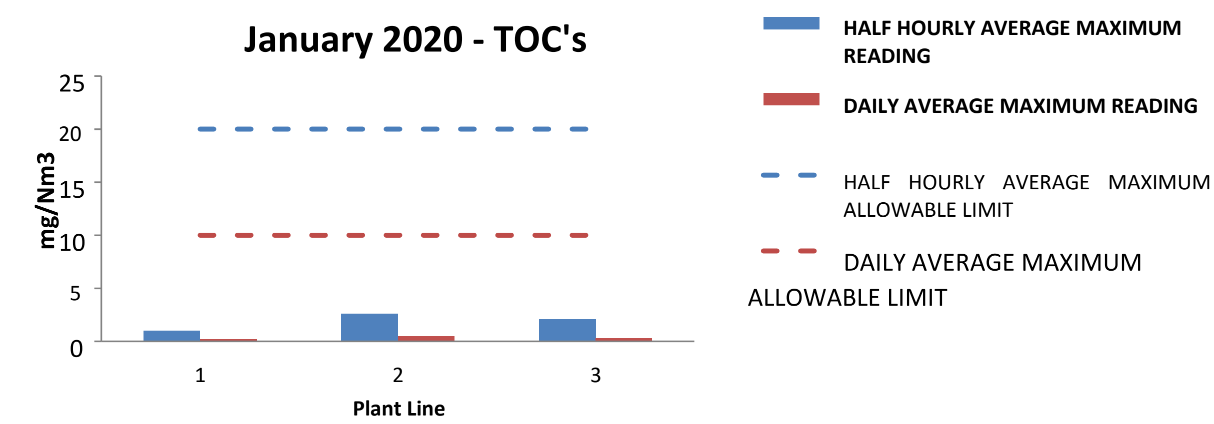


MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 0.5 mg/Nm3
Line 2 = 0.3 mg/Nm3
Line 3 = 0.4 mg/Nm3

Why do we control and monitor Ammonia?

Although in wide-use in several industries, ammonia is both caustic and hazardous. It is a colourless gas with a characteristic pungent odour.

Ammonia, unlike the other species monitored, is not a product from the incineration of waste but is actually introduced into the furnace. Under the right conditions, ammonia is able to reduce oxides of nitrogen found in the flue gas by the chemical process Selective Non-Catalytic Reduction (SNCR) to nitrogen and water vapour which are both nonhazardous.



MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 0.1 mg/Nm3
Line 2 = 0.4 mg/Nm3
Line 3 = 0.2 mg/Nm3

Why do we control and monitor Total Organic Carbon (TOC)?

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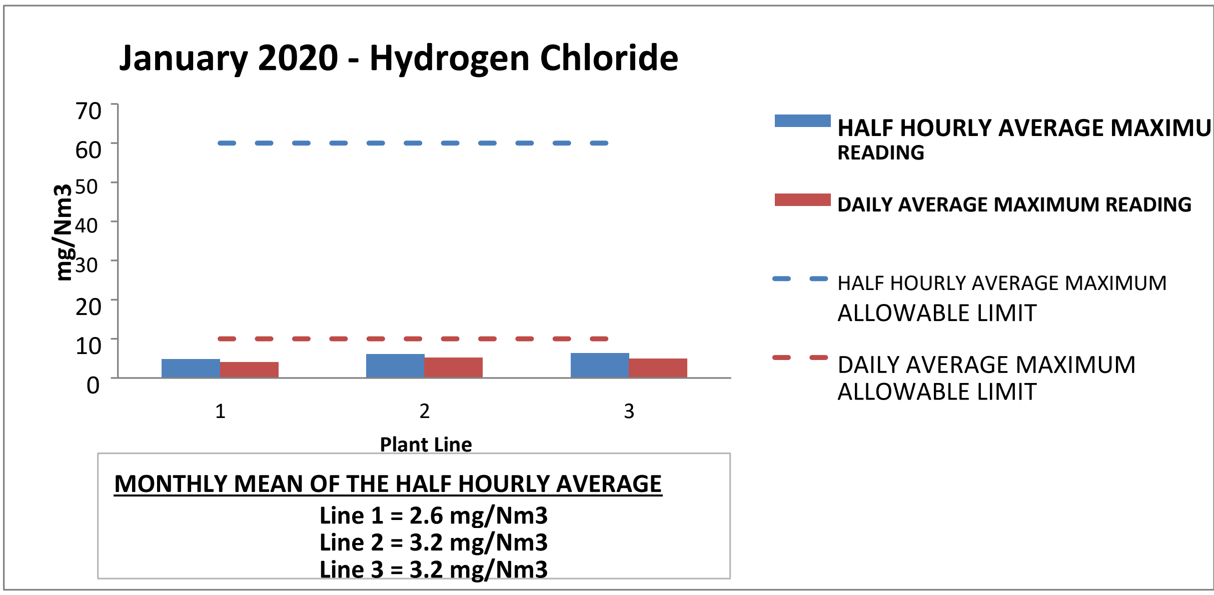
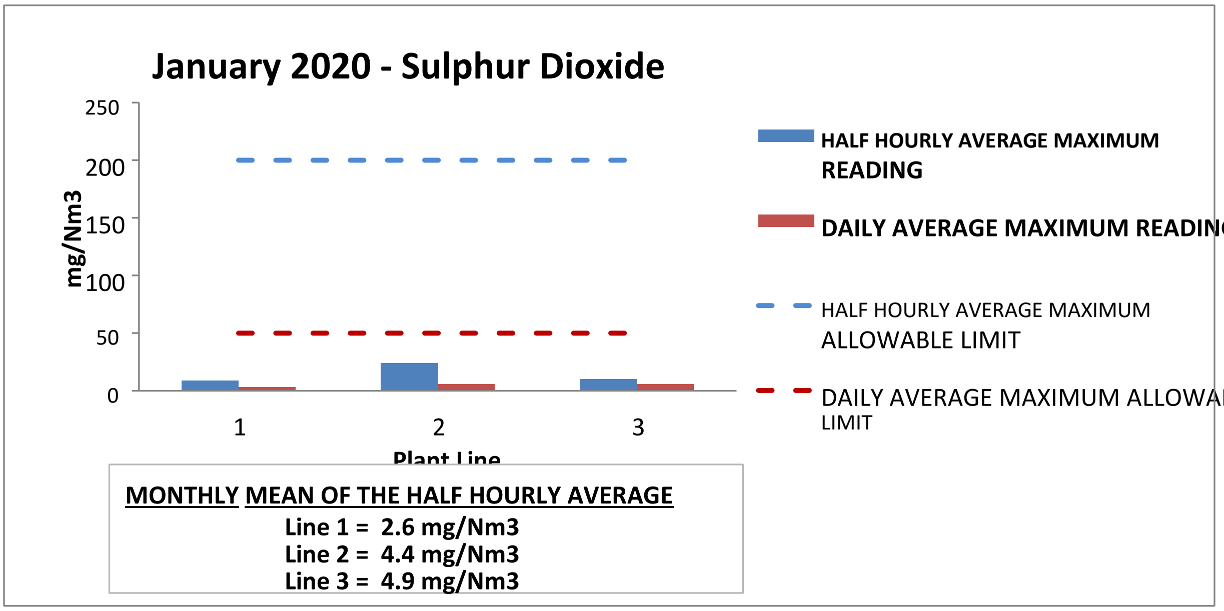
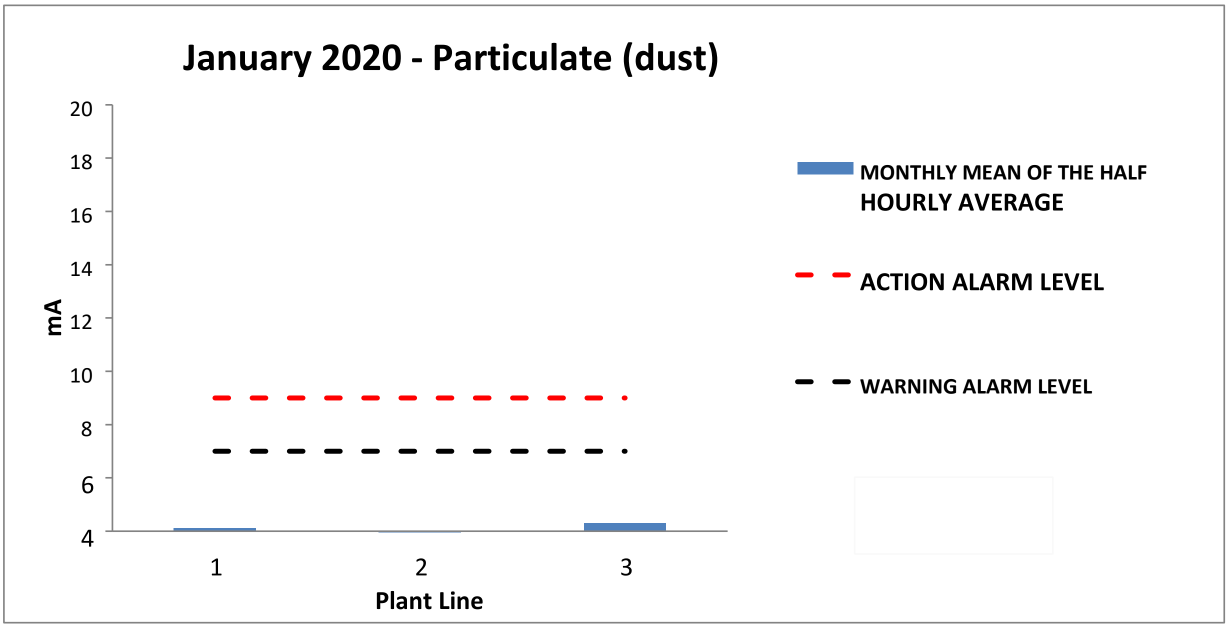




Why do we control and monitor Sulphur Dioxide and Hydrogen Chloride?

Both gases dissolve in water to form strong acids and thus can contribute to the formation of acid rain. Acid rain is environmentally damaging to crops, soils and waters.



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Why do we control and monitor Particulates (dust)?

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D.2 2019 Emissions

1. Extracts of Emissions Information from Riverside Annual Performance Report 2019

CORY
RIVERSIDE ENERGY

Annual Performance Report 2019

Permit EPR/BK0825UI

Riverside Resource Recovery Facility

Cory Riverside Energy

Year:	2019		
Address:	Norman Road, Belvedere, Bexley, DA17 6JY		
Tel:	0208 320 3310		
Email:	info@coryenergy.com		
Prepared by:	Gordon Jack	Position:	Process Engineer
Approved by:	Miguel Santana	Position:	Operations Manager
Version:	2		
Issue Date:	10/02/2020		

Annual Performance Report 2019 Riverside Resource Recovery Facility

Summary of Permit Compliance

Compliance with permit limits for continuously monitored pollutants

The plant met its emission limits as shown in the table below:

Substance	Percentage time compliant during operation	
	Half-hourly limit	Daily limit
Particulates	100%	100%
Oxides of nitrogen	100%	100%
Sulphur dioxide	100%	100%
Carbon monoxide	100% 95% of 10-min averages	100%
Total organic carbon	100%	100%
Hydrogen chloride	100%	100%
Hydrogen fluoride		

Summary of any notifications or non-compliances under the permit

Date	Summary of notification or non-compliance [including Line/Reference]	Reason	Measures taken to prevent reoccurrence

Summary of any complaints received and actions to taken to resolve them.

Date	Summary of complaint [including Line/Reference]	Reason *	Measures taken to prevent reoccurrence

* including whether substantiated by the operator or the EA

Annual Performance Report 2019 Riverside Resource Recovery Facility

Emissions to Air (periodically monitored)

Summary of monitoring undertaken, standards used and compliance

All substances had 100% compliance with Emission Limit Values stated in Environmental Permit. Heavy metals suite (BS EN 14385), Mercury (BS EN 13211), Dioxins/Furans (BS EN 1948-1) and Polychlorinated Biphenyls (BS EN 1948-1) monitoring performed on a quarterly basis. Polycyclic Aromatic Hydrocarbons (BS ISO 11338-1) and Hydrogen Fluoride (BS ISO 15713) monitoring performed on a bi-annual basis.

Results of emissions to air that are periodically monitored

Substance	Ref. Period	Emission Limit Value	Average		
			A1	A2	A3
Hydrogen fluoride	1 hr	2 mg/m³	0.025	0.05	0.035
Cd and Th and their compounds	6-8hrs	0.05 mg/m³	0.000623	0.00095	0.00103
Hg and its compounds	6-8hrs	0.05 mg/m³	0.0008	0.000643	0.0008075
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	6-8hrs	0.5 mg/m³	0.019225	0.0192	0.020875
Dioxins & Furans (I-TEQ)	6-8hrs	0.1 ng/m³	0.011275	0.014625	0.009225
PCBs (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m³	0.001025	0.000918	0.0011
PCBs (WHO-TEQ Fish)	6-8hrs	None set ng/m³	4.75E-05	3.35E-05	0.00005
PCBs (WHO-TEQ Birds)	6-8hrs	None set ng/m³	0.002325	0.001653	0.00265
Dioxins & Furans (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m³	0.011175	0.0143	0.0098
Dioxins & Furans (WHO-TEQ Fish)	6-8hrs	None set ng/m³	0.0125	0.01575	0.010025
Dioxins & Furans (WHO-TEQ Birds)	6-8hrs	None set ng/m³	0.01785	0.020975	0.013775
Anthanthrene	6-8hrs	None set µg/m³	0.0033	0.00365	0.0034
Benzo(a)anthracene	6-8hrs	None set µg/m³	0.0033	0.00365	0.0034
Benzo(a)pyrene	6-8hrs	None set µg/m³	0.0033	0.00365	0.0034
Benzo(b)fluoranthene	6-8hrs	None set µg/m³	0.0033	0.00365	0.0034
Benzo(b)naptho(2,1-d) thiophene	6-8hrs	None set µg/m³	0.0039	0.00485	0.00455
Benzo(c)phenanthrene	6-8hrs	None set µg/m³	0.0039	0.00485	0.00455
Benzo(ghi)perylene	6-8hrs	None set µg/m³	0.0033	0.00365	0.0034
Benzo(k)fluoranthene	6-8hrs	None set µg/m³	0.0033	0.00365	0.0034
Cholanthrene	6-8hrs	None set µg/m³	0.0039	0.00485	0.00455
Chrysene	6-8hrs	None set µg/m³	0.0033	0.0067	0.0075
Cyclopenta(cd)pyrene	6-8hrs	None set µg/m³	0.0039	0.00485	0.0076
Dibenzo(ai)pyrene	6-8hrs	None set µg/m³	0.0055	0.00605	0.0057
Dibenzo(ah)anthracene	6-8hrs	None set µg/m³	0.0068	0.00445	0.0034
Fluoranthene	6-8hrs	None set µg/m³	0.025	0.115	0.19
Indeno(123-cd) pyrene	6-8hrs	None set µg/m³	0.0033	0.00365	0.0034
Naphthalene	6-8hrs	None set µg/m³	0.03195	0.03785	0.05295
Comments :					

Annual Performance Report 2019 Riverside

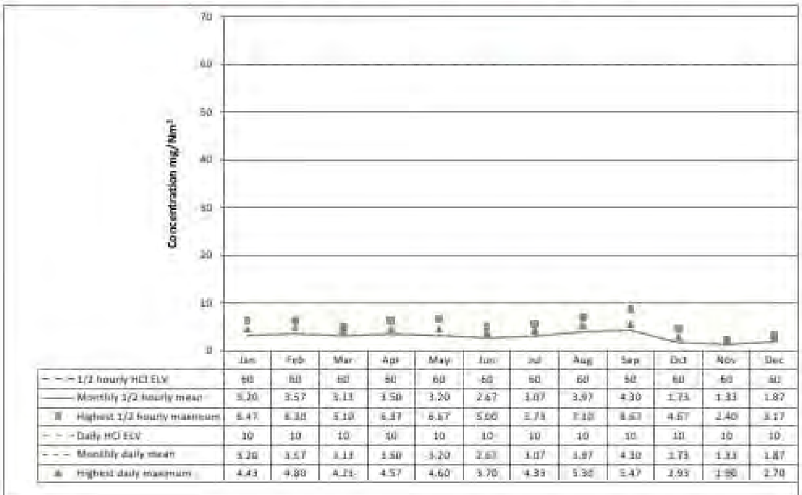
Emissions to Air (continously monitored)

Summary of monitoring undertaken, standards used and compliance									
All substances listed below are continuously monitored in line with the requirements of the Environmental permit. There was 100% compliance throughout 2019. Oxides of Nitrogen (ISO 10849), Particulate Matter (BS EN 13284-2), Total Organic Carbon (BS EN 12619), Hydrogen Chloride, Sulphur Dioxide (BS 6069-4.4)									
Results of emissions to air that are continuously monitored									
Substance	**Reference Period**	**Emission Limit Value**	**A1**		**A2**		**A3**		
			Max.	**Avg.**	**Max.**	**Avg.**	**Max.**	**Avg.**	
Oxides of nitrogen	Daily mean	200 mg/m³	173.4	171	175.8	172.1	172.6	170.4	
	½ hourly mean	400 mg/m³	173.4	171	175.8	172.1	172.6	170.4	
Particulates	Daily mean	10 mg/m³	-	-	-	-	-	-	
	½ hourly mean	30 mg/m³	-	-	-	-	-	-	
Total Organic Carbon	Daily mean	10 mg/m³	0.4	0.18	0.6	0.44	0.3	0.2	
	½ hourly mean	20 mg/m³	0.4	0.18	0.6	0.44	0.3	0.2	
Hydrogen chloride	Daily mean	10 mg/m³	3.2	2.05	3.3	2.5	5.9	4.3	
	½ hourly mean	60 mg/m³	3.2	2.05	3.3	2.5	5.9	4.3	
Sulphur dioxide	Daily mean	50 mg/m³	3.2	2.2	4.9	3.5	5.2	4.16	
	½ hourly mean	200 mg/m³	3.2	2.2	4.9	3.5	5.2	4.16	
Carbon monoxide	Daily mean	50 mg/m³	10.8	2.78	6	2.75	16.6	3.71	
	95%ile 10-min avg *	150 mg/m³ *	25.1	2.78	12.3	2.75	40.6	3.71	
Ammonia	Daily mean	No limit set	0.9	0.425	0.4	0.33	0.4	0.35	
Comments :									
Following EA guidance and approval in July 2015, RRRL now monitor particulate emissions qualitatively as opposed to quantitatively. The particulate data is now reported in mA (milliamps) and the reporting range of the instrument is 4mA to 20mA.									

Annual Performance Report 2019 Riverside Resource Recovery Facility

Monitoring of Hydrogen Chloride emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	**1/2 hourly HCl ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily HCl ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	60	3.20	6.47	10	3.20	4.43
Feb	60	3.57	6.30	10	3.57	4.80
Mar	60	3.13	5.10	10	3.13	4.23
Apr	60	3.50	6.37	10	3.50	4.57
May	60	3.20	6.67	10	3.20	4.60
Jun	60	2.67	5.00	10	2.67	3.70
Jul	60	3.07	5.73	10	3.07	4.33
Aug	60	3.97	7.10	10	3.97	5.30
Sep	60	4.30	8.67	10	4.30	5.47
Oct	60	1.73	4.67	10	1.73	2.93
Nov	60	1.33	2.40	10	1.33	1.90
Dec	60	1.87	3.17	10	1.87	2.70

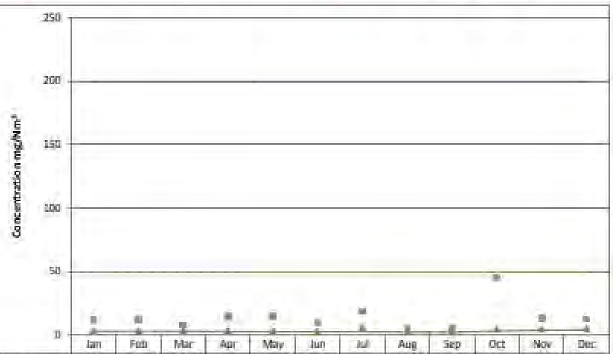


Comments :

Annual Performance Report 2019 — Riverside Resource Recovery Facility

Monitoring of Sulphur dioxide emissions — **Whole Installation** — *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly SO2 ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily SO2 ELV	Monthly daily mean	Highest daily maximum
Jan	200	3.27	12.50	50	3.27	3.57
Feb	200	3.33	12.50	50	3.33	3.87
Mar	200	3.20	8.43	50	3.20	3.97
Apr	200	3.10	15.17	50	3.10	3.73
May	200	3.00	15.43	50	3.00	3.53
Jun	200	3.00	9.97	50	3.00	3.40
Jul	200	3.07	19.17	50	3.07	6.73
Aug	200	2.70	5.97	50	2.70	3.20
Sep	200	2.63	6.07	50	2.63	3.07
Oct	200	3.50	45.60	50	3.50	5.37
Nov	200	4.17	13.73	50	4.17	4.90
Dec	200	4.40	13.17	50	4.40	5.57



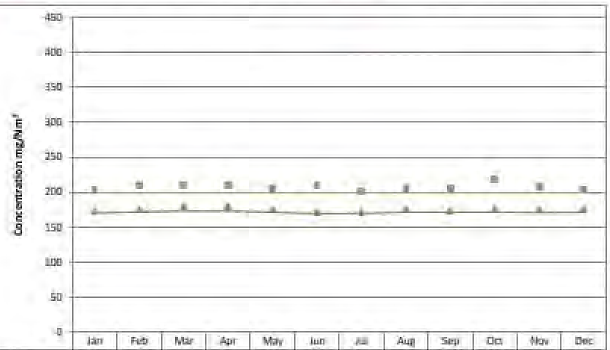
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly SO2 ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly 1/2 hourly mean	3.27	3.33	3.20	3.10	3.00	3.00	3.07	2.70	2.63	3.50	4.17	4.40
Highest 1/2 hourly maximum	12.50	12.50	8.43	15.17	15.43	9.97	19.17	5.97	6.07	45.60	13.73	13.17
Daily SO2 ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	3.27	3.33	3.20	3.10	3.00	3.00	3.07	2.70	2.63	3.50	4.17	4.40
Highest daily maximum	3.57	3.87	3.97	3.73	3.53	3.40	6.73	3.20	3.07	5.37	4.90	5.57

Comments :

Annual Performance Report 2019 — Riverside Resource Recovery Facility

Monitoring of Oxides of Nitrogen emissions — **Whole Installation** — *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly NOx ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily NOx ELV	Monthly daily mean	Highest daily maximum
Jan	400	170.37	204.07	200	170.37	173.10
Feb	400	171.60	209.53	200	171.60	175.10
Mar	400	172.97	210.40	200	172.97	180.30
Apr	400	173.13	210.80	200	173.13	180.40
May	400	171.33	206.00	200	171.33	174.97
Jun	400	169.53	210.90	200	169.53	171.57
Jul	400	169.73	201.03	200	169.73	172.33
Aug	400	170.63	205.33	200	170.63	175.70
Sep	400	170.67	206.70	200	170.67	173.77
Oct	400	171.57	219.10	200	171.57	175.93
Nov	400	170.90	208.47	200	170.90	175.10
Dec	400	171.17	204.67	200	171.17	176.47



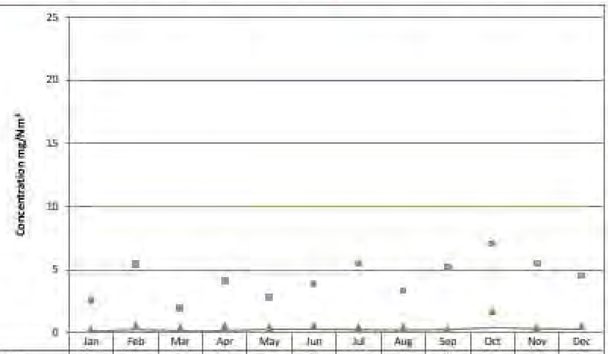
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly NOx ELV	400	400	400	400	400	400	400	400	400	400	400	400
Monthly 1/2 hourly mean	170.37	171.60	172.97	173.13	171.33	169.53	169.73	170.63	170.67	171.57	170.90	171.17
Highest 1/2 hourly maximum	204.07	209.53	210.40	210.80	206.00	210.90	201.03	205.33	206.70	219.10	208.47	204.67
Daily NOx ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly daily mean	170.37	171.60	172.97	173.13	171.33	169.53	169.73	170.63	170.67	171.57	170.90	171.17
Highest daily maximum	173.10	175.10	180.30	180.40	174.97	171.57	172.33	175.70	173.77	175.93	175.10	176.47

Comments :

Annual Performance Report 2019 — Riverside Resource Recovery Facility

Monitoring of Total organic carbon emissions — **Whole Installation** — *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly TOC ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily TOC ELV	Monthly daily mean	Highest daily maximum
Jan	20	0.13	2.53	10	0.13	0.30
Feb	20	0.27	5.43	10	0.27	0.63
Mar	20	0.23	2.00	10	0.23	0.43
Apr	20	0.23	4.17	10	0.23	0.57
May	20	0.30	2.83	10	0.30	0.47
Jun	20	0.30	3.87	10	0.30	0.57
Jul	20	0.27	5.50	10	0.27	0.47
Aug	20	0.23	3.37	10	0.23	0.47
Sep	20	0.27	5.27	10	0.27	0.30
Oct	20	0.43	7.07	10	0.43	1.73
Nov	20	0.33	5.50	10	0.33	0.47
Dec	20	0.30	4.57	10	0.30	0.57



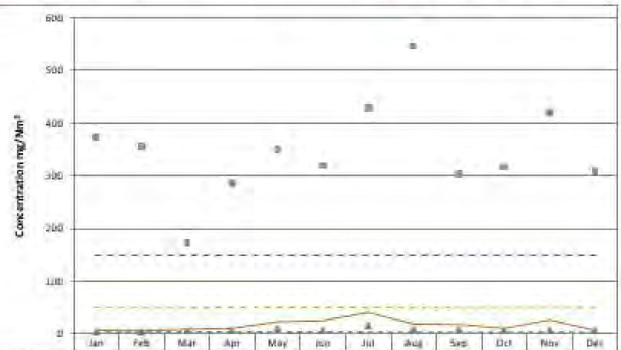
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly TOC ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hourly mean	0.13	0.27	0.23	0.23	0.30	0.30	0.27	0.23	0.27	0.43	0.33	0.30
Highest 1/2 hourly maximum	2.53	5.43	2.00	4.17	2.83	3.87	5.50	3.37	5.27	7.07	5.50	4.57
Daily TOC ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.13	0.27	0.23	0.23	0.30	0.30	0.27	0.23	0.27	0.43	0.33	0.30
Highest daily maximum	0.30	0.63	0.43	0.57	0.47	0.57	0.47	0.47	0.30	1.73	0.47	0.57

Comments :

Annual Performance Report 2019 — Riverside Resource Recovery Facility

Monitoring of Carbon Monoxide (10-minute avg) — **Whole Installation** — *See Notes in Cell S3*

mg/Nm^3	10-minute Reference Periods				Daily Reference Periods		
2019	95%ile 10-min avg CO ELV	95%ile 10-min avg maximum	Monthly CO 10-min avg mean	10-min avg maximum	Daily CO ELV	Monthly daily mean	Highest daily maximum
Jan	150	6.9	2.9	373.4	50	2.9	4.9
Feb	150	6.1	2.7	355.9	50	2.7	4.5
Mar	150	8.8	2.7	173.6	50	2.7	6.3
Apr	150	10.7	3.2	285.4	50	3.2	6.3
May	150	22.7	3.4	349.5	50	3.4	10.8
Jun	150	25.1	3.2	319.8	50	3.2	6.5
Jul	150	40.6	3.6	429.2	50	3.6	16.6
Aug	150	18.7	2.9	546.5	50	2.9	8.8
Sep	150	17.7	3.3	304	50	3.3	7.9
Oct	150	10.7	2.8	316.4	50	2.8	6.6
Nov	150	26.3	3.4	419.9	50	3.4	7
Dec	150	6.7	2.7	308.4	50	2.7	6.4



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
95%ile 10-min avg CO ELV	150	150	150	150	150	150	150	150	150	150	150	150
95%ile 10-min avg maximum	6.9	6.1	8.8	10.7	22.7	25.1	40.6	18.7	17.7	10.7	26.3	6.7
10-min avg maximum	373.4	355.9	173.6	285.4	349.5	319.8	429.2	546.5	304	316.4	419.9	308.4
Daily CO ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	2.9	2.7	2.7	3.2	3.4	3.2	3.6	2.9	3.3	2.8	3.4	2.7
Highest daily maximum	4.9	4.5	6.3	6.3	10.8	6.5	16.6	8.8	7.9	6.6	7	6.4

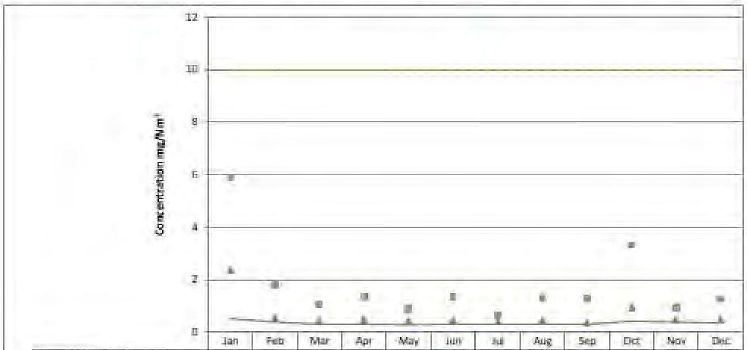
Comments :

Environment Agency explanatory note: The 10-minute average ELV is based on the "95th percentile". In this case this means that 95% of the 10 minute averages in the relevant 24-hour period (i.e. 137) must be below 150 mg/Nm3, and 5% (i.e. 7) are allowed to be any value above 150 mg/Nm3. Whilst we expect operators to minimise CO emissions at all times, it is perfectly acceptable for the value of the maximum 10-minute average to be above 150 mg/Nm3, provided the 95th percentile ELV has been met for that period.

Annual Performance Report 2019 — Riverside Resource Recovery Facility

Monitoring of Ammonia emissions — **Whole Installation** — *See Notes in Cell O3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	**1/2 hourly NH3 ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily NH3 ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	0	0.53	5.90	10	0.53	2.40
Feb	0	0.40	1.80	10	0.40	0.57
Mar	0	0.33	1.07	10	0.33	0.47
Apr	0	0.33	1.37	10	0.33	0.50
May	0	0.30	0.90	10	0.30	0.43
Jun	0	0.33	1.33	10	0.33	0.47
Jul	0	0.33	0.67	10	0.33	0.43
Aug	0	0.33	1.30	10	0.33	0.47
Sep	0	0.33	1.30	10	0.33	0.37
Oct	0	0.43	3.33	10	0.43	0.97
Nov	0	0.40	0.97	10	0.40	0.50
Dec	0	0.37	1.27	10	0.37	0.50



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly NH3 ELV	0	0	0	0	0	0	0	0	0	0	0	0
Monthly 1/2 hourly mean	0.53	0.40	0.33	0.33	0.30	0.33	0.33	0.33	0.33	0.43	0.40	0.37
Highest 1/2 hourly maximum	5.90	1.80	1.07	1.37	0.90	1.33	0.67	1.30	1.30	3.33	0.97	1.27
Daily NH3 ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.53	0.40	0.33	0.33	0.30	0.33	0.33	0.33	0.33	0.43	0.40	0.37
Highest daily maximum	2.40	0.57	0.47	0.50	0.43	0.47	0.43	0.47	0.37	0.97	0.50	0.50

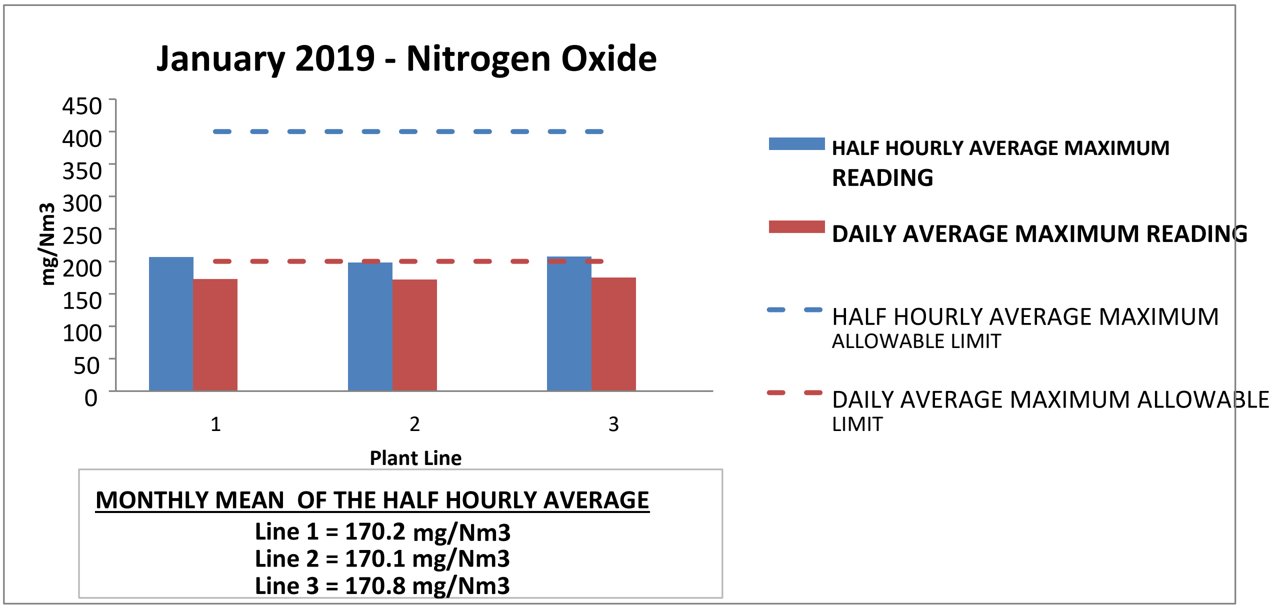
Comments :

An indicated ELV value of zero in the table above means that no ammonia limit is set in the permit.

2. Publicly reported continuously monitored emissions reports

Riverside Resource Recovery emission report – January 2019

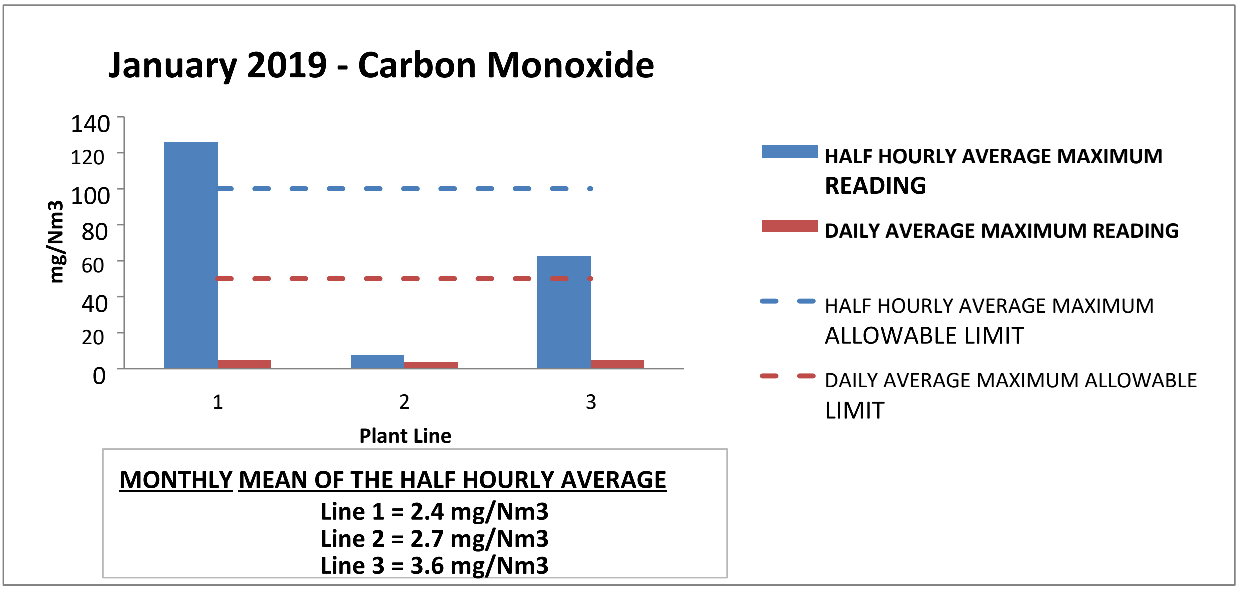
The following charts summarise the emission data for the Riverside Resource Recovery facility. The charts show the **MAXIMUM** readings taken during the month.



Why do we control and monitor Oxides of Nitrogen (NOx)?

NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO).

These can be formed naturally, but are also formed from man-made processes like fuel combustion or biomass burning. There are a number of health and environmental issues attributed to NOx, including smog, acid rain, and possibly global warming.



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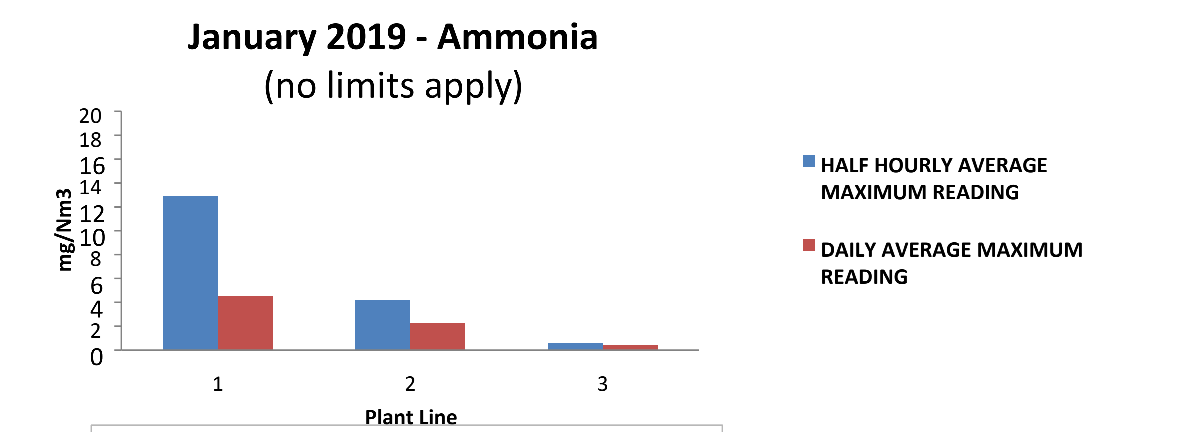
Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues.



MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.9 mg/Nm3
Line 2 = 0.4 mg/Nm3
Line 3 = 0.3 mg/Nm3

Why do we control and monitor Ammonia?

Although in wide-use in several industries, ammonia is both caustic and hazardous. It is a colourless gas with a characteristic pungent odour.

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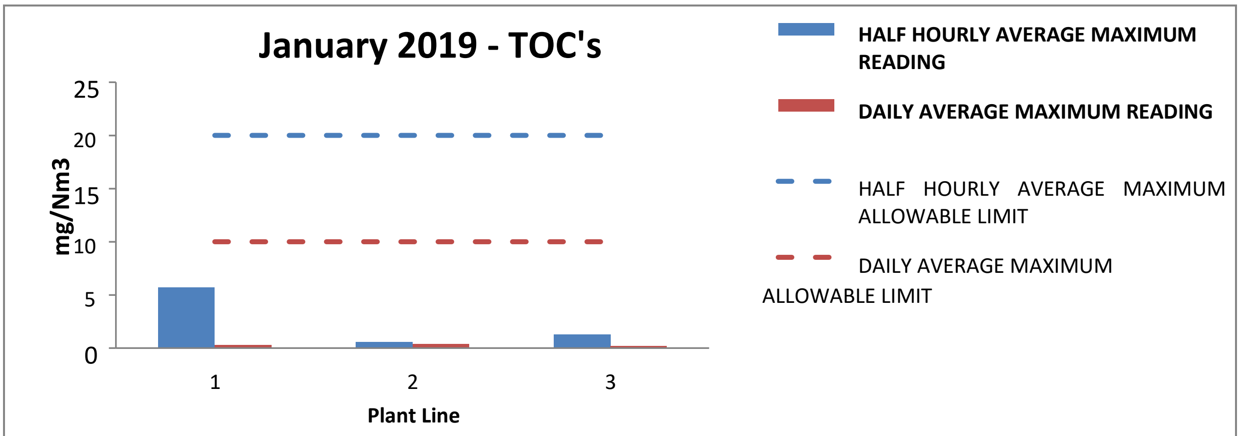
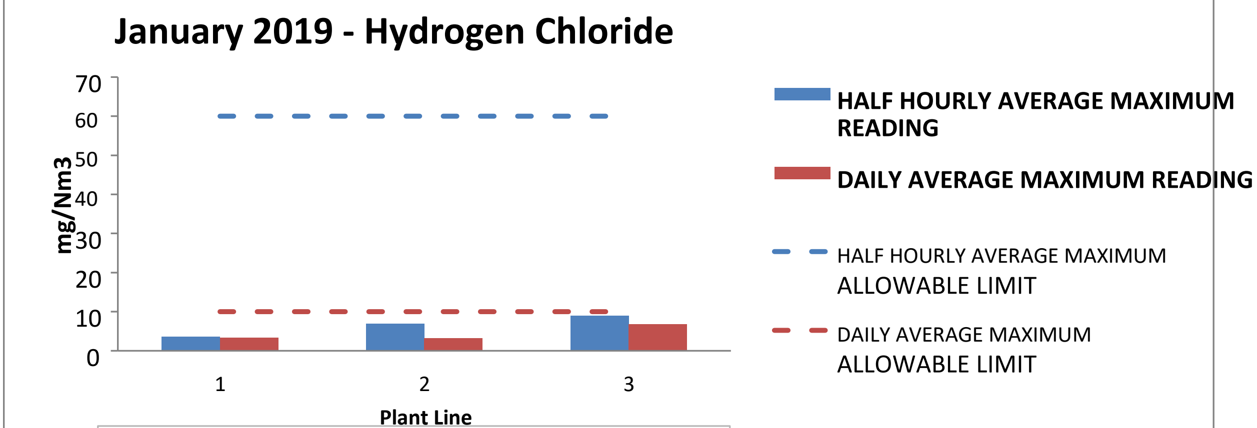


MONTHLY MEAN OF THE HALF HOURLY AVERAGE

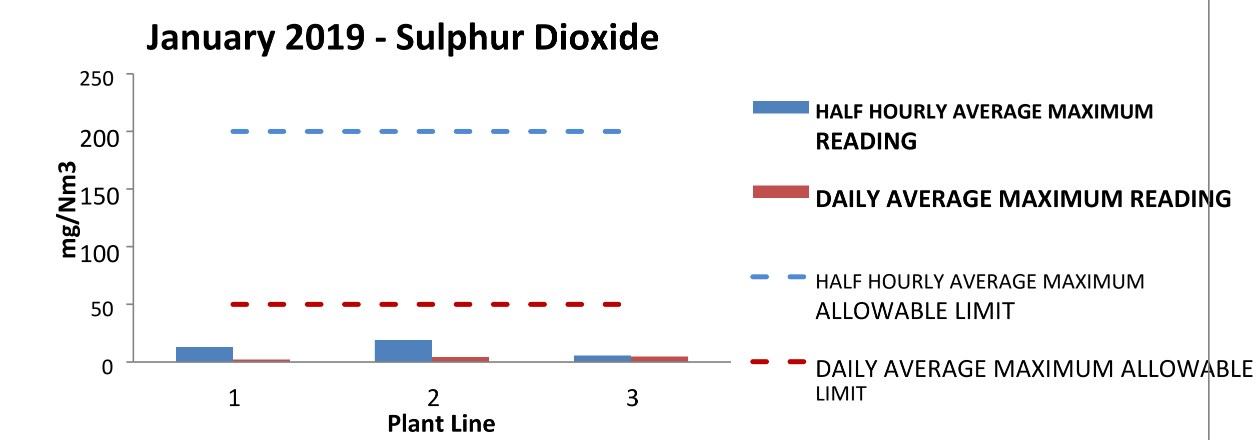
Line 1 = 0.0 mg/Nm3
Line 2 = 0.3 mg/Nm3
Line 3 = 0.1 mg/Nm3

Why do we control and monitor Total Organic Carbon (TOC)?

Total Organic Carbon (TOC) consists of a wide range of organic compounds including Volatile Organic Compounds (VOCs). VOCs are numerous, varied and found everywhere. VOCs are of general concern because of their ability to react with other pollutants (such as nitrogen oxides) in the lower atmosphere to form ozone. High concentrations of ozone at ground level can harm human health, damage crops and affect materials such as rubber. Some VOCs may be directly harmful to human health, contribute to global warming or destroy stratospheric ozone needed to shield the earth's surface from harmful ultra violet radiation.

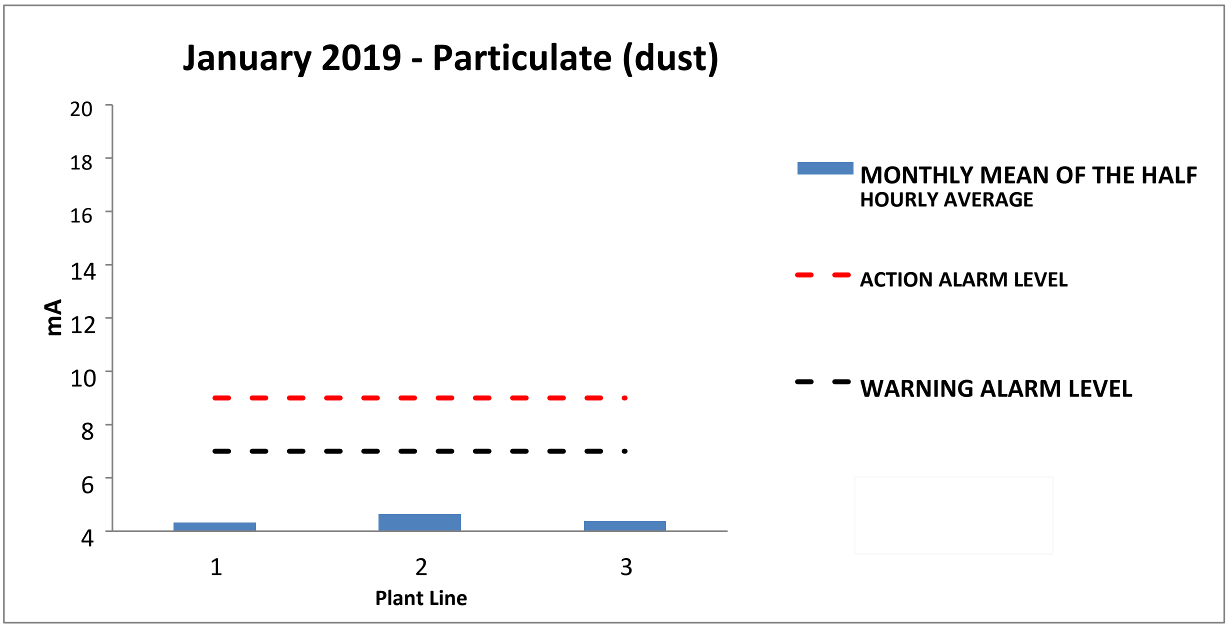


MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 2.0 mg/Nm3
Line 2 = 2.0 mg/Nm3
Line 3 = 5.6 mg/Nm3



MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 1.7 mg/Nm3
Line 2 = 3.7 mg/Nm3
Line 3 = 4.4 mg/Nm3

Why do we control and monitor Sulphur Dioxide and Hydrogen Chloride?
Both gases dissolve in water to form strong acids and thus can contribute to the formation of acid rain. Acid rain is environmentally damaging to crops, soils and waters.



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Riverside Resource Recovery emission report – February 2019

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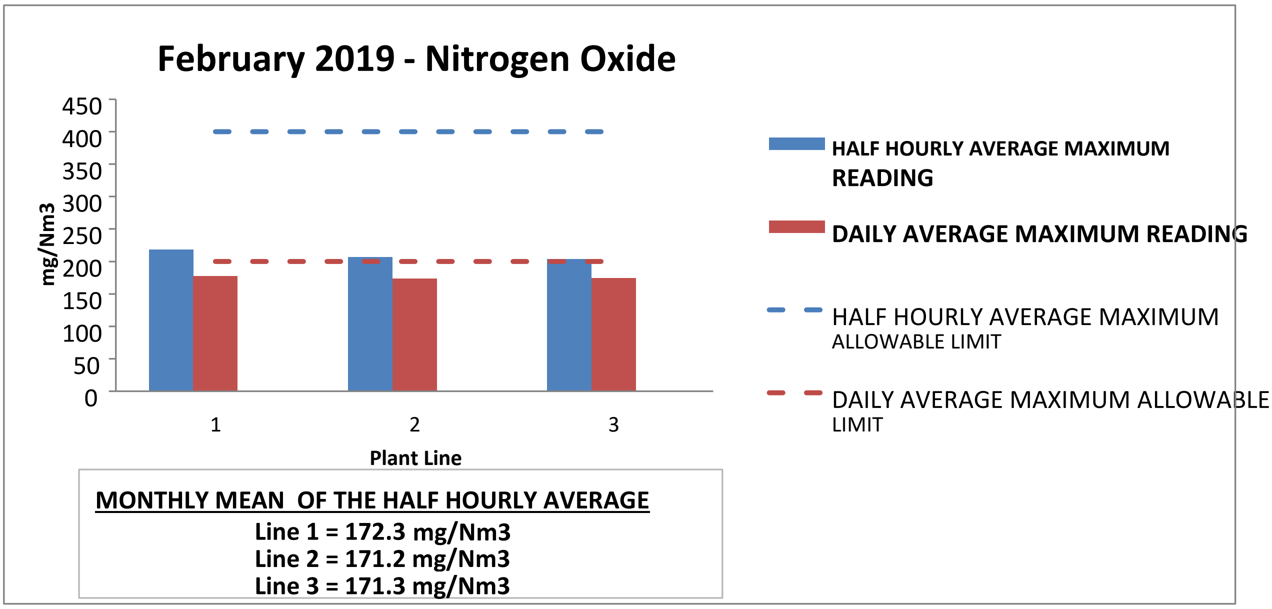

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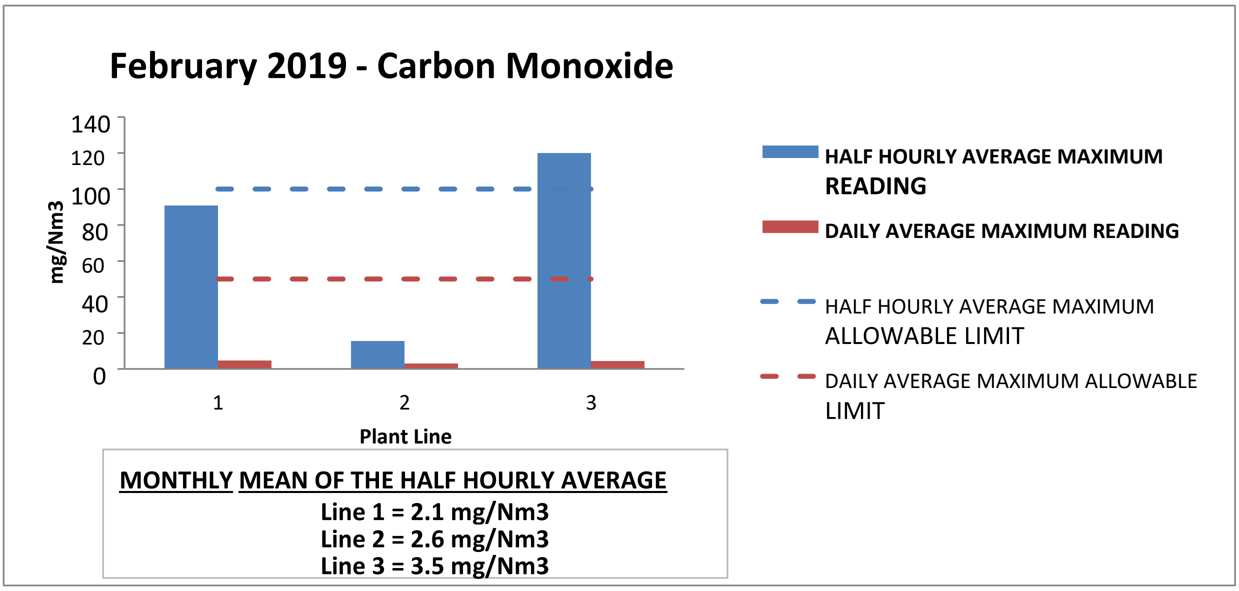

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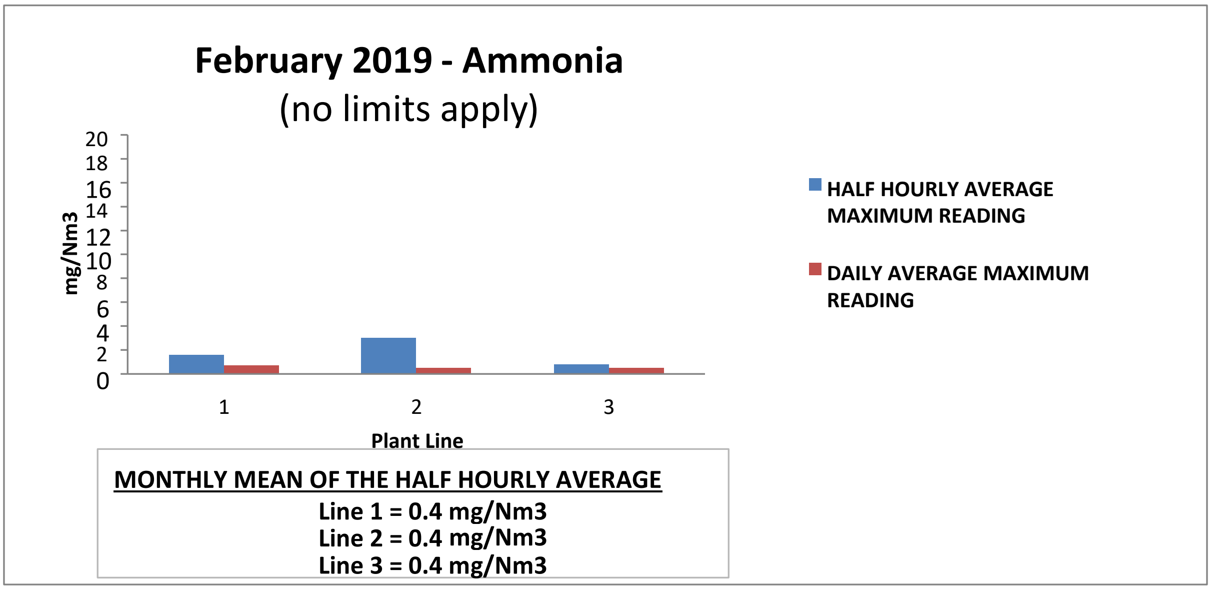
Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues.



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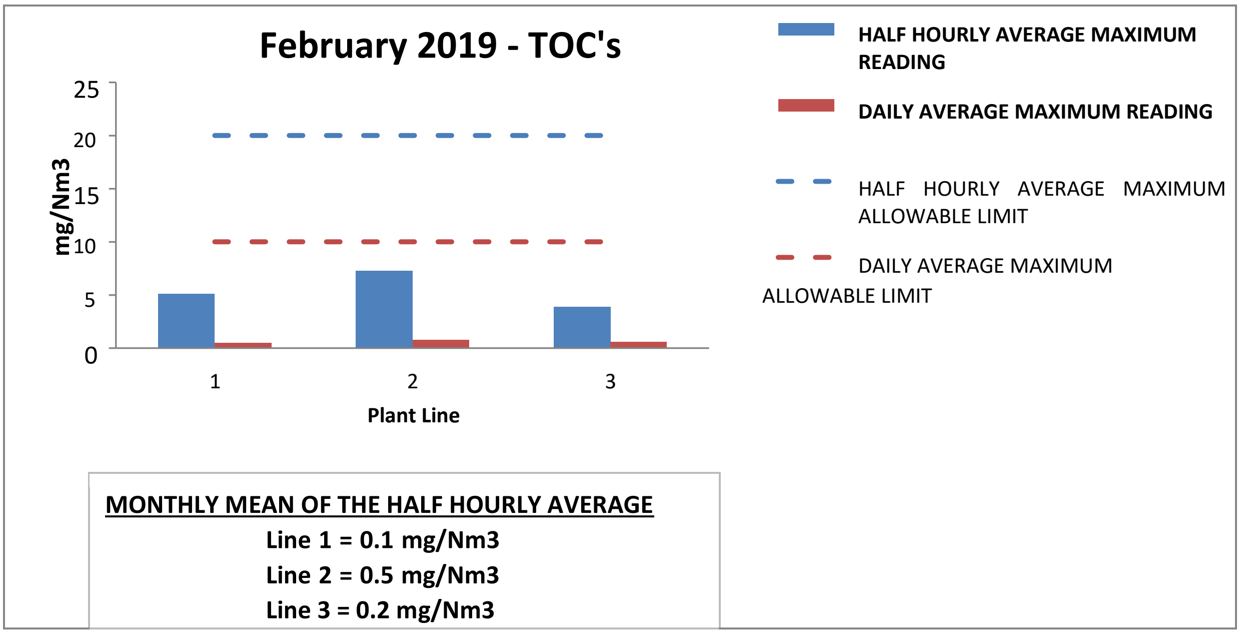

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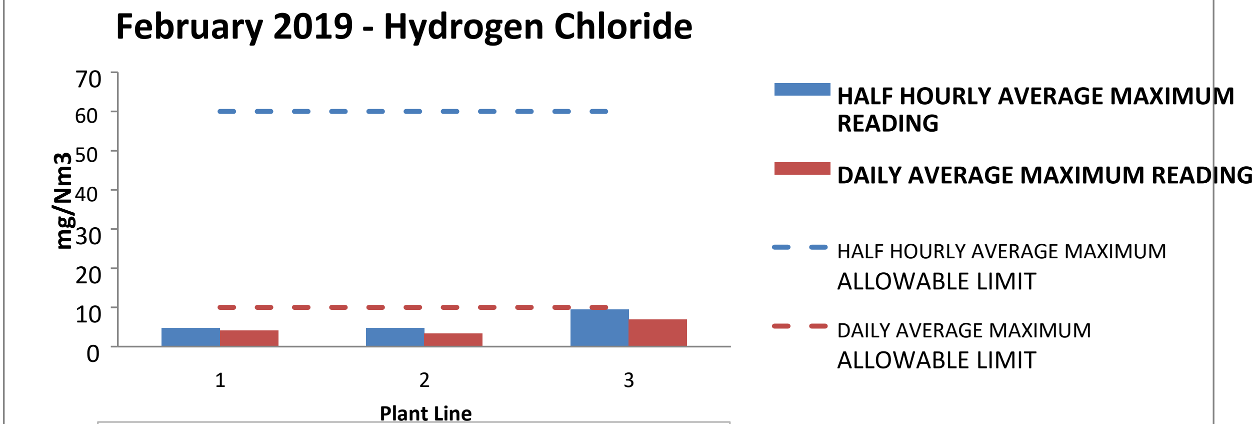
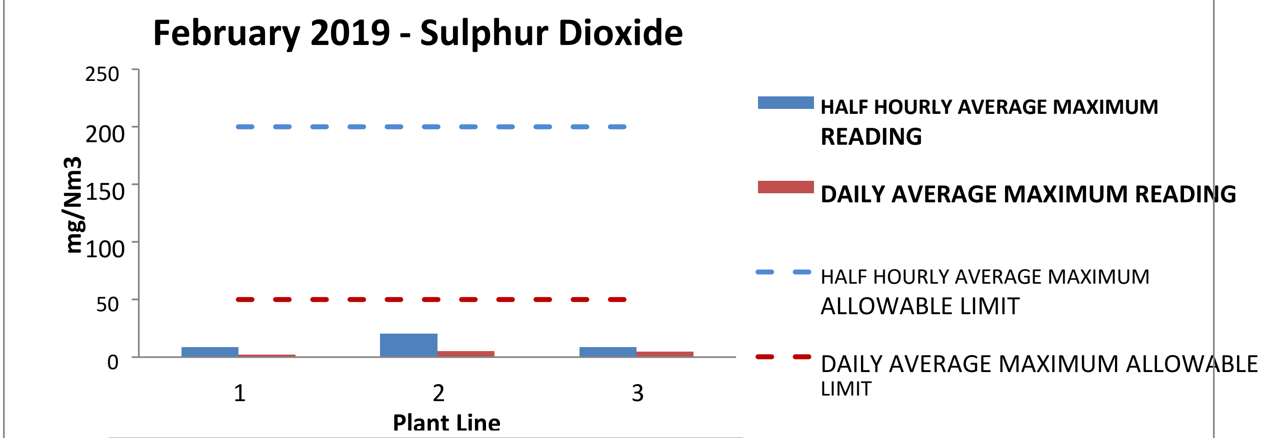


MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 2.6 mg/Nm3
Line 2 = 2.2 mg/Nm3
Line 3 = 5.9 mg/Nm3

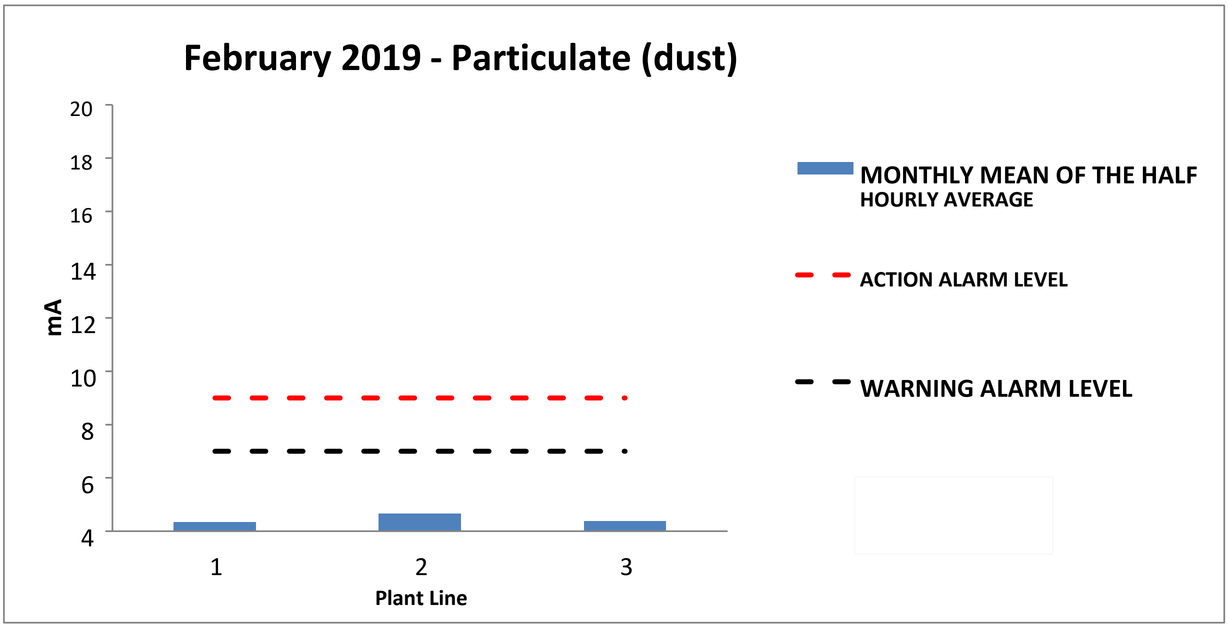


MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 1.7 mg/Nm3
Line 2 = 4.0 mg/Nm3
Line 3 = 4.3 mg/Nm3

Why do we control and monitor Sulphur Dioxide and Hydrogen Chloride?

Both gases dissolve in water to form strong acids and thus can contribute to the formation of acid rain. Acid rain is environmentally damaging to crops, soils and waters.



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Riverside Resource Recovery emission report – March 2019

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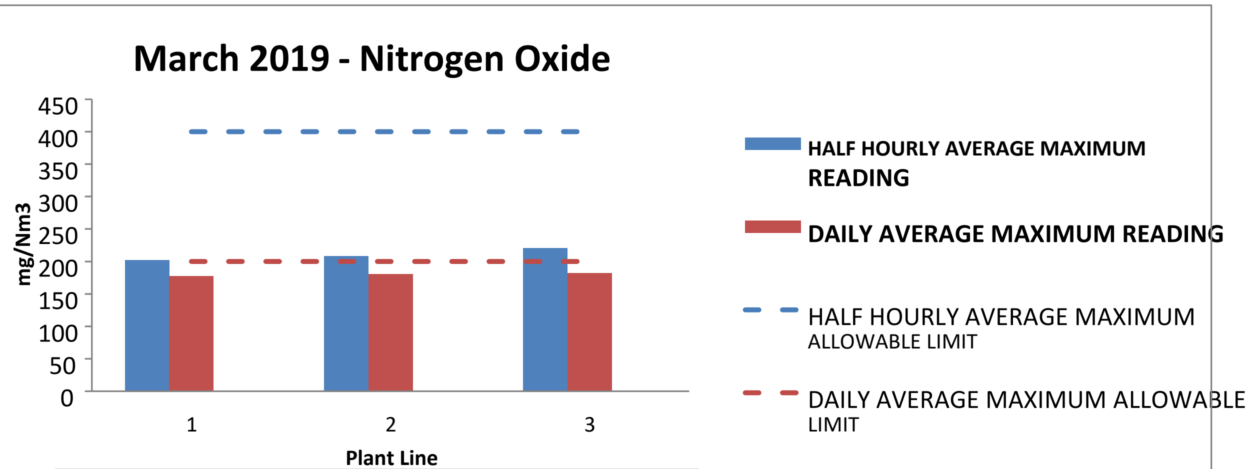

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 170.6 mg/Nm3
Line 2 = 175.7 mg/Nm3
Line 3 = 172.6 mg/Nm3

Why do we control and monitor Oxides of Nitrogen (NOx)?

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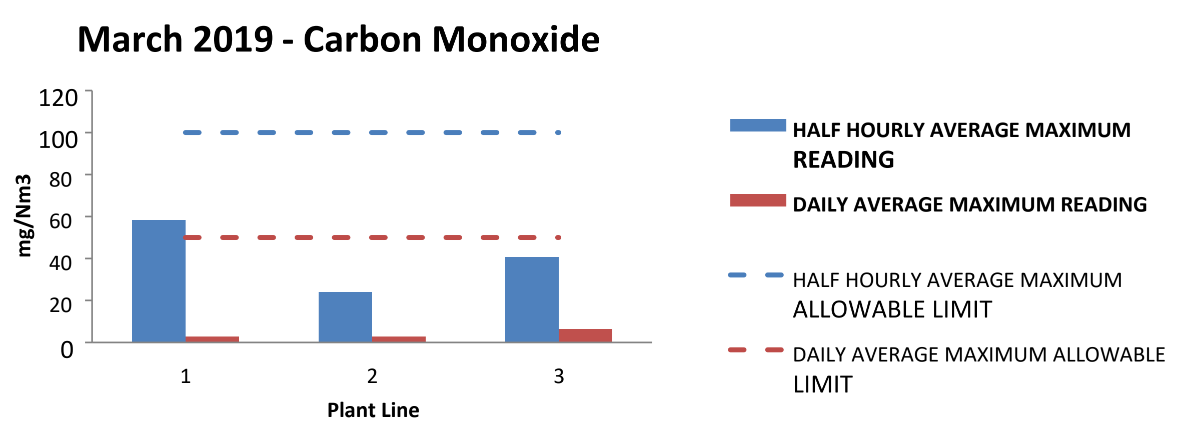

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 2.0 mg/Nm3
Line 2 = 2.4 mg/Nm3
Line 3 = 3.8 mg/Nm3

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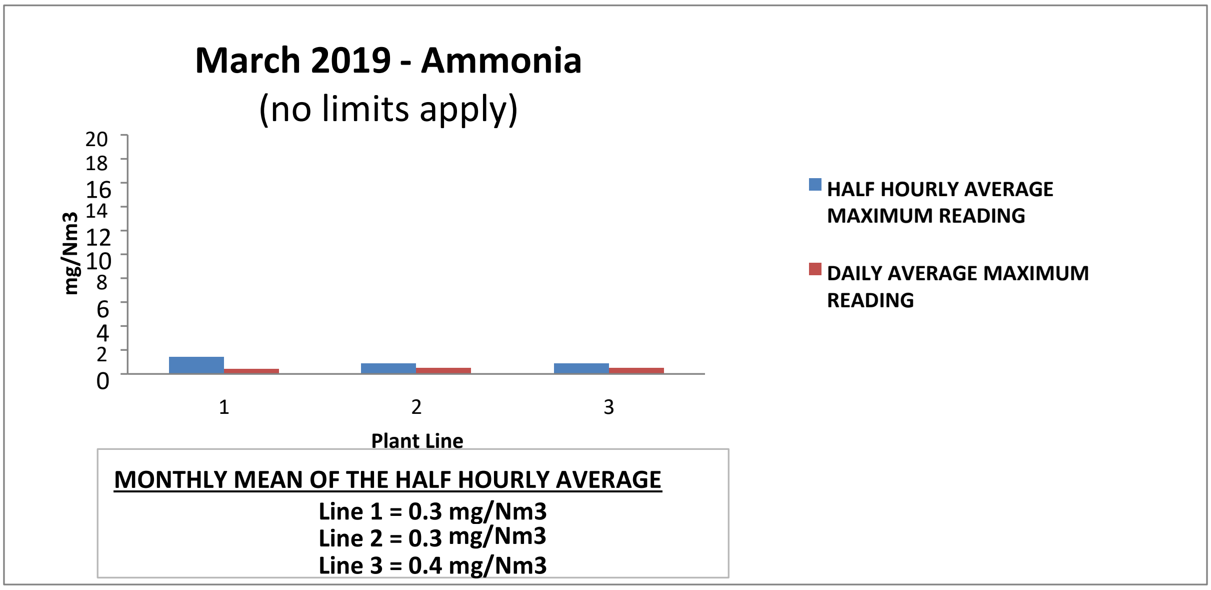

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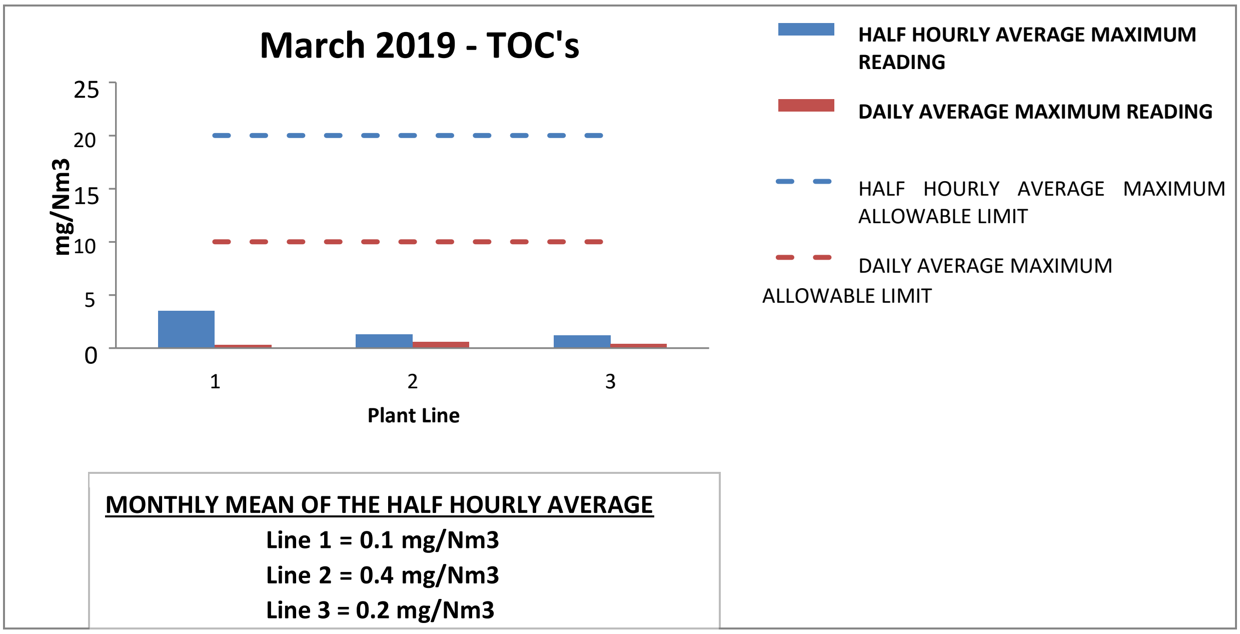

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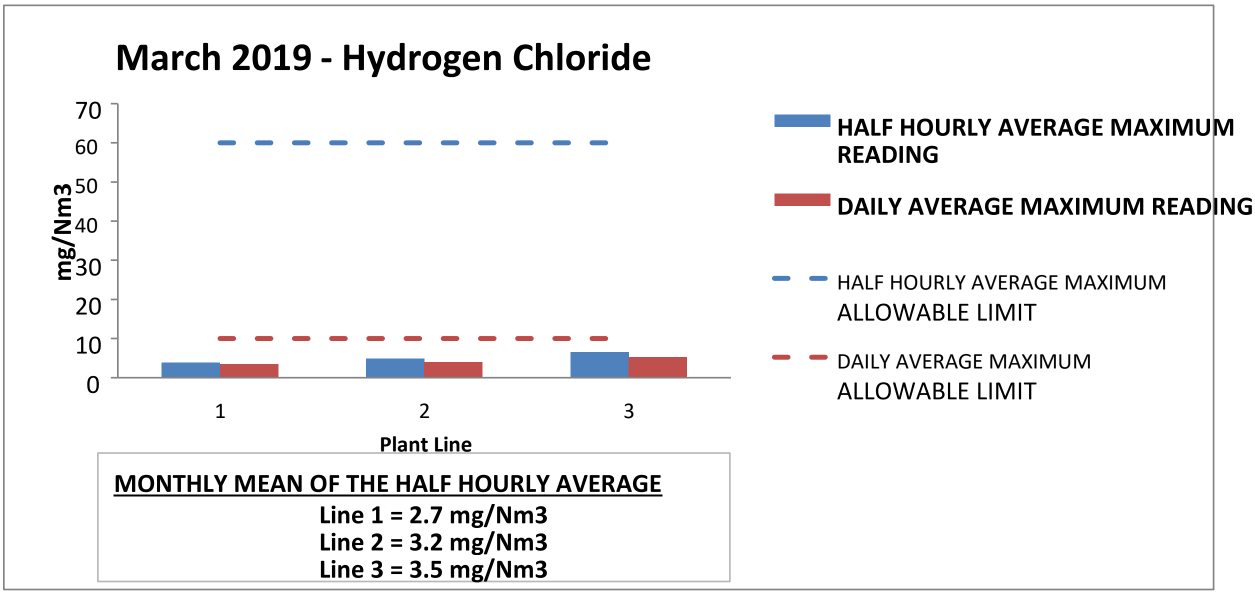

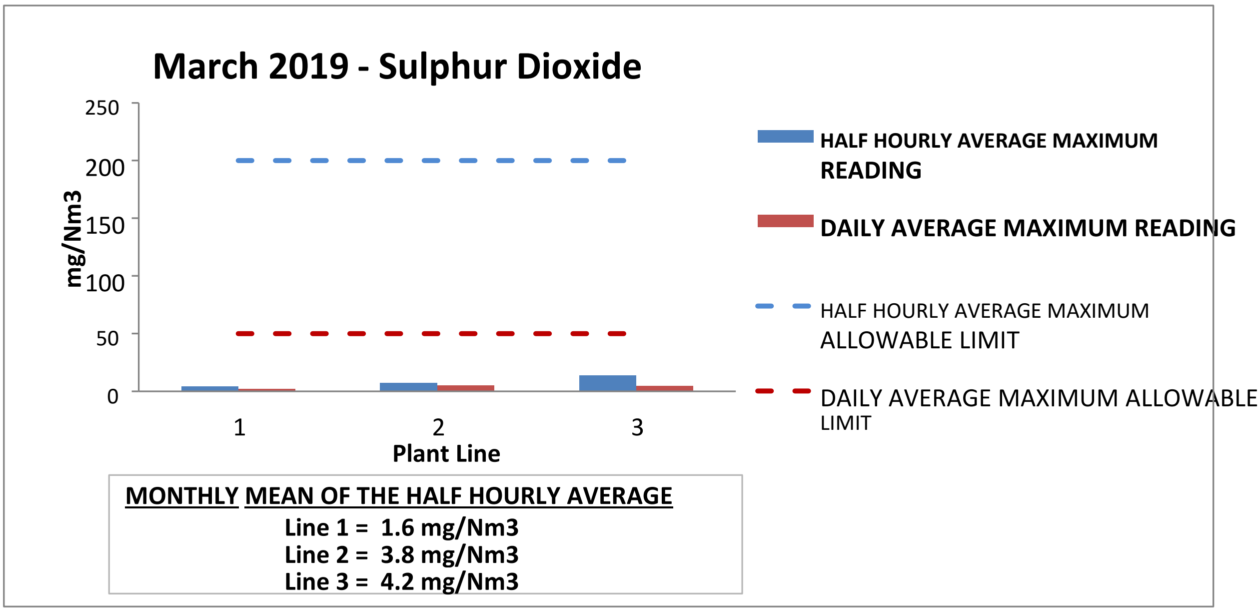

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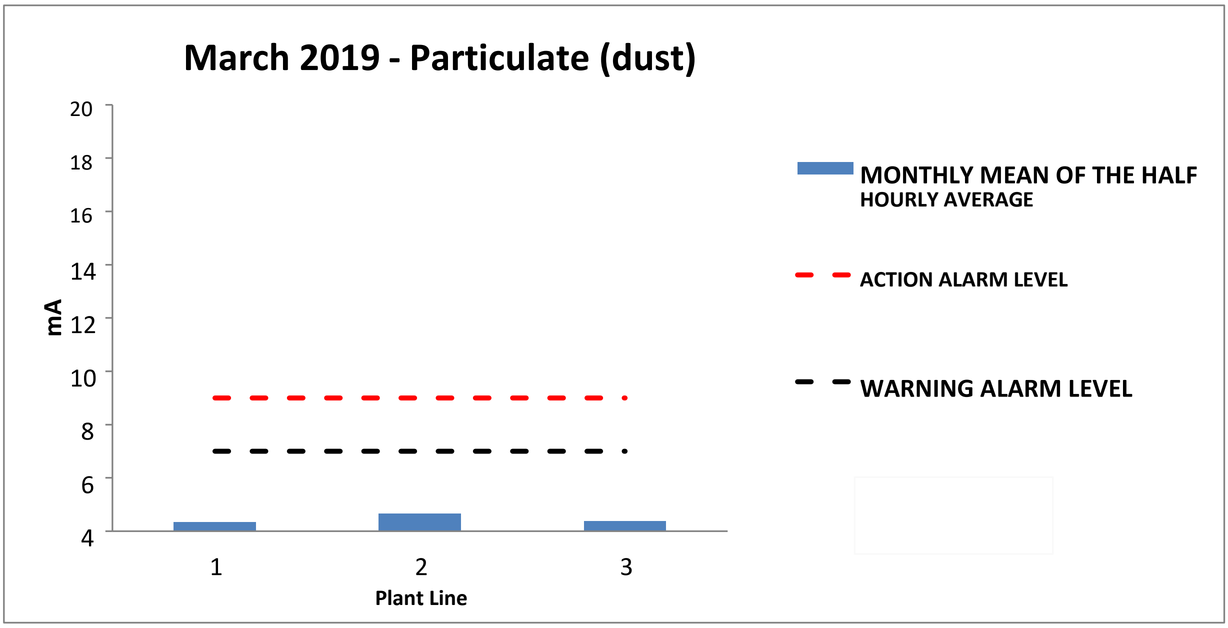

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Riverside Resource Recovery emission report – April 2019

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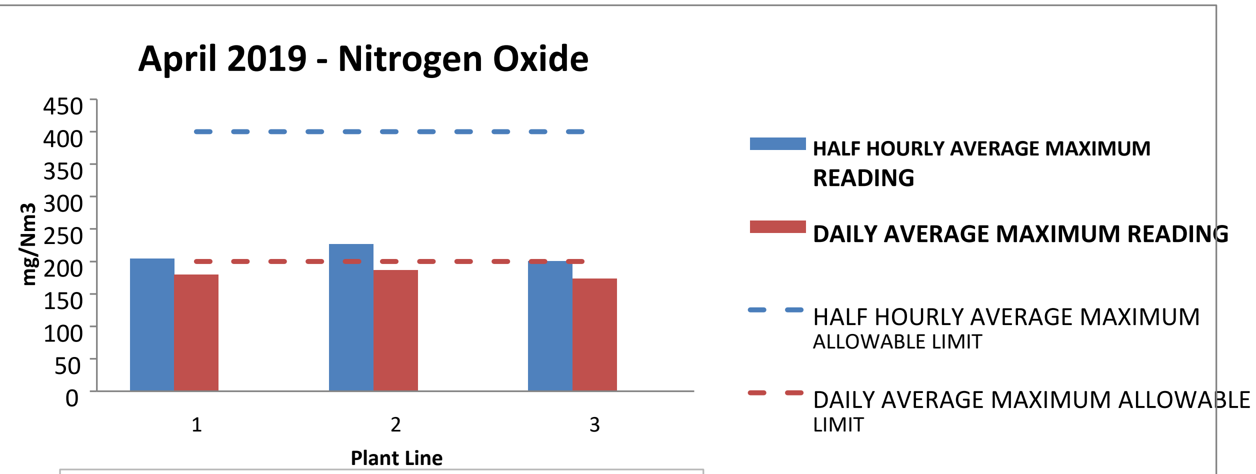

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Line 3 = 170.2 mg/Nm3

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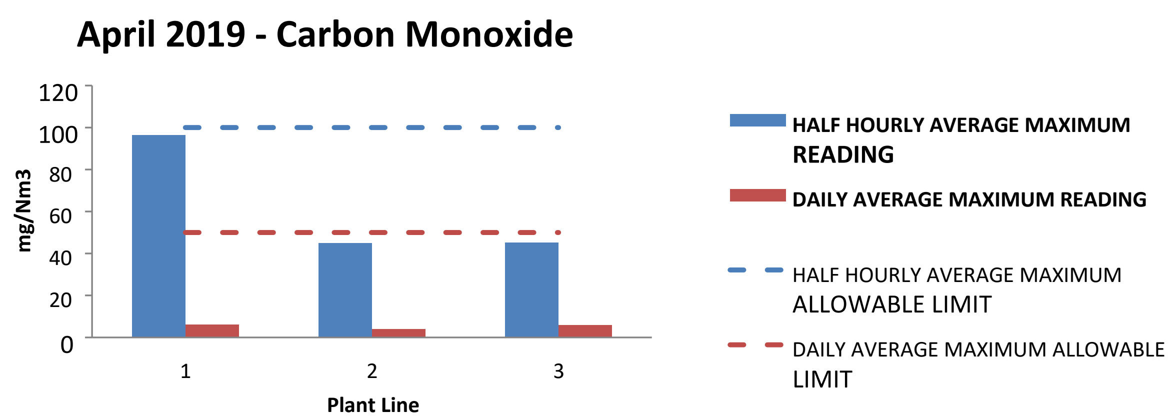

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 3.0 mg/Nm3
Line 2 = 2.6 mg/Nm3
Line 3 = 4.0 mg/Nm3

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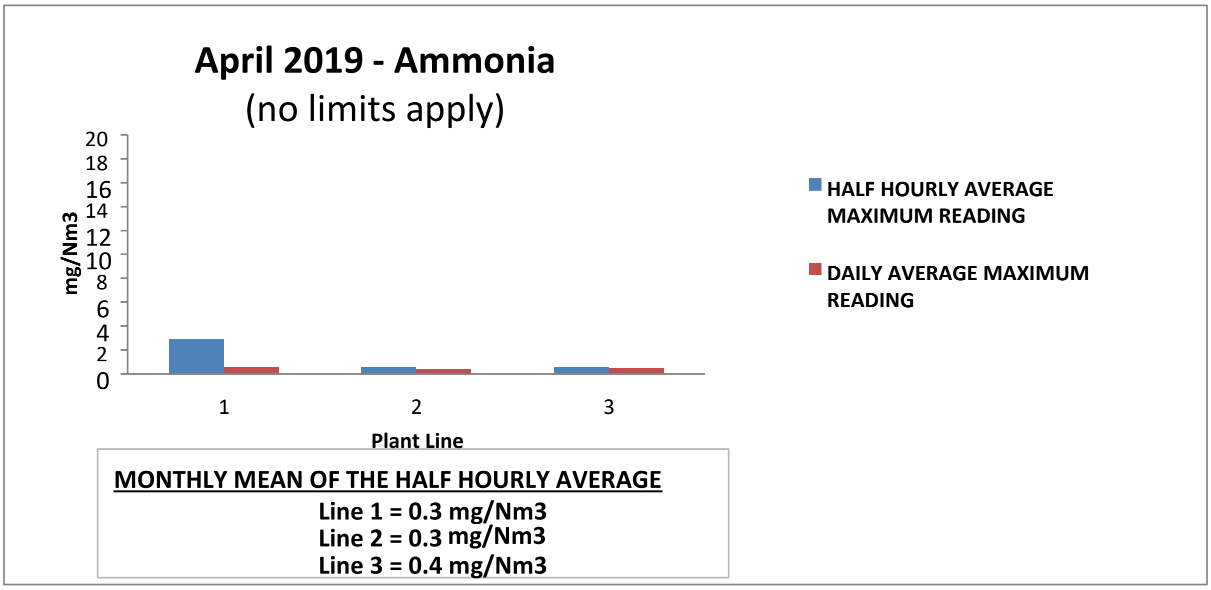

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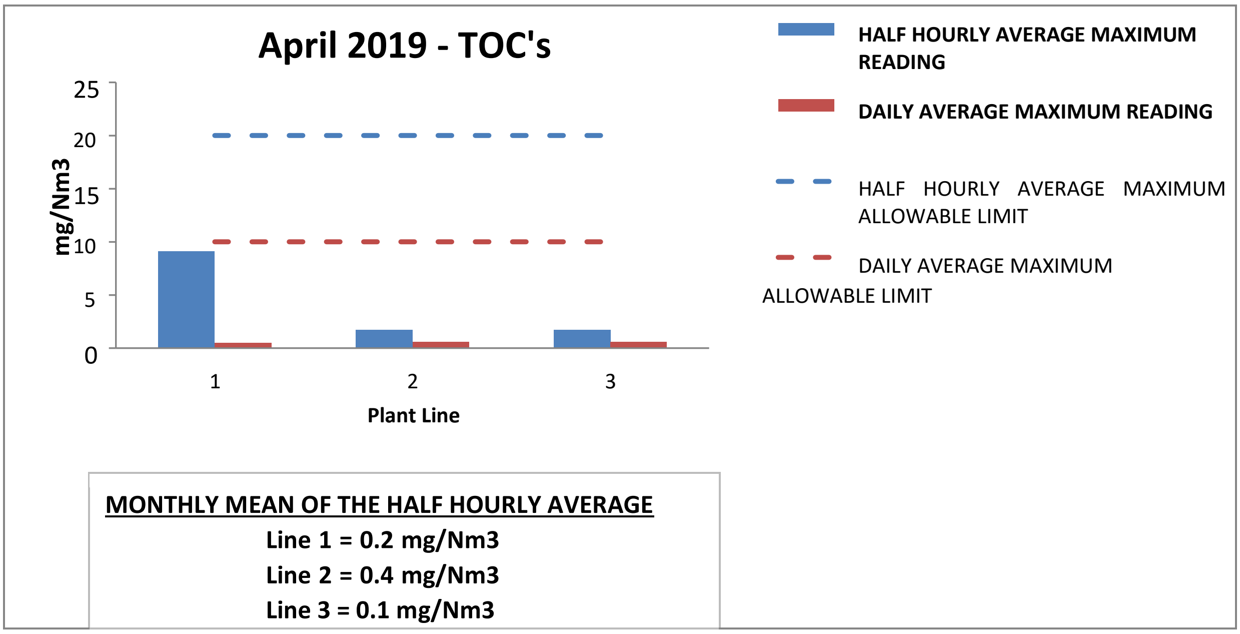

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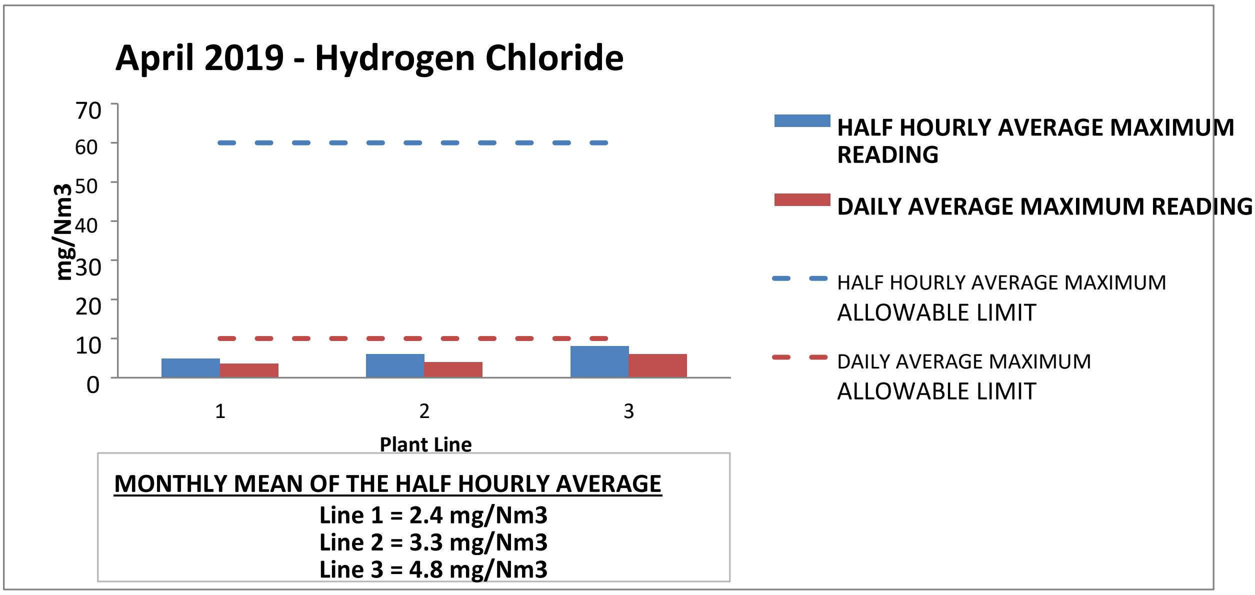

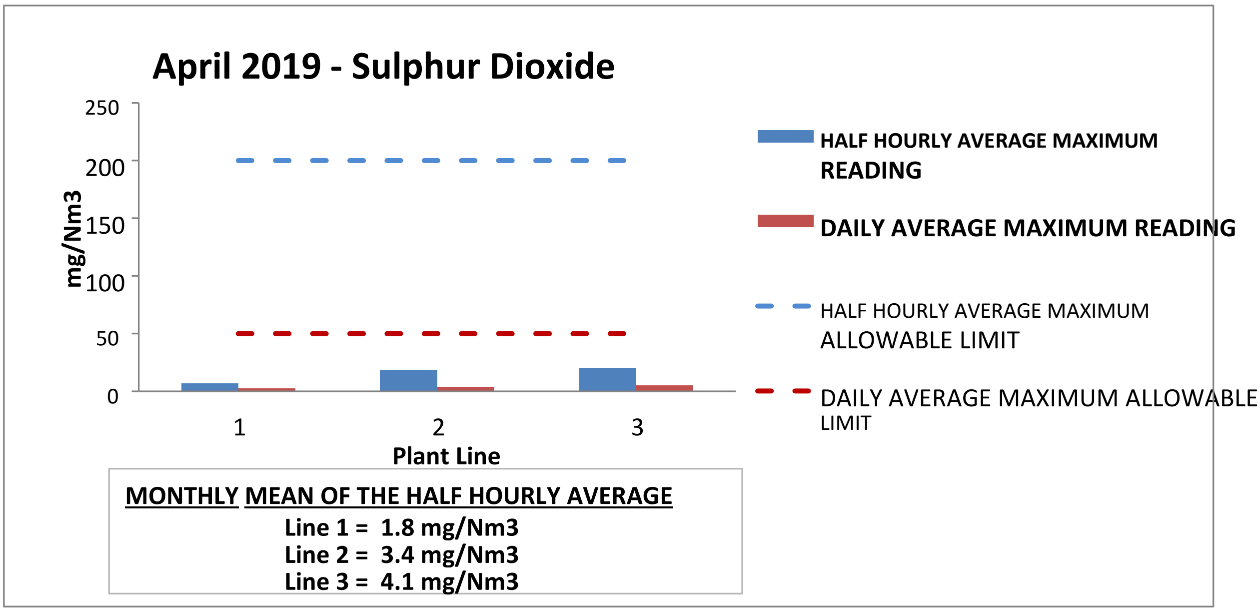

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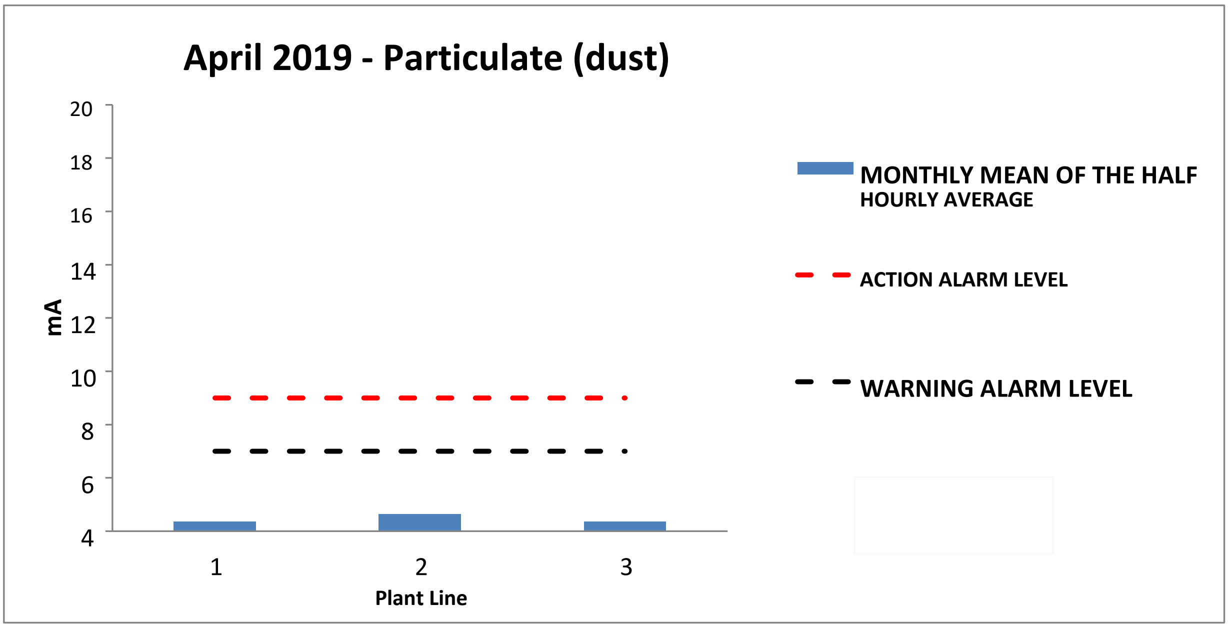

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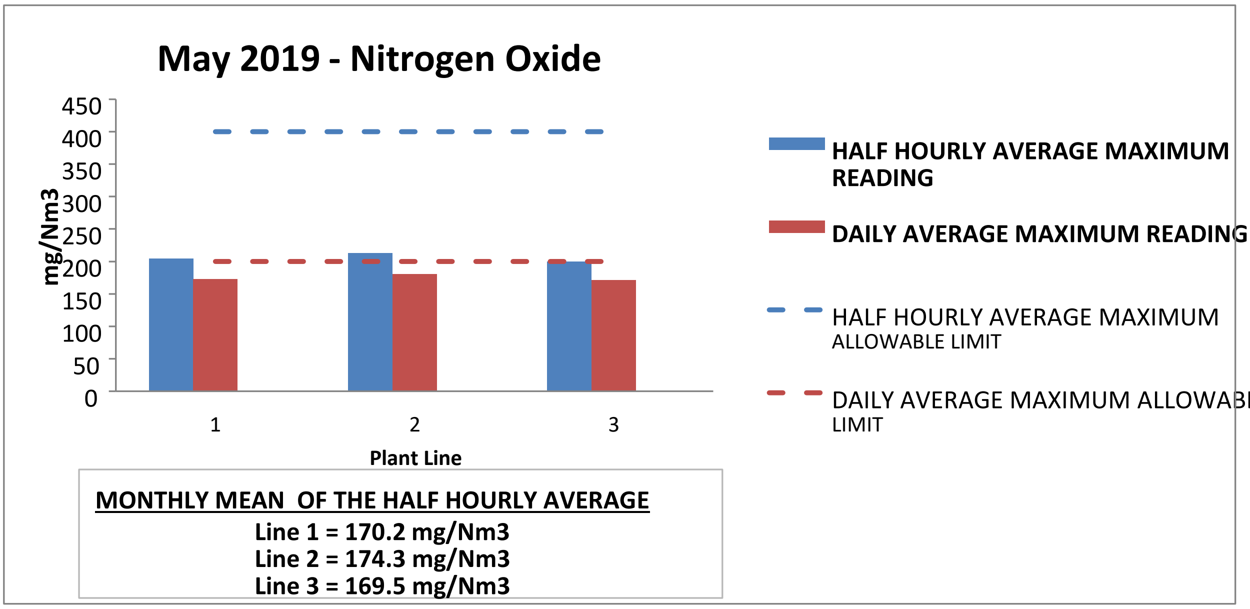
Riverside Resource Recovery emission report – May 2019

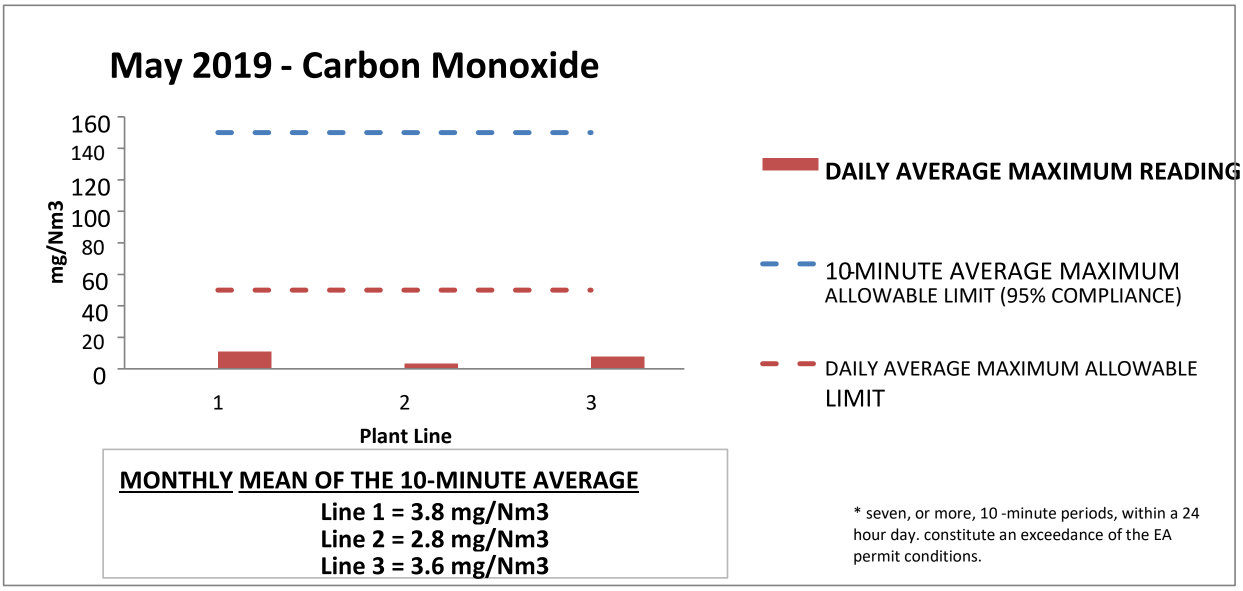
The following charts summarise the emission data for the Riverside Resource Recovery facility. The charts show the **MAXIMUM** readings taken during the month.



Why do we control and monitor Oxides of Nitrogen (NOx)?

NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO).

These can be formed naturally, but are also formed from man-made processes like fuel combustion or biomass burning. There are a number of health and environmental issues attributed to NOx, including smog, acid rain, and possibly global warming.



Following EA guidance and approval in May 2019, RRRL no longer report carbon monoxide against a half-hourly emissions limit value. Carbon monoxide is now monitored against the requirement to be 95% compliant against a 10minute average value, of 150mg/Nm3, over a 24-hour period. Any 24-hour period where the 95% compliance level is breached will be highlighted in the chart above. The daily average emissions limit value of 50mg/Nm3 remains unchanged.

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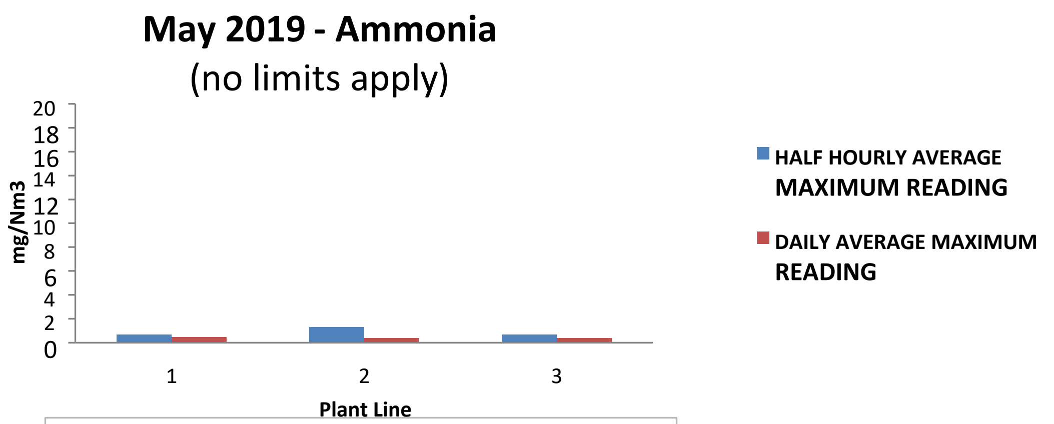
Carbon monoxide is both a common naturally occurring chemical and is manufactured by man. It is a colourless, odourless poisonous gas. Carbon monoxide is one of the eight substances for which the government has established an air quality standard as part of its national Air Quality Strategy.

Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues.



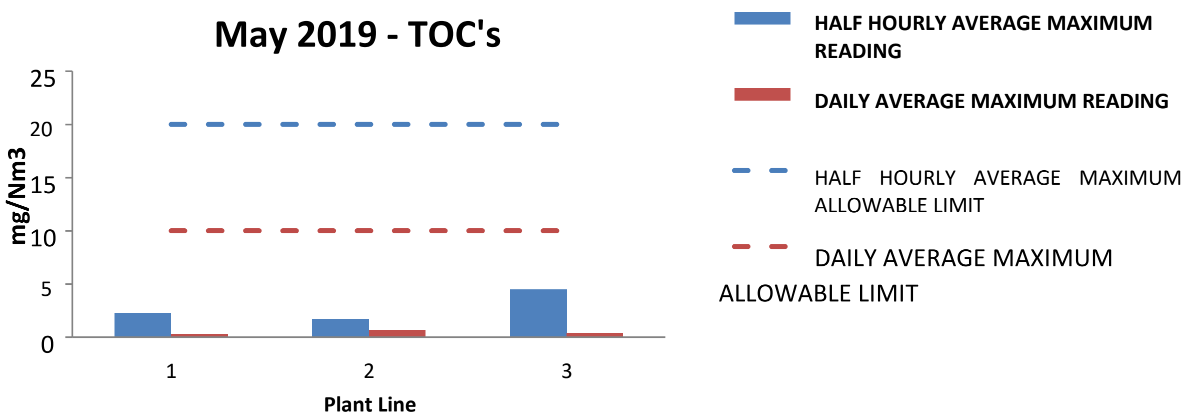
MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.3 mg/Nm3
Line 2 = 0.3 mg/Nm3
Line 3 = 0.3 mg/Nm3

Why do we control and monitor Ammonia?

Although in wide-use in several industries, ammonia is both caustic and hazardous. It is a colourless gas with a characteristic pungent odour.

Ammonia, unlike the other species monitored, is not a product from the incineration of waste but is actually introduced into the furnace. Under the right conditions, ammonia is able to reduce oxides of nitrogen found in the flue gas by the chemical process Selective Non-Catalytic Reduction (SNCR) to nitrogen and water vapour which are both nonhazardous.



MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.2 mg/Nm3
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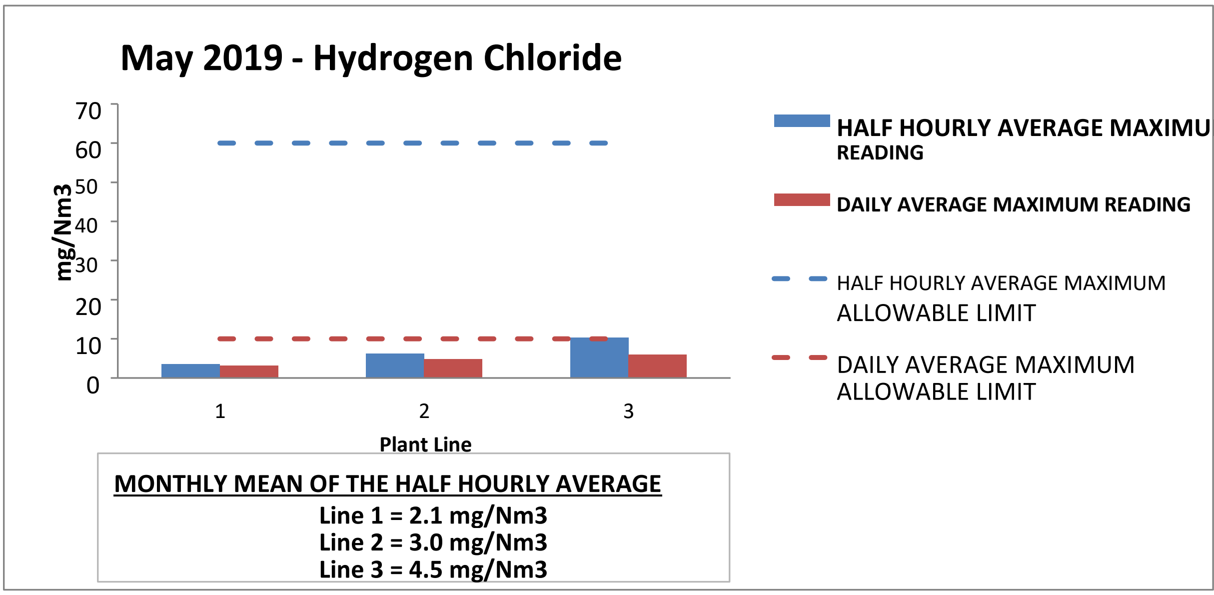
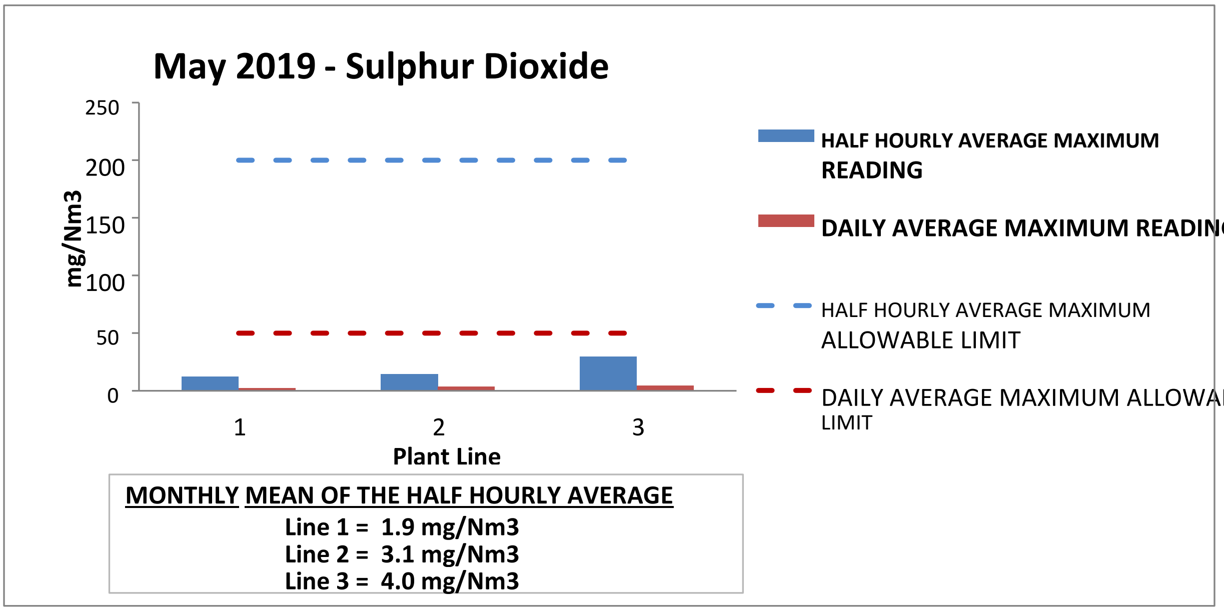
Why do we control and monitor Total Organic Carbon (TOC)?

Total Organic Carbon (TOC) consists of a wide range of organic compounds including Volatile Organic Compounds (VOCs). VOCs are numerous, varied and found everywhere. VOCs are of general concern because of their ability to react with other pollutants (such as nitrogen oxides) in the lower atmosphere to form ozone. High concentrations of ozone at ground level can harm human health, damage crops and affect materials such as rubber. Some VOCs may be directly harmful to human health, contribute to global warming or destroy stratospheric ozone needed to shield the earth's surface from harmful ultra violet radiation.





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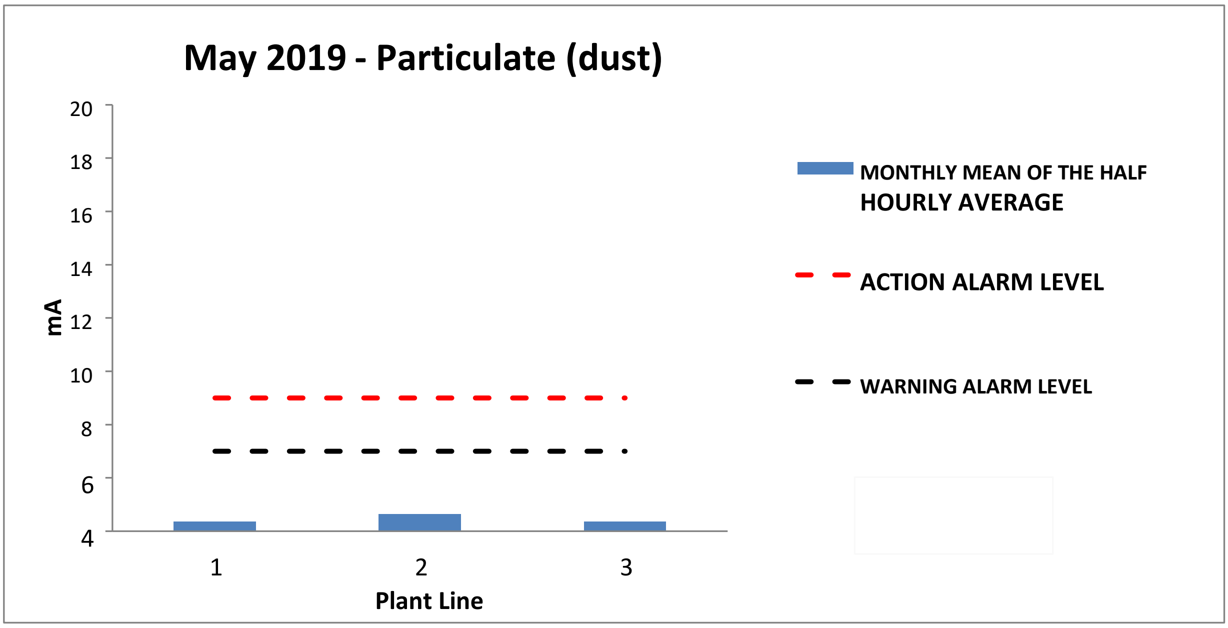

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Riverside Resource Recovery emission report – June 2019

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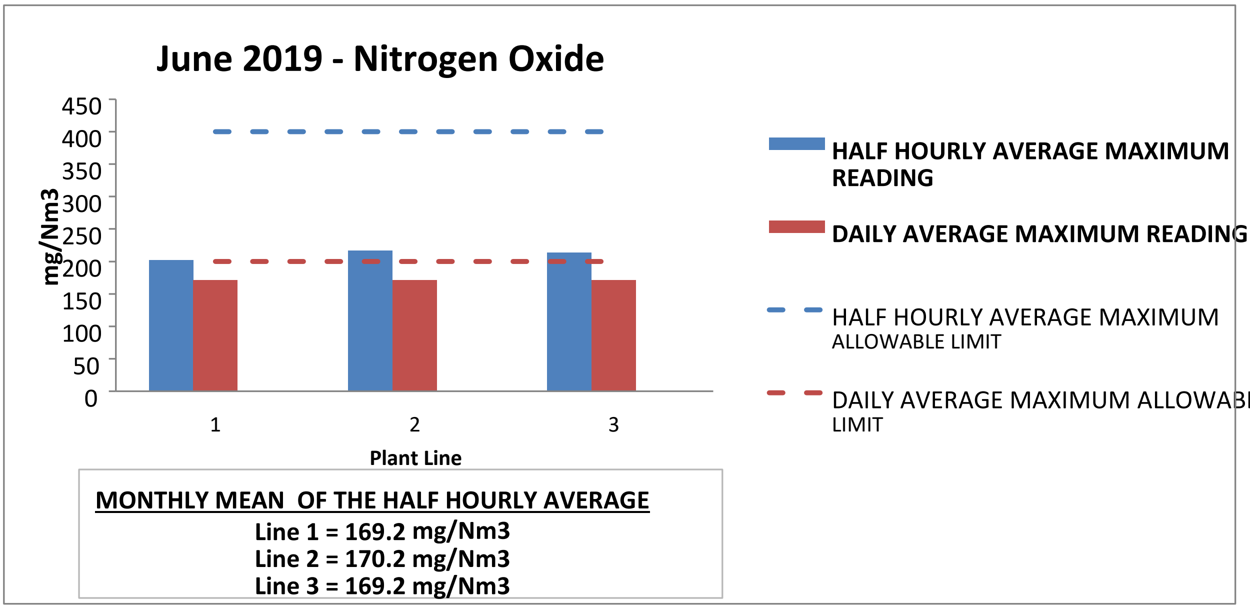

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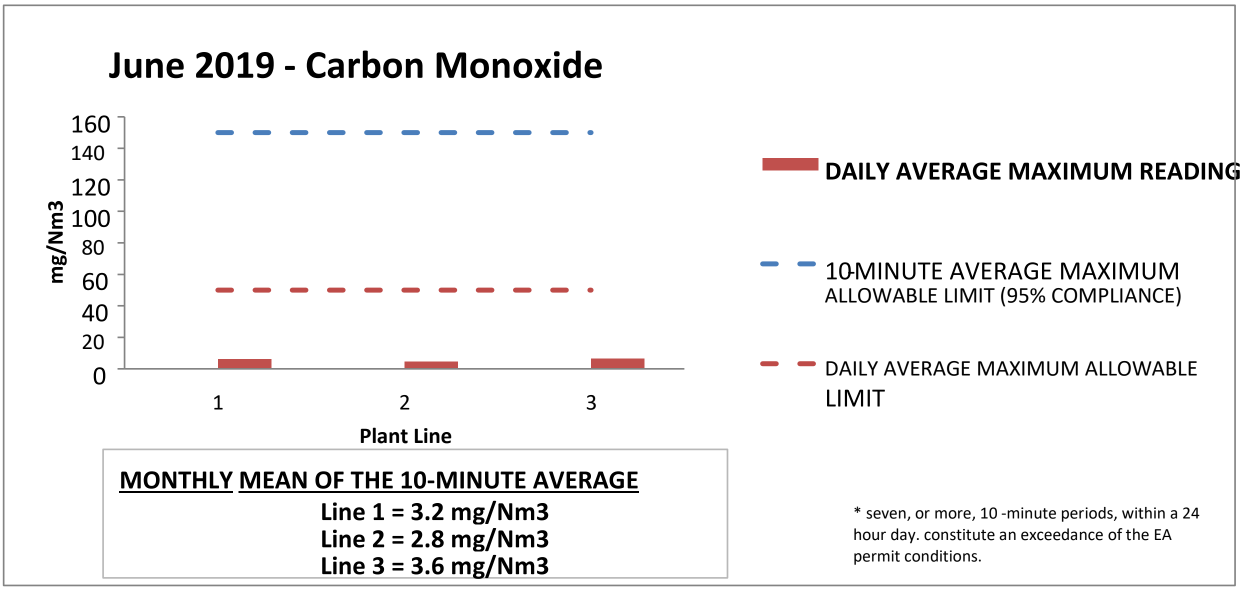

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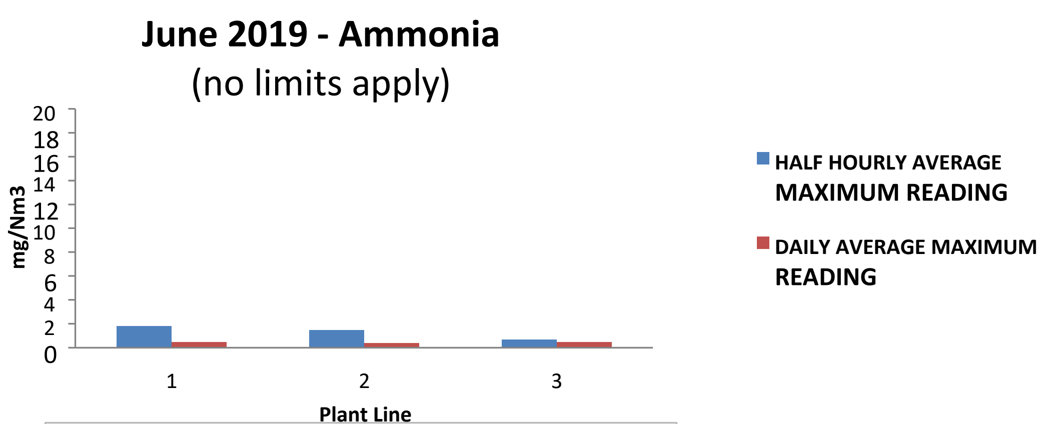

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
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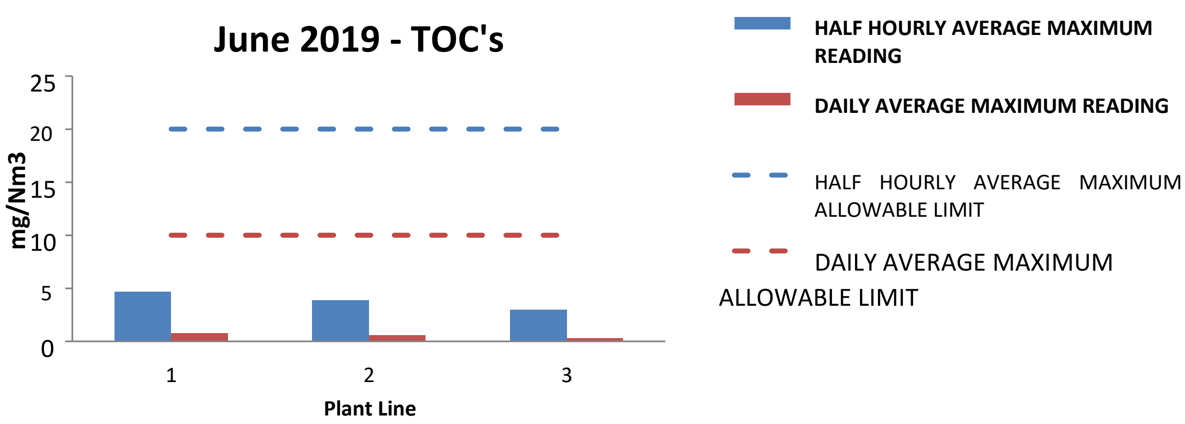

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
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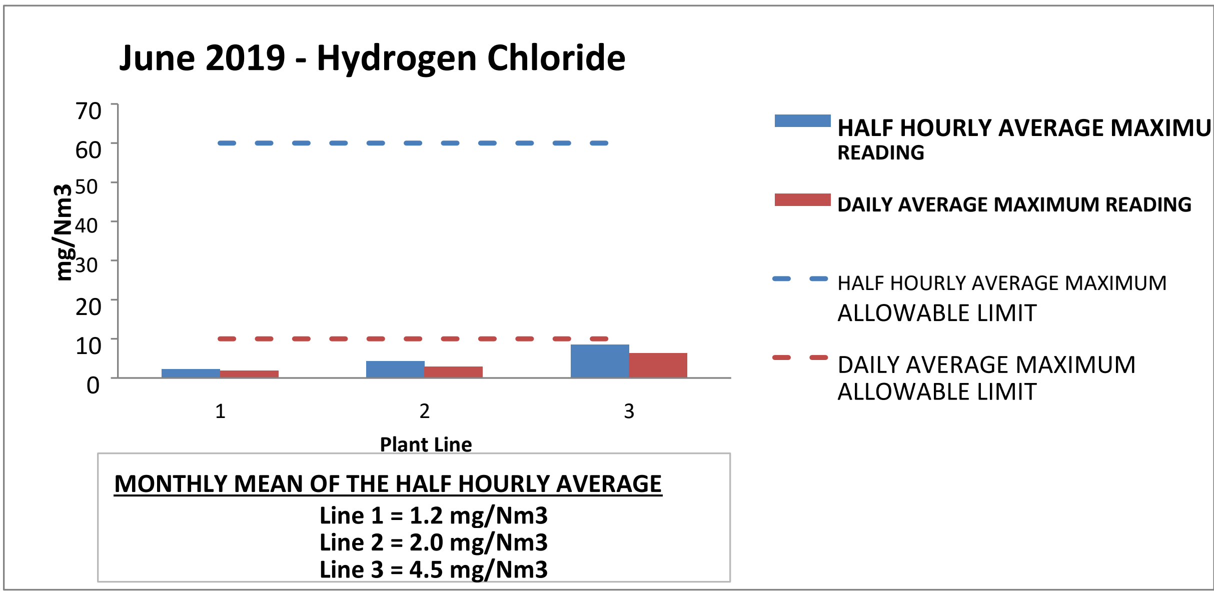

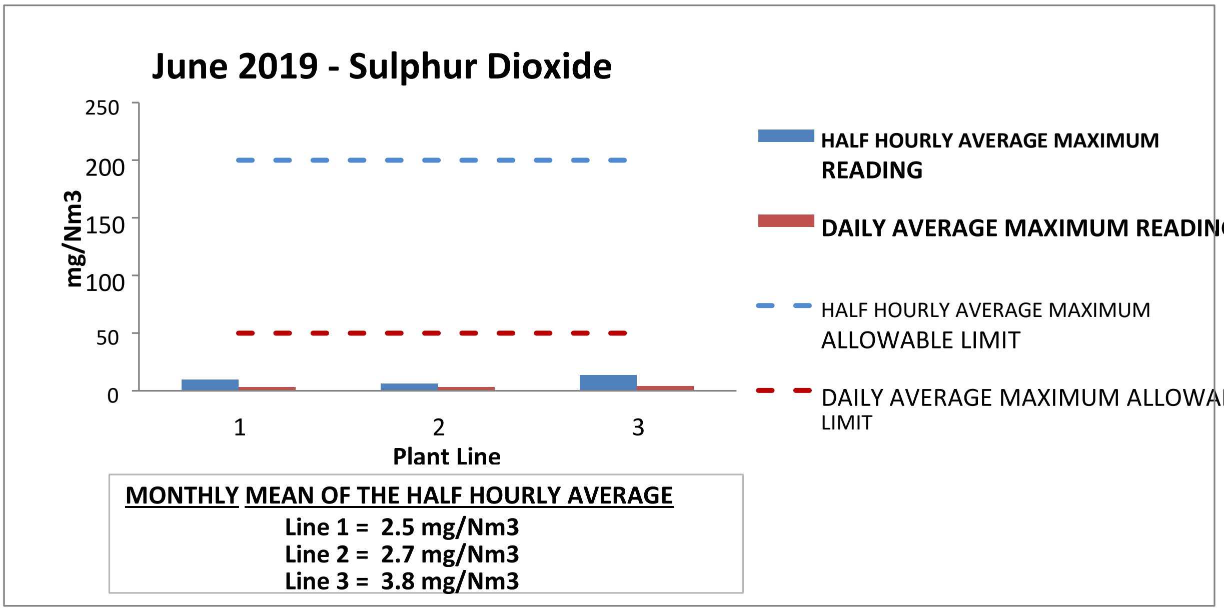

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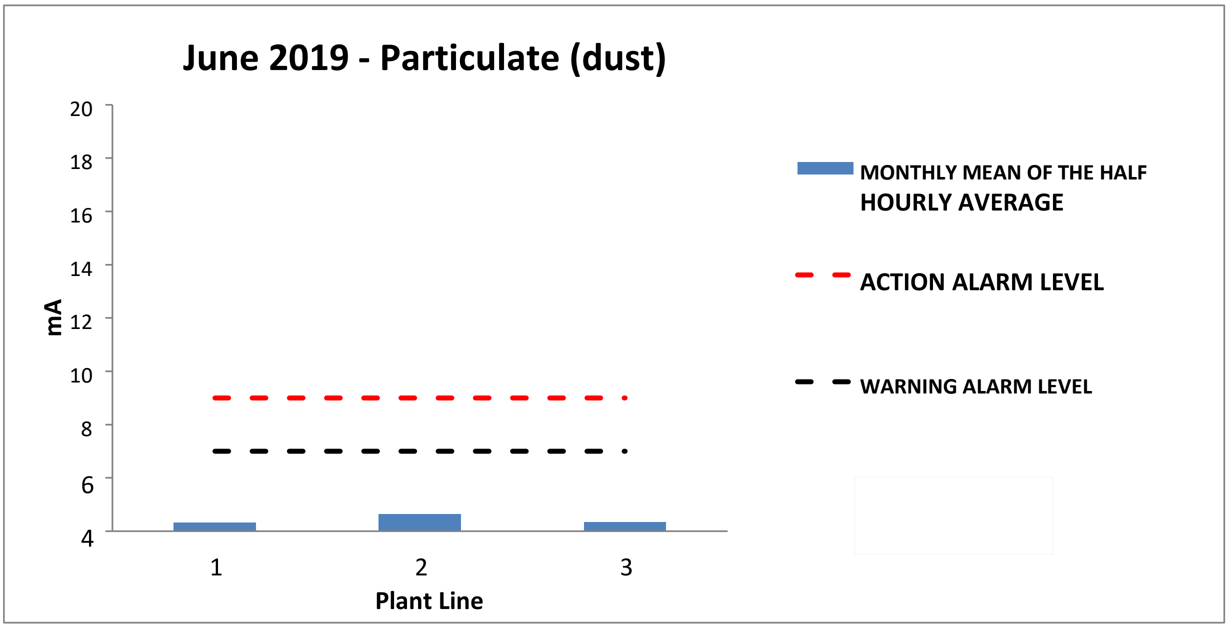

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Riverside Resource Recovery emission report – July 2019

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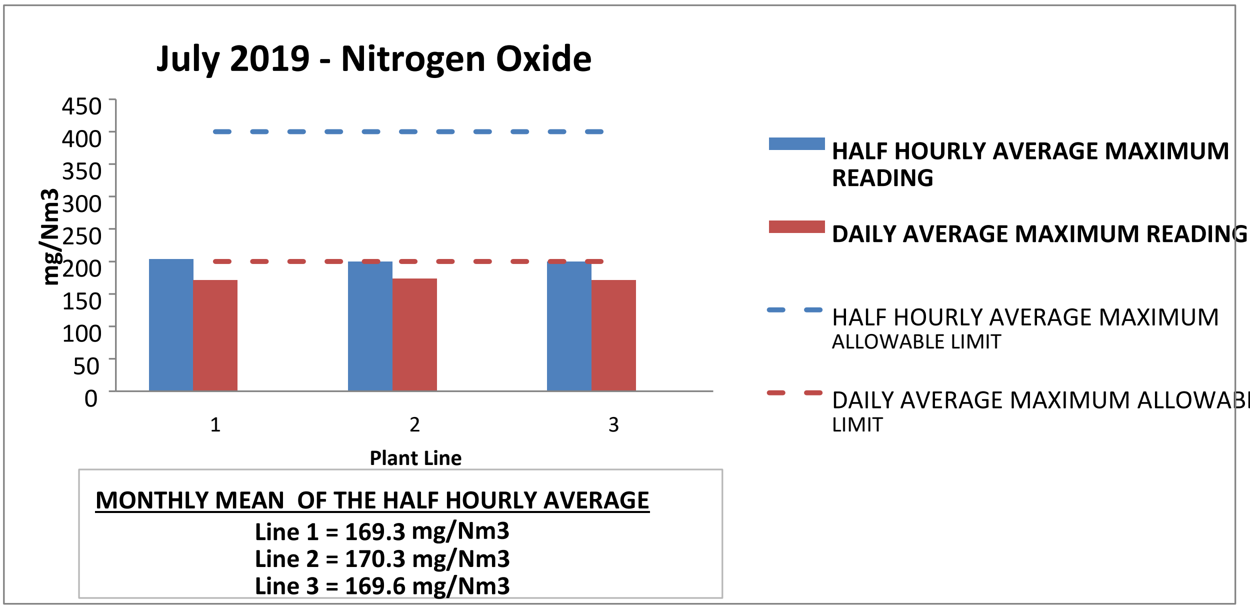

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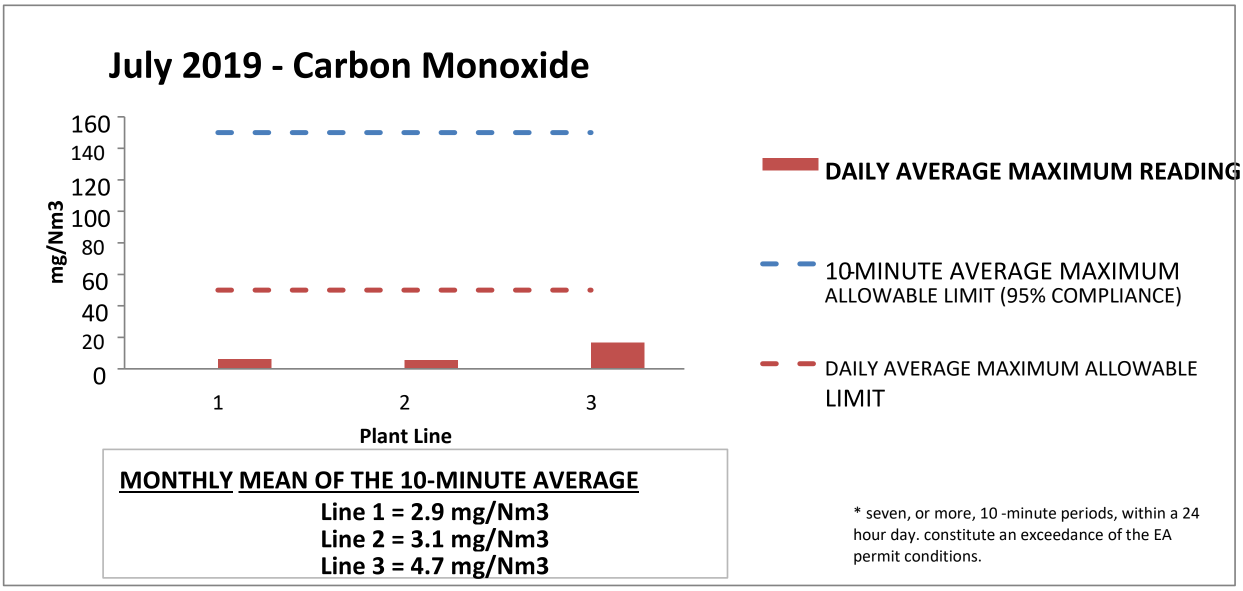

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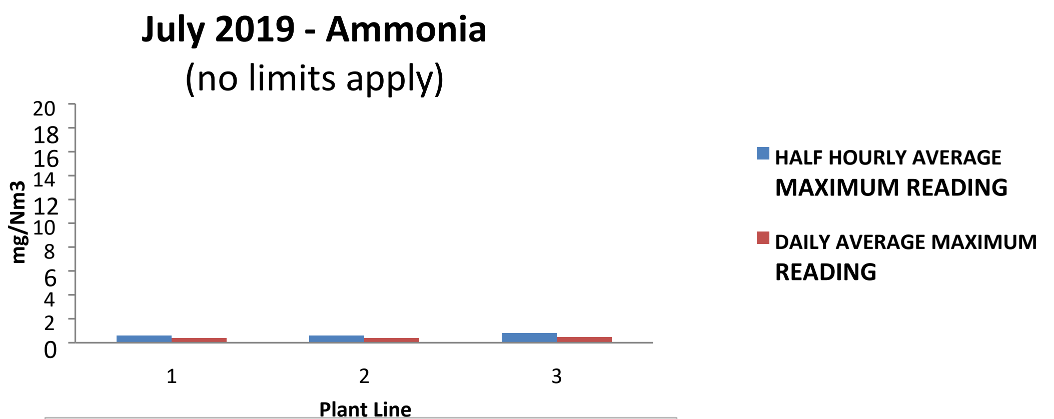

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
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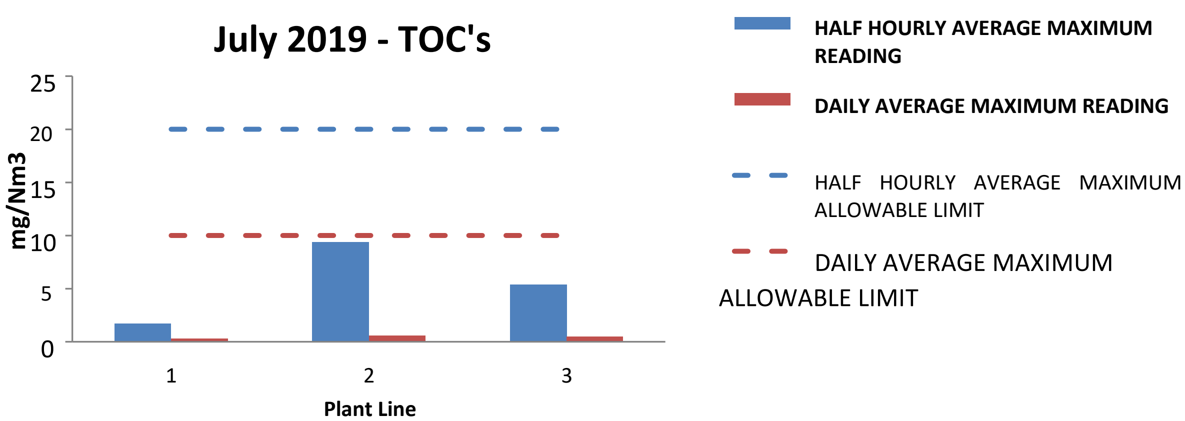

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 0.2 mg/Nm3
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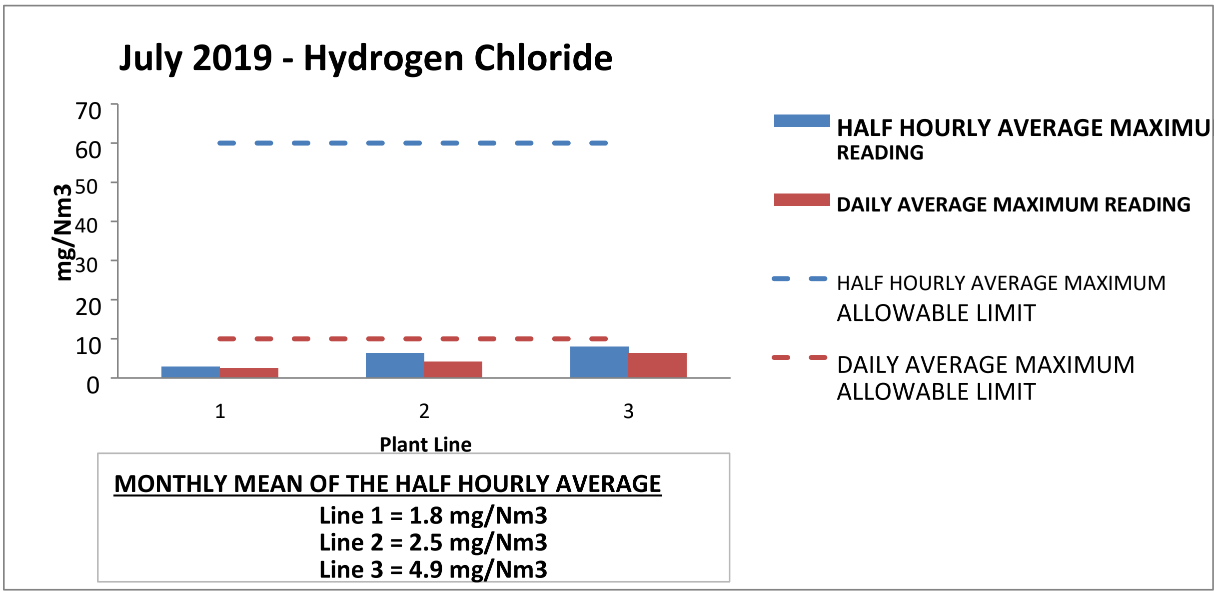

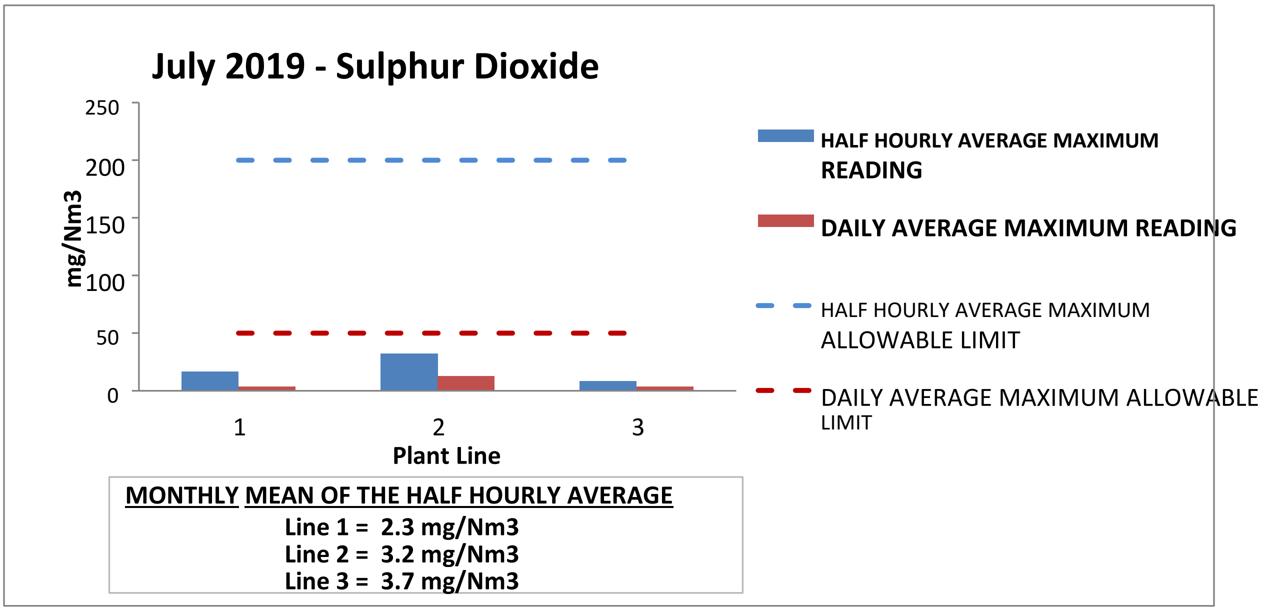

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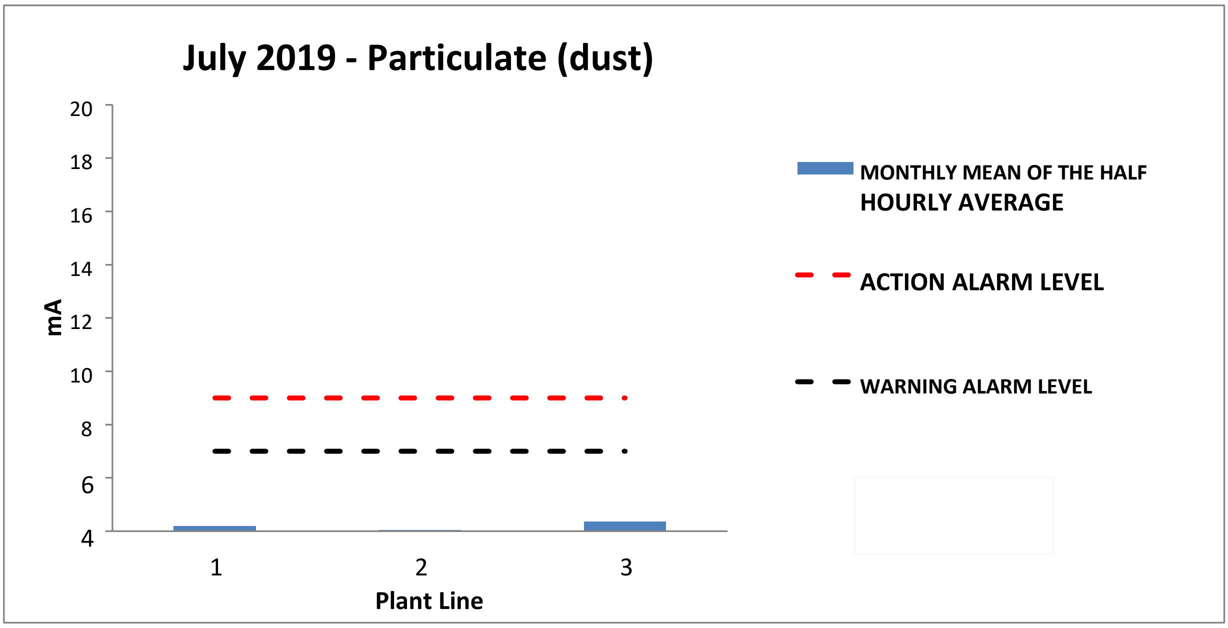

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Riverside Resource Recovery emission report – August 2019

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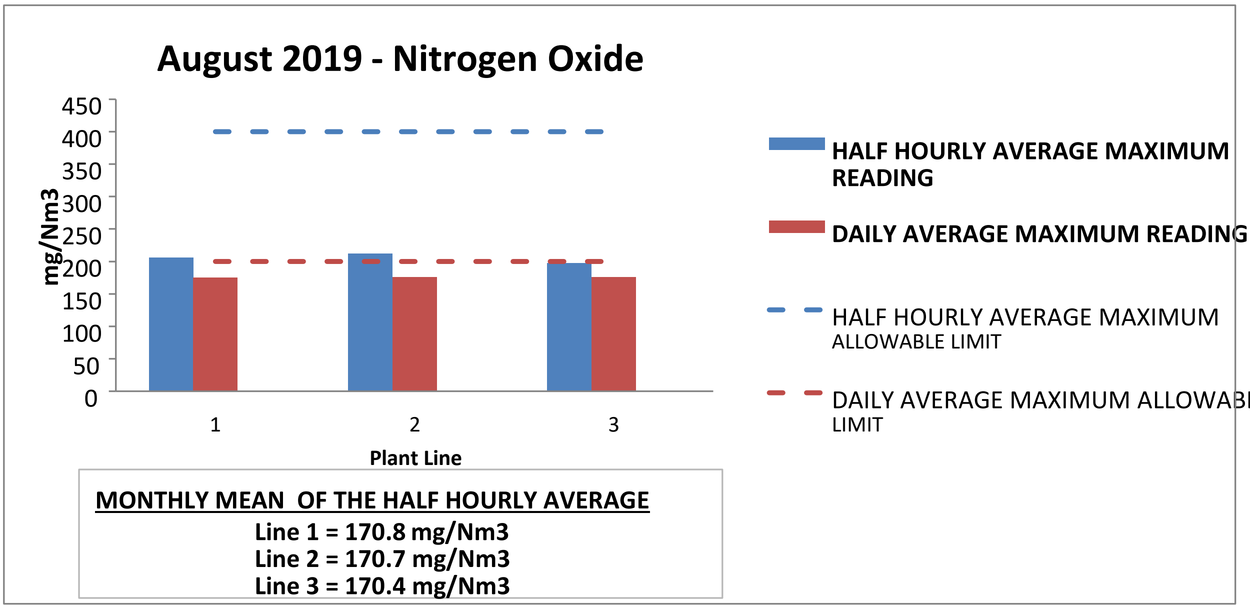

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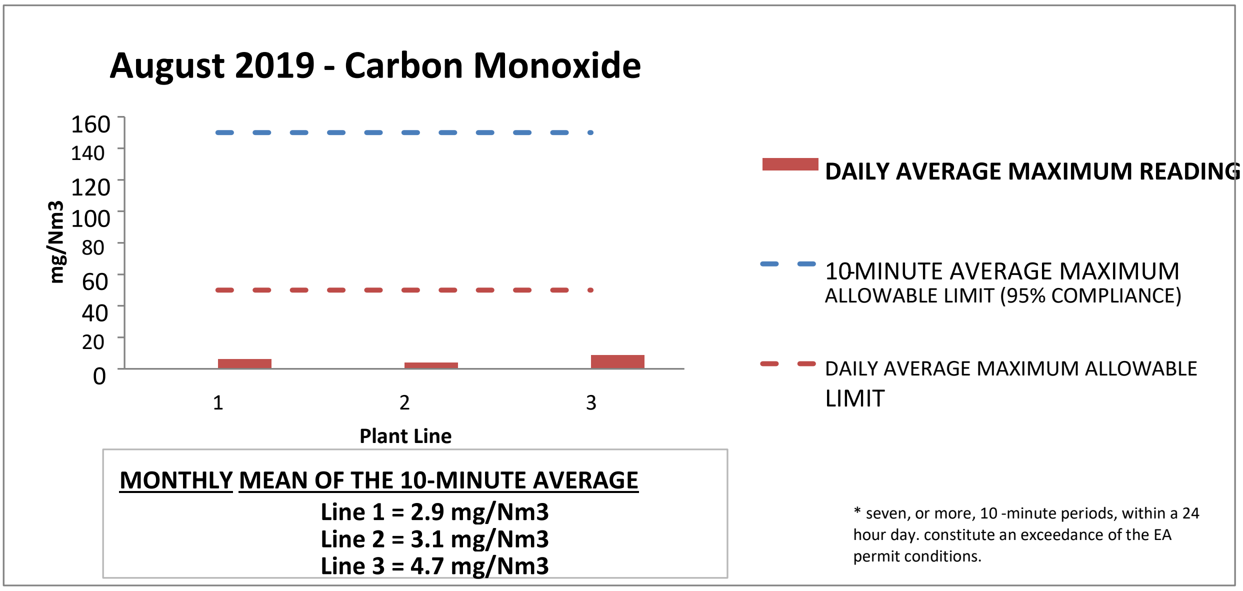

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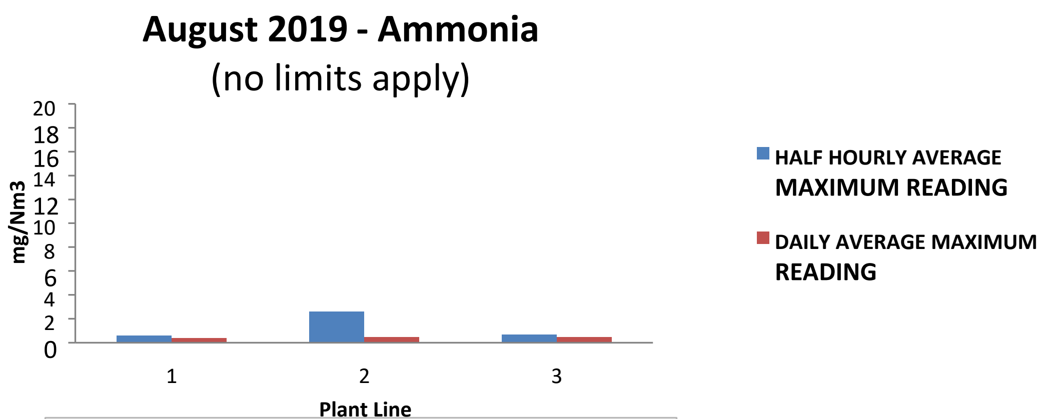

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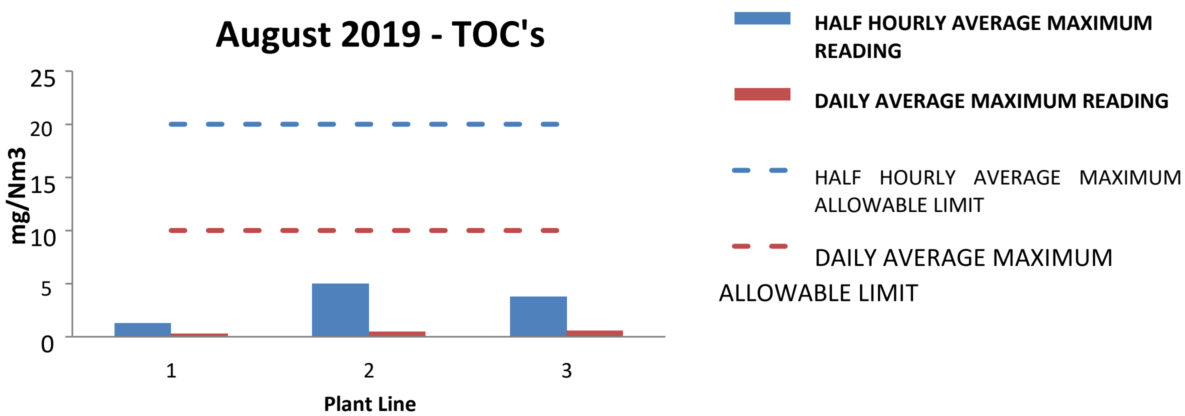

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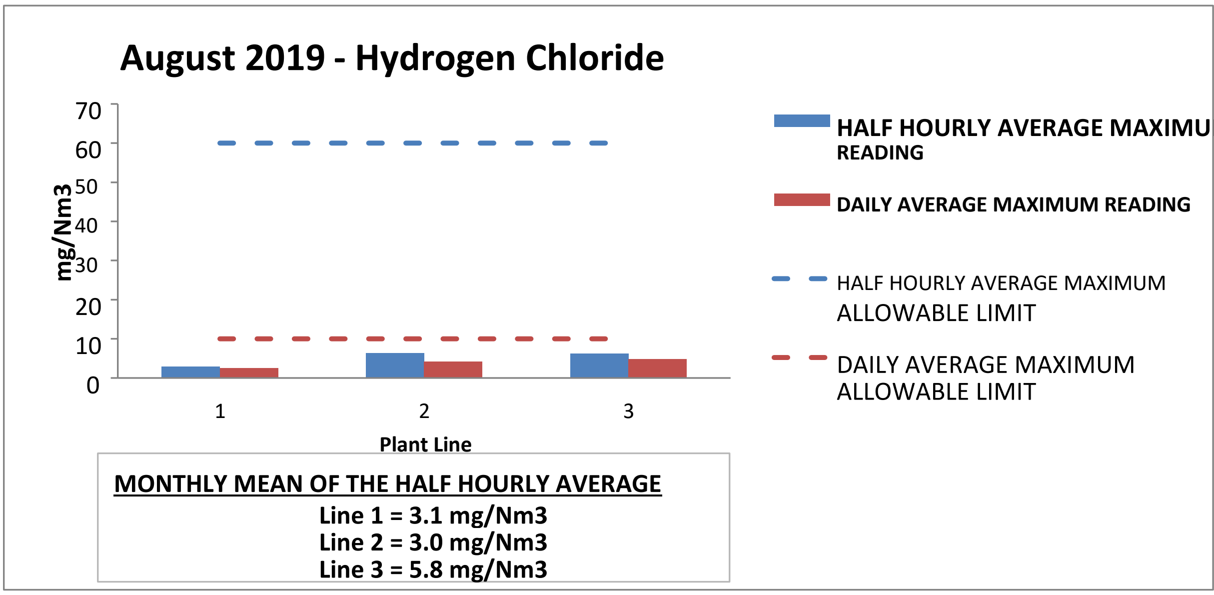

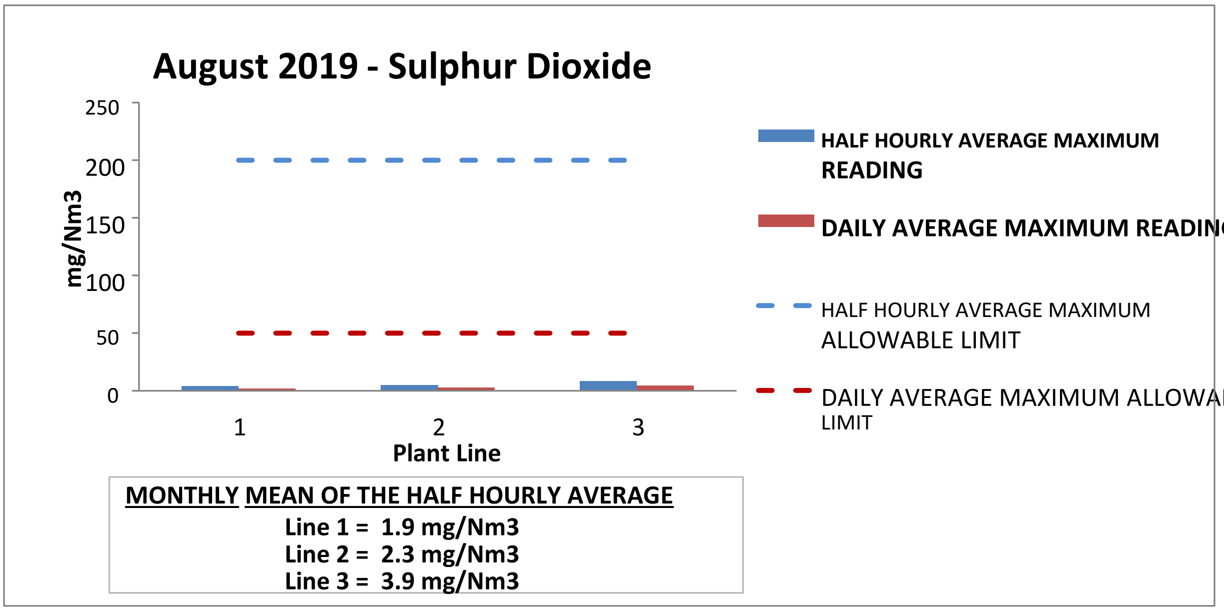

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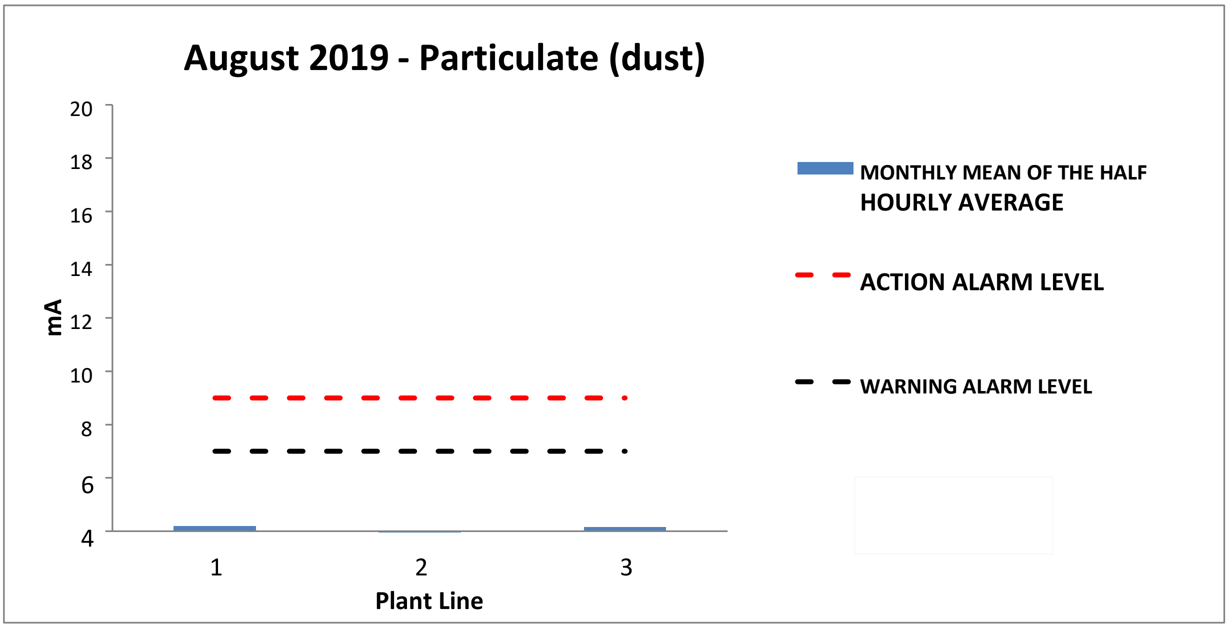

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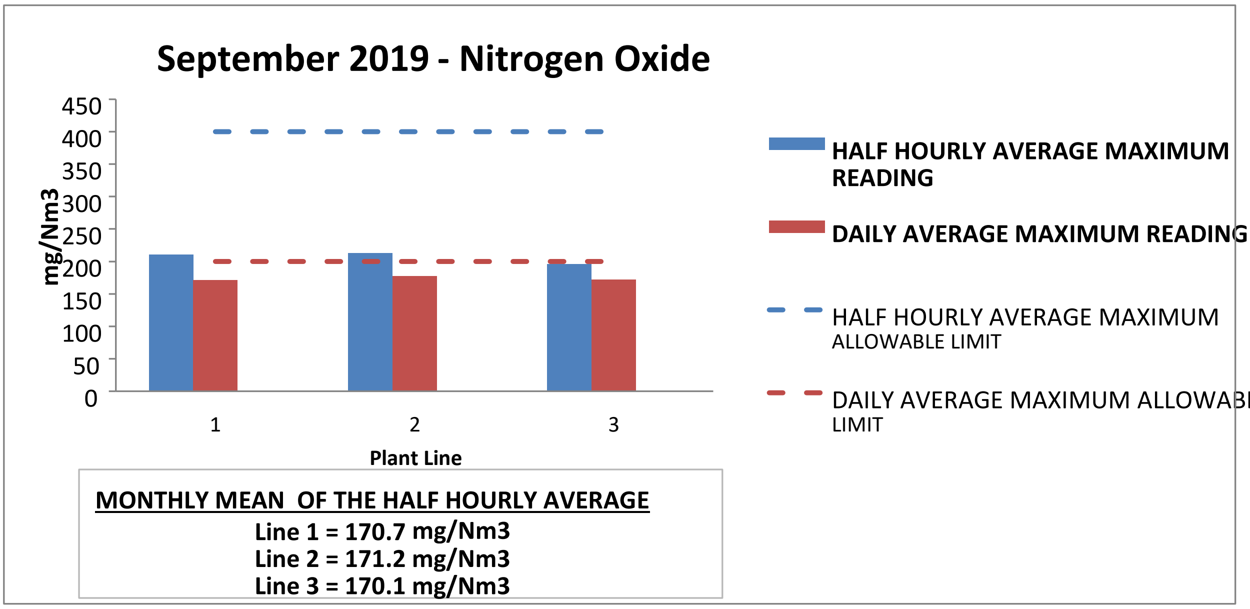

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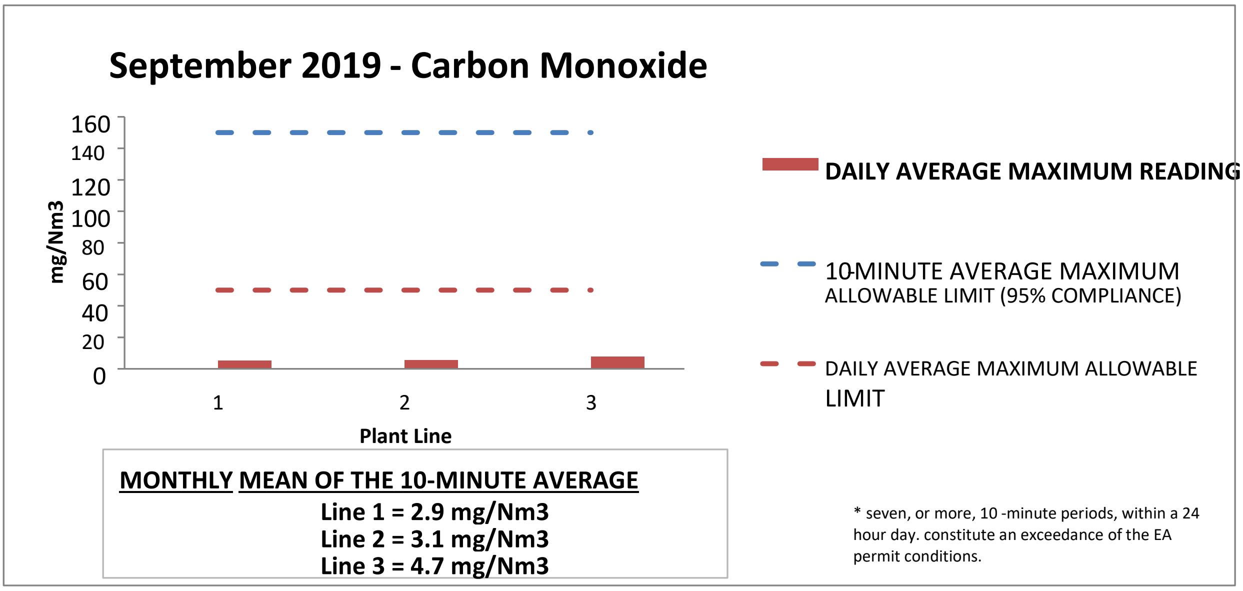

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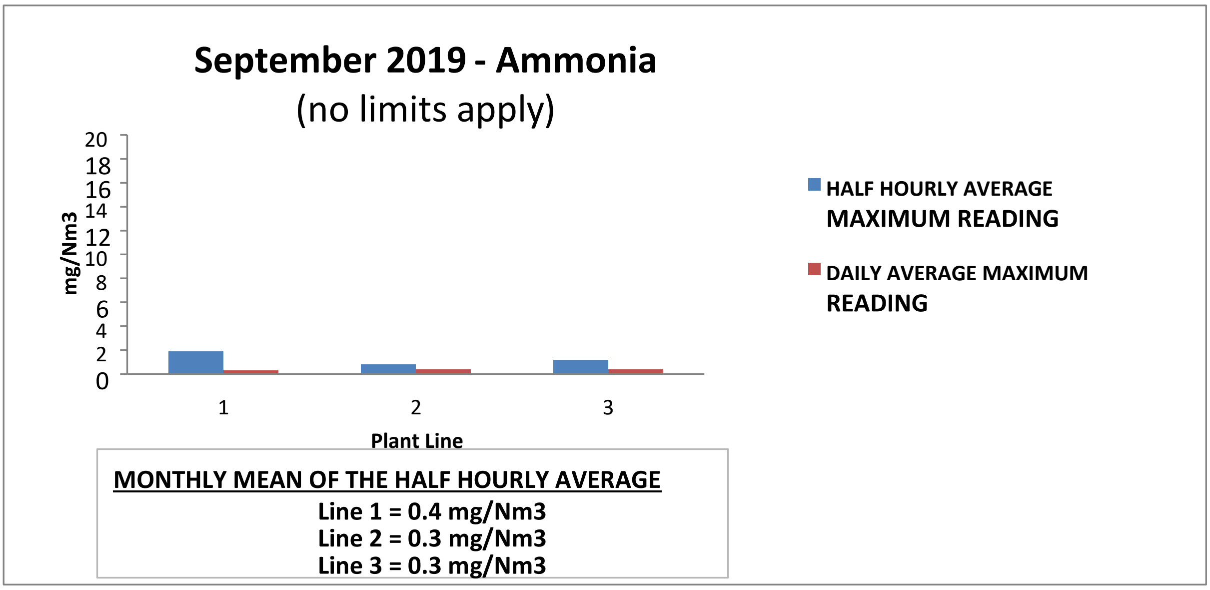

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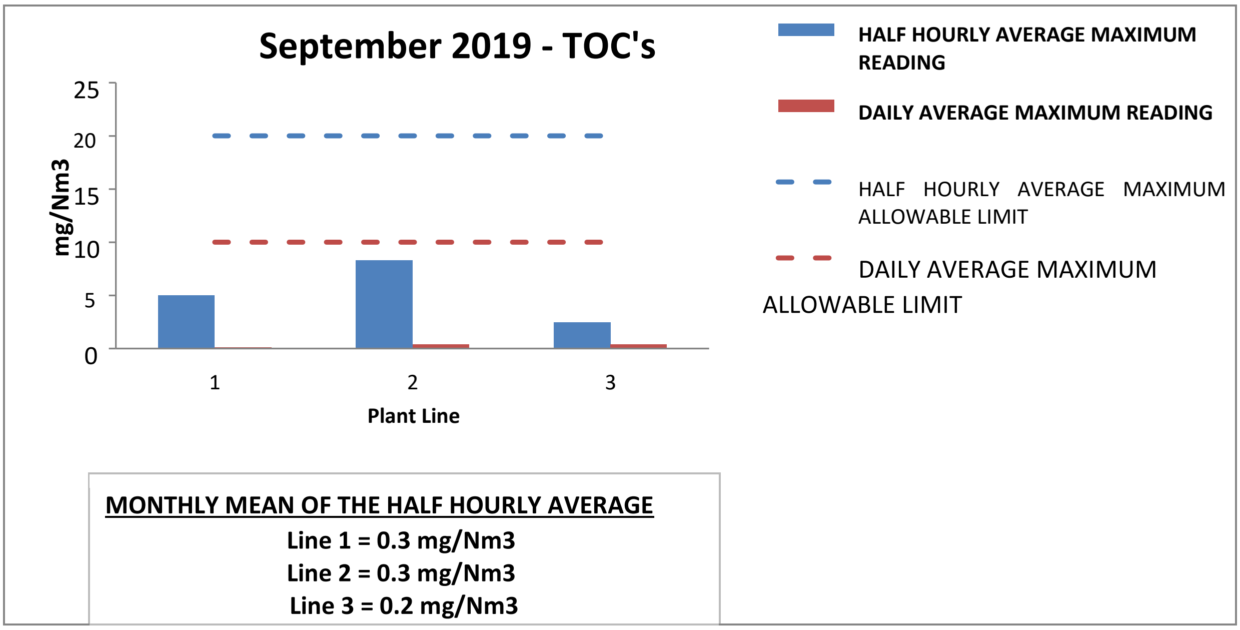

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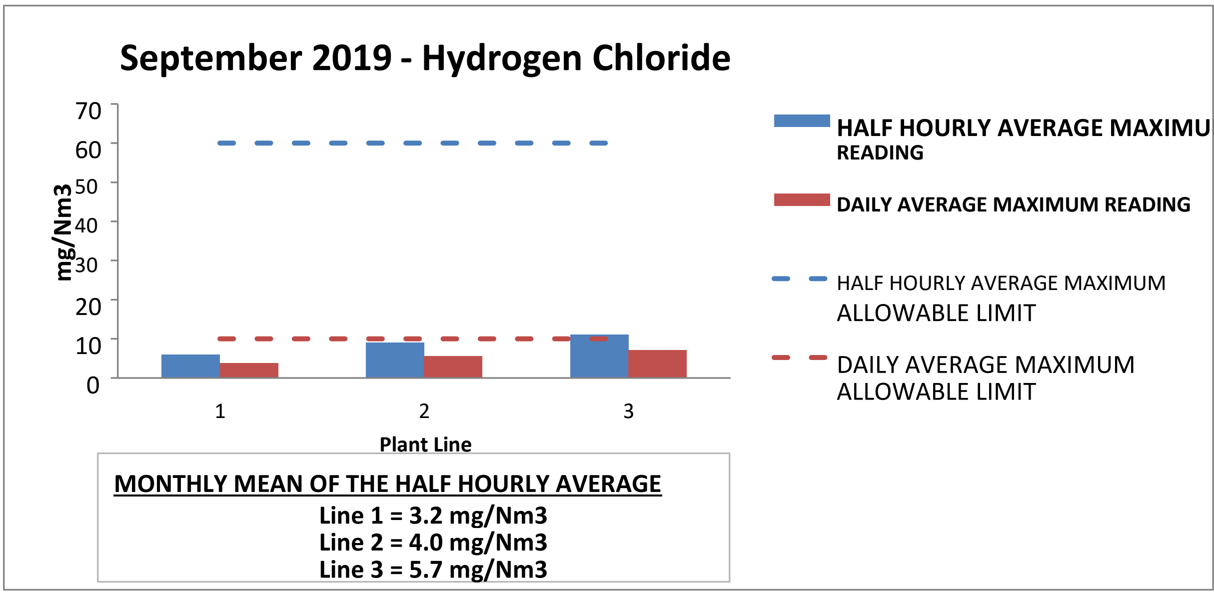

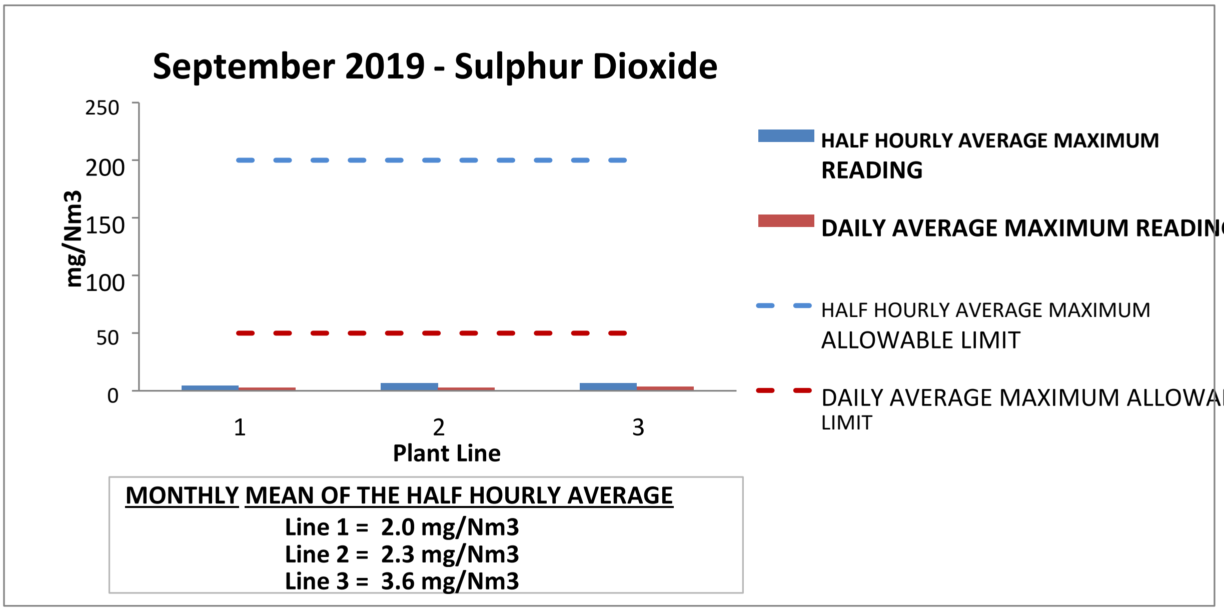

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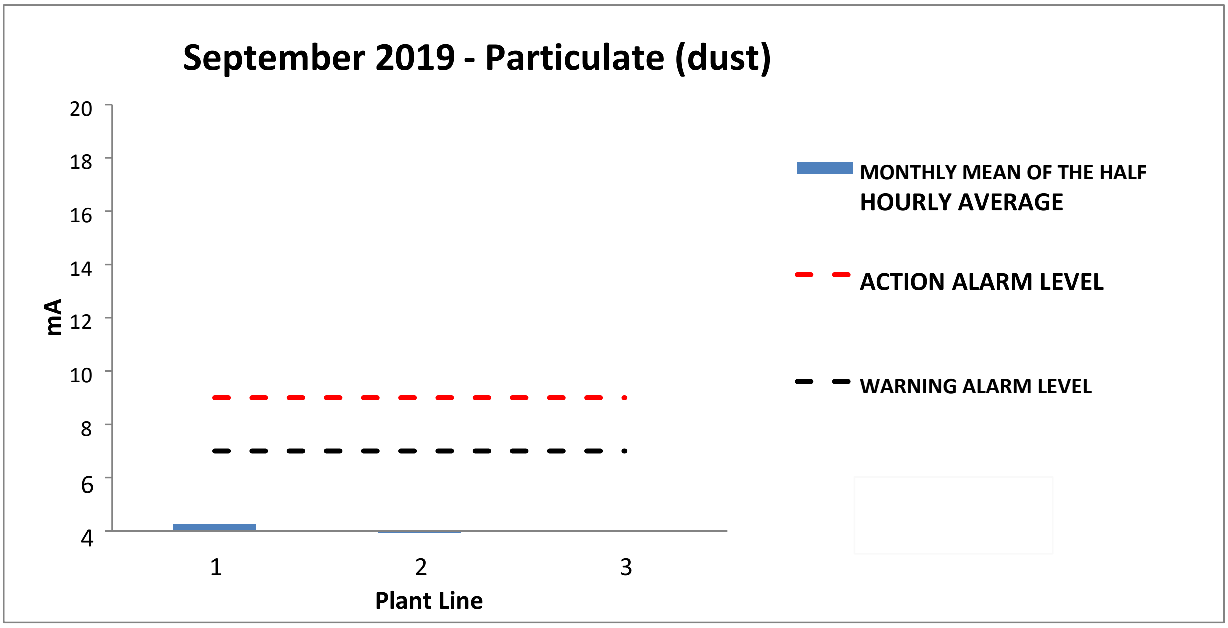

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Riverside Resource Recovery emission report – October 2019

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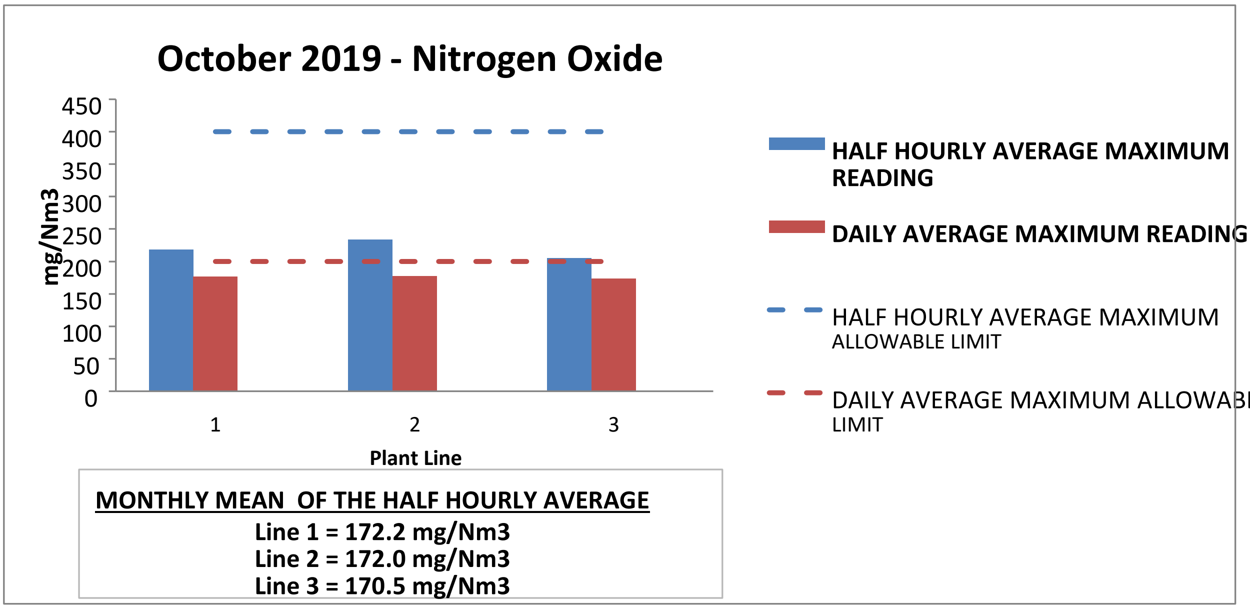

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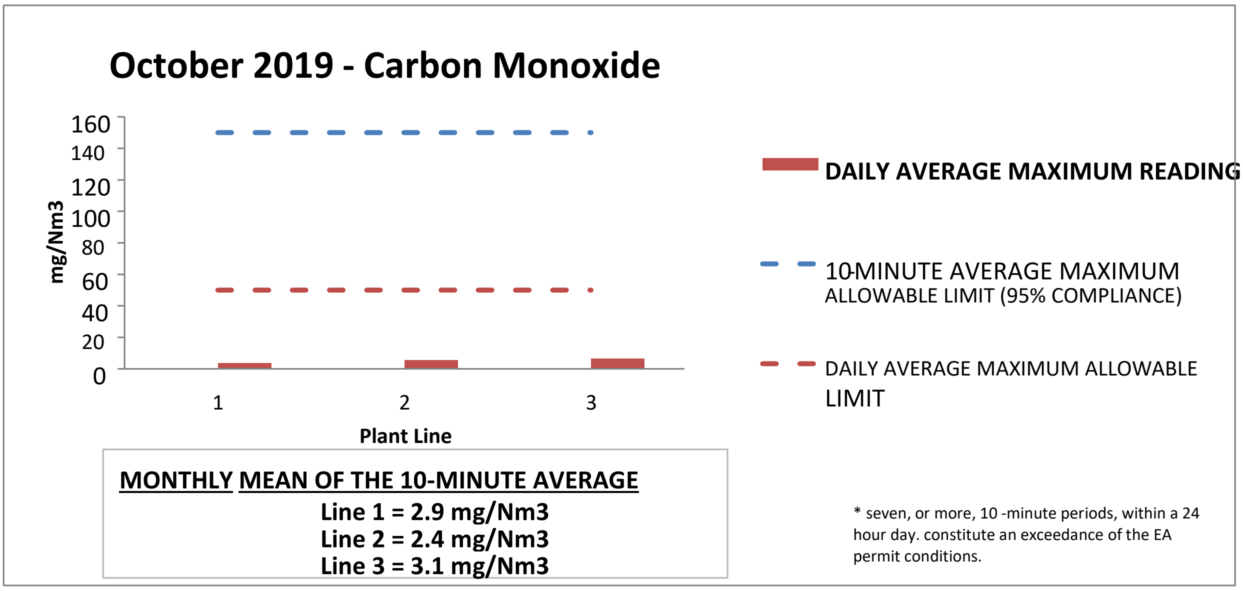

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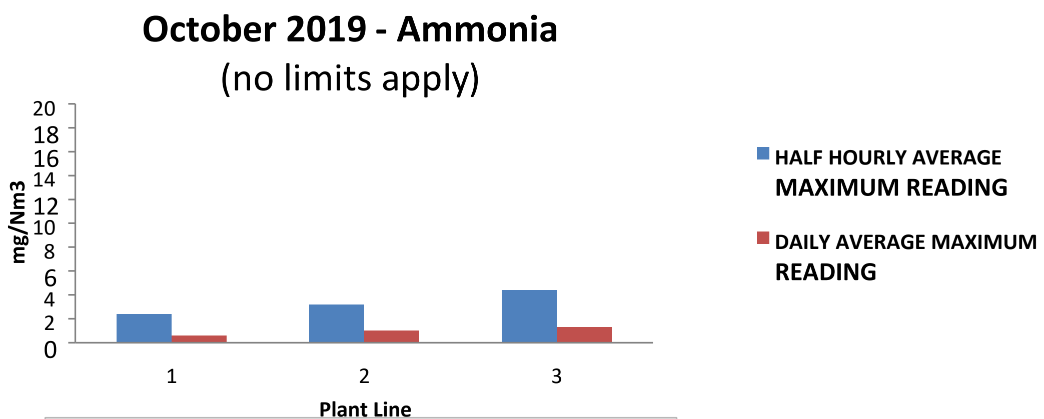


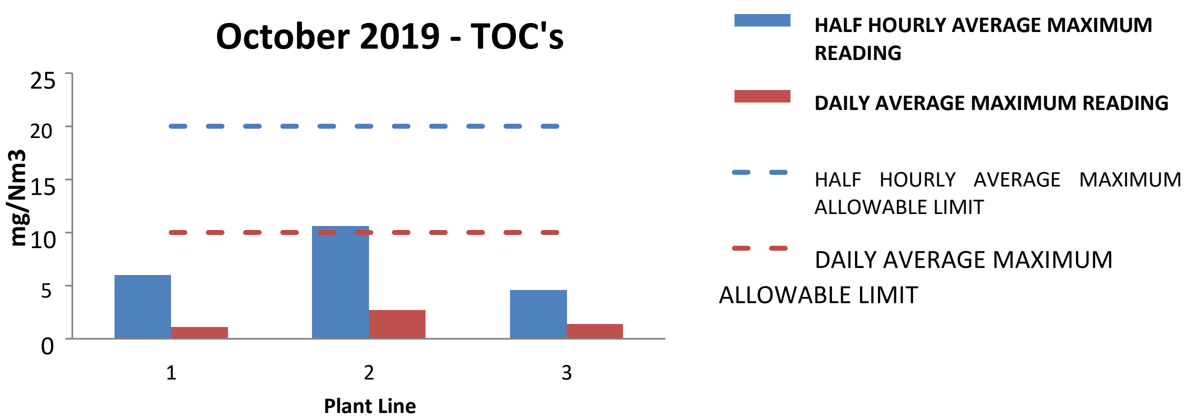
MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.5 mg/Nm3
Line 2 = 0.4 mg/Nm3
Line 3 = 0.4 mg/Nm3

Why do we control and monitor Ammonia?

Although in wide-use in several industries, ammonia is both caustic and hazardous. It is a colourless gas with a characteristic pungent odour.

Ammonia, unlike the other species monitored, is not a product from the incineration of waste but is actually introduced into the furnace. Under the right conditions, ammonia is able to reduce oxides of nitrogen found in the flue gas by the chemical process Selective Non-Catalytic Reduction (SNCR) to nitrogen and water vapour which are both nonhazardous.

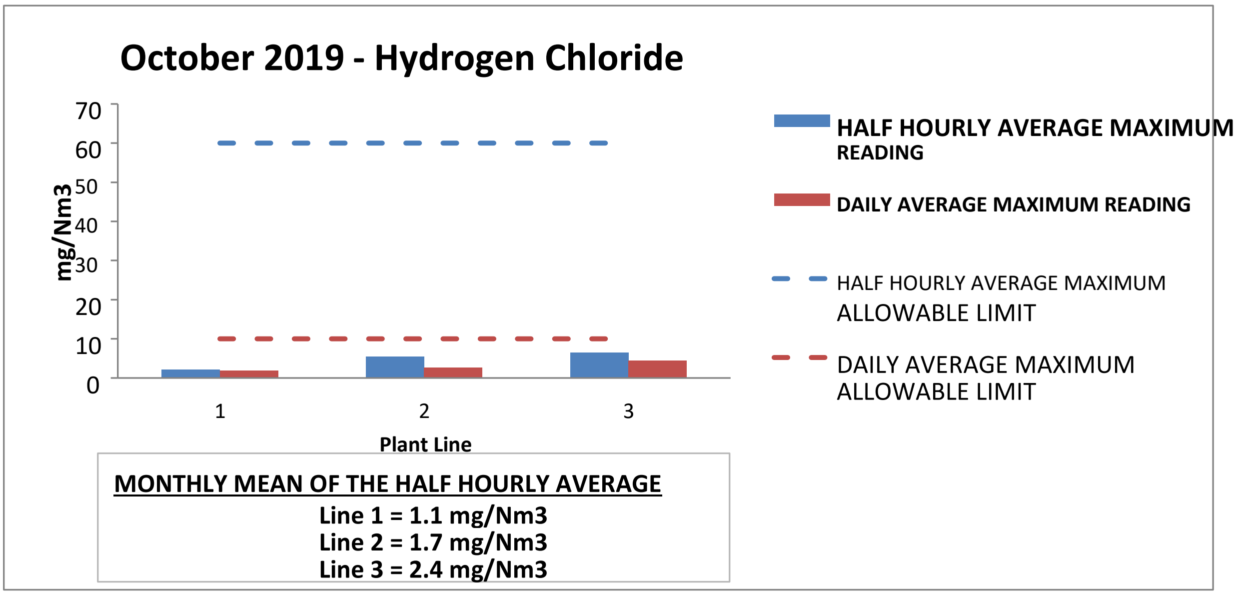


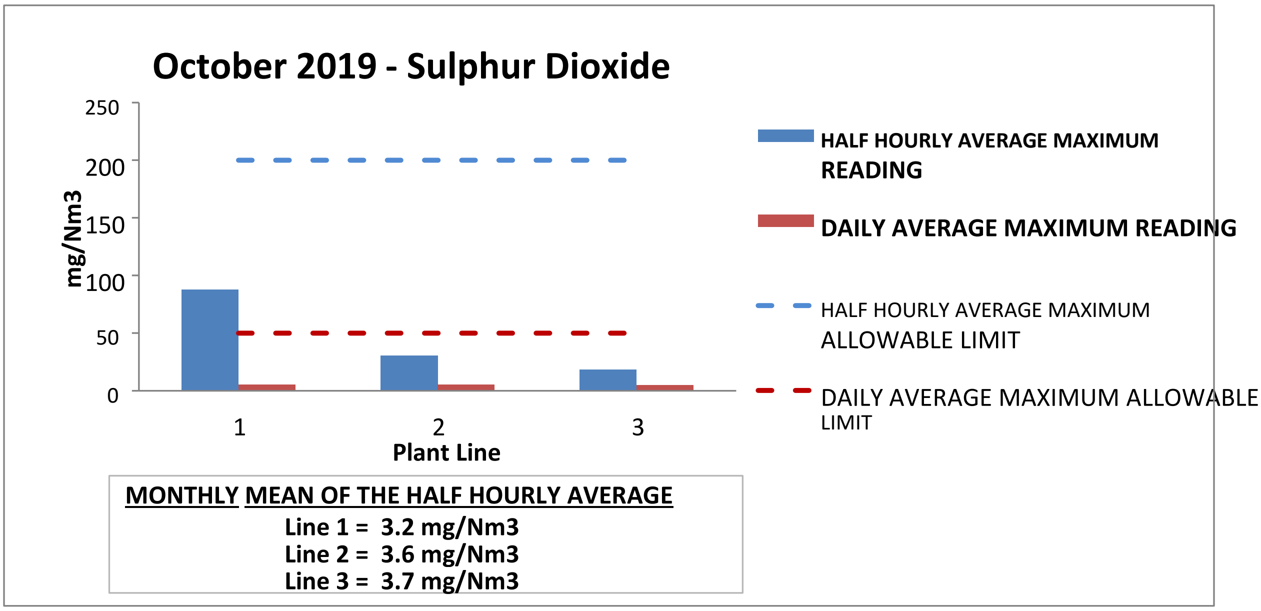
MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.4 mg/Nm3
Line 2 = 0.6 mg/Nm3
Line 3 = 0.3 mg/Nm3

Why do we control and monitor Total Organic Carbon (TOC)?

Total Organic Carbon (TOC) consists of a wide range of organic compounds including Volatile Organic Compounds (VOCs). VOCs are numerous, varied and found everywhere. VOCs are of general concern because of their ability to react with other pollutants (such as nitrogen oxides) in the lower atmosphere to form ozone. High concentrations of ozone at ground level can harm human health, damage crops and affect materials such as rubber. Some VOCs may be directly harmful to human health, contribute to global warming or destroy stratospheric ozone needed to shield the earth's surface from harmful ultra violet radiation.





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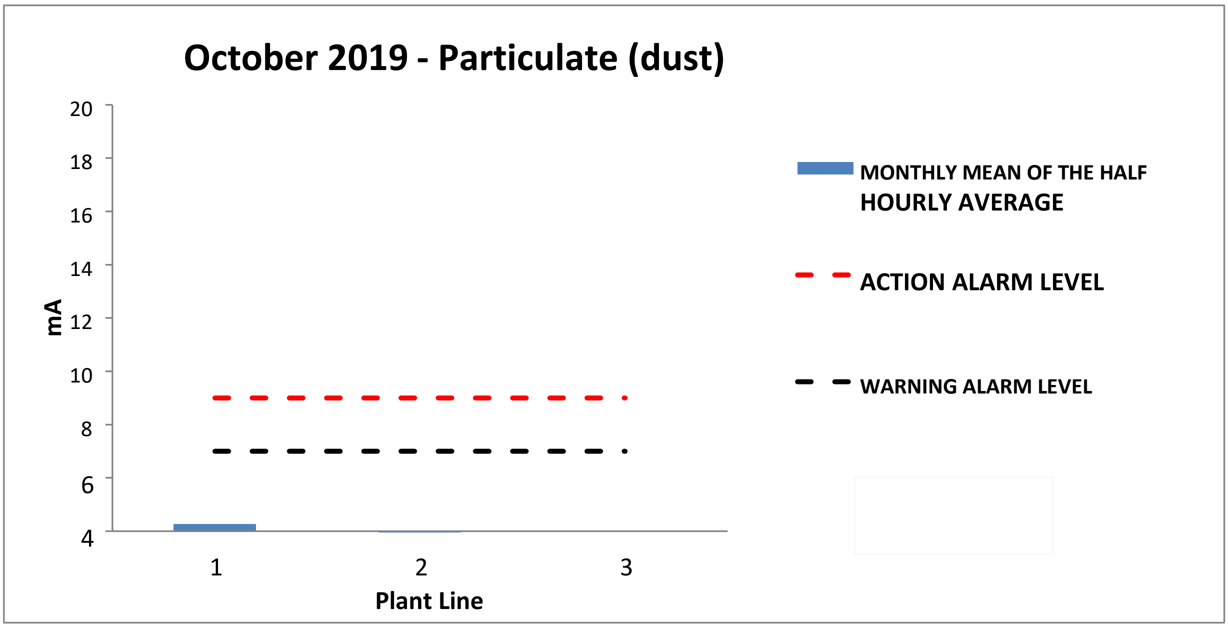

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Riverside Resource Recovery emission report – November 2019

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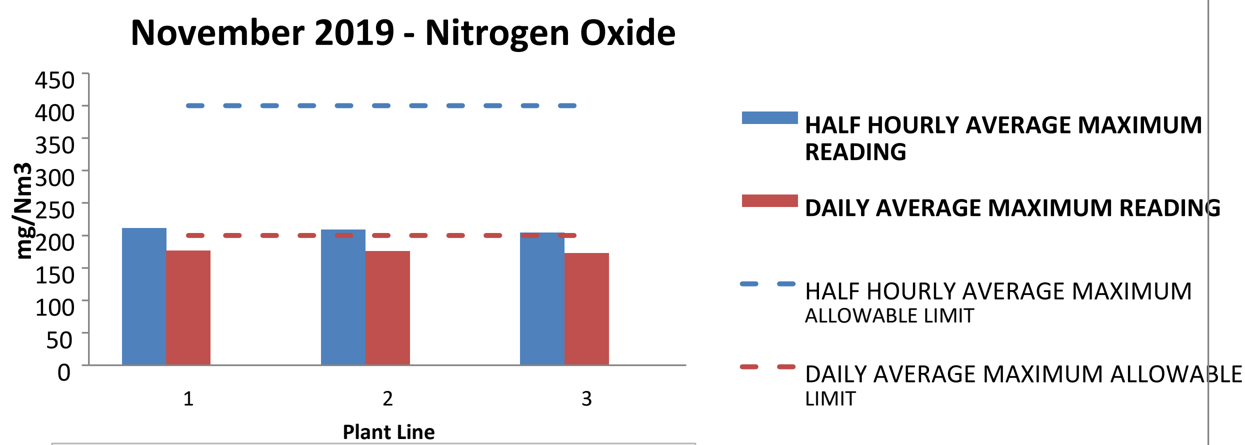

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 171.5 mg/Nm3
Line 2 = 171.6 mg/Nm3
Line 3 = 169.6 mg/Nm3

Why do we control and monitor Oxides of Nitrogen (NOx)?

NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO).

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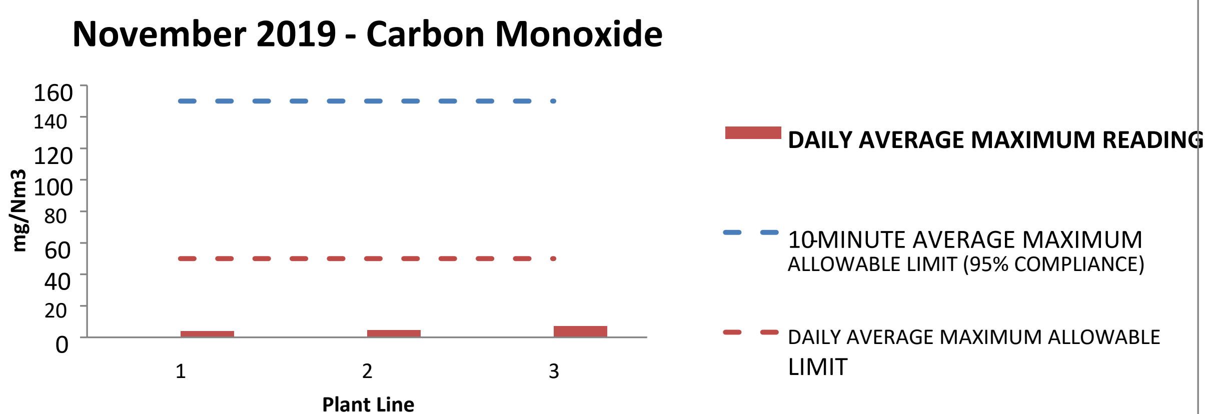

MONTHLY MEAN OF THE 10-MINUTE AVERAGE
Line 1 = 2.7 mg/Nm3
Line 2 = 3.2 mg/Nm3
Line 3 = 4.4 mg/Nm3

* seven, or more, 10 -minute periods, within a 24 hour day. constitute an exceedance of the EA permit conditions.

Following EA guidance and approval in May 2019, RRRL no longer report carbon monoxide against a half-hourly emissions limit value. Carbon monoxide is now monitored against the requirement to be 95% compliant against a 10minute average value, of 150mg/Nm3, over a 24-hour period. Any 24-hour period where the 95% compliance level is breached will be highlighted in the chart above. The daily average emissions limit value of 50mg/Nm3 remains unchanged.

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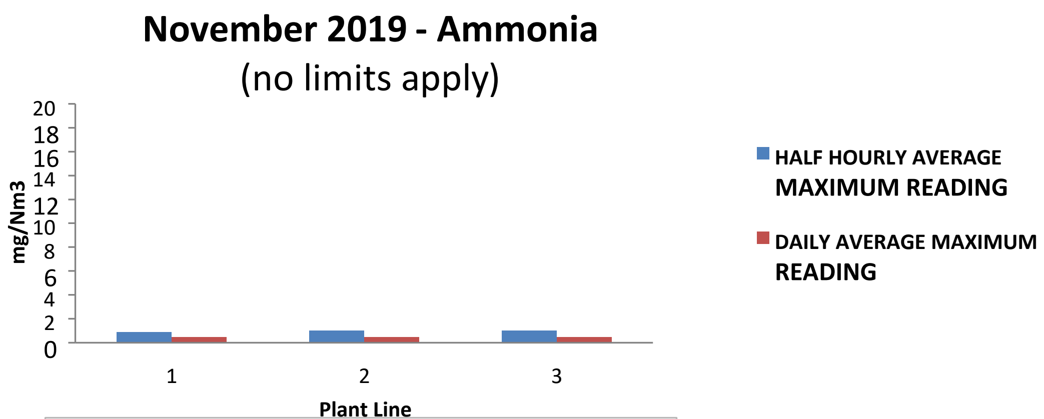

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Line 1 = 0.5 mg/Nm3
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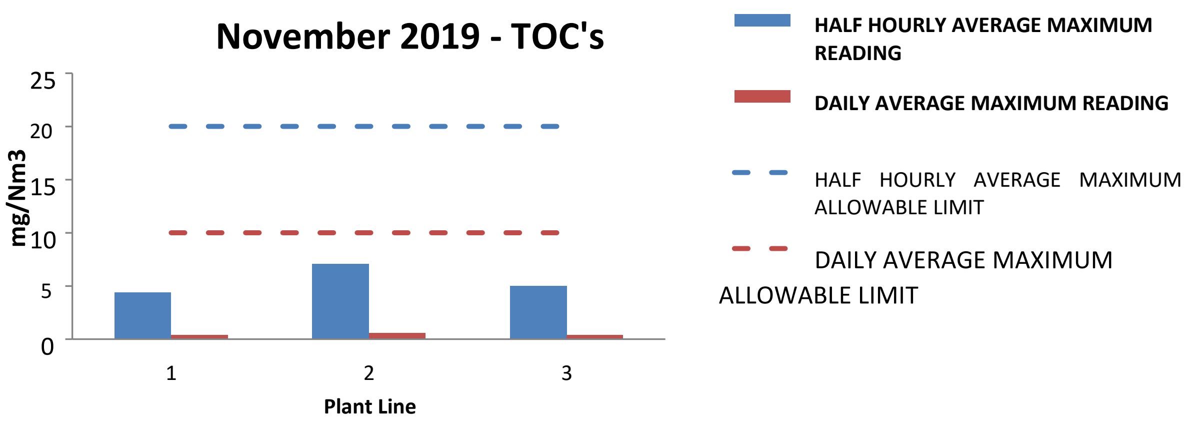

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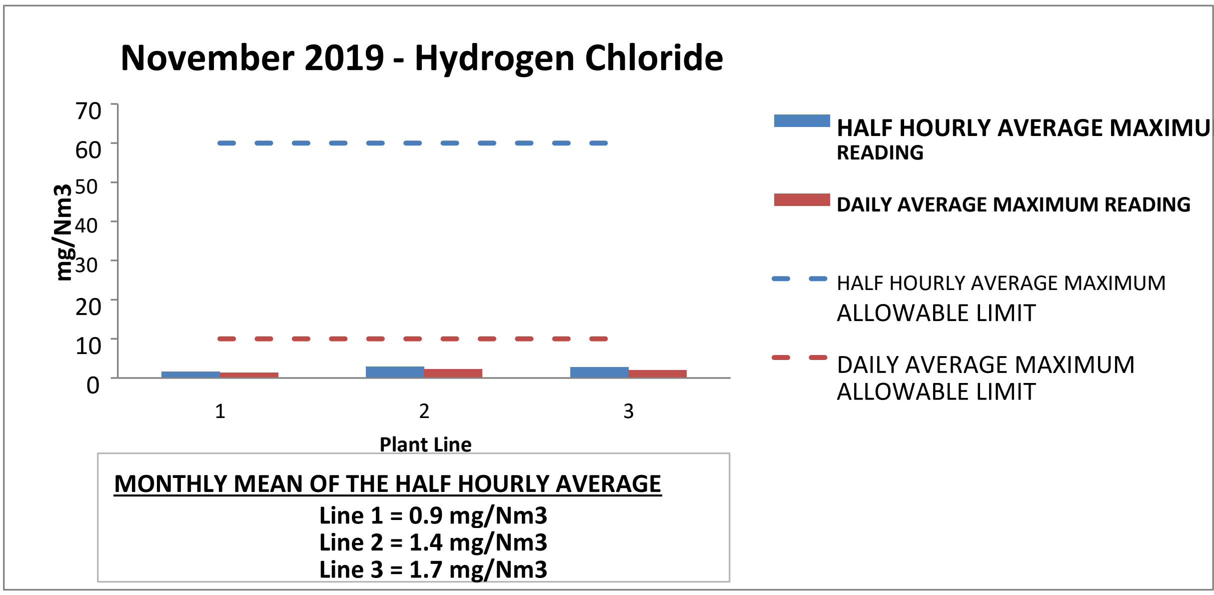

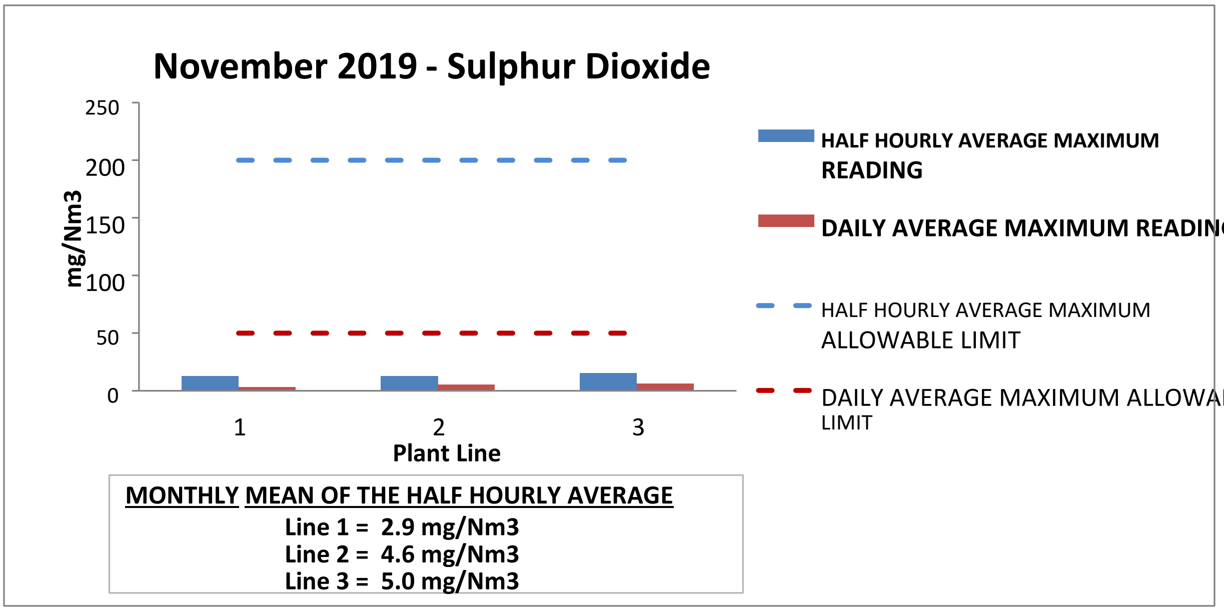

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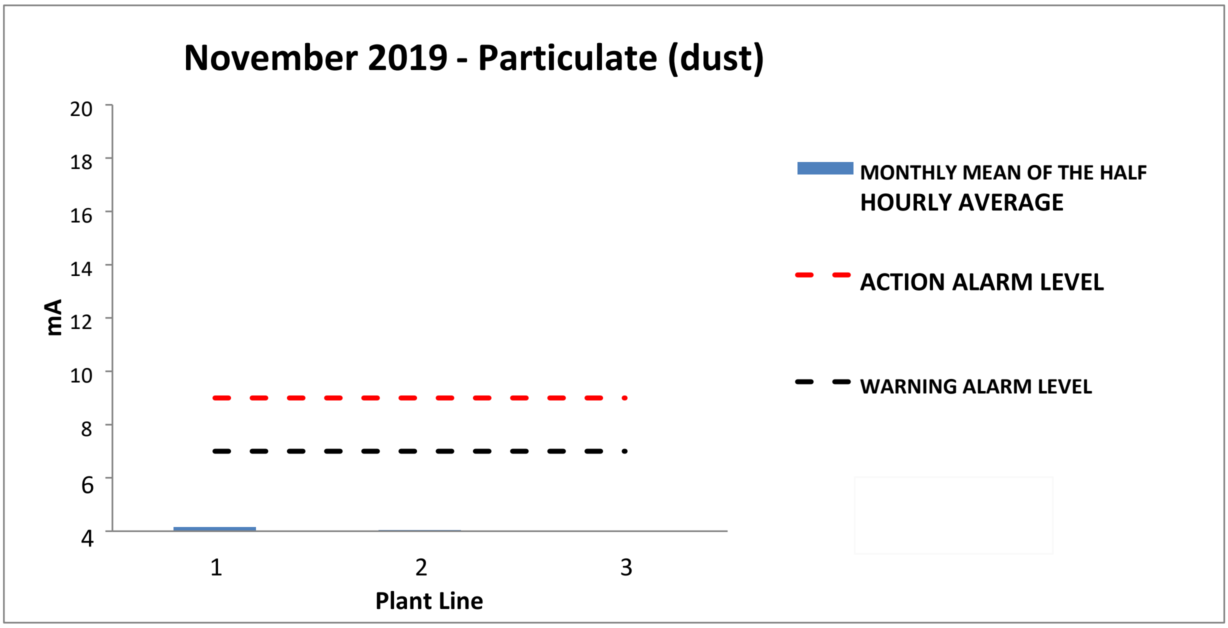

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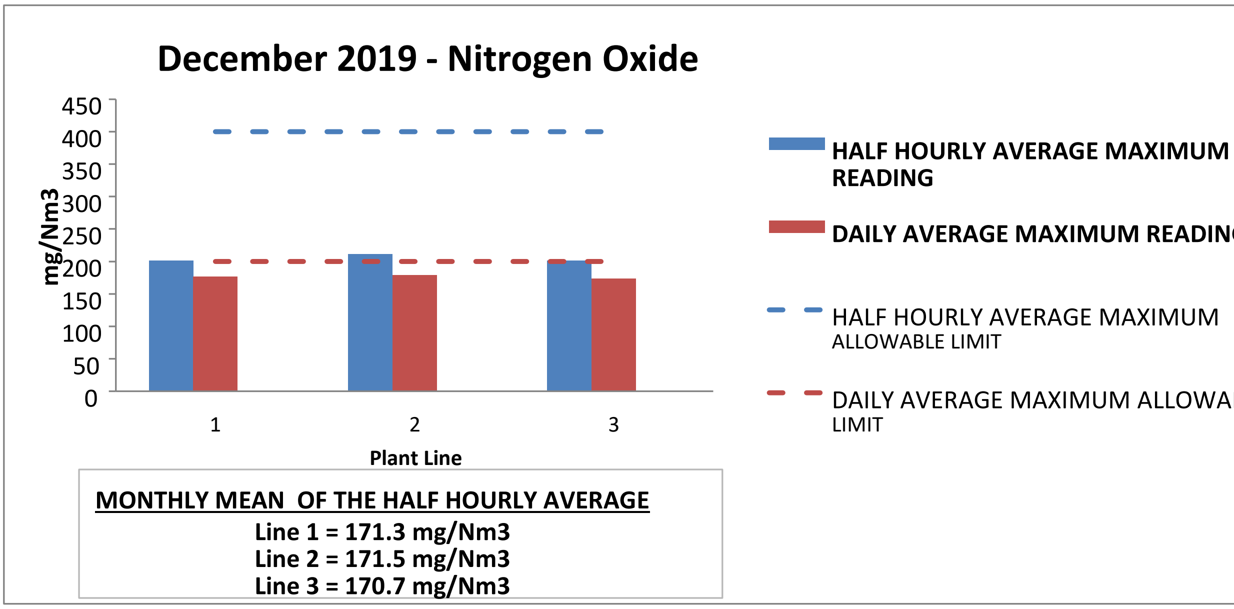

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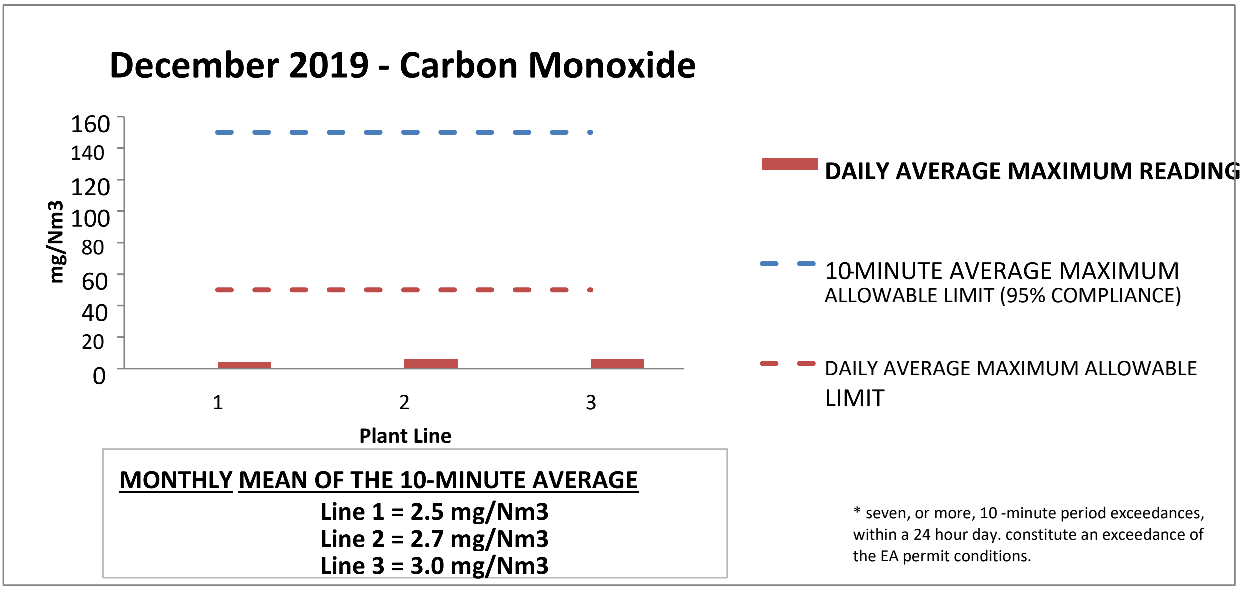

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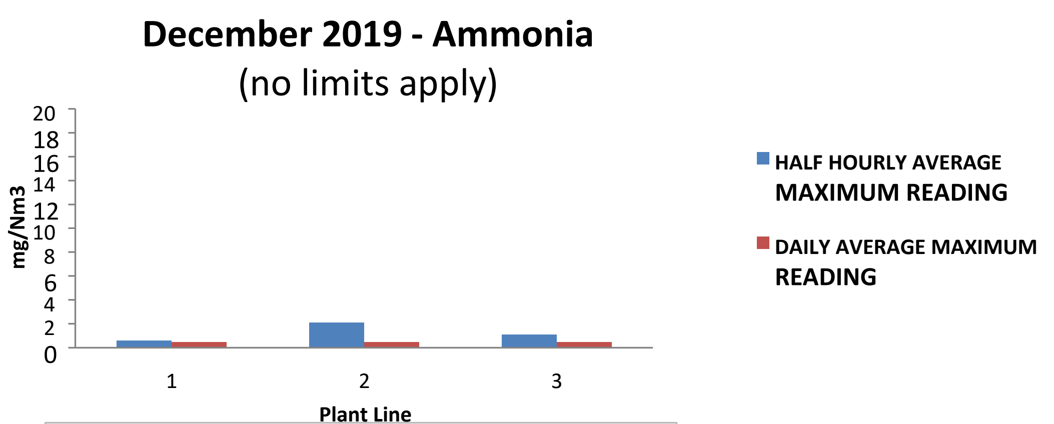

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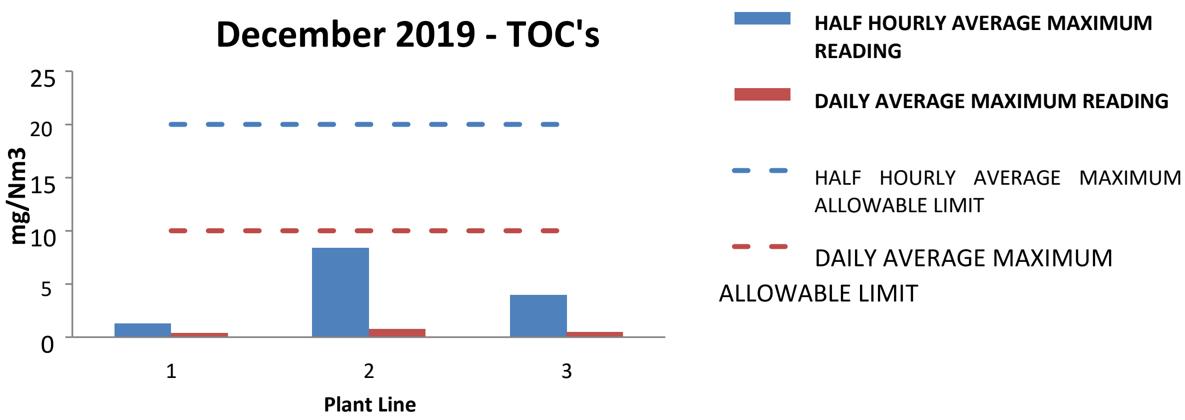

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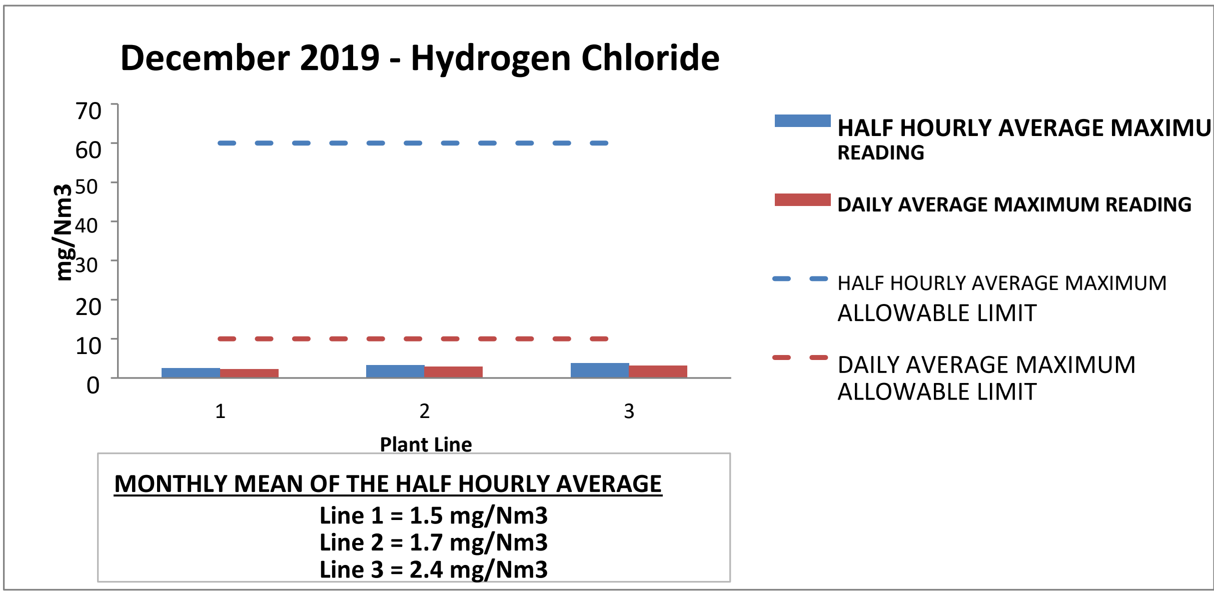

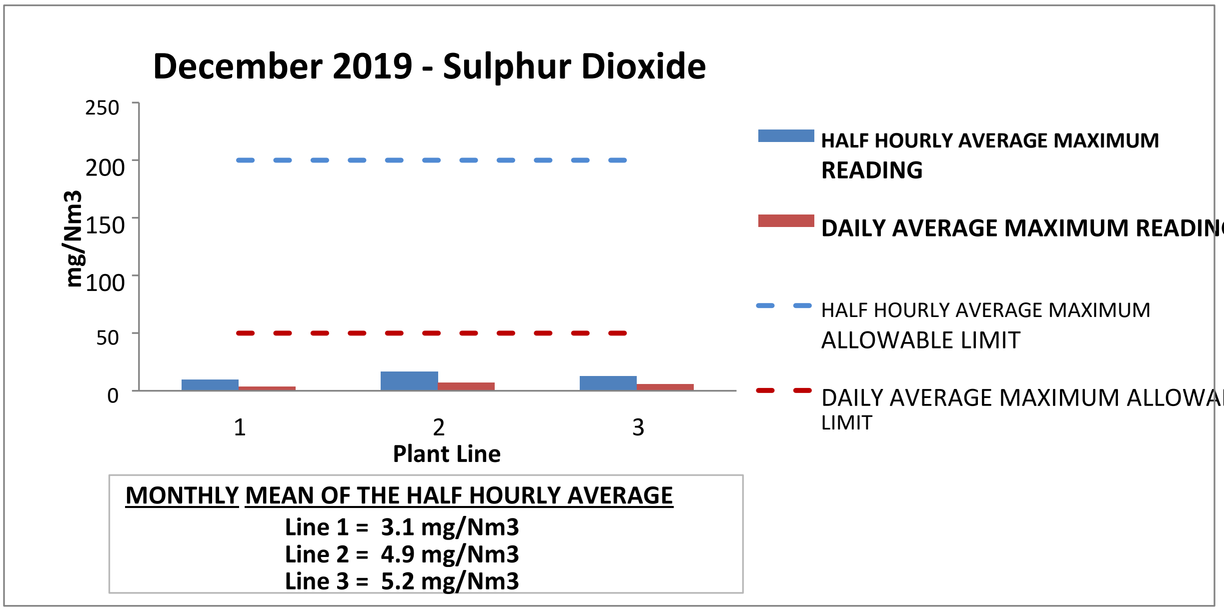

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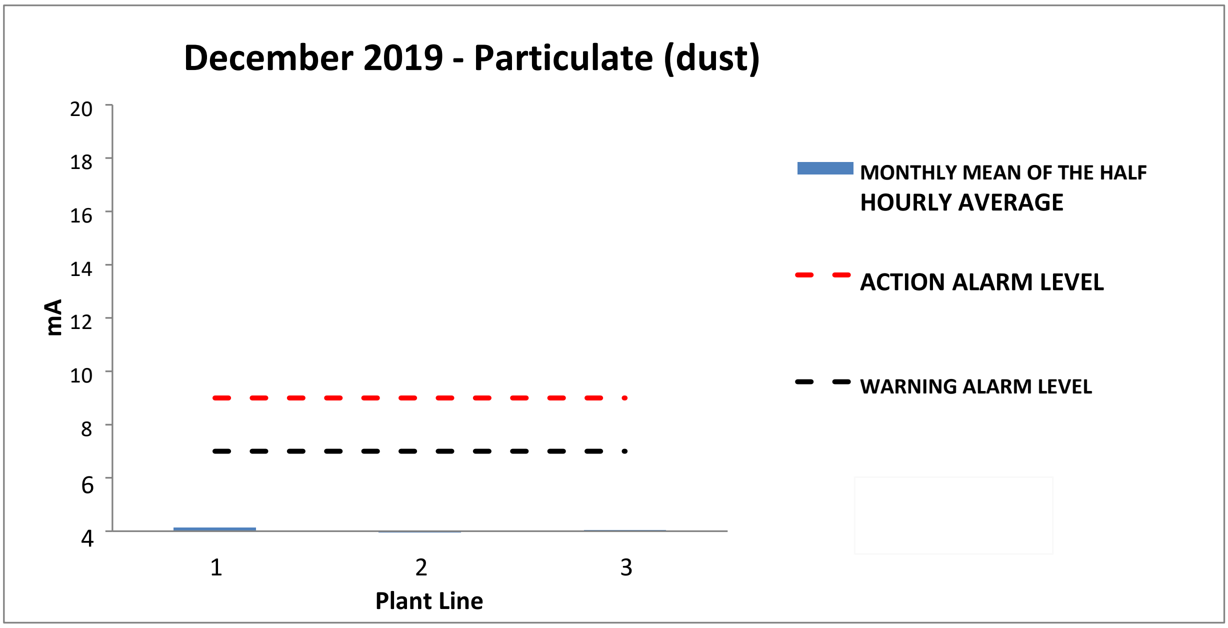

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D.3 2018 Emissions

1. Extracts of Emissions Information from Riverside Annual Performance Report 2018

Annual performance report for: **Riverside Resource Recovery Limited**

Permit Number: **EPR/BK0825UI**

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	Riverside Resource Recovery Facility Norman Road Belvedere Bexley DA17 6JY
Description of waste input	Municipal waste, commercial waste and non-hazardous industrial waste.
Operator contact details if members of the public have any questions	info@coryenergy.com

2. Plant description

The Riverside Resource Recovery Energy from Waste facility at Belvedere in the London Borough of Bexley, uses the waste that would otherwise have gone to landfill as feedstock to generate electricity. As one of the largest operations of its kind in the UK, the facility generates c.580,000 MWh of electricity each year from processing circa 750,000 tonnes of waste. What's more, we use the River Thames as a green highway to move the waste from the city to the facility on our fleet of tugs and barges, removing around 100,000 truck movements a year off our capital's congested roads. By generating electricity from domestic and commercial residual waste, after recycling, we are improving resource efficiency, avoiding London's use on landfill, and achieving greater sustainability as part of London's circular economy.

With the Riverside Resource Recovery facility continuing to be fully operational, the Environment Agency has renewed the facility R1 certification; this means that the facility is classified as a recovery operation. The facility is permitted to process 785,000 tonnes of waste from across London and exports 525,000 – 530,000 Mega Watt hours of electricity to the National Grid.
Cory's river operations are a key aspect of the process for Riverside, with over 85% of the waste being brought to the plant on barges along the River Thames. The Incinerator Bottom Ash (IBA) produced by Riverside is also taken away on the river to an IBA processing facility at Tilbury Docks.

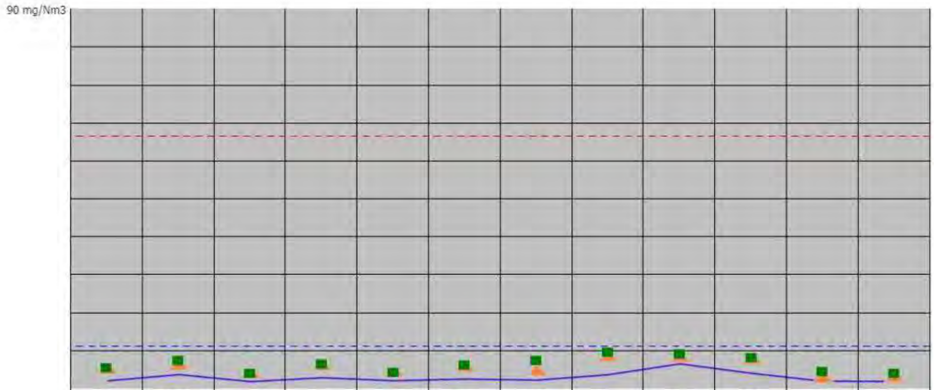
The plant operates within a Health, Safety, Environmental and Quality Integrated Management System which is compliant with OHSAS 18001, ISO 14001 and ISO 9001 and is independently audited.

4. Summary of Plant Emissions

4.1 Summary of continuous emissions monitoring results for emissions to air

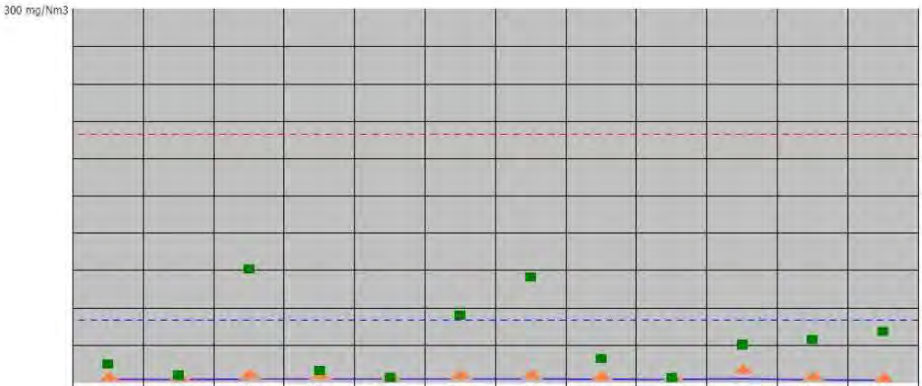
The following charts show the performance of the plant against its emission limit values (ELVs) for substances that are continuously monitored.

Line 1 - Hydrogen chloride



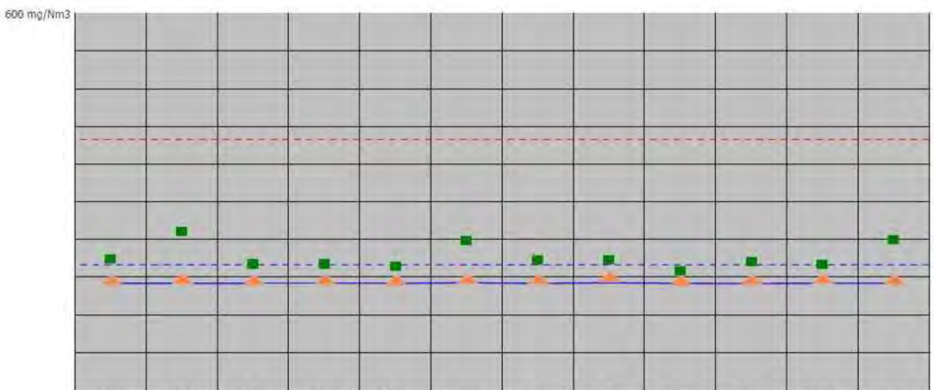
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	60	60	60	60	60	60	60	60	60	60	60	60
Monthly 1/2 hr Mean.	1.8	3.2	1.6	2.5	1.8	2.1	1.9	3.3	5.8	3.6	1.7	1.7
Monthly 1/2 hr Max	5.0	6.7	3.5	5.8	3.8	5.5	6.7	8.6	8.1	7.4	4.0	3.6
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Daily Mean	1.8	3.3	1.6	2.5	1.8	2.2	1.9	3.2	5.8	3.6	1.7	1.6
Daily Max	4.1	5.0	3.0	4.9	3.5	4.6	3.7	7.1	6.9	6.4	2.0	2.1

Line 1 – Sulphur dioxide



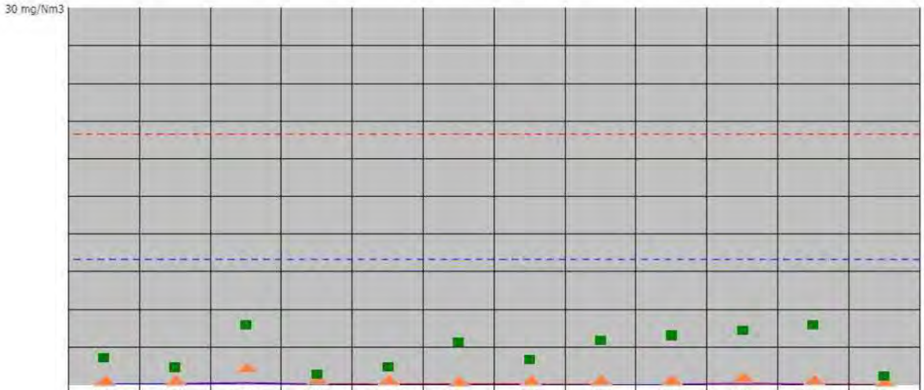
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly 1/2 hr Mean.	2.5	2.4	2.7	2.8	2.7	2.8	2.8	2.6	2.4	3.0	2.0	1.8
Monthly 1/2 hr Max	14.6	5.7	91.5	9.9	4.0	54.0	84.6	18.9	3.7	30.5	34.4	41.3
Daily ELV	50	50	50	50	50	50	50	50	50	50	50	50
Daily Mean	2.5	2.3	2.7	2.7	2.6	2.7	2.8	2.6	2.4	3.0	2.0	1.7
Daily Max	2.9	2.9	4.9	4.6	2.9	4.5	4.5	3.4	2.6	9.1	3.5	2.2

Line 1 – Oxides of nitrogen



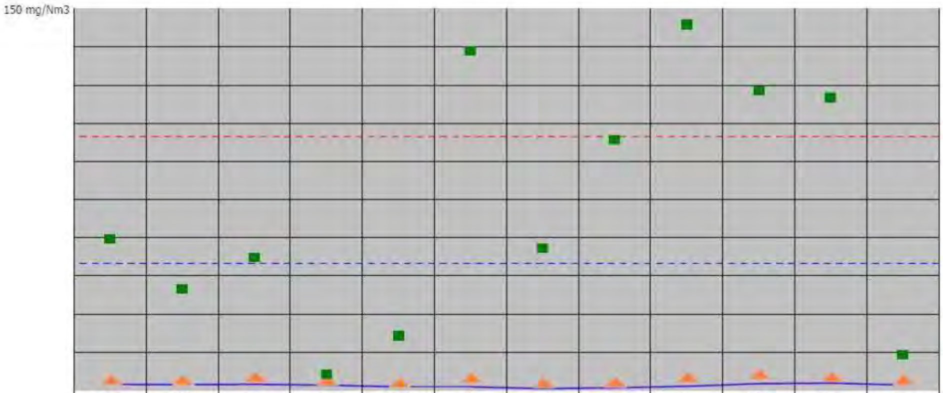
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	400	400	400	400	400	400	400	400	400	400	400	400
Monthly 1/2 hr Mean.	169.8	170.1	170.0	169.8	170.0	170.7	170.0	170.7	170.0	169.3	170.1	170.1
Monthly 1/2 hr Max	208.6	252.5	201.0	201.1	197.8	238.5	208.0	206.9	189.5	205.1	200.0	239.3
Daily ELV	200	200	200	200	200	200	200	200	200	200	200	200
Daily Mean	169.9	170.1	169.9	169.9	170.0	170.6	170.0	170.6	170.0	169.7	170.0	170.0
Daily Max	171.2	172.9	171.1	171.7	170.7	173.2	172.5	176.7	170.6	171.6	173.1	171.8

Line 1 – Total organic carbon



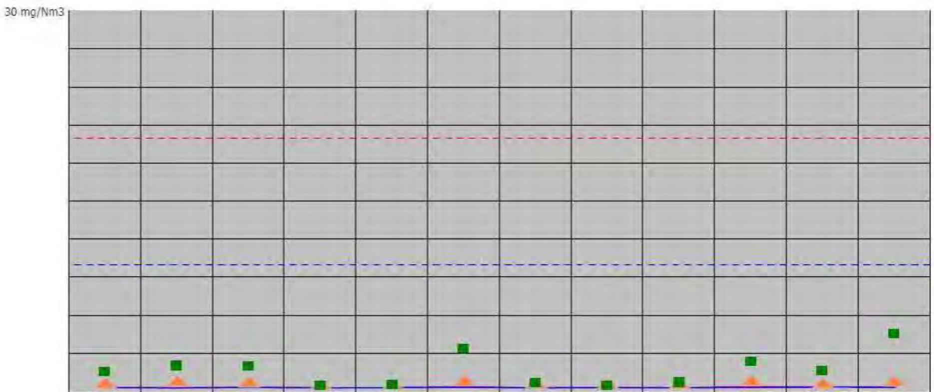
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hr Mean.	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Monthly 1/2 hr Max	2.2	1.4	4.8	0.8	1.4	3.4	2.0	3.5	3.9	4.3	4.7	0.7
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Daily Mean	0.0	0.0	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0
Daily Max	0.1	0.2	1.2	0.3	0.2	0.1	0.2	0.2	0.2	0.4	0.2	0.1

Line 1 – Carbon monoxide



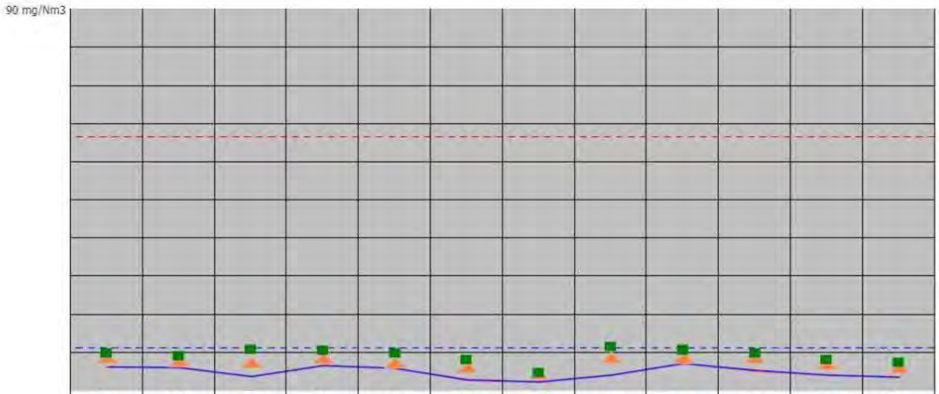
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	100	100	100	100	100	100	100	100	100	100	100	100
Monthly 1/2 hr Mean.	2.3	2.2	2.3	2.0	1.3	1.3	0.6	0.9	1.6	2.6	2.8	2.0
Monthly 1/2 hr Max	59.5	39.9	52.3	6.3	21.4	133.4	56.0	98.6	144.0	117.9	115.1	13.8
Daily ELV	50	50	50	50	50	50	50	50	50	50	50	50
Daily Mean	2.3	2.2	2.3	2.0	1.3	1.3	0.6	0.9	1.5	2.5	2.8	2.0
Daily Max	3.2	3.0	4.3	3.0	2.1	3.9	2.1	2.3	4.1	5.2	4.4	3.1

Line 1 – Ammonia



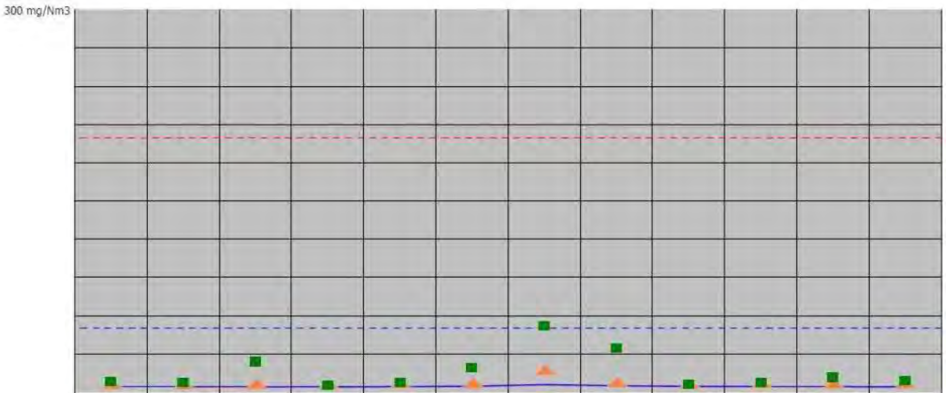
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hr Mean.	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3
Monthly 1/2 hr Max	1.5	2.0	2.0	0.5	0.5	3.4	0.7	0.5	0.7	2.4	1.7	4.5
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Daily Mean	0.3	0.2	0.3	0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3
Daily Max	0.4	0.6	0.6	0.4	0.3	0.7	0.4	0.4	0.4	0.7	0.4	0.6

Line 2 - Hydrogen chloride



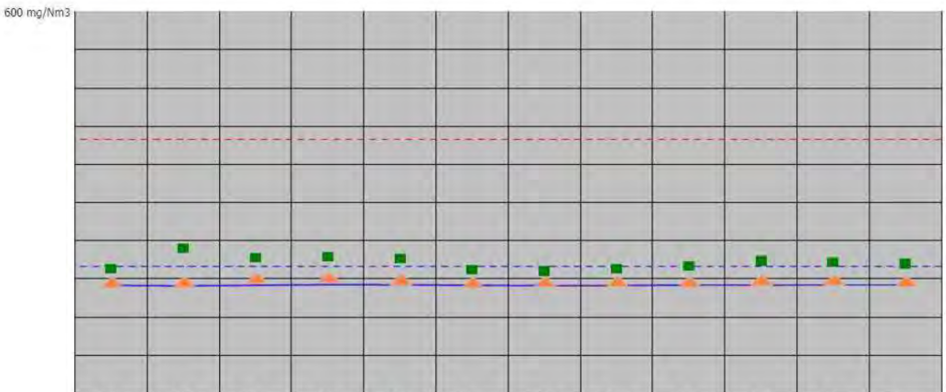
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	60	60	60	60	60	60	60	60	60	60	60	60
Monthly 1/2 hr Mean.	5.5	5.4	3.2	5.9	5.2	2.5	2.0	3.6	6.3	4.6	3.6	3.1
Monthly 1/2 hr Max	8.9	8.2	9.7	9.5	8.7	7.4	4.2	10.4	9.6	8.8	7.2	6.6
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Daily Mean	5.5	5.3	3.2	5.8	5.1	2.4	1.9	3.6	6.3	4.7	3.6	3.1
Daily Max	6.9	6.2	5.9	6.9	5.9	4.7	3.1	7.0	7.0	7.0	5.5	4.6

Line 2 – Sulphur dioxide



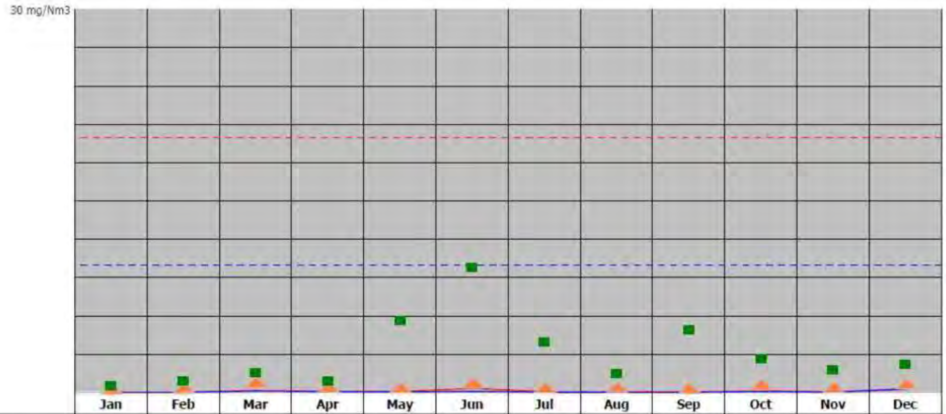
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly 1/2 hr Mean.	3.9	3.9	4.0	4.0	4.2	4.6	5.8	4.9	4.4	4.3	4.2	4.1
Monthly 1/2 hr Max	8.2	7.2	23.9	5.2	7.2	19.0	51.8	34.6	6.3	7.5	11.6	8.8
Daily ELV	50	50	50	50	50	50	50	50	50	50	50	50
Daily Mean	3.8	3.8	3.9	4.0	4.2	4.5	5.7	4.9	4.4	4.2	4.2	4.0
Daily Max	4.1	4.1	4.4	4.2	4.9	5.0	15.4	5.7	4.7	4.9	4.8	4.8

Line 2 – Oxides of nitrogen



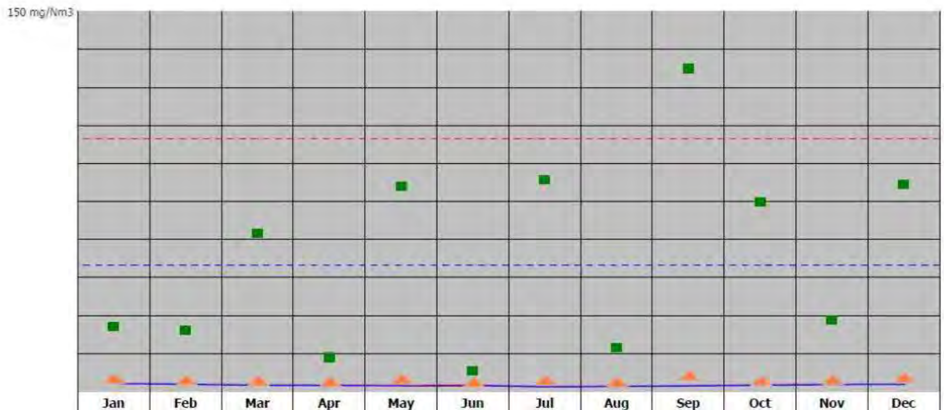
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	400	400	400	400	400	400	400	400	400	400	400	400
Monthly 1/2 hr Mean.	169.7	168.8	169.7	170.7	170.4	169.4	169.5	169.5	170.1	169.6	170.1	170.2
Monthly 1/2 hr Max	196.2	228.0	213.1	214.6	212.1	194.1	192.2	195.9	199.6	208.3	205.7	203.8
Daily ELV	200	200	200	200	200	200	200	200	200	200	200	200
Daily Mean	169.7	168.7	169.9	170.6	170.4	169.8	169.4	169.5	170.0	170.1	170.1	170.2
Daily Max	170.5	170.9	177.0	178.2	174.9	170.2	171.7	171.8	171.1	174.0	174.1	171.9

Line 2 – Total organic carbon



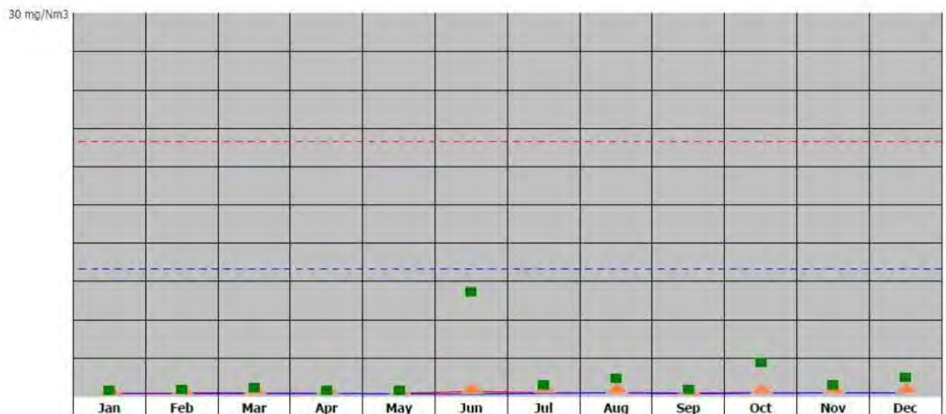
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hr Mean.	0.0	0.0	0.1	0.1	0.1	0.3	0.0	0.0	0.0	0.1	0.0	0.3
Monthly 1/2 hr Max	0.6	0.9	1.6	0.9	5.6	9.8	4.0	1.5	4.9	2.6	1.8	2.2
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Daily Mean	-0.0	-0.0	0.1	0.0	0.0	0.1	0.0	-0.0	-0.0	0.1	0.0	0.3
Daily Max	0.1	0.2	0.6	0.2	0.2	0.6	0.2	0.2	0.1	0.4	0.2	0.5

Line 2 – Carbon monoxide



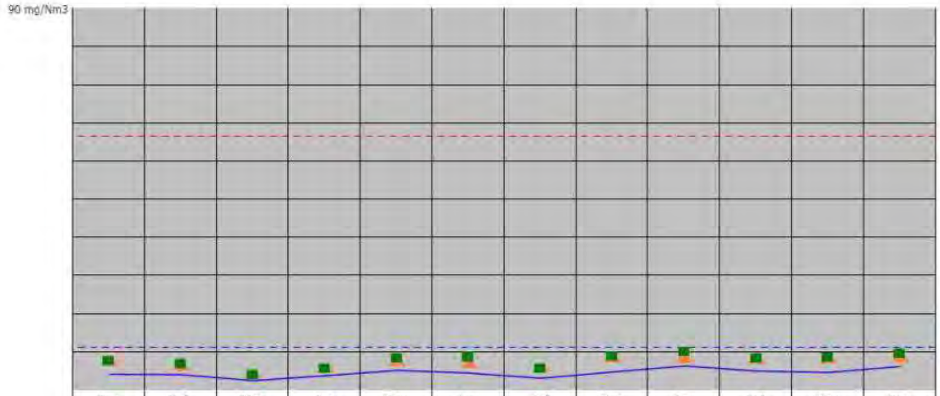
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	100	100	100	100	100	100	100	100	100	100	100	100
Monthly 1/2 hr Mean.	3.1	2.8	2.5	2.4	2.3	2.5	1.9	2.0	2.2	2.5	2.7	2.8
Monthly 1/2 hr Max	25.6	24.2	62.5	13.4	81.0	8.0	83.5	17.3	127.6	75.0	28.1	81.8
Daily ELV	50	50	50	50	50	50	50	50	50	50	50	50
Daily Mean	3.1	2.8	2.4	2.4	2.3	2.3	1.8	2.0	2.2	2.4	2.7	2.7
Daily Max	4.1	3.5	3.2	2.9	4.0	2.7	3.5	2.8	5.3	3.3	3.7	4.5

Line 2 – Ammonia



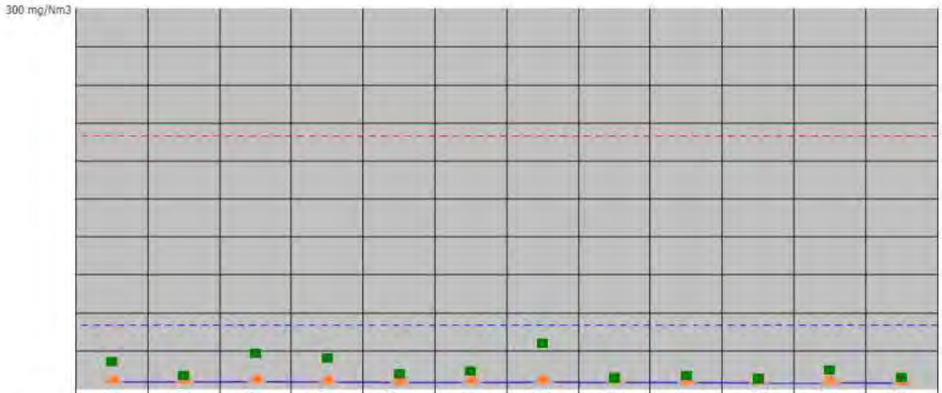
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hr Mean.	0.2	0.2	0.2	0.2	0.2	0.4	0.3	0.3	0.2	0.3	0.3	0.3
Monthly 1/2 hr Max	0.5	0.6	0.7	0.5	0.5	8.2	0.9	1.4	0.5	2.7	0.9	1.5
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Daily Mean	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.3
Daily Max	0.3	0.3	0.4	0.3	0.3	0.4	0.5	0.5	0.3	0.4	0.4	0.5

Line 3 - Hydrogen chloride



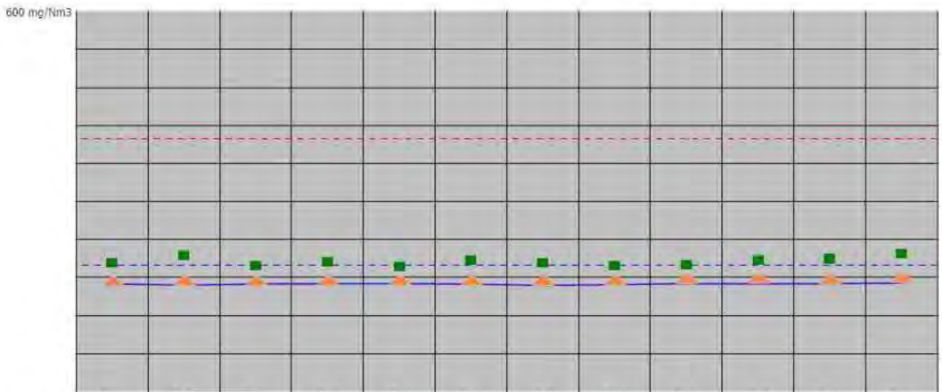
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	60	60	60	60	60	60	60	60	60	60	60	60
Monthly 1/2 hr Mean.	3.7	3.6	2.1	3.3	4.5	3.9	2.7	4.2	5.6	4.4	4.1	5.5
Monthly 1/2 hr Max	6.8	6.3	3.6	5.0	7.5	7.8	5.1	7.9	9.1	7.5	7.7	8.6
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Daily Mean	3.6	3.5	2.1	3.3	4.5	3.9	2.7	4.2	5.6	4.4	4.0	5.5
Daily Max	6.2	5.0	3.2	4.5	6.1	5.6	4.7	7.0	6.9	6.6	6.7	7.0

Line 3 – Sulphur dioxide



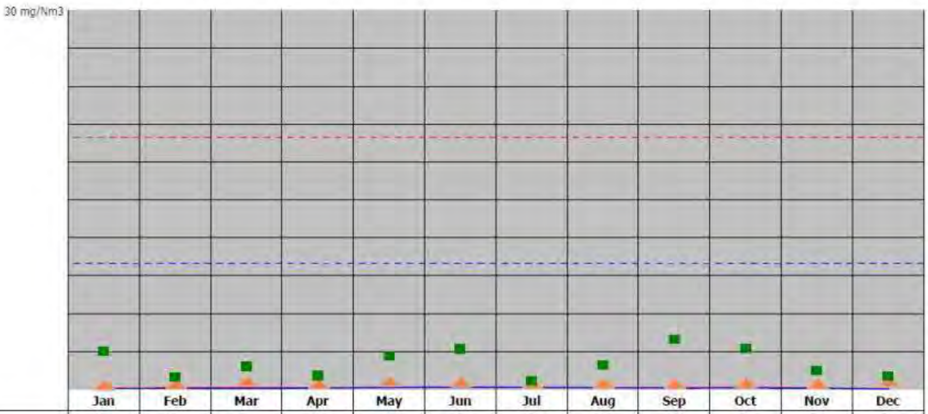
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly 1/2 hr Mean.	5.4	5.3	5.6	5.3	5.0	4.9	5.1	4.9	4.8	4.6	4.6	4.4
Monthly 1/2 hr Max	21.4	10.3	27.9	24.0	12.0	13.8	35.8	8.6	10.6	7.9	14.9	9.2
Daily ELV	50	50	50	50	50	50	50	50	50	50	50	50
Daily Mean	5.3	5.2	5.5	5.3	5.0	4.9	5.1	4.9	4.8	4.5	4.5	4.4
Daily Max	5.8	5.5	6.3	6.0	5.4	5.6	6.0	5.4	5.2	5.1	5.3	4.7

Line 3 – Oxides of nitrogen



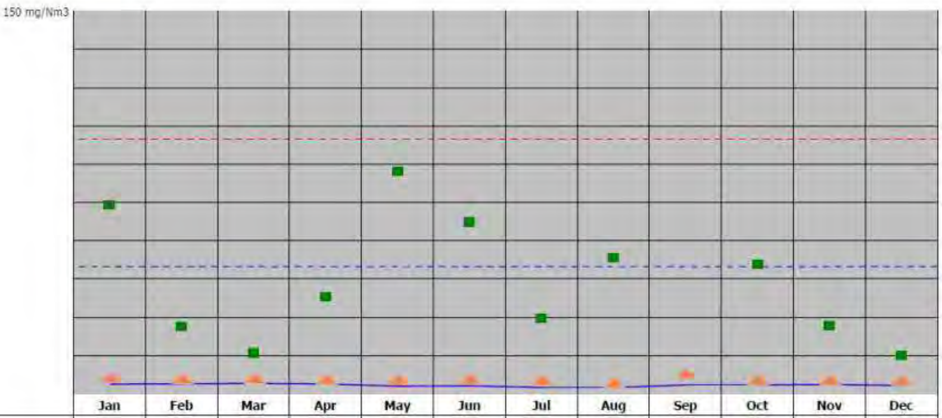
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	400	400	400	400	400	400	400	400	400	400	400	400
Monthly 1/2 hr Mean.	169.7	167.8	169.5	170.0	170.2	169.1	167.6	168.6	170.1	169.5	170.3	171.1
Monthly 1/2 hr Max	203.6	214.5	199.2	205.1	197.5	207.4	203.5	199.2	200.1	207.8	209.7	218.3
Daily ELV	200	200	200	200	200	200	200	200	200	200	200	200
Daily Mean	169.6	167.7	169.4	170.0	170.1	169.3	167.5	168.5	170.2	169.9	170.3	171.0
Daily Max	171.0	171.4	171.3	171.8	172.0	171.6	171.9	172.0	174.8	175.4	173.8	176.5

Line 3 – Total organic carbon



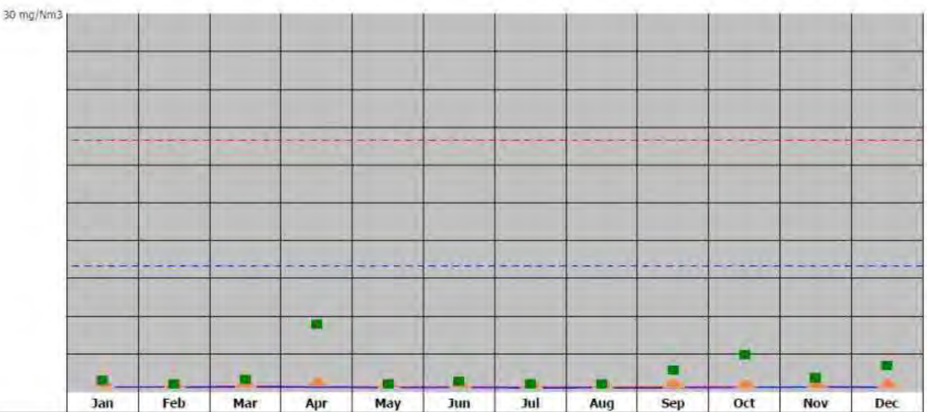
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hr Mean.	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1
Monthly 1/2 hr Max	3.0	1.0	1.8	1.1	2.7	3.2	0.7	1.9	4.0	3.2	1.5	1.1
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Daily Mean	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Daily Max	0.1	0.2	0.4	0.2	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.4

Line 3 – Carbon monoxide



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	100	100	100	100	100	100	100	100	100	100	100	100
Monthly 1/2 hr Mean.	3.8	3.9	4.1	3.9	3.0	3.1	2.4	2.4	3.5	3.5	3.6	3.3
Monthly 1/2 hr Max	74.2	26.4	16.0	38.0	87.4	67.3	29.6	53.2	167.6	50.7	26.8	15.1
Daily ELV	50	50	50	50	50	50	50	50	50	50	50	50
Daily Mean	3.7	3.9	4.1	3.8	3.0	3.1	2.4	2.4	3.4	3.5	3.6	3.2
Daily Max	5.5	5.0	5.0	4.7	4.8	4.8	4.3	3.5	7.0	4.6	4.6	4.6

Line 3 – Ammonia



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 min ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hr Mean.	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4
Monthly 1/2 hr Max	0.9	0.6	1.0	5.4	0.6	0.8	0.6	0.6	1.7	2.9	1.1	2.1
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Daily Mean	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Daily Max	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

4.2 Summary of periodic monitoring results for emissions to air

The table below shows the results of periodically monitored substances.

Substance	Emission limit value	Results			
		12/02/18	06/04/18	20/07/18	04/10/18
Mercury and its compounds	0.05 mg/m^3	L1- 0.0009 mg/m^3 L2- 0.0005 mg/m^3 L3- 0.0003 mg/m^3	L1- 0.0004 mg/m^3 L2- 0.0004 mg/m^3 L3- 0.0004 mg/m^3	L1- 0.001 mg/m^3 L2- 0.0006 mg/m^3 L3- 0.0005 mg/m^3	L1- 0.001 mg/m^3 L2- 0.001 mg/m^3 L3- 0.0004 mg/m^3
Cadmium & thallium and their compounds (total)	0.05 mg/m^3	L1- 0.0006 mg/m^3 L2- 0.0005 mg/m^3 L3- 0.0005 mg/m^3	L1- 0.001 mg/m^3 L2- 0.001 mg/m^3 L3- 0.001 mg/m^3	L1- 0.001 mg/m^3 L2- 0.001 mg/m^3 L3- 0.0006 mg/m^3	L1- 0.0005 mg/m^3 L2- 0.001 mg/m^3 L3- 0.0004 mg/m^3
Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m^3	L1- 0.1706 mg/m^3 L2- 0.0275 mg/m^3 L3- 0.0946 mg/m^3	L1- 0.134 mg/m^3 L2- 0.038 mg/m^3 L3- 0.023 mg/m^3	L1- 0.04 mg/m^3 L2- 0.024 mg/m^3 L3- 0.047 mg/m^3	L1- 0.121 mg/m^3 L2- 0.125 mg/m^3 L3- 0.09 mg/m^3
Dioxins and furans (I-TEQ)	0.1 ng/m^3	L1- 0.0034 ng/m^3 L2- 0.0039 ng/m^3 L3- 0.0031 ng/m^3	L1- 0.0103 ng/m^3 L2- 0.0023 ng/m^3 L3- 0.0075 ng/m^3	L1- 0.0022 mg/m^3 L2- 0.0261 mg/m^3 L3- 0.0029 ng/m^3	L1- 0.0028 ng/m^3 L2- 0.0029 ng/m^3 L3- 0.0045 ng/m^3
Hydrogen Fluoride	4 mg/m^3	L1- 0.04 mg/m^3 L2- 0.03 mg/m^3 L3- 0.05 mg/m^3		L1- 0.07 mg/m^3 L2- 0.03 mg/m^3 L3- 0.03 mg/m^3	

5. Summary of Permit Compliance

5.1 Compliance with permit limits for continuously monitored pollutants

The plant met its emission limits as shown in the table below.

Substance	Percentage time compliant during operation	
	Half-hourly limit	Daily limit
Particulates	100 %	100 %
Oxides of nitrogen	100 %	100 %
Sulphur dioxide	100 %	100 %
Carbon monoxide	99.97 %	100 %
Total organic carbon	100 %	100 %
Hydrogen chloride	100 %	100 %

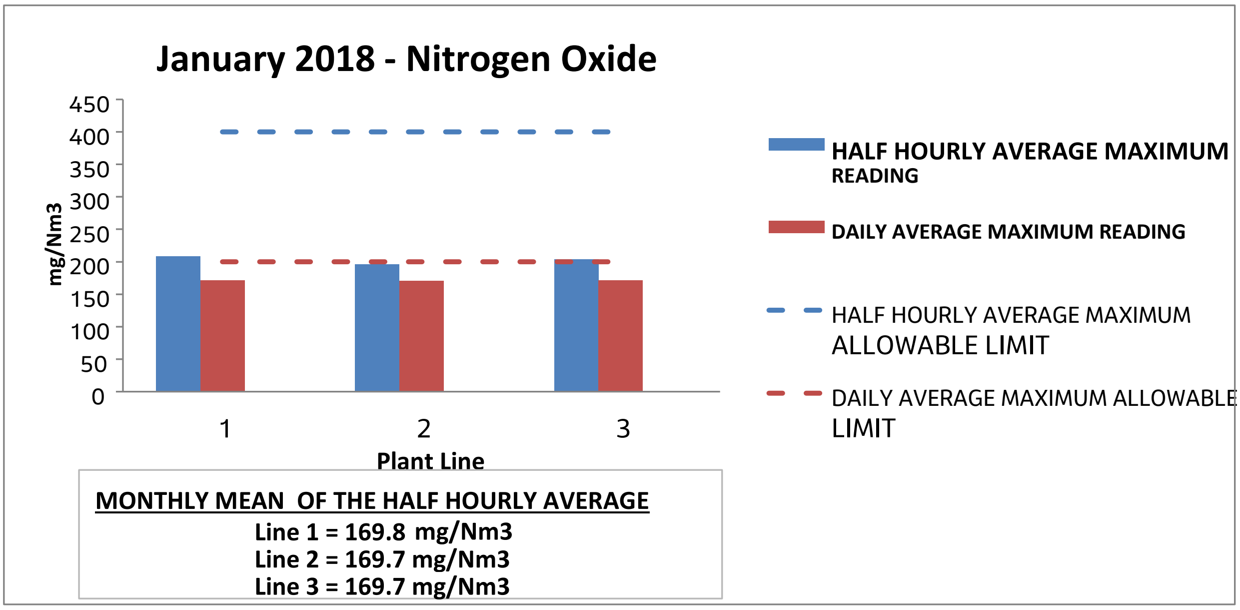
5.2 Summary of any notifications or non-compliances under the permit

Date	Summary of notification or non-compliance	Reason	Measures taken to prevent reoccurrence
06/06/18	notification for half-hourly CO ELV exceedance	Volatile waste on the boiler grate surface resulting in an over-pressurisation of the boiler.	Monitoring of incoming waste deliveries to eradicate volatile materials eg. gas bottles.
10/09/18	notification for half-hourly CO ELV exceedance	Volatile waste on the boiler grate surface resulting in an over-pressurisation of the boiler.	Monitoring of incoming waste deliveries to eradicate volatile materials eg. gas bottles.
16/09/18	notification for half-hourly CO ELV exceedance	Volatile waste on the boiler grate surface resulting in an over-pressurisation of the boiler.	Monitoring of incoming waste deliveries to eradicate volatile materials eg. gas bottles.
26/09/18	notification for half-hourly CO ELV exceedance	Volatile waste on the boiler grate surface resulting in an over-pressurisation of the boiler.	Monitoring of incoming waste deliveries to eradicate volatile materials eg. gas bottles.
02/10/18	notification for half-hourly CO ELV exceedance	Volatile waste on the boiler grate surface resulting in an over-pressurisation of the boiler.	Monitoring of incoming waste deliveries to eradicate volatile materials eg. gas bottles.
22/11/18	notification for half-hourly CO ELV exceedance	Volatile waste on the boiler grate surface resulting in an over-pressurisation of the boiler.	Monitoring of incoming waste deliveries to eradicate volatile materials eg. gas bottles.

2. Publicly reported continuously monitored emissions reports

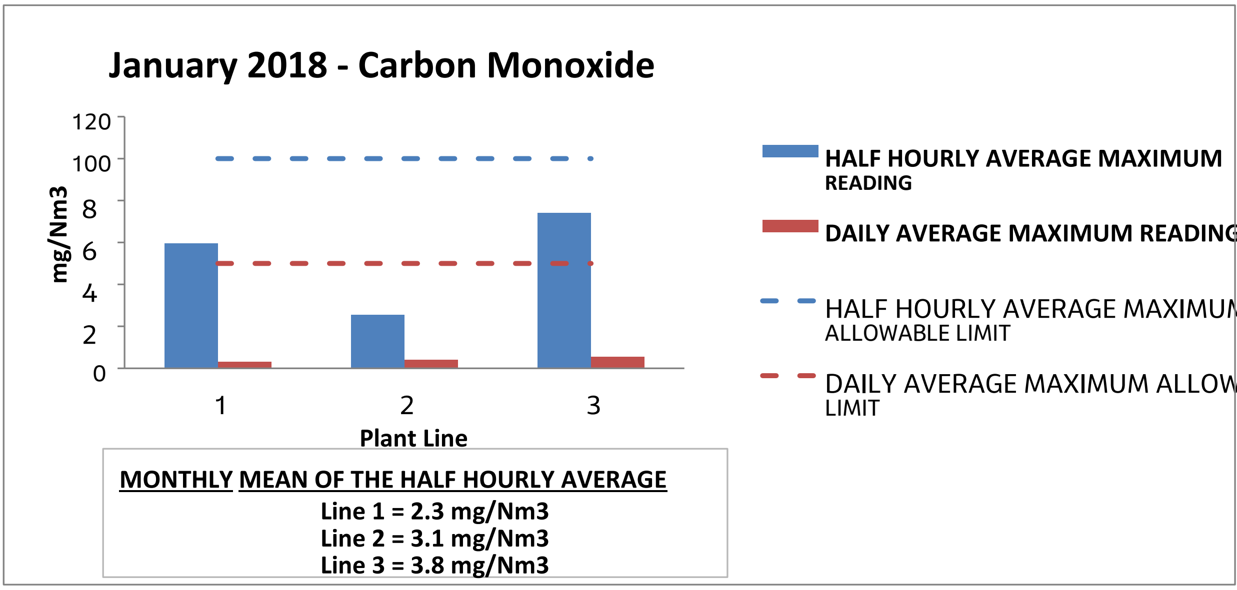
Riverside Resource Recovery emission report – January 2018

The following charts summarise the emission data for the Riverside Resource Recovery facility. The charts show the **MAXIMUM** readings taken during the month.



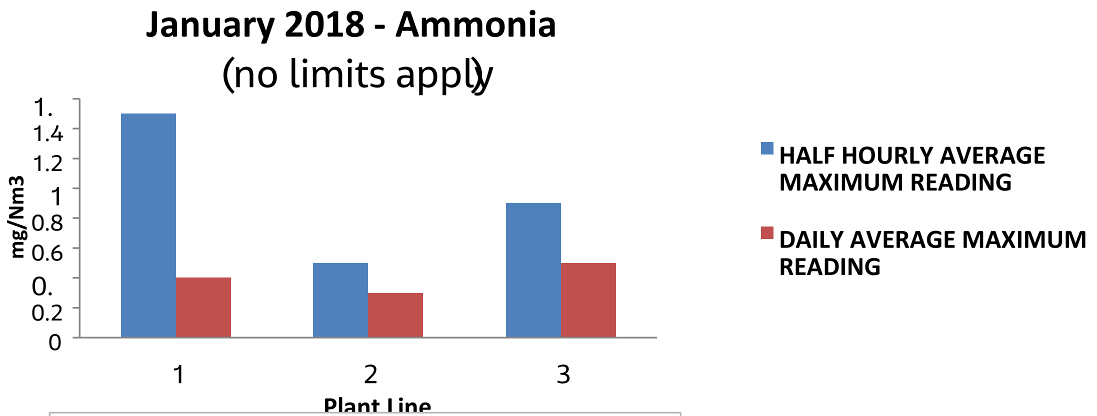
Why do we control and monitor Oxides of Nitrogen (NOx)?

NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO). These can be formed naturally, but are also formed from man-made processes like fuel combustion or biomass burning. There are a number of health and environmental issues attributed to NOx, including smog, acid rain, and possibly global warming.



Why do we control and monitor Carbon Monoxide?

Carbon monoxide is both a common naturally occurring chemical and is manufactured by man. It is a colourless, odourless poisonous gas. Carbon monoxide is one of the eight substances for which the government has established an air quality standard as part of its national Air Quality Strategy.



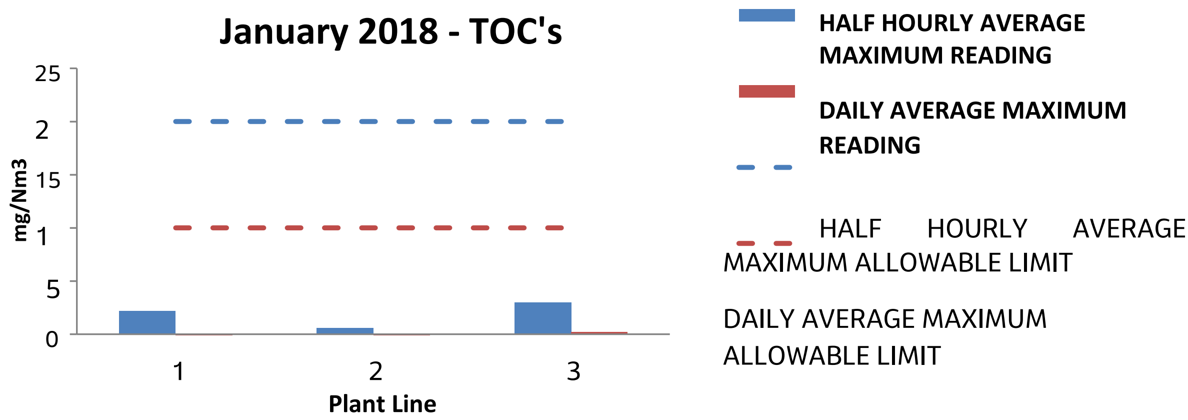
MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.3 mg/Nm3
Line 2 = 0.2 mg/Nm3
Line 3 = 0.4 mg/Nm3

Why do we control and monitor Ammonia?

Although in wide-use in several industries, ammonia is both caustic and hazardous. It is a colourless gas with a characteristic pungent odour.

Ammonia, unlike the other species monitored, is not a product from the incineration of waste but is actually introduced into the furnace. Under the right conditions, ammonia is able to reduce oxides of nitrogen found in the flue gas by the chemical process Selective Non-Catalytic Reduction (SNCR) to nitrogen and water vapour which are both non-hazardous.



MONTHLY MEAN OF THE HALF HOURLY AVERAGE

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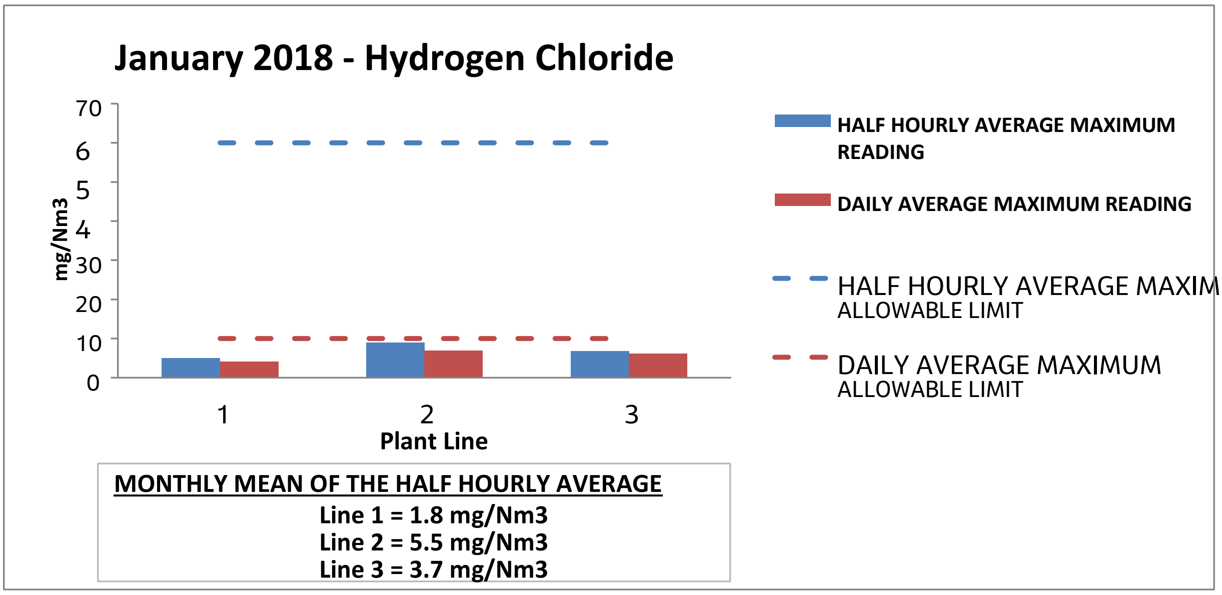

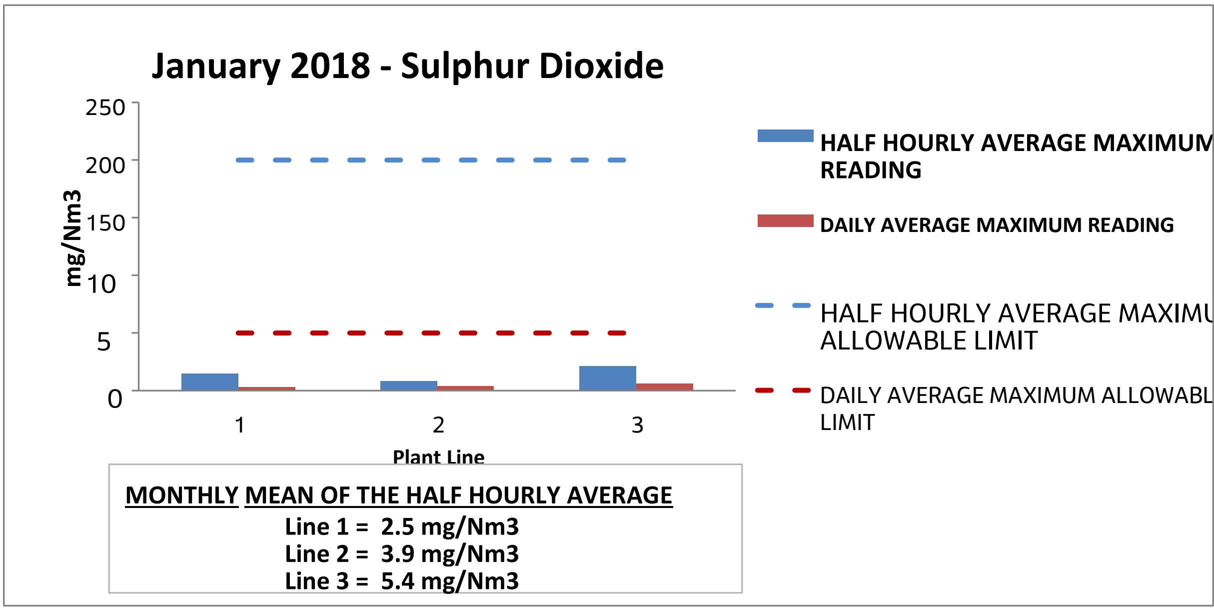

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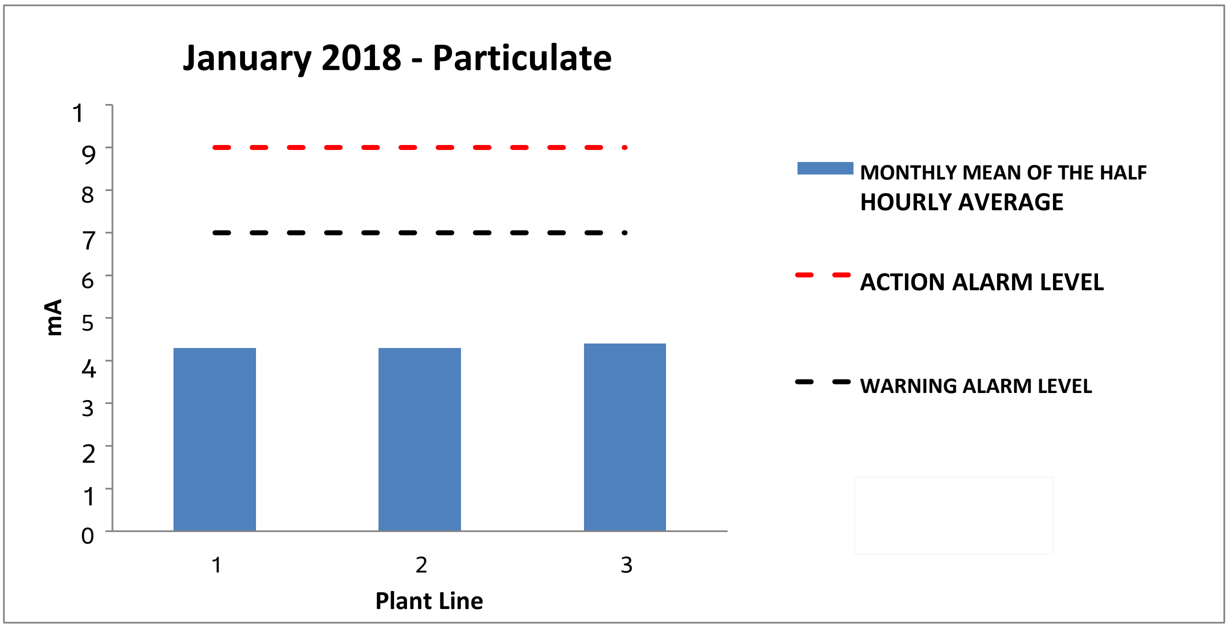

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Riverside Resource Recovery emission report – February 2018

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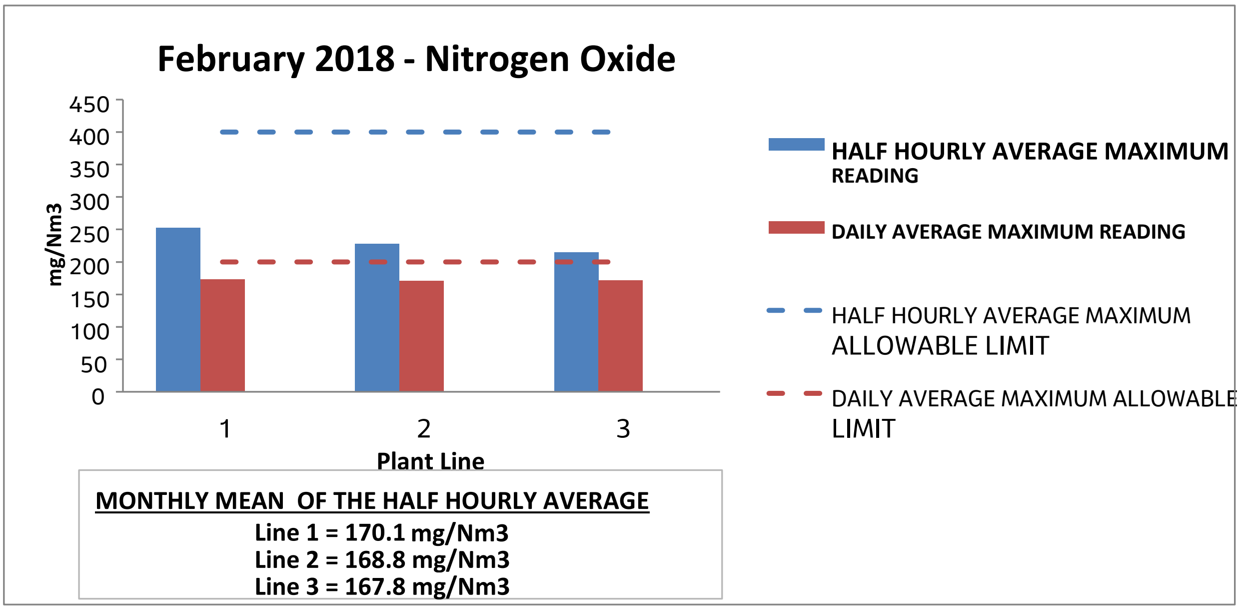

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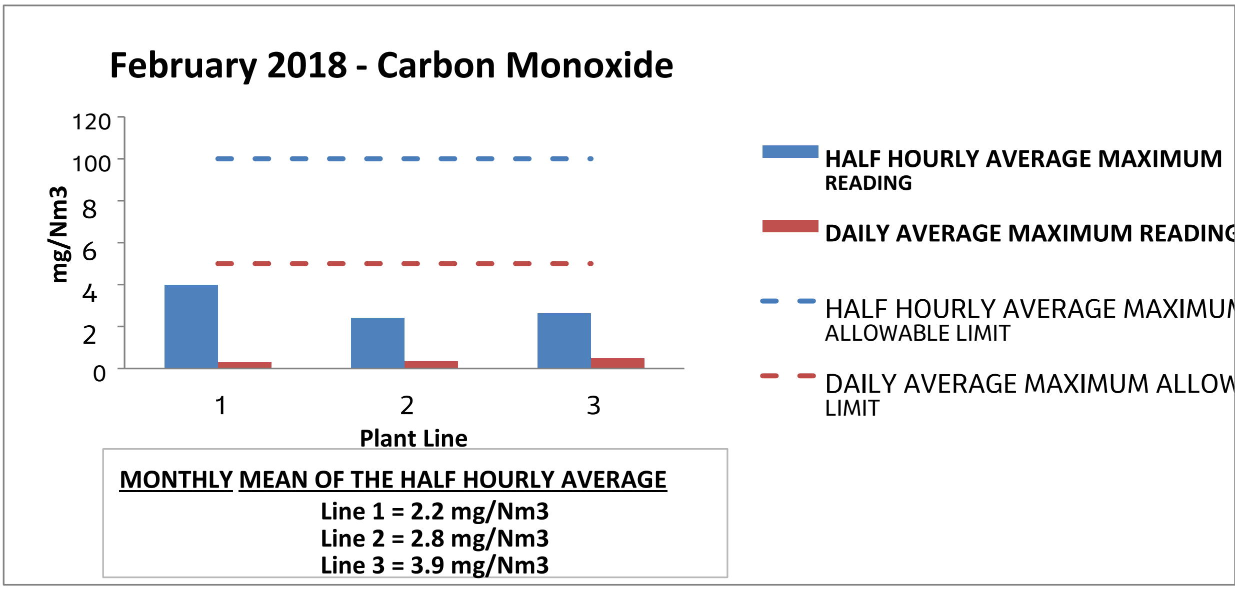

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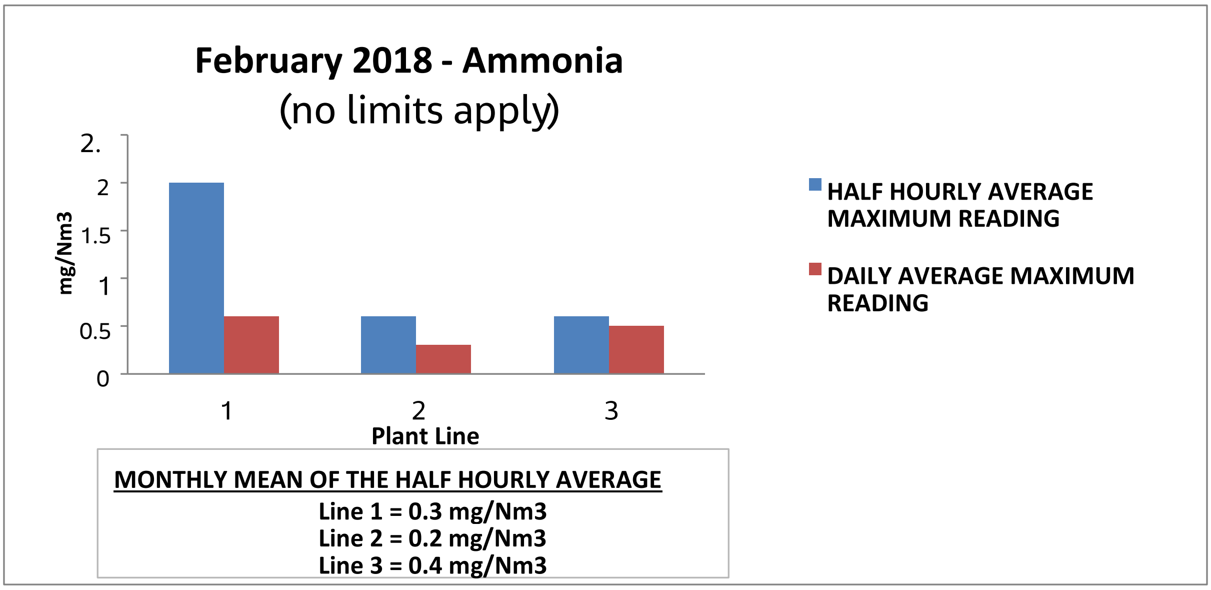

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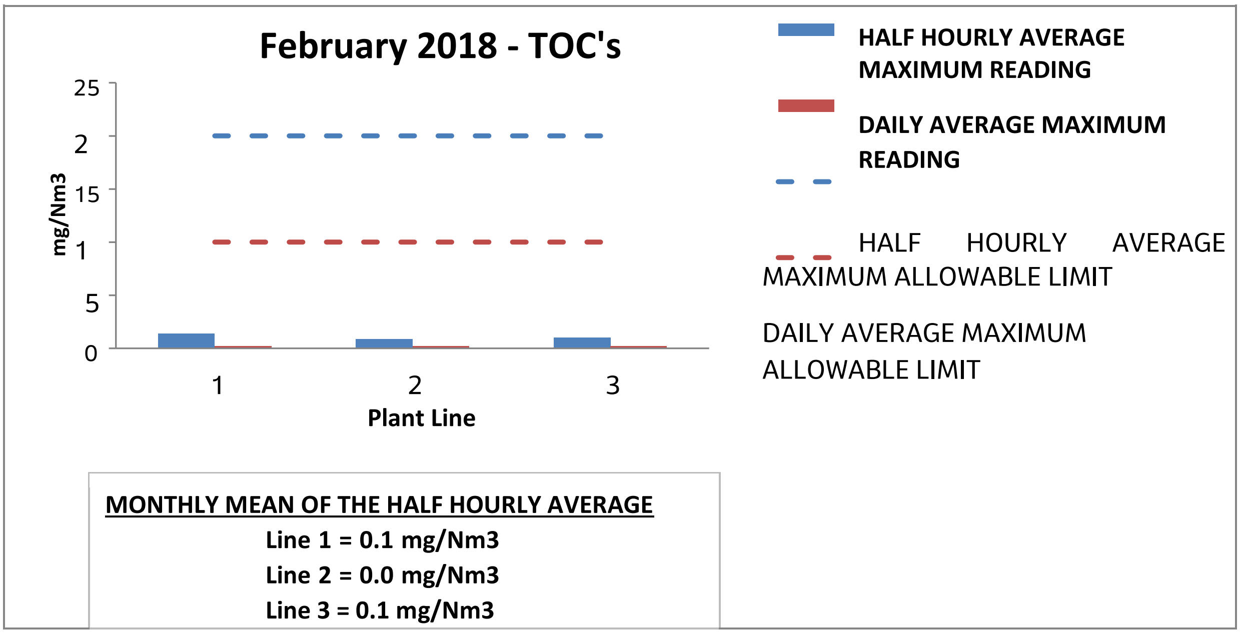

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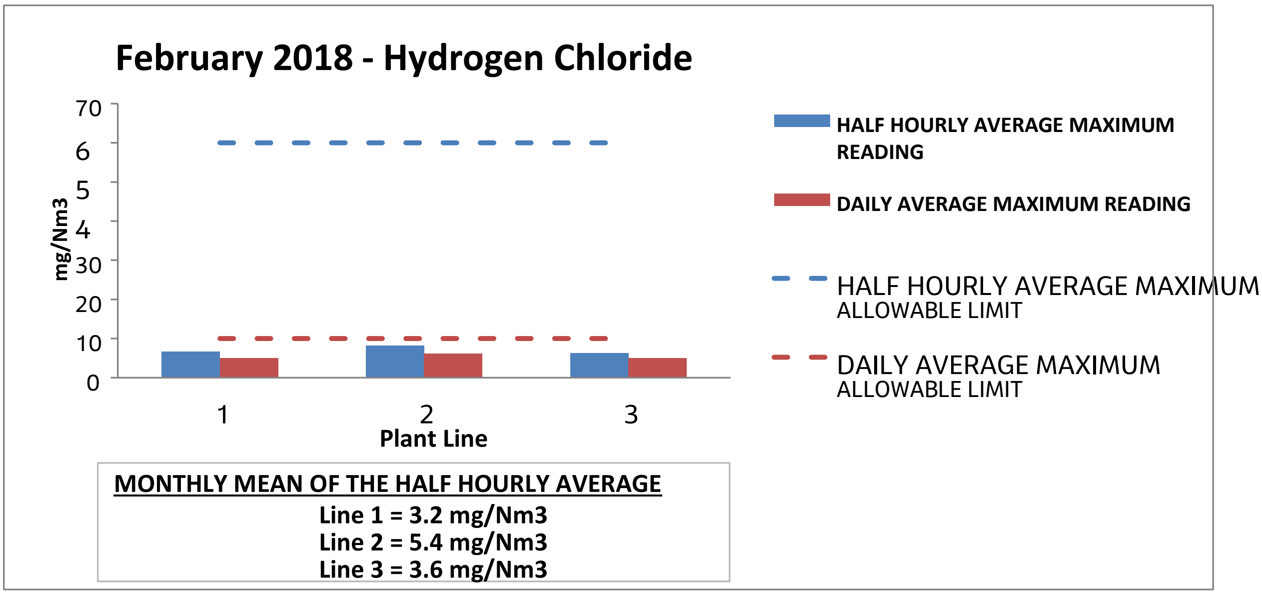

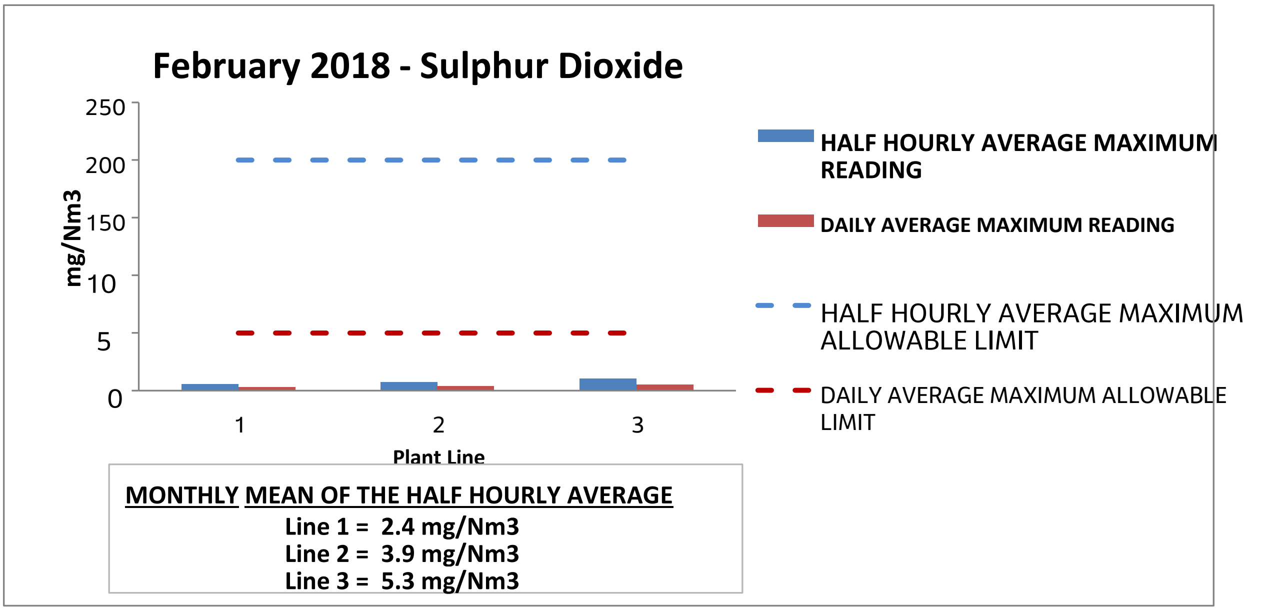

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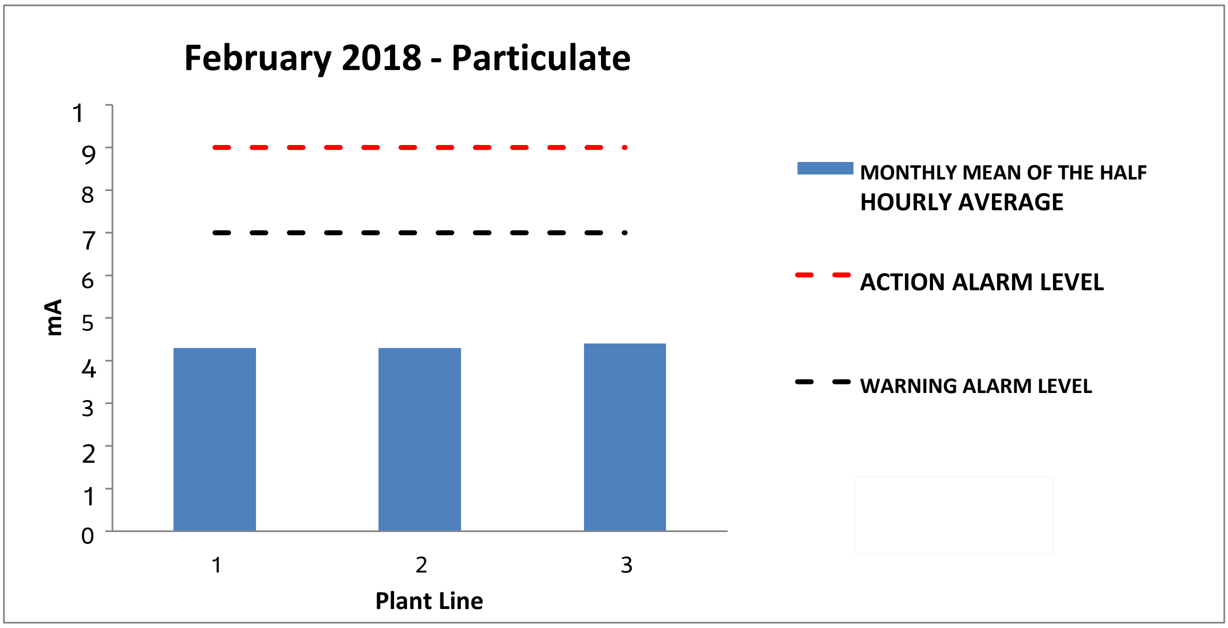

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Riverside Resource Recovery emission report – March 2018

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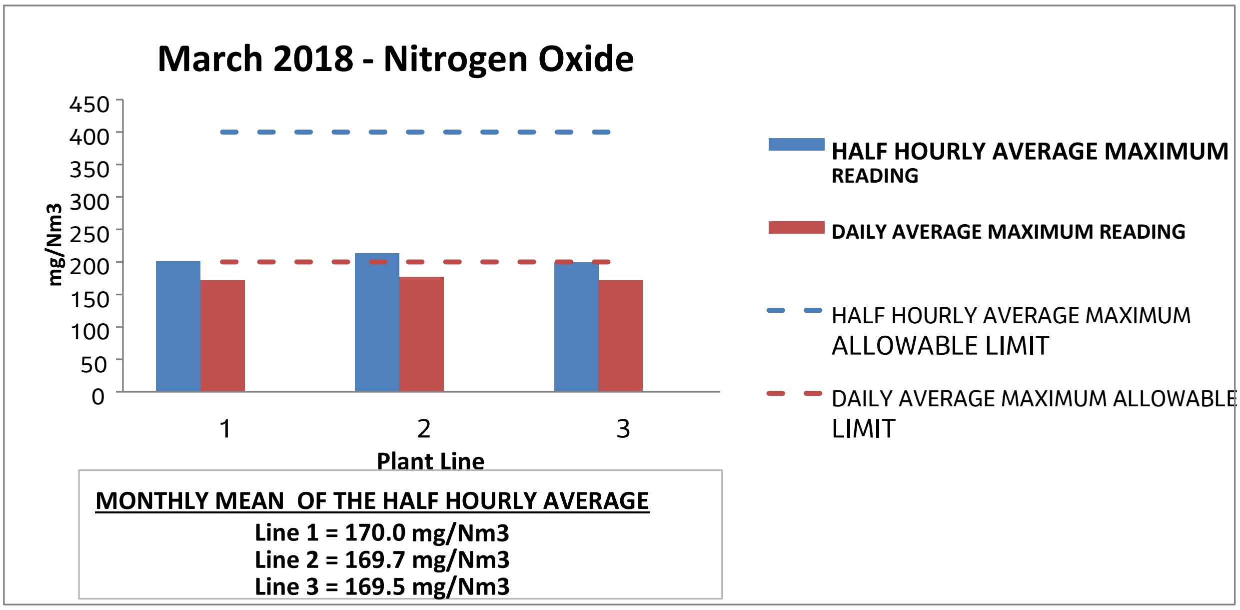

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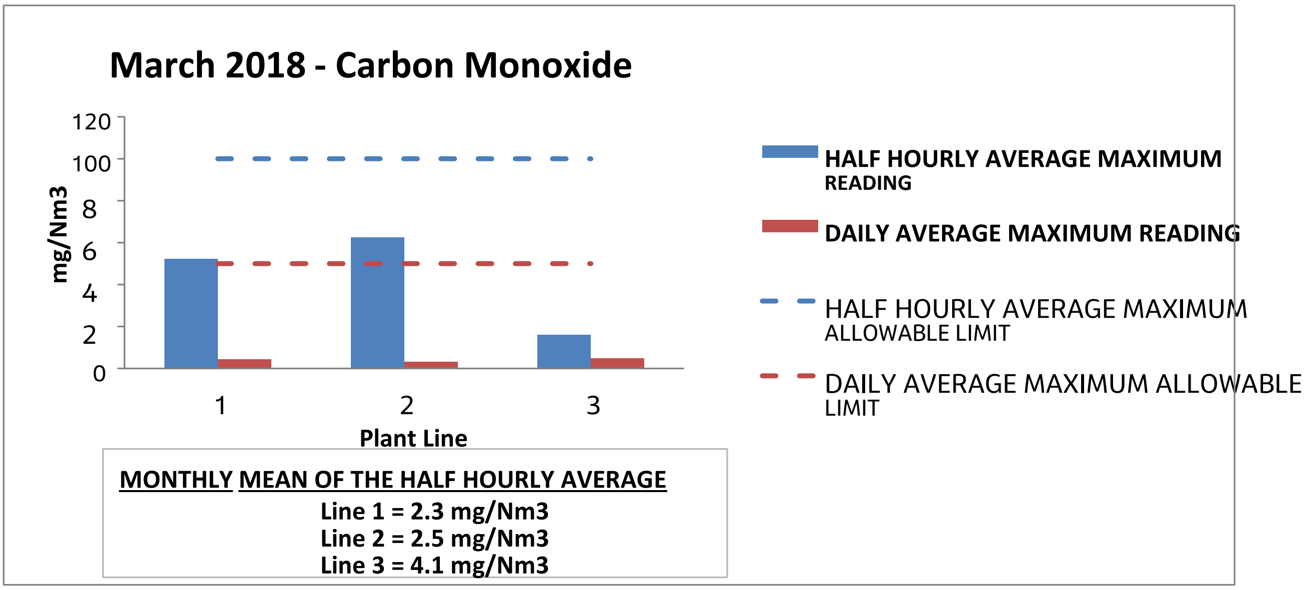

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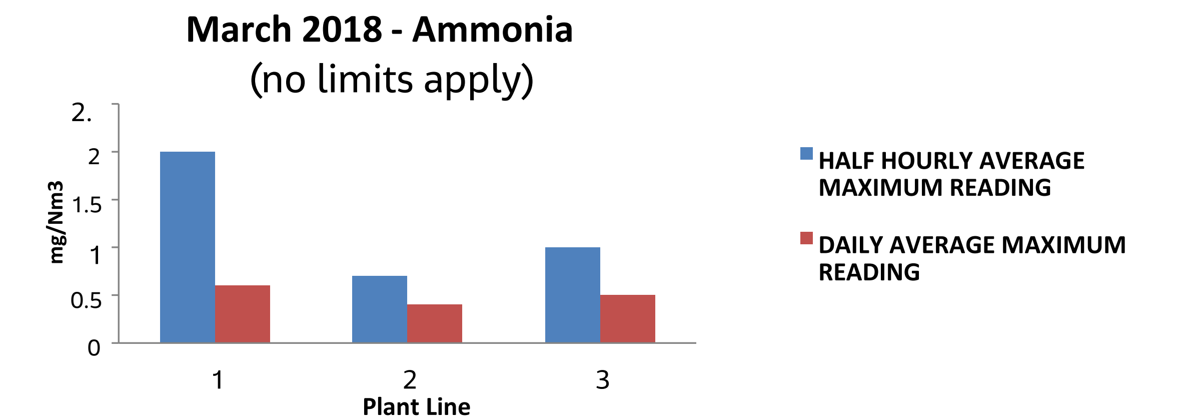

<u>**MONTHLY MEAN OF THE HALF HOURLY AVERAGE**</u>

Line 1 = 0.3 mg/Nm3
Line 2 = 0.2 mg/Nm3
Line 3 = 0.4 mg/Nm3

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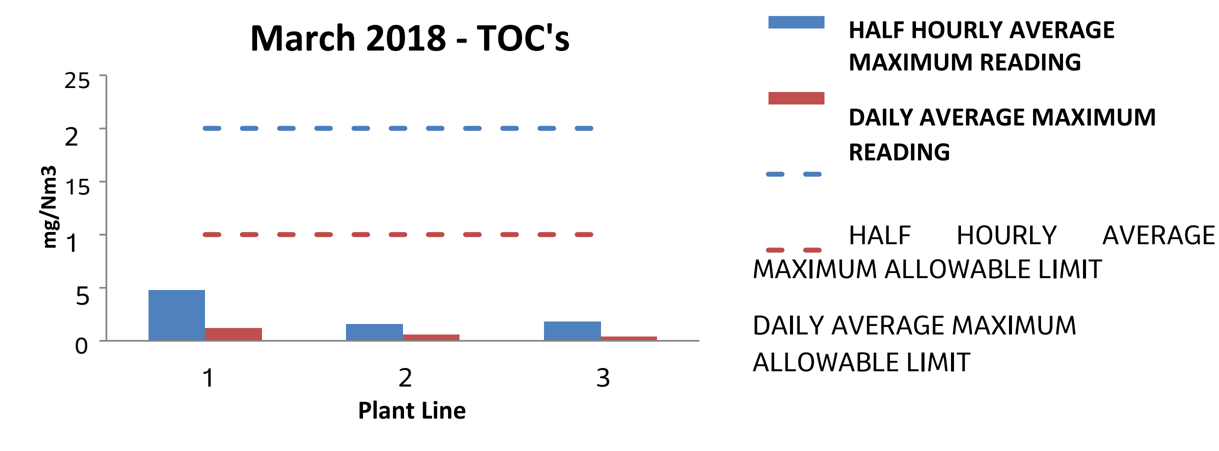

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Line 1 = 0.1 mg/Nm3
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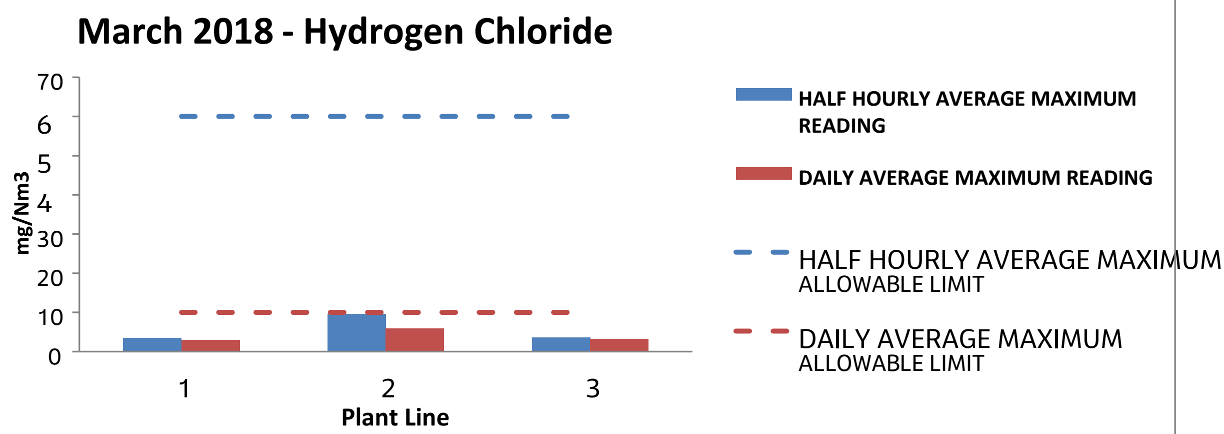

MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 1.6 mg/Nm3
Line 2 = 3.2 mg/Nm3
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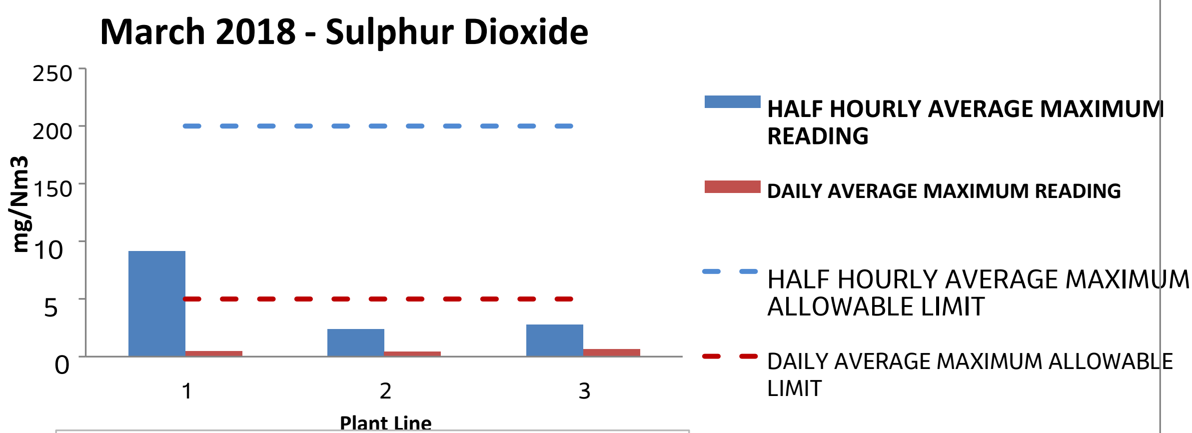

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Line 1 = 2.7 mg/Nm3
Line 2 = 4.0 mg/Nm3
Line 3 = 5.6 mg/Nm3

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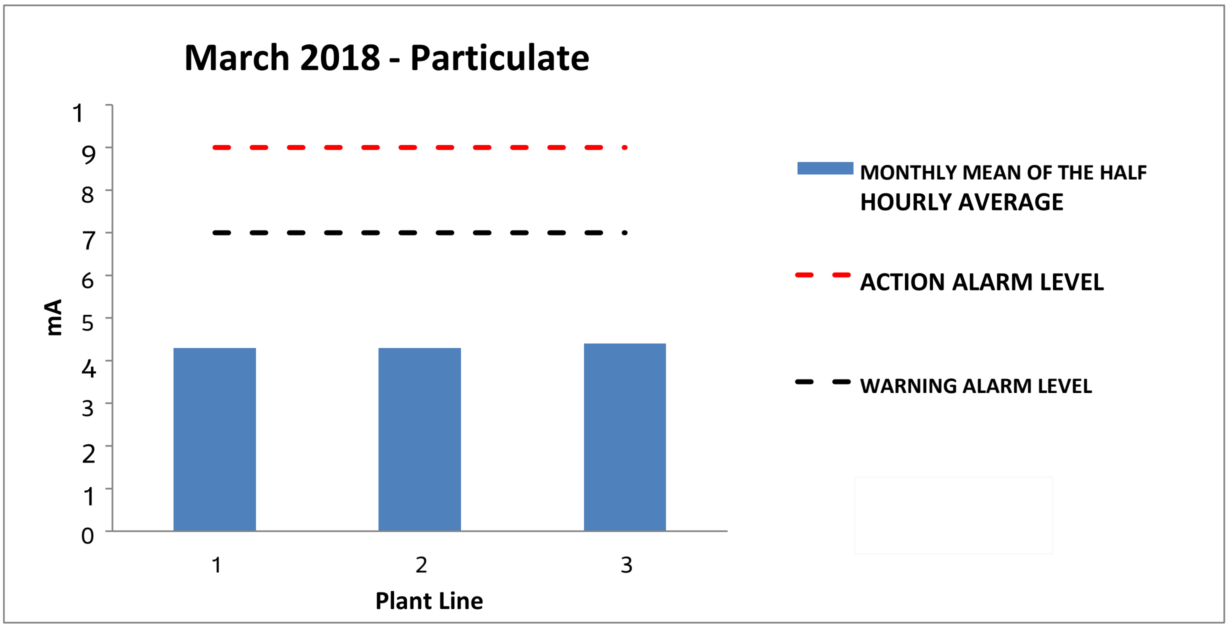
Both gases dissolve in water to form strong acids and thus can contribute to the formation of acid rain. Acid rain is environmentally damaging to crops, soils and waters.



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Riverside Resource Recovery emission report – April 2018

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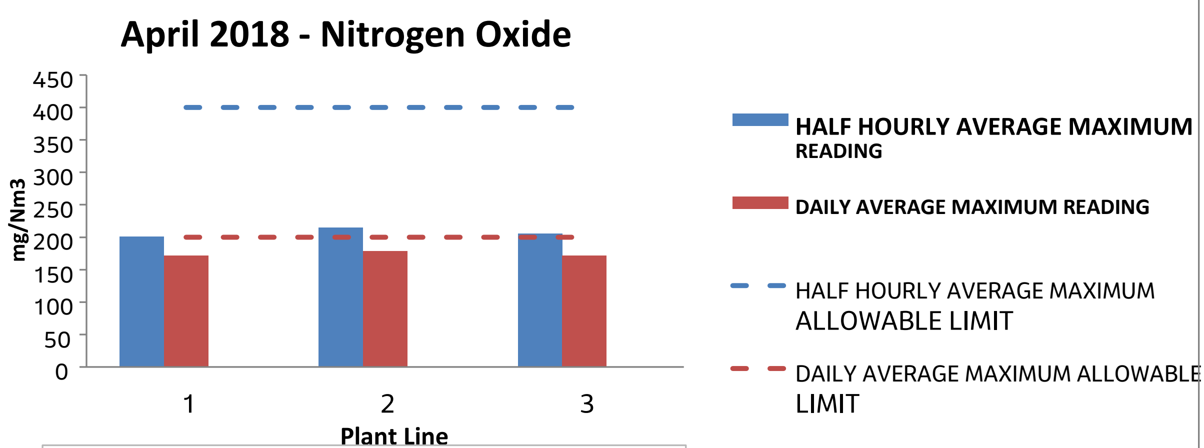

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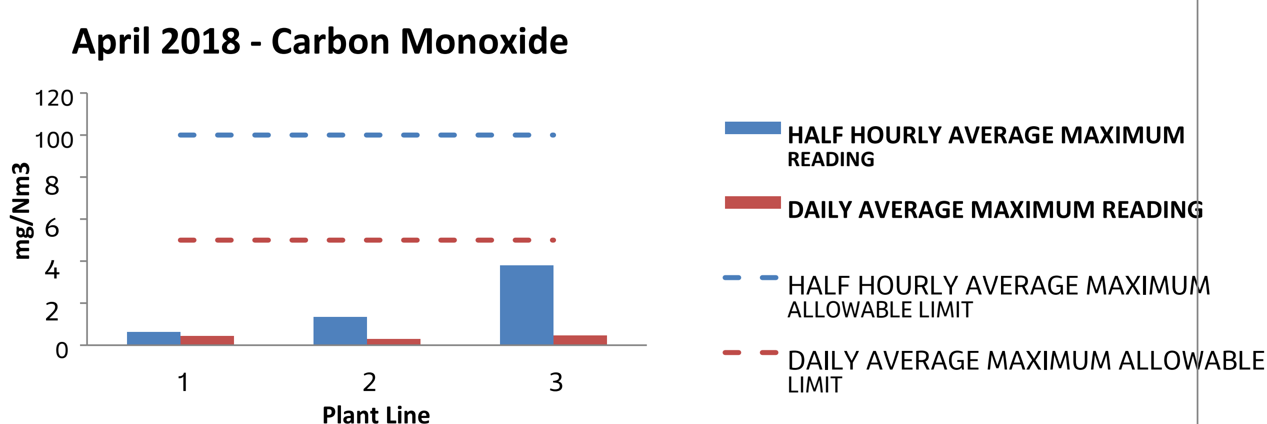

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Line 3 = 3.9 mg/Nm3

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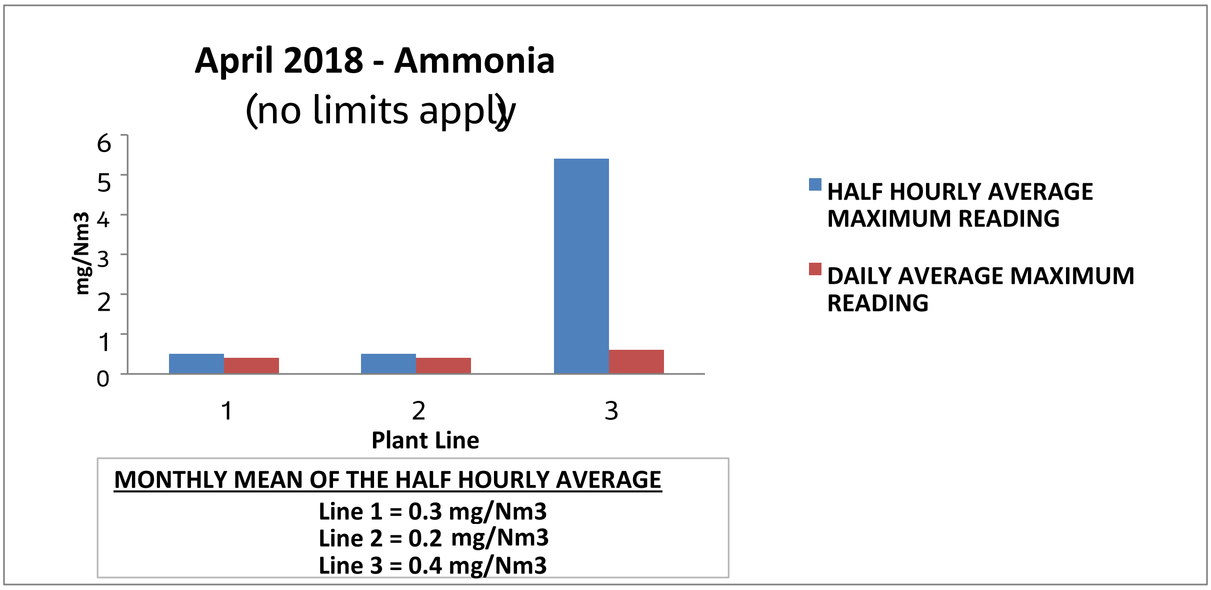

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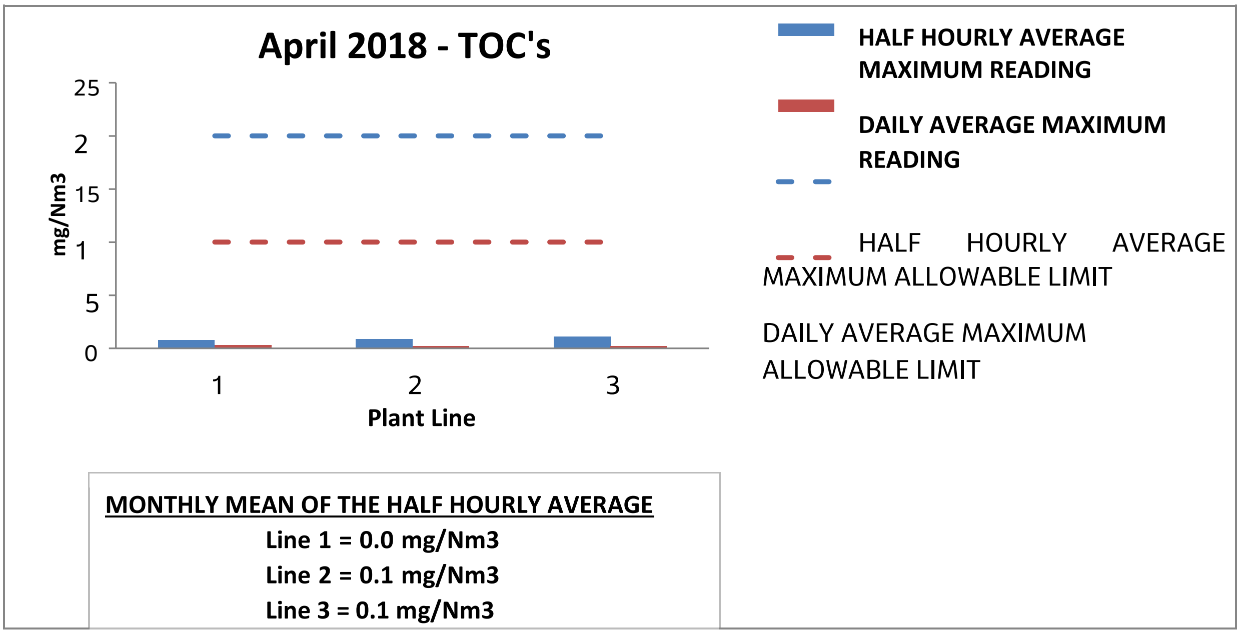

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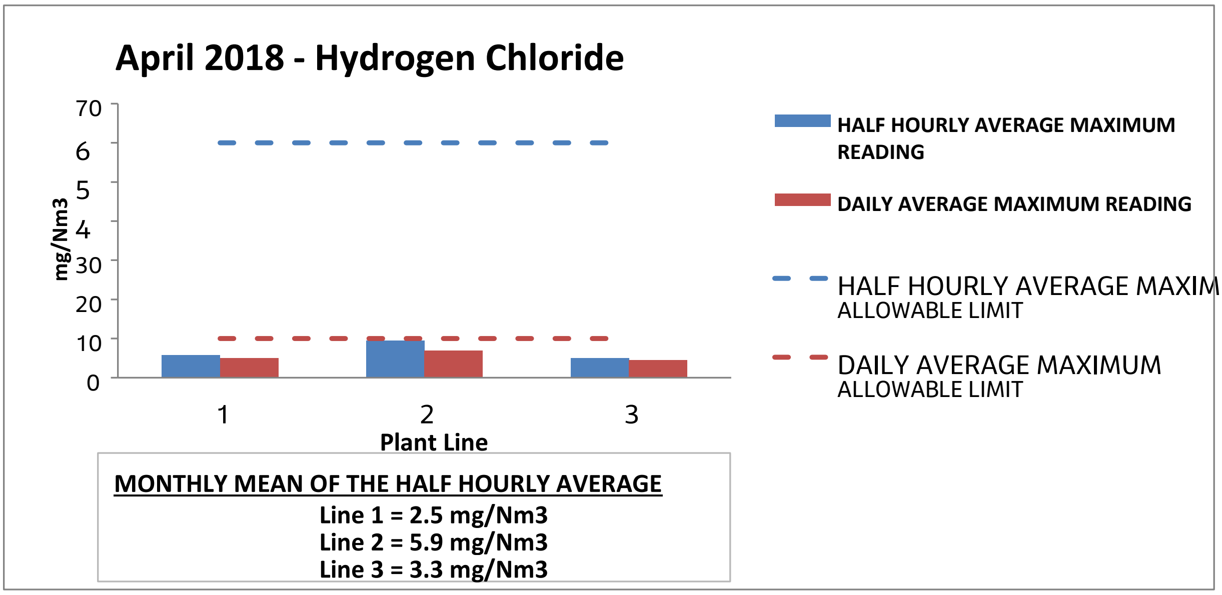

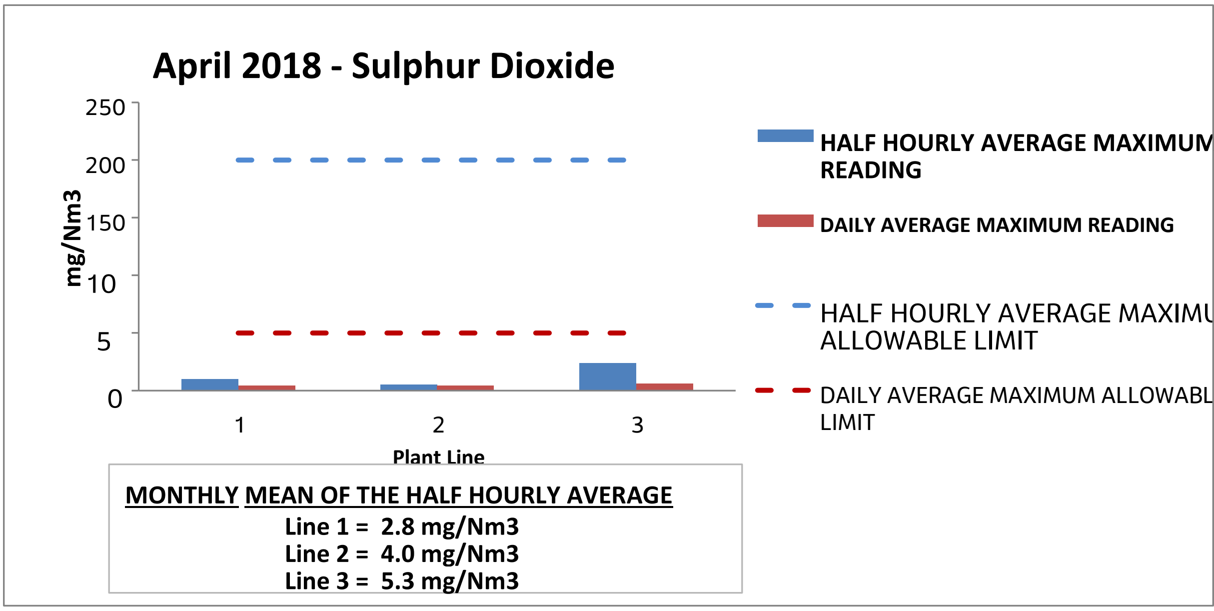

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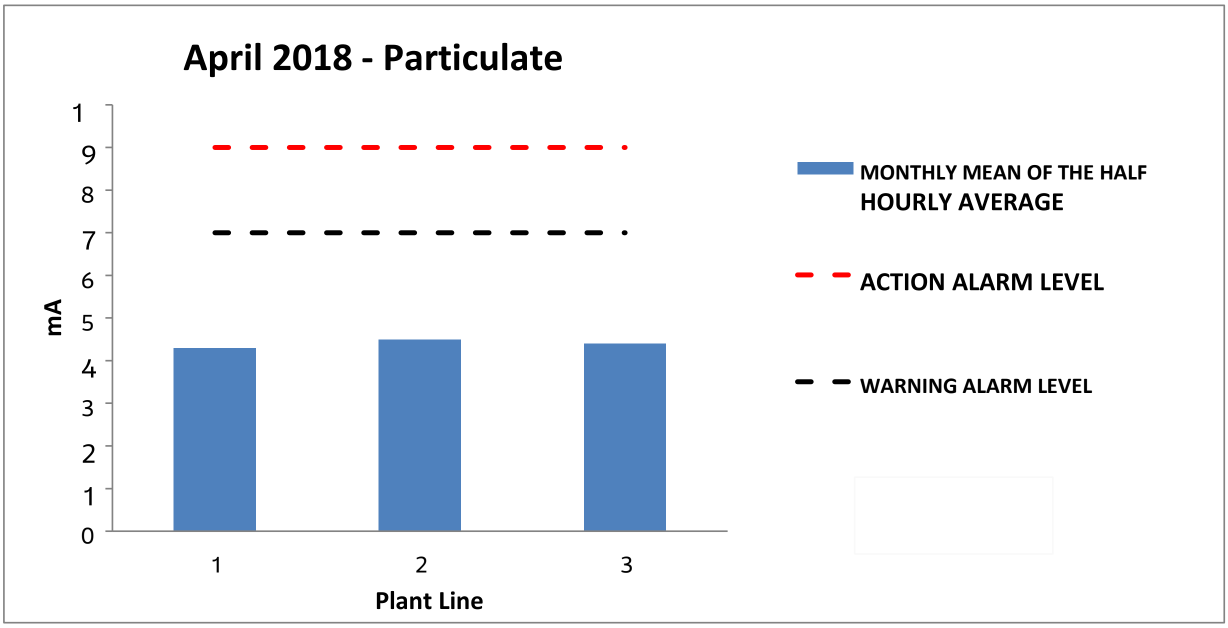

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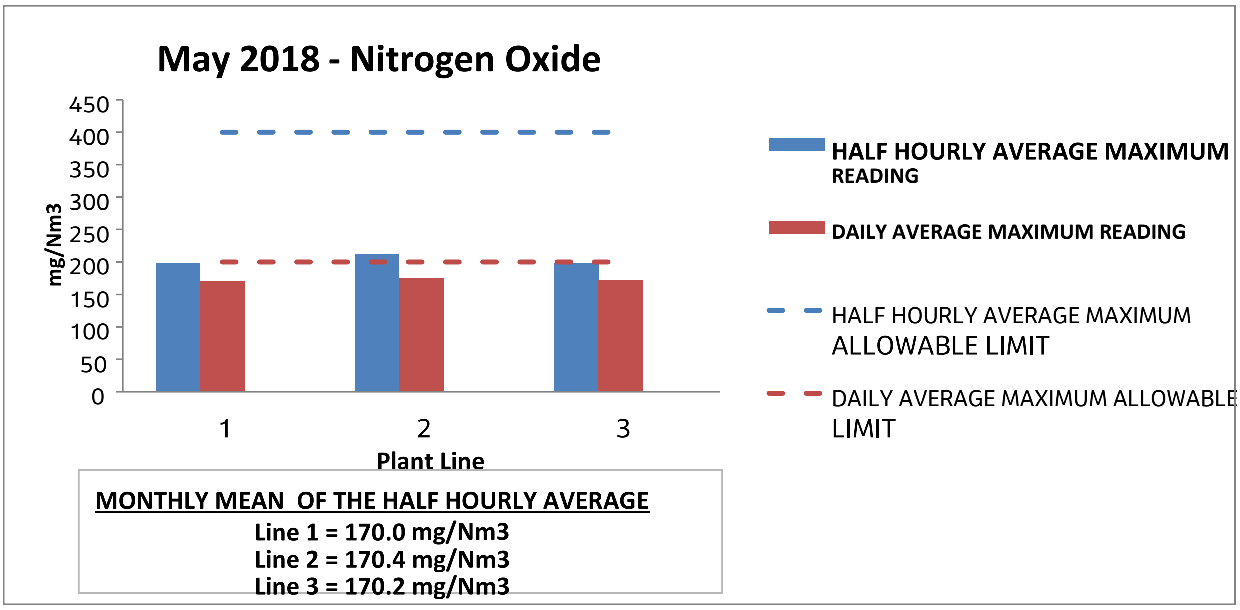

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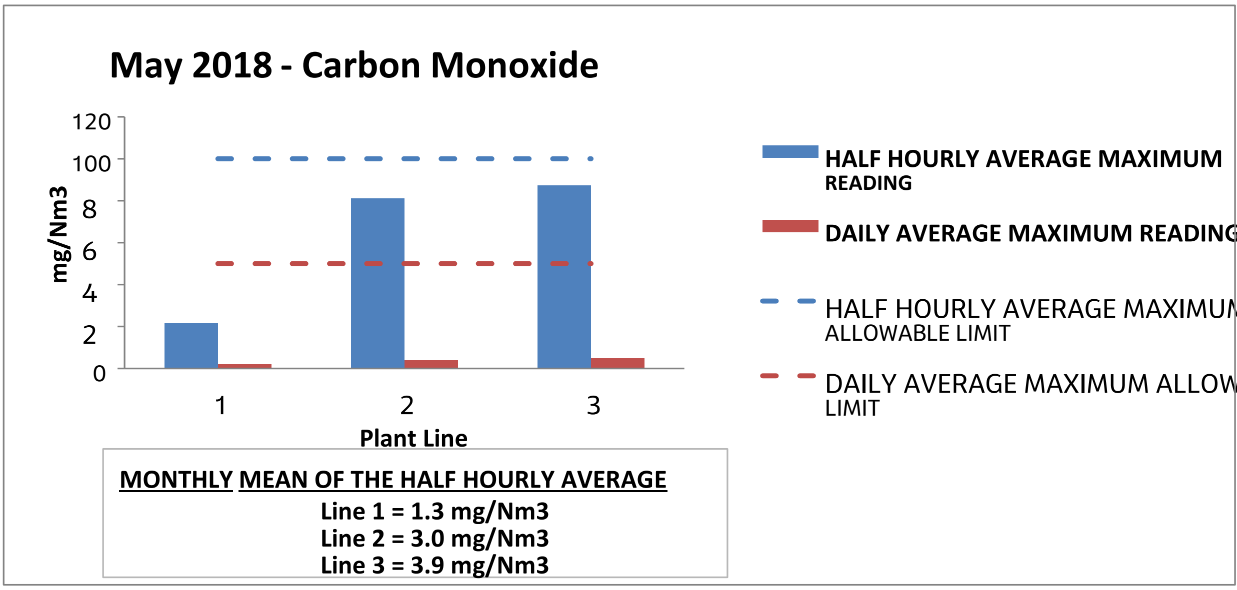

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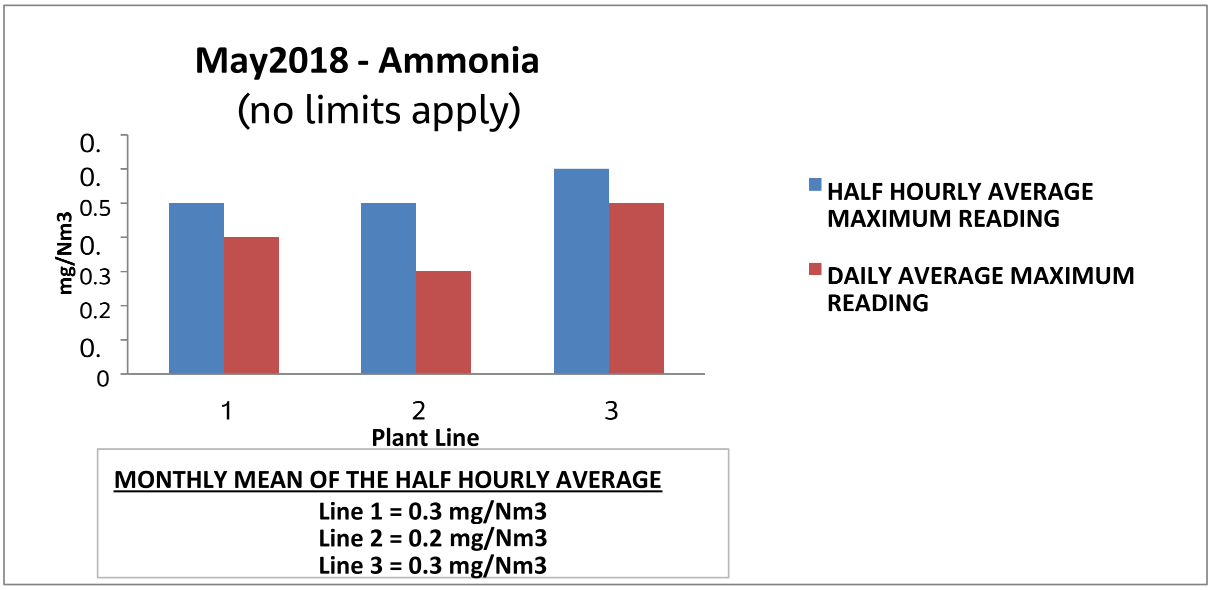

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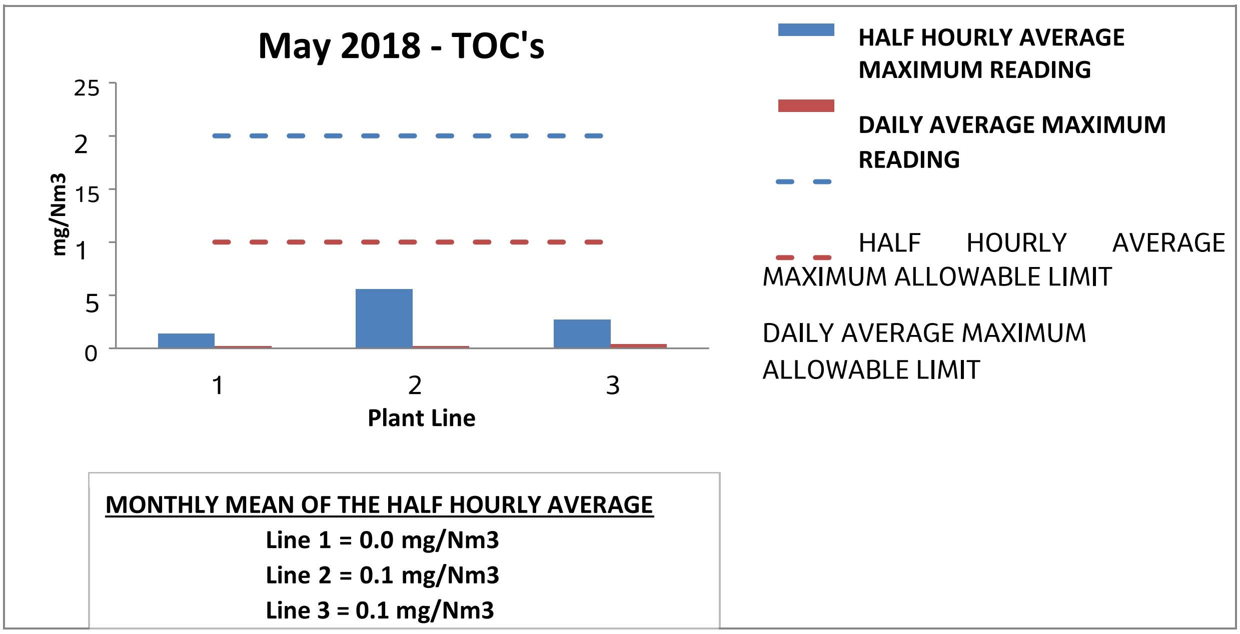

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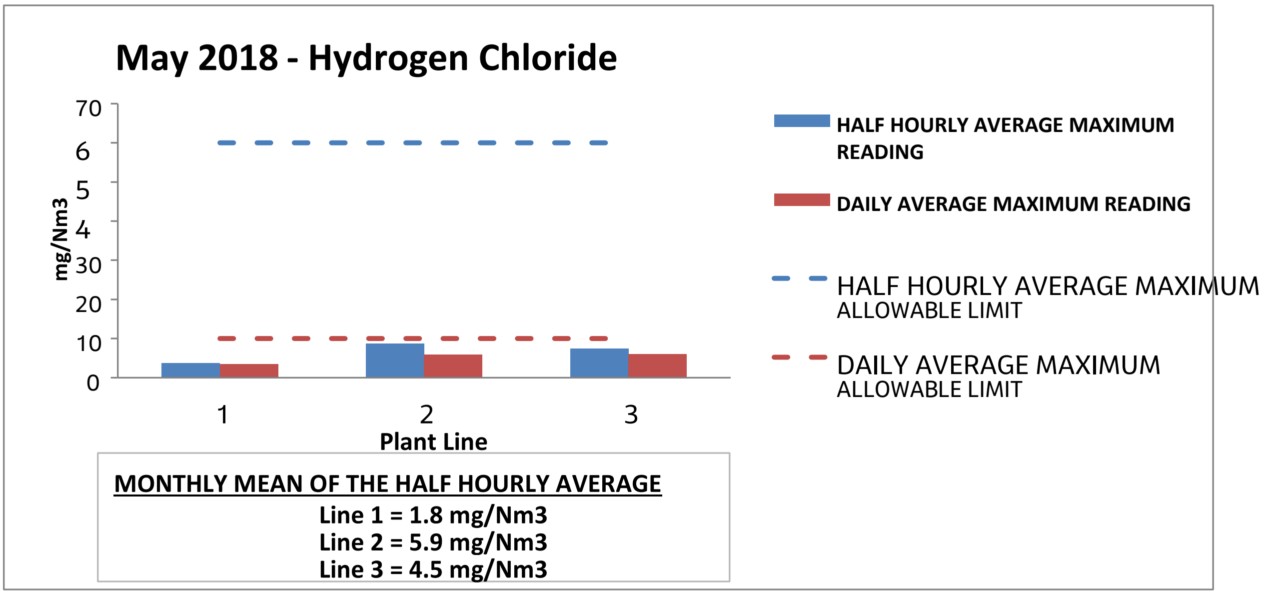

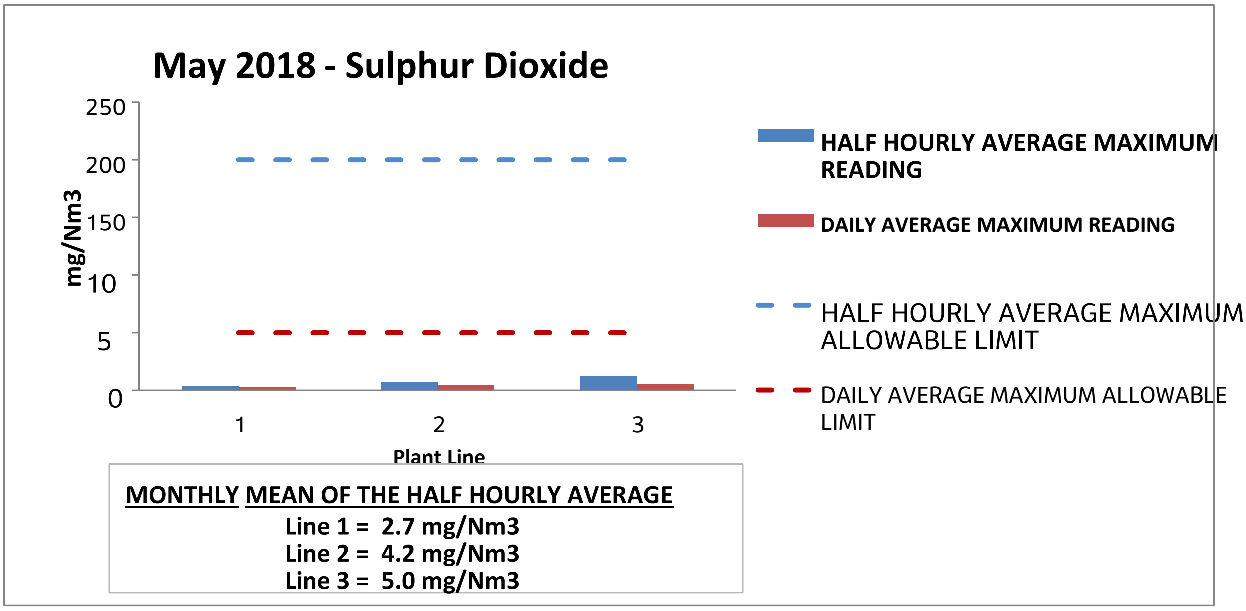

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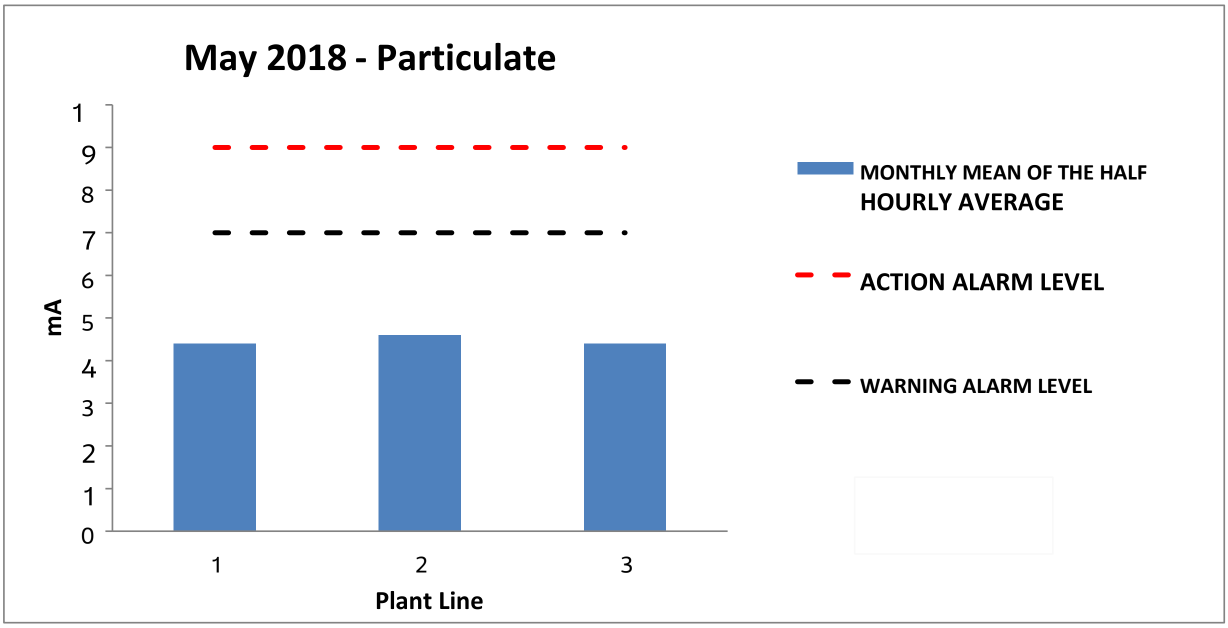

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Riverside Resource Recovery emission report – June 2018

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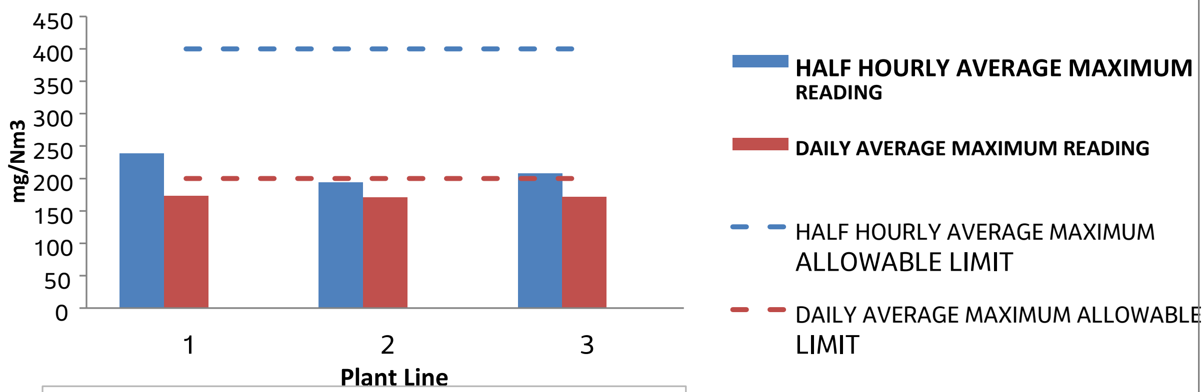
June 2018 - Nitrogen Oxide



MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 170.7 mg/Nm3
Line 2 = 169.7 mg/Nm3
Line 3 = 169.1 mg/Nm3

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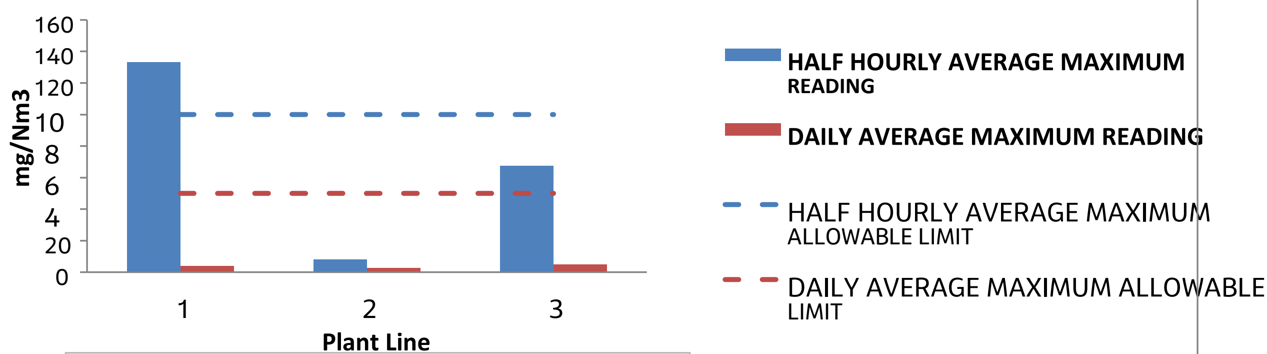
NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO). These can be formed naturally, but are also formed from man-made processes like fuel combustion or biomass burning. There are a number of health and environmental issues attributed to NOx, including smog, acid rain, and possibly global warming.

June 2018 - Carbon Monoxide



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Line 1 = 1.3 mg/Nm3
Line 2 = 2.5 mg/Nm3
Line 3 = 3.1 mg/Nm3

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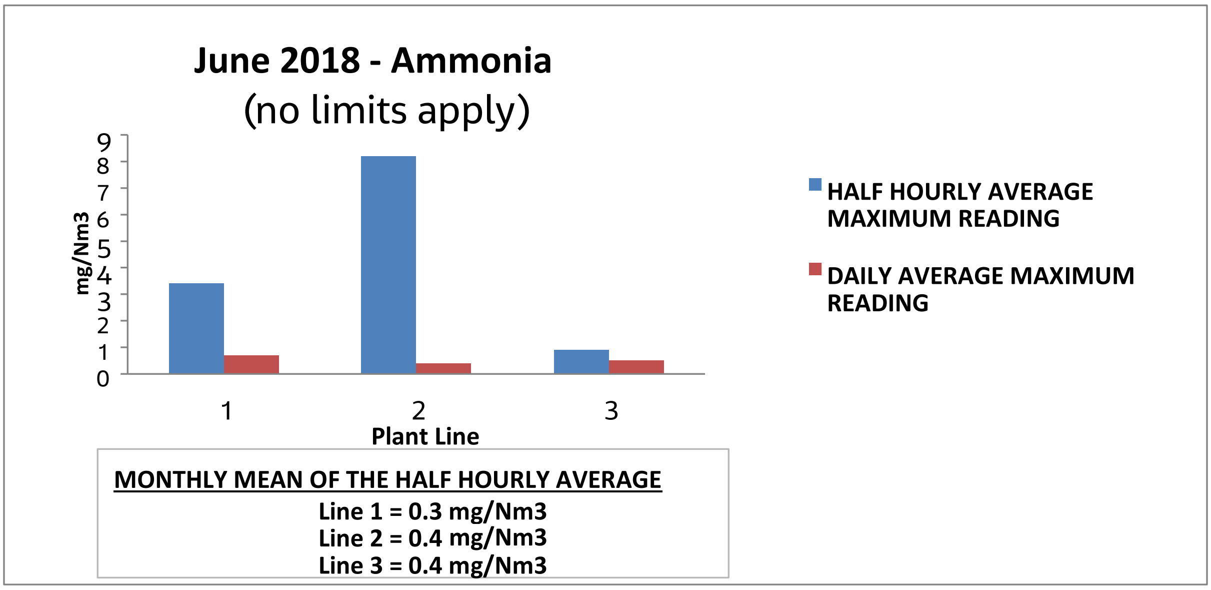

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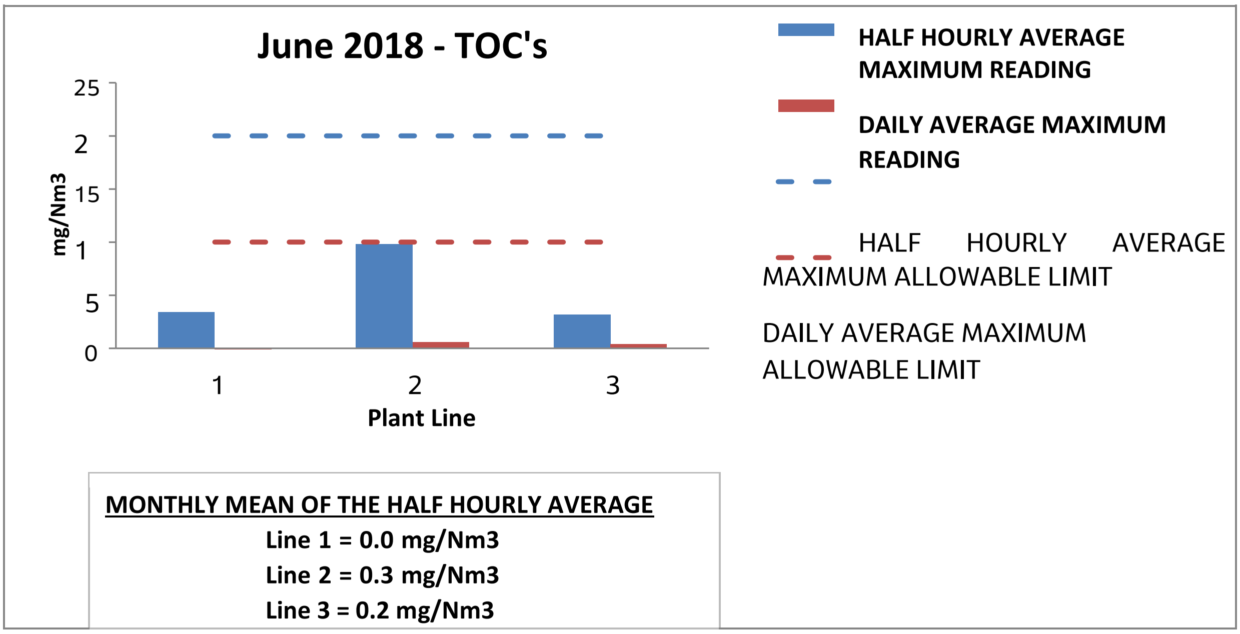
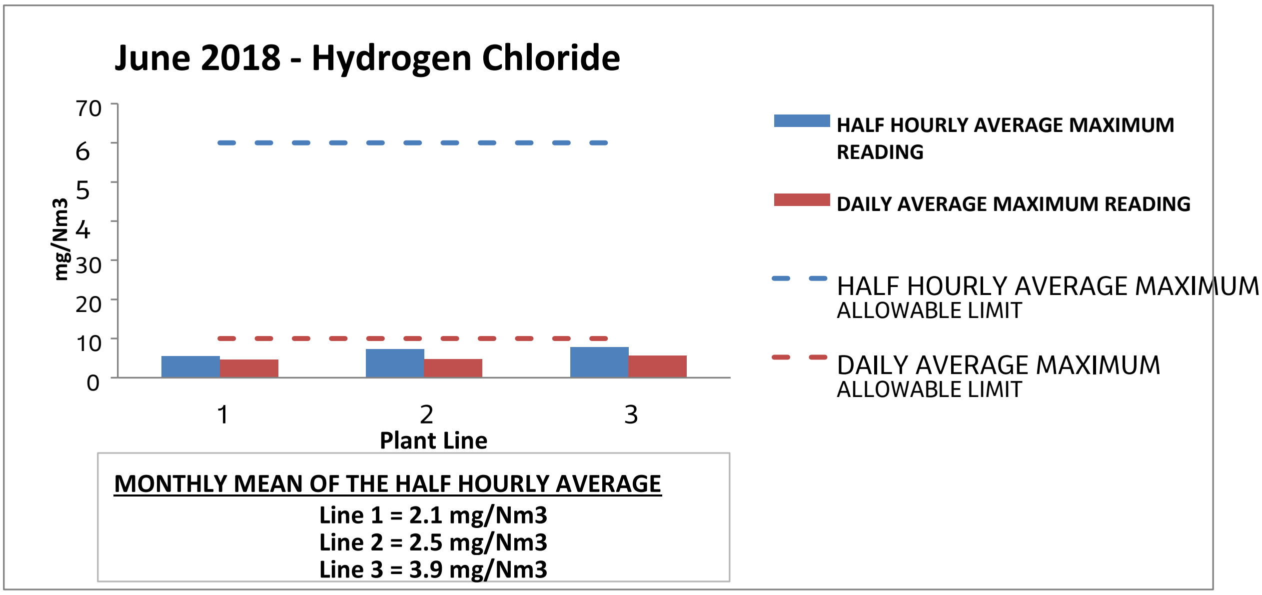
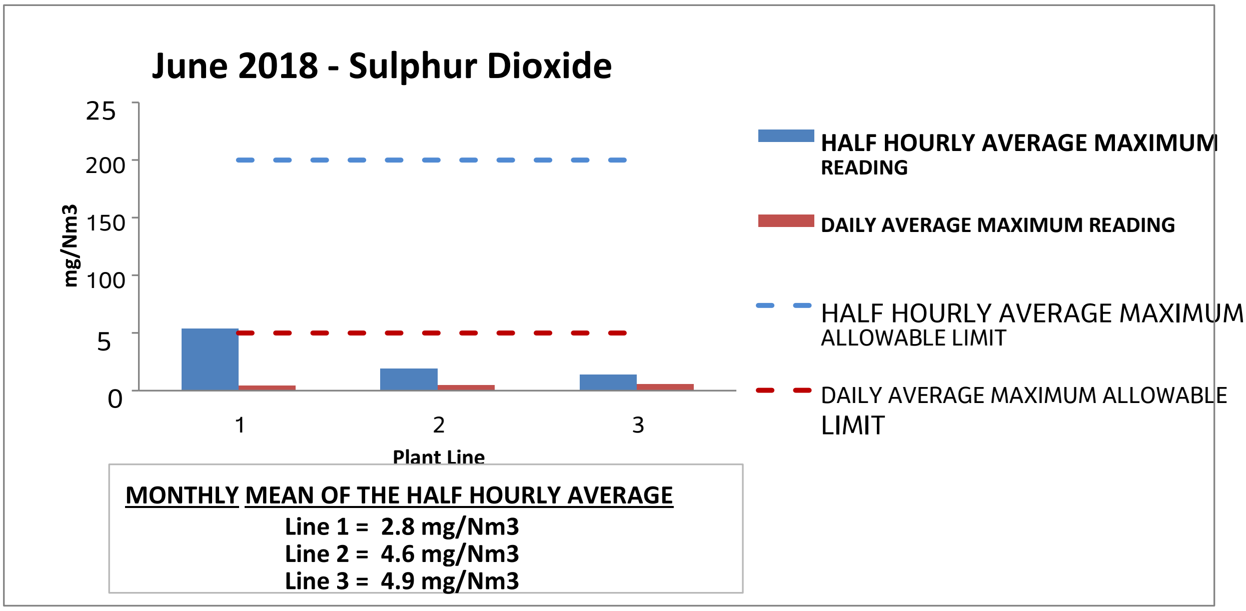
Ammonia, unlike the other species monitored, is not a product from the incineration of waste but is actually introduced into the furnace. Under the right conditions, ammonia is able to reduce oxides of nitrogen found in the flue gas by the chemical process Selective Non-Catalytic Reduction (SNCR) to nitrogen and water vapour which are both non-hazardous.



Why do we control and monitor Total Organic Carbon (TOC)?

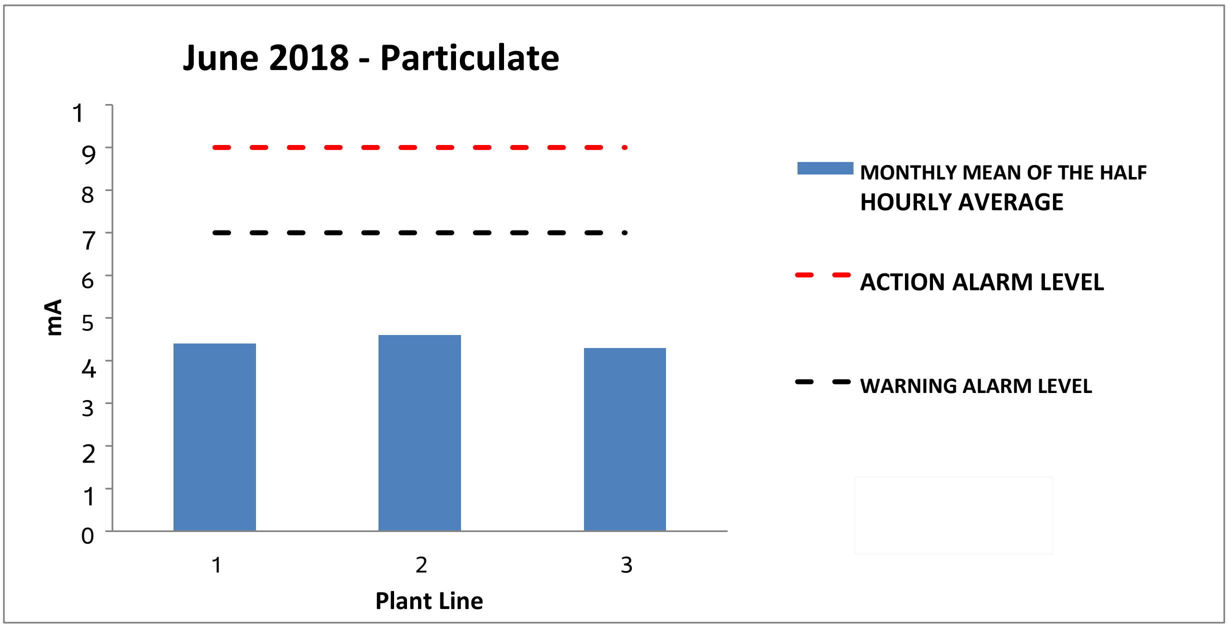
Total Organic Carbon (TOC) consists of a wide range of organic compounds including Volatile Organic Compounds (VOCs). VOCs are numerous, varied and found everywhere. VOCs are of general concern because of their ability to react with other pollutants (such as nitrogen oxides) in the lower atmosphere to form ozone. High concentrations of ozone at ground level can harm human health, damage crops and affect materials such as rubber. Some VOCs may be directly harmful to human health, contribute to global warming or destroy stratospheric ozone needed to shield the earth's surface from harmful ultra violet radiation.





Why do we control and monitor Sulphur Dioxide and Hydrogen Chloride?

Both gases dissolve in water to form strong acids and thus can contribute to the formation of acid rain. Acid rain is environmentally damaging to crops, soils and waters.



In July 2015, the EA agreed to allow RRRL to follow Monitoring Quick Guide 6 (RM-QG-06 Calibrating particulate-monitoring continuous emission monitoring systems (CEMs), especially for low concentrations of particulate matter).

In October 2015, the change necessary to monitor particulate qualitatively as opposed to quantitatively was implemented within the Envirosoft system. RRRL now report particulate data in mA (milliamps). The Half Hourly and Daily ELVs no longer apply, the ELVs have been replaced by two alarm levels that prompt the operator to start an investigation or take further action these are set at 7mA – Warning Alarm and 9mA – Action Alarm.

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Riverside Resource Recovery emission report – July 2018

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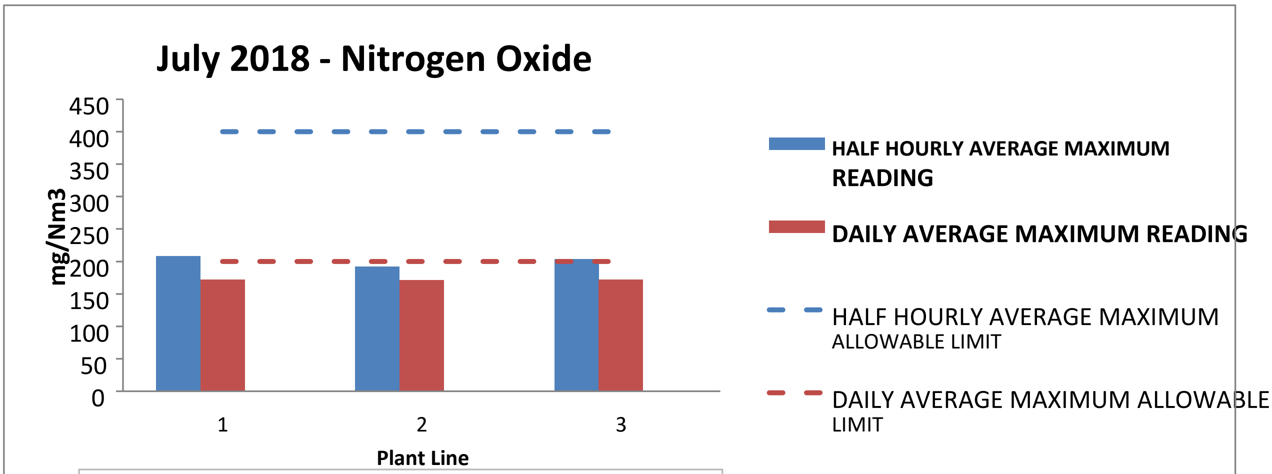

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 170.0 mg/Nm3
Line 2 = 169.7 mg/Nm3
Line 3 = 169.1 mg/Nm3

Why do we control and monitor Oxides of Nitrogen (NOx)?

NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO).

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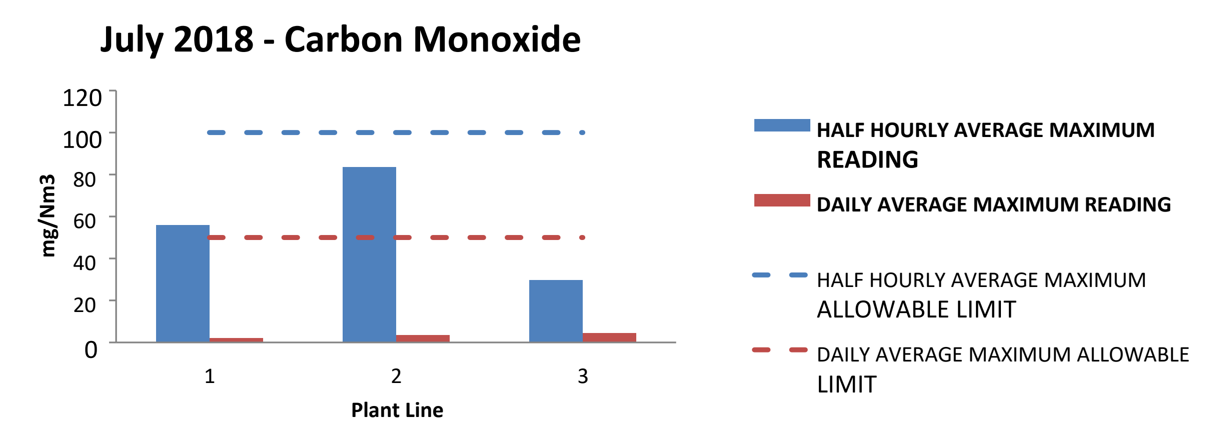
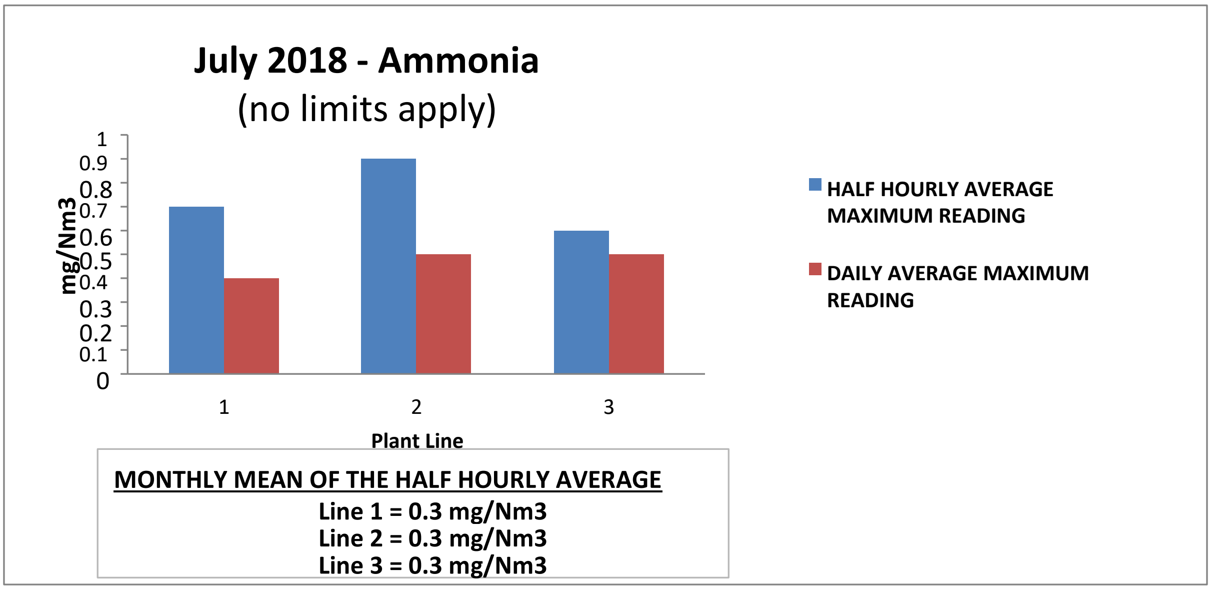


MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 0.6 mg/Nm3
Line 2 = 1.9 mg/Nm3
Line 3 = 2.4 mg/Nm3

Why do we control and monitor Carbon Monoxide?

Carbon monoxide is both a common naturally occurring chemical and is manufactured by man. It is a colourless, odourless poisonous gas. Carbon monoxide is one of the eight substances for which the government has established an air quality standard as part of its national Air Quality Strategy.

Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues.



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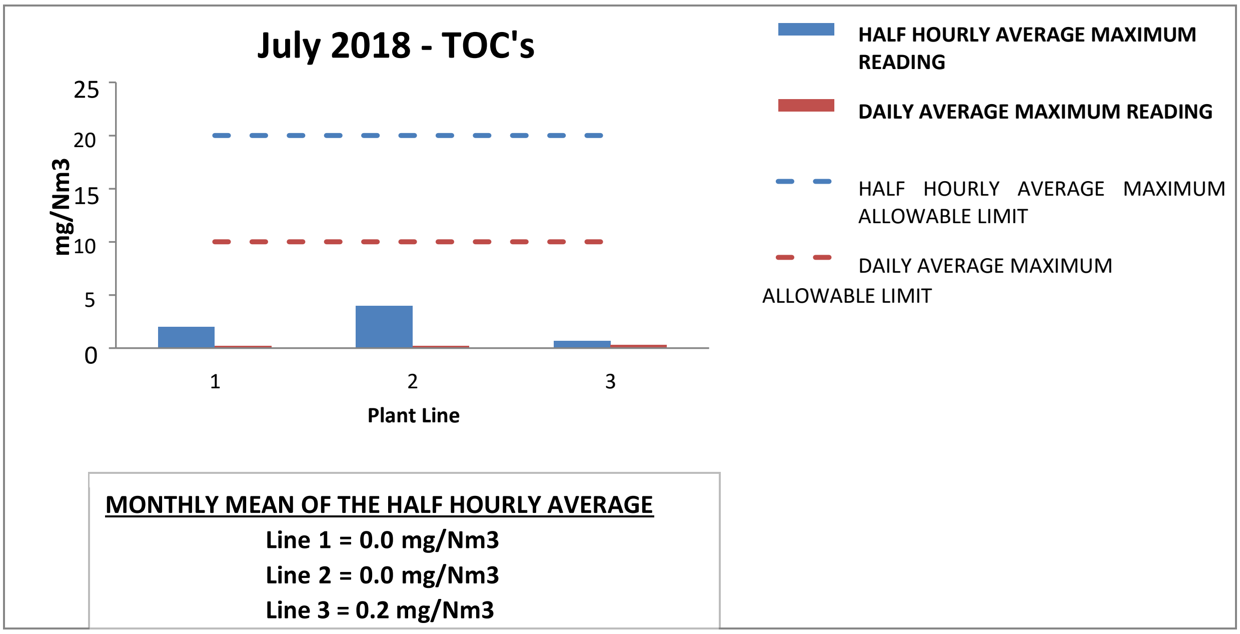

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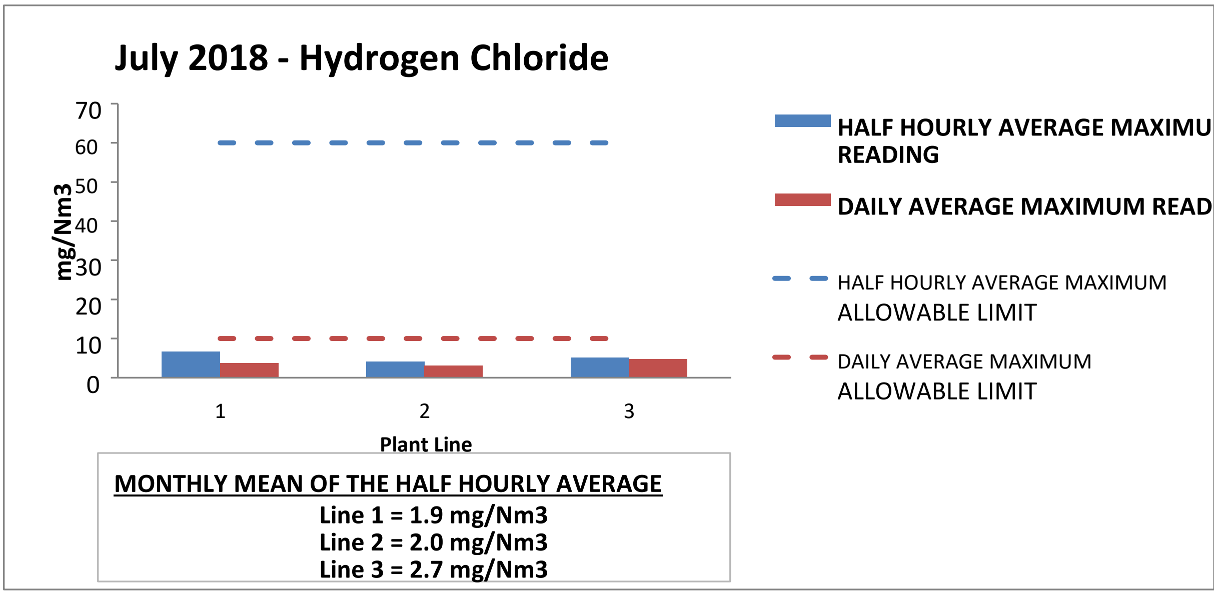

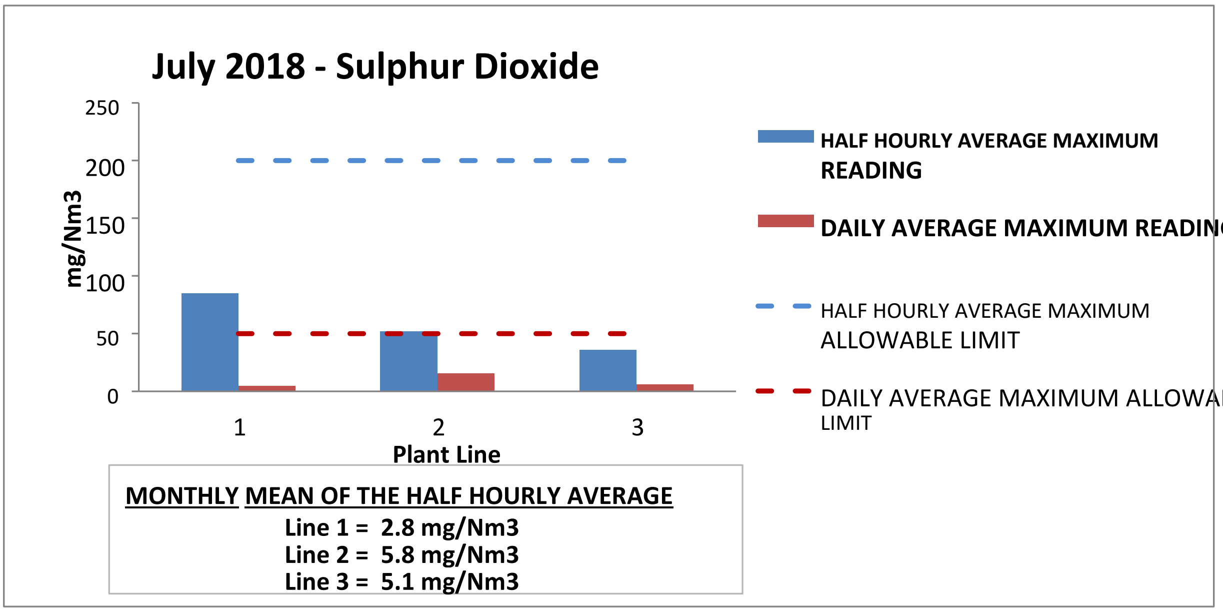

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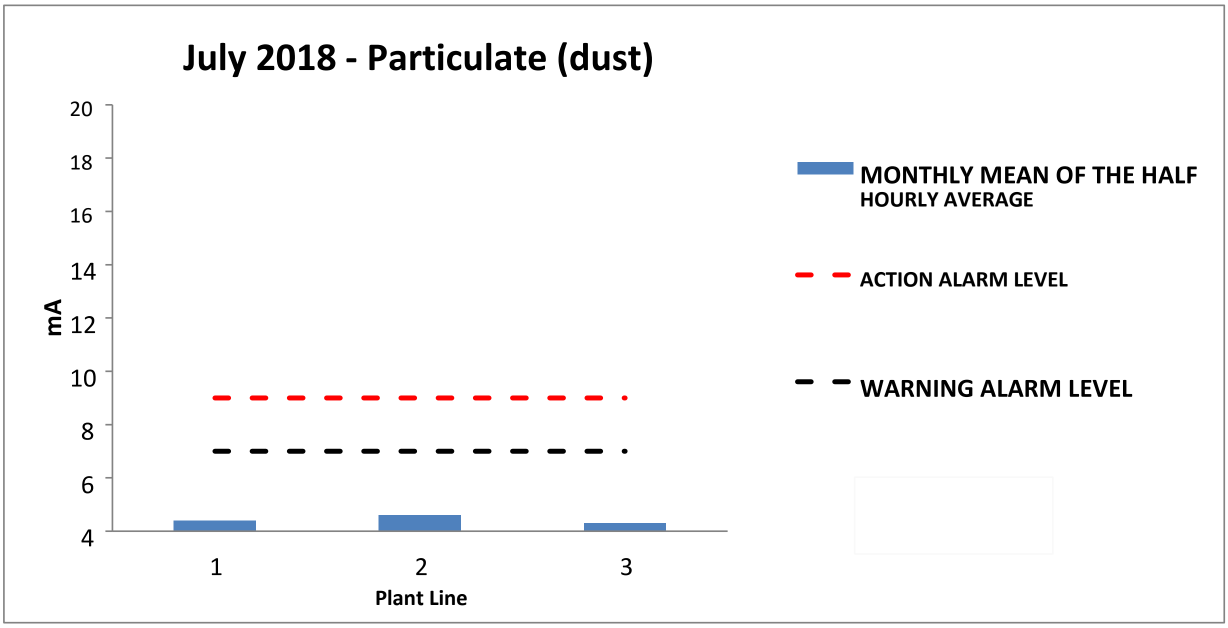

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Riverside Resource Recovery emission report – August 2018

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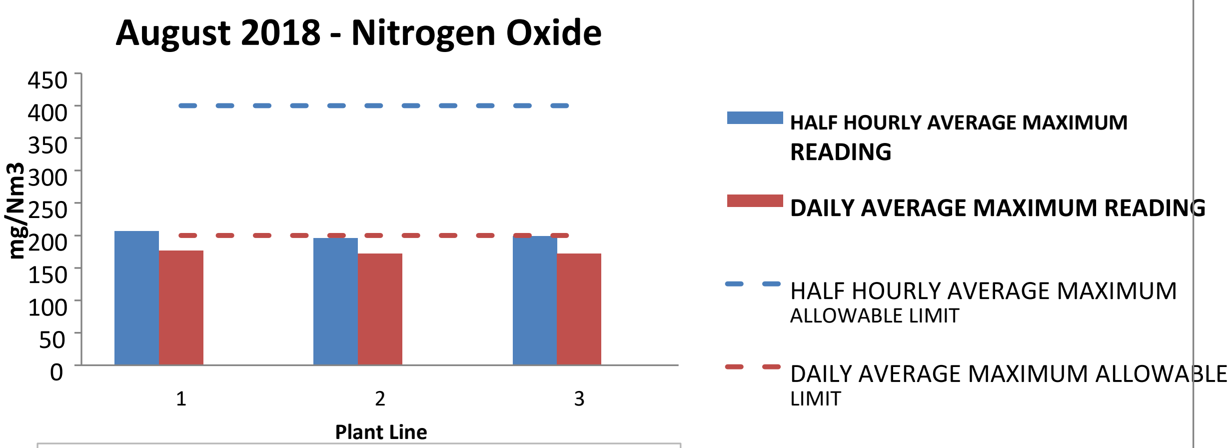

MONTHLY MEAN OF THE HALF HOURLY AVERAGE

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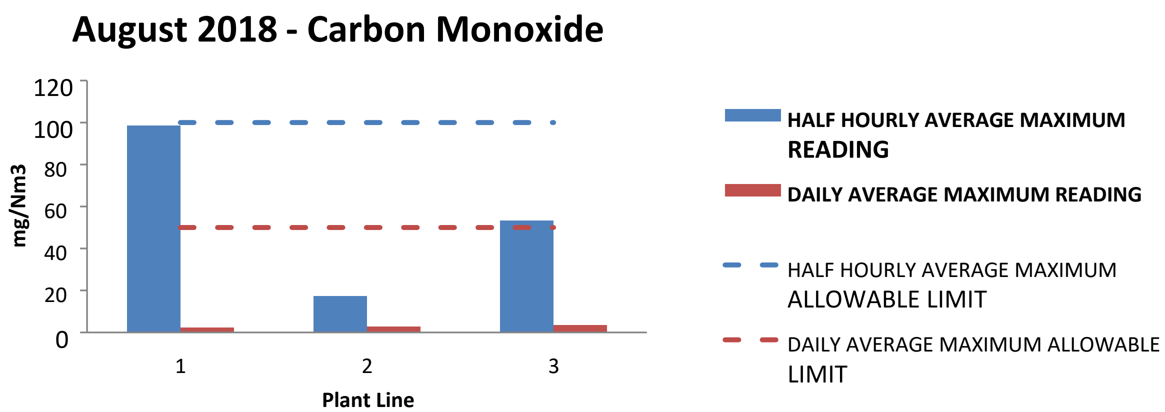

MONTHLY MEAN OF THE HALF HOURLY AVERAGE

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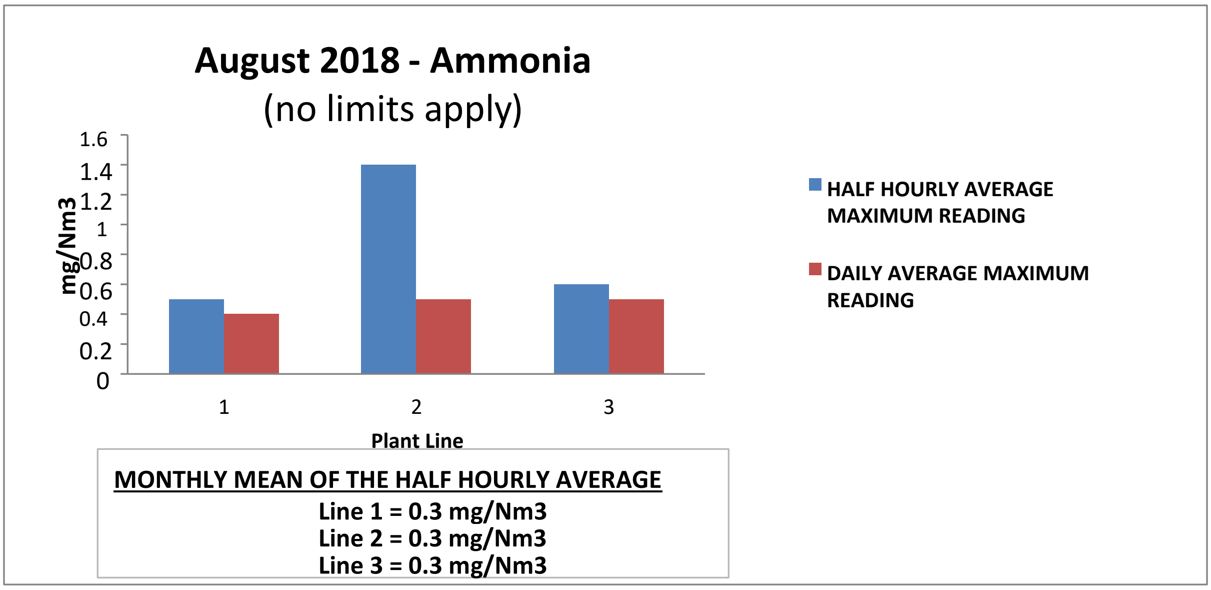

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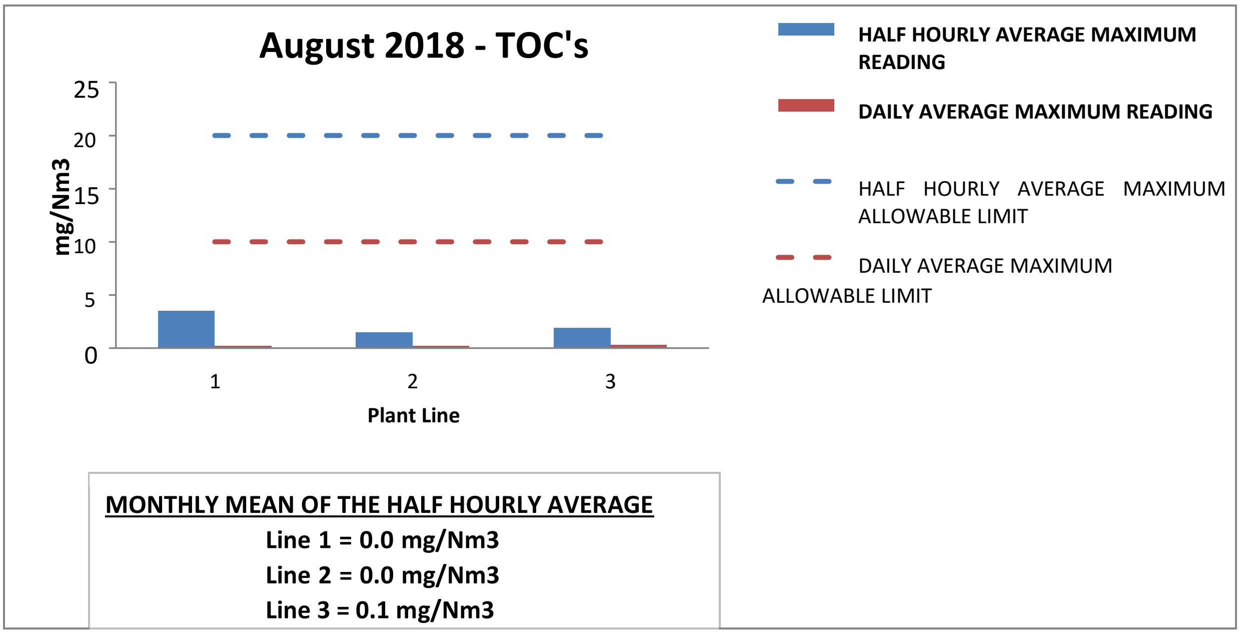

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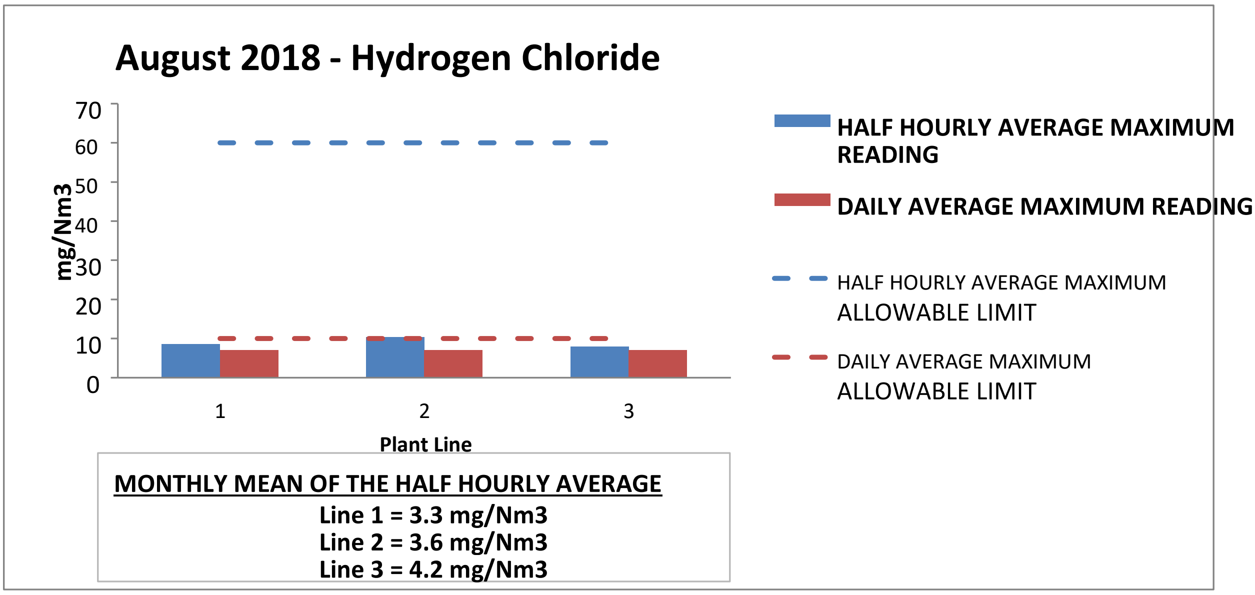

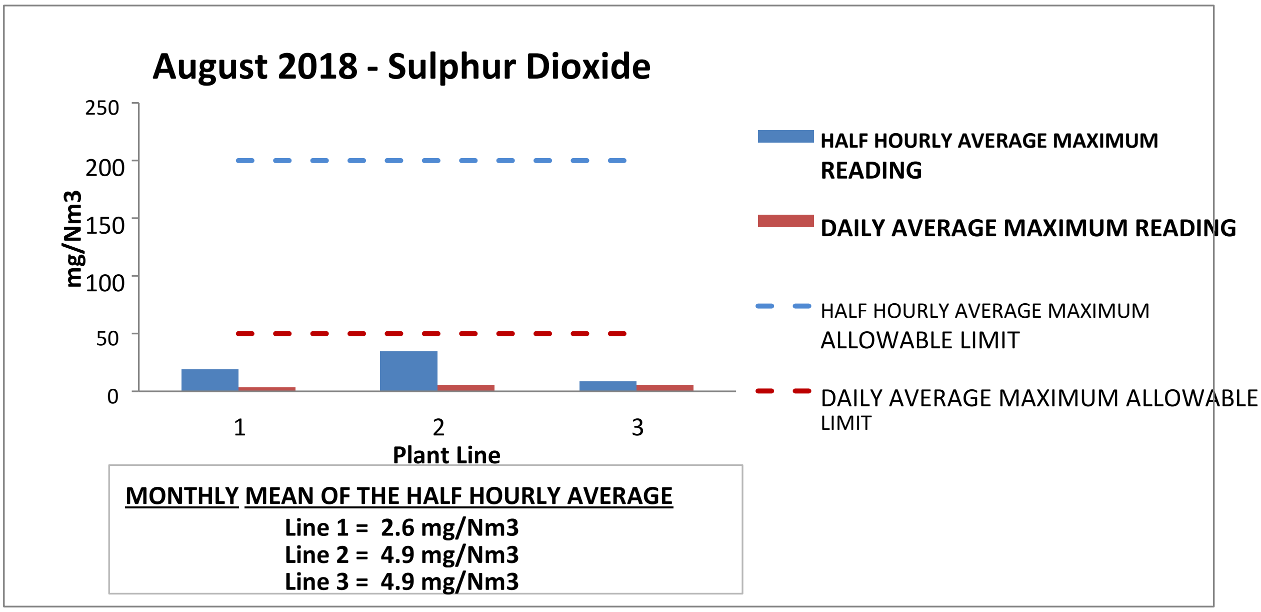

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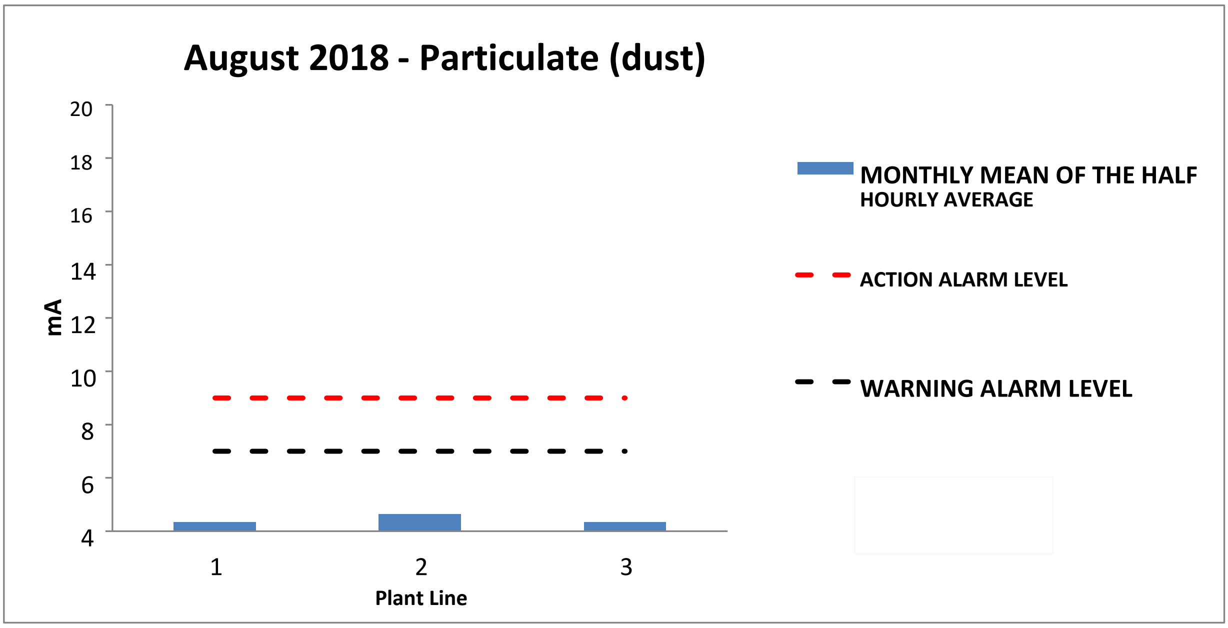

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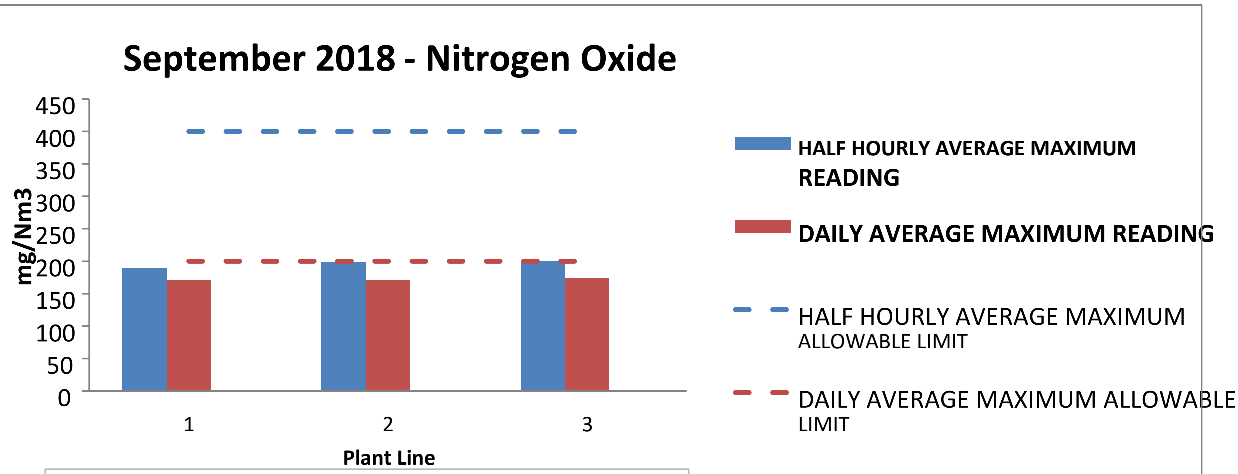
Riverside Resource Recovery emission report – Sepember 2018

The following charts summarise the emission data for the Riverside Resource Recovery facility. The charts show the **MAXIMUM** readings taken during the month.



MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 170.0 mg/Nm3
Line 2 = 170.1 mg/Nm3
Line 3 = 170.1 mg/Nm3

Why do we control and monitor Oxides of Nitrogen (NOx)?

NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO).

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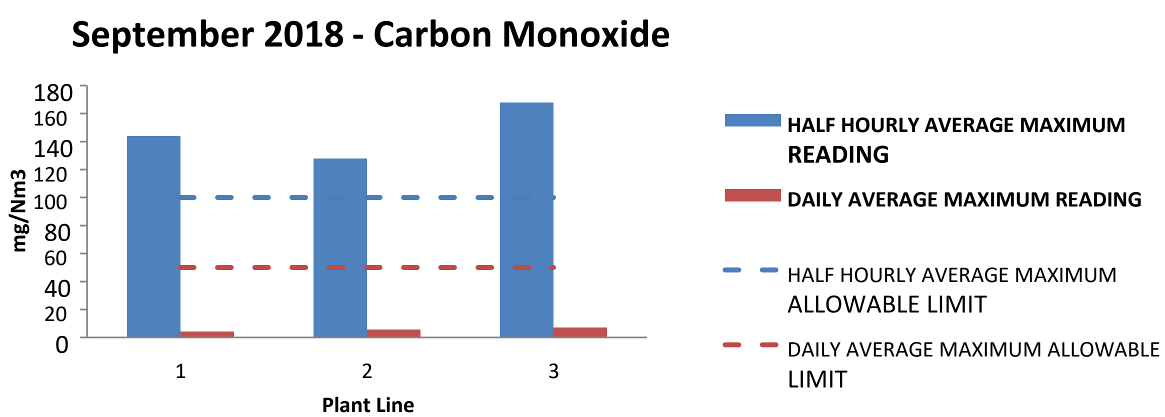

MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 1.6 mg/Nm3
Line 2 = 2.2 mg/Nm3
Line 3 = 3.5 mg/Nm3

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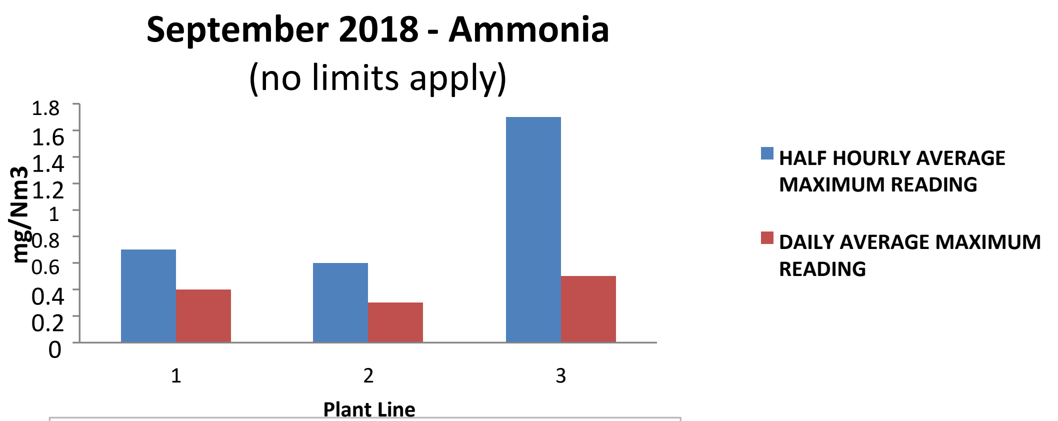

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 0.3 mg/Nm3
Line 2 = 0.2 mg/Nm3
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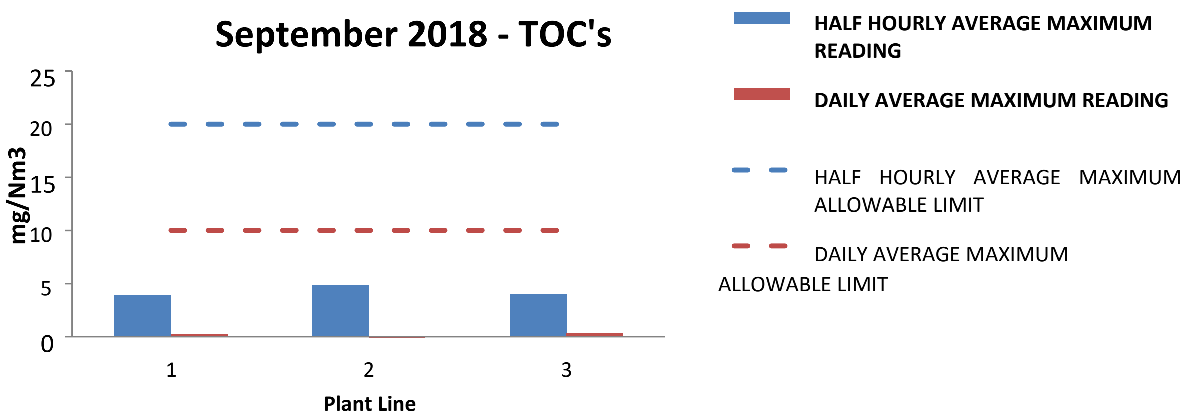

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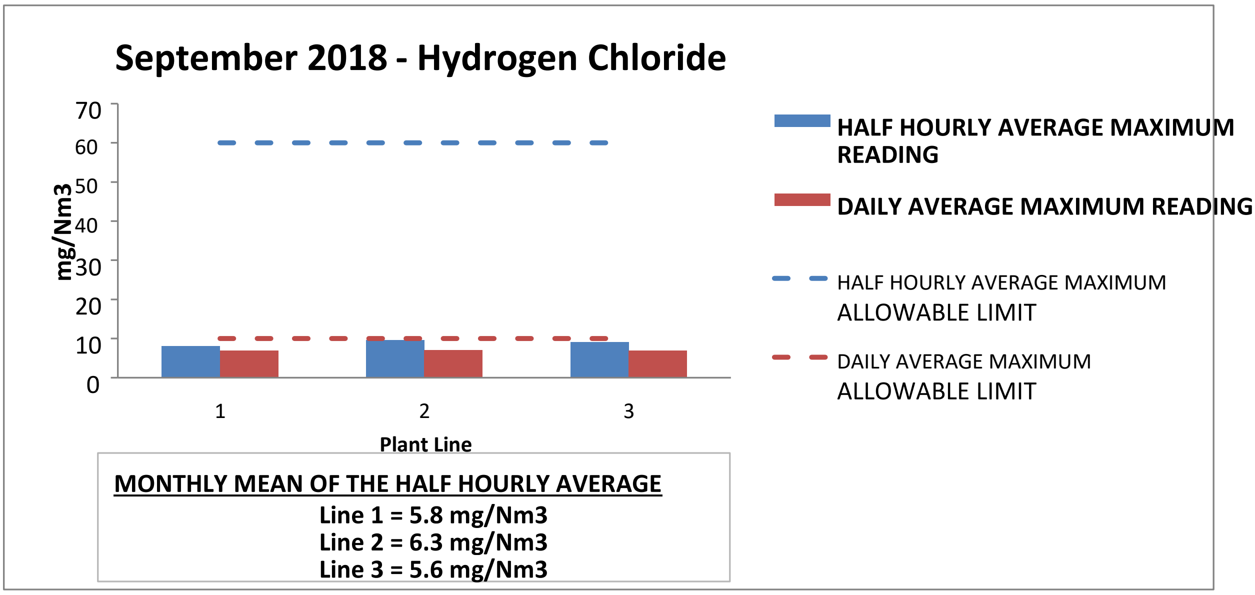

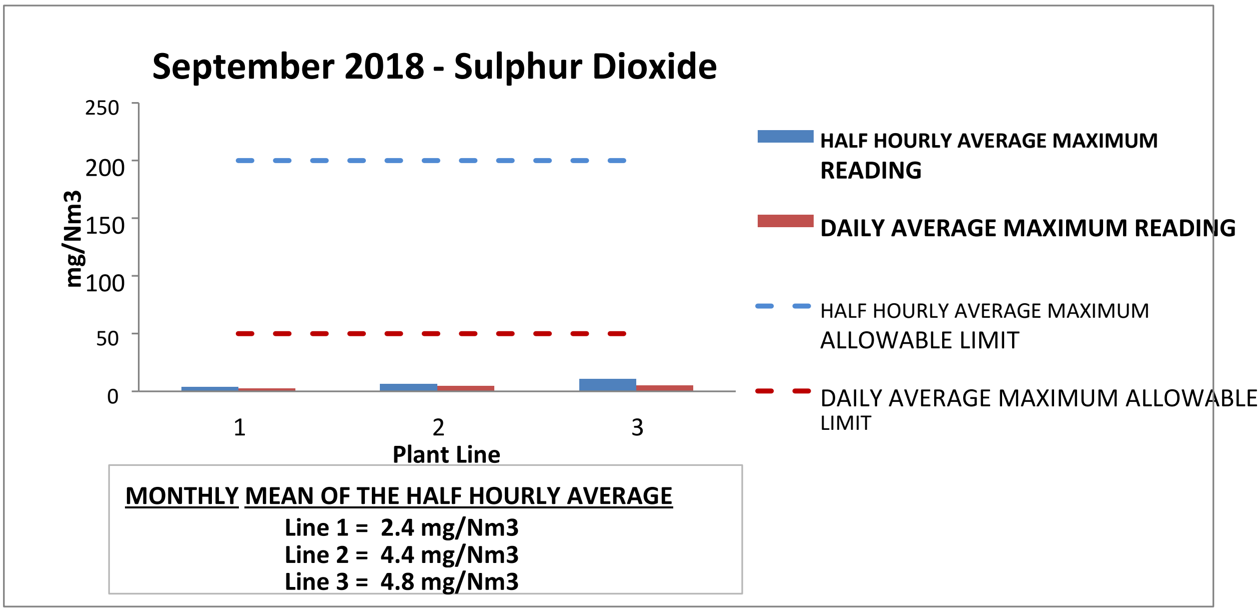

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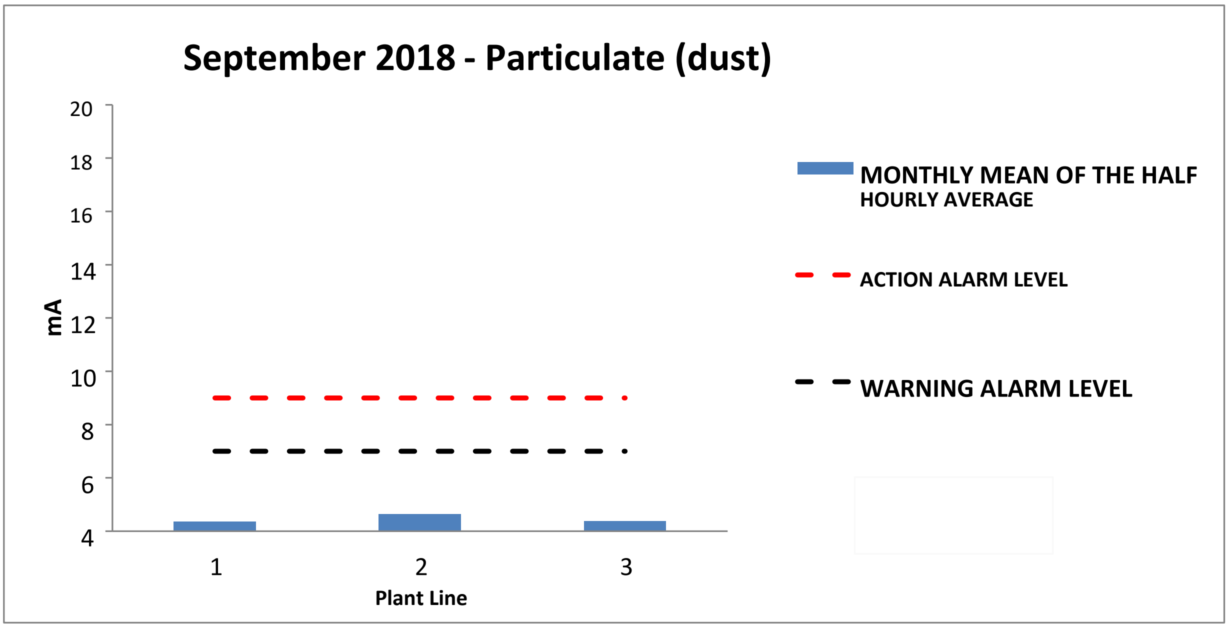

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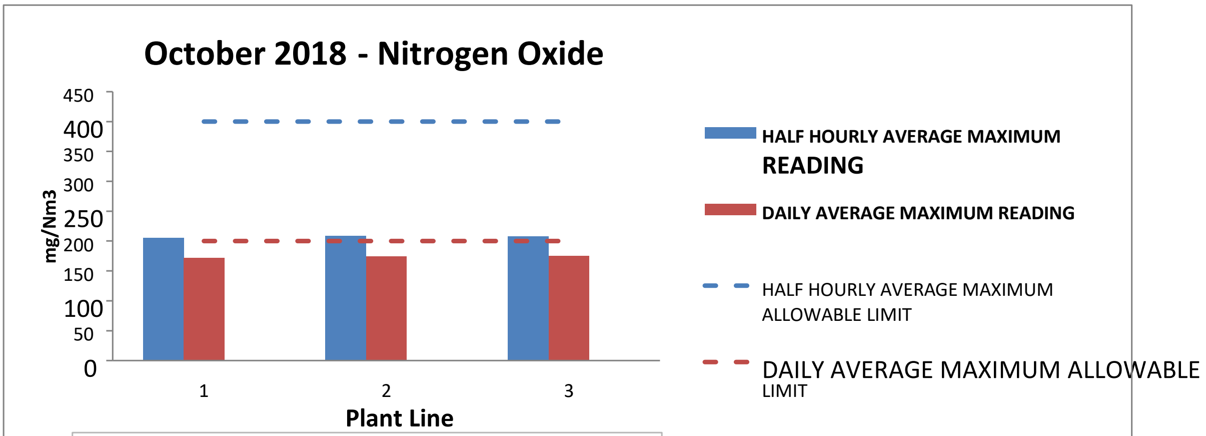

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Line 1 = 169.3 mg/Nm3
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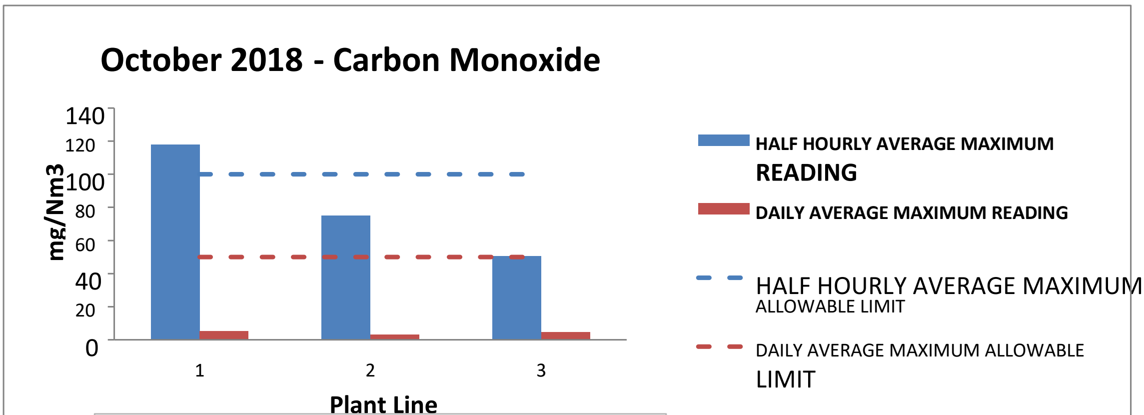

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Line 1 = 2.6 mg/Nm3
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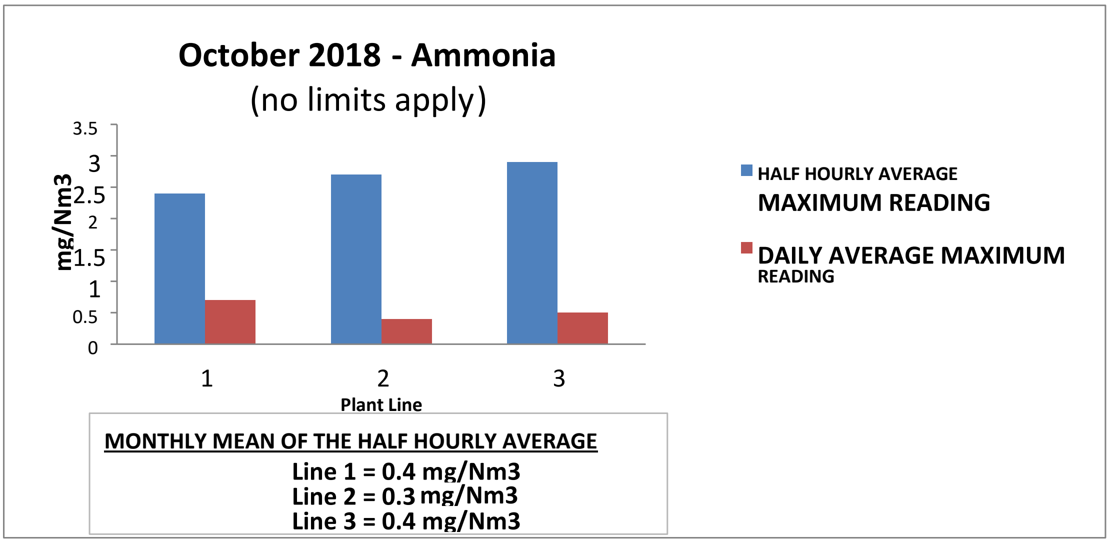

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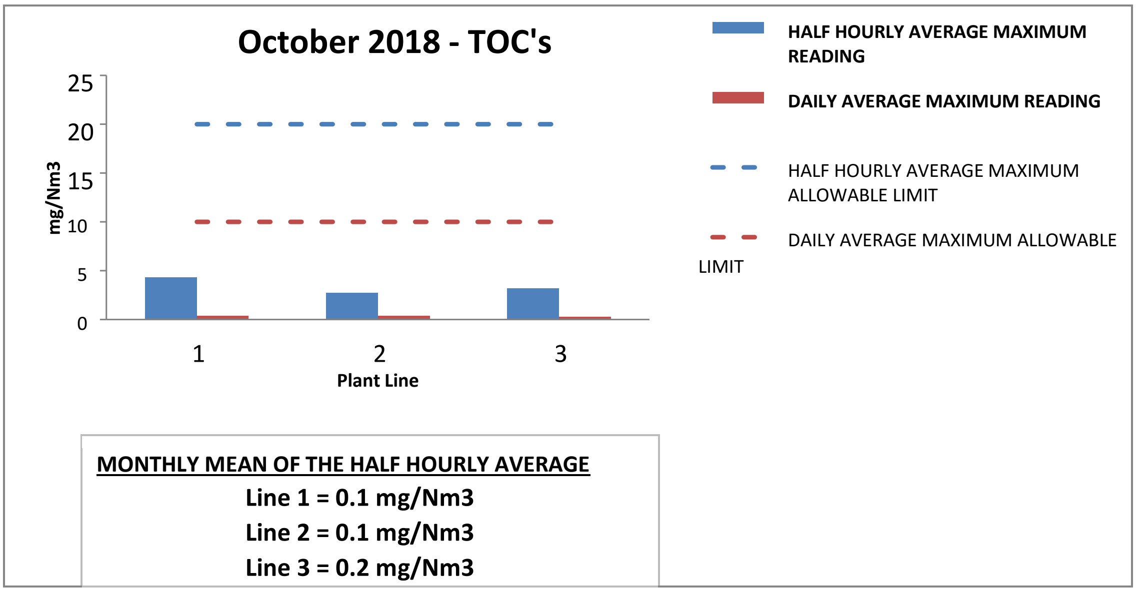

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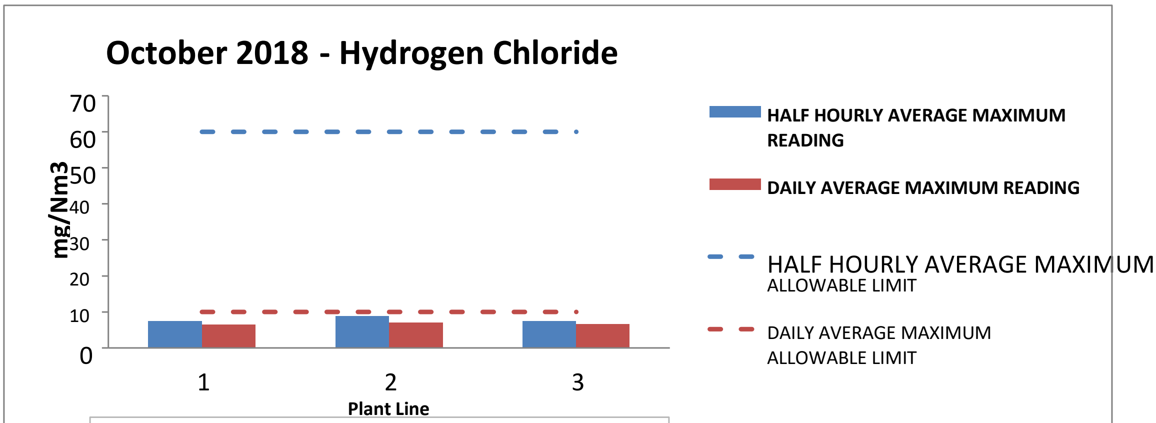

MONTHLY MEAN OF THE HALF HOURLY AVERAGE

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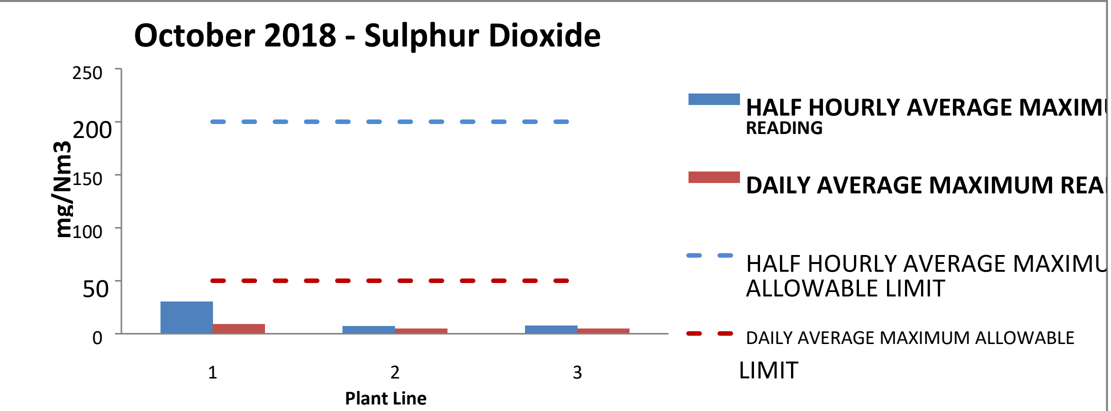
Line 3 = 4.4 mg/Nm3



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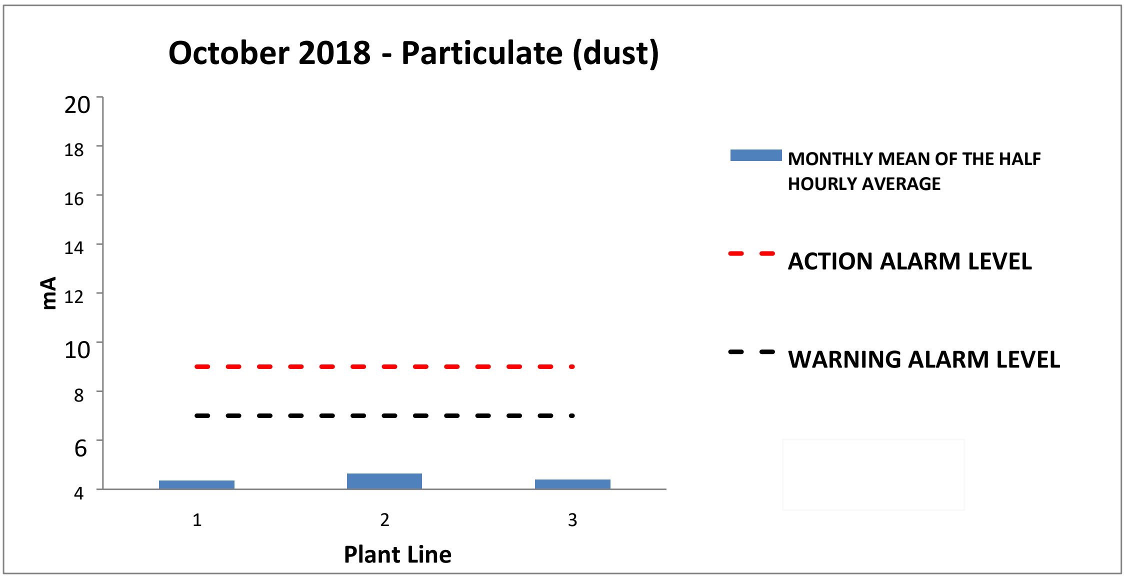

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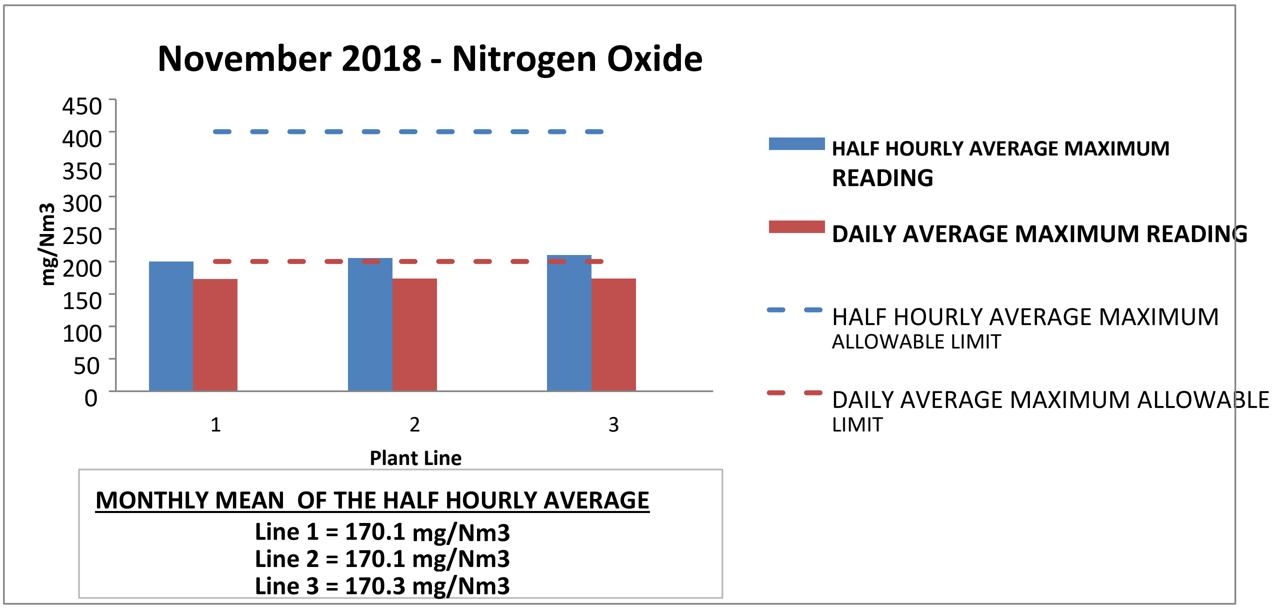

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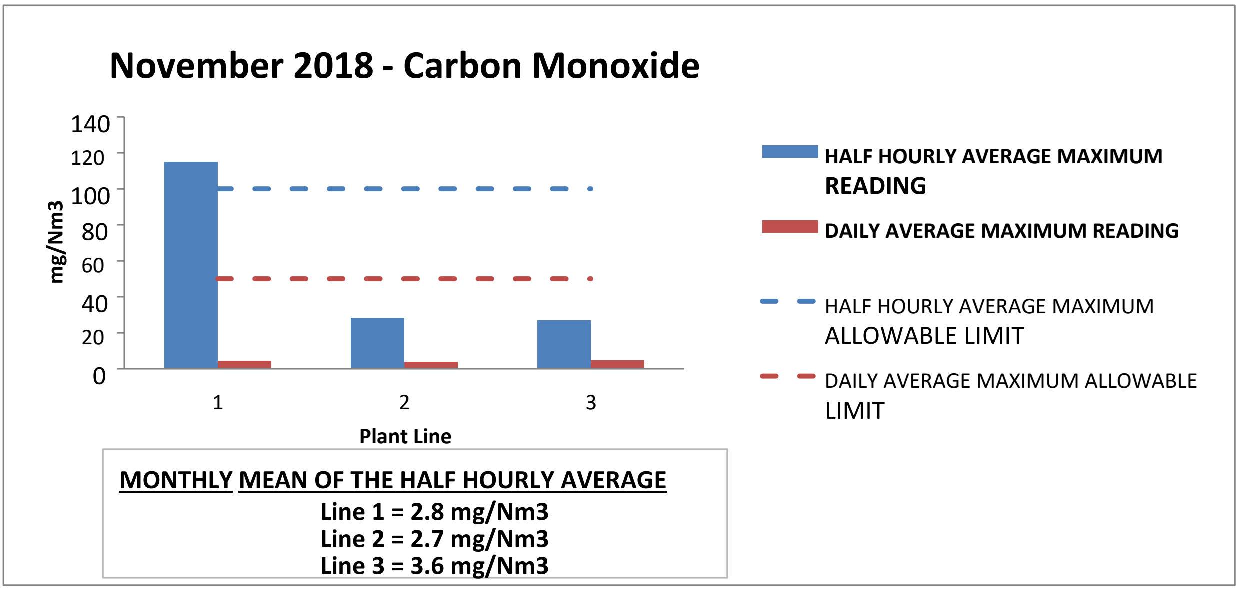

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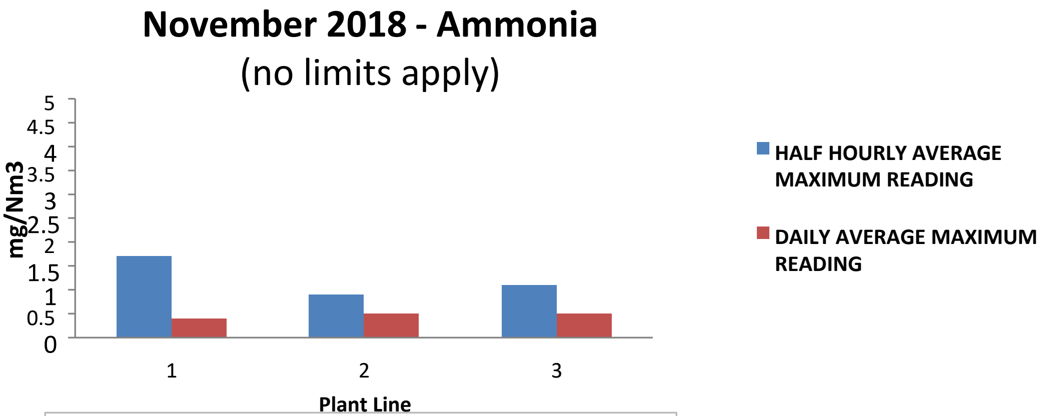
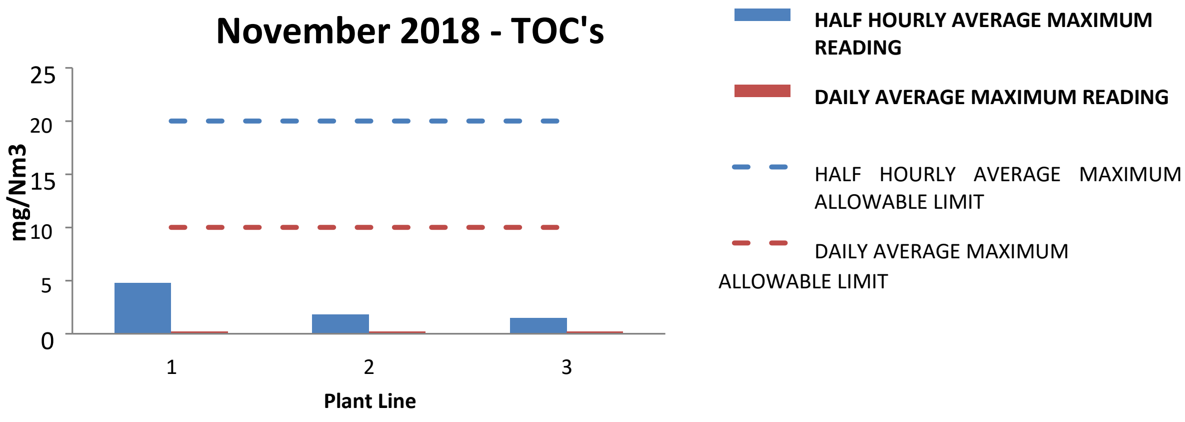


MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 0.3 mg/Nm3
Line 2 = 0.3 mg/Nm3
Line 3 = 0.4 mg/Nm3

Why do we control and monitor Ammonia?

Although in wide-use in several industries, ammonia is both caustic and hazardous. It is a colourless gas with a characteristic pungent odour.

Ammonia, unlike the other species monitored, is not a product from the incineration of waste but is actually introduced into the furnace. Under the right conditions, ammonia is able to reduce oxides of nitrogen found in the flue gas by the chemical process Selective Non-Catalytic Reduction (SNCR) to nitrogen and water vapour which are both nonhazardous.



MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 0.0 mg/Nm3
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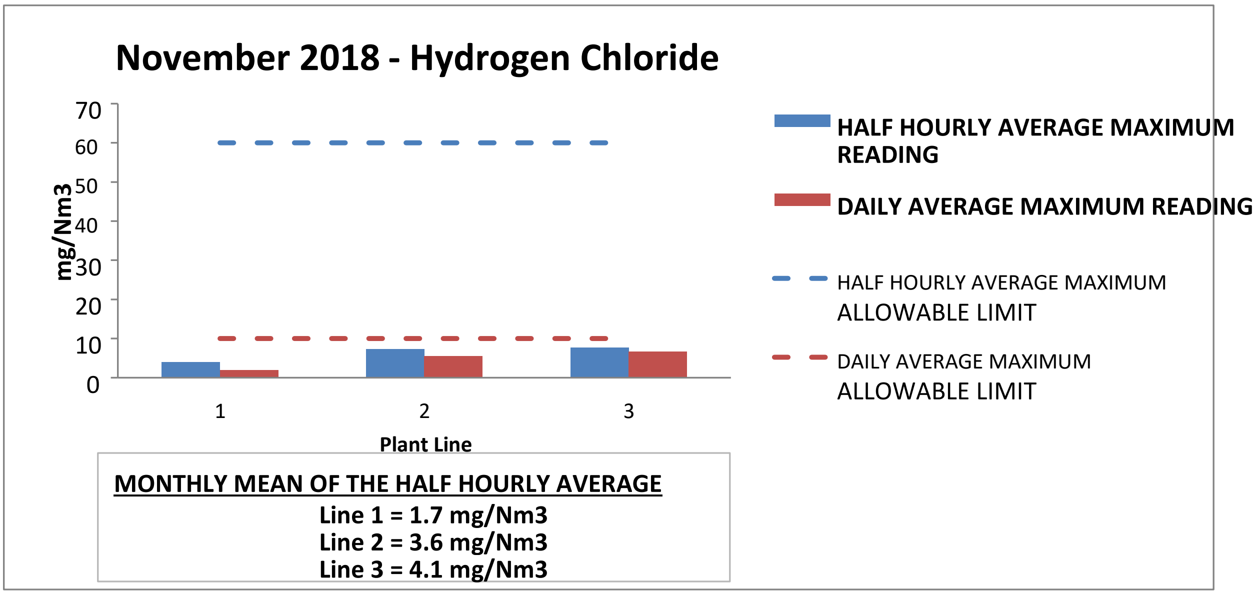
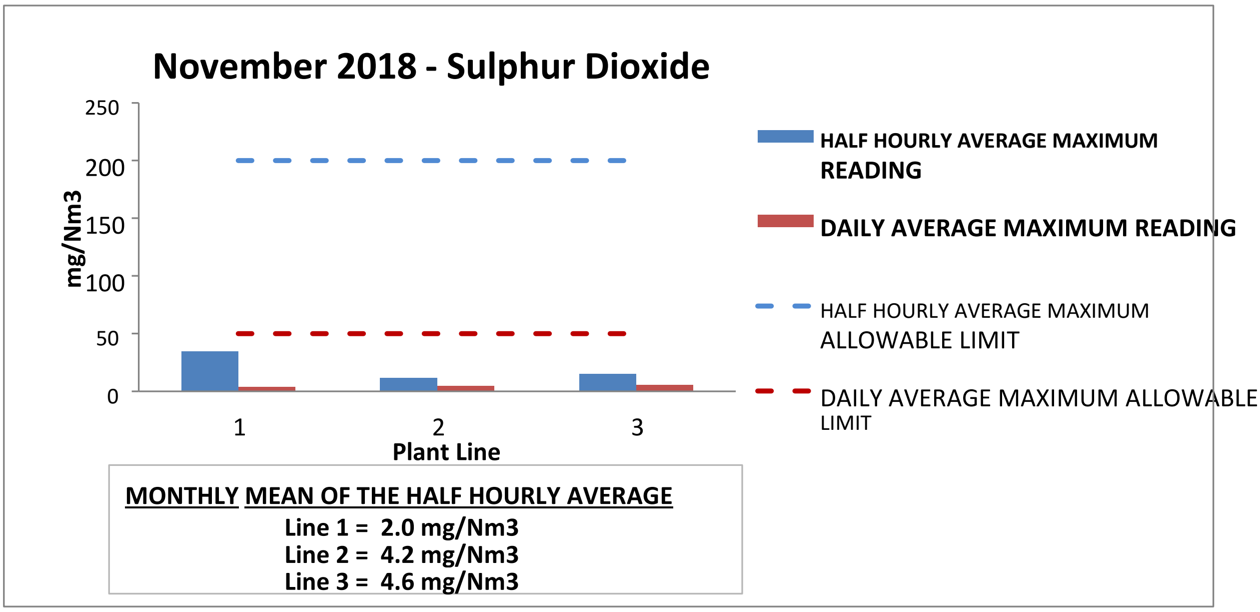
Why do we control and monitor Total Organic Carbon (TOC)?

Total Organic Carbon (TOC) consists of a wide range of organic compounds including Volatile Organic Compounds (VOCs). VOCs are numerous, varied and found everywhere. VOCs are of general concern because of their ability to react with other pollutants (such as nitrogen oxides) in the lower atmosphere to form ozone. High concentrations of ozone at ground level can harm human health, damage crops and affect materials such as rubber. Some VOCs may be directly harmful to human health, contribute to global warming or destroy stratospheric ozone needed to shield the earth's surface from harmful ultra violet radiation.





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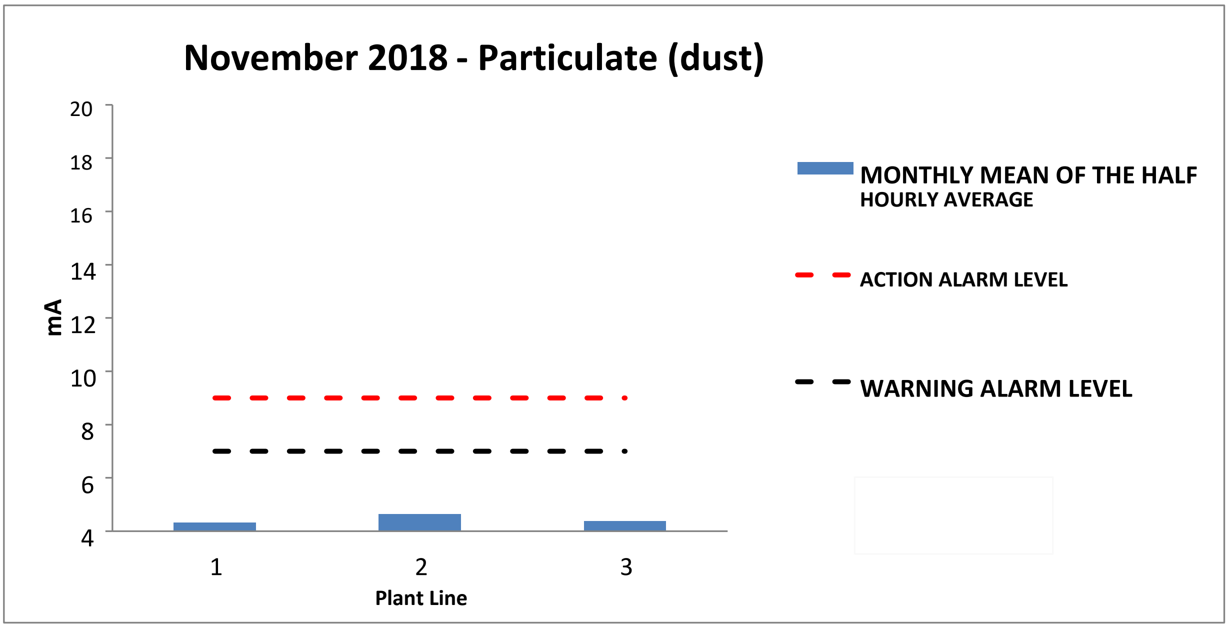

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Riverside Resource Recovery emission report – December 2018

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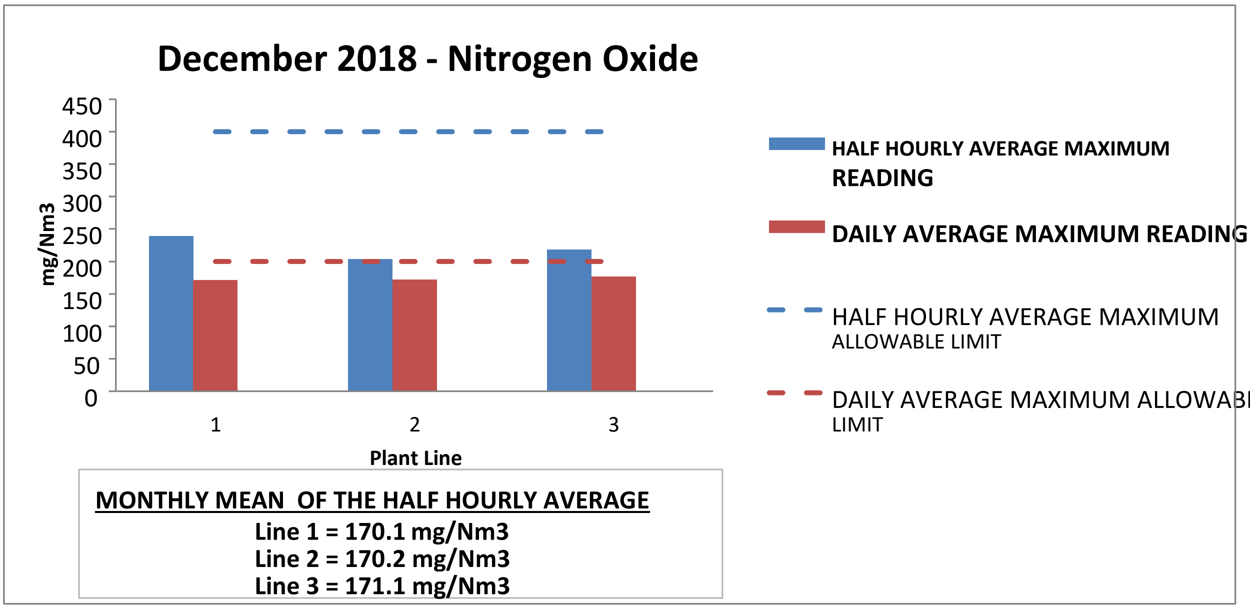

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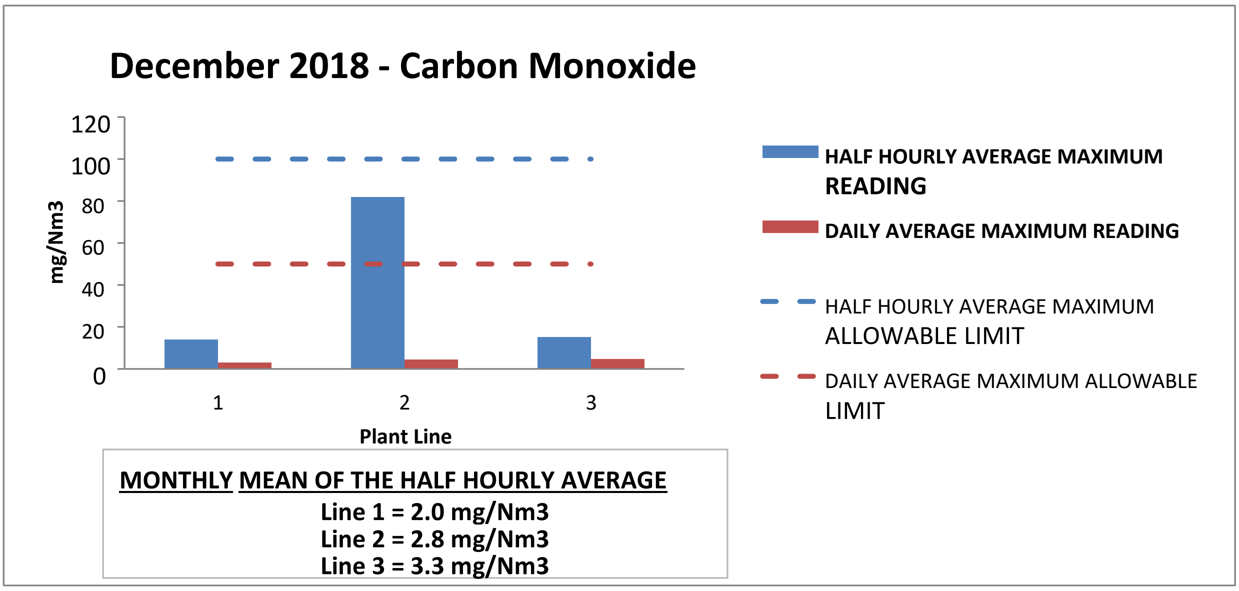

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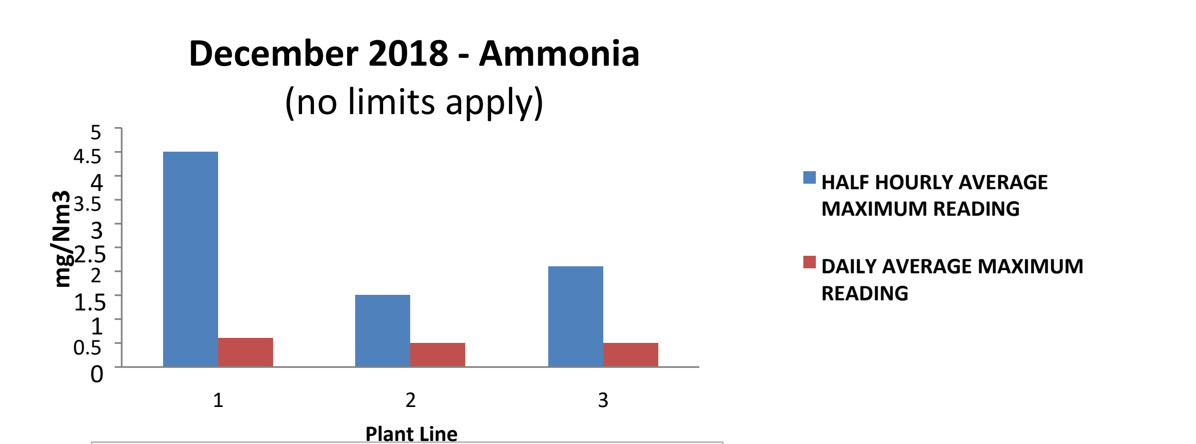

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 0.3 mg/Nm3
Line 2 = 0.3 mg/Nm3
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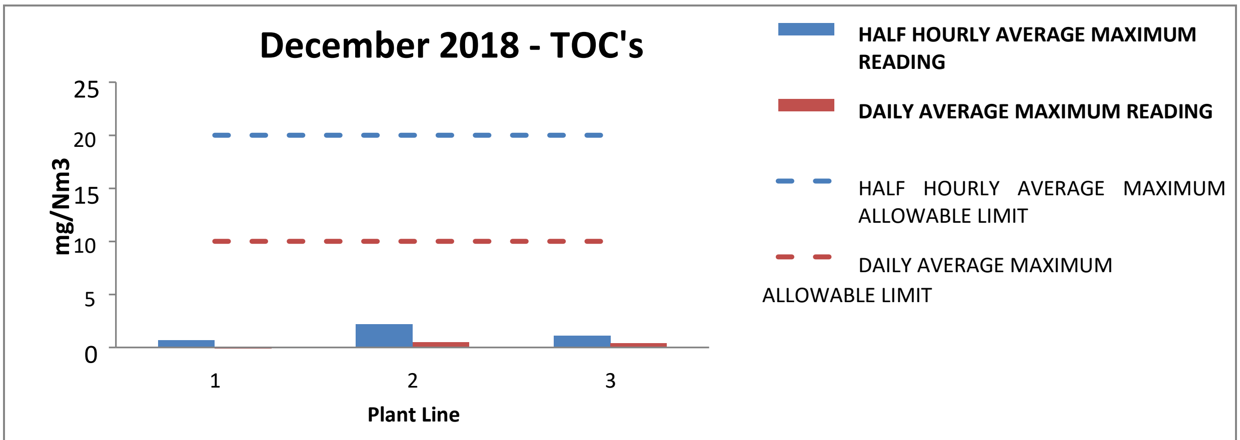

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
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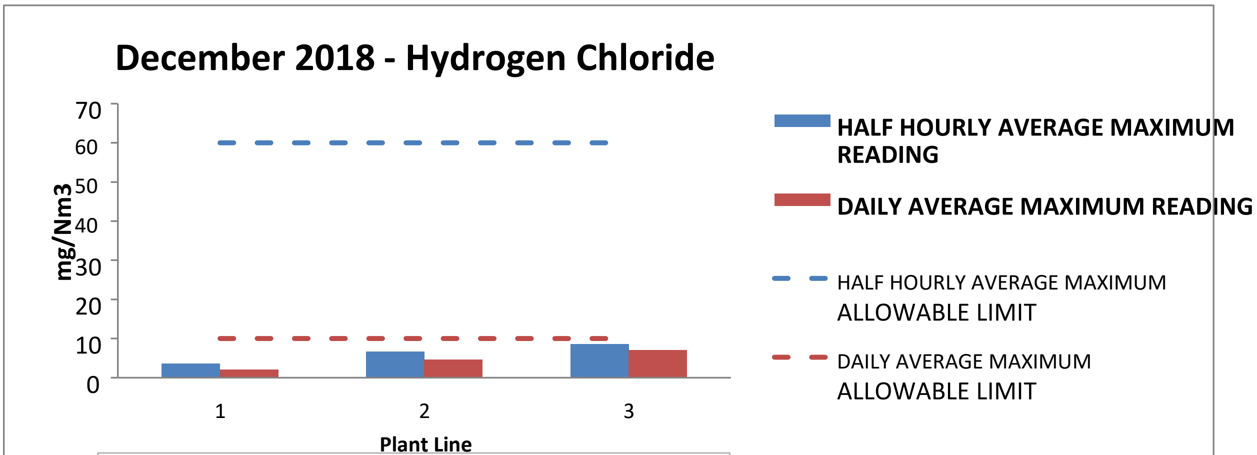
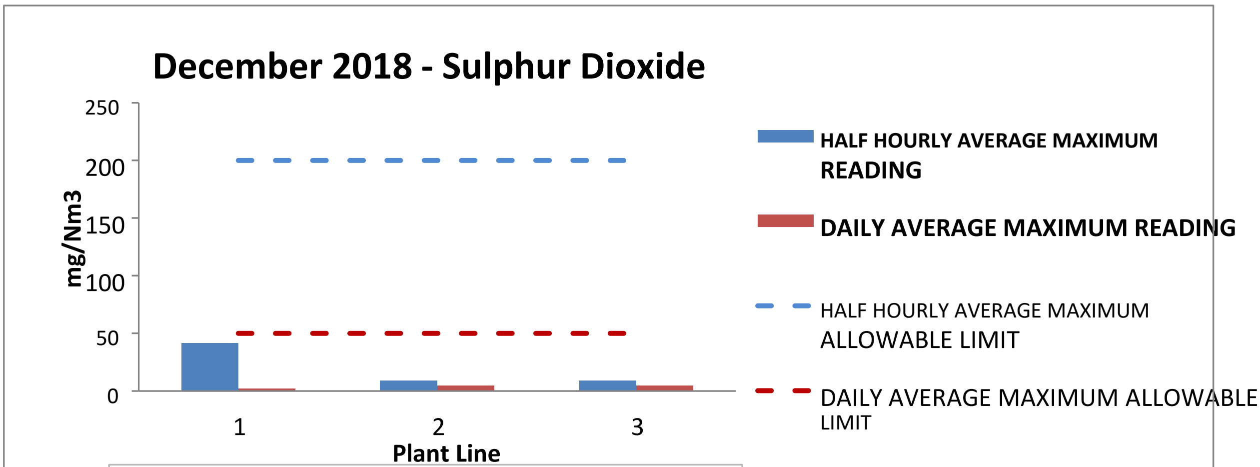


MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 1.7 mg/Nm3
Line 2 = 3.1 mg/Nm3
Line 3 = 5.5 mg/Nm3



MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 1.8 mg/Nm3
Line 2 = 4.1 mg/Nm3
Line 3 = 4.4 mg/Nm3

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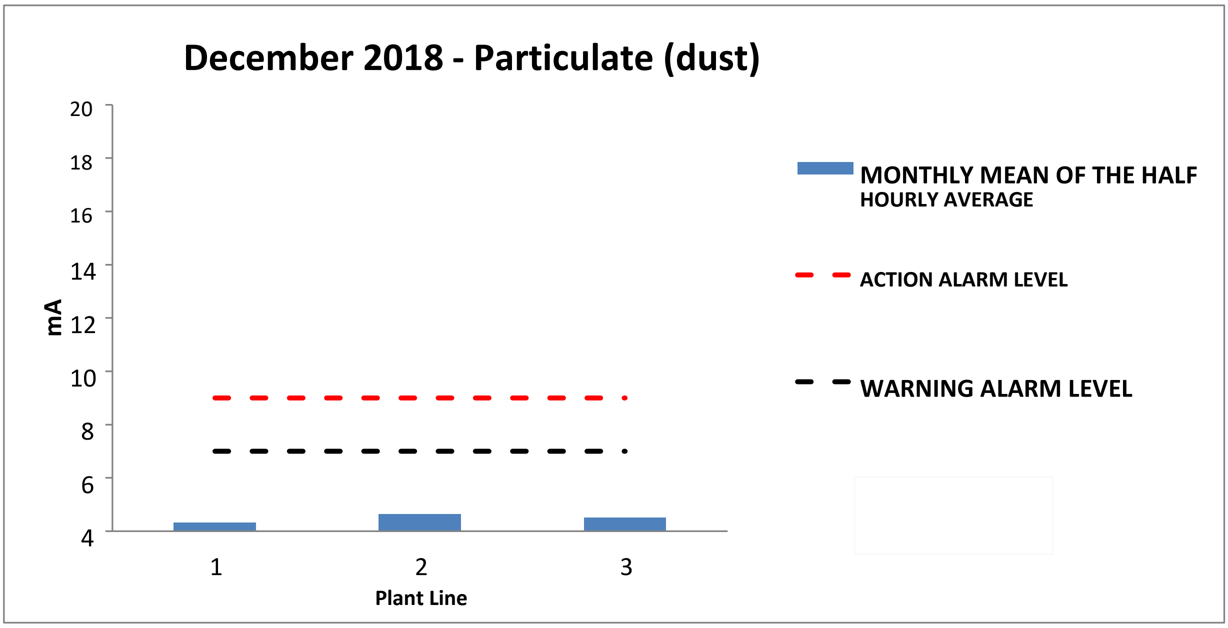
Both gases dissolve in water to form strong acids and thus can contribute to the formation of acid rain. Acid rain is environmentally damaging to crops, soils and waters.



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D.4 2017 Emissions

1. <u>Extracts of Emissions Information from Riverside Annual Performance Report 2017</u>

CORY
RIVERSIDE ENERGY

Cory Riverside Energy

Riverside Resource Recovery Facility

Annual Performance Report: 2017

Environmental Permit: BK0825IU

Riverside Resource Recovery Ltd
Norman Road
Belvedere
DA17 6JY

4. Summary of Plant Emissions

There are no point source emissions to water, air or land except from the sources and emissions points listed in the site PPC Permit.

4.1 Emissions to Air

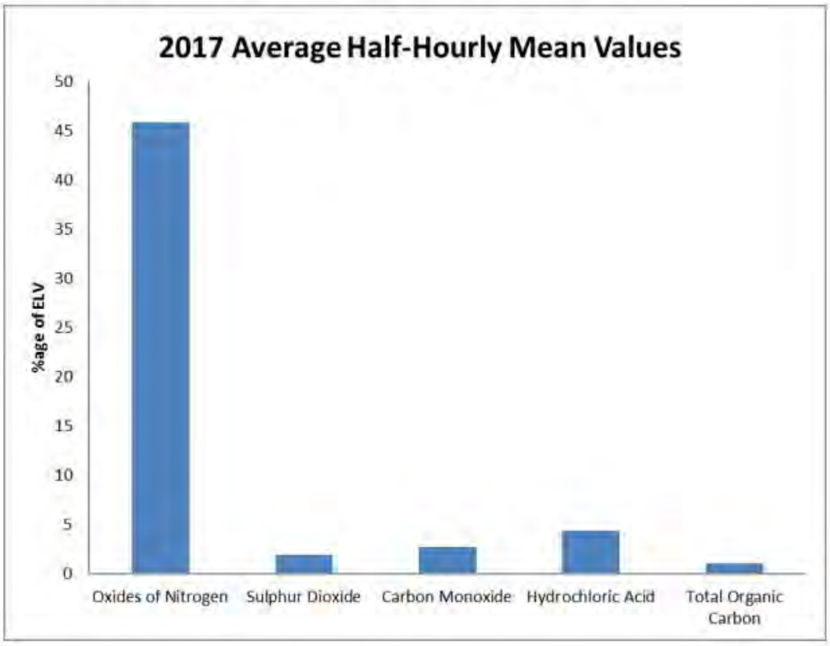
Flue gases are released to atmosphere via the stack and are monitored and controlled to prevent any breaches of the emission limits set in the PPC Permit. The monitoring programme frequency for each flue gas species is as follows:

Pollutant	Monitoring Frequency
Particulate matter	Continuous & Bi-annually
Oxides of Nitrogen	Continuous & Bi-annually
Carbon Monoxide	Continuous & Bi-annually
Sulphur dioxide	Continuous & Bi-annually
Hydrochloric acid	Continuous & Bi-annually
Total Organic Carbon (TOC)	Continuous & Bi-annually
Ammonia	Continuous & Bi-annually
Mercury	Quarterly
Cadmium & Thallium	Quarterly
Total Heavy Metals*	Quarterly
Dioxins & Furans	Quarterly
Dioxin-like PCBs	Quarterly
Polycyclic Aromatic Hydrocarbons (PAH's)	Bi-annually
Hydrogen Fluoride	Bi-annually
Nitrous Oxide	Bi-annually

*Total Heavy Metals consists of Antimony, Arsenic, Lead, Cadmium, Chromium, Copper, Cobalt, Manganese, Mercury, Nickel, Thallium and Vanadium.

All monitoring is carried out to BS EN 14181 standard and the continuous emissions monitoring (CEMS) equipment is calibrated regularly with standby equipment always available to ensure that the monitoring programme continues to be in progress whenever the Plant is in operation. The Quarterly and Bi-annual extractive testing is carried out by a fully accredited third party Testing House.

The 2017 average half-hourly emission values are given in the below table as a percentage of the Emission Limit Value (ELV):

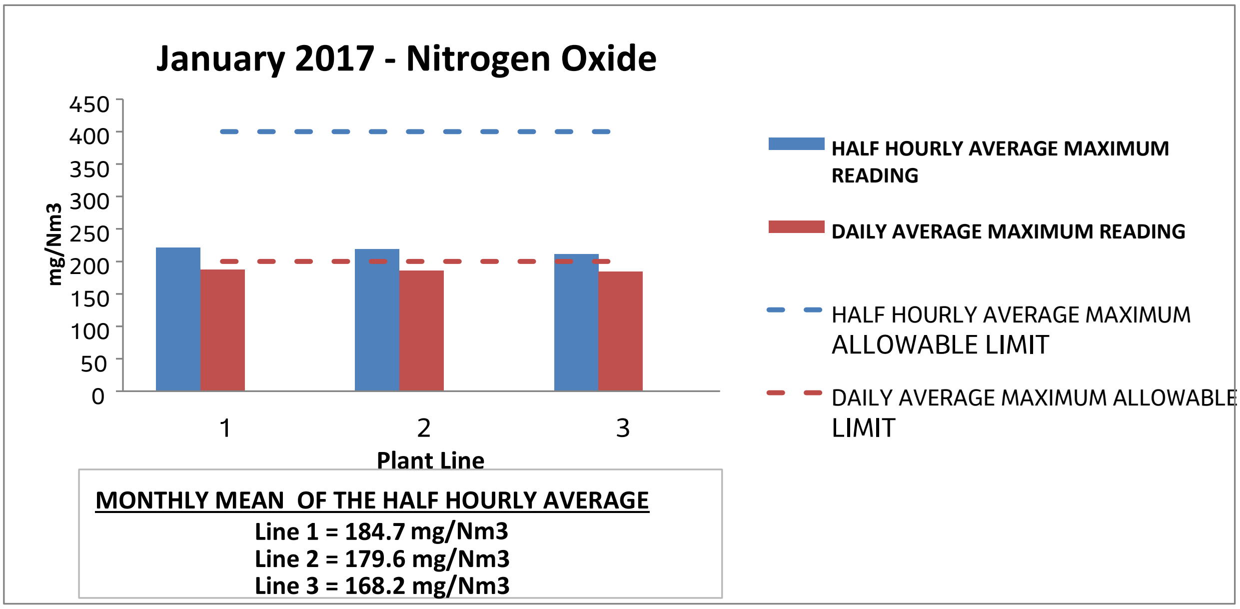


In 2017, there were five half-hourly average emissions level exceedances at the Riverside Resource Recovery facility, for Carbon Monoxide. The cause of these incidents was thought to be volatile waste which caused combustion conditions in the furnace to rapidly change for a short period. Procedures are in place to minimise the possibility of such items entering the waste stream where possible and these procedures have been reviewed and improved as a result. There have been no resultant negative effects associated to these incidents and the Environment Agency is fully supportive of the actions taken and the procedures in place at Riverside.

2. Publicly reported continuously monitored emissions reports

Riverside Resource Recovery emission report – January 2017

The following charts summarise the emission data for the Riverside Resource Recovery facility. The charts show the **MAXIMUM** readings taken during the month.



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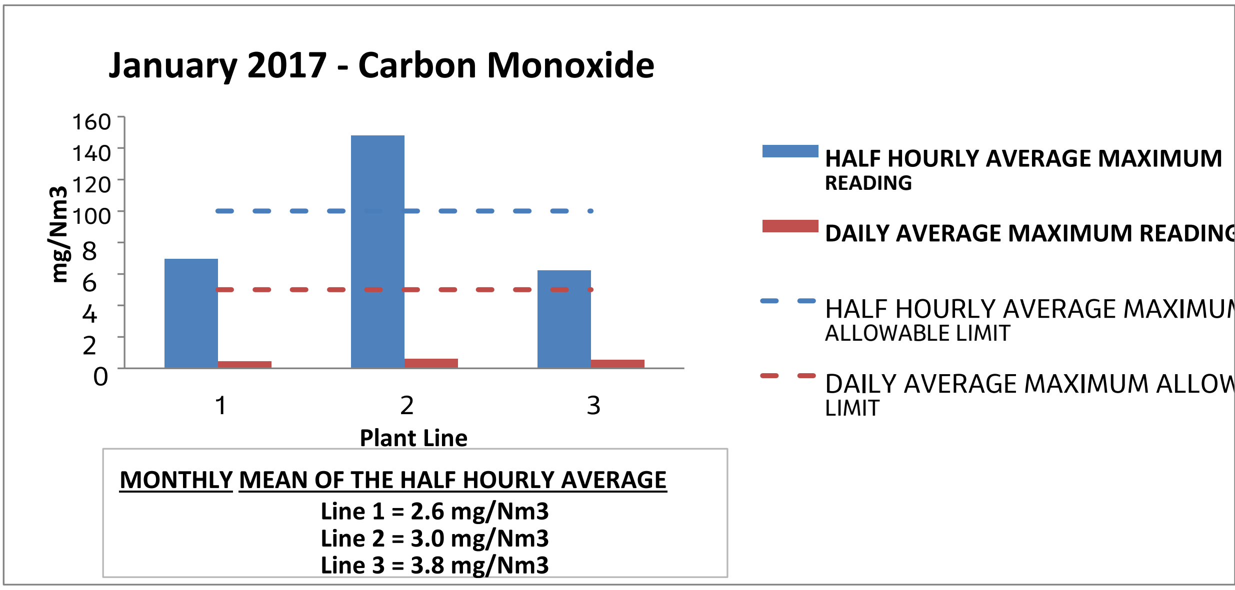
NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO). These can be formed naturally, but are also formed from man-made processes like fuel combustion or biomass burning. There are a number of health and environmental issues attributed to NOx, including smog, acid rain, and possibly global warming.



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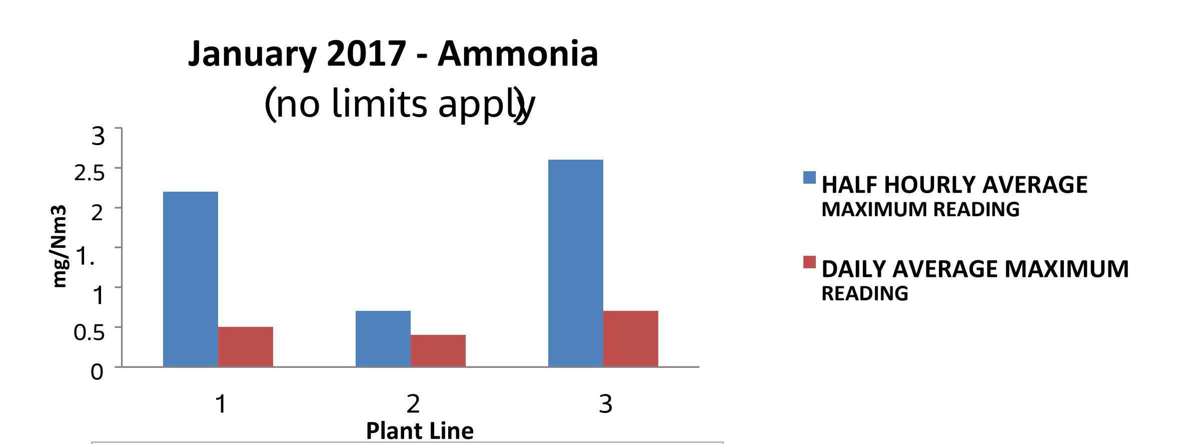

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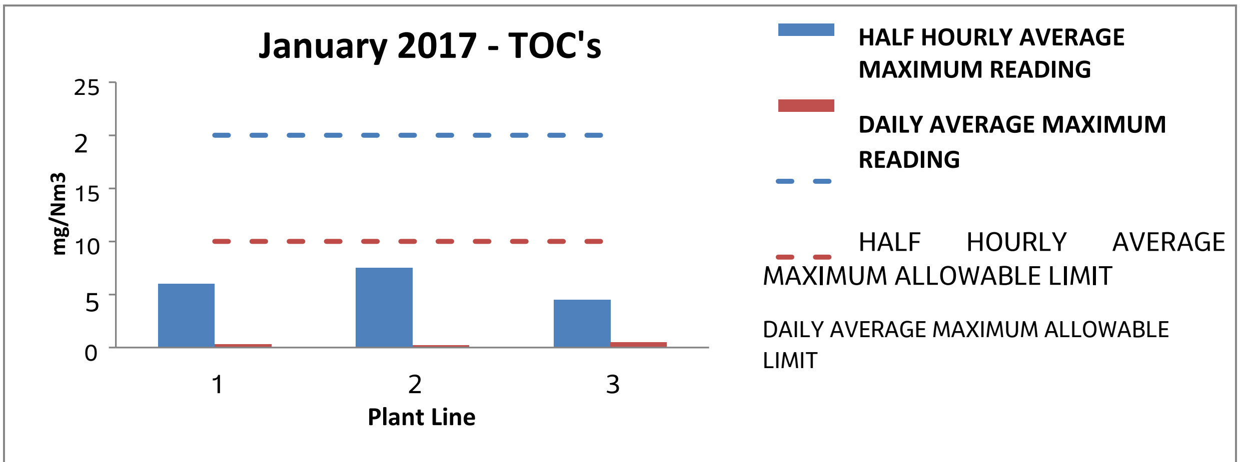

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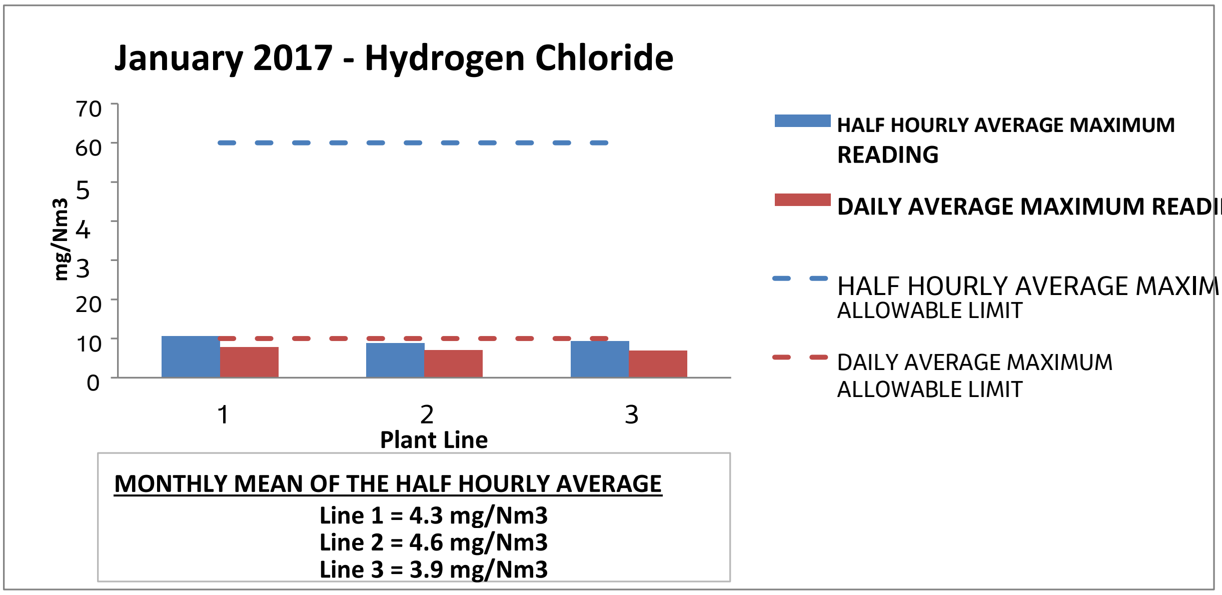

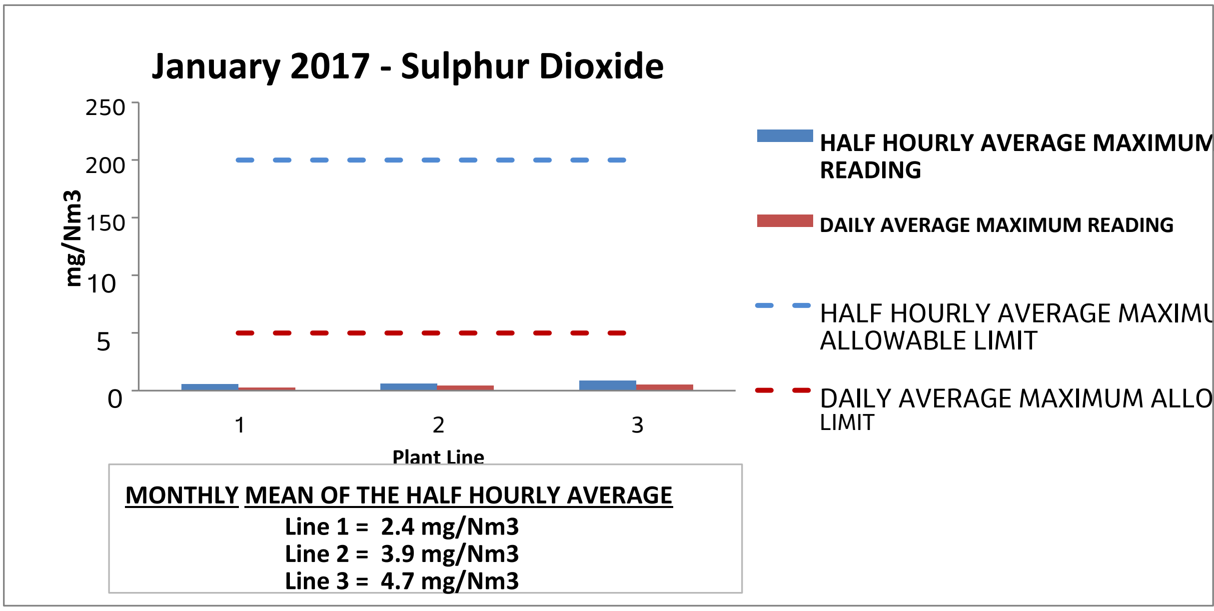

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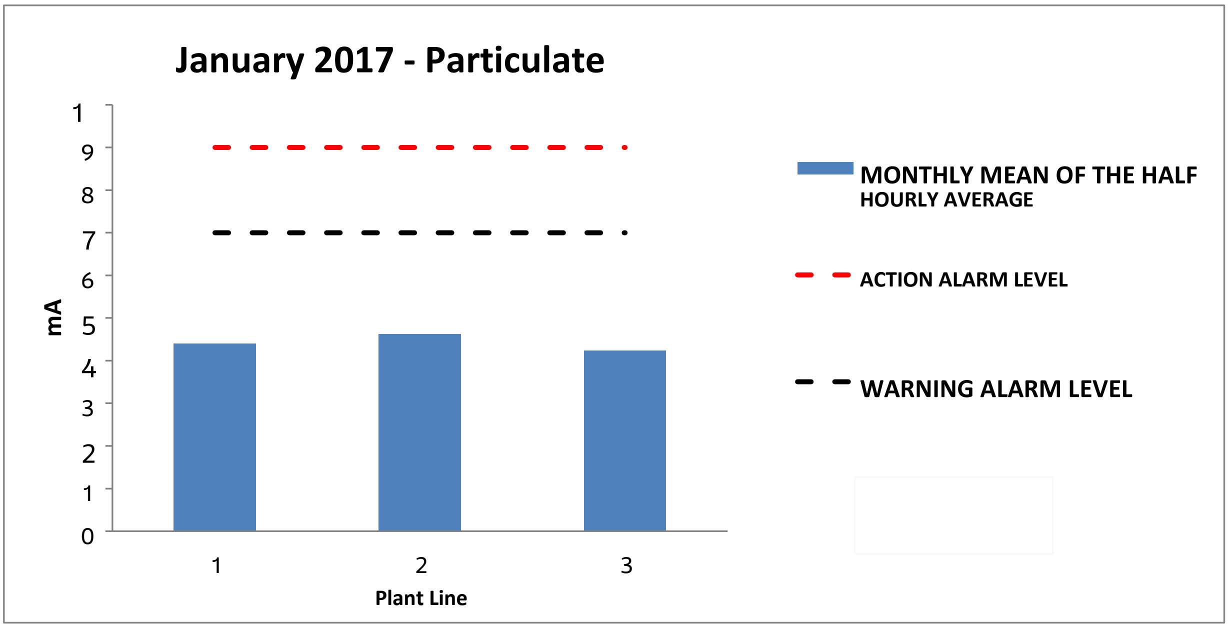

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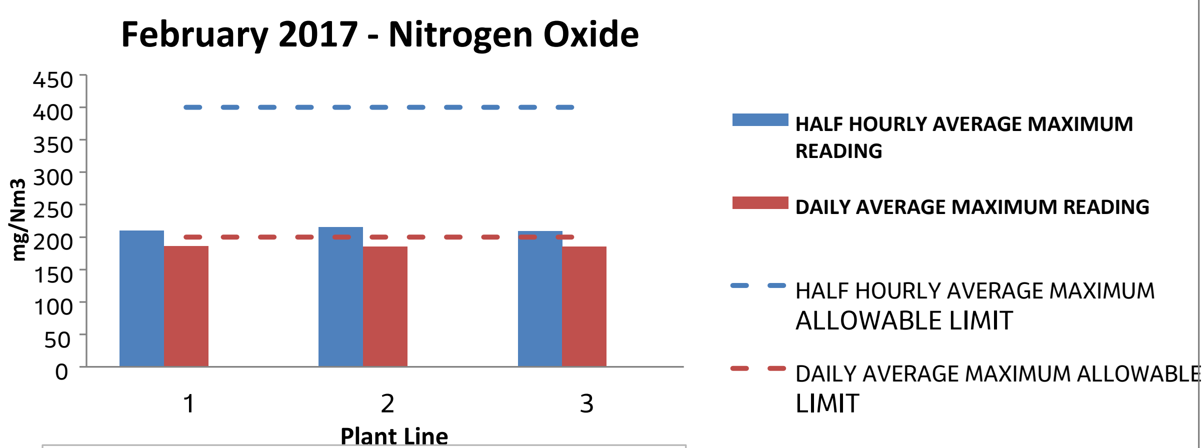

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 184.7 mg/Nm3
Line 2 = 184.5 mg/Nm3
Line 3 = 177.9 mg/Nm3

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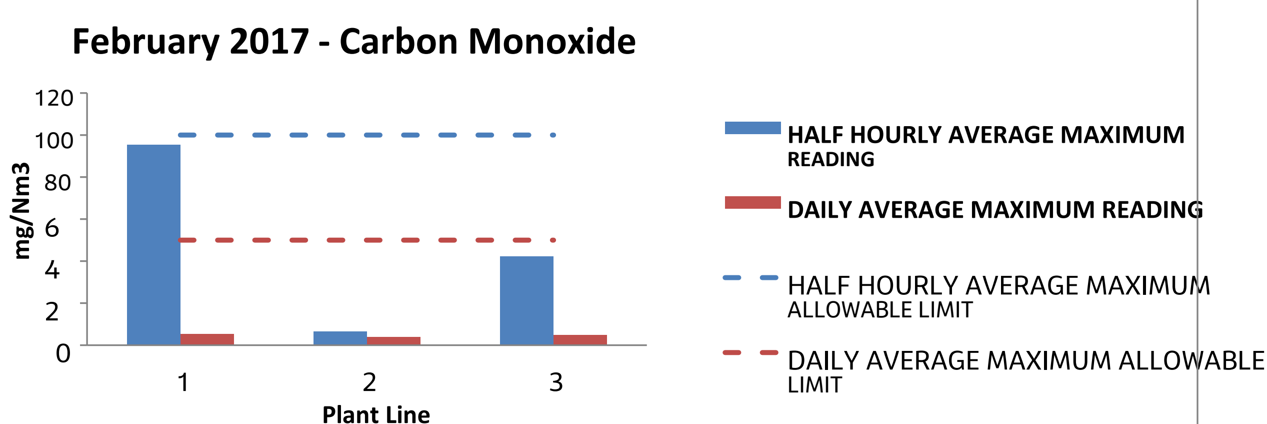

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 2.7 mg/Nm3
Line 2 = 3.3 mg/Nm3
Line 3 = 3.9 mg/Nm3

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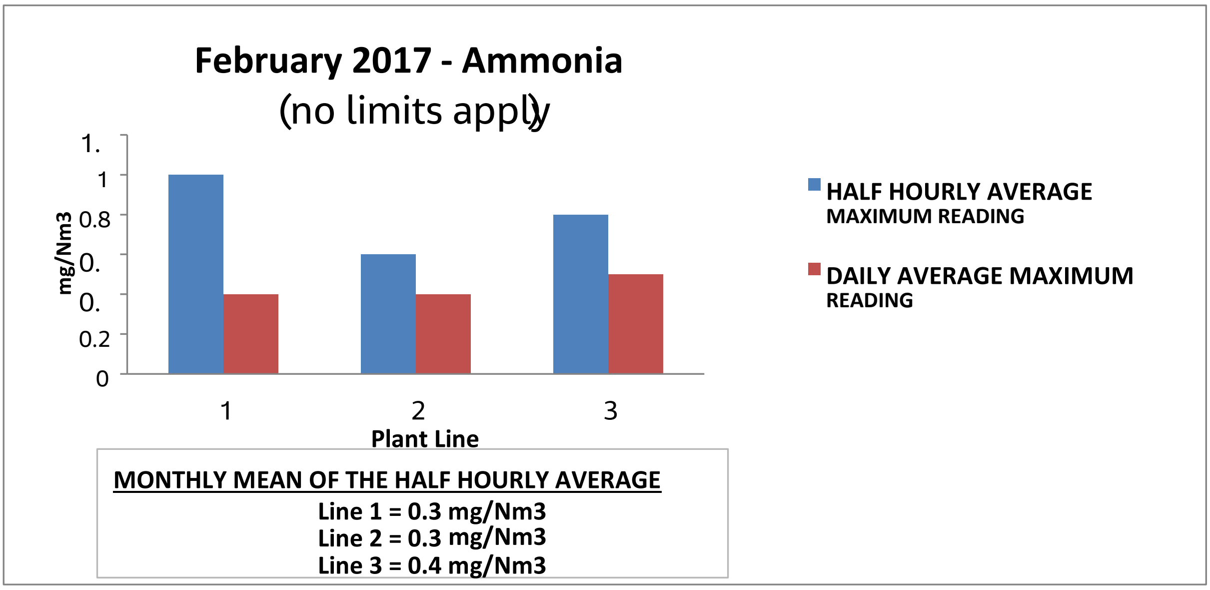

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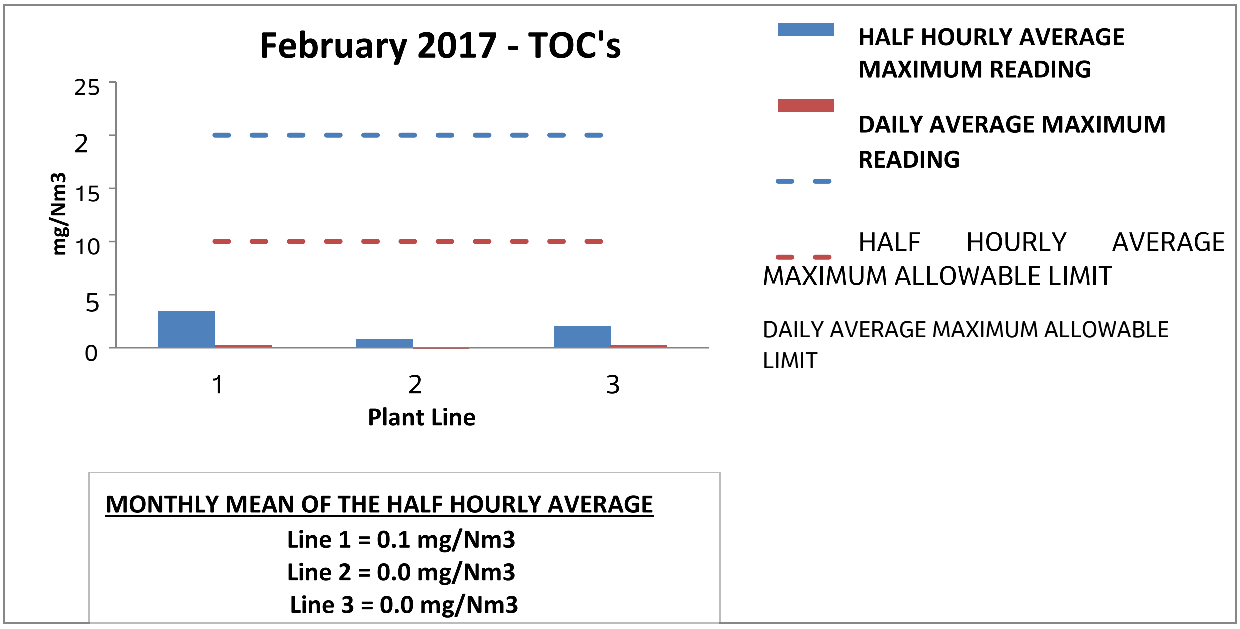

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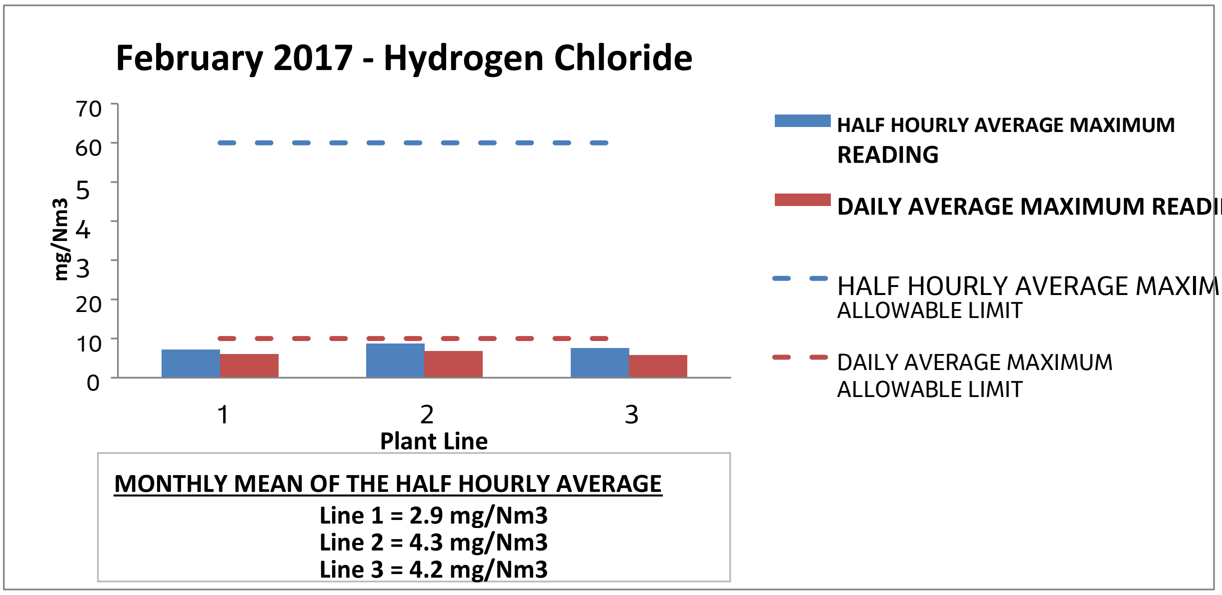

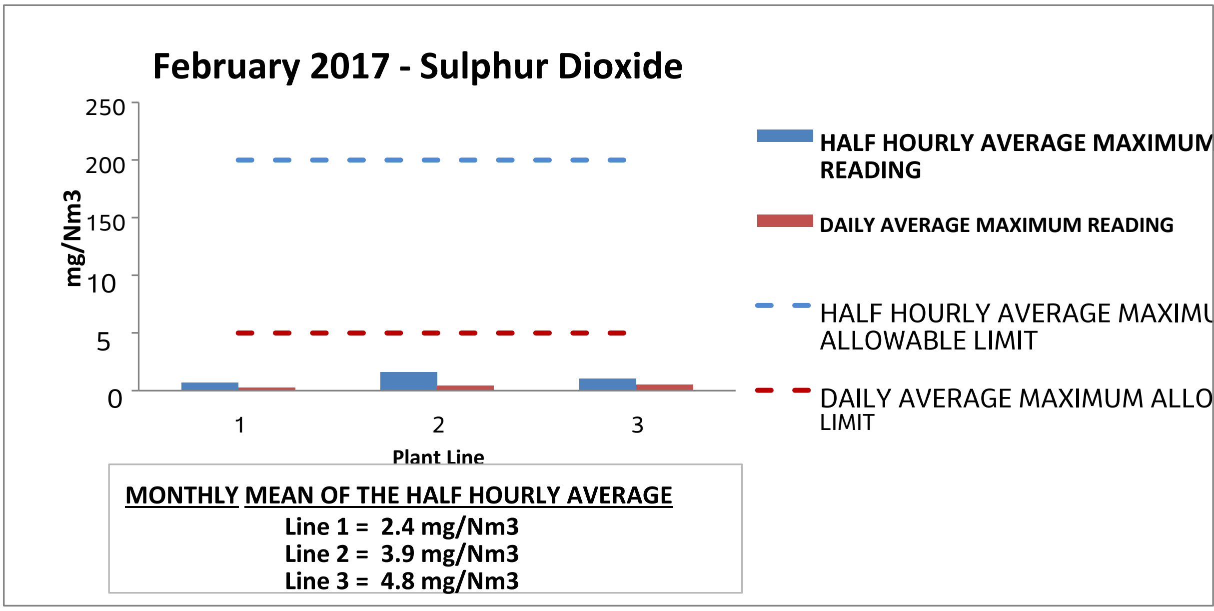

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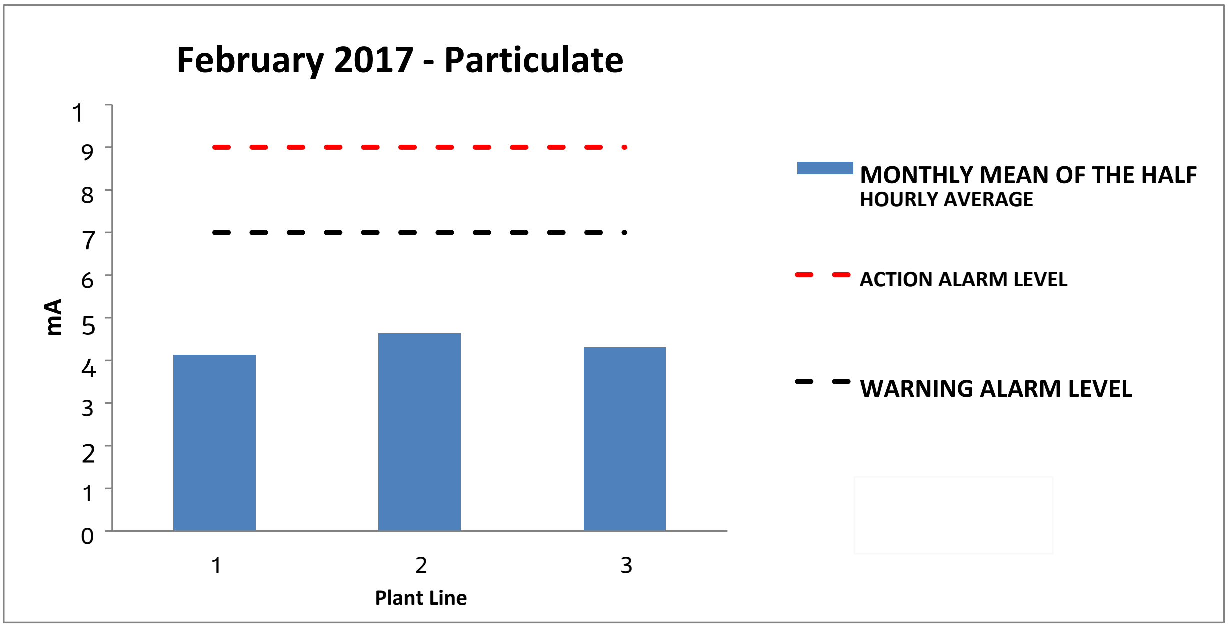

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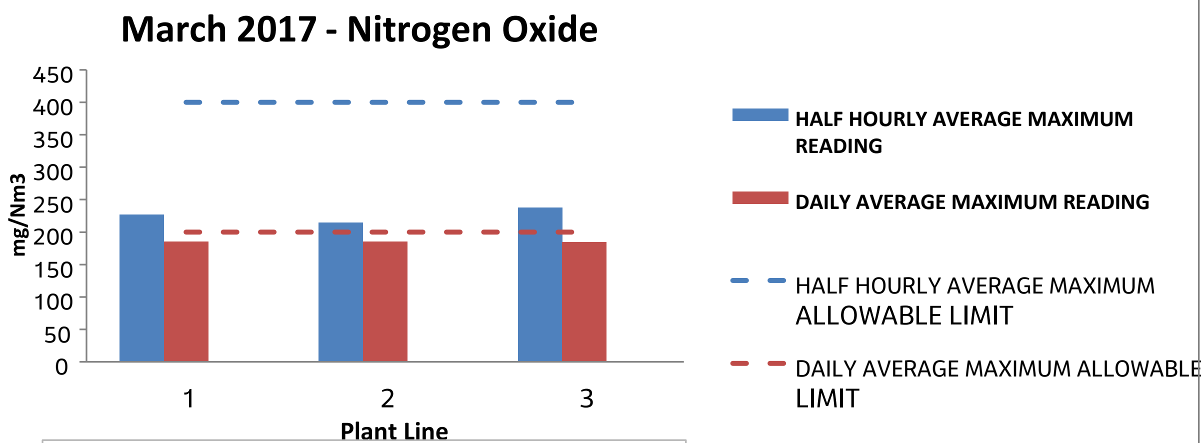

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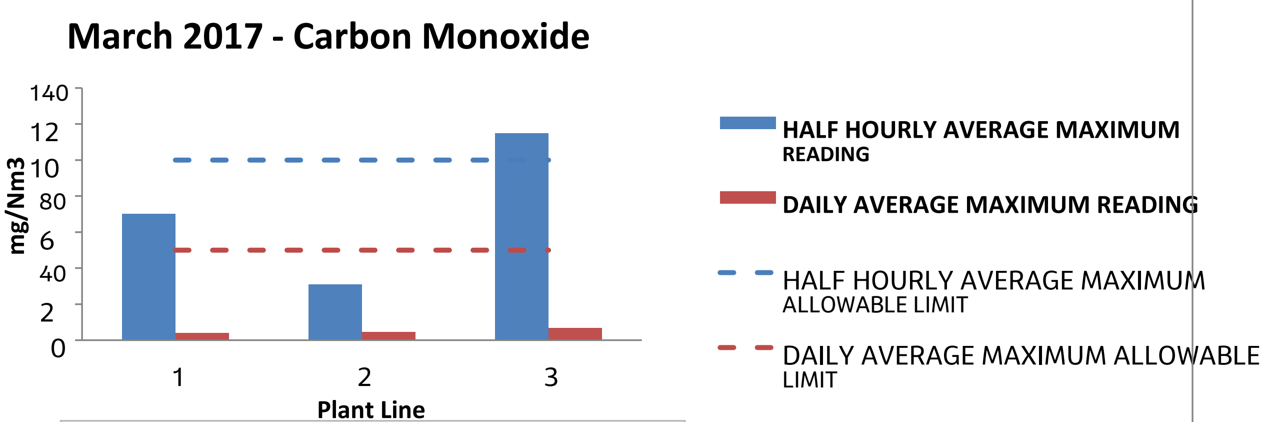

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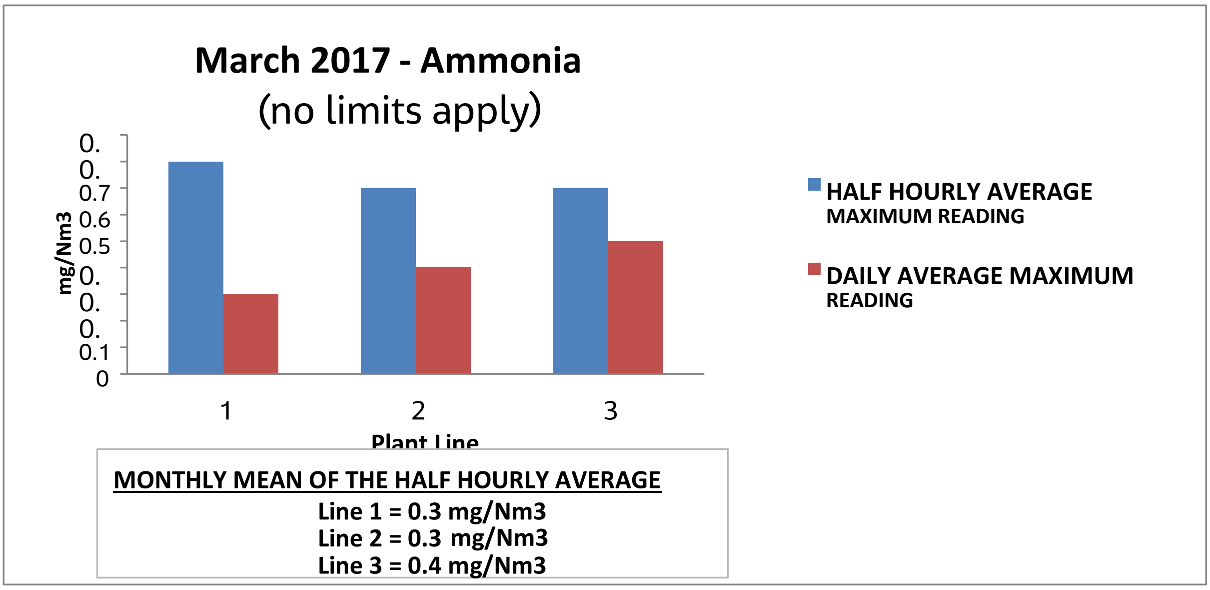

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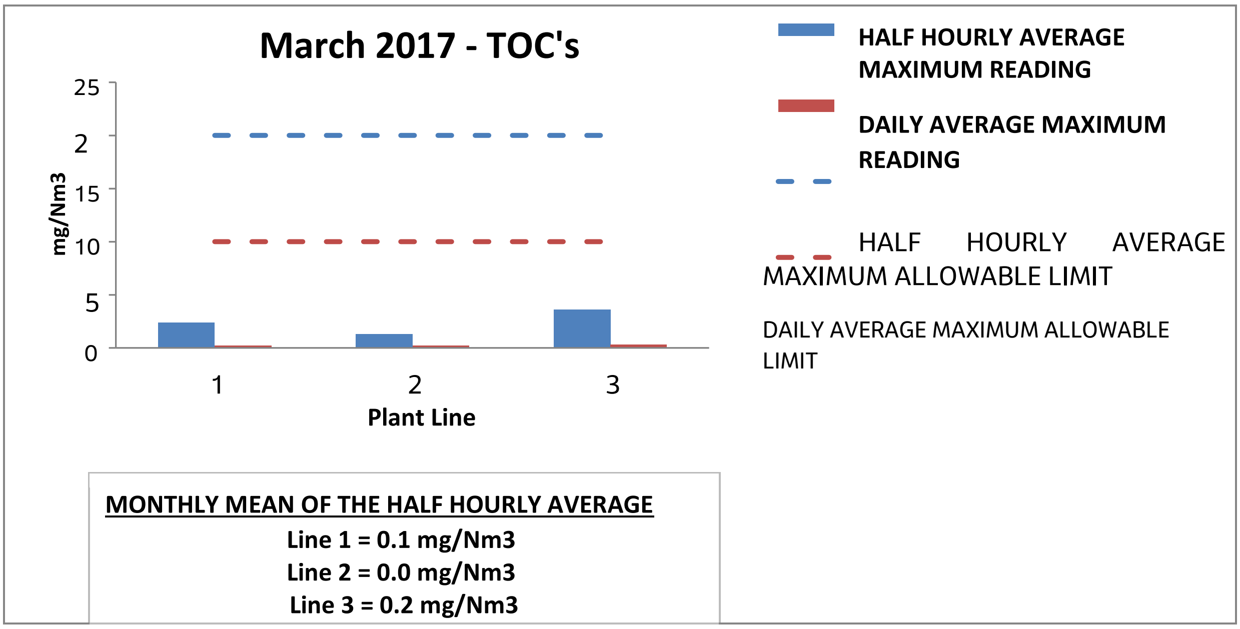

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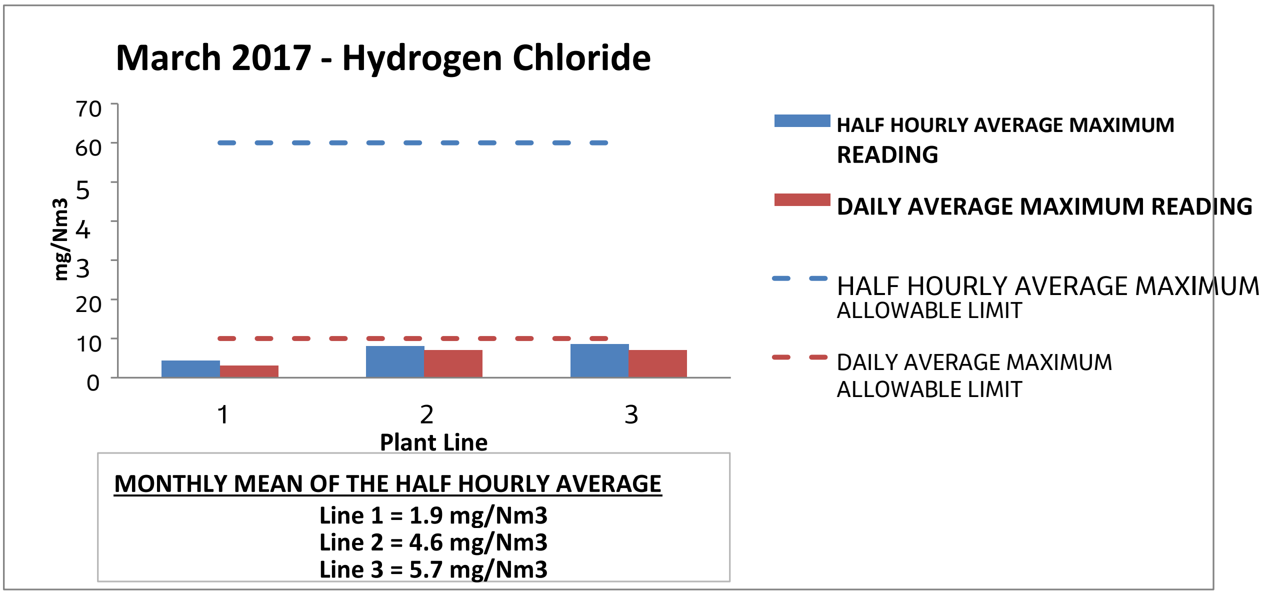

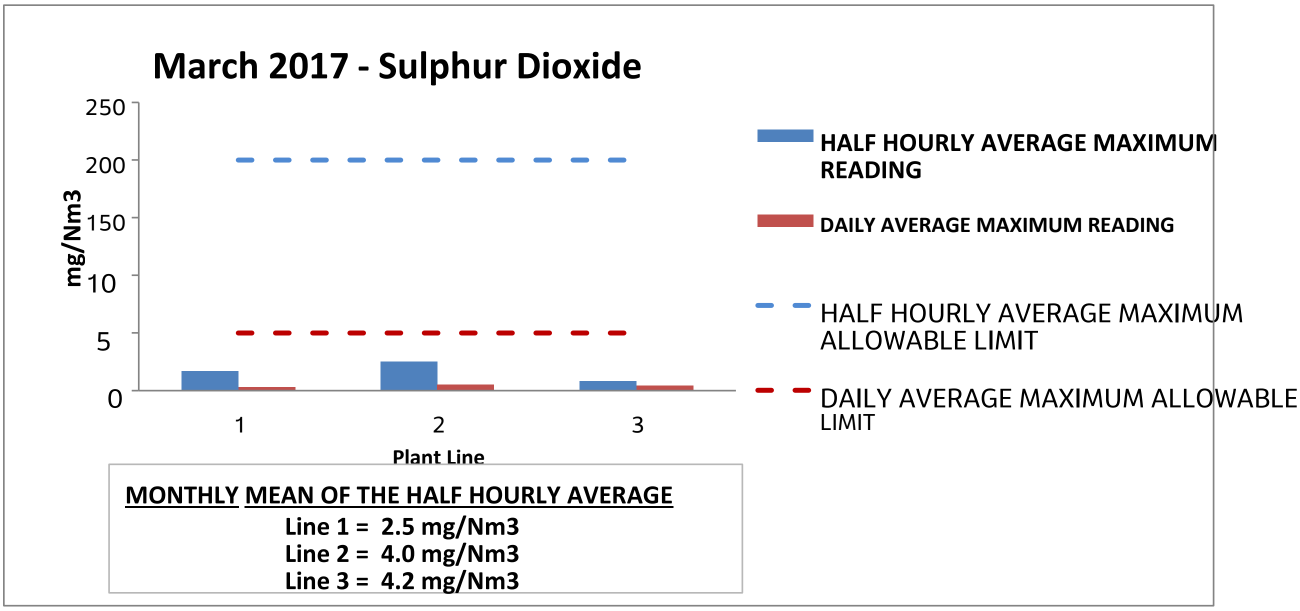

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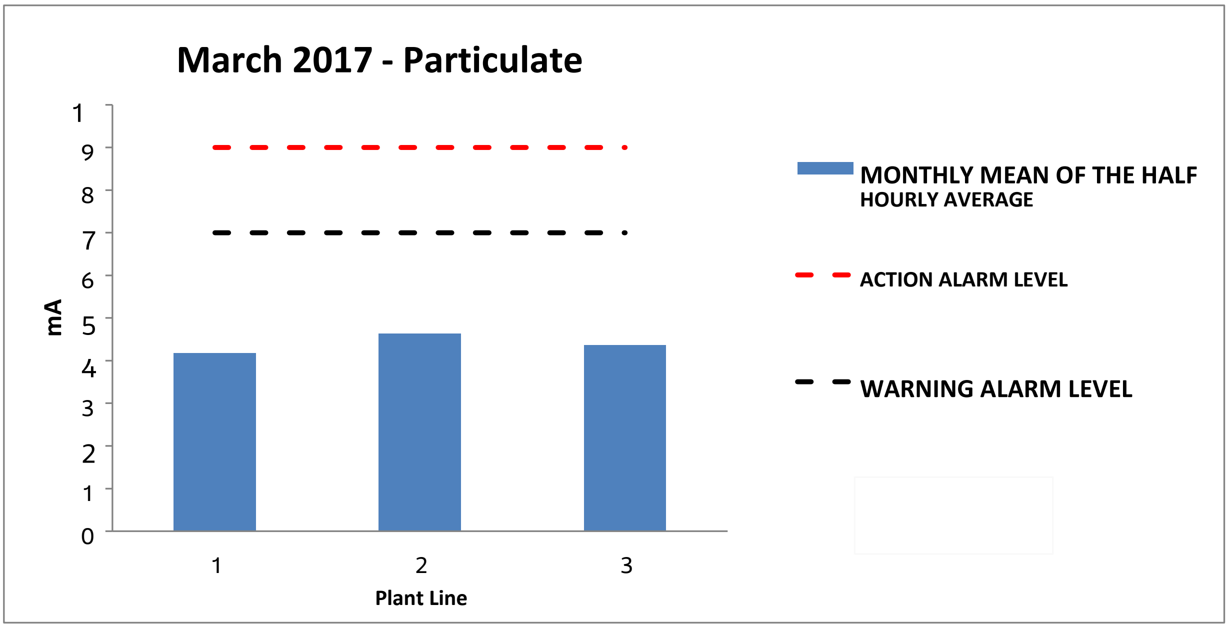

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Riverside Resource Recovery emission report – April 2017

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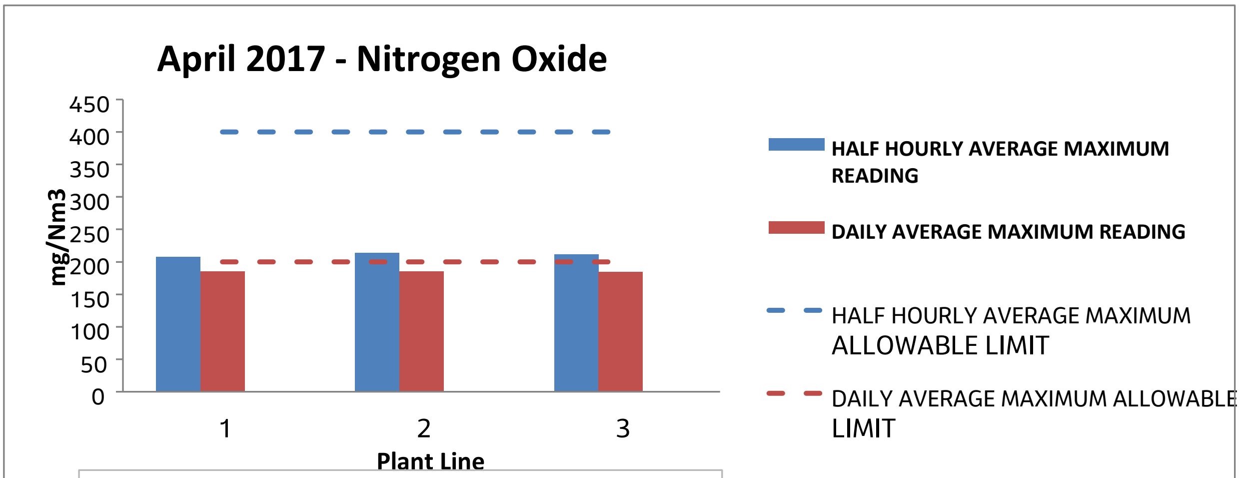
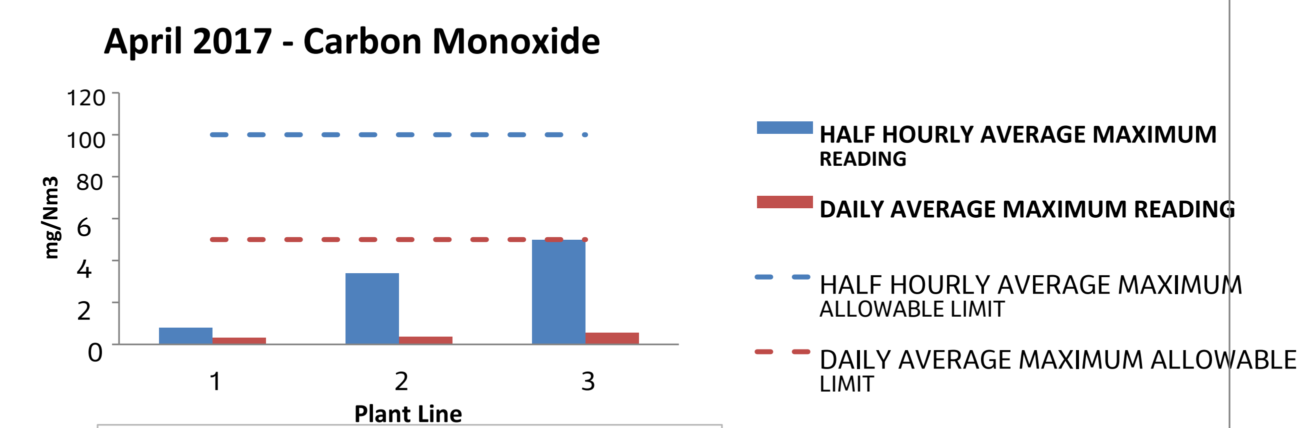


MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 185.0 mg/Nm3
Line 2 = 184.4 mg/Nm3
Line 3 = 179.3 mg/Nm3

Why do we control and monitor Oxides of Nitrogen (NOx)?

NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO). These can be formed naturally, but are also formed from man-made processes like fuel combustion or biomass burning. There are a number of health and environmental issues attributed to NOx, including smog, acid rain, and possibly global warming.



MONTHLY MEAN OF THE HALF HOURLY AVERAGE
Line 1 = 2.6 mg/Nm3
Line 2 = 3.1 mg/Nm3
Line 3 = 4.5 mg/Nm3

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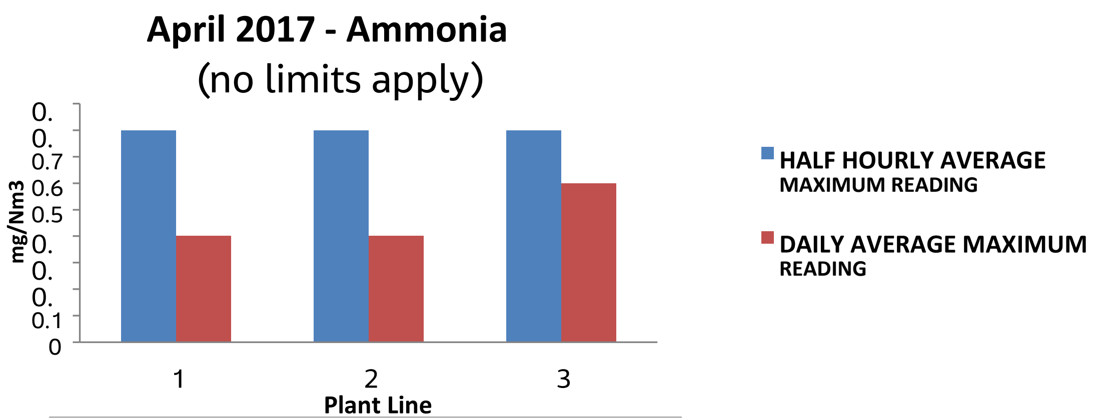

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
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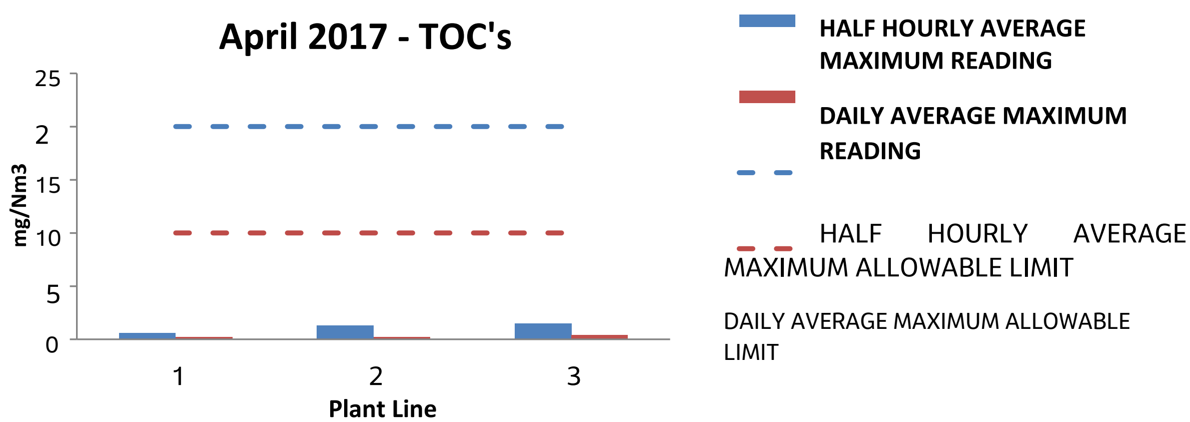

MONTHLY MEAN OF THE HALF HOURLY AVERAGE
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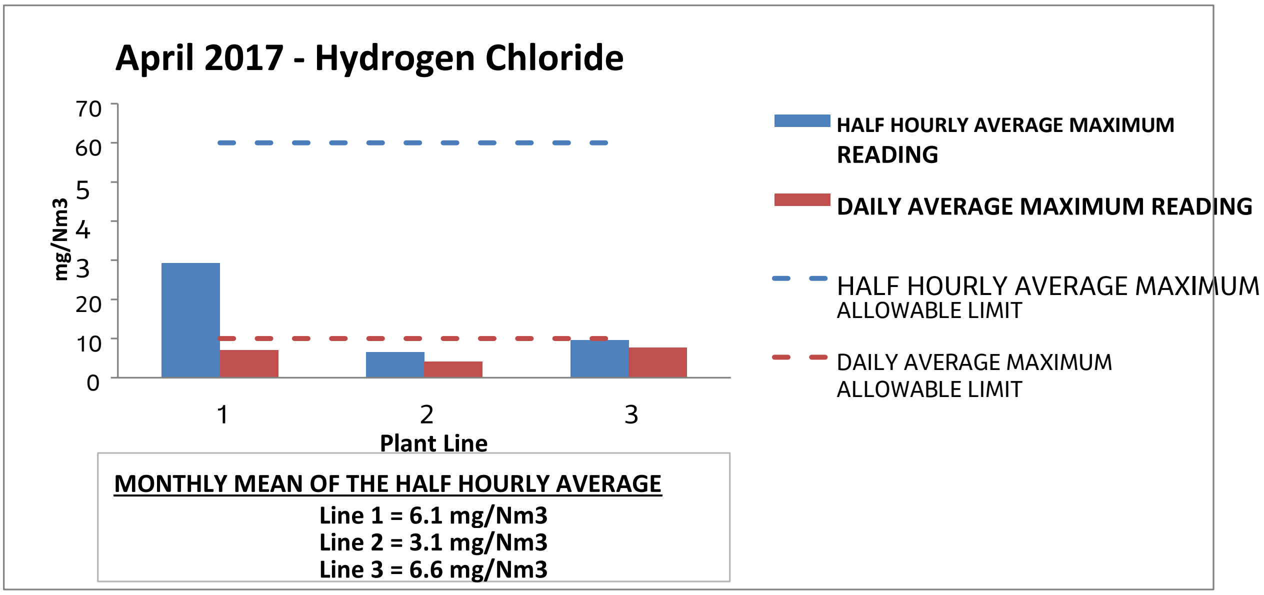

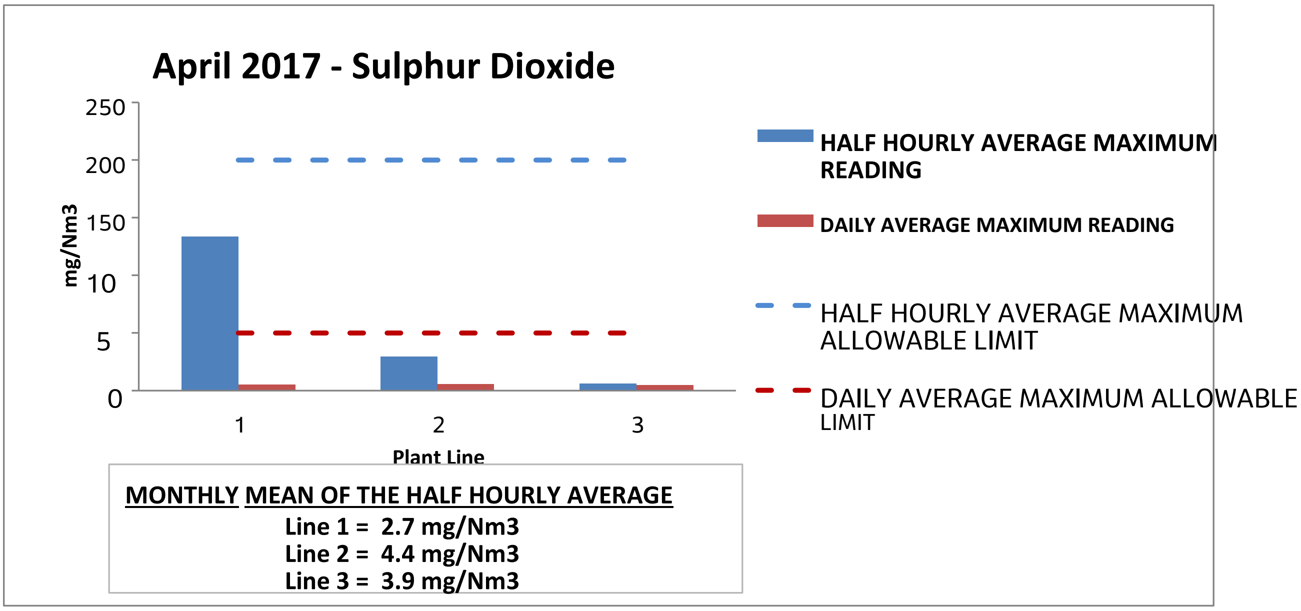

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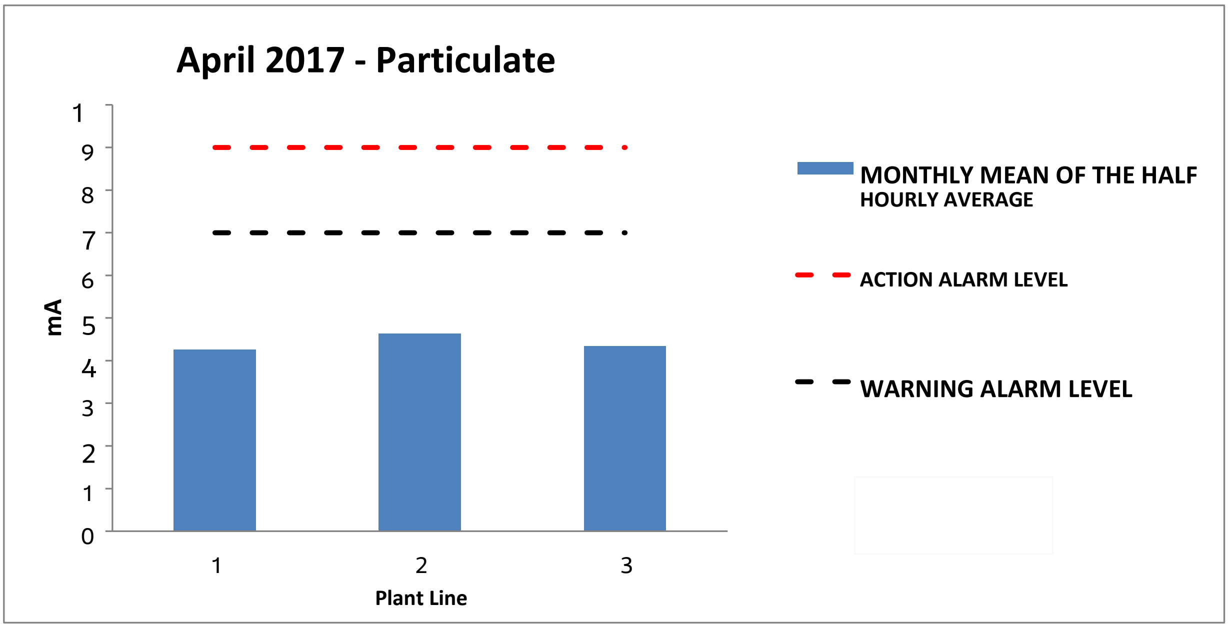

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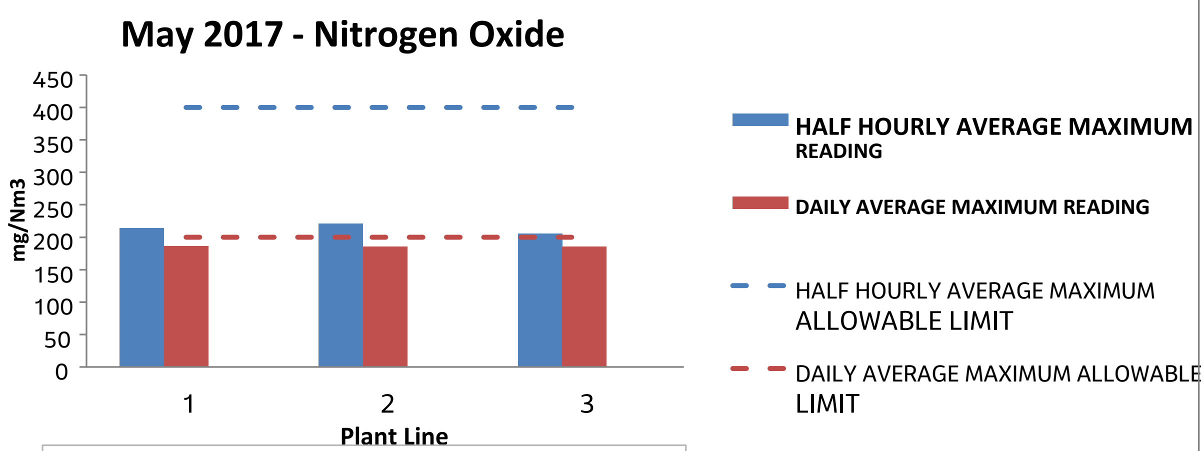

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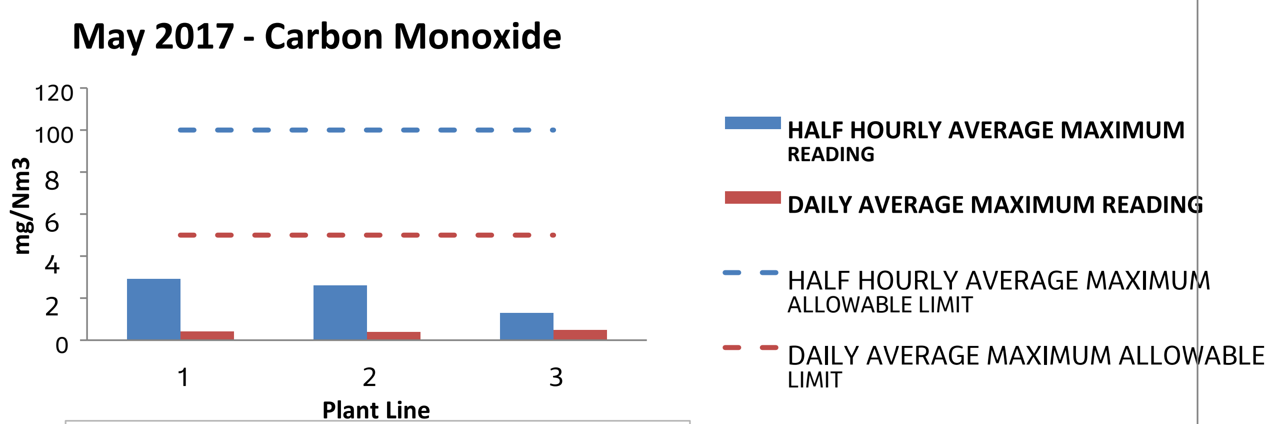

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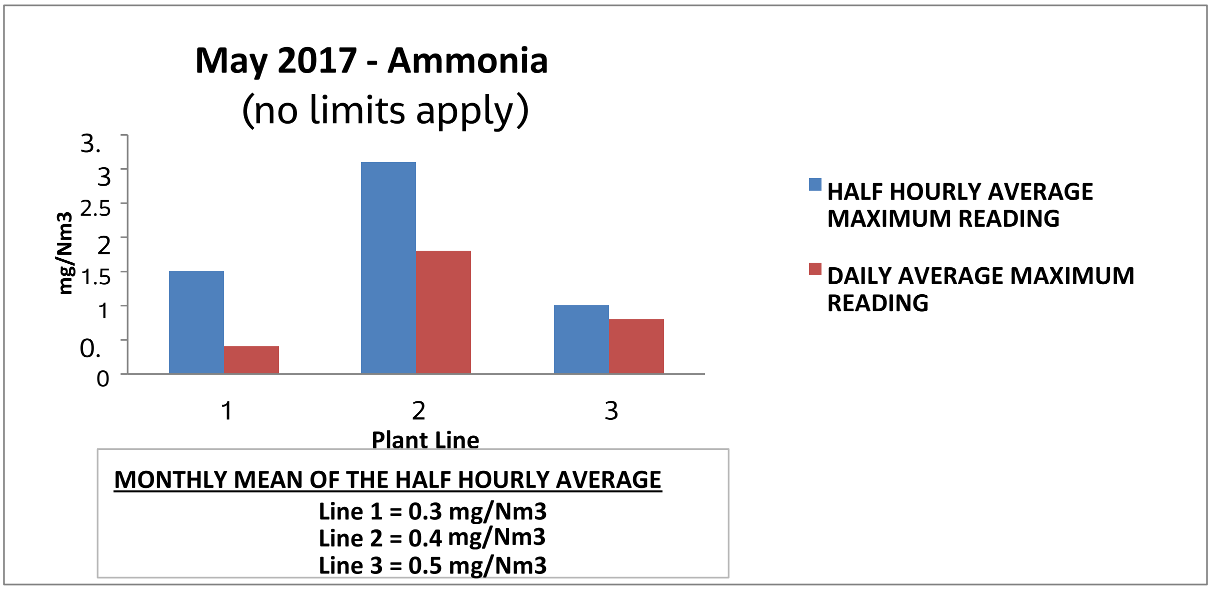

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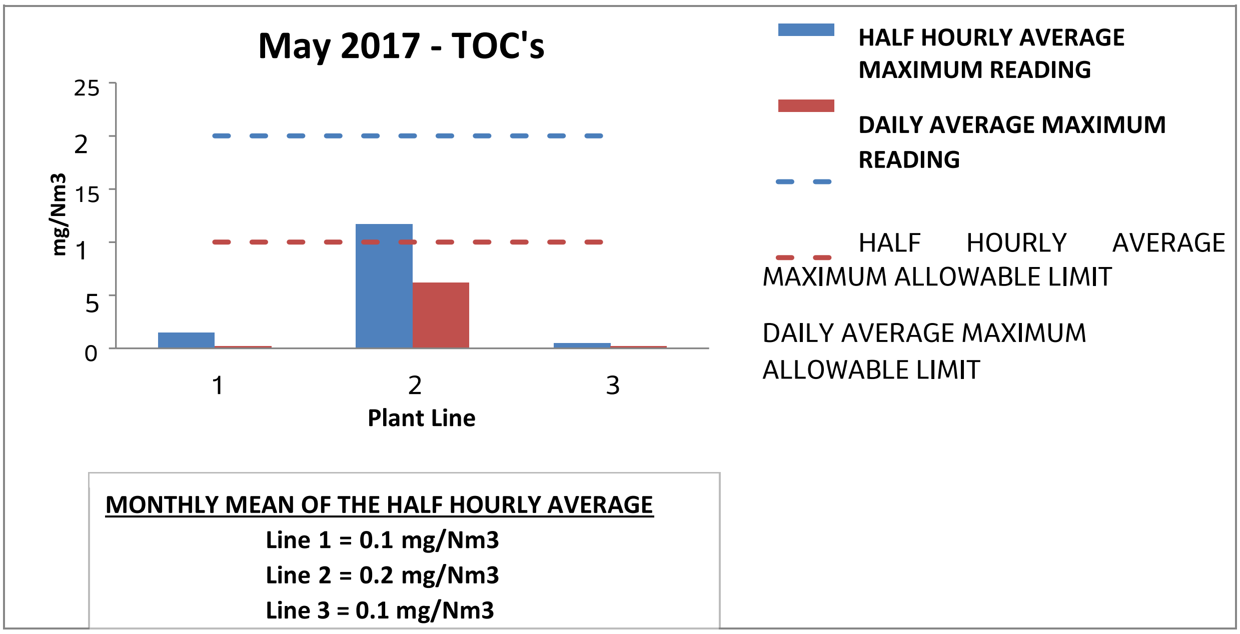

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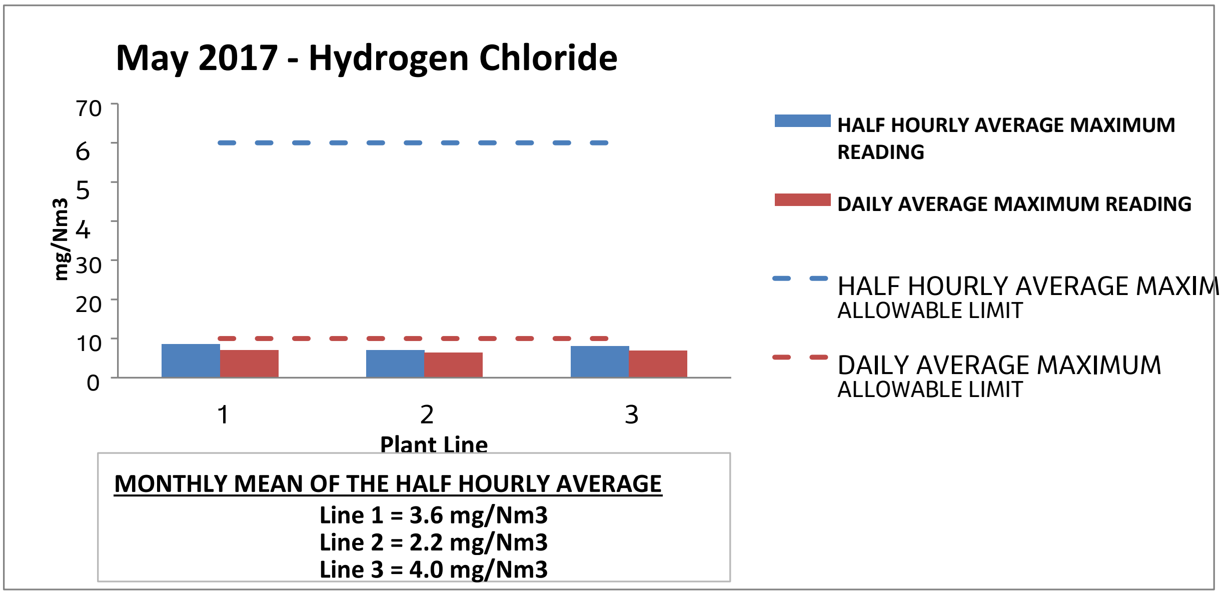

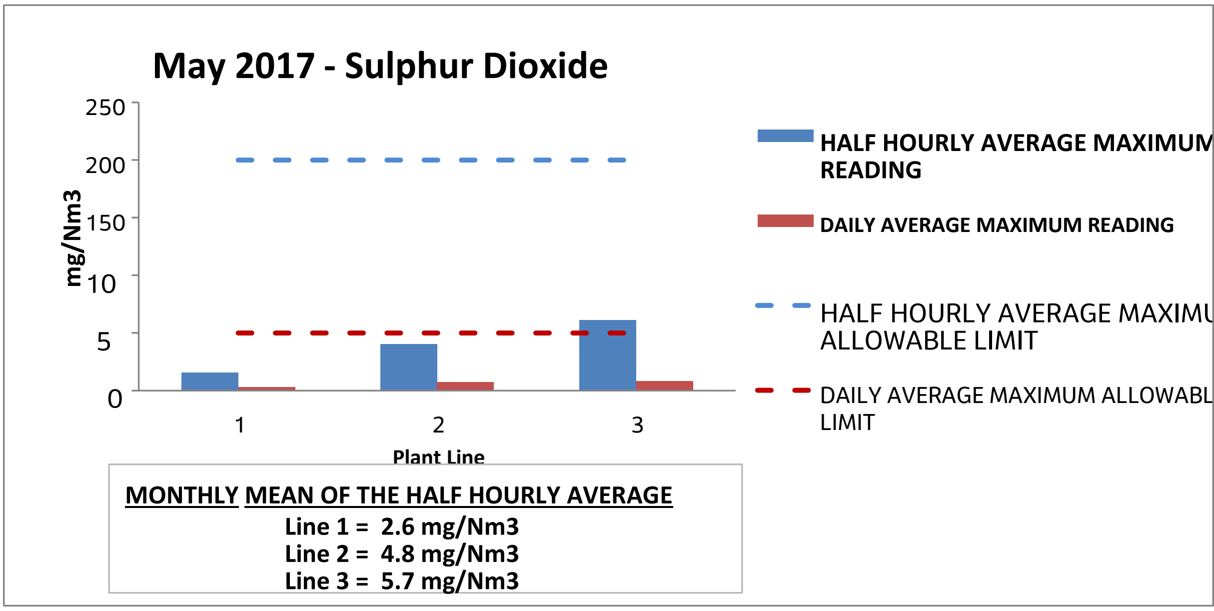

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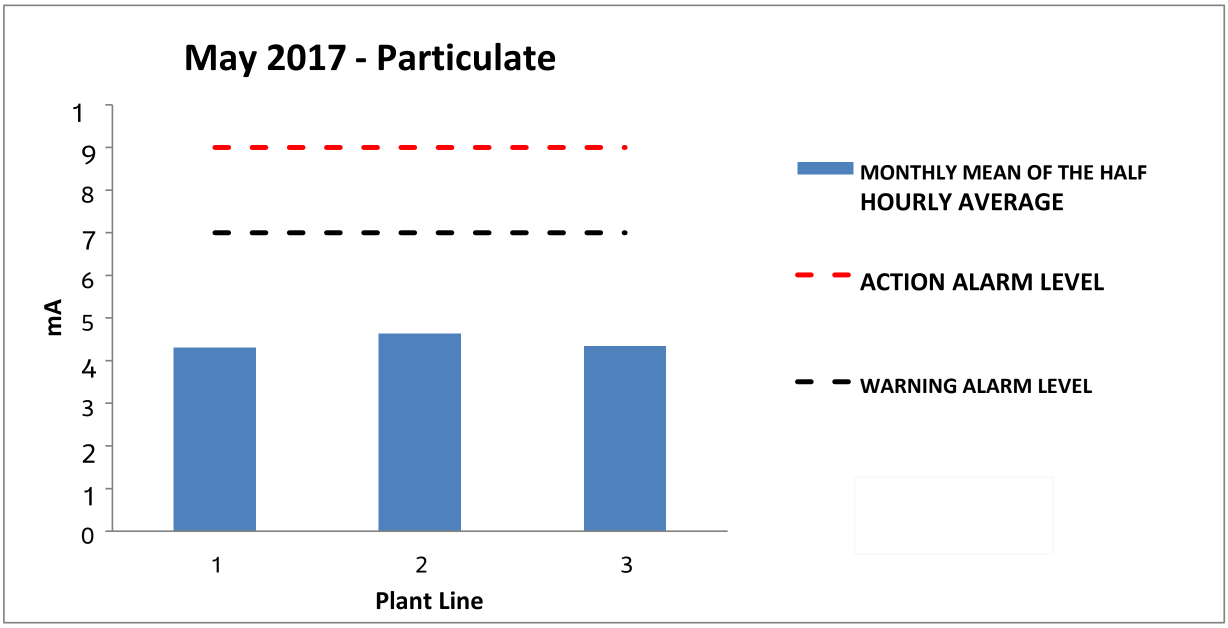

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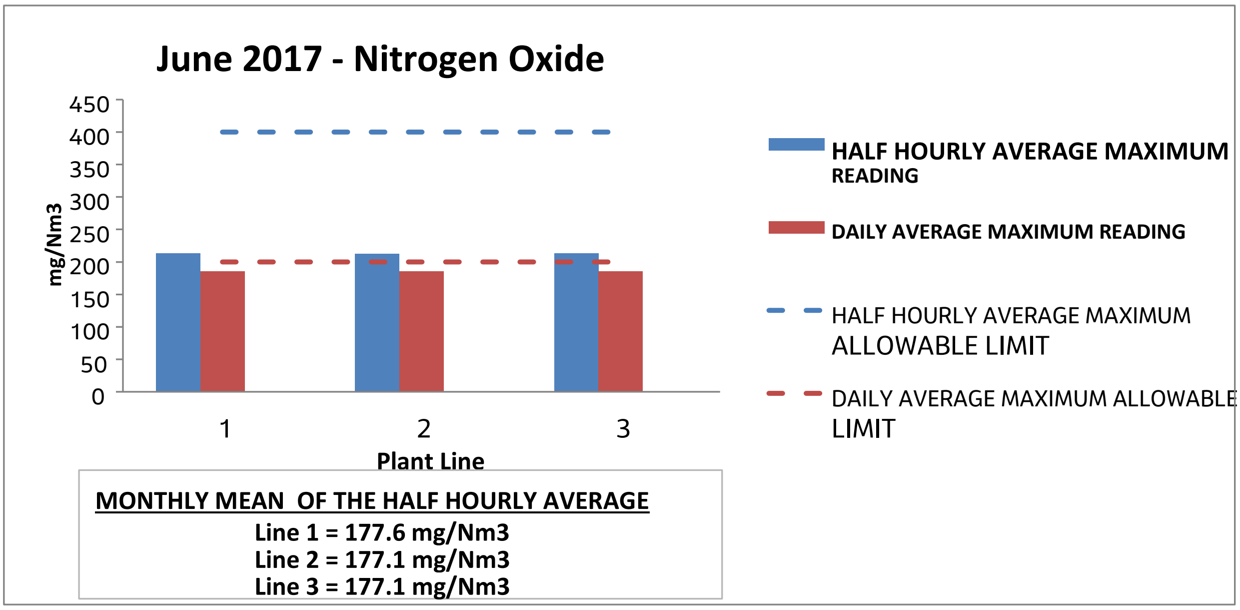

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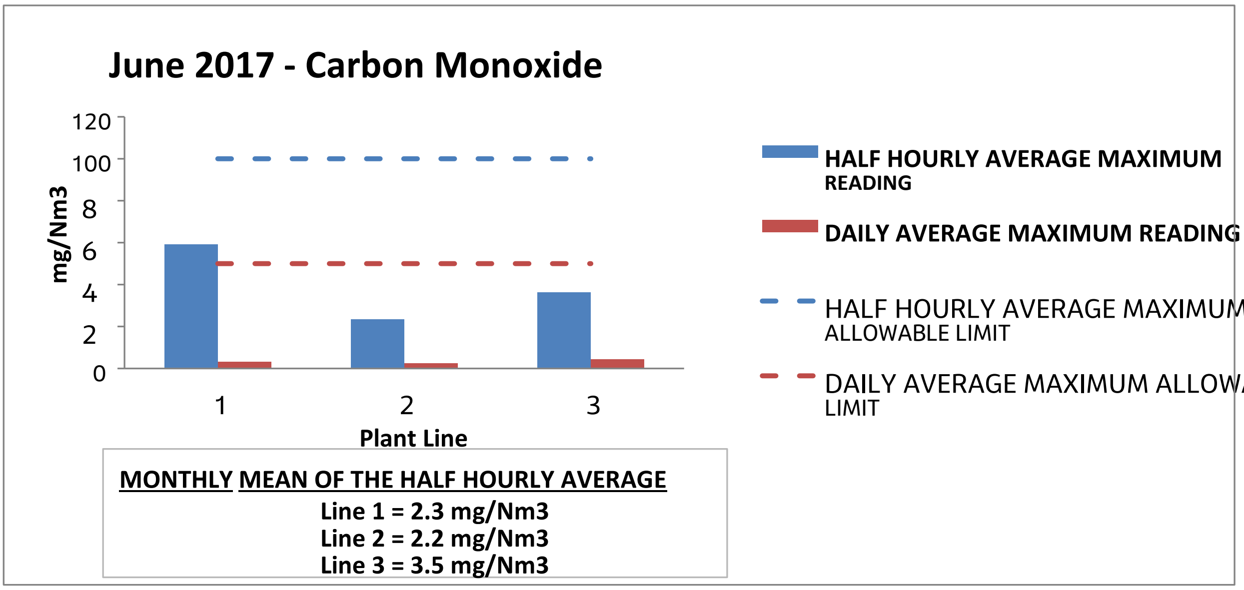

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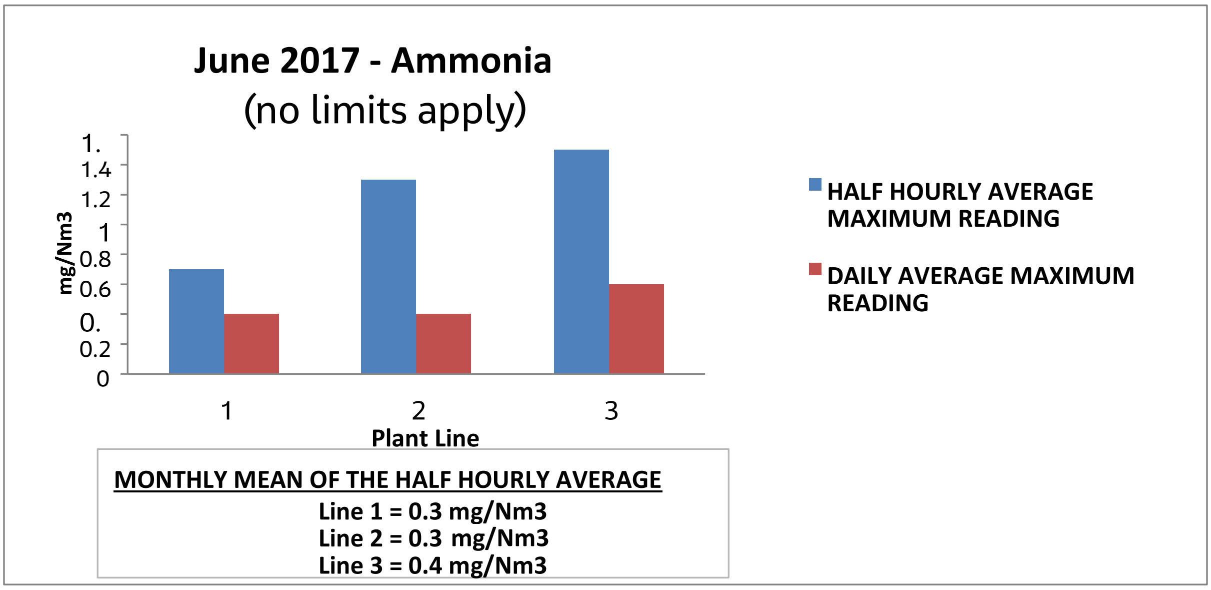

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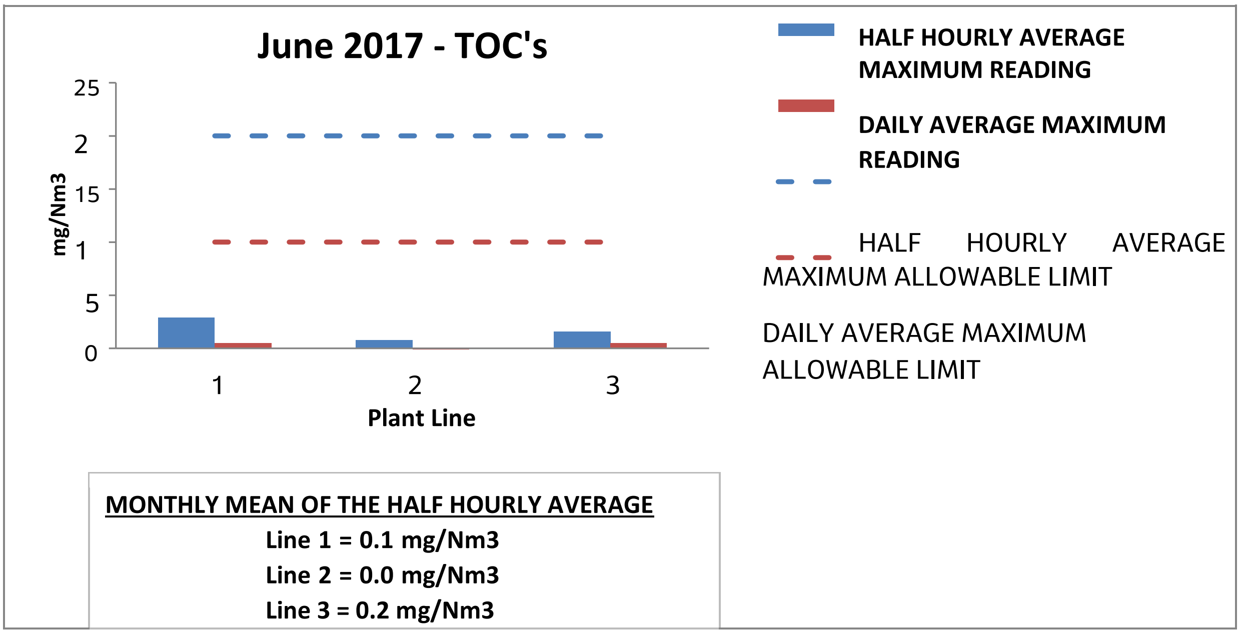

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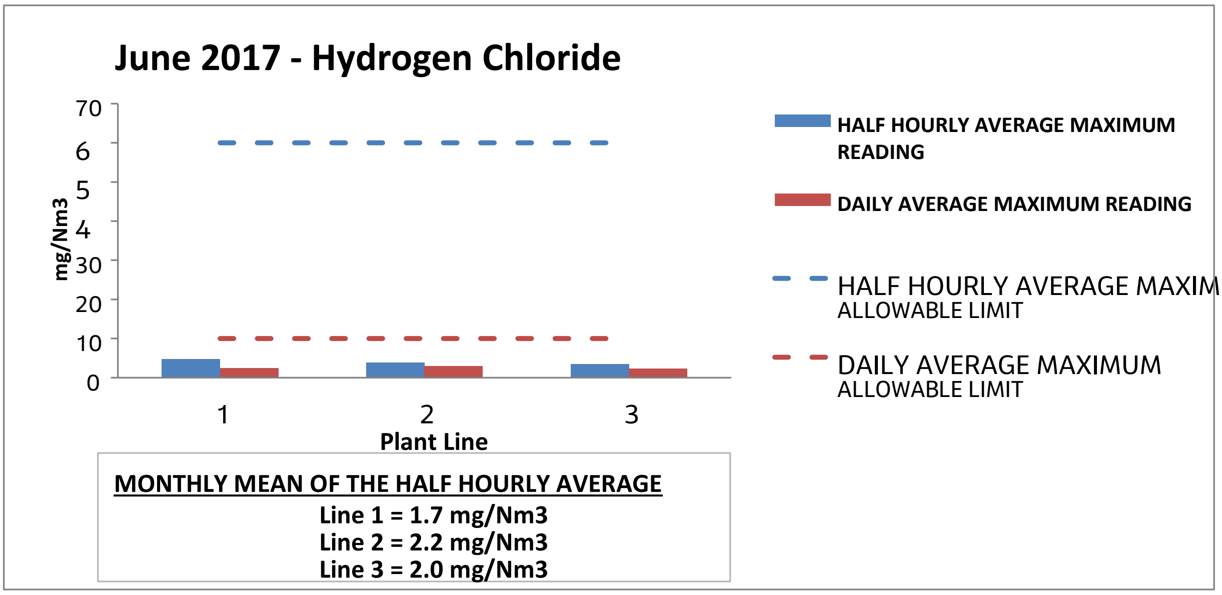

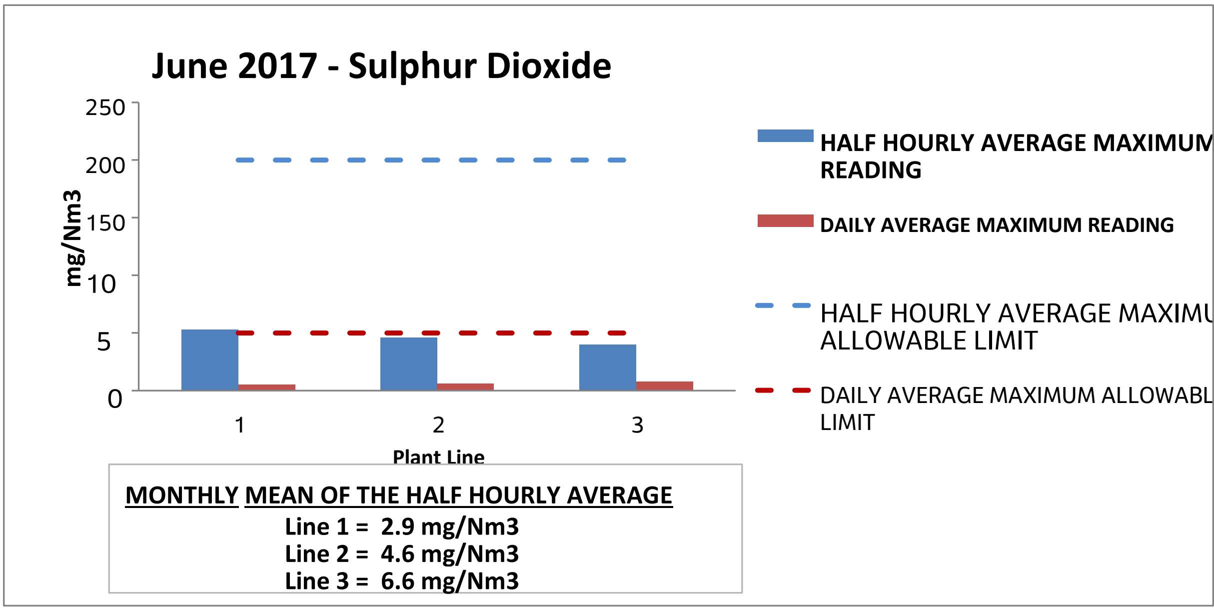

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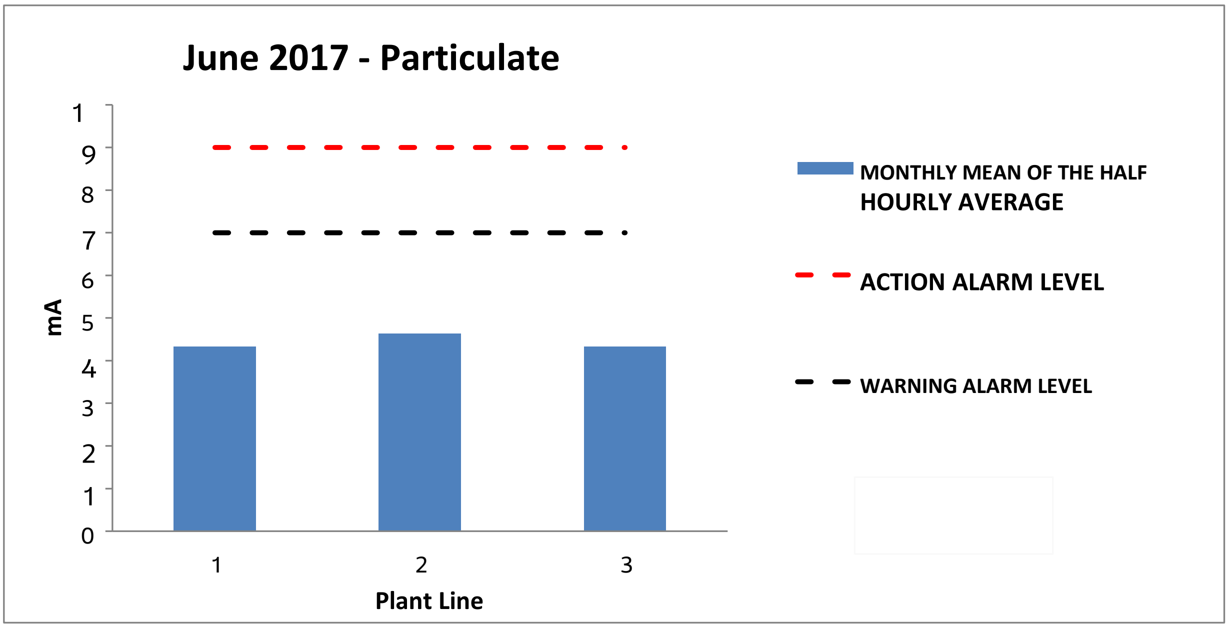

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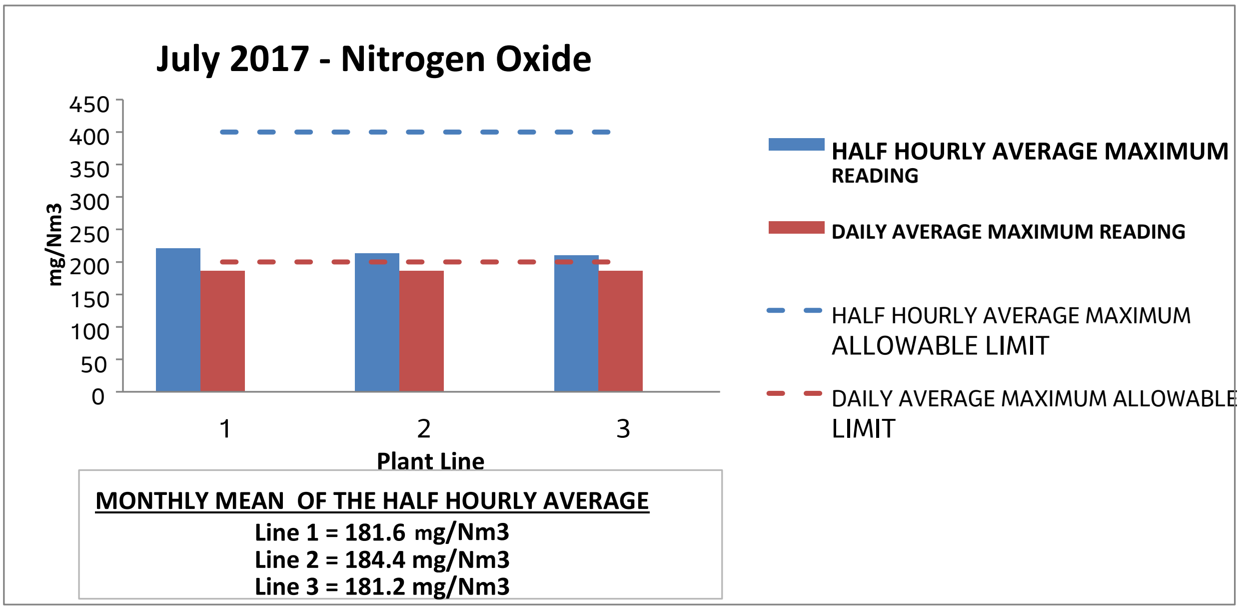

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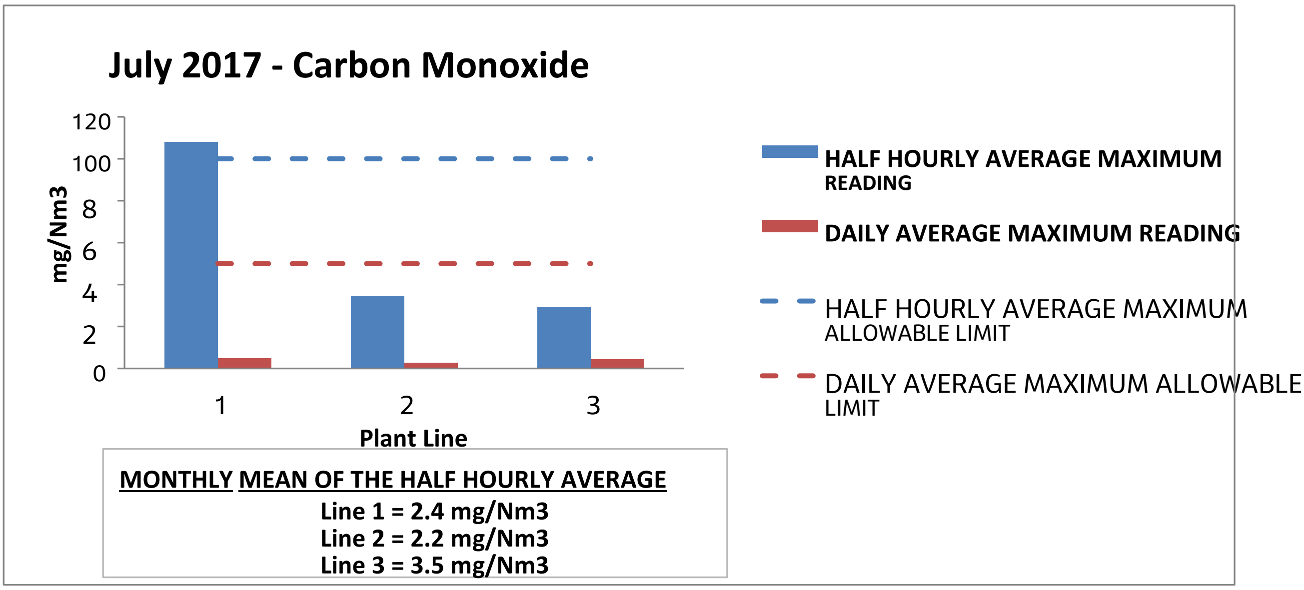

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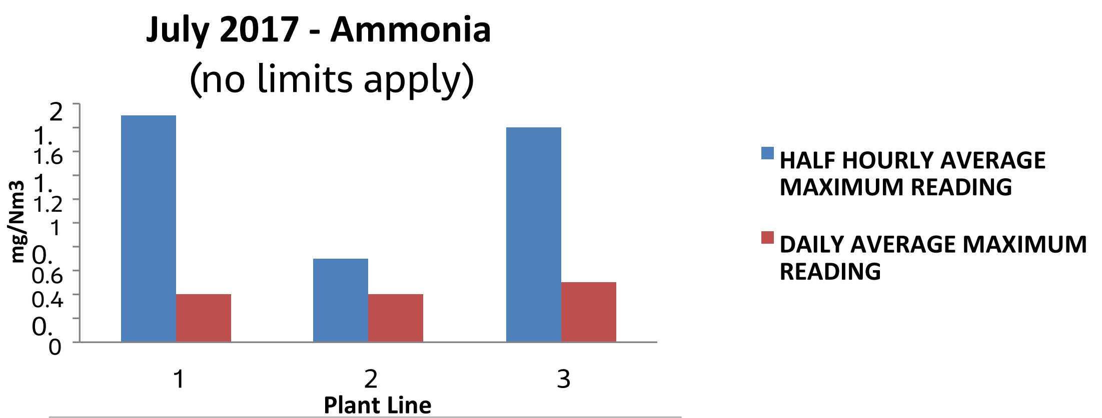

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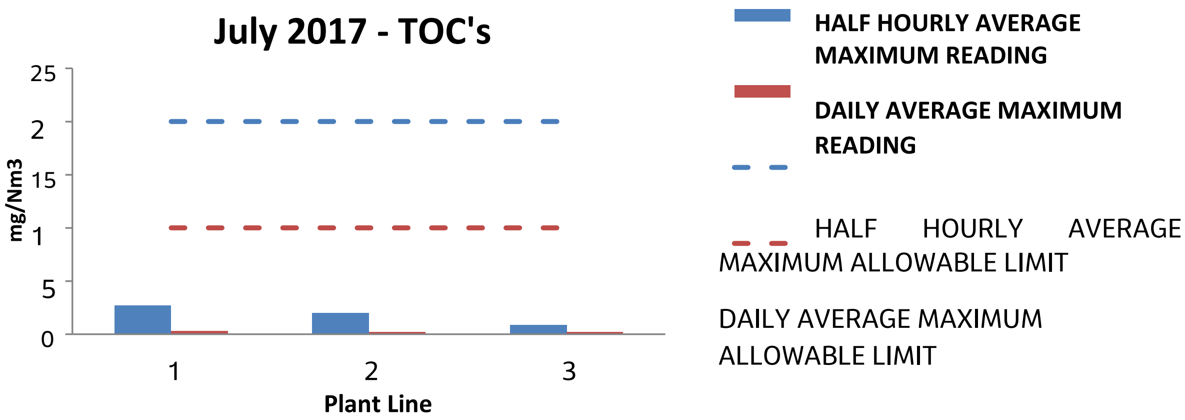

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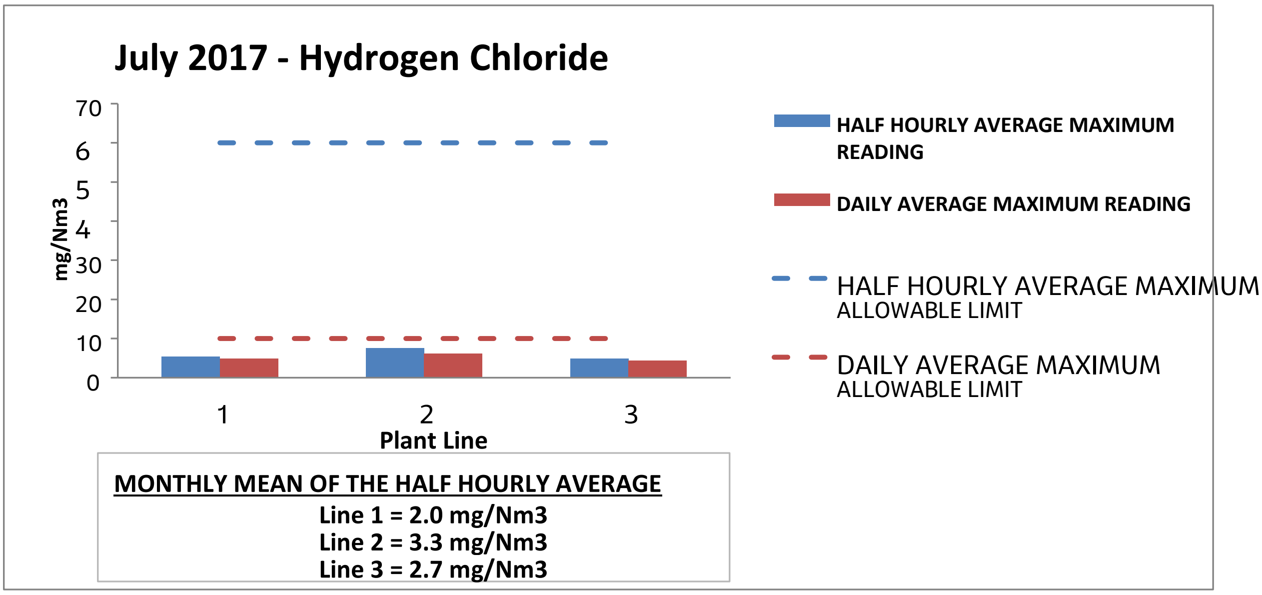

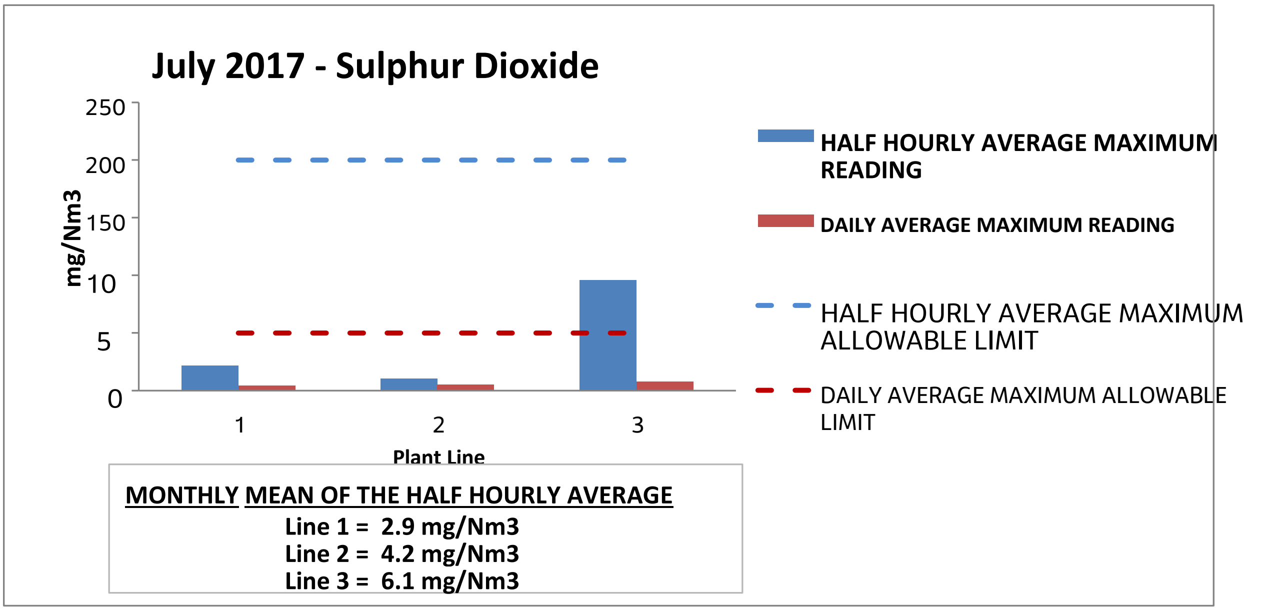

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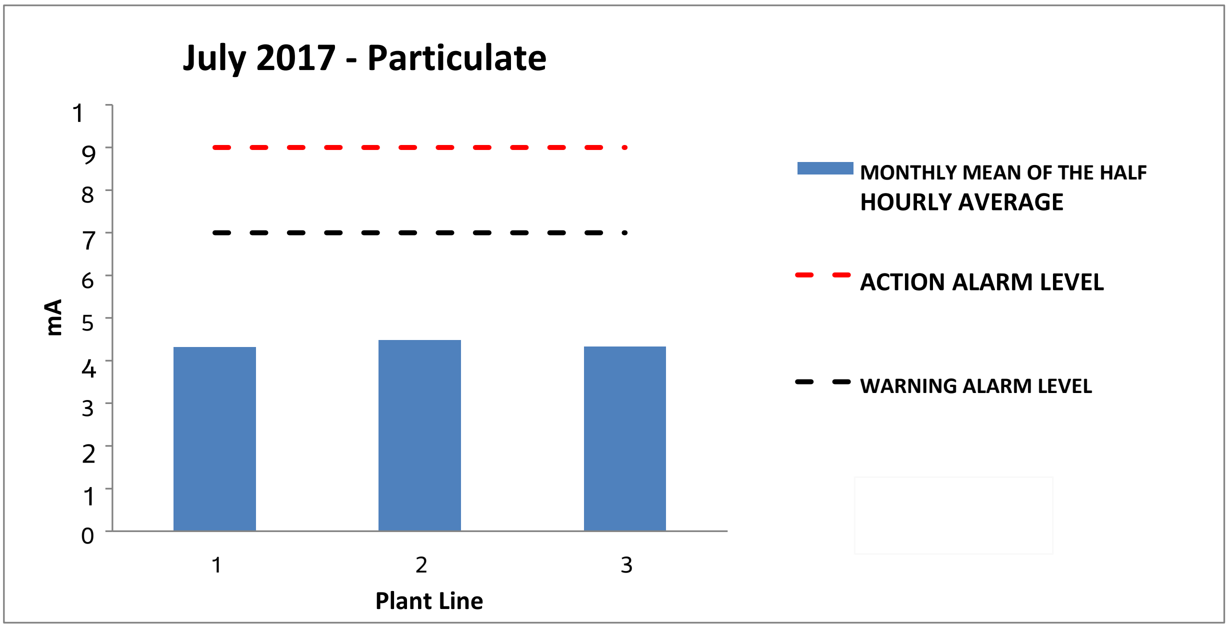

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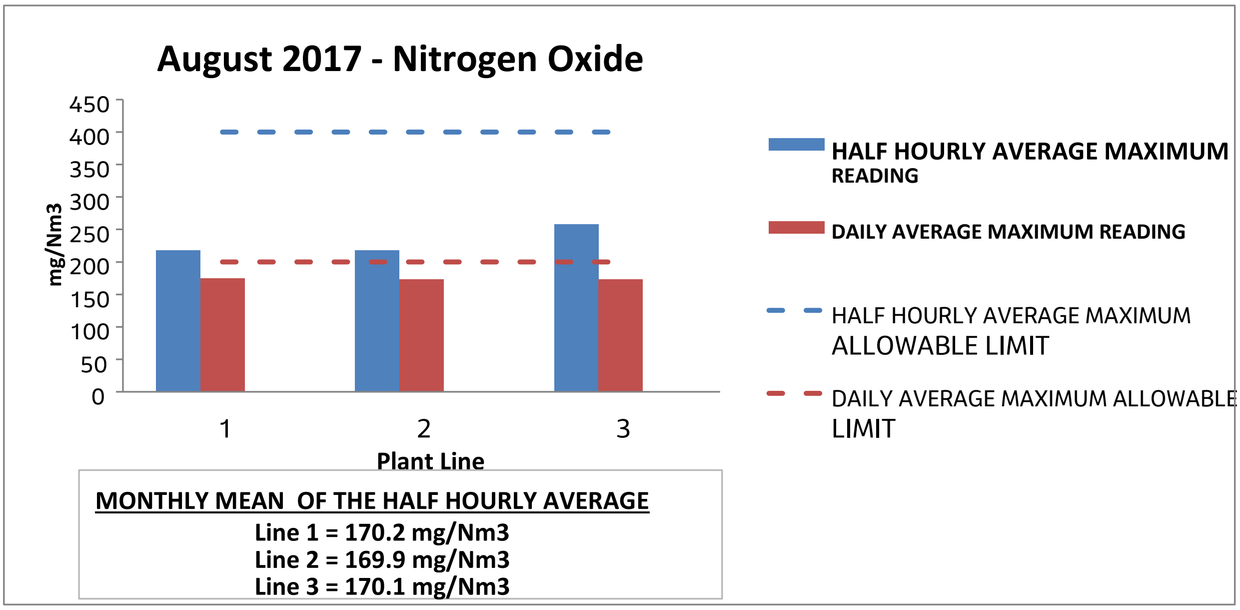

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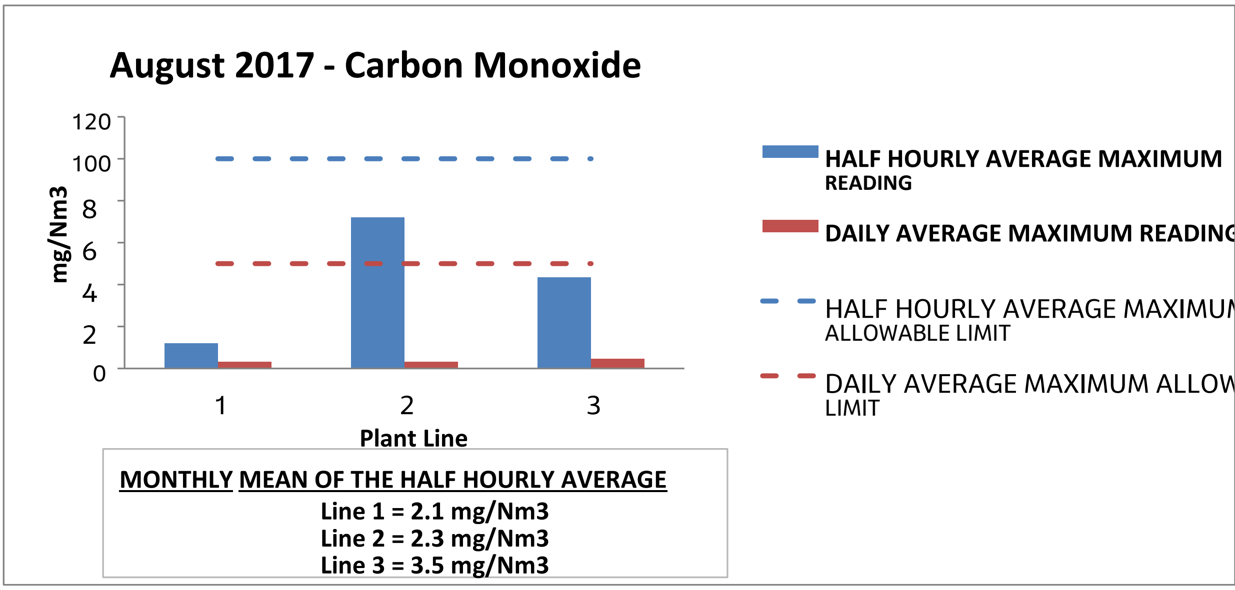

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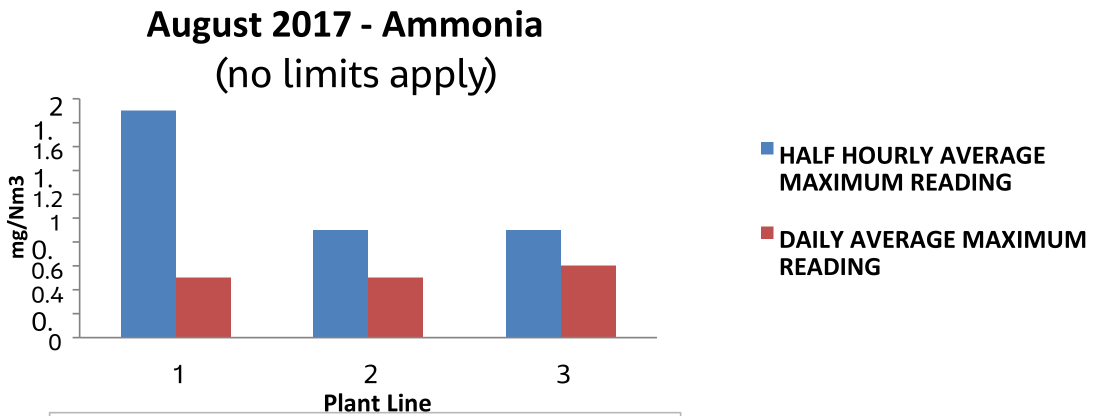

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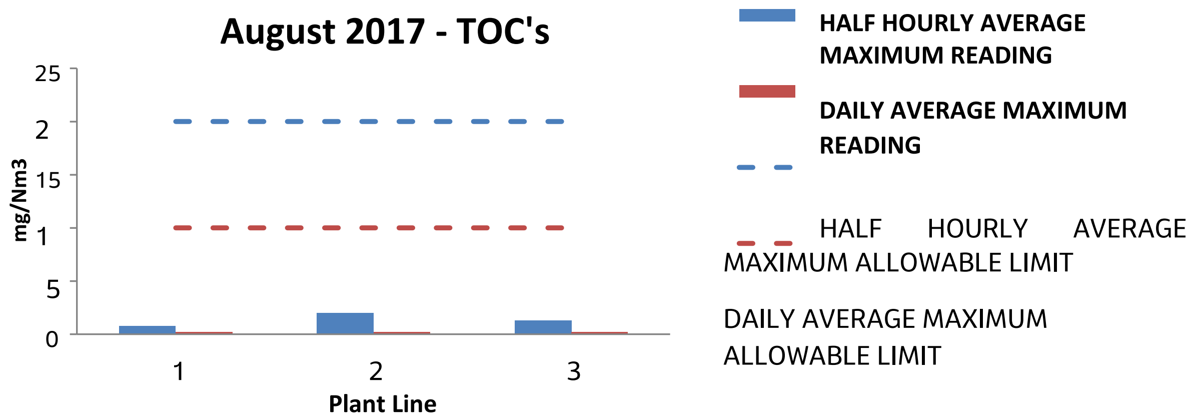

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Line 3 = 0.1 mg/Nm3

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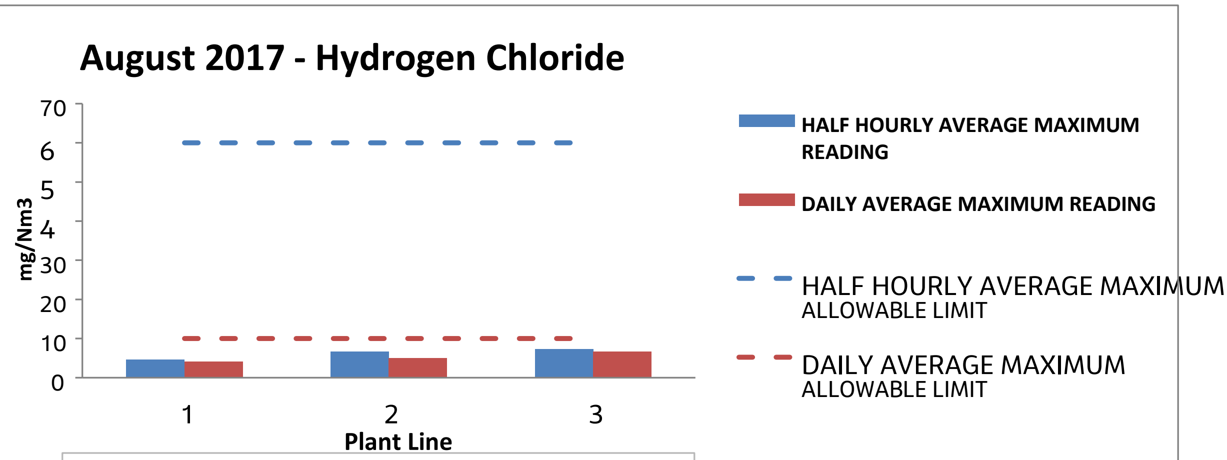
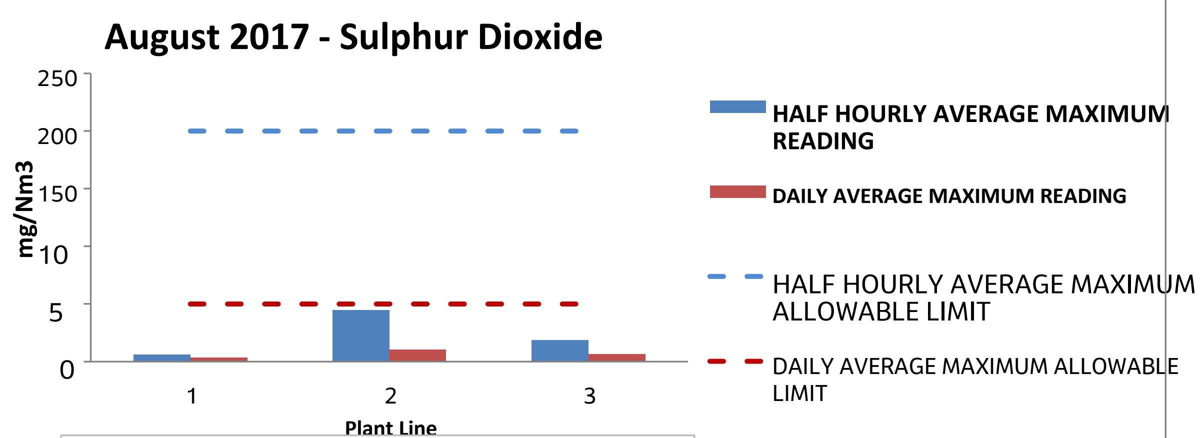


MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 2.3 mg/Nm3
Line 2 = 3.1 mg/Nm3
Line 3 = 4.2 mg/Nm3



MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 2.8 mg/Nm3
Line 2 = 5.0 mg/Nm3
Line 3 = 5.6 mg/Nm3

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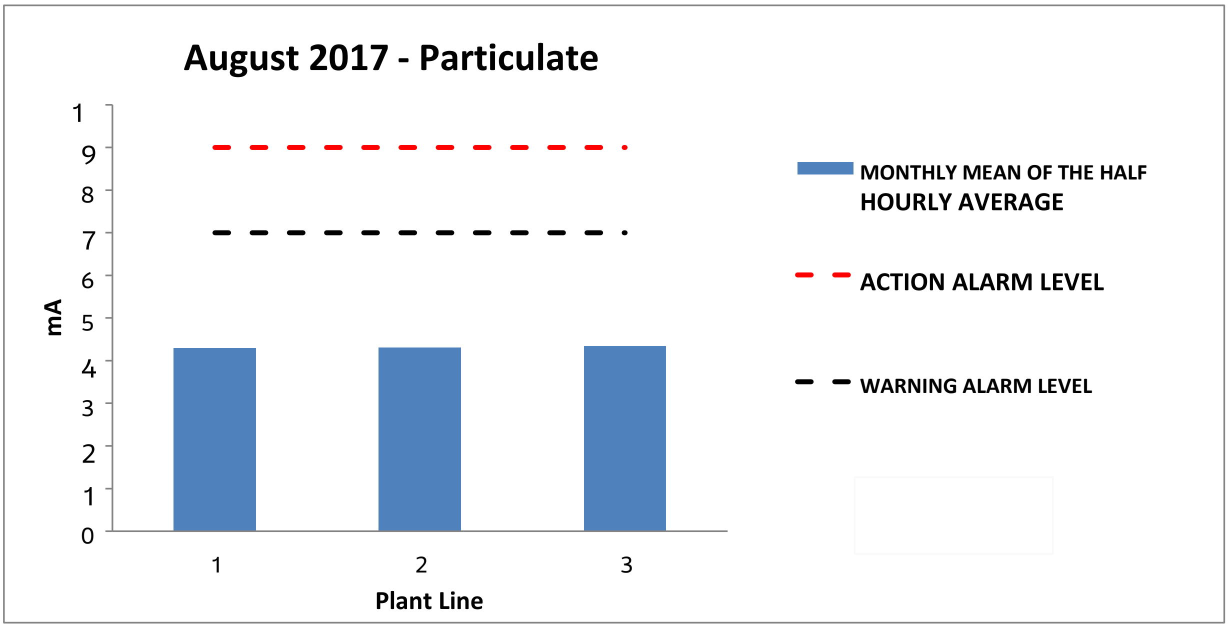

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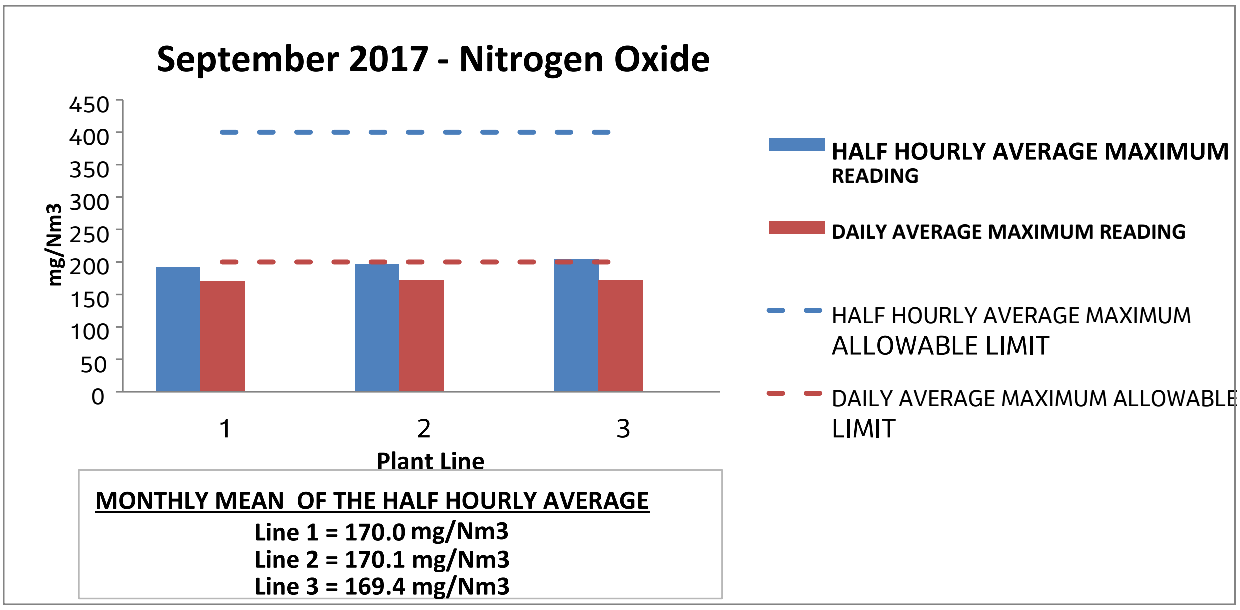

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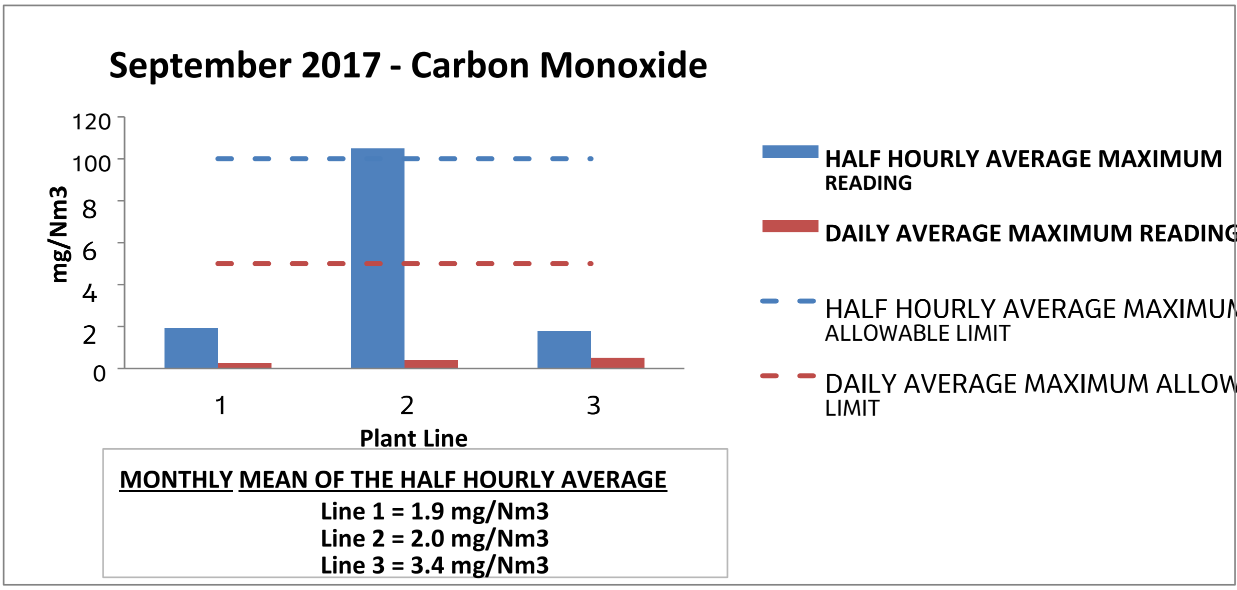

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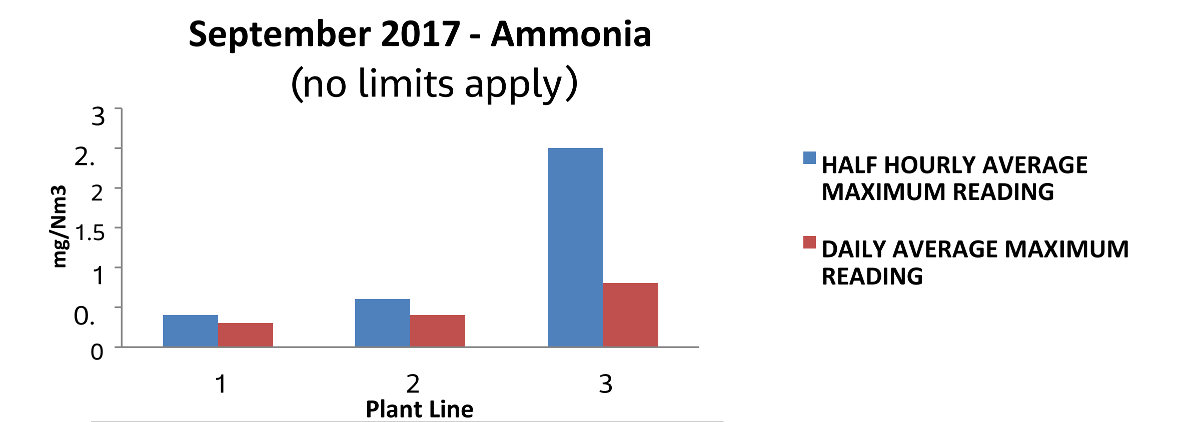

MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.3 mg/Nm3
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Line 3 = 0.4 mg/Nm3

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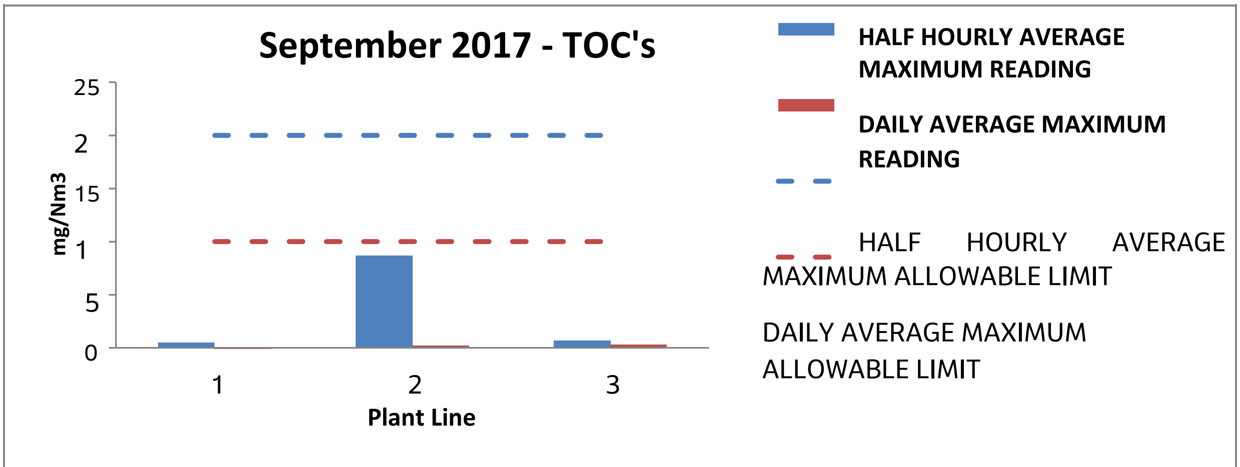

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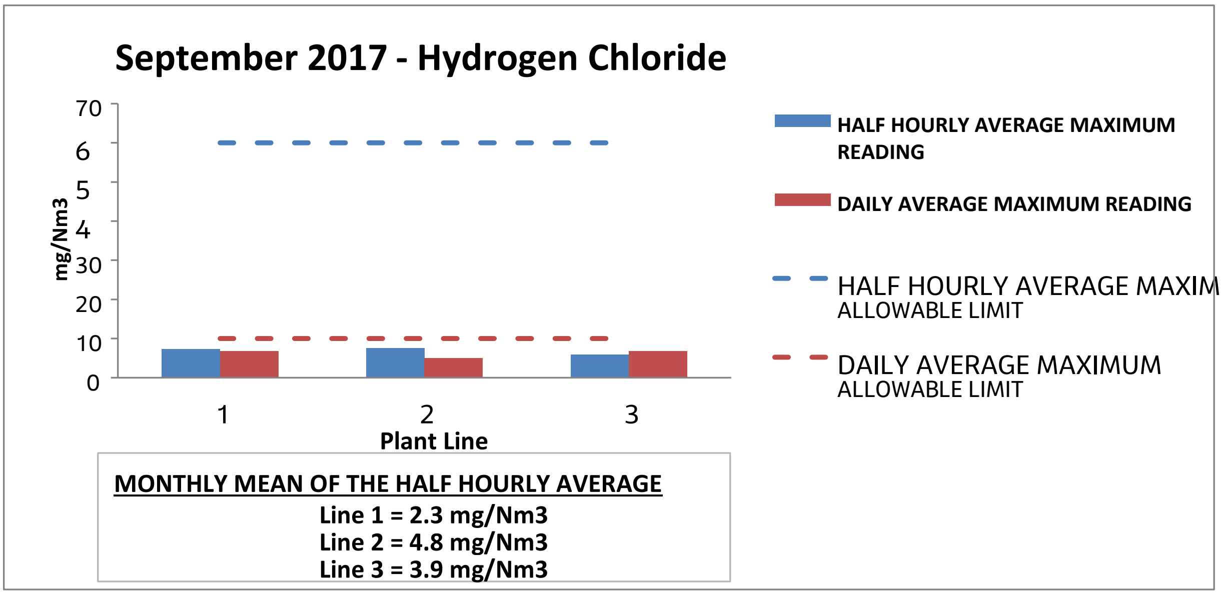

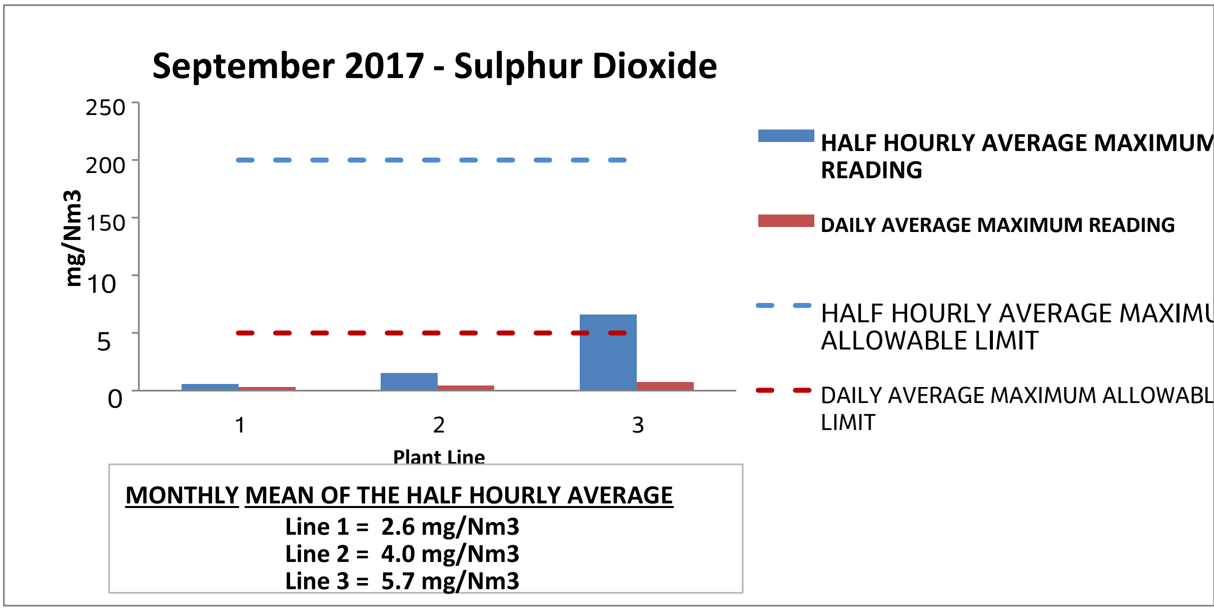

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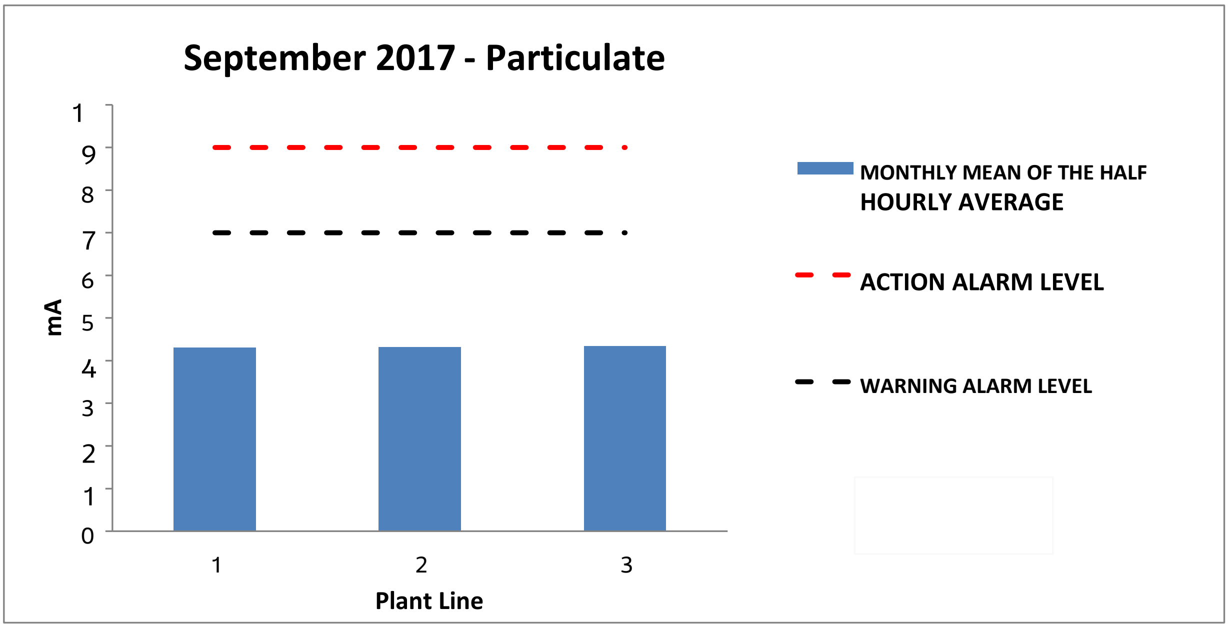

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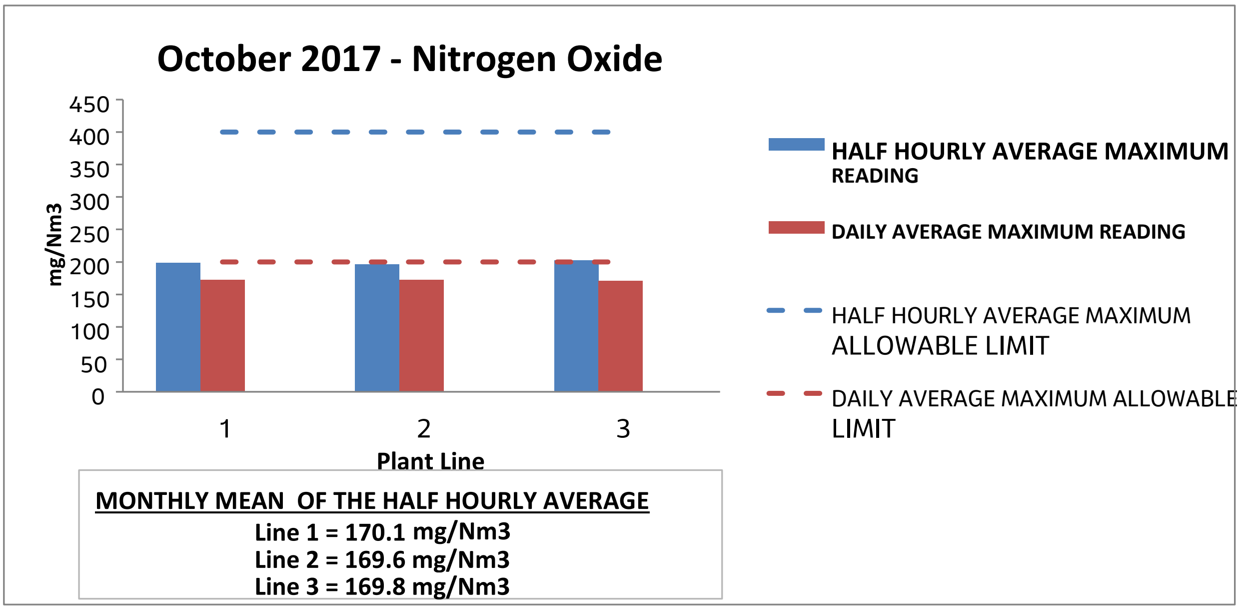

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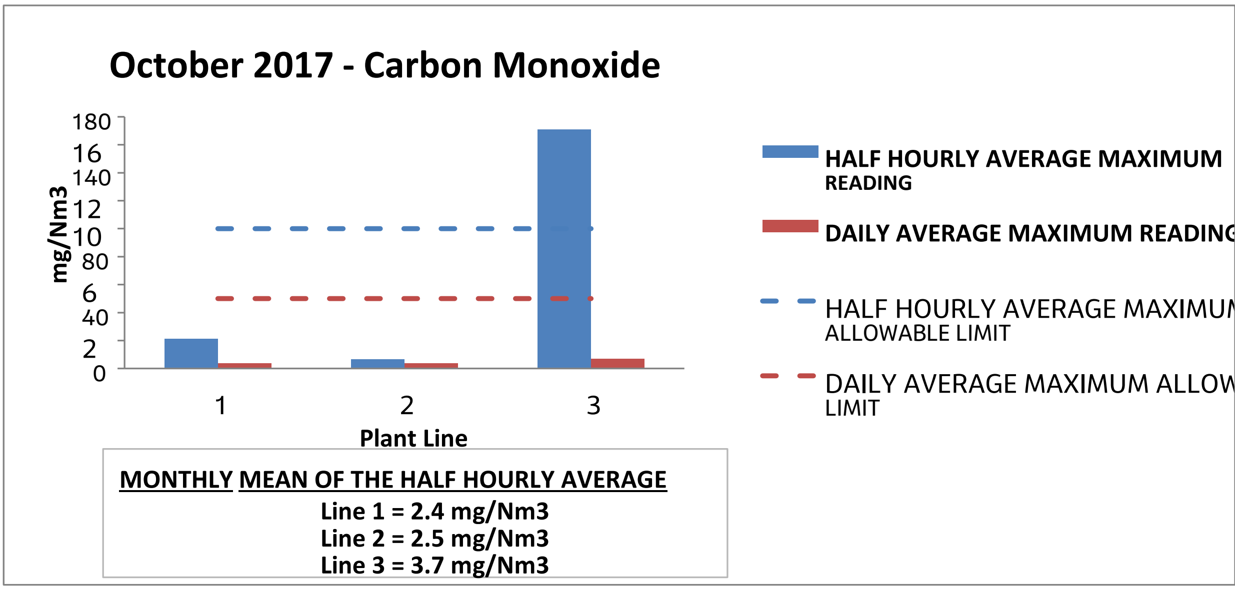

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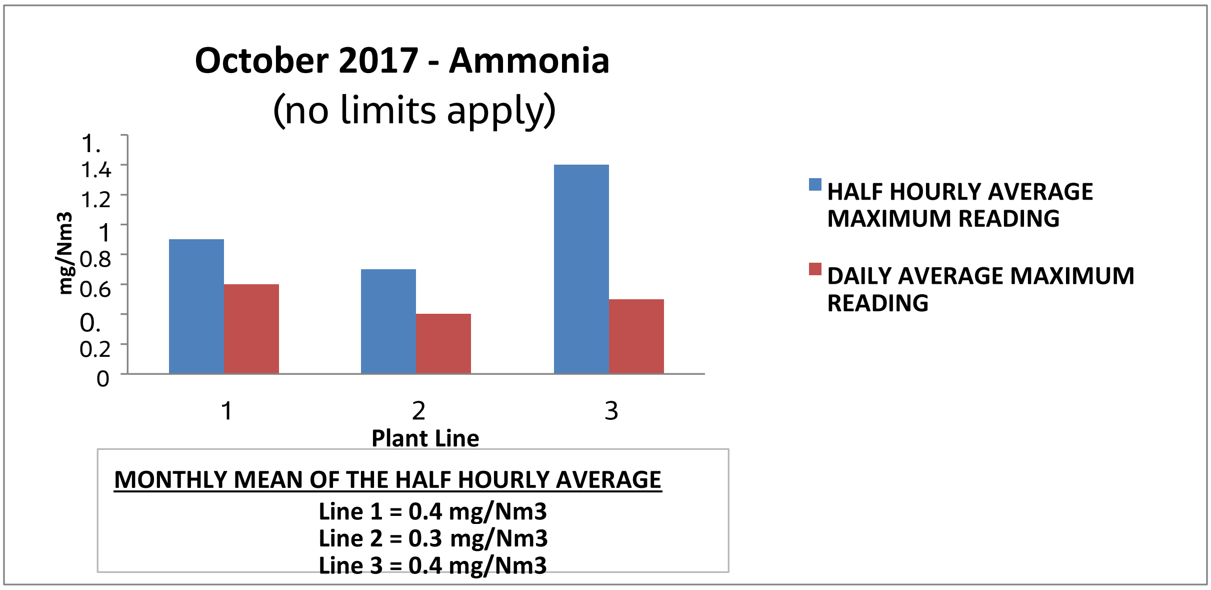

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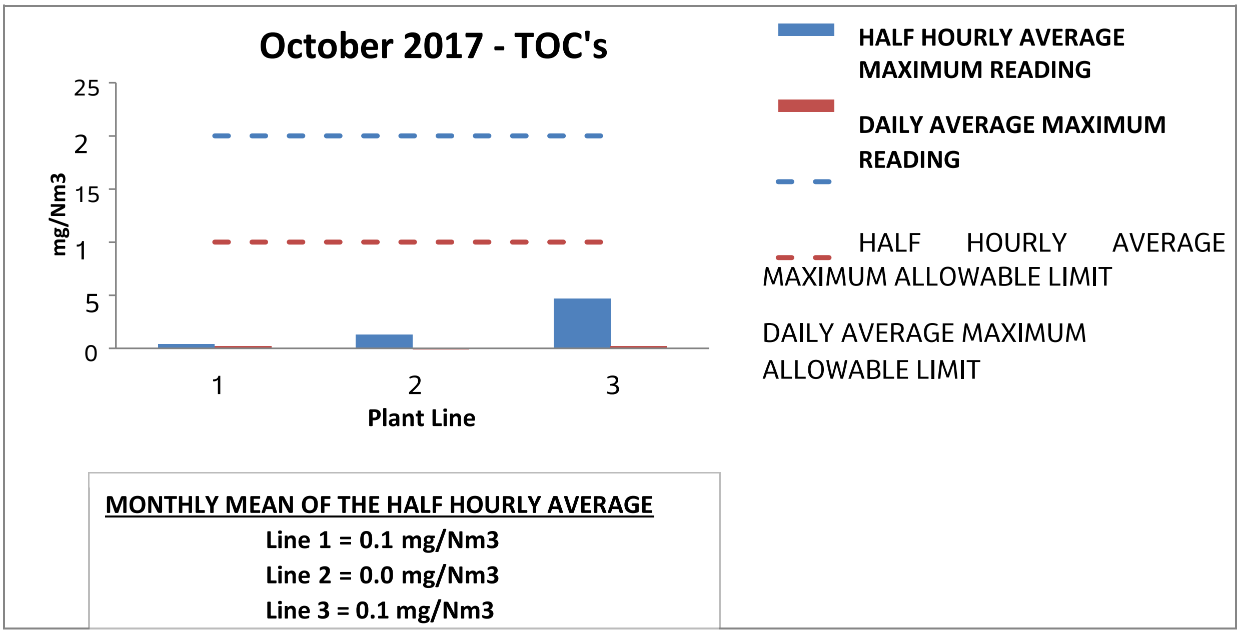

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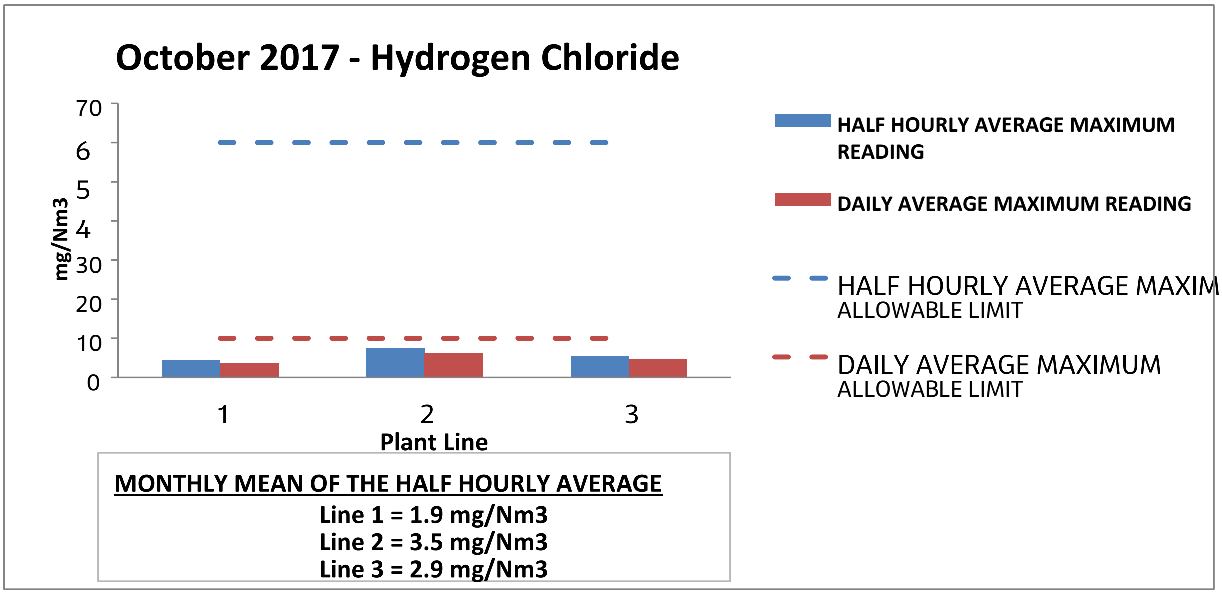

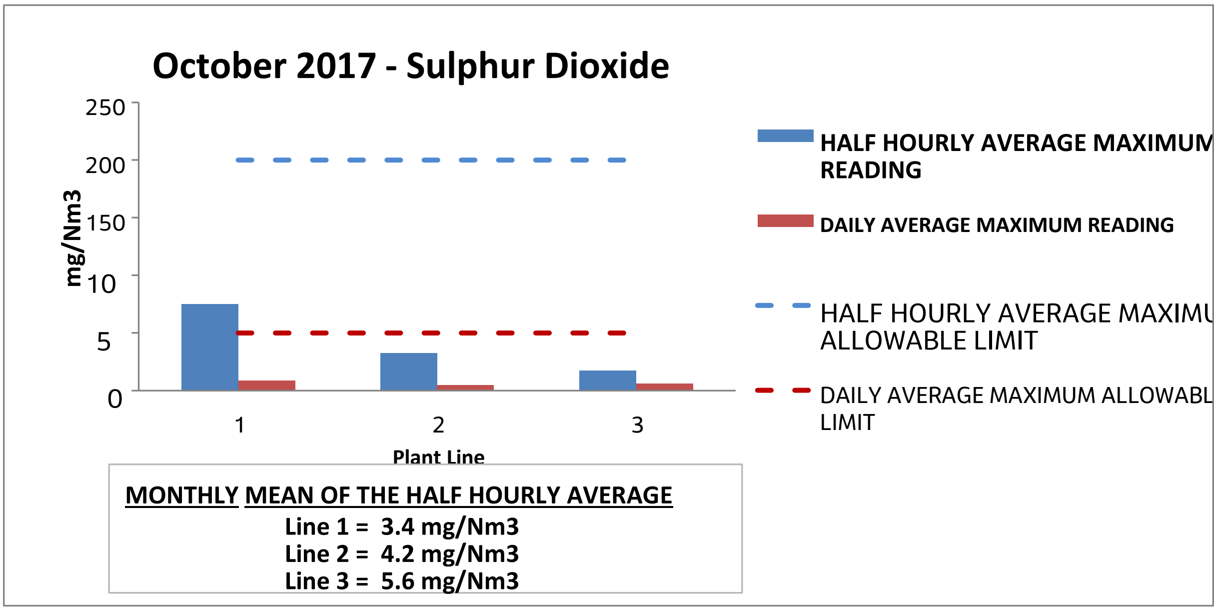

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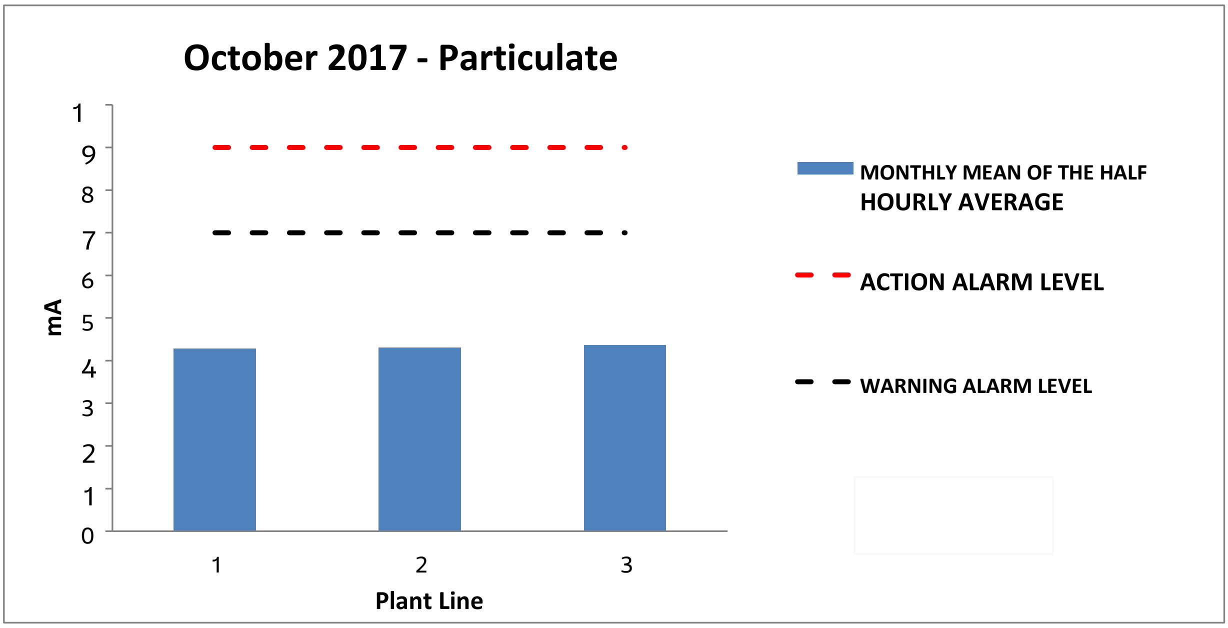

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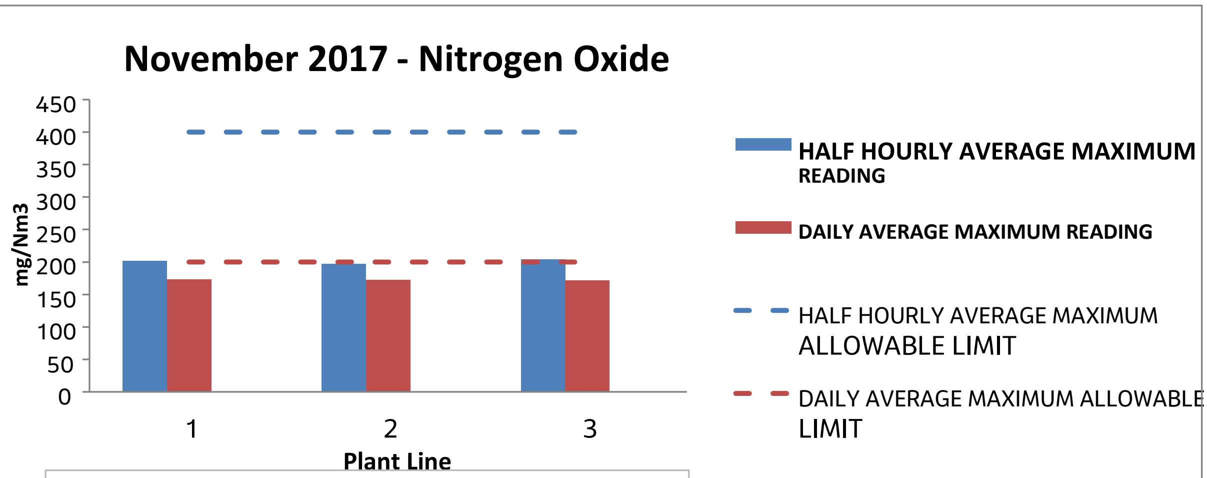
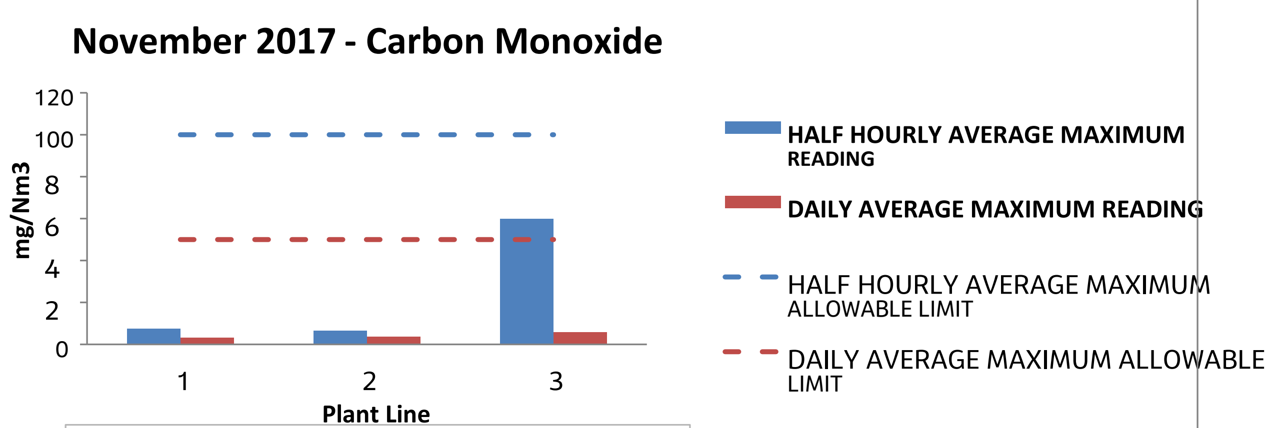


MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 170.2 mg/Nm3
Line 2 = 170.0 mg/Nm3
Line 3 = 170.0 mg/Nm3

Why do we control and monitor Oxides of Nitrogen (NOx)?

NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO). These can be formed naturally, but are also formed from man-made processes like fuel combustion or biomass burning. There are a number of health and environmental issues attributed to NOx, including smog, acid rain, and possibly global warming.



MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 2.6 mg/Nm3
Line 2 = 3.0 mg/Nm3
Line 3 = 3.7 mg/Nm3

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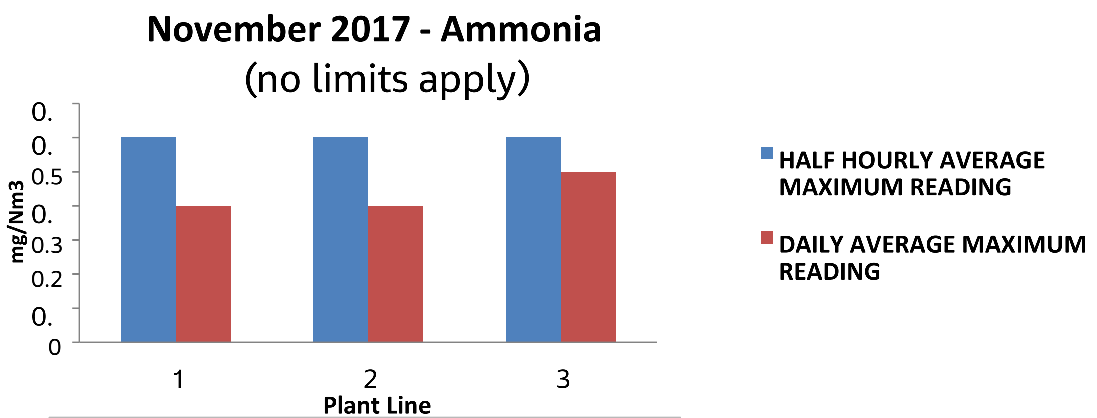

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Line 1 = 0.3 mg/Nm3
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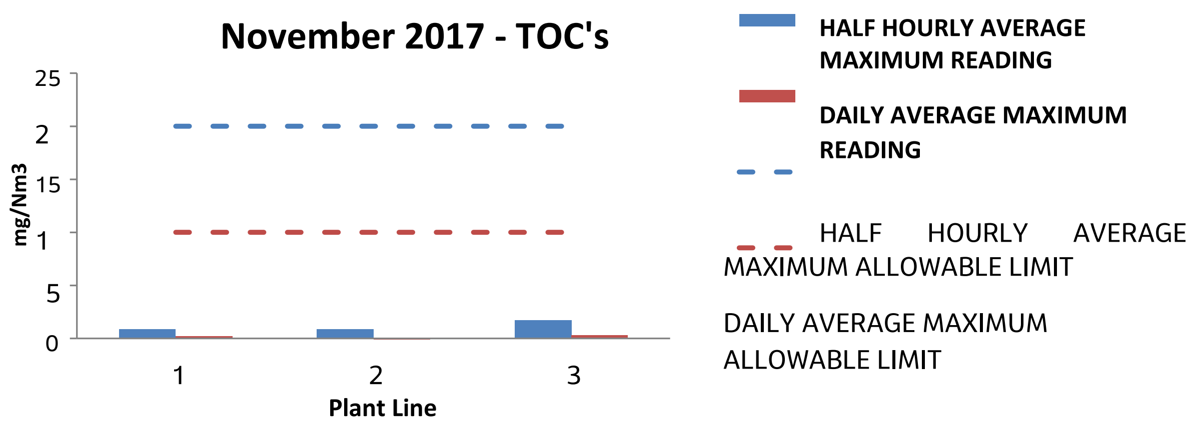

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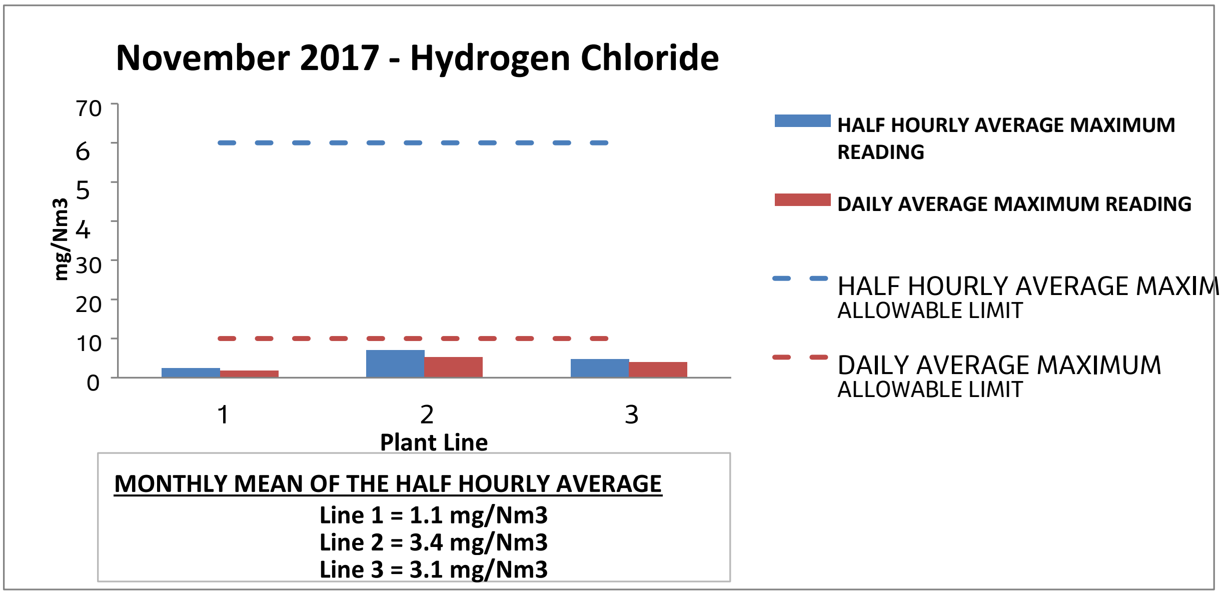

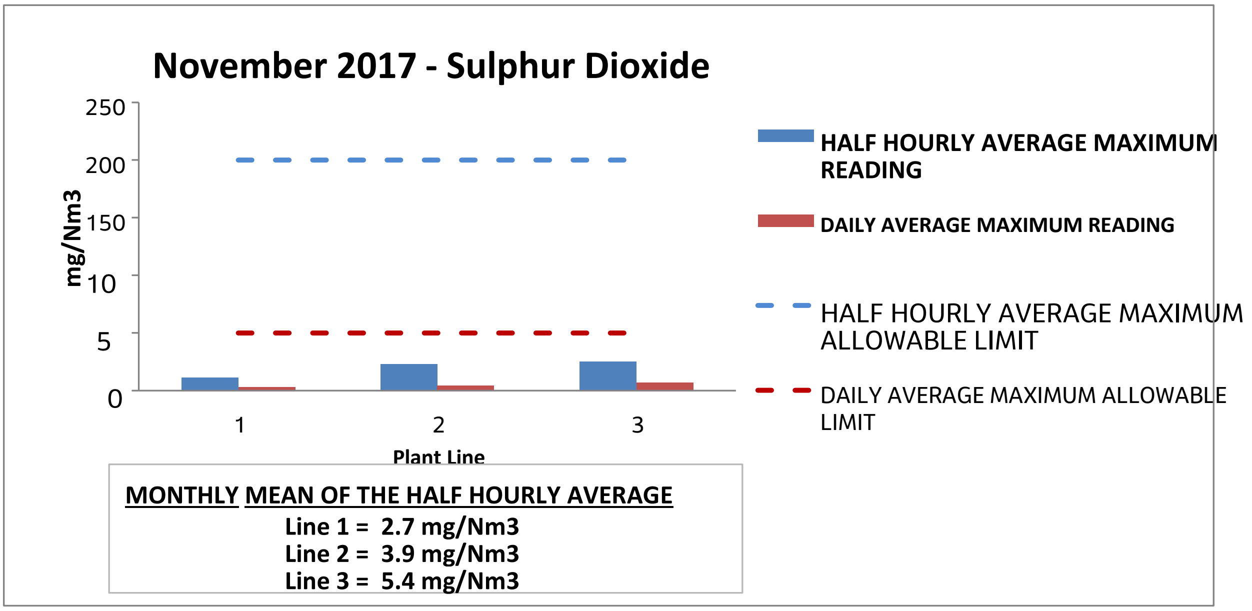

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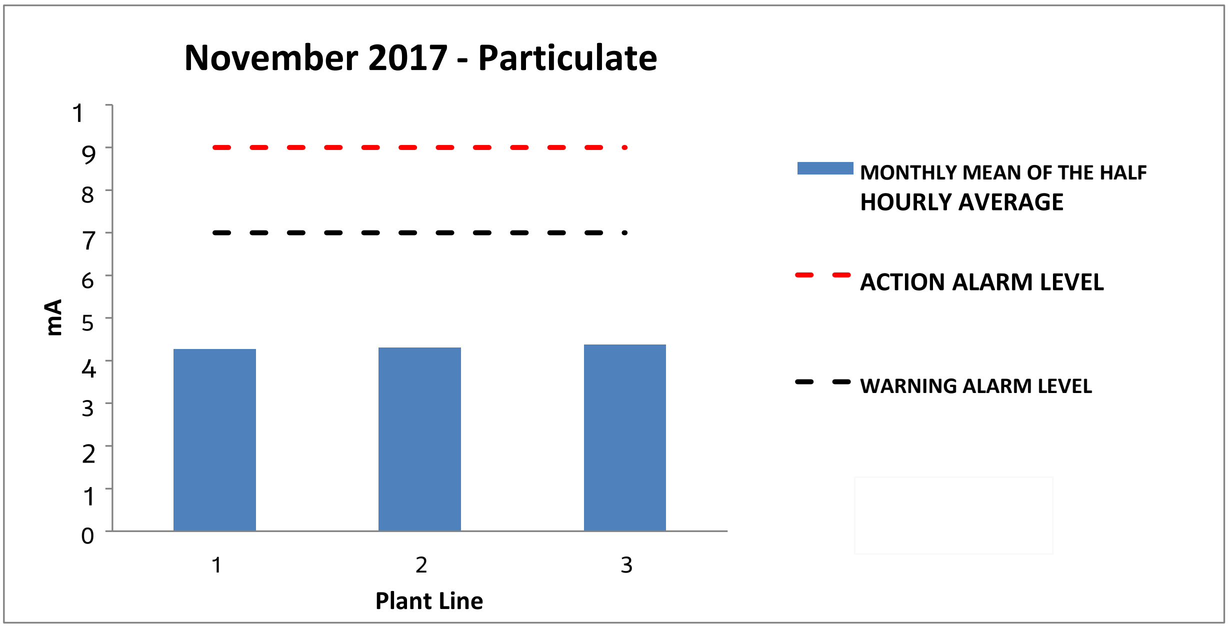

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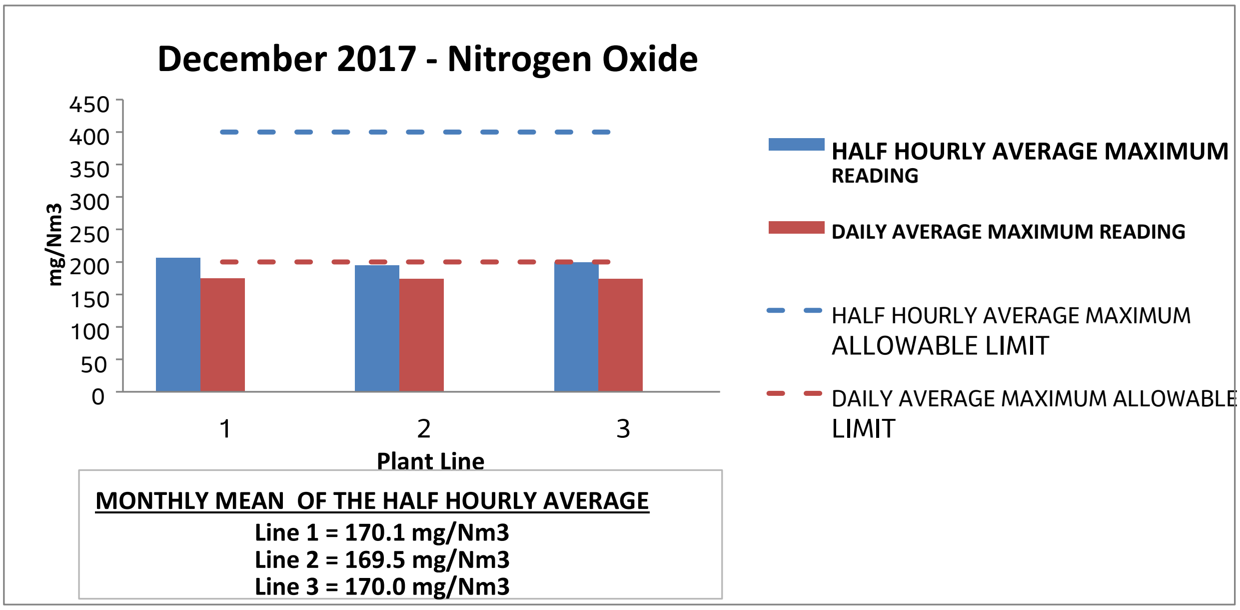

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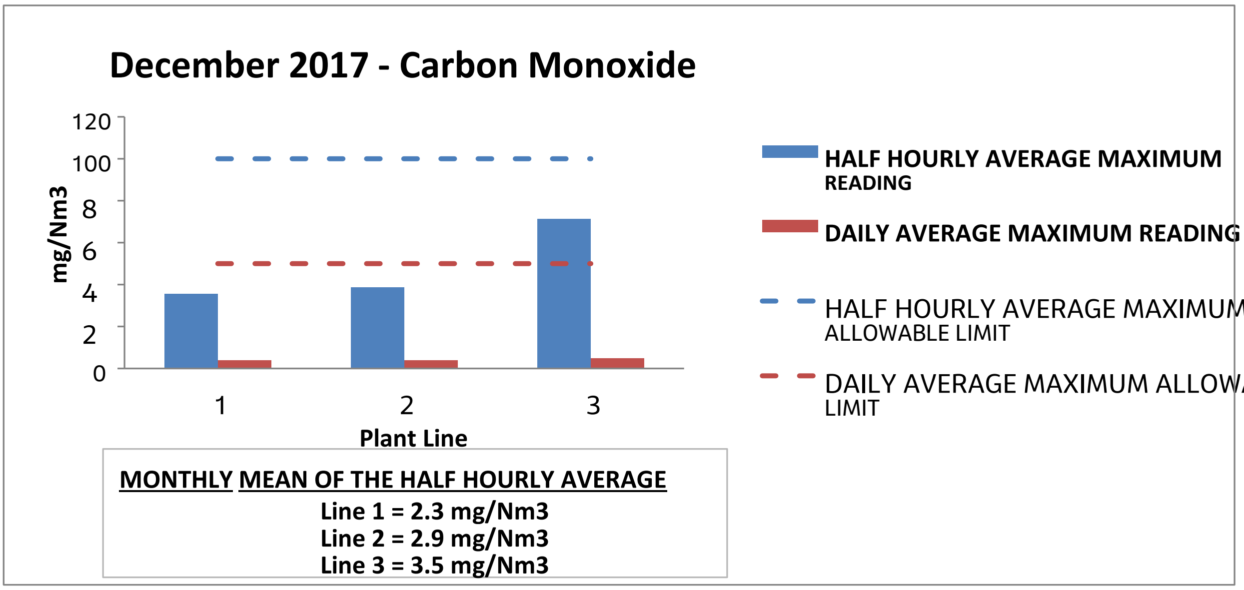

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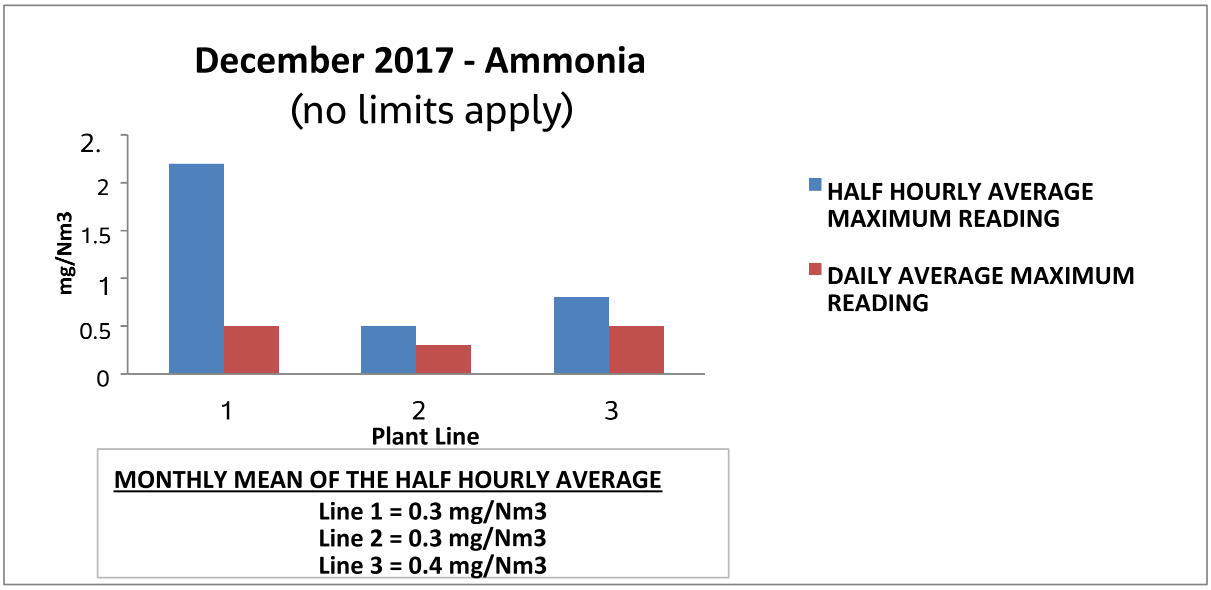

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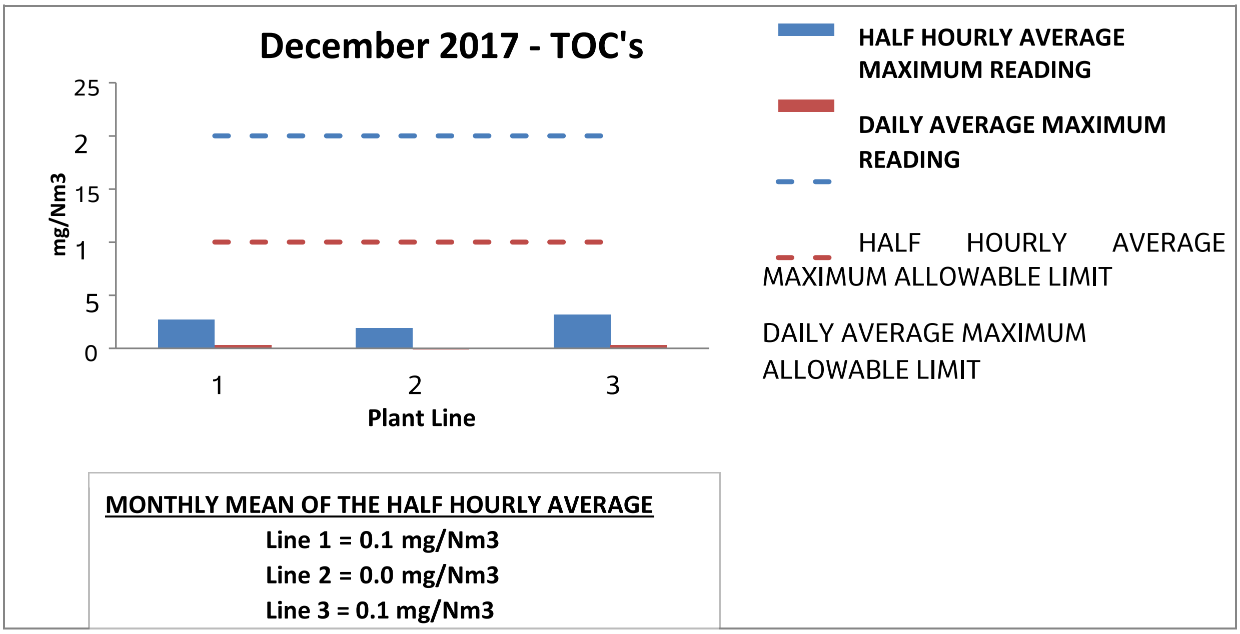

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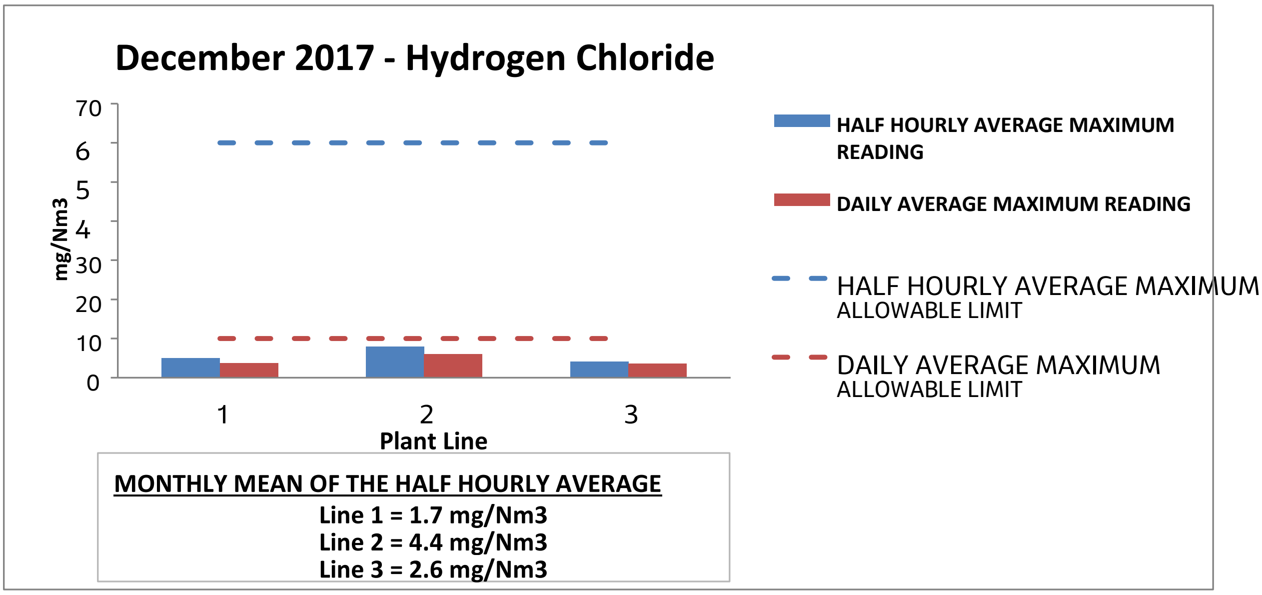

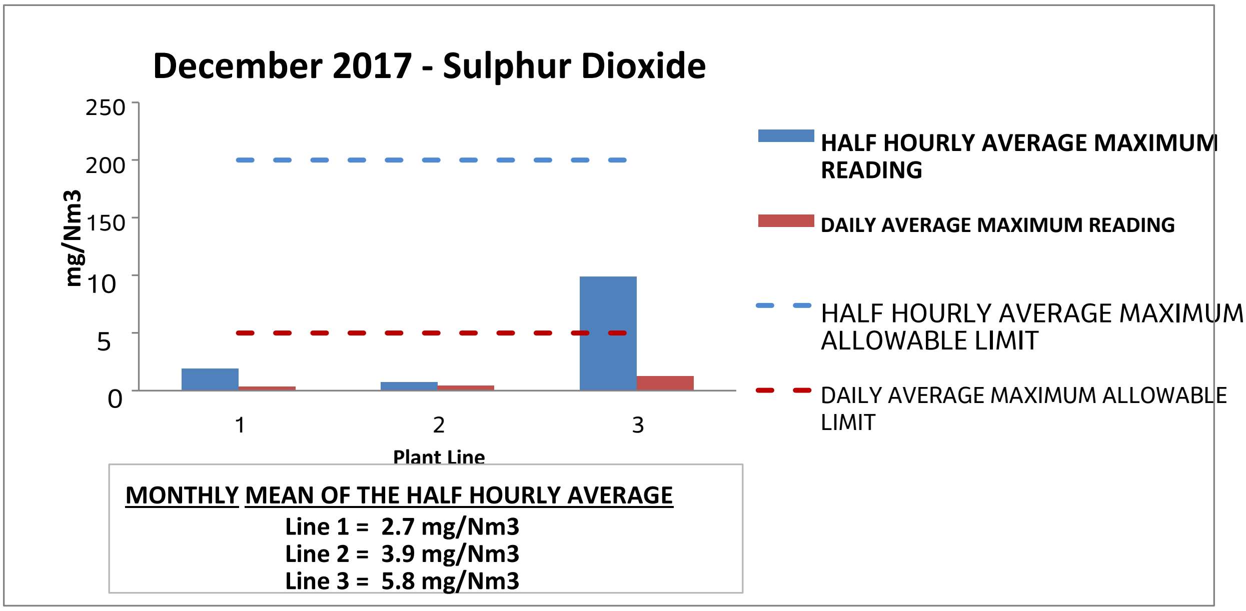

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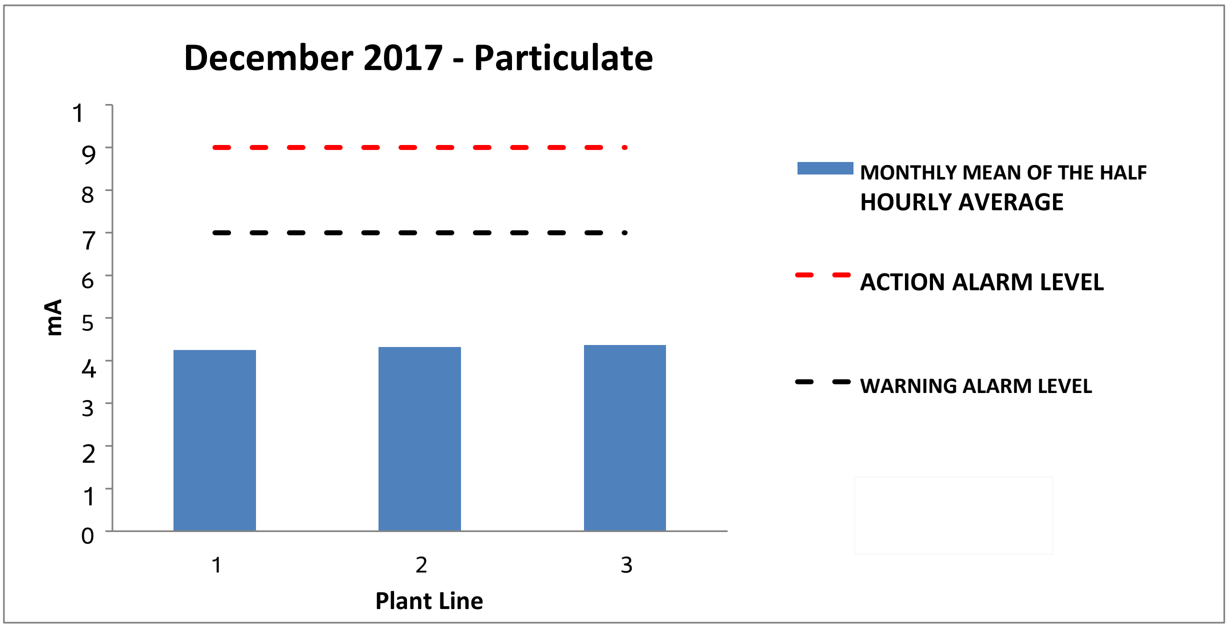

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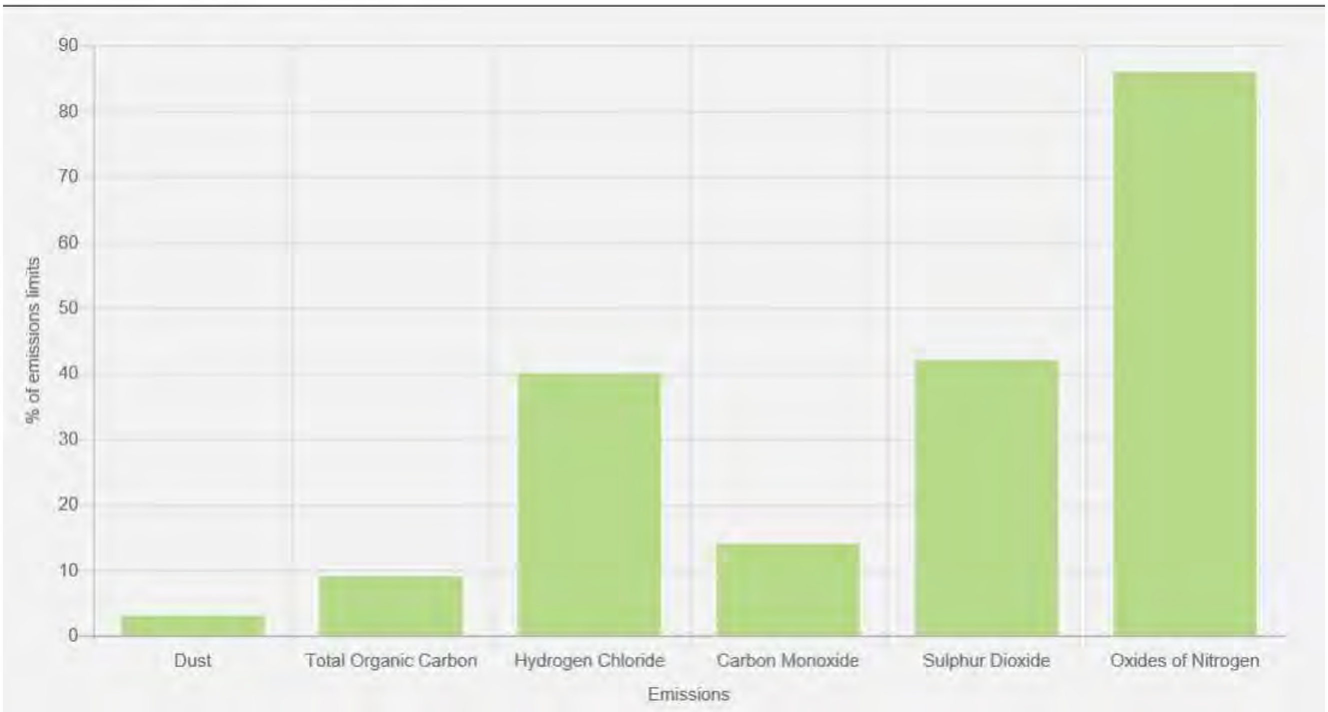
Appendix E. Battlefield EfW emissions data

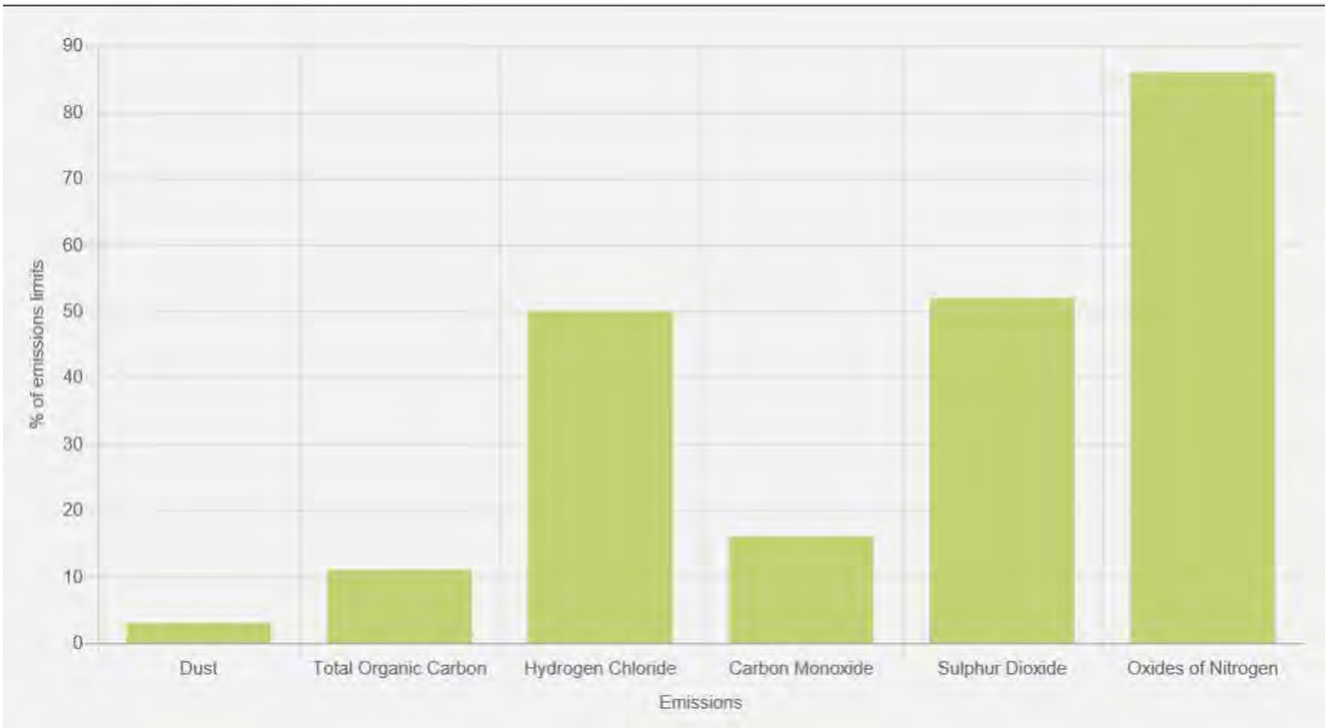
E.1 2020 Emissions

1. <u>Publicly reported continuously monitored emissions reports</u>

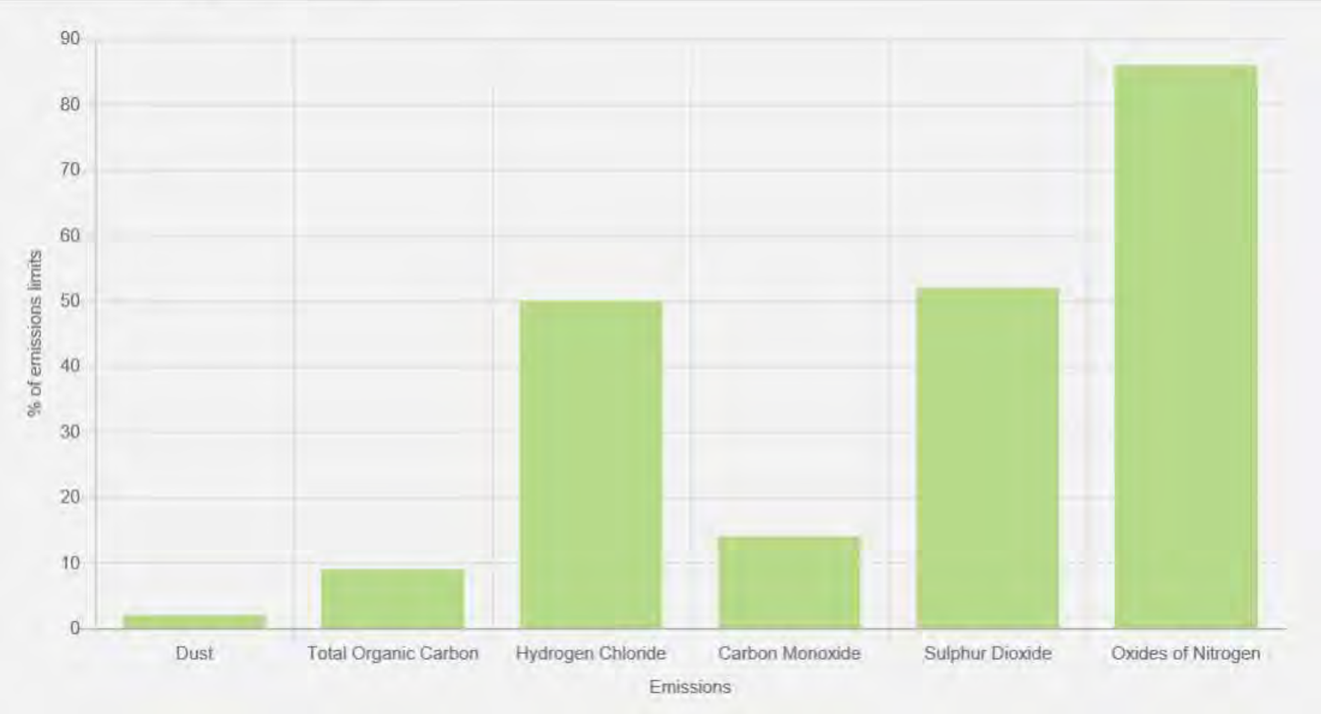
January 2020 Average Daily Emissions



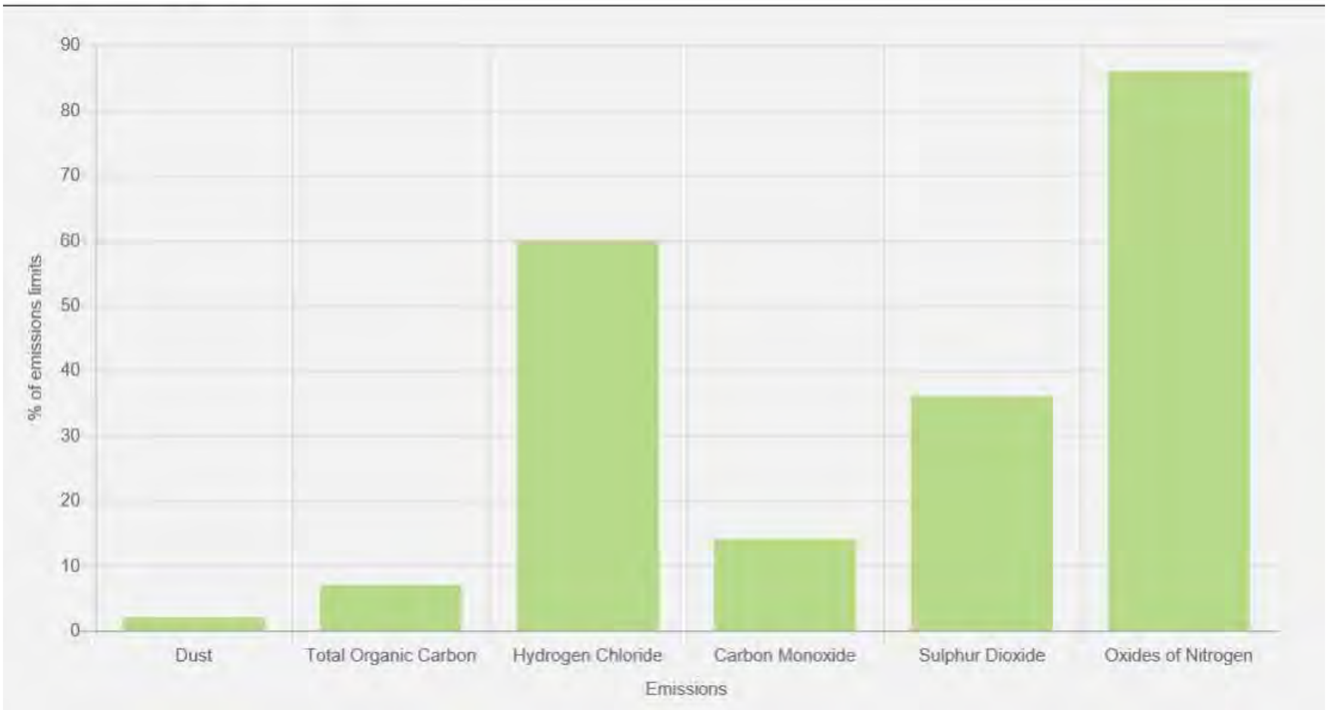
February 2020 Average Daily Emissions



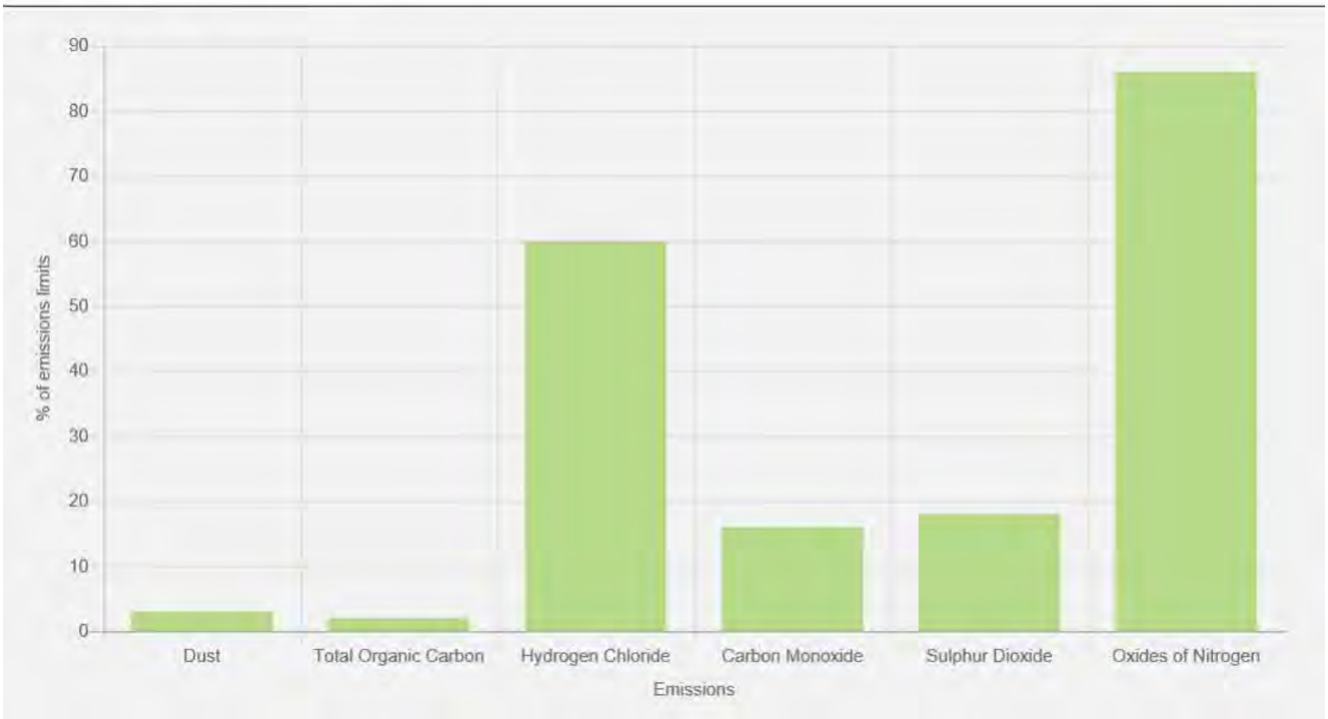
March 2020 Average Daily Emissions



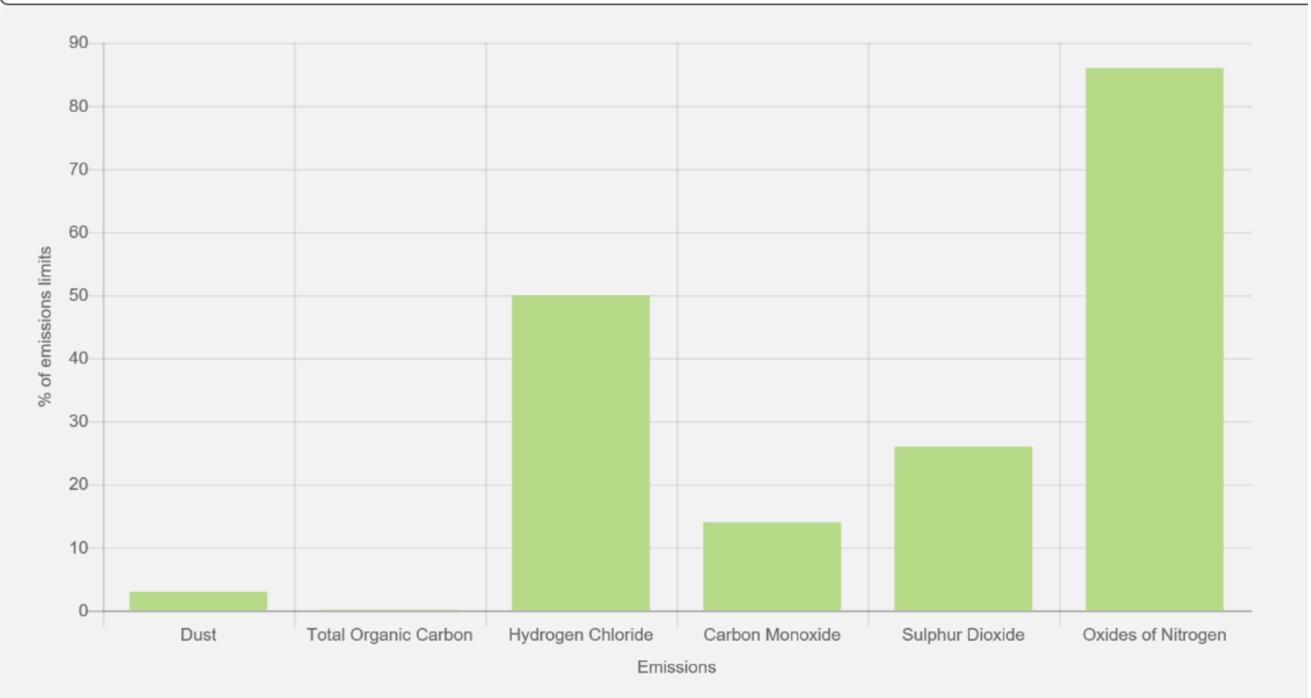
April 2020 Average Daily Emissions



May 2020 Average Daily Emissions



June 2020 Average Daily Emissions



E.2 2019 Emissions

1. <u>Extracts of Emissions Information from Battlefield Annual Performance Report 2019</u>

VEOLIA

Annual Performance Report 2019

Permit EPR/XP3239GF

Battlefield Energy from Waste Facility

VEOLIA ES Shropshire Limited

Year:	2019		
Address:	Vanguard Way, Shrewsbury, Shropshire, SY1 3TG		
Tel:	020 3567 3742		
Email:	christine.skaramaga@veolia.com		
Prepared by:	Christine Skaramaga	Position:	Midlands Region Environmental Engineer
Approved by:	Robert Foster	Position:	Facility Manager
Version:	1		
Issue Date:	27/01/2019		

Compliance with permit limits for continuously monitored pollutants

The plant met its emission limits as shown in the table below:

Substance	Percentage time compliant during operation	
	Half-hourly limit	Daily limit
Particulates	100%	100%
Oxides of nitrogen	100%	100%
Sulphur dioxide	100%	100%
Carbon monoxide	100% of 95% of 10-min averages	100%
Total organic carbon	99.99975%	100%
Hydrogen chloride	100%	100%
Hydrogen fluoride	100%	100%

Summary of any notifications or non-compliances under the permit

Date	Summary of notification or non-compliance [including Line/Reference]	Reason	Measures taken to prevent reoccurrence
22/11/2019	Schedule 6 Notification submitted to Environment Agency, Part A 22/11/19 Part B 27/11/19	TOC 30 min ELV exceeded 11:30-11:59 22/11/2019, 35.7mg/m3	Waste feed to furnace suspended and auxilliary oil burner started

Summary of any complaints received and actions to taken to resolve them.

Date	Summary of complaint [including Line/Reference]	Reason *	Measures taken to prevent reoccurrence

* Including whether substantiated by the operator or the EA

Emissions to Air (periodically monitored)

Summary of monitoring undertaken, standards used and compliance
As Permit requirements & TGN M2 v.12

Results of emissions to air that are periodically monitored					
Substance	Ref. Period	Emission Limit Value	A1 (Q1/2)	A1 (Q3/4)	Average A1
Hydrogen fluoride	1 hr	2 mg/m^3	0.03	0.03	0.03
Cd and Th and their compounds	6-8hrs	0.05 mg/m^3	0.0014	0.00053	0.000965
Hg and its compounds	6-8hrs	0.05 mg/m^3	0.0017	0.0008	0.00125
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	6-8hrs	0.5 mg/m^3	0.015	0.025	0.02
Dioxins & Furans (I-TEQ)	6-8hrs	0.1 ng/m^3	0.0054	0.0033	0.00435
PCBs (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m^3	0.00036	0.00037	0.000365
PCBs (WHO-TEQ Fish)	6-8hrs	None set ng/m^3	0.000023	0.000022	0.0000225
PCBs (WHO-TEQ Birds)	6-8hrs	None set ng/m^3	0.0021	0.0016	0.00185
Dioxins & Furans (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m^3	0.0059	0.0036	0.00475
Dioxins & Furans (WHO-TEQ Fish)	6-8hrs	None set ng/m^3	0.0058	0.0035	0.00465
Dioxins & Furans (WHO-TEQ Birds)	6-8hrs	None set ng/m^3	0.0098	0.0063	0.00805
Nitrous Oxide (N2O)	1 hr	None set mg/m3	10.82	13.51	12.165
PAH Total	6-8hrs	None set µg/m^2	0.59	0.2	0.395
Anthanthrene	6-8hrs	None set µg/m^3	0.016	0.011	0.0135
Benzo(a)anthracene	6-8hrs	None set µg/m^3	0.016	0.002	0.009
Benzo(a)pyrene	6-8hrs	None set µg/m^3	0.016	0.00072	0.00836
Benzo(b)fluoranthene	6-8hrs	None set µg/m^3	0.016	0.00072	0.00836
Benzo(b)naptho(2,1-d) thiophene	6-8hrs	None set µg/m^3	0.016	0.0012	0.0086
Benzo(c)phenanthrene	6-8hrs	None set µg/m^3	0.016	0.016	0.016
Benzo(ghi)perylene	6-8hrs	None set µg/m^3	0.016	0.0017	0.00885
Benzo(k)fluoranthene	6-8hrs	None set µg/m^3	0.016	0.00072	0.00836
Cholanthrene	6-8hrs	None set µg/m^3	0.016	0.00072	0.00836
Chrysene	6-8hrs	None set µg/m^3	0.016	0.0026	0.0093
Cyclopenta(cd)pyrene	6-8hrs	None set µg/m^3	0.016	0.00072	0.00836
Dibenzo(ai)pyrene	6-8hrs	None set µg/m^3	0.016	0.017	0.0165
Dibenzo(ah)anthracene	6-8hrs	None set µg/m^3	0.016	0.00072	0.00836
Fluoranthene	6-8hrs	None set µg/m^3	0.014	0.0068	0.0104
Indeno(123-cd) pyrene	6-8hrs	None set µg/m^3	0.016	0.00072	0.00836
Naphthalene	6-8hrs	None set µg/m^3	0.23	0.15	0.19
Comments :					

Emissions to Air (continously monitored)

Summary of monitoring undertaken, standards used and compliance

Results of emissions to air that are continuously monitored

Substance	Reference Period	Emission Limit Value	A1		A2		A3		A4		A5	
			Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.
Oxides of nitrogen	Daily mean	200 mg/m³	176.6	172.4								
	½ hourly mean	400 mg/m³	342.6	172.5								
Particulates	Daily mean	10 mg/m³	1.7	0.3								
	½ hourly mean	30 mg/m³	6.1	0.3								
Total Organic Carbon	Daily mean	10 mg/m³	1.7	0.7								
	½ hourly mean	20 mg/m³	35.7	0.7								
Hydrogen chloride	Daily mean	10 mg/m³	9.3	6.3								
	½ hourly mean	60 mg/m³	22.1	6.3								
Sulphur dioxide	Daily mean	50 mg/m³	42.7	22.7								
	½ hourly mean	200 mg/m³	143.6	22.8								
Carbon monoxide	Daily mean	50 mg/m³	34.3	34.3								
	95%ile 10-min avg *	150 mg/m³ *	1006.0	16.8								

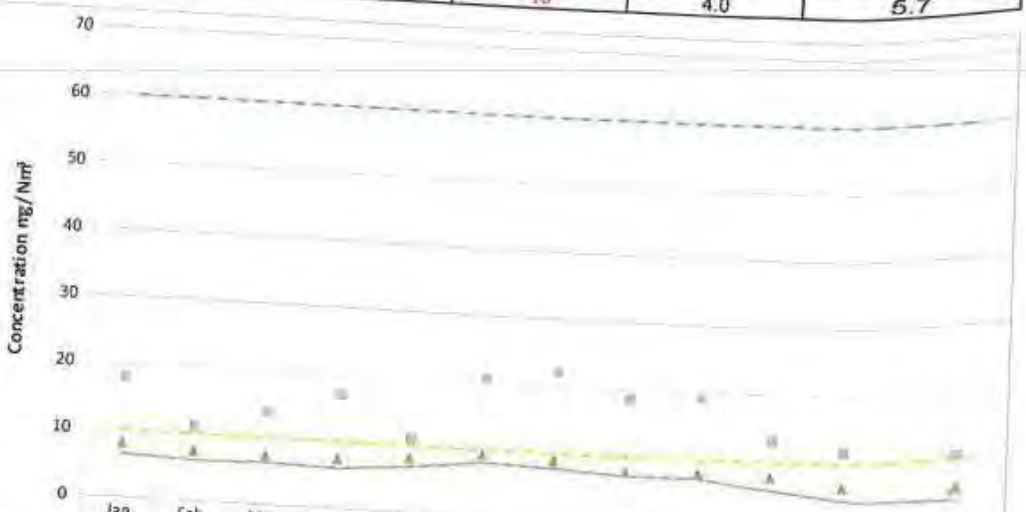
* = delete or amend as appropriate

Comments :

Monitoring of Hydrogen Chloride emissions **Whole Installation** Battlefield Energy from Waste Facility

See Notes in Cell Q3

mg/Nm³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly HCl ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily HCl ELV	Monthly daily mean	Highest daily maximum
Jan	60	6.5	18.0	10	6.5	8.1
Feb	60	6.0	11.2	10	6.0	7.4
Mar	60	6.3	13.8	10	6.3	7.3
Apr	60	6.0	17.0	10	6.1	7.4
May	60	6.8	11.1	10	6.8	8.1
Jun	60	8.1	20.7	10	8.1	9.3
Jul	60	7.7	22.1	10	7.8	8.9
Aug	60	7.1	18.6	10	7.1	7.6
Sep	60	7.2	19.3	10	7.2	7.9
Oct	60	5.7	13.2	10	5.7	7.6
Nov	60	4.5	11.7	10	4.5	6.4
Dec	60	4.0	10.7	10	4.0	5.7



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly HCl ELV	60	60	60	60	60	60	60	60	60	60	60	60
Monthly 1/2 hourly mean	6.5	6.0	6.3	6.0	6.8	8.1	7.7	7.1	7.2	5.7	4.5	4.0
Highest 1/2 hourly maximum	18.0	11.2	13.8	17.0	11.1	20.7	22.1	18.6	19.3	13.2	11.7	10.7
Daily HCl ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	6.5	6.0	6.3	6.1	6.8	8.1	7.8	7.1	7.2	5.7	4.5	4.0
Highest daily maximum	8.1	7.4	7.3	7.4	8.1	9.3	8.9	7.6	7.9	7.6	6.4	5.7

Comments :

27/01/2019

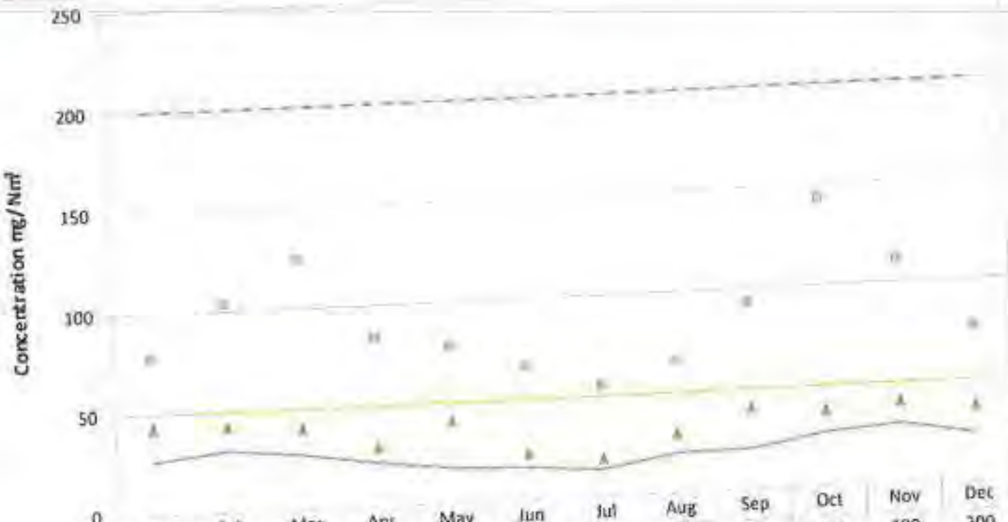
Annual Performance Report 2019

Battlefield Energy from Waste Facility

See Notes in Cell Q3

Monitoring of Sulphur dioxide emissions **Whole Installation**

mg/Nm³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly SO2 ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily SO2 ELV	Monthly daily mean	Highest daily maximum
Jan	200	26.2	77.8	50	26.2	42.7
Feb	200	30.6	104.0	50	30.6	42.5
Mar	200	27.1	124.5	50	27.1	39.8
Apr	200	22.0	84.0	50	21.6	29.3
May	200	17.5	78.7	50	17.5	41.0
Jun	200	16.3	67.0	50	16.3	22.9
Jul	200	13.6	55.5	50	13.6	18.8
Aug	200	20.0	65.7	50	20.0	29.5
Sep	200	20.3	92.9	50	20.3	40.2
Oct	200	26.7	143.6	50	26.7	37.6
Nov	200	29.7	111.4	50	29.6	40.3
Dec	200	23.0	76.5	50	23.1	37.0



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly SO2 ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly 1/2 hourly mean	26.2	30.6	27.1	22.0	17.5	16.3	13.6	20.0	20.3	26.7	29.7	23.0
Highest 1/2 hourly maximum	77.8	104.0	124.5	84.0	78.7	67.0	55.5	65.7	92.9	143.6	111.4	76.5
Daily SO2 ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	26.2	30.6	27.1	21.6	17.5	16.3	13.6	20.0	20.3	26.7	29.6	23.1
Highest daily maximum	42.7	42.5	39.8	29.3	41.0	22.9	18.8	29.5	40.2	37.6	40.3	37.0

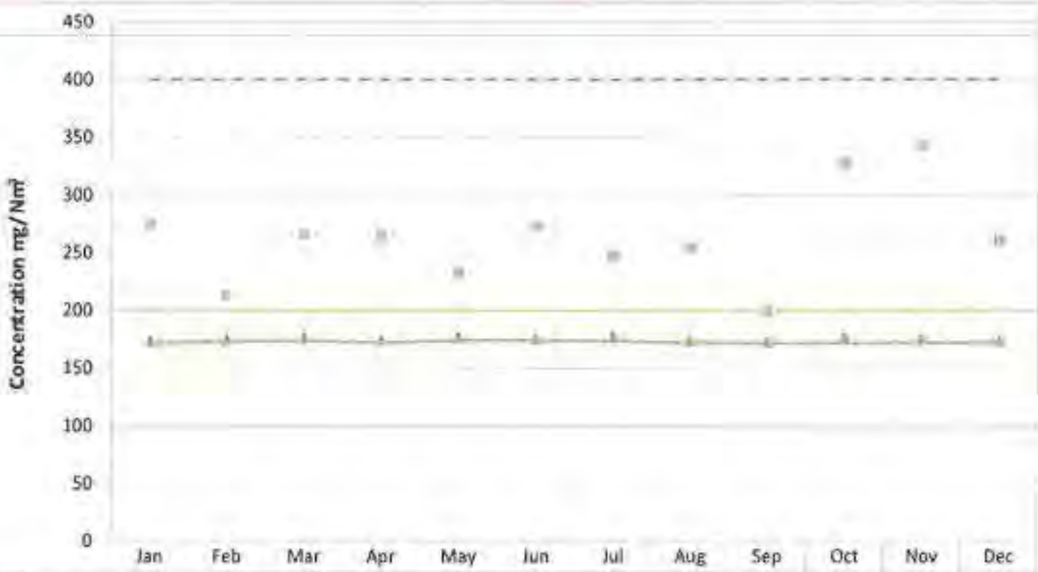
Comments :

27/01/2019

Annual Performance Report 2019 — Battlefield Energy from Waste Facility

Monitoring of Oxides of Nitrogen emissions — **Whole Installation** — *See Notes in Cell Q3*

mg/Nm³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly NOx ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily NOx ELV	Monthly daily mean	Highest daily maximum
Jan	400	171.4	275.1	200	171.4	172.9
Feb	400	173.0	213.2	200	173.0	174.7
Mar	400	173.7	266.5	200	173.7	176.3
Apr	400	172.0	264.7	200	171.7	174.4
May	400	174.0	232.7	200	174.0	176.5
Jun	400	173.9	272.8	200	173.9	175.3
Jul	400	173.4	247.2	200	173.4	176.6
Aug	400	171.9	254.0	200	171.9	174.0
Sep	400	171.5	199.2	200	171.5	172.4
Oct	400	171.4	328.0	200	171.4	176.1
Nov	400	171.7	342.6	200	171.7	174.7
Dec	400	171.8	261.0	200	171.8	173.8



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly NOx ELV	400	400	400	400	400	400	400	400	400	400	400	400
Monthly 1/2 hourly mean	171.4	173.0	173.7	172.0	174.0	173.9	173.4	171.9	171.5	171.4	171.7	171.8
Highest 1/2 hourly maximum	275.1	213.2	266.5	264.7	232.7	272.8	247.2	254.0	199.2	328.0	342.6	261.0
Daily NOx ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly daily mean	171.4	173.0	173.7	171.7	174.0	173.9	173.4	171.9	171.5	171.4	171.7	171.8
Highest daily maximum	172.9	174.7	176.3	174.4	176.5	175.3	176.6	174.0	172.4	176.1	174.7	173.8

Comments :

27/01/2019

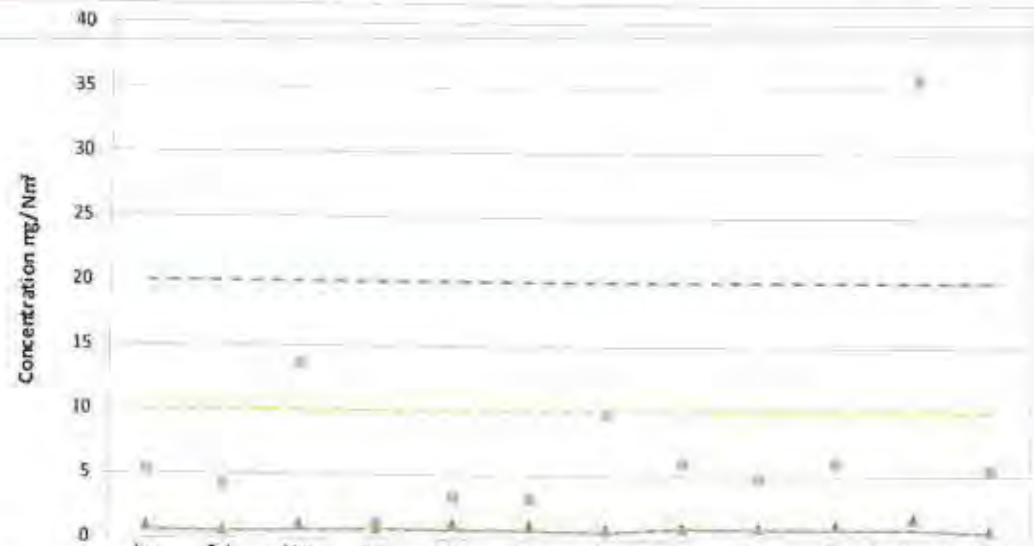
Annual Performance Report 2019

Battlefield Energy from Waste Facility

Monitoring of Total organic carbon emissions **Whole Installation**

See Notes in Cell Q3

mg/Nm³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	**1/2 hourly TOC ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily TOC ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	20	0.6	5.3	10	0.6	1.0
Feb	20	0.6	4.2	10	0.6	0.7
Mar	20	0.7	13.6	10	0.7	1.2
Apr	20	0.8	1.2	10	0.8	0.9
May	20	0.7	3.3	10	0.7	1.2
Jun	20	0.7	3.2	10	0.7	1.2
Jul	20	0.6	9.8	10	0.6	0.8
Aug	20	0.9	6.0	10	0.9	1.0
Sep	20	0.9	4.8	10	0.9	1.0
Oct	20	0.8	6.0	10	0.8	1.1
Nov	20	0.9	35.7	10	0.9	1.7
Dec	20	0.6	5.5	10	0.6	0.8



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly TOC ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hourly mean	0.6	0.6	0.7	0.8	0.7	0.7	0.6	0.9	0.9	0.8	0.9	0.6
Highest 1/2 hourly maximum	5.3	4.2	13.6	1.2	3.3	3.2	9.8	6.0	4.8	6.0	35.7	5.5
Daily TOC ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.6	0.6	0.7	0.8	0.7	0.7	0.6	0.9	0.9	0.8	0.9	0.6
Highest daily maximum	1.0	0.7	1.2	0.9	1.2	1.2	0.8	1.0	1.0	1.1	1.7	0.8

Comments :

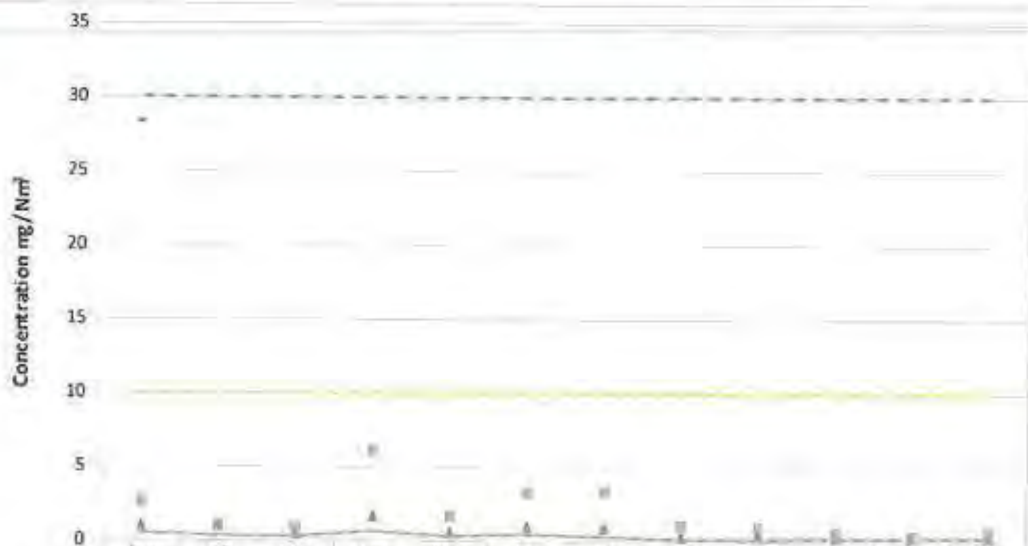
27/01/2019

Annual Performance Report 2019

Battlefield Energy from Waste Facility

Monitoring of Particulate matter emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	**1/2 hourly PM ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily PM ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	30	0.5	2.7	10	0.5	1.0
Feb	30	0.3	1.1	10	0.3	1.0
Mar	30	0.3	0.9	10	0.3	0.5
Apr	30	0.7	6.1	10	0.7	1.7
May	30	0.4	1.7	10	0.4	0.6
Jun	30	0.5	3.3	10	0.5	1.0
Jul	30	0.3	3.4	10	0.3	0.9
Aug	30	0.2	1.1	10	0.2	0.3
Sep	30	0.2	1.0	10	0.2	0.4
Oct	30	0.2	0.7	10	0.2	0.3
Nov	30	0.3	0.4	10	0.3	0.3
Dec	30	0.3	0.7	10	0.3	0.3



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly PM ELV	30	30	30	30	30	30	30	30	30	30	30	30
Monthly 1/2 hourly mean	0.5	0.3	0.3	0.7	0.4	0.5	0.3	0.2	0.2	0.2	0.3	0.3
Highest 1/2 hourly maximum	2.7	1.1	0.9	6.1	1.7	3.3	3.4	1.1	1.0	0.7	0.4	0.7
Daily PM ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.5	0.3	0.3	0.7	0.4	0.5	0.3	0.2	0.2	0.2	0.3	0.3
Highest daily maximum	1.0	1.0	0.5	1.7	0.6	1.0	0.9	0.3	0.4	0.3	0.3	0.3

Comments :

27/01/2019

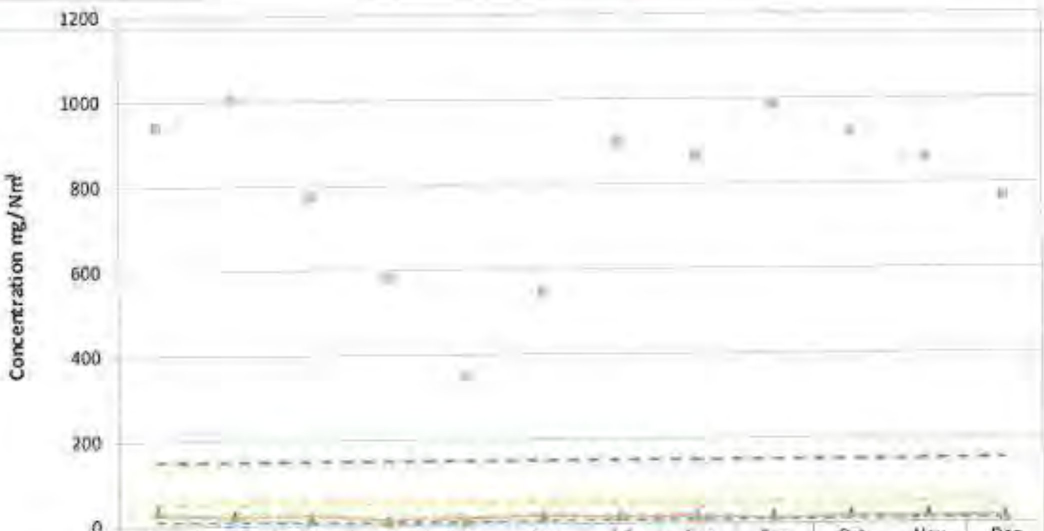
Annual Performance Report 2019

Battlefield Energy from Waste Facility

Monitoring of Carbon Monoxide (10-minute avg)

Whole Installation

mg/Nm^3	10-minute Reference Periods				Daily Reference Periods		
2019	**95%ile 10-min avg CO ELV**	**95%ile 10-min avg maximum**	**Monthly CO 10-min avg mean**	**10-min avg maximum**	**Daily CO ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	150	26.0	9.2	940.4	50	9.3	34.3
Feb	150	19.0	8.6	1006.0	50	8.6	23.9
Mar	150	23.0	7.0	774.7	50	7.0	12.7
Apr	150	12.0	5.9	580.9	50	5.5	8.5
May	150	15.0	4.9	347.4	50	4.9	7.7
Jun	150	20.0	6.8	547.2	50	6.8	15.3
Jul	150	15.0	7.3	899.2	50	7.3	17.9
Aug	150	17.0	8.9	864.6	50	8.9	18.5
Sep	150	10.0	7.4	985.2	50	7.4	16.5
Oct	150	16.0	8.6	921.1	50	8.6	19.6
Nov	150	14.0	8.9	860.0	50	8.9	19.7
Dec	150	15.0	7.7	766.9	50	7.7	14.6



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
95%ile 10-min avg CO ELV	150	150	150	150	150	150	150	150	150	150	150	150
95%ile 10-min avg maximum	26.0	19.0	23.0	12.0	15.0	20.0	15.0	17.0	10.0	16.0	14.0	15.0
10-min avg maximum	940.4	1006.0	774.7	580.9	347.4	547.2	899.2	864.6	985.2	921.1	860.0	766.9
Daily CO ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	9.3	8.6	7.0	5.5	4.9	6.8	7.3	8.9	7.4	8.6	8.9	7.7
Highest daily maximum	34.3	23.9	12.7	8.5	7.7	15.3	17.9	18.5	16.5	19.6	19.7	14.6

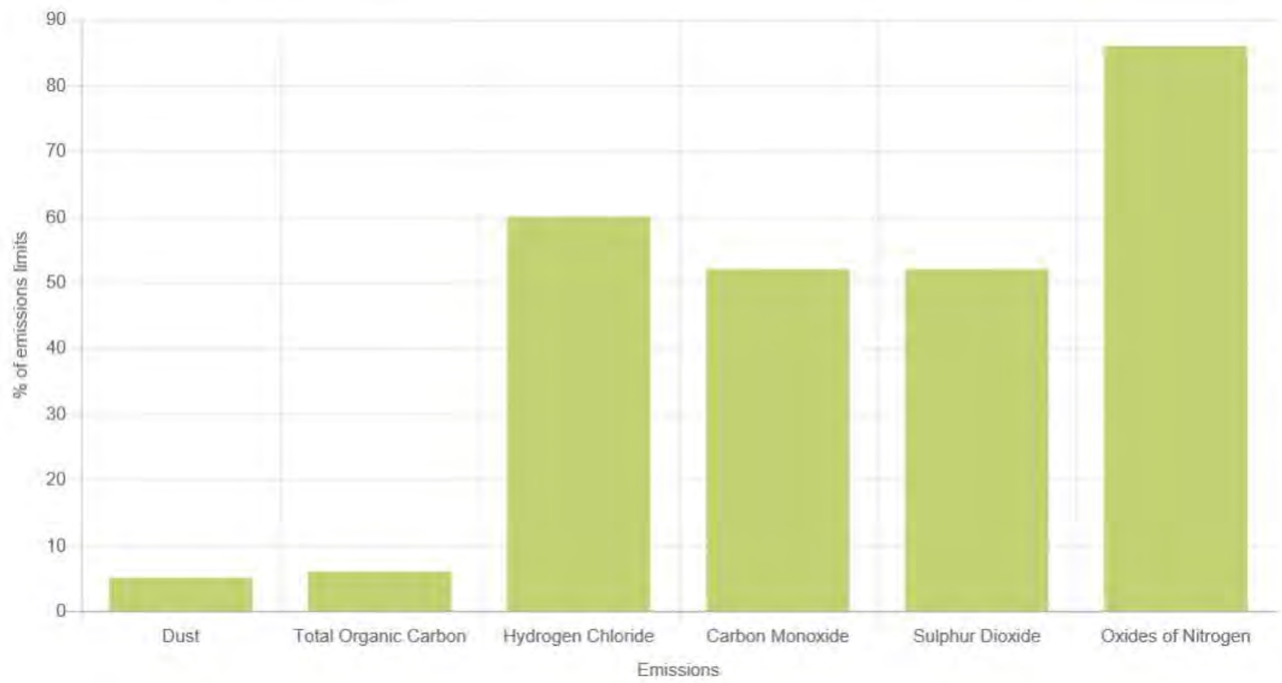
Comments :

Environment Agency explanatory note: The 10-minute average ELV is based on the "95th percentile". In this case this means that 95% of the 10 minute averages in the relevant 24-hour period (i.e. 137) must be below 150 mg/Nm3, and 5% (i.e. 7) are allowed to be any value above 150 mg/Nm3. Whilst we expect operators to minimise CO emissions at all times, it is perfectly acceptable for the value of the maximum 10-minute average to be above 150 mg/Nm3, provided the 95th percentile ELV has been met for that period.

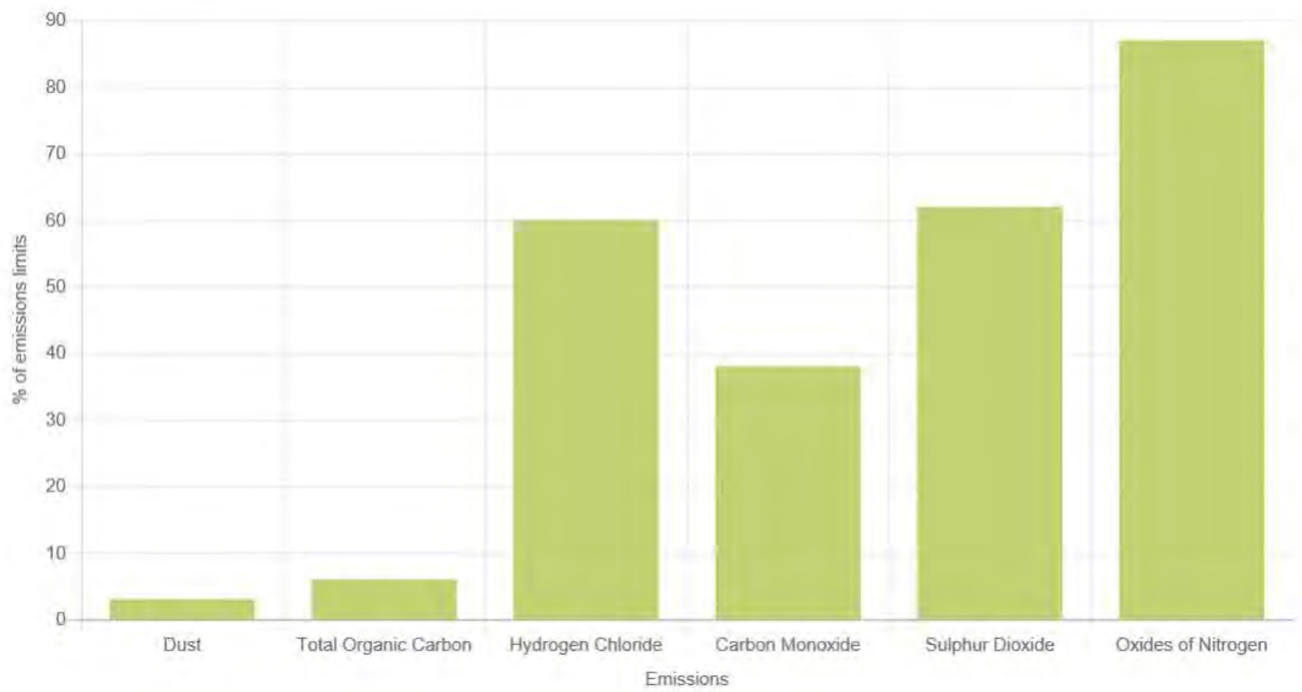
27/01/2019

2. Publicly reported continuously monitored emissions reports

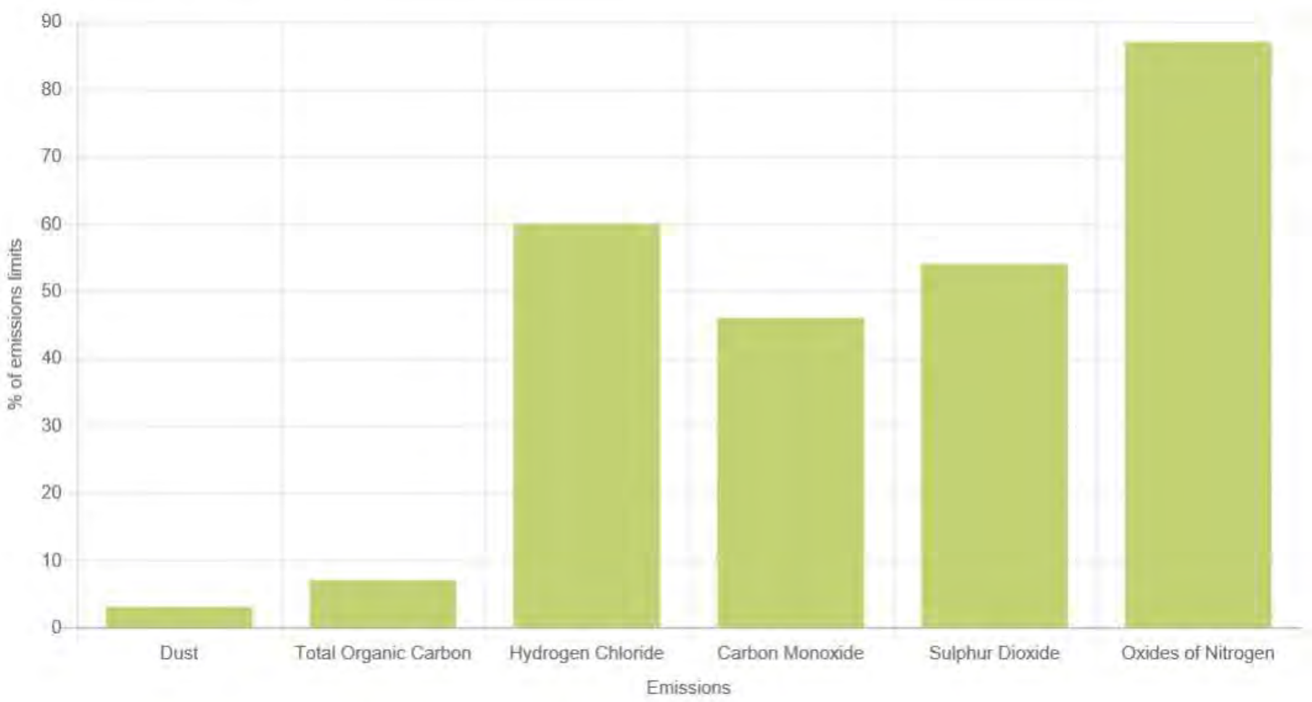
January 2019 Average Daily Emissions



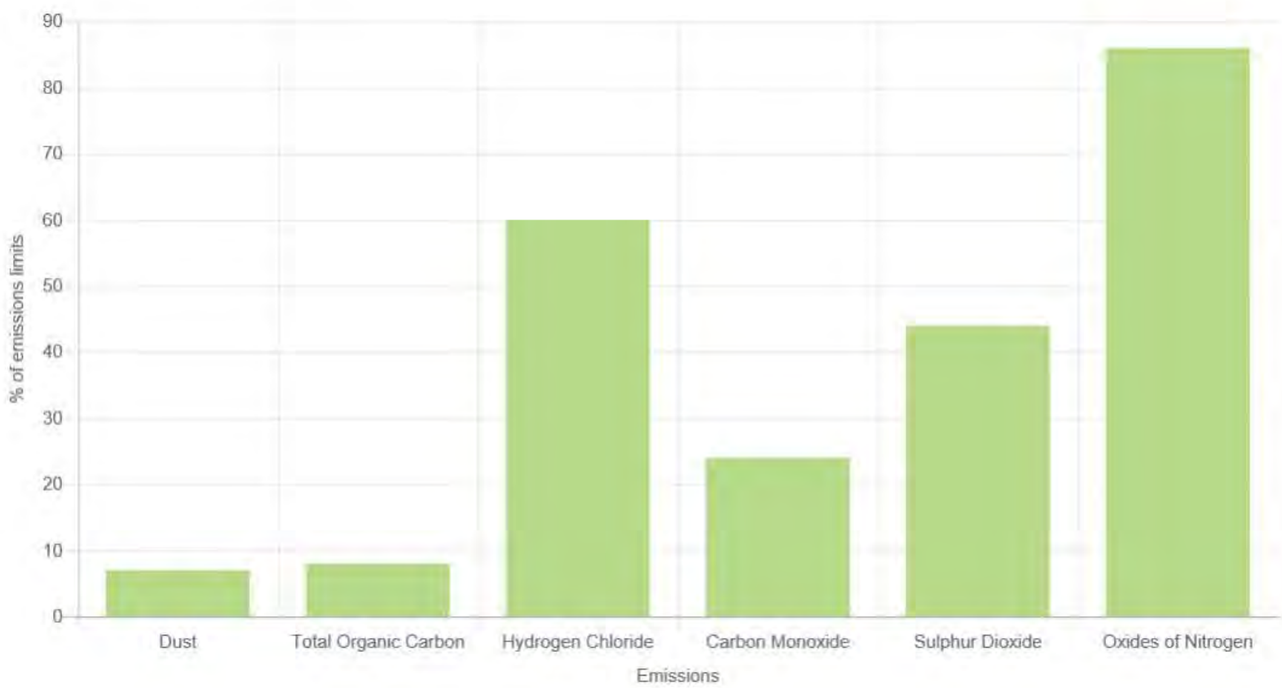
February 2019 Average Daily Emissions



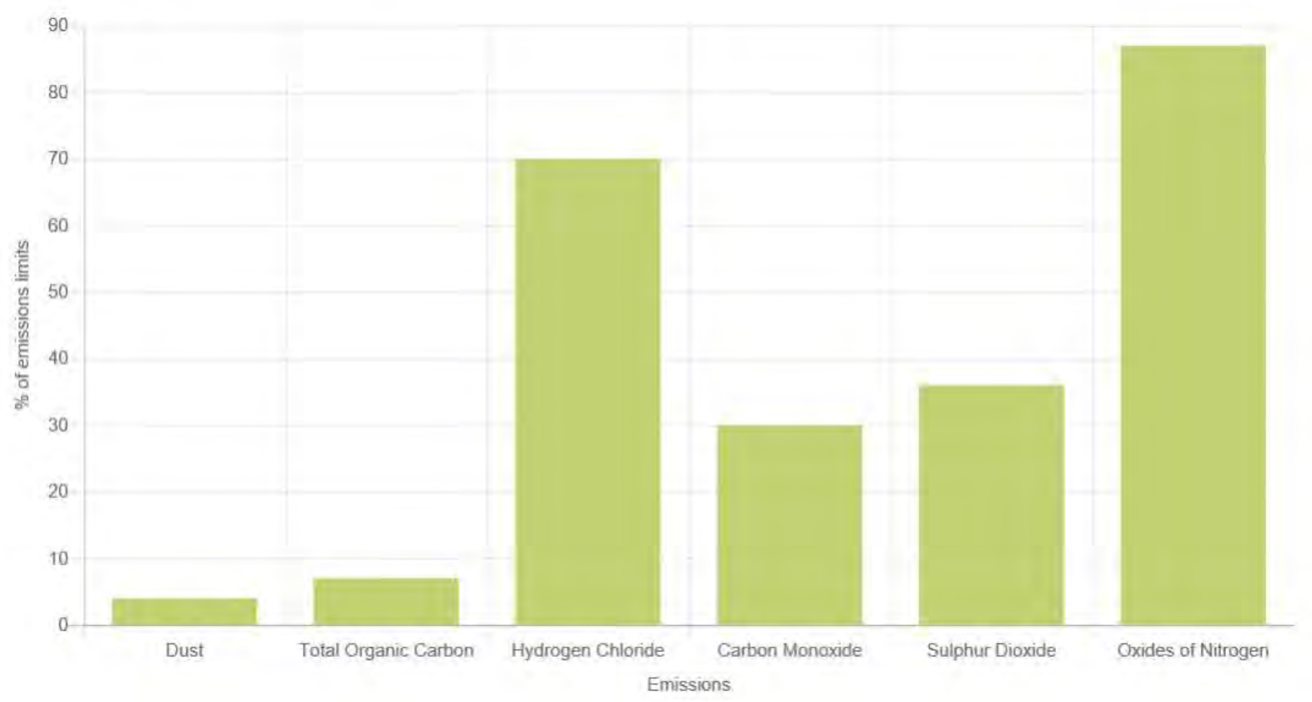
March 2019 Average Daily Emissions



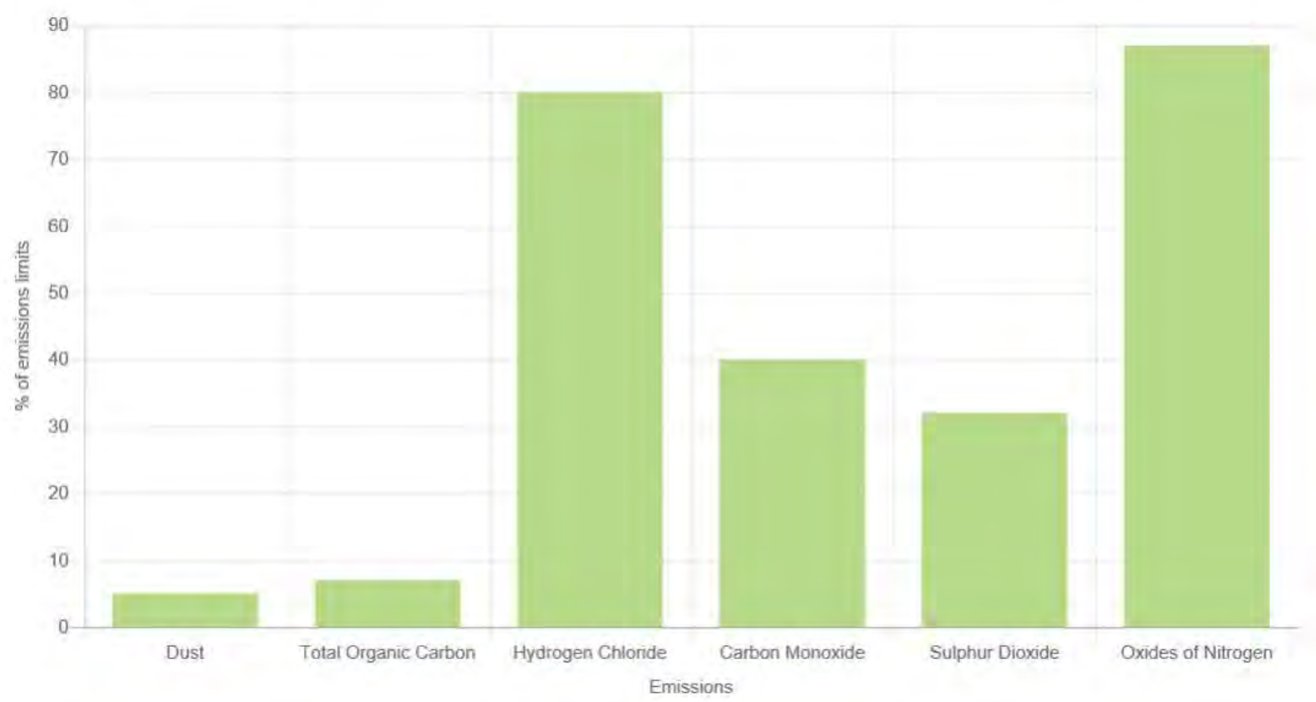
April 2019 Average Daily Emissions



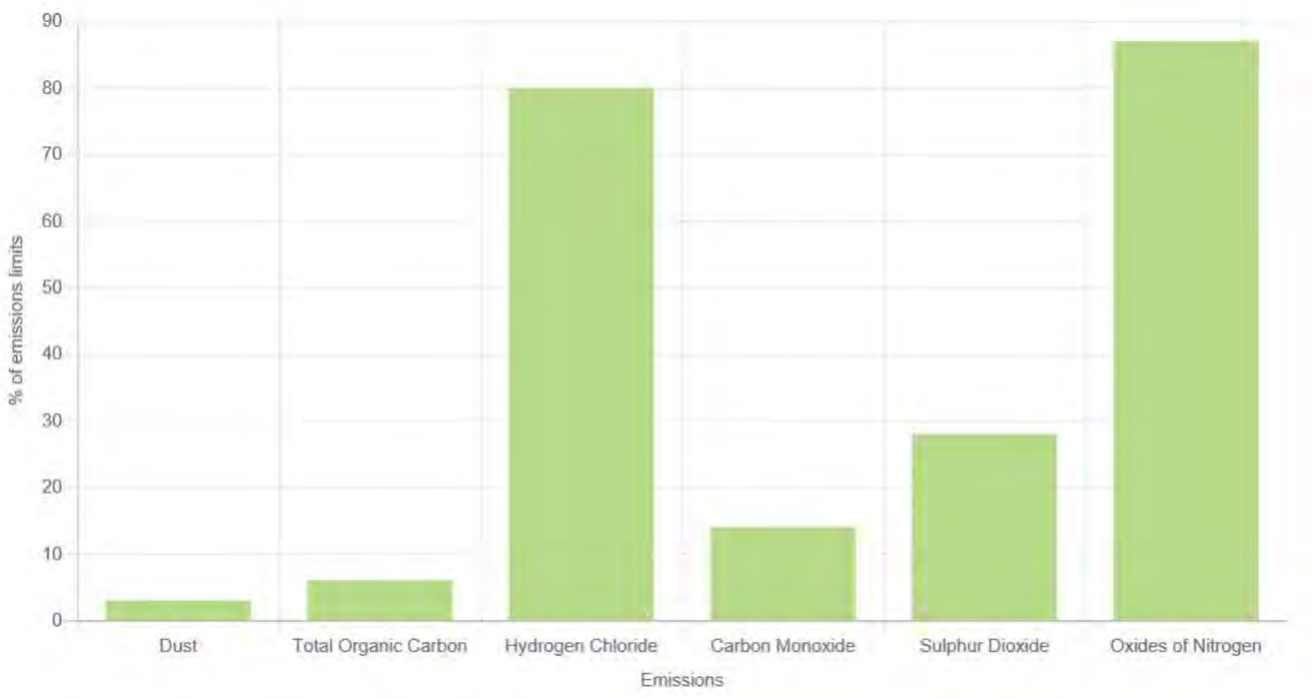
May 2019 Average Daily Emissions



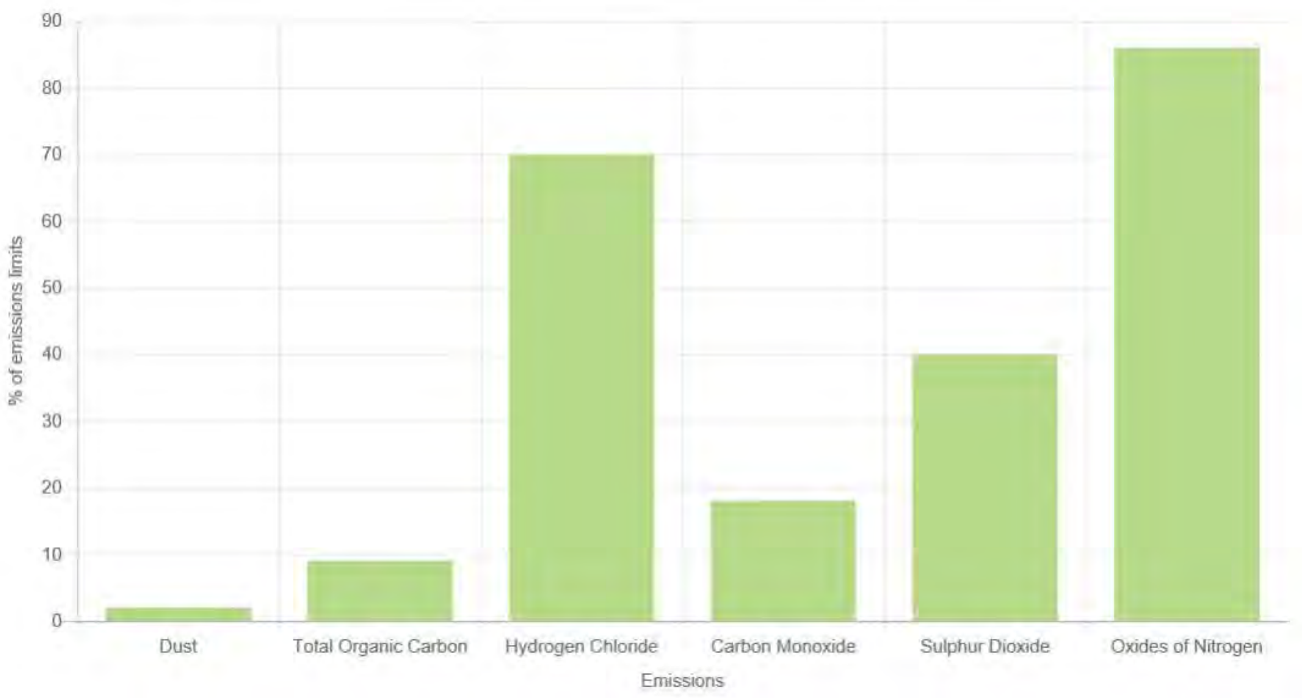
June 2019 Average Daily Emissions



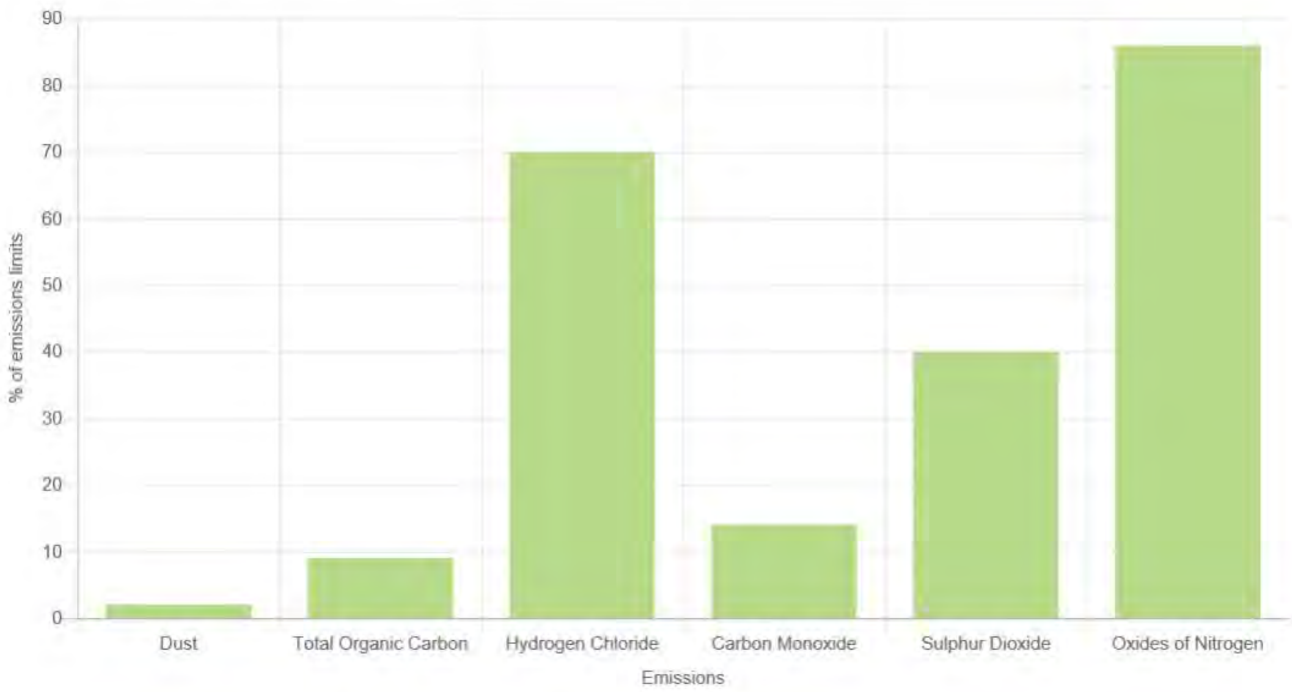
July 2019 Average Daily Emissions



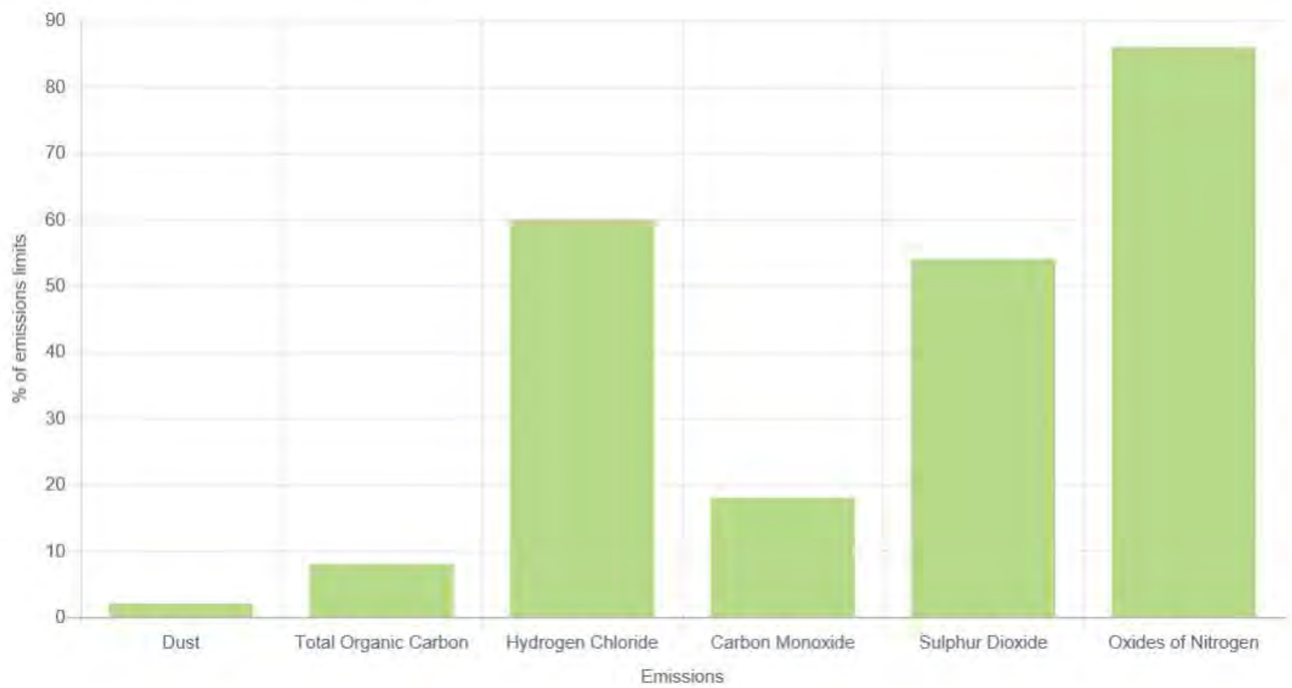
August 2019 Average Daily Emissions



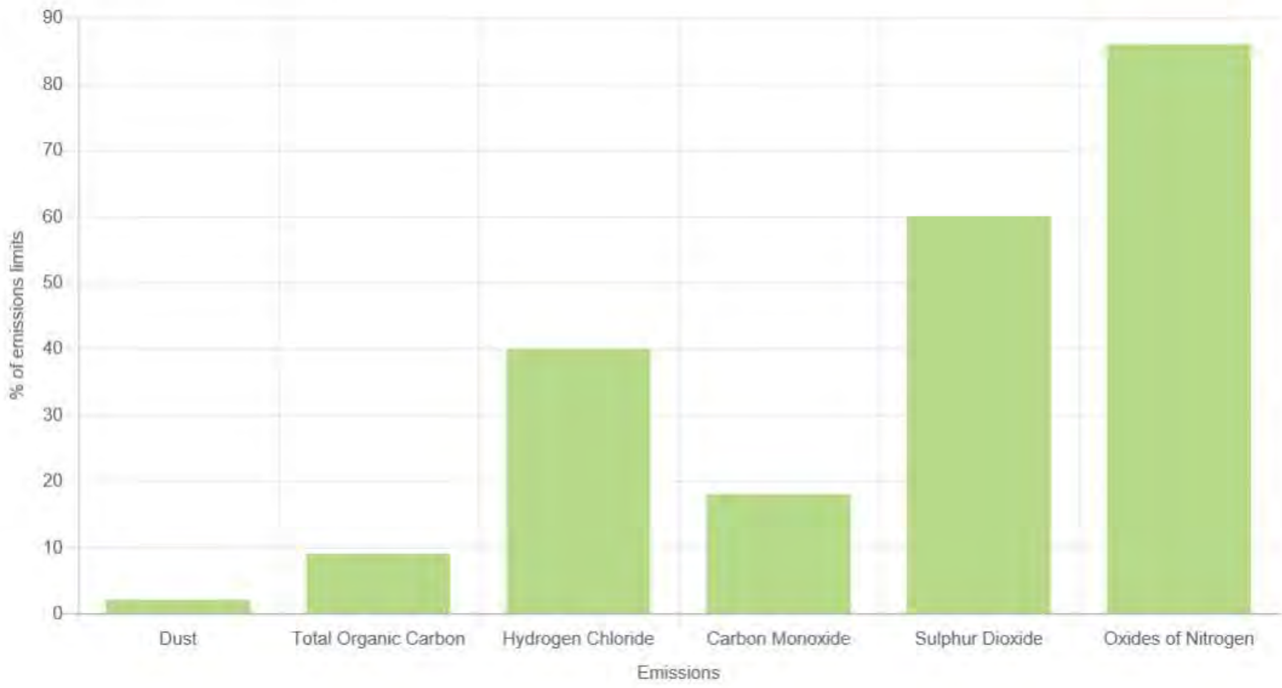
September 2019 Average Daily Emissions



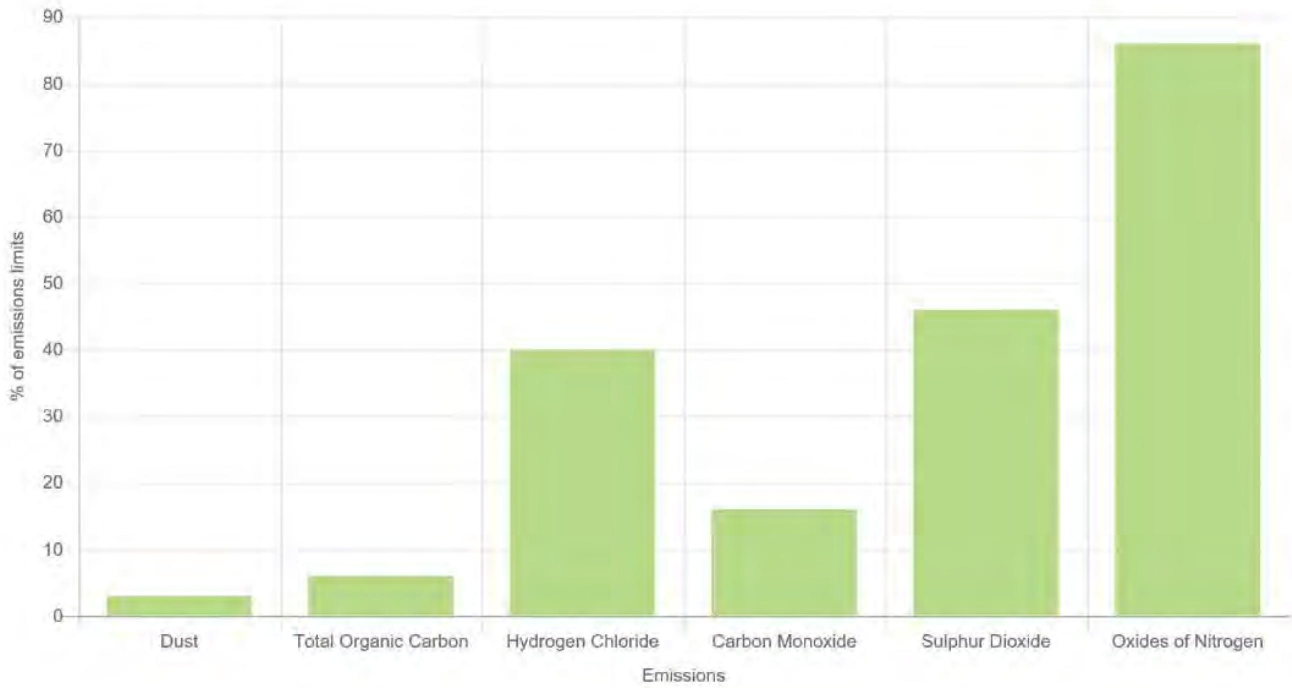
October 2019 Average Daily Emissions



November 2019 Average Daily Emissions



December 2019 Average Daily Emissions



E.3 2018 Emissions

1. <u>Extracts of Emissions Information from Battlefield Annual Performance Report 2018</u>

Battlefield Energy From Waste Facility

Annual Report 2018
EPR/XP3239GF

Written by: Christine Skaramaga

Approved by: Scott Francis

Approved Date: 17/01/19

Version 1

4. EMISSIONS TO AIR

The furnace is fitted with an independent dry urea system in order to reduce NOx emissions to air via selective non-catalytic reduction (SNCR). A dry flue gas treatment system is used to neutralise acid flue gases with the injection of hydrated lime into the reaction chamber. Activated carbon is injected into the flue gases in order to help reduce the concentrations of heavy metals and dioxins in the combustion gases emitted to air. Bag filters are used to separate out the resulting particulate matter from the cooled and treated gases. Gases are finally released to atmosphere via the 65m chimney. In compliance with the IED and EPR Permit, MCERTS accredited equipment is installed in the stack, which continuously monitors a range of determinants.

In addition to the continuous monitoring, an extractive sampling campaign is undertaken on a biannual basis by an approved service supplier. The organisation used for analysis and monitoring are accredited by the United Kingdom Accreditation Service (UKAS) and the Environment Agency's Monitoring Certification Scheme (MCERTS).

The parameters measured and their frequency of monitoring, for the second and subsequent years of operation, are summarised.

Parameters	Continuous	Jan – Jun	Jul – Dec
Particulate Matter	✓		
TOC	✓		
Hydrogen Chloride	✓		
Oxides of Nitrogen	✓		
Carbon Monoxide	✓		
Sulphur Dioxides	✓		
Ammonia	✓		
Nitrous Oxide		✓	✓
Hydrogen Fluoride		✓	✓
Mercury		✓	✓
Arsenic		✓	✓
Cadmium		✓	✓
Chromium		✓	✓
Copper		✓	✓
Cobalt		✓	✓
Nickel		✓	✓
Manganese		✓	✓
Antimony		✓	✓
Lead		✓	✓
Thallium		✓	✓
Vanadium		✓	✓
Dioxins and Furans		✓	✓
Dioxin-like PCBs		✓	✓
PAHs		✓	✓

4.1 Continuous Emissions

Continuous emissions monitoring of six main pollutants with ELVs is undertaken, using MCERTS approved instruments. The pollutants measured in this way comprise: particulates, total organic carbon, carbon monoxide, sulphur dioxide and oxides of nitrogen.

Each pollutant has its own Emission Limit Value (ELV). A summary is shown below.

Pollutant	Chemical Symbol	ELV	Measurement	Monitoring Standard
Particulates	PMx	30mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		10mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Total Organic Carbon	TOC	20mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		10mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Hydrogen Chloride	HCL	60mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		10mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Carbon Monoxide	CO	150mg/m3	10 minute average	BS EN 14181 and BS EN 15267-3
		50mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Sulphur Dioxide	SO2	200mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		50mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Oxides of Nitrogen	NO and NO2 as NOX	400mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		200mg/m3	daily average	BS EN 14181 and BS EN 15267-3

A summary of the continuous emissions can be seen below for 2018 with the monthly averages being those of the average daily concentrations:

Monthly Averages – from daily averages

	Limit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dust	10	0.6	0.7	0.7	0.4	0.2	0.2	0.2	0.2	0.4	0.2	0.2	0.2
Total Organic Carbon	10	0.4	0.4	0.6	0.3	0.3	0.3	0.2	0.1	0.2	0.5	0.5	0.6
Hydrogen Chloride	10	6	6	5	6	7	7	7	7	7	7	6	6
Carbon Monoxide	50	9	10	9	8	8	7	9	8	8	8	9	9
Sulphur Dioxide	50	18	19	23	20	15	15	13	12	11	12	19	20
Oxides of Nitrogen	200	172	172	173	172	172	172	172	172	172	172	172	172

The above data is communicated monthly to the public via our Veolia website in terms of a percentage of each ELV. A more detailed IED report is sent to the EA each month showing emissions per pollutant per month in terms of half hourly averages and daily averages.

APPENDIX A

Permit Number: **EPR/ XP3239GF** **Operator:** **Veolia**

Facility: Battlefield EFW

Reporting of periodically monitored emissions to air for the period from 01/01/18 to 31/06/18 Quarter 1&2

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result [1]	Test Method	Result Date and Time [2]	Uncertainty [3]
A1	Hydrogen fluoride	2 mg/m³	Periodic over minimum 1-hour period	0.03 mg/m³	BS ISO 15713	12/04/2018; 10:00 – 11:00	14%
A1	Cadmium & thallium and their compounds (total)	0.05 mg/m³	over minimum 30 minute, maximum 8 hour period	0.001 mg/m³	BS EN 14385	12/04/2018; 07:45 – 09:46	8%
A1	Mercury and its compounds	0.05 mg/m³	over minimum 30 minute, maximum 8 hour period	0.004 mg/m³	BS EN 14385	12/04/2018; 07:45 – 09:46	13%
A1	Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m³	over minimum 30 minute, maximum 8 hour period	0.0097 mg/m³	BS EN 14385	12/04/2018; 07:45 – 09:46	4%
A1	N_2O	No limit applies	Periodic Over minimum 1-hour period	13.12 mg/m³	EA TGN M22	10/04/2018; 11:00 – 12:00	8%
A1	Dioxins / Furans (I-TEQ)	0.1 ng/m³	over minimum 6 hour period, maximum 8 hour period	0.00033-0.0048 ng/m³	BS EN 1948	11/04/2018; 07:42 – 13:45	16%
A1	Dioxins / furans (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.0003-0.0054 ng/m³	BS EN 1948	11/04/2018; 07:42 – 13:45	17%
A1	Dioxins / furans (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.000029-0.0049 ng/m3	BS EN 1948	11/04/2018; 07:42 – 13:45	19%
A1	Dioxins / furans (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.000029-0.008 ng/m3	BS EN 1948	11/04/2018; 07:42 – 13:45	20%
A1	Dioxin-like PCBs (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.00057-0.0006 ng/m³	BS EN 1948	11/04/2018; 07:42 – 13:45	20%
A1	Dioxin-like PCBs (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.000036-0.000036 ng/m³	BS EN 1948	11/04/2018; 07:42 – 13:45	17%
A1	Dioxin-like PCBs (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.0031-0.0031 ng/m³	BS EN 1948	11/04/2018; 07:42 – 13:45	13%
A1	Poly-cyclic aromatic	No limit	over minimum 6 hour period	0.88 ug/m³	BS ISO 11338	10/04/2018; 07:35 – 13:36	11%

A1	Poly-cyclic aromatic hydrocarbons (PAHs) Total	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.88 ug/m³	BS ISO 11338	10/04/2018; 07:35 – 13:36	11%
A1	Anthanthrene	No limit applies		0.014 ug/m³			>100%
A1	Benzo[a]anthracene	No limit applies		0.014 ug/m³			>100%
A1	Benzo[b]fluoranthene	No limit applies		0.014 ug/m³			>100%
A1	Benzo[k]fluoranthene	No limit applies		0.014 ug/m³			>100%
A1	Benzo[b]naph(2,1-d)thiophene	No limit applies		0.014 ug/m³			>100%
A1	Benzo[c]phenanthrene	No limit applies		0.014 ug/m³			>100%
A1	Benzo[ghi]perylene	No limit applies		0.014 ug/m³			>100%
A1	Benzo[a]pyrene	No limit applies		0.014 ug/m³			>100%
A1	Cholanthrene	No limit applies		0.014 ug/m³			>100%
A1	Chrysene	No limit applies		0.014 ug/m³			>100%
A1	Cyclopenta(c,d)pyrene	No limit applies		0.014 ug/m³			>100%
A1	Dibenzo[ah]anthracene	No limit applies		0.014 ug/m³			>100%
A1	Dibenzo[a,i]pyrene	No limit applies		0.014 ug/m³			>100%
A1	Fluoranthene	No limit applies		0.31 ug/m³			18%
A1	Indo[1,2,3-cd]pyrene	No limit applies		0.014 ug/m³			>100%
A1	Naphthalene	No limit applies		0.37 ug/m³			18%

[1] For dioxins and dioxin-like PCBs, the result are to be reported as a range based on: All congeners less than the detection limit assumed to be zero as a minimum, and all congeners less than the detection limit assumed to be at the detection limit as a maximum

[2] The date and time of the sample that produced the result is given.

[3] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Signed .... **Date** 13/7/18

(authorised to sign as representative of Operator)

Permit Number: **EPR/ XP3239GF** **Operator:** **Veolia**
Facility: Battlefield EFW
Reporting of periodically monitored emissions to air for the period from 01/07/18 to 31/12/18 Quarter 3&4

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result [1]	Test Method	Result Date and Time [2]	Uncertainty [3]
A1	Hydrogen fluoride	2 mg/m³	Periodic over minimum 1-hour period	0.04 mg/m³	BS ISO 15713	9/10/2018; 08:15 – 09:15	14%
A1	Cadmium & thallium and their compounds (total)	0.05 mg/m³	over minimum 30 minute, maximum 8 hour period	0.0012 mg/m³	BS EN 14385	8/10/2018; 11:00 – 13:01	8%
A1	Mercury and its compounds	0.05 mg/m³	over minimum 30 minute, maximum 8 hour period	0.0055 mg/m³	BS EN 14385	8/10/2018; 11:00 – 13:01	13%
A1	Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m³	over minimum 30 minute, maximum 8 hour period	0.016 mg/m³	BS EN 14385	8/10/2018; 11:00 – 13:01	4%
A1	N_2O	No limit applies	Periodic Over minimum 1-hour period	8.38 mg/m³	EA TGN M22	16/10/2018; 13:00 – 13:59	9%
A1	Dioxins / Furans (I-TEQ)	0.1 ng/m³	over minimum 6 hour period, maximum 8 hour period	0.011-0.011 ng/m³	BS EN 1948	27/12/2018; 08:40 – 14:43	14%
A1	Dioxins / furans (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.012-0.012 ng/m³	BS EN 1948	27/12/2018; 08:40 – 14:43	14%
A1	Dioxins / furans (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.012-0.012 ng/m3	BS EN 1948	27/12/2018; 08:40 – 14:43	15%
A1	Dioxins / furans (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.018-0.018 ng/m3	BS EN 1948	27/12/2018; 08:40 – 14:43	17%
A1	Dioxin-like PCBs (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.0016-0.0016 ng/m³	BS EN 1948	27/12/2018; 08:40 – 14:43	20%
A1	Dioxin-like PCBs (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.000089-0.000089 ng/m³	BS EN 1948	27/12/2018; 08:40 – 14:43	18%
A1	Dioxin-like PCBs (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.005-0.005 ng/m³	BS EN 1948	27/12/2018; 08:40 – 14:43	13%

A1	Poly-cyclic aromatic hydrocarbons (PAHs) Total	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.69 ug/m³	BS ISO 11338	28/12/2018; 06:35 – 12:37	9%
A1	Anthanthrene	No limit applies		0.013 ug/m³			>100%
A1	Benzo[a]anthracene	No limit applies		0.013 ug/m³			17%
A1	Benzo[b]fluoranthene	No limit applies		0.013 ug/m³			>100%
A1	Benzo[k]fluoranthene	No limit applies		0.013 ug/m³			17%
A1	Benzo[b]naph(2,1-d)thiophene	No limit applies		0.013 ug/m³			>100%
A1	Benzo[c]phenanthrene	No limit applies		0.013 ug/m³			>100%
A1	Benzo[ghi]perylene	No limit applies		0.11 ug/m³			17%
A1	Benzo[a]pyrene	No limit applies		0.04 ug/m³			17%
A1	Cholanthrene	No limit applies		0.013 ug/m³			>100%
A1	Chrysene	No limit applies		0.013 ug/m³			17%
A1	Cyclopenta(c,d)pyrene	No limit applies		0.013 ug/m³			>100%
A1	Dibenzo[ah]anthracene	No limit applies		0.013 ug/m³			>100%
A1	Dibenzo[a,i]pyrene	No limit applies		0.013 ug/m³			>100%
A1	Fluoranthene	No limit applies		0.24 ug/m³			17%
A1	Indo[1,2,3-cd]pyrene	No limit applies		0.026 ug/m³			17%
A1	Naphthalene	No limit applies		0.13 ug/m³			17%

[1] For dioxins and dioxin-like PCBs, the result are to be reported as a range based on: All congeners less than the detection limit assumed to be zero as a minimum, and all congeners less than the detection limit assumed to be at the detection limit as a maximum
[2] The date and time of the sample that produced the result is given.
[3] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Signed .... **Date** 17/1/19
(authorised to sign as representative of Operator)

APPENDIX B

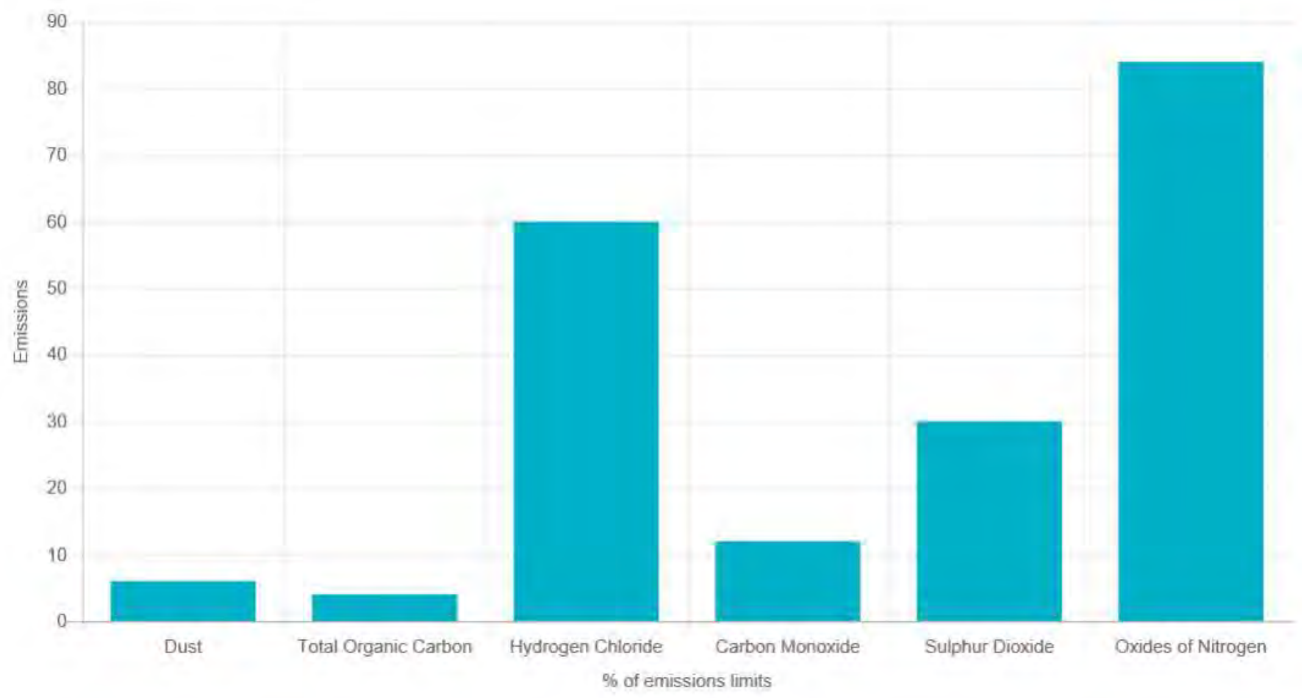
OPERATIONAL SUMMARY for each month of the YEAR to 31/12/2018

Average concentrations from valid 30 min (10 min for CO) averages.

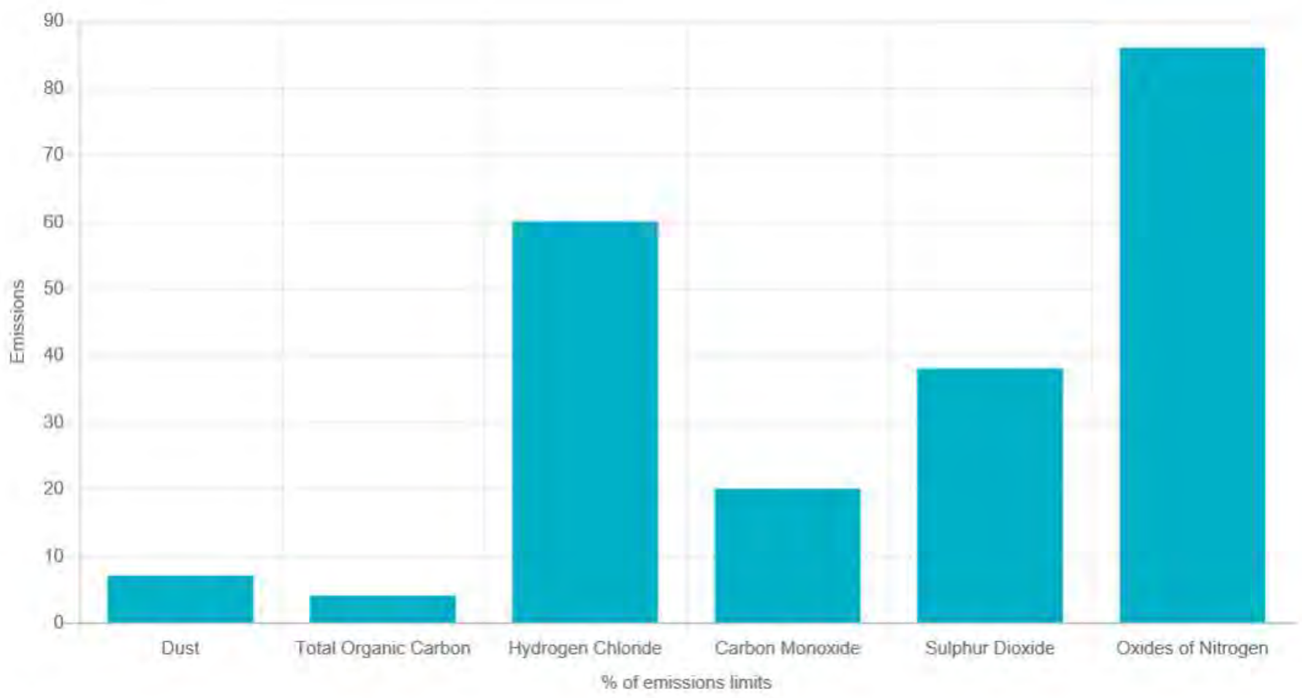
Month	NOx (mg/m3)	CO (mg/m3)	SO2 (mg/m3)	HCl (mg/m3)	VOC (mg/m3)	NH3 (mg/m3)	Dust (mg/m3)	Flow (kNm3/hr)
January	172	9	18	6	0.4	9	0.6	67.7
February	172	10	19	6	0.4	9	0.7	67.7
March	173	9	23	5	0.6	10	0.7	63.6
April	172	8	20	6	0.3	10	0.4	65.2
May	172	8	15	7	0.3	9	0.2	65.2
June	172	7	15	7	0.3	9	0.2	65.1
July	172	9	13	7	0.2	9	0.2	64.5
August	172	8	12	7	0.1	7	0.2	64.8
September	172	8	11	7	0.2	6	0.4	65.0
October	172	8	12	7	0.5	9	0.2	65.5
November	172	9	19	6	0.5	9	0.2	65.2
December	172	9	20	6	0.6	6	0.2	65.1
Yearly Average	**172**	**9**	**16**	**6**	**0.4**	**9**	**0.4**	**65.4**

2. Publicly reported continuously monitored emissions reports

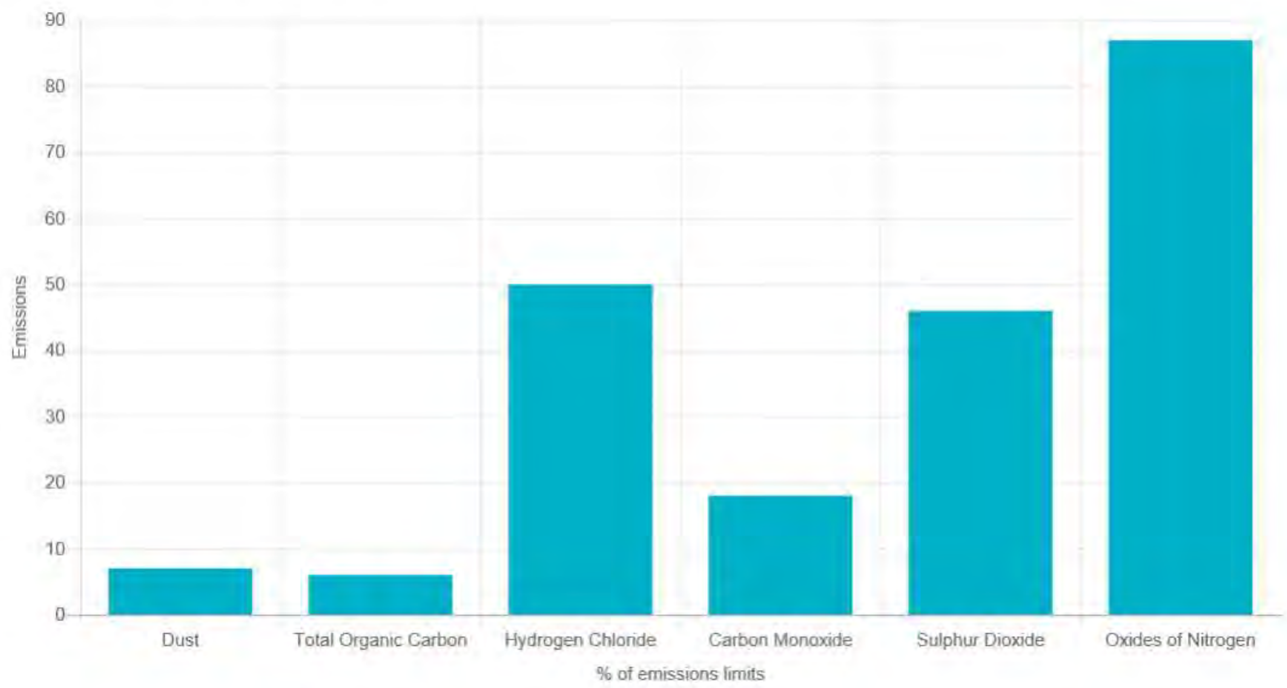
January 2018 Average Daily Emissions



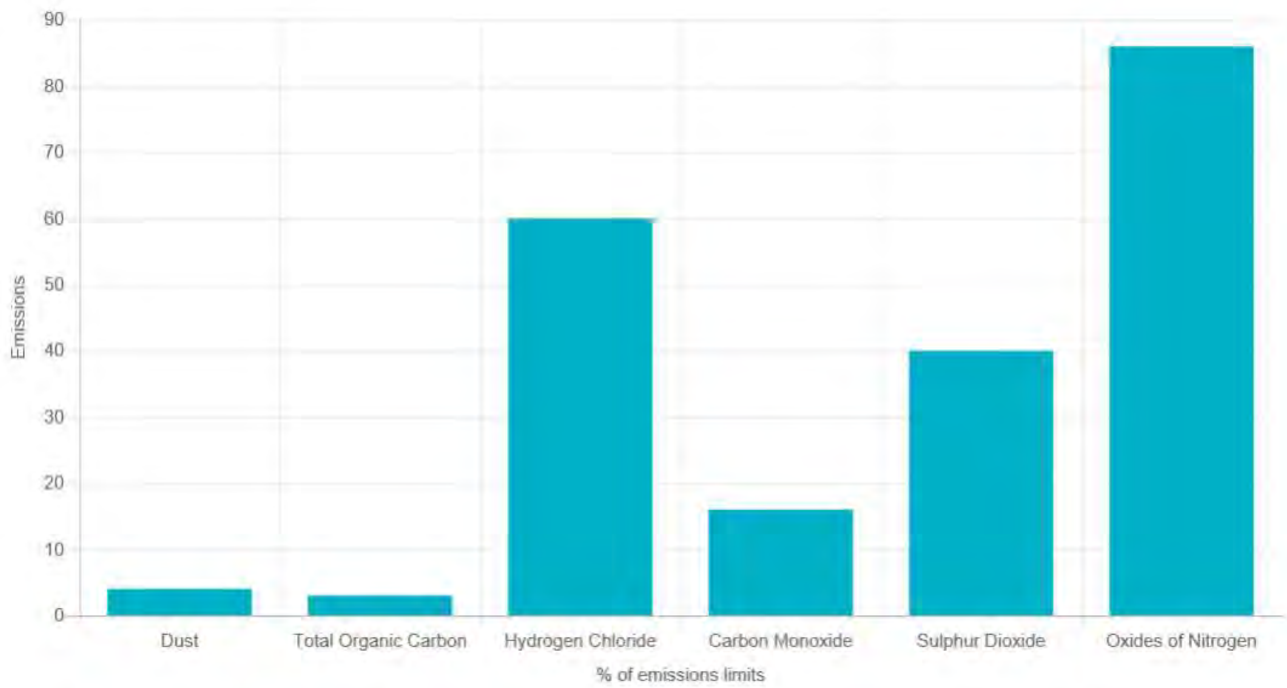
February 2018 Average Daily Emissions



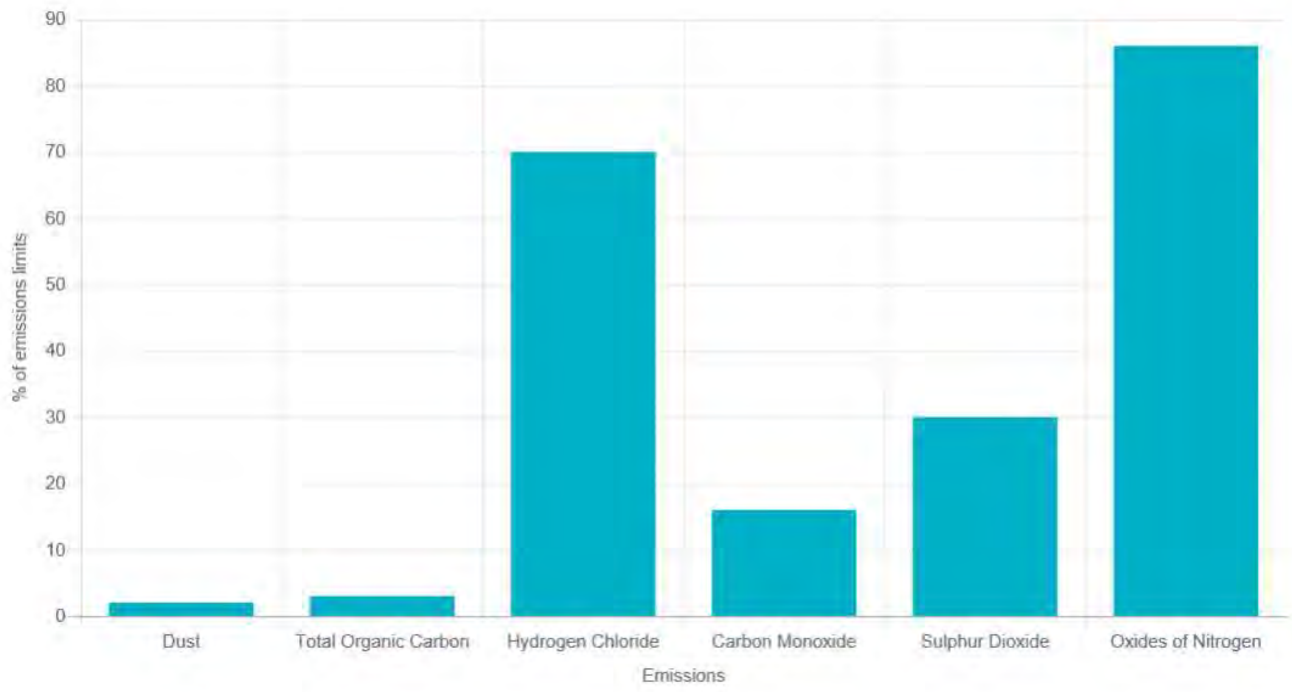
March 2018 Average Daily Emissions



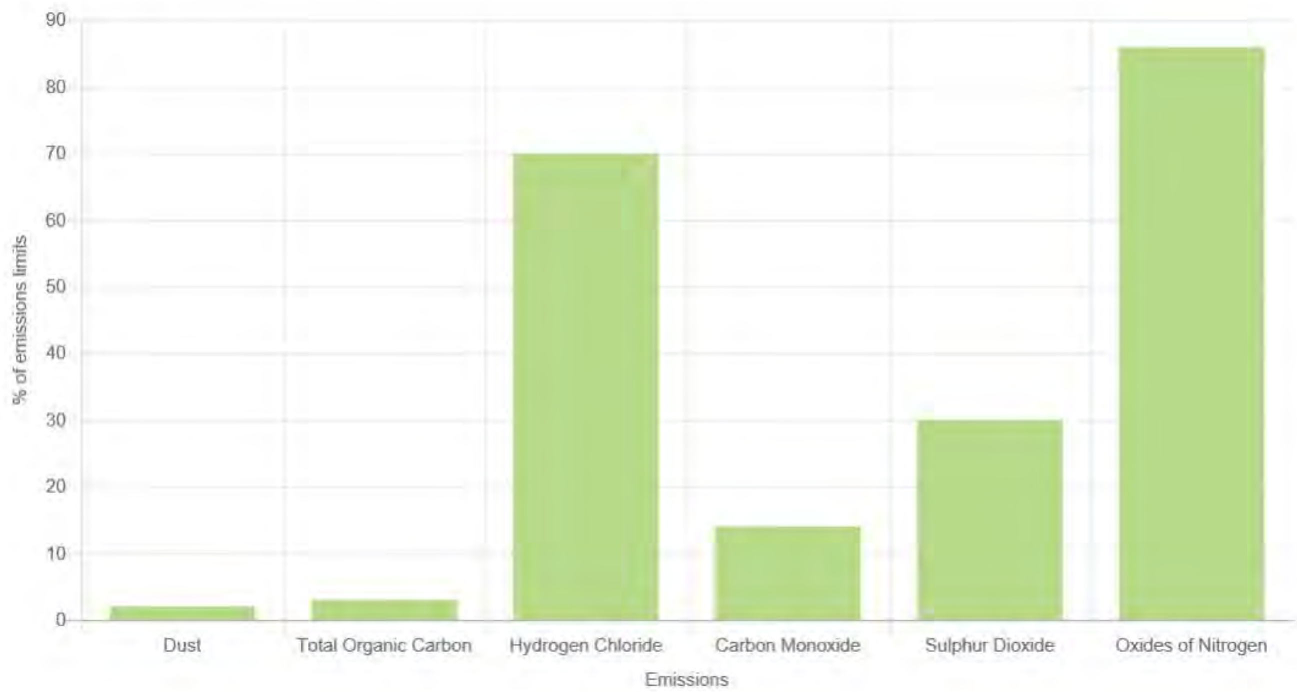
April 2018 Average Daily Emissions



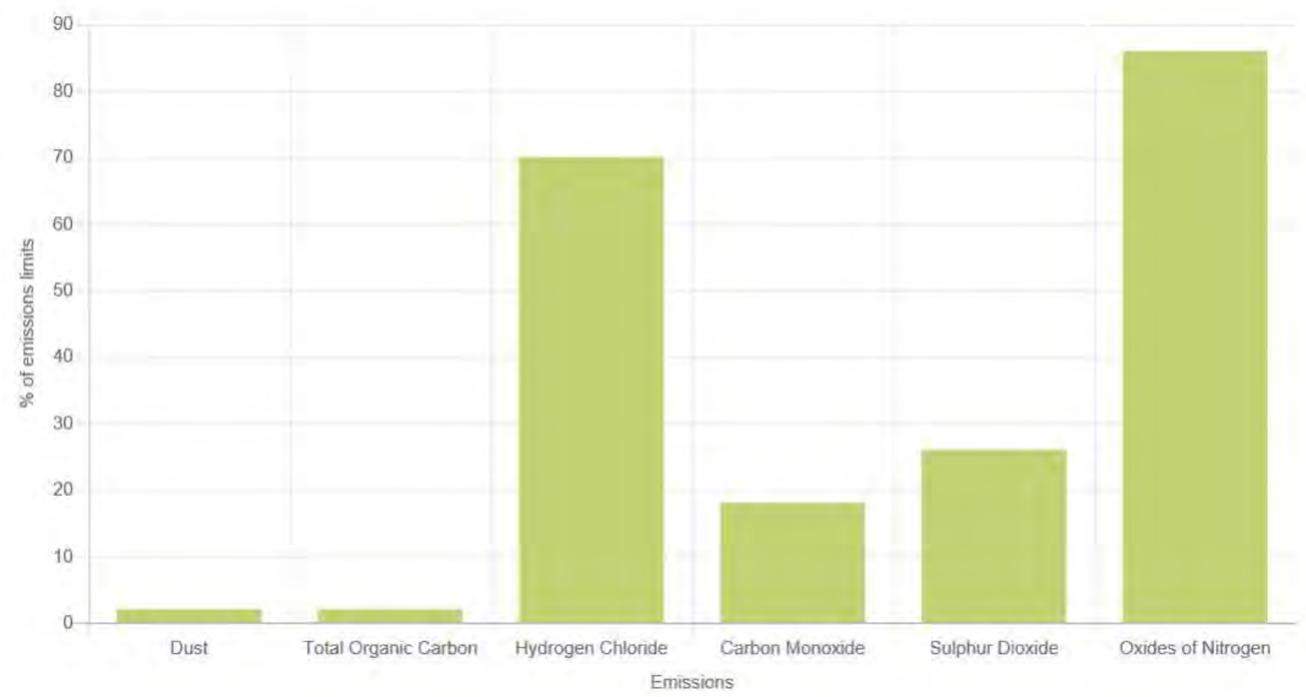
May 2018 Average Daily Emissions



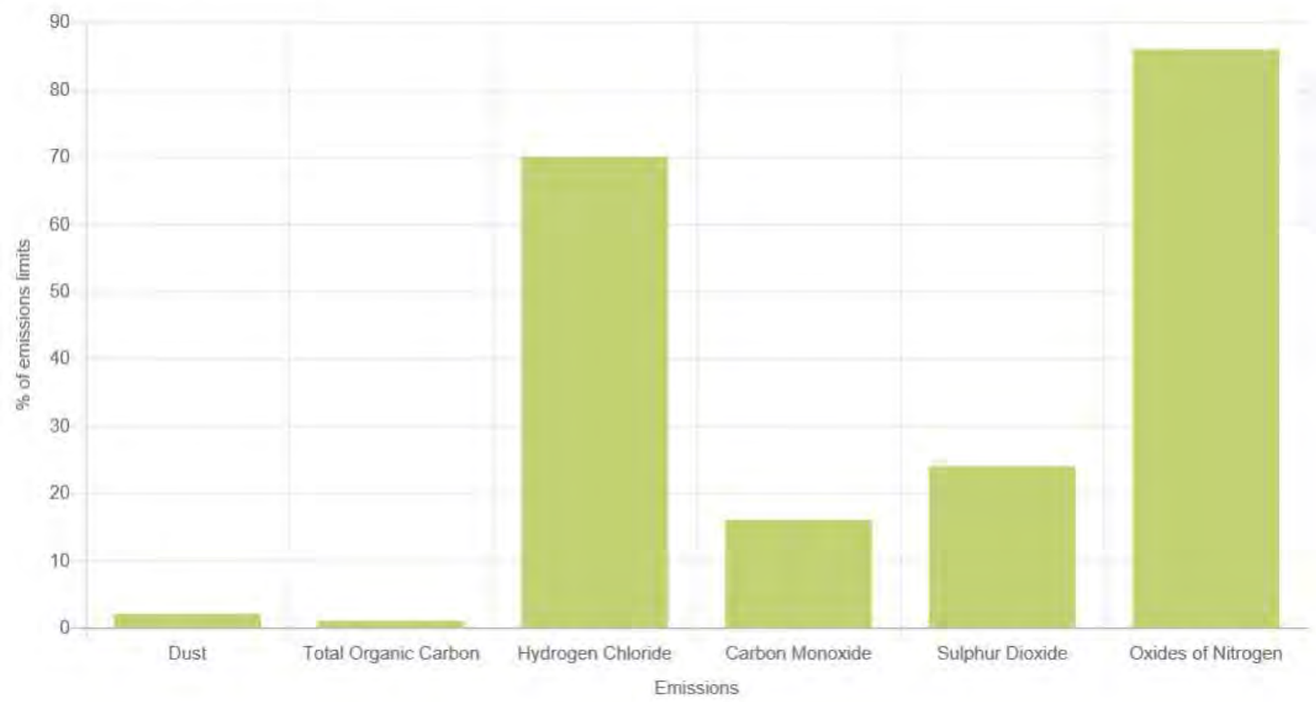
June 2018 Average Daily Emissions



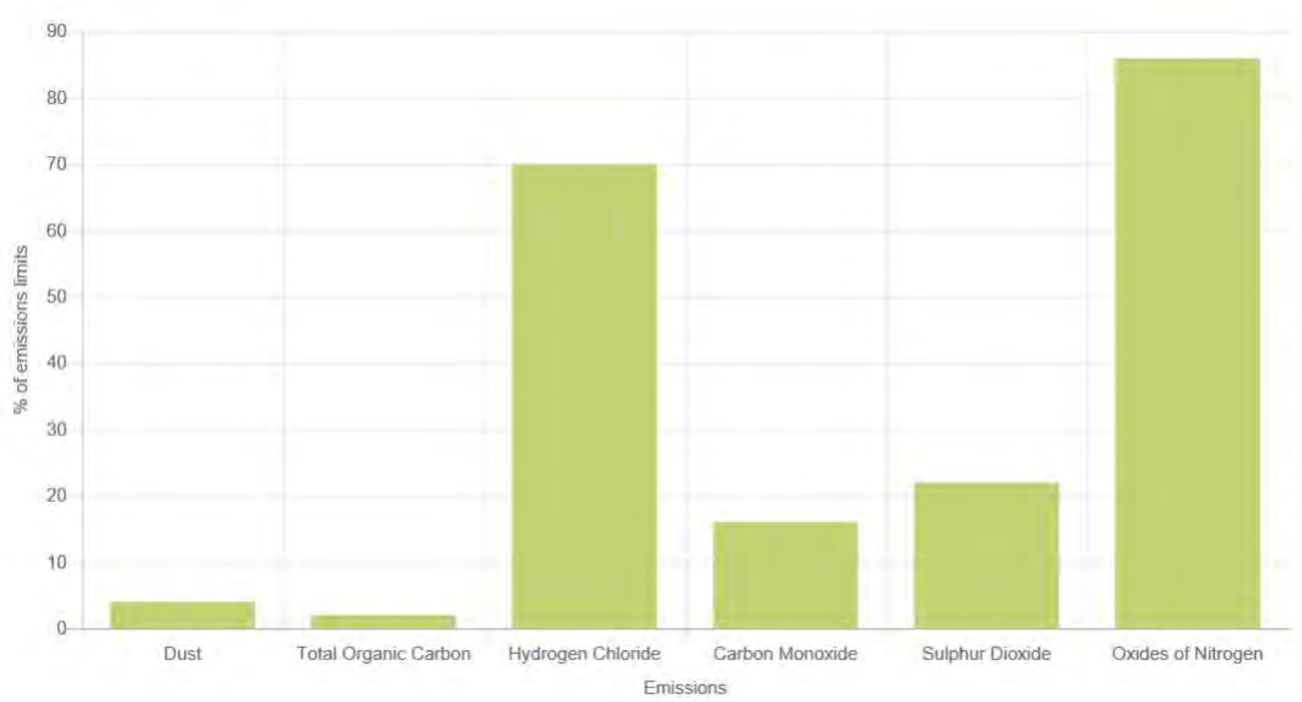
July 2018 Average Daily Emissions



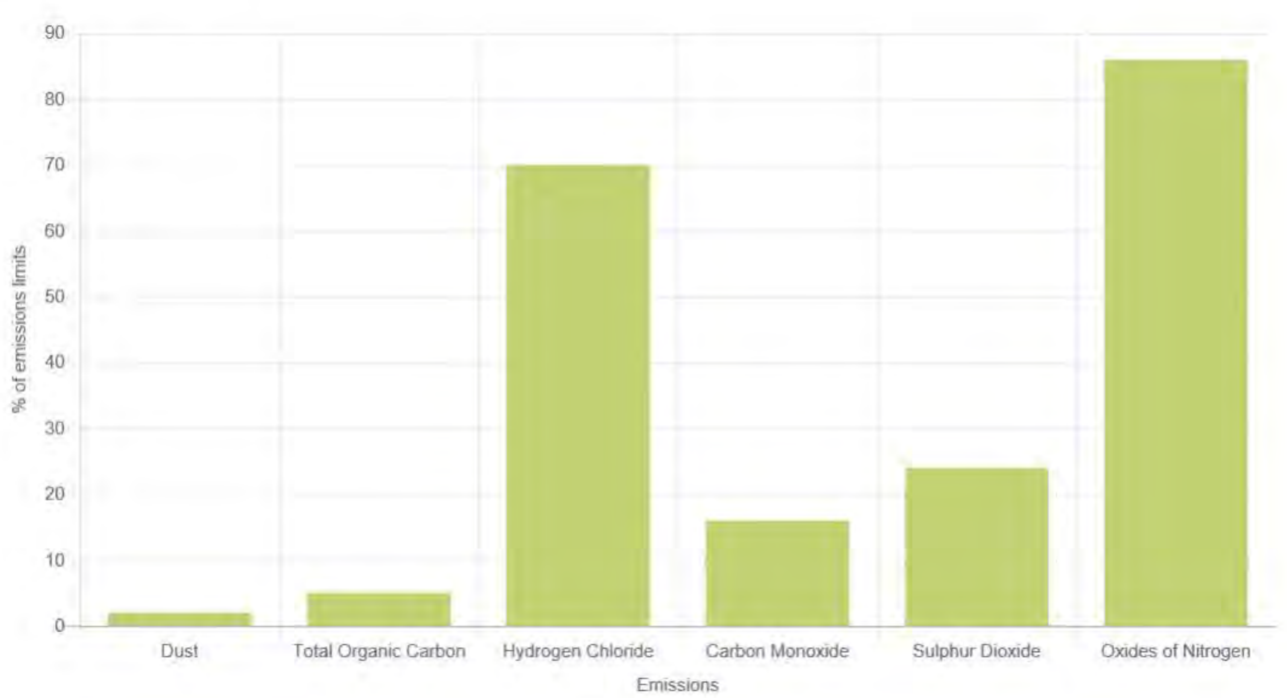
August 2018 Average Emissions



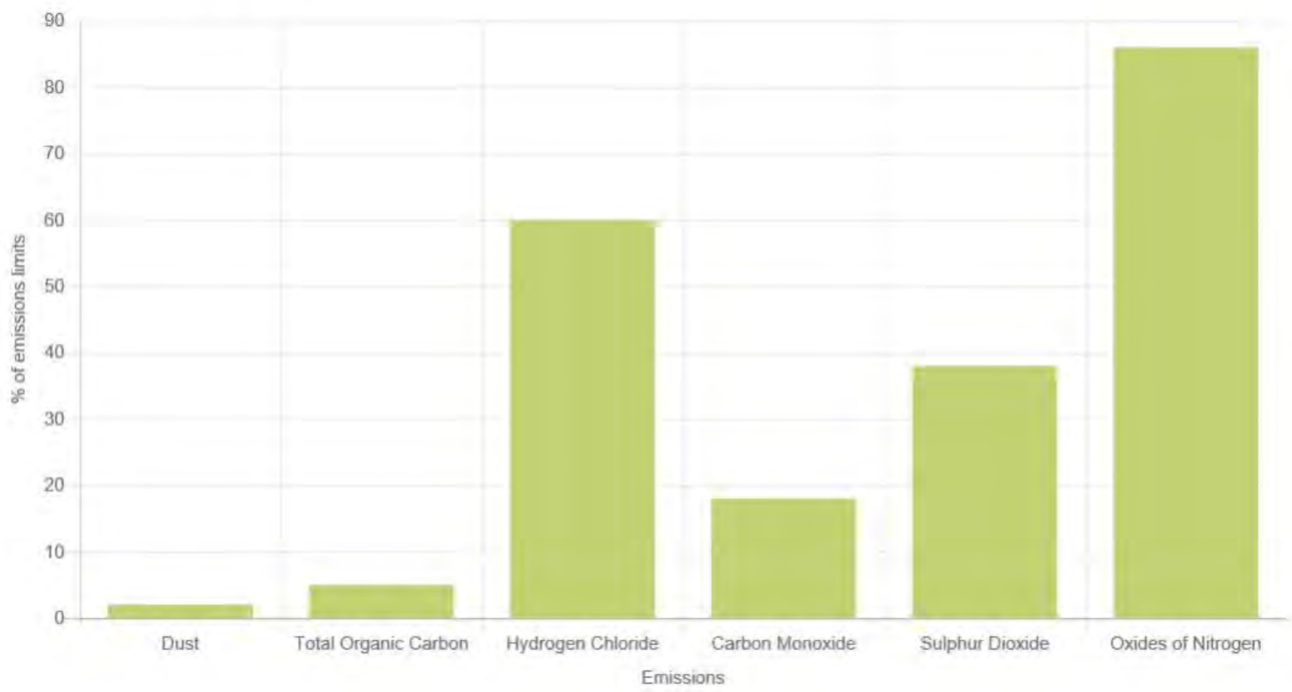
September 2018 Average Daily Emissions



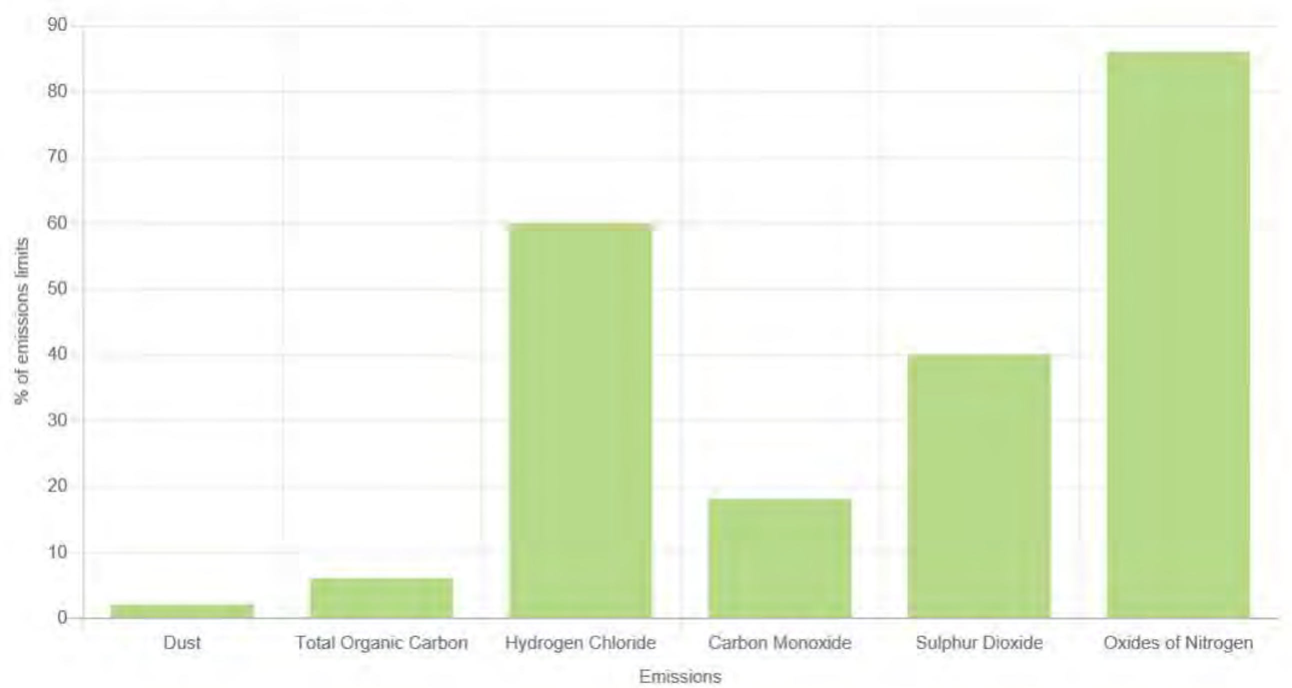
October 2018 Average Daily Emissions



November 2018 Average Daily Emissions



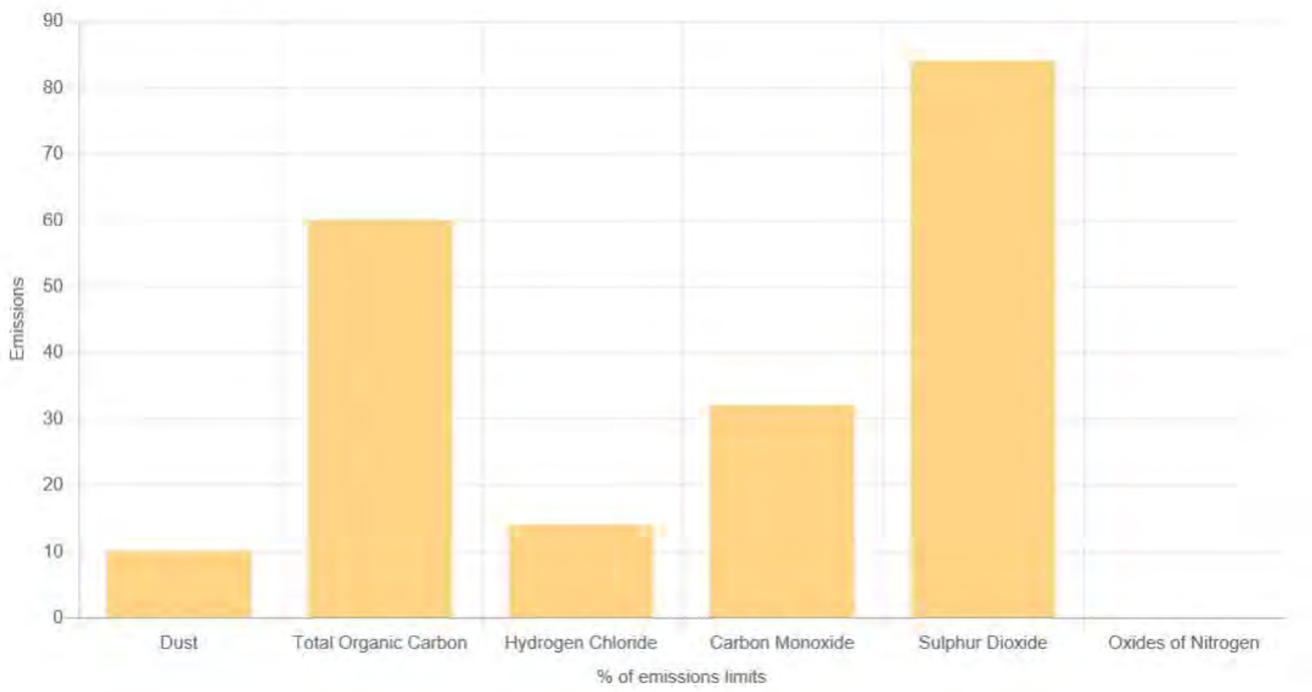
December 2018 Average Daily Emissions



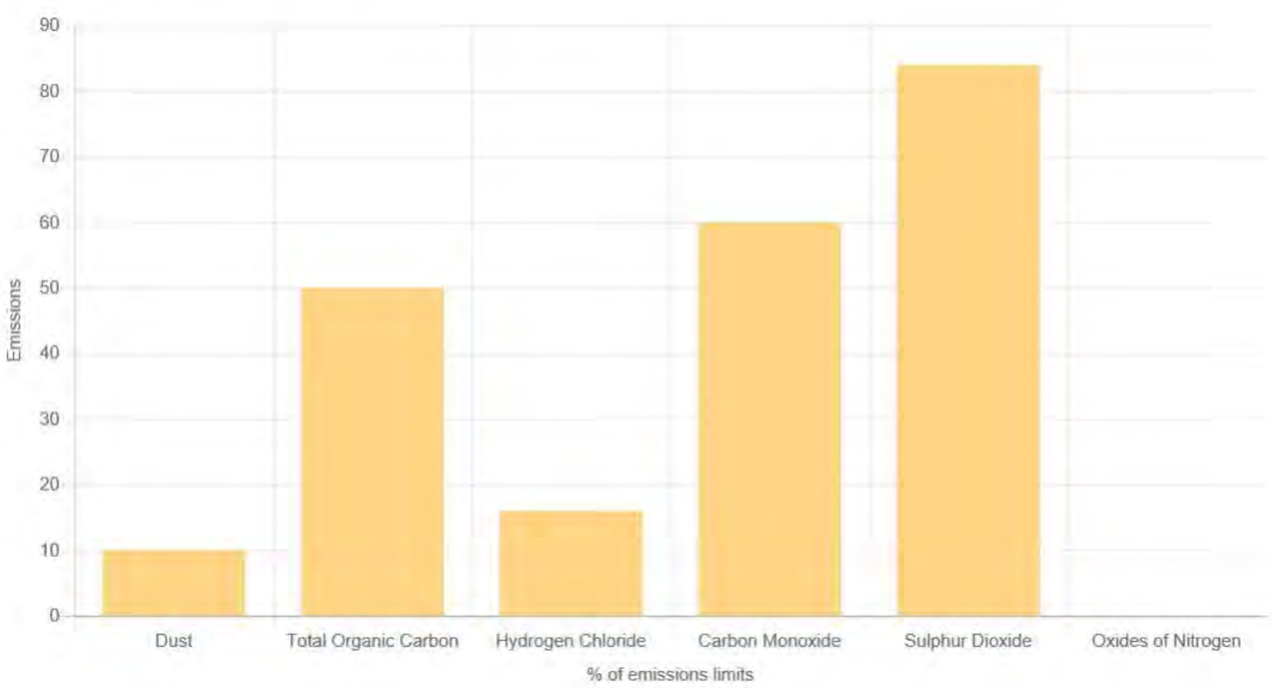
E.4 2017 Emissions

1. <u>Publicly reported continuously monitored emissions reports</u>

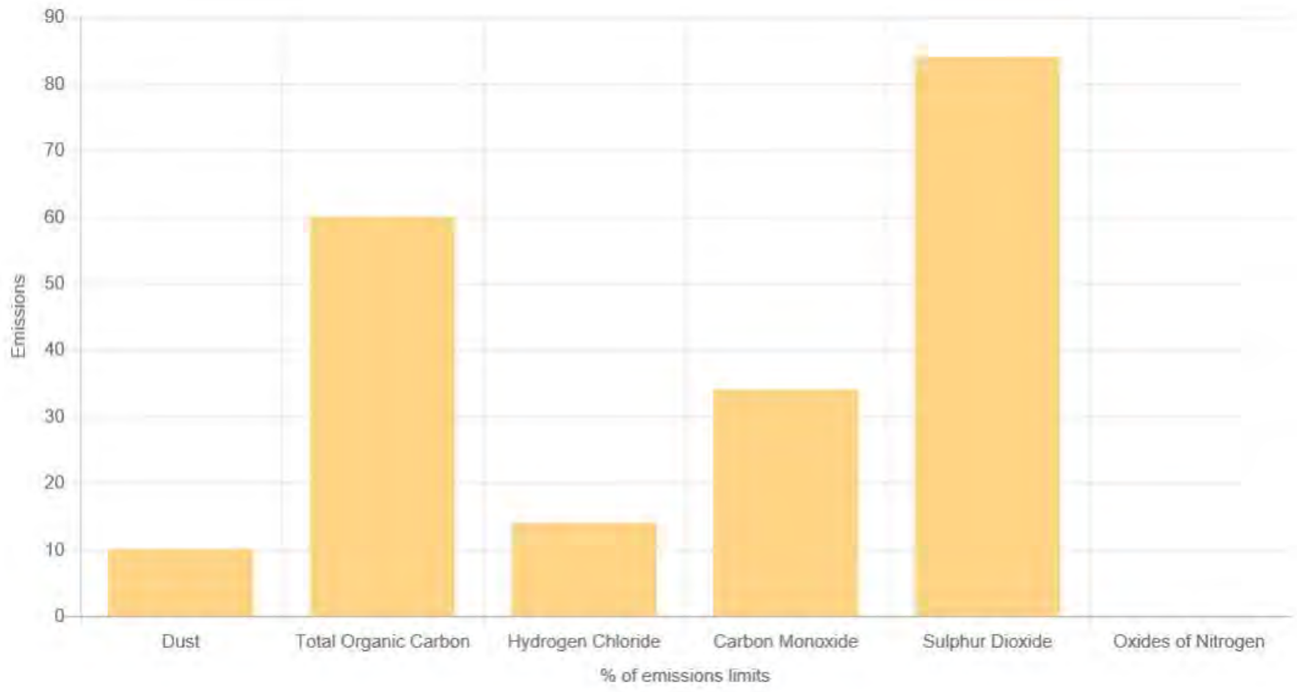
January 2017 Average Daily Emissions



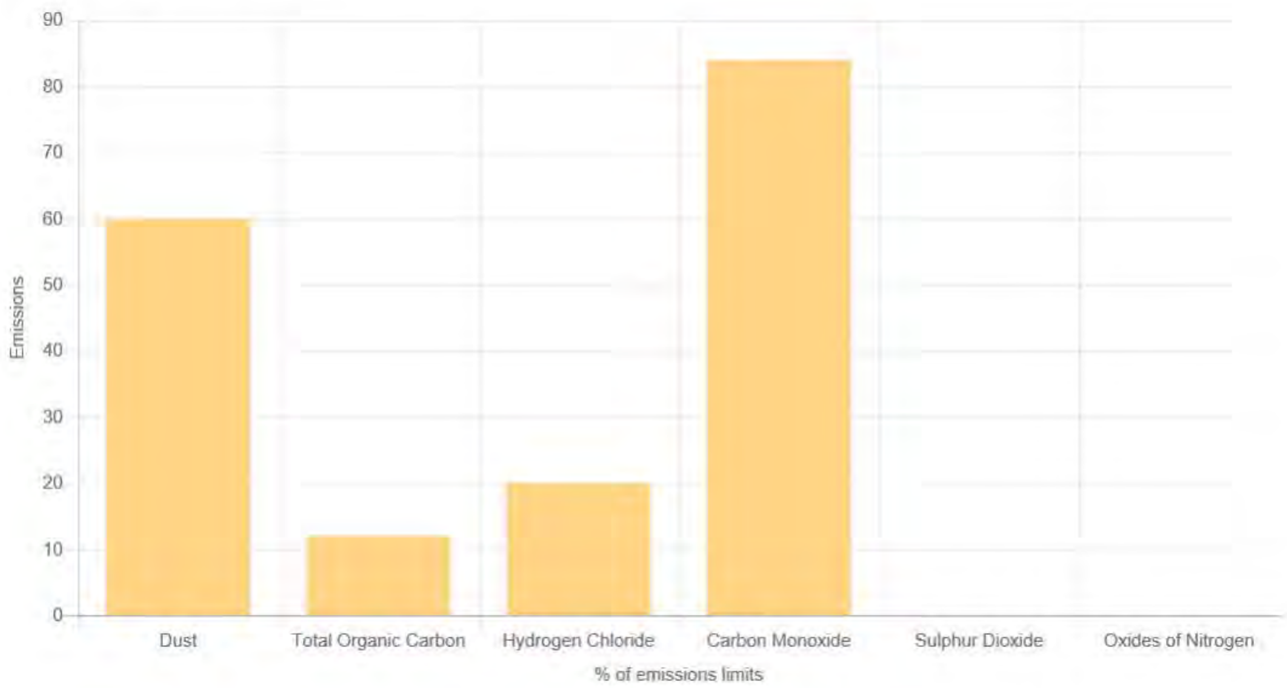
February 2017 Average Daily Emissions



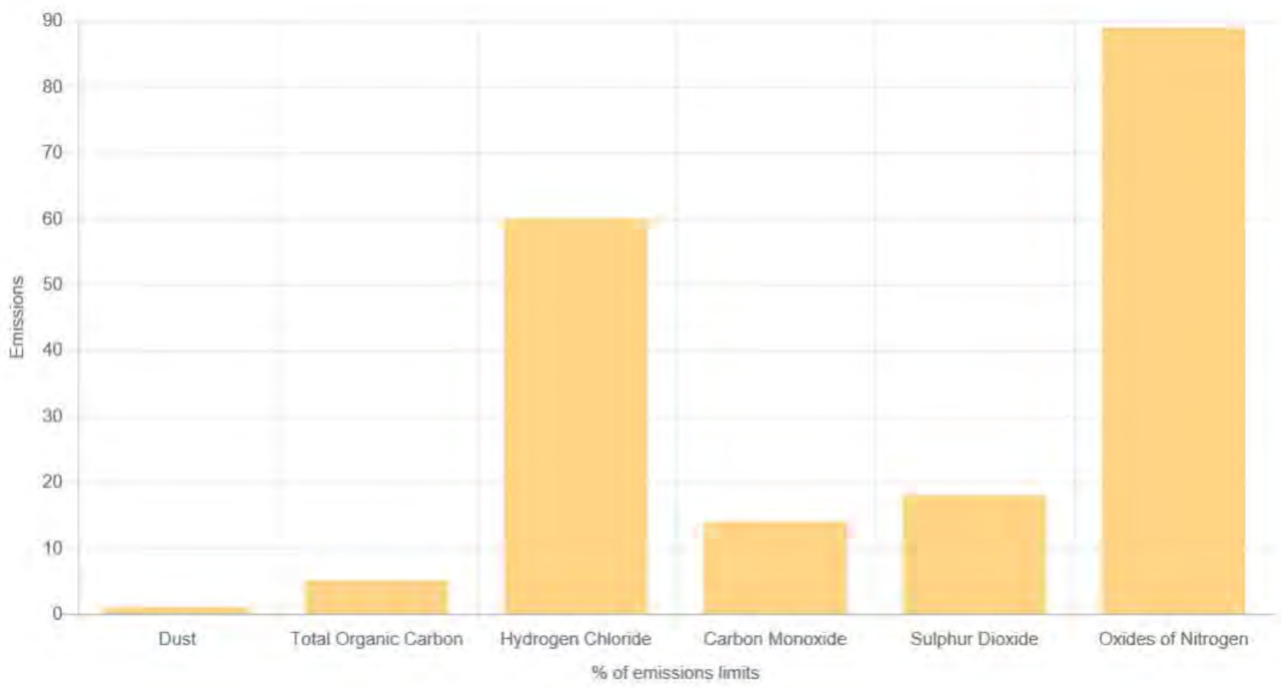
March 2017 Average Daily Emissions



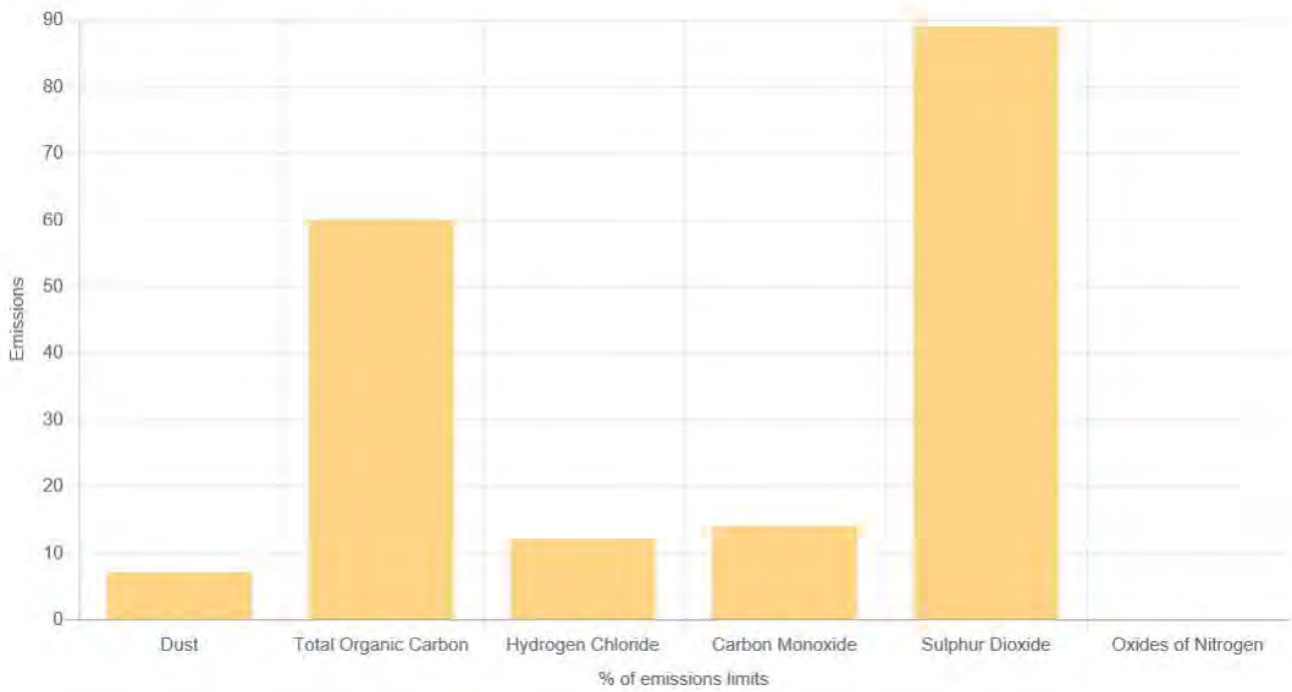
April 2017 Average Daily Emissions



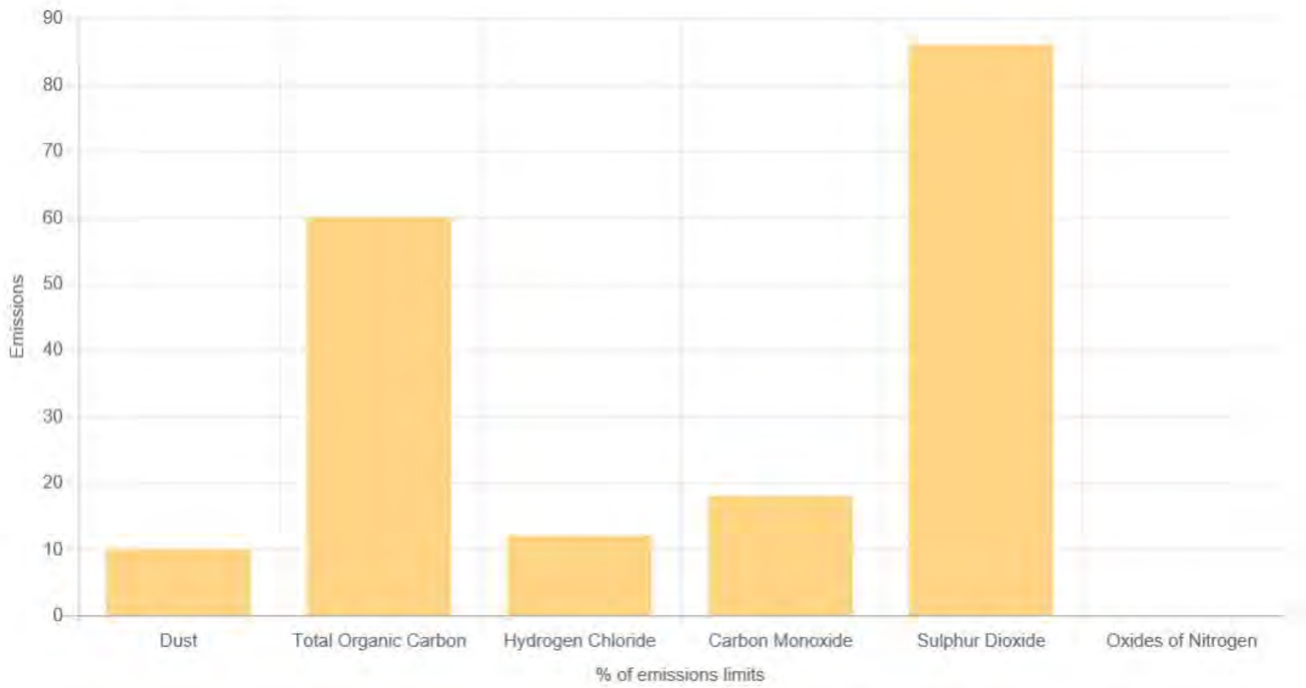
May 2017 Average Daily Emissions



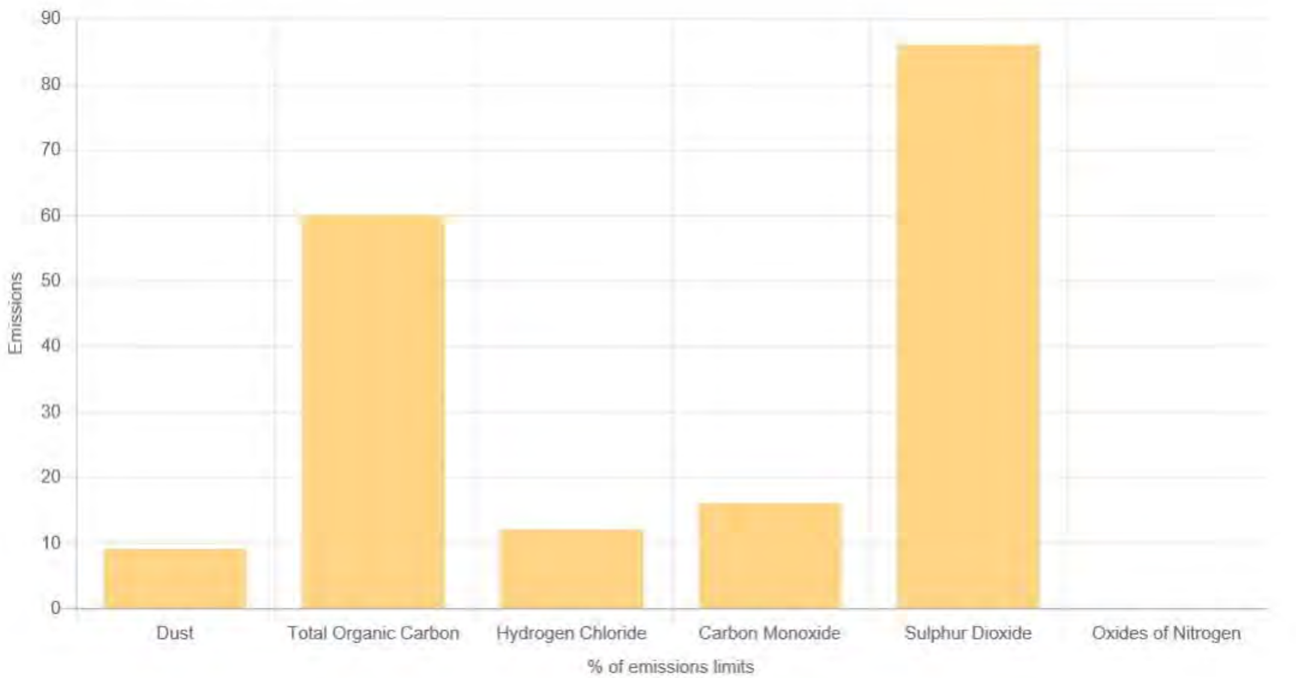
June 2017 Average Daily Emissions



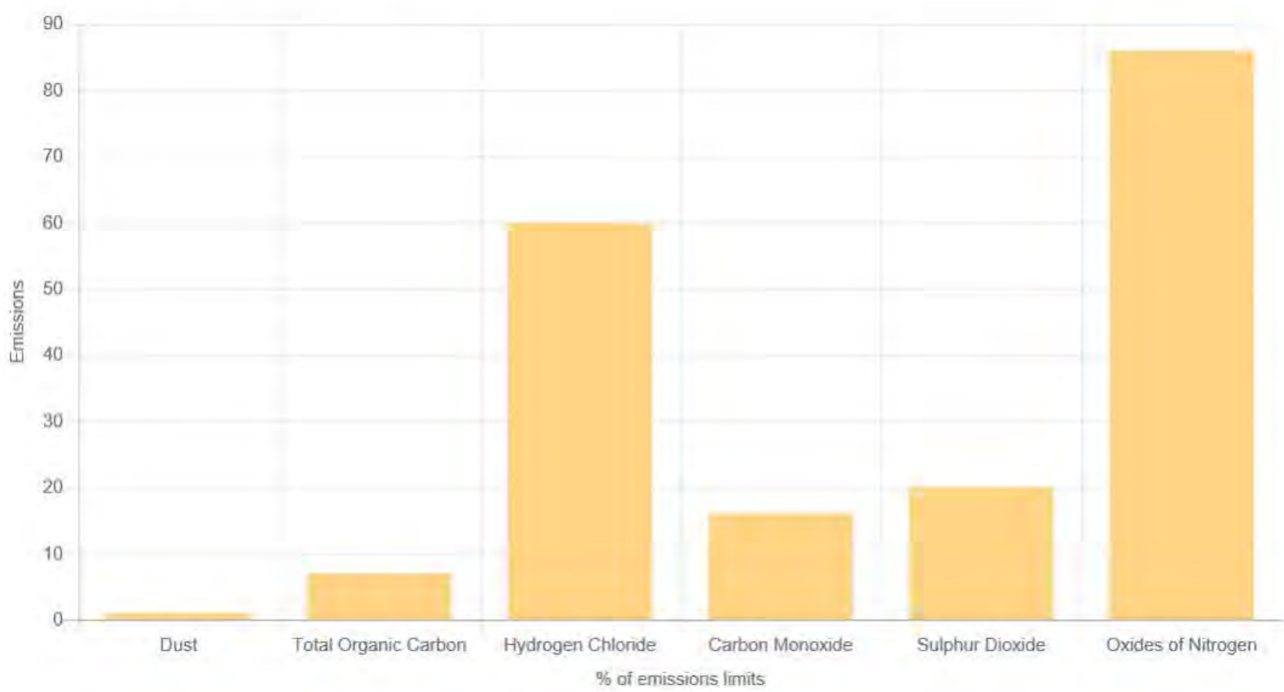
July 2017 Average Daily Emissions



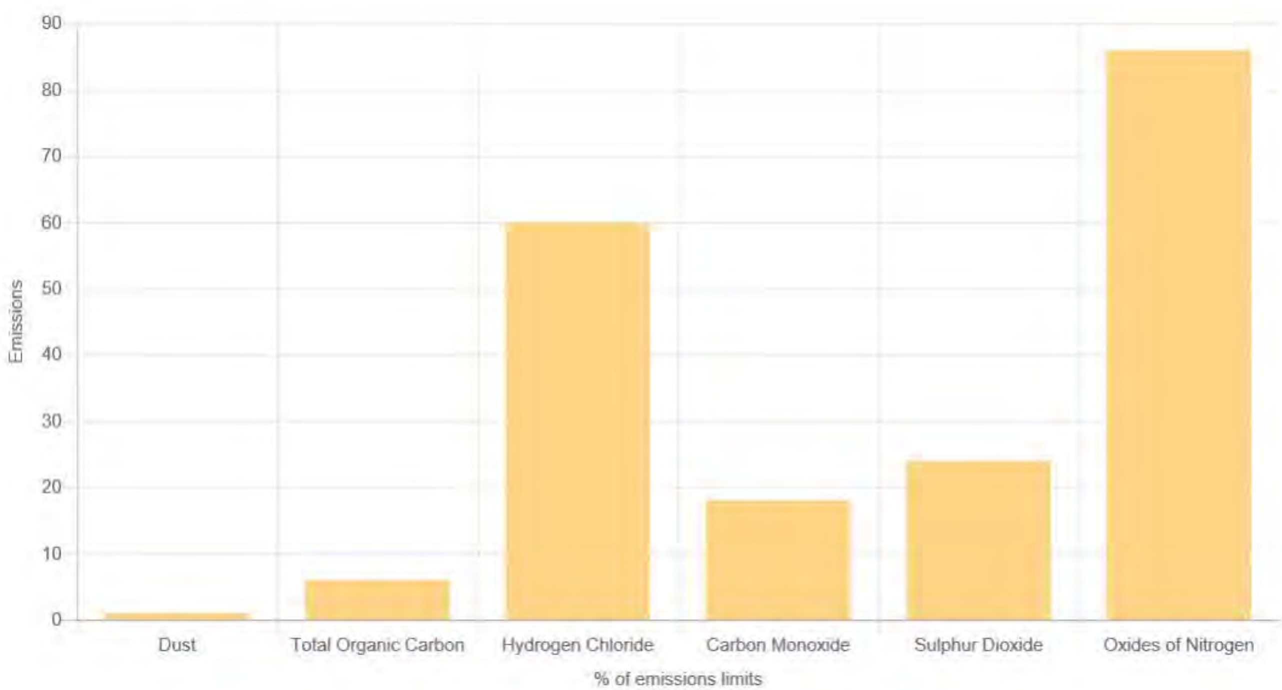
August 2017 Average Daily Emissions



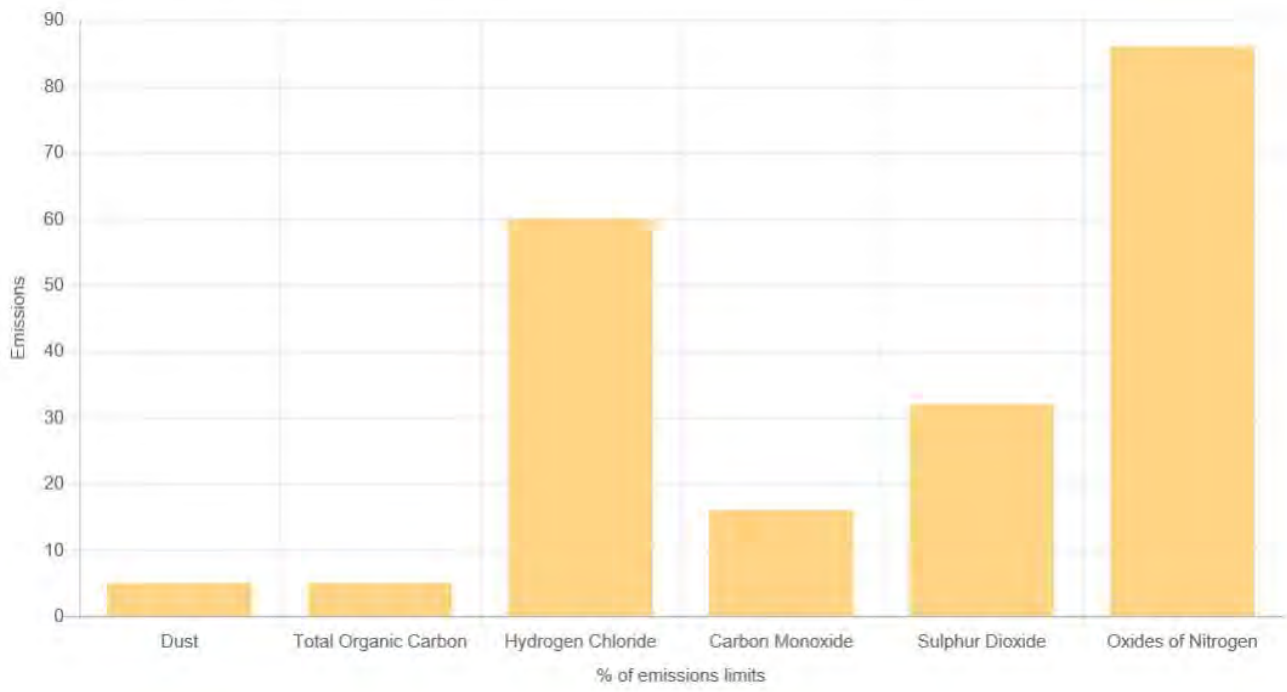
September 2017 Average Daily Emissions



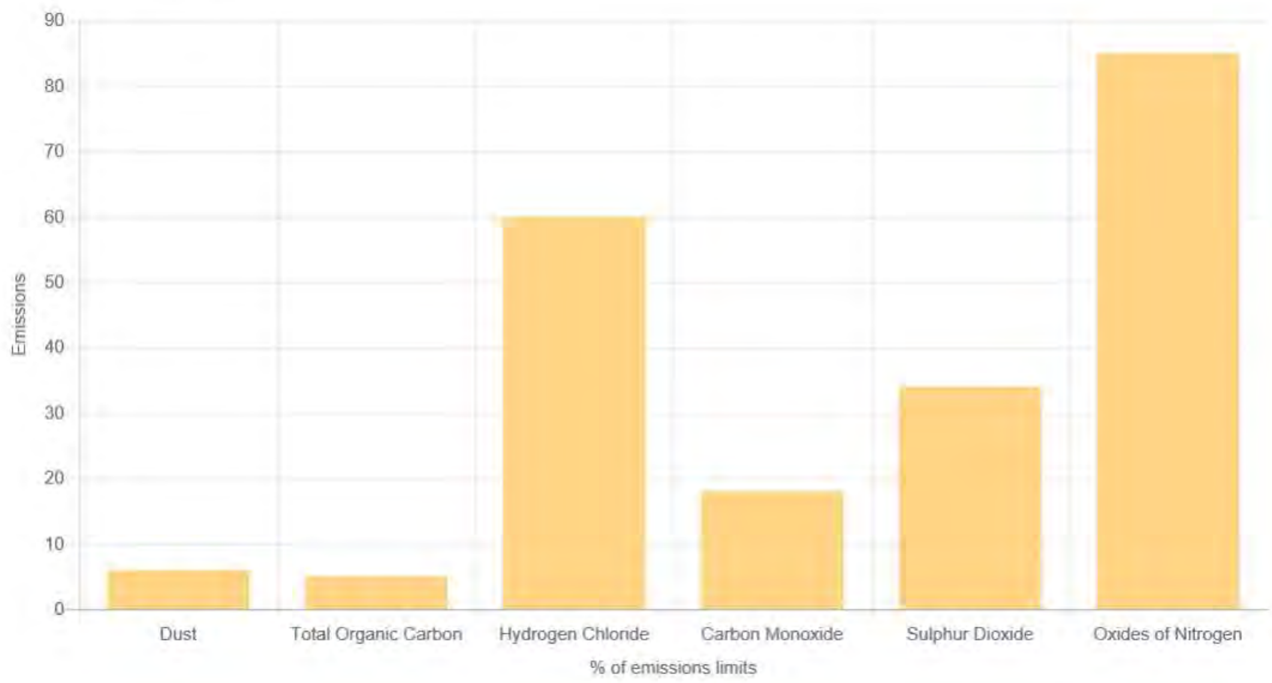
October 2017 Average Daily Emissions



November 2017 Average Daily Emissions



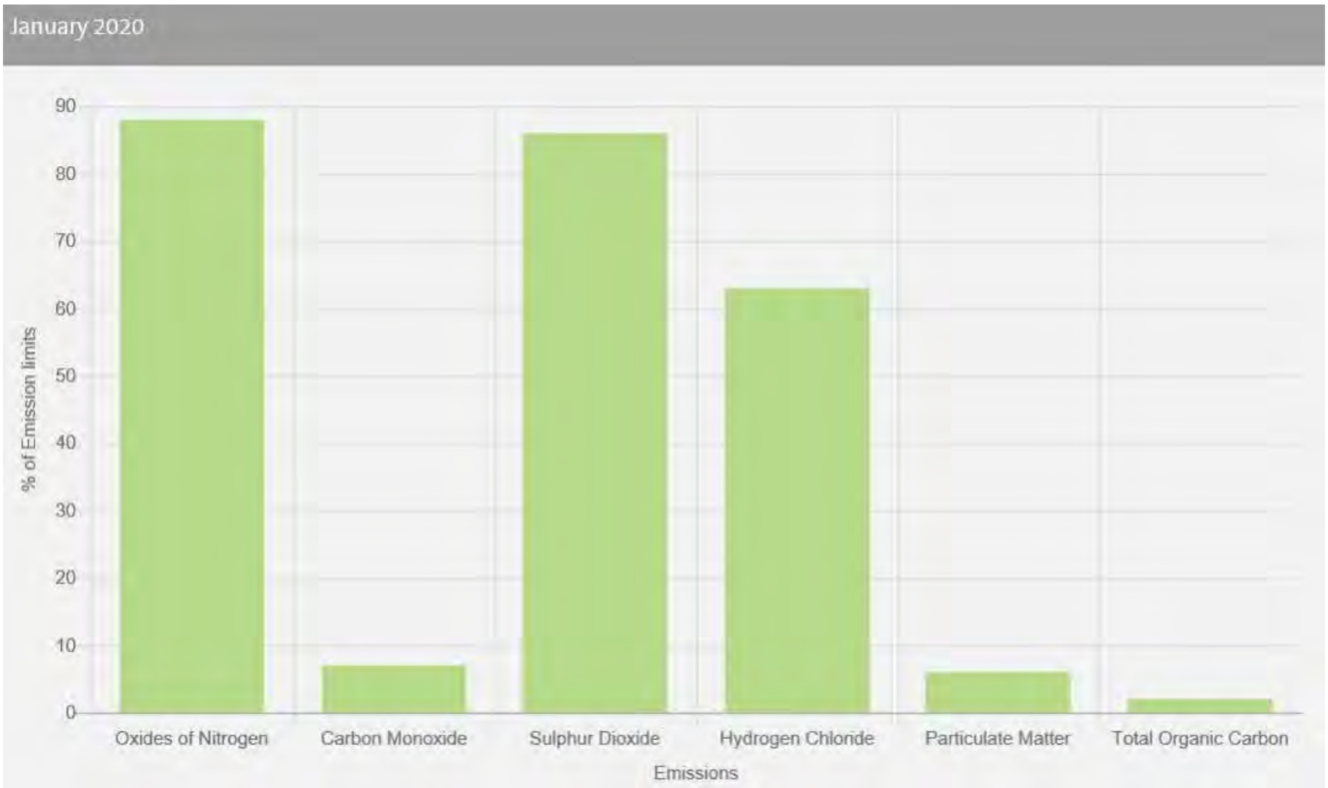
December 2017 Average Daily Emissions

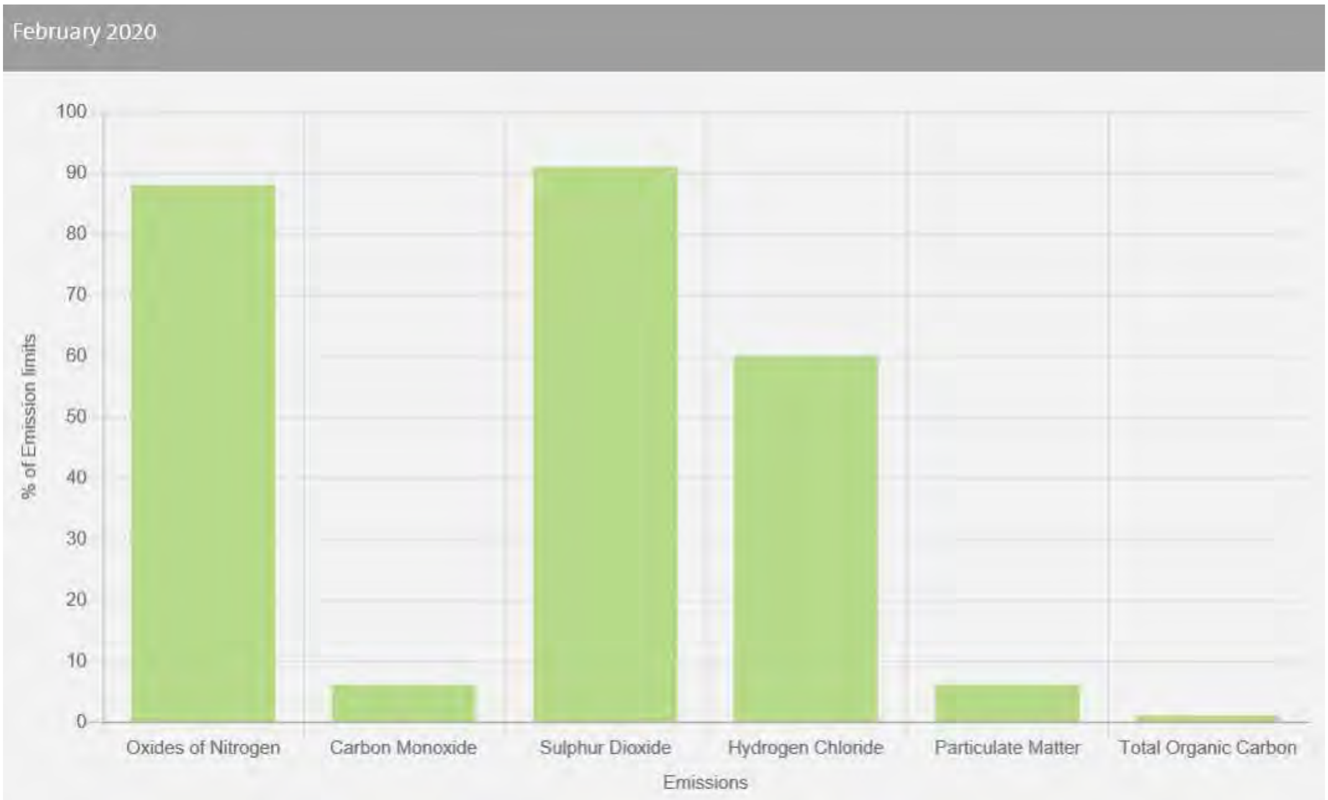


Appendix F. Leeds EfW emissions data

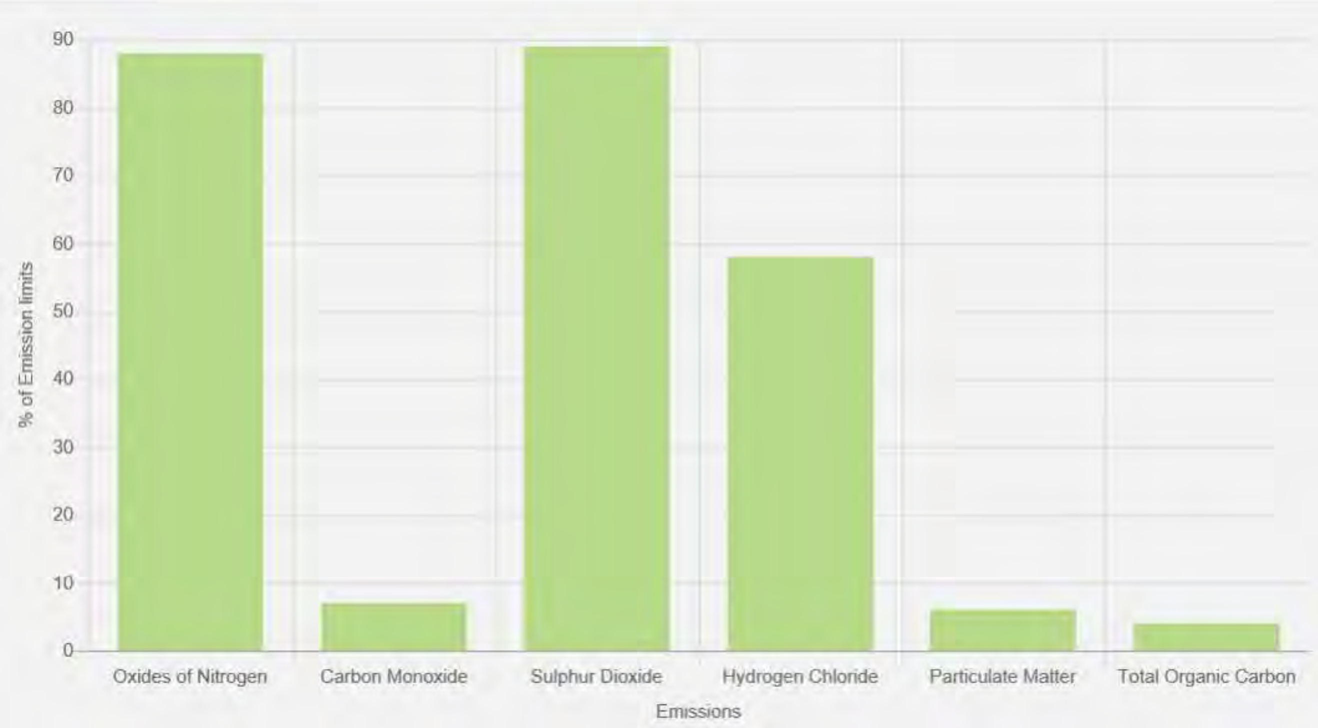
F.1 2020 Emissions

1. <u>Publicly reported continuously monitored emissions reports</u>

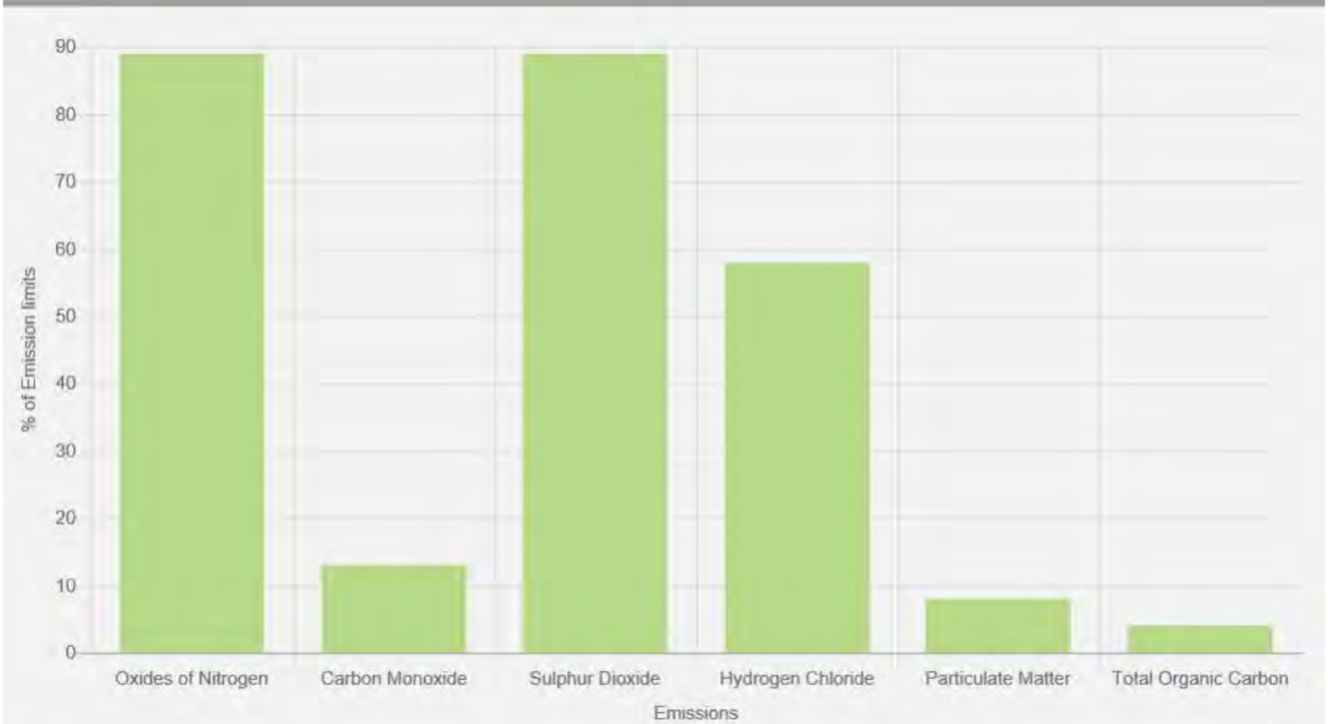


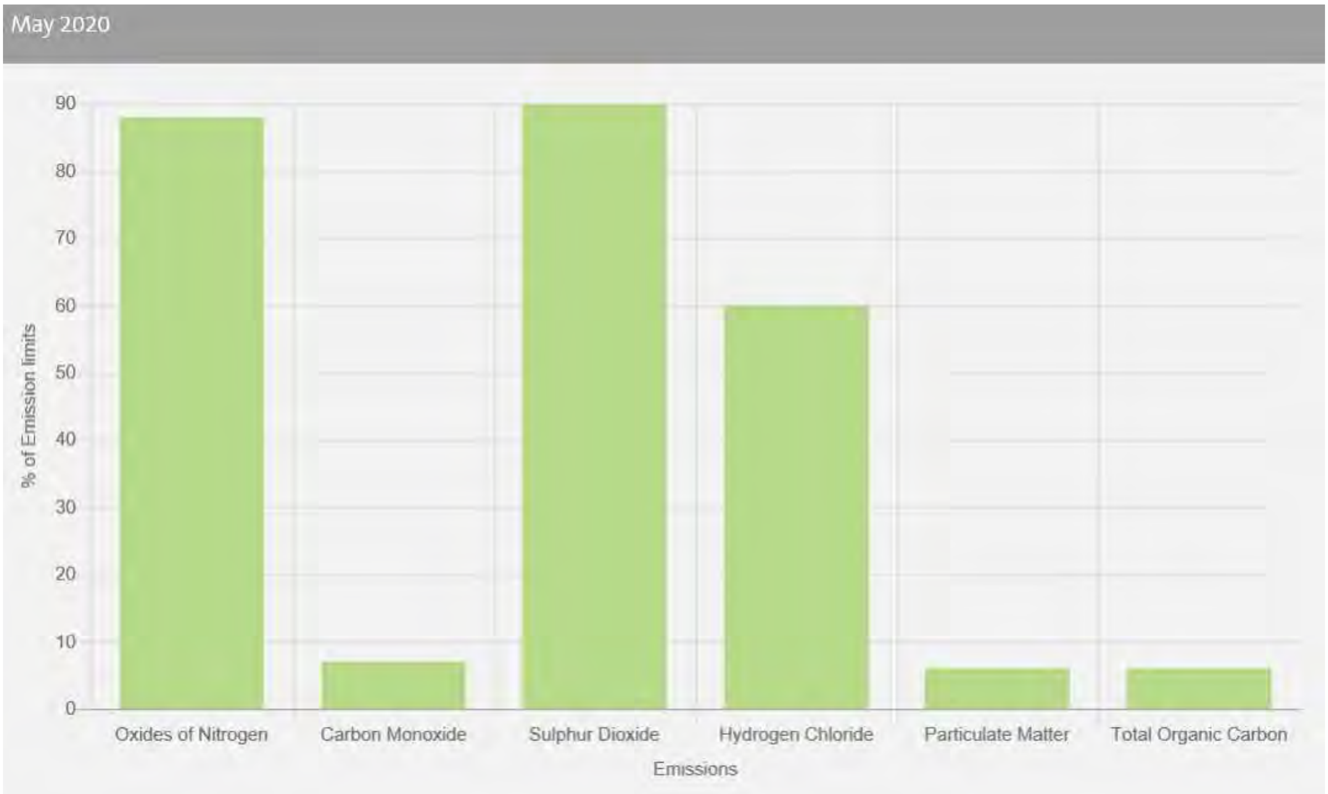


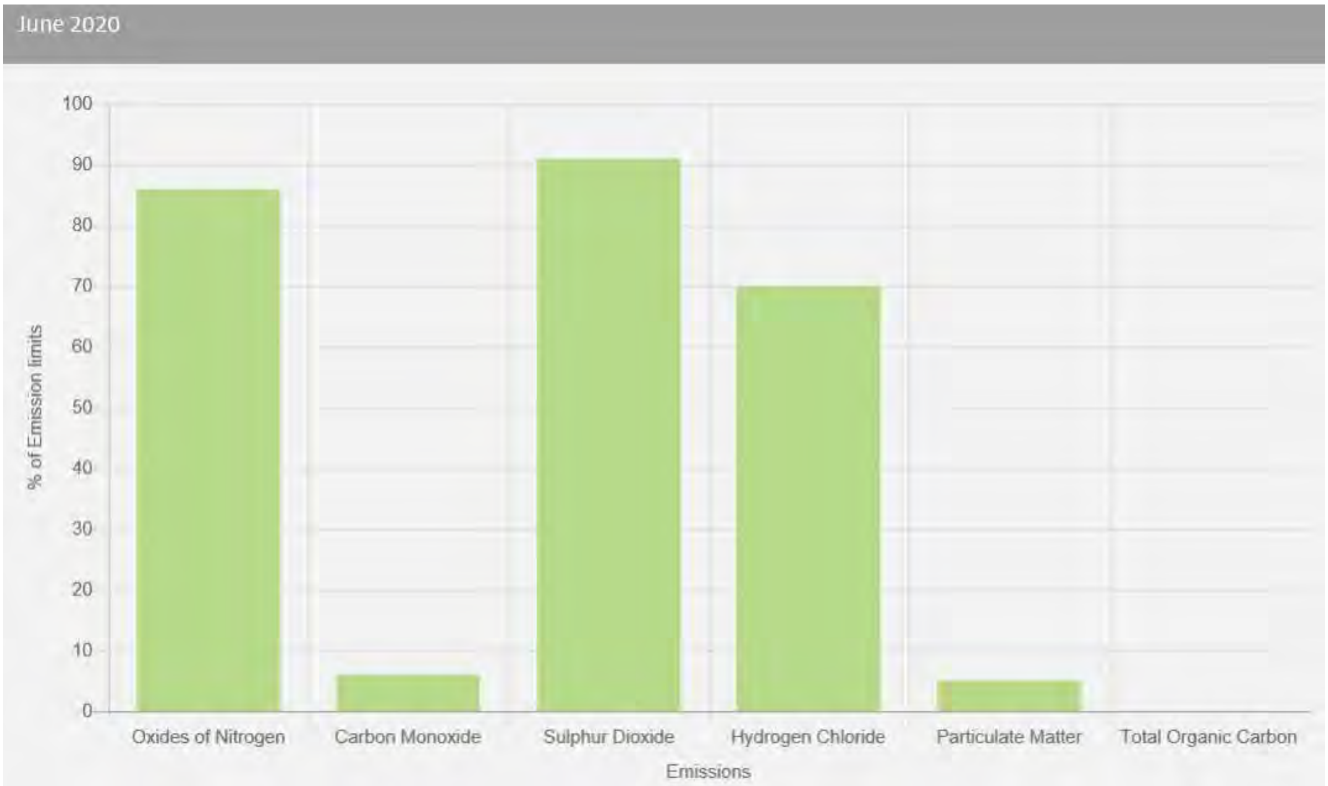
March 2020



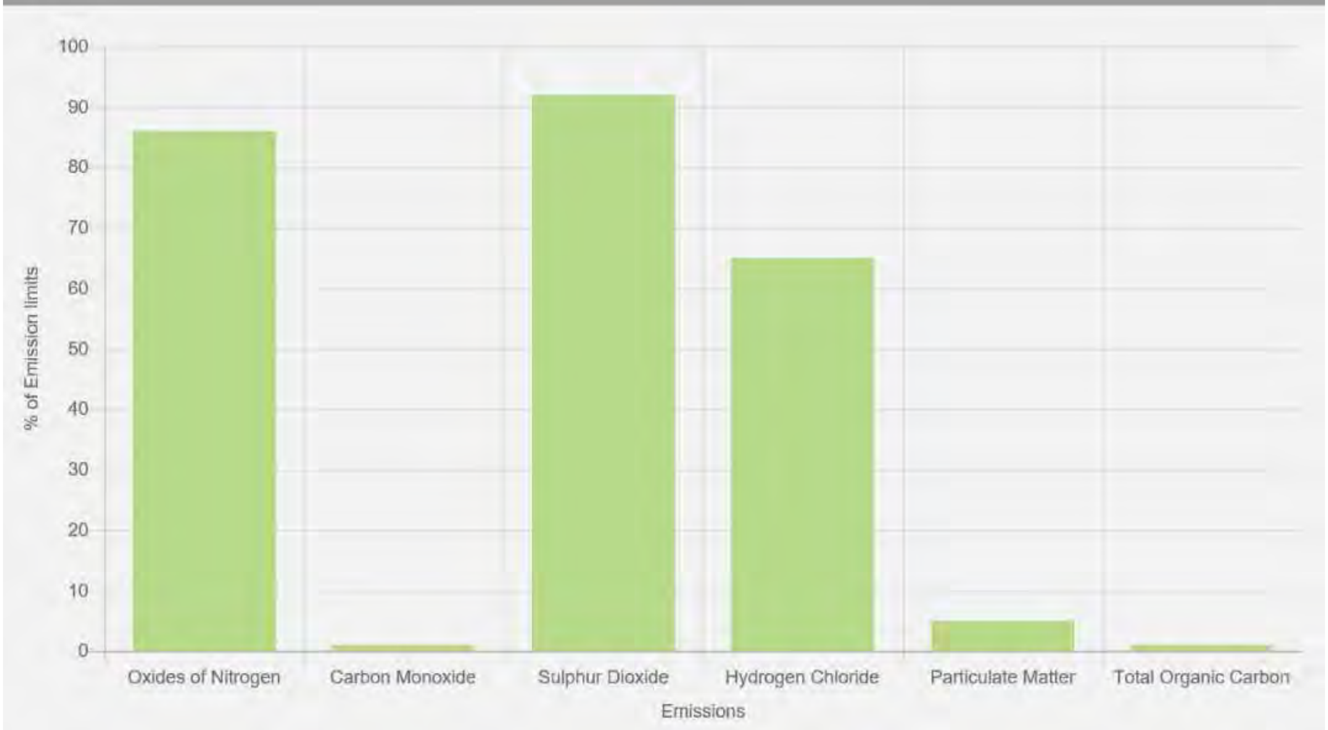
April 2020



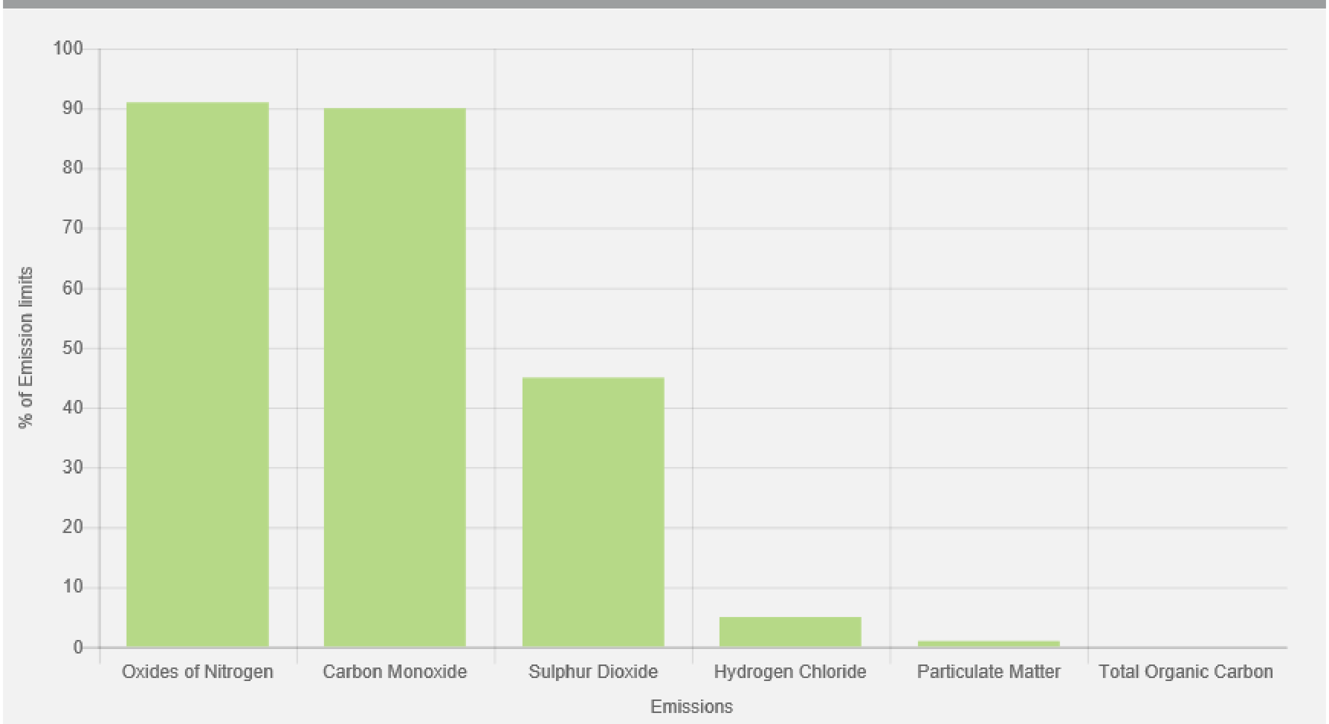

May 2020
% of Emission limits
0
10
20
30
40
50
60
70
80
90
Oxides of Nitrogen
Carbon Monoxide
Sulphur Dioxide
Hydrogen Chloride
Particulate Matter
Total Organic Carbon
Emissions


June 2020
% of Emission limits
0
10
20
30
40
50
60
70
80
90
100
Oxides of Nitrogen
Carbon Monoxide
Sulphur Dioxide
Hydrogen Chloride
Particulate Matter
Total Organic Carbon
Emissions

July 2020



August 2020



F.2 2019 Emissions

1. <u>Extracts of Emissions Information from Leeds Annual Performance Report 2019</u>

.1 11/11/19

Annual Performance Report 2019

Permit EPR/GP3334CX

Leeds Recycling and Energy Recovery Facility

Veolia ES Leeds Limited

Year:	2019		
Address:	Leeds Recycling and Energy Recovery Facility, Former Wholesale Market Site, Cross Green, Leeds, LS9 0RJ		
Tel:	0203 567 8430		
Email:	fiona.gormley@veolia.com; david.wedlake@veolia.com		
Prepared	Fiona Gormley	Position:	Compliance Manager
Approved	David Wedlake	Position:	Operations Manager
Version:	1		
Issue Dat	13/01/2019		

Section 7: Summary of Permit Compliance

Compliance with Permit Limits for Continuously Monitored Pollutants

The plant met its emission limits as shown in the table below:

Substance	Percentage time compliant during operation	
	Half-hourly limit	Daily limit
Particulates	100 %	100 %
Oxides of nitrogen	100 %	100 %
Sulphur dioxide	100 %	100 %
Carbon monoxide	100% 95% of 10-min averages	100 %
Total organic carbon	100 %	100 %
Hydrogen chloride	100 %	100 %
Hydrogen fluoride	100%	100%
TOTAL	100 %	100 %

Summary of any notifications or non-compliances under the permit			
Date	Summary of notification or non-compliance [including Line/Reference]	Reason	Measures taken to prevent reoccurrence
-	-	-	-

Summary of any complaints received and actions to taken to resolve them.			
Date	Summary of complaint [including Line/Reference]	Reason *	Measures taken to prevent reoccurrence
06/02/2019	Odour Complaint - RIVO 10183171 Anonymous reports to EA of odour from tipping hall at the boundary of the site from the East and West particularly at Newmarket Lane and Pontefract Road.	Odour - This complaint was not substantiated	Doors are closed when able and odour suppression system in use as required.
06/02/2019	Seagulls - RIVO 10183452 Anonymous reports to EA from same reporter as above of seagulls on site all day and believes they are attracted by the tipping hall doors being open all day.	Seagulls - Complaint Substantiated	Doors have been closed and operating in auto. Dummy owls have been put up around site to deter the seagulls. Megaphone with distressed seagull noise is in use throughout day to try to deter seagulls.

* including whether substantiated by the operator or the EA

Section 11: Emissions to Air (Periodically Monitored)

Summary of Monitoring Undertaken, Standards Used and Compliance
Emissions are periodically monitored twice per year in accordance with the facility Environmental Permit by MCERTS accredited laboratory staff. All testing and reports comply with the requirements of EN 14181. In 2019 periodic monitoring was conducted in Q1 between 08/01/2019 and 10/01/2019 and in Q4 between 07/10/2019 and 13/10/2019. All determinands were compliant with the Environmental Permit and associated legislation

Results of emissions to air that are periodically monitored

Substance	Ref. Period	Emission Limit Value	Average		
			Q1	Q4	Annual Average
Hydrogen fluoride	1 hr	2 mg/m3	0.02	0.04	0.03
Cd and Th and their compounds	6-8hrs	0.05 mg/m3	0.002	0.001	0.0015
Hg and its compounds	6-8hrs	0.05 mg/m3	0.002	0.0004	0.0012
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	6-8hrs	0.5 mg/m3	0.32	0.119	0.2195
Dioxins & Furans (I-TEQ)	6-8hrs	0.1 ng/m3	0.001	0.0035	0.00225
PCBs (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m3	0.000101	0.00084	0.0004705
PCBs (WHO-TEQ Fish)	6-8hrs	None set ng/m3	0.000006	0.00004	0.000023
PCBs (WHO-TEQ Birds)	6-8hrs	None set ng/m3	0.000518	0.00217	0.001344
Dioxins & Furans (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m3	0.001	0.0035	0.00225
Dioxins & Furans (WHO-TEQ Fish)	6-8hrs	None set ng/m3	0.0011	0.0039	0.0025
Dioxins & Furans (WHO-TEQ Birds)	6-8hrs	None set ng/m3	0.0017	0.006	0.00385
Anthanthrene	6-8hrs	None set µg/m3	0.01	0.004	0.007
Benzo(a)anthracene	6-8hrs	None set µg/m3	0.01	0.0001	0.00505
Benzo(a)pyrene	6-8hrs	None set µg/m3	0.01	0.0001	0.00505
Benzo(b)fluoranthene	6-8hrs	None set µg/m3	0.01	0.0013	0.00565
Benzo(b)naptho(2,1-d) thiophene	6-8hrs	None set µg/m3	0.01	0.0001	0.00505
Benzo(c)phenanthrene	6-8hrs	None set µg/m3	0.01	0.0015	0.00575
Benzo(ghi)perylene	6-8hrs	None set µg/m3	0.01	0.0001	0.00505
Benzo(k)fluoranthene	6-8hrs	None set µg/m3	0.01	0.0001	0.00505
Cholanthrene	6-8hrs	None set µg/m3	0.01	0.0001	0.00505
Chrysene	6-8hrs	None set µg/m3	0.01	0.0059	0.00795
Cyclopenta(cd)pyrene	6-8hrs	None set µg/m3	0.01	0.0001	0.00505
Dibenzo(ai)pyrene	6-8hrs	None set µg/m3	0.01	0.0007	0.00535
Dibenzo(ah)anthracene	6-8hrs	None set µg/m3	0.01	0.0007	0.00535
Fluoranthene	6-8hrs	None set µg/m3	0.15	0.015	0.0825
Indeno(123-cd) pyrene	6-8hrs	None set µg/m3	0.01	0.0001	0.00505
Naphthalene	6-8hrs	None set µg/m3	1.05	0.06	0.555

Comments :

All periodic monitoring results demonstrated compliance with the Environmental Permit and associated legislation.

Section 12: Emissions to Air (continuously monitored)

Summary of Monitoring Undertaken, Standards Used and Compliance

HCl, SO2, NOx, TOC and CO all have limits set out in the Environmental Permit; these determinands are continuously monitored by the CEMS in compliance with EN 14181. NH3, O2, CO2 and Water Vapour are also continuously monitored by the CEMS.

HCl, SO2, NOx, TOC, NH3, CO, CO2 and water vapour are extractive monitored using Environmental SA MIR FT CEMS (MCERTS number MC 040041/07).
TOC is extractive monitored using Environmental Graphite 52M CEMS (MCERTS number MC 060082/08).
Particulate is monitored in-situ using PCME QAL 181 CEMS (MCERTS number MC 090152/01).
Oxygen (wet) is extractive monitored using EPMR Oximitter 4000 CEMS (MCERTS number MC 040041/07).
Temperature and Pressure are monitored and recorded using PCME Stackflow 400.

All instruments are QAL1 compliant and undergo annual checks either in the form of a QAL2 or an Annual Surveillance Test (AST) compliant with the requirements of EN 14181.

Results of Emissions to Air that are Continuously Monitored

Substance	Reference Period	Emission Limit Value	A1	
			Max.	Avg.
Oxides of nitrogen	Daily mean	200 mg/m3	192	178.7
	½ hourly mean	400 mg/m3	375	178.6
Particulates	Daily mean	10 mg/m3	1	1
	½ hourly mean	30 mg/m3	1	1
Total Organic Carbon	Daily mean	10 mg/m3	1	0.083
	½ hourly mean	20 mg/m3	8	0.083
Hydrogen chloride	Daily mean	10 mg/m3	8	5.58
	½ hourly mean	60 mg/m3	22	5.58
Sulphur dioxide	Daily mean	50 mg/m3	49	41.5
	½ hourly mean	200 mg/m3	109	41.6
Carbon monoxide	Daily mean	50 mg/m3	26	5.2
	95%ile 10-min avg	150 mg/m3 *	1257	38.5
Ammonia	Daily mean	No limit set	9	3.8

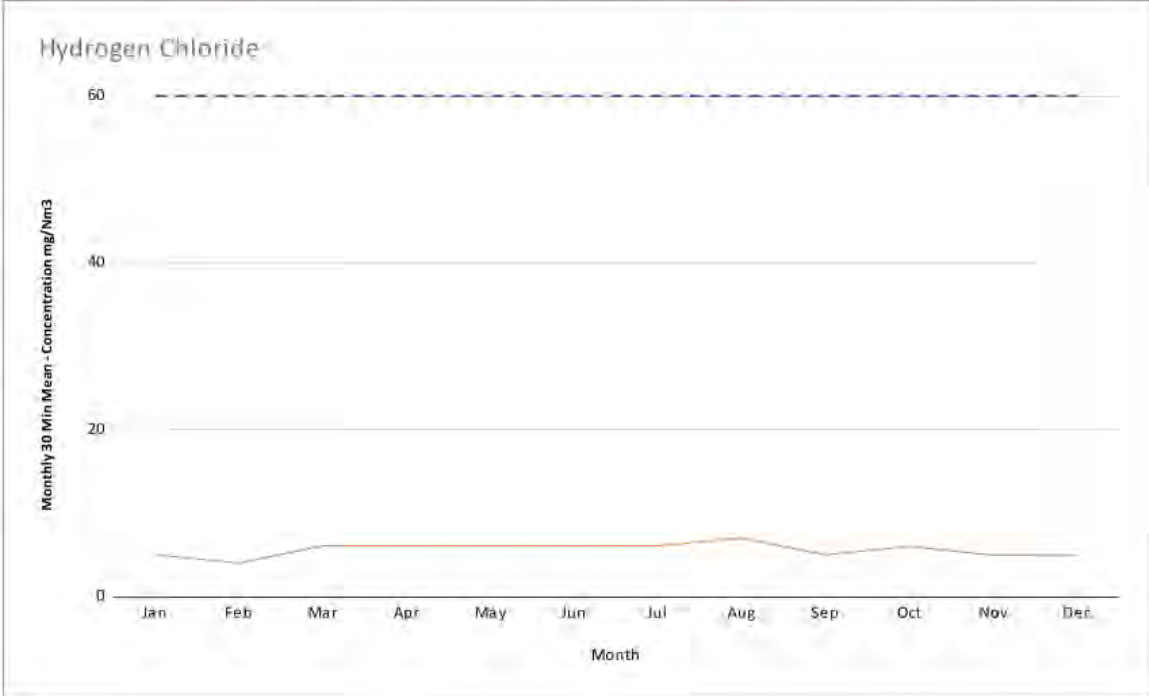
Comments :

For 2019 the facility achieve 100% compliance with the limits set in the Environmental Permit for all determinands.

Section 12.1: Monitoring of Hydrogen Chloride Emissions

Whole Installation

mg/Nm3	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly HCl ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily HCl ELV	Monthly daily mean	Highest daily maximum
Jan	60	5	22	10	5	7
Feb	60	4	7	10	4	6
Mar	60	6	16	10	6	7
Apr	60	6	9	10	6	7
May	60	6	11	10	6	8
Jun	60	6	11	10	6	7
Jul	60	6	11	10	6	7
Aug	60	7	12	10	7	7
Sep	60	5	12	10	5	7
Oct	60	6	12	10	6	8
Nov	60	5	12	10	5	6
Dec	60	5	14	10	5	8



Comments :

Section 12.1: Monitoring of Hydrogen Chloride Emissions

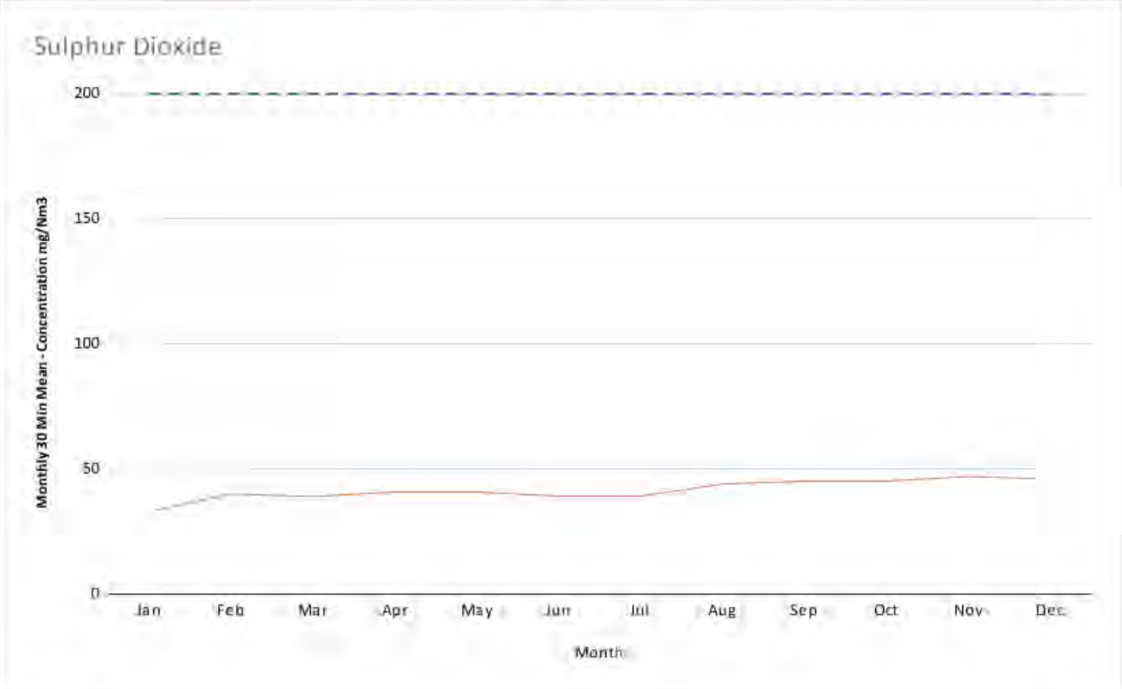
Per Combustion Line

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly daily	Monthly daily
A1	Jan	5	22	5	7
	Feb	4	7	4	6
	Mar	6	16	6	7
	Apr	6	9	6	7
	May	6	11	6	8
	Jun	6	11	6	7
	Jul	6	11	6	7
	Aug	7	12	7	7
	Sep	5	12	5	7
	Oct	6	12	6	8
	Nov	5	12	5	6
	Dec	5	14	5	8
	Annual	5.583333333	22	5.583333333	8

Section 12.2: Monitoring of Sulphur Dioxide Emissions

Whole Installation

mg/Nm3	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly SO2 ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily SO2 ELV	Monthly daily mean	Highest daily maximum
Jan	200	33	59	50	34	40
Feb	200	40	60	50	40	46
Mar	200	39	74	50	39	45
Apr	200	41	87	50	41	46
May	200	41	70	50	41	46
Jun	200	39	89	50	39	46
Jul	200	39	72	50	37	44
Aug	200	44	87	50	44	48
Sep	200	45	70	50	45	49
Oct	200	45	71	50	45	48
Nov	200	47	95	50	47	49
Dec	200	46	109	50	46	49



Comments :

Section 12.2: Monitoring of Sulphur Dioxide Emissions

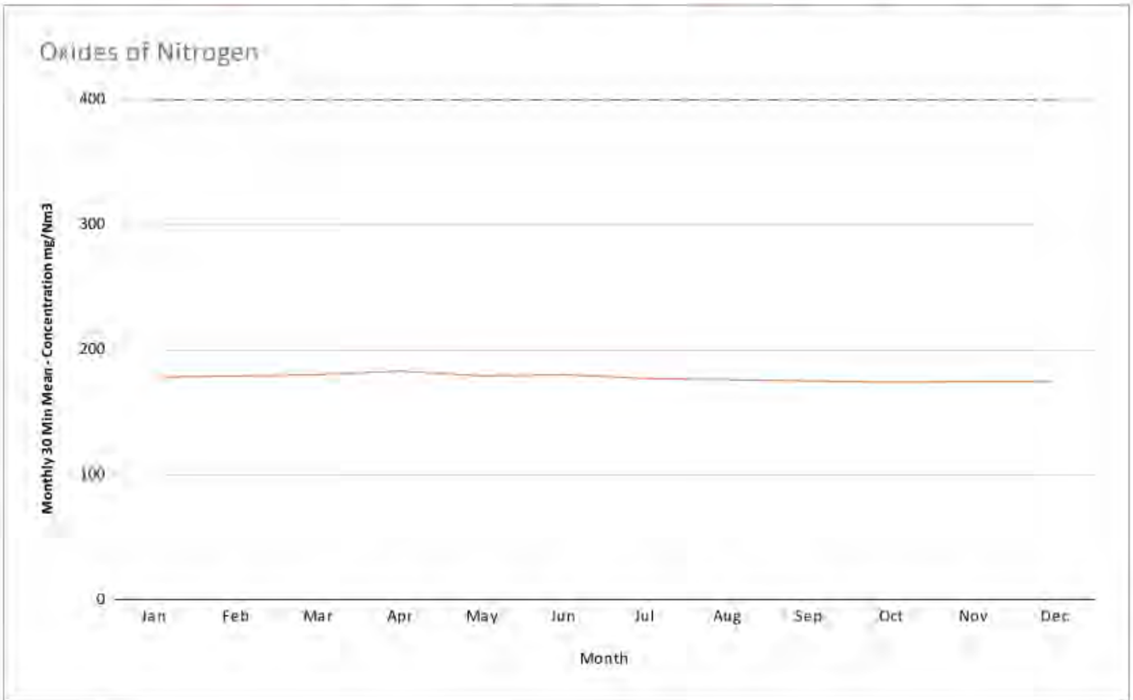
Per Combustion Line

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly daily	Monthly daily
A1	Jan	33	59	34	40
	Feb	40	60	40	46
	Mar	39	74	39	45
	Apr	41	87	41	46
	May	41	70	41	46
	Jun	39	89	39	46
	Jul	39	72	37	44
	Aug	44	87	44	48
	Sep	45	70	45	49
	Oct	45	71	45	48
	Nov	47	95	47	49
	Dec	46	109	46	49
	Annual	41.58333333	109	41.5	49

Section 12.3: Monitoring of Oxides of Nitrogen Emissions

Whole Installation

mg/Nm3	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly NOx ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily NOx ELV	Monthly daily mean	Highest daily maximum
Jan	400	178	320	200	179	184
Feb	400	179	332	200	179	188
Mar	400	180	254	200	180	182
Apr	400	183	269	200	183	187
May	400	179	196	200	179	181
Jun	400	180	195	200	180	182
Jul	400	177	357	200	177	192
Aug	400	176	219	200	176	178
Sep	400	175	237	200	175	178
Oct	400	174	263	200	174	180
Nov	400	175	229	200	175	177
Dec	400	175	191	200	175	177



Comments :

Section 12.3: Monitoring of Oxides of Nitrogen Emissions

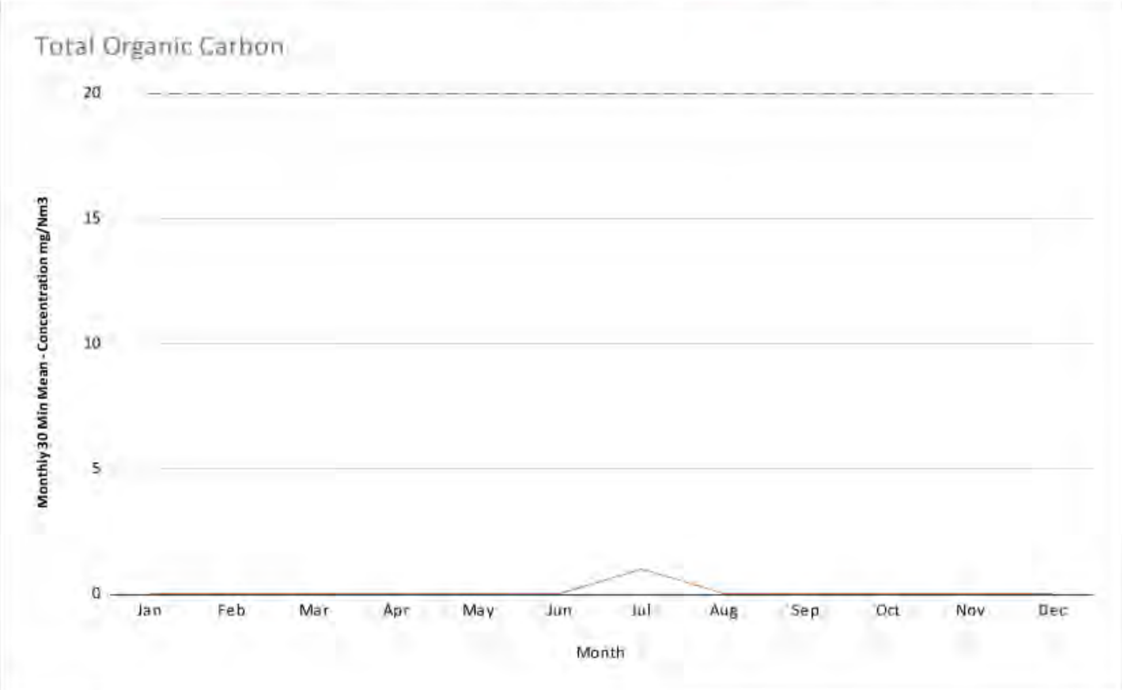
Per Combustion Line

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly daily	Monthly daily
A1	Jan	178	320	179	184
	Feb	179	332	179	188
	Mar	180	254	180	182
	Apr	183	269	183	187
	May	179	196	179	181
	Jun	180	195	180	182
	Jul	177	357	177	192
	Aug	176	219	176	178
	Sep	175	237	175	178
	Oct	174	263	174	180
	Nov	175	229	175	177
	Dec	175	191	175	177
	Annual	177.5833333	357	177.6666667	192

Section 12.4 :Monitoring of Total Organic Carbon Emissions

Whole Installation

mg/Nm3	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly TOC ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily TOC ELV	Monthly daily mean	Highest daily maximum
Jan	20	0	7	10	0	0
Feb	20	0	2	10	0	0
Mar	20	0	4	10	0	0
Apr	20	0	4	10	0	0
May	20	0	3	10	0	0
Jun	20	0	5	10	0	0
Jul	20	1	5	10	1	1
Aug	20	0	9	10	0	1
Sep	20	0	8	10	0	0
Oct	20	0	0	10	0	0
Nov	20	0	4	10	0	0
Dec	20	0	8	10	0	0



Comments :

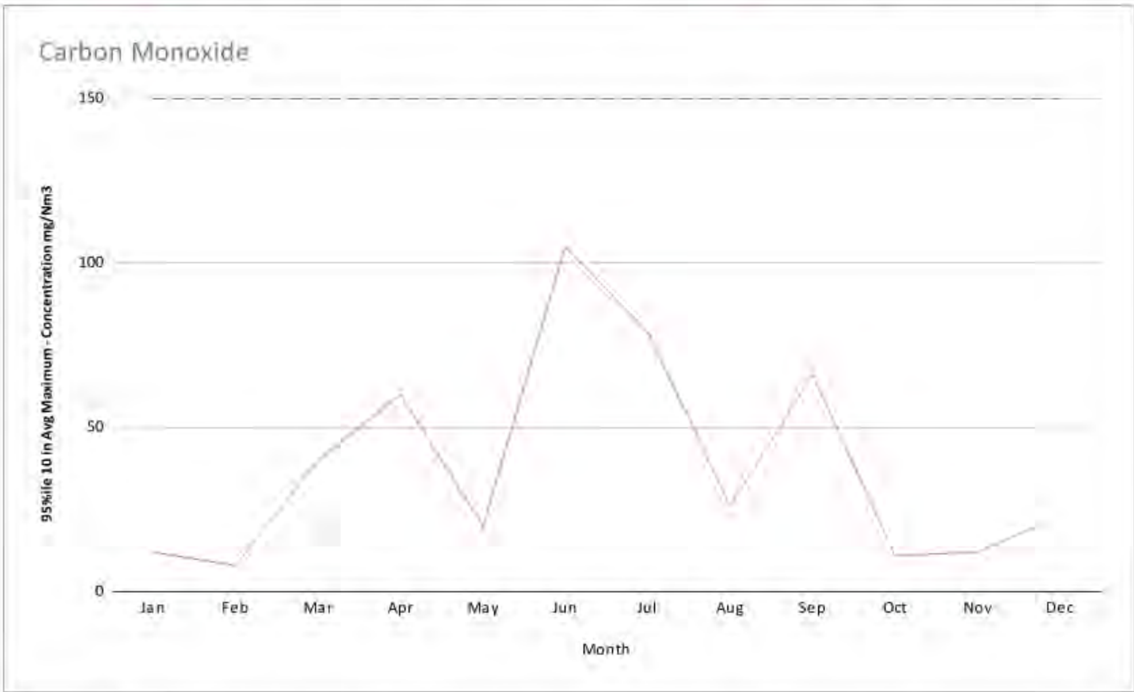
Section 12.4 :Monitoring of Total Organic Carbon Emissions
Per Combustion Line

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly daily	Monthly daily
A1	Jan	0	7	0	0
	Feb	0	2	0	0
	Mar	0	4	0	0
	Apr	0	4	0	0
	May	0	3	0	0
	Jun	0	5	0	0
	Jul	1	5	1	1
	Aug	0	9	0	1
	Sep	0	8	0	0
	Oct	0	0	0	0
	Nov	0	4	0	0
	Dec	0	8	0	0
	Annual	0.08333333333	9	0.08333333333	1

Section 12.5: Monitoring of Carbon Monoxide (10-minute avg)

Whole Installation

mg/Nm3	10-minute Reference Periods				Daily Reference Periods		
2019	**95%ile 10-min avg CO**	**95%ile 10-min avg maximum**	**Monthly CO 10-min avg mean**	**10-min avg maximum**	**Daily CO ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	150	12	3	510	50	3	10
Feb	150	8	3	594	50	2	7
Mar	150	40	7	839	50	7	16
Apr	150	60	9	1257	50	9	24
May	150	20	6	1092	50	6	12
Jun	150	105	8	1115	50	8	26
Jul	150	79	6	79	50	6	17
Aug	150	26	3	26	50	2	6
Sep	150	66	3	66	50	3	8
Oct	150	11	6	44	50	6	10
Nov	150	12	5	333	50	5	7
Dec	150	23	5	326	50	5	10



Comments :

Environment Agency explanatory note: The 10-minute average ELV is based on the "95th percentile". In this case this means that 95% of the 10 minute averages in the relevant 24-hour period (i.e. 137) must be below 150 mg/Nm3, and 5% (i.e. 7) are allowed to be any value above 150 mg/Nm3. Whilst we expect operators to minimise CO emissions at all times, it is perfectly acceptable for the value of the maximum 10-minute average to be above 150 mg/Nm3, provided the 95th percentile ELV has been met for that period.

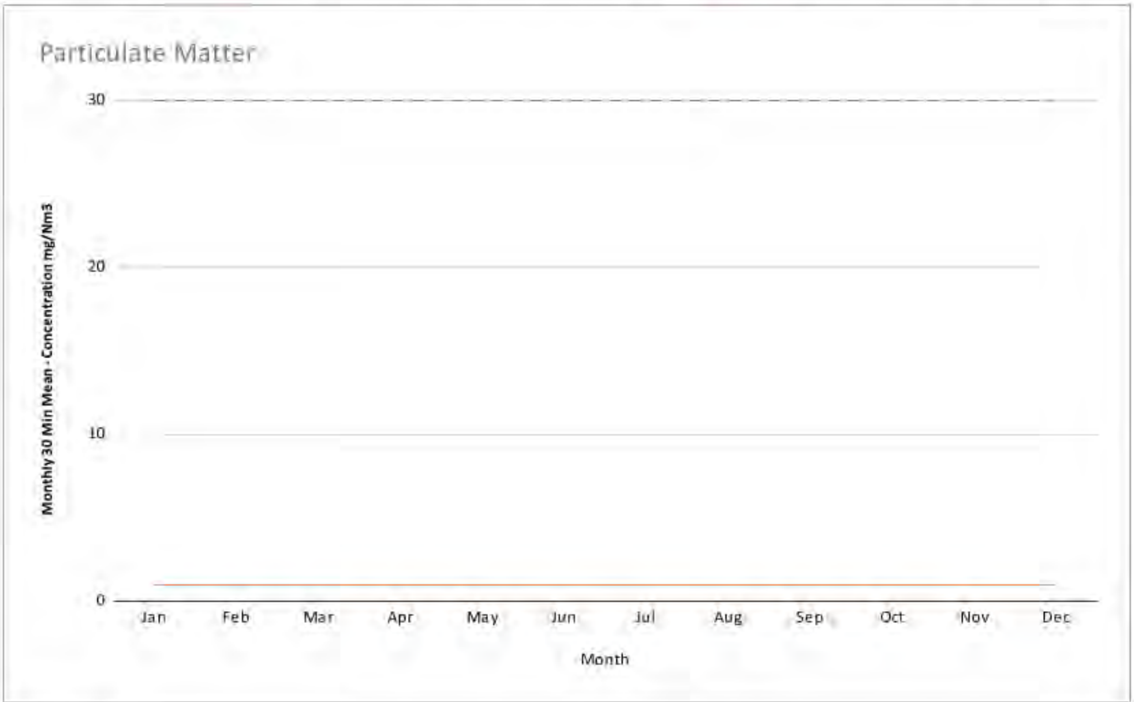
Section 12.5: Monitoring of Carbon Monoxide (10-minute avg)

Per Combustion Line

2019	mg/Nm3	95%ile 10-min	Monthly CO 10-	10-min avg	Monthly	Monthly daily
A1	Jan	12	3	510	3	10
	Feb	8	3	594	2	7
	Mar	40	7	839	7	16
	Apr	60	9	1257	9	24
	May	20	6	1092	6	12
	Jun	105	8	1115	8	26
	Jul	79	6	79	6	17
	Aug	26	3	26	2	6
	Sep	66	3	66	3	8
	Oct	11	6	44	6	10
	Nov	12	5	333	5	7
	Dec	23	5	326	5	10
	Annual	38.5	5.333333333	1257	5.166666667	26

Section 12.6: Monitoring of Particulate Matter Emissions

	Whole Installation					
		From EA graphs	From EA graphs		from KPI	From EA graphs
mg/Nm3	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly PM ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily PM ELV	Monthly daily mean	Highest daily maximum
Jan	30	1	1	10	1	1
Feb	30	1	1	10	1	1
Mar	30	1	1	10	1	1
Apr	30	1	1	10	1	1
May	30	1	1	10	1	1
Jun	30	1	1	10	1	1
Jul	30	1	1	10	1	1
Aug	30	1	1	10	1	1
Sep	30	1	1	10	1	1
Oct	30	1	1	10	1	1
Nov	30	1	1	10	1	1
Dec	30	1	1	10	1	1



Comments :

Section 12.6: Monitoring of Particulate Matter Emissions

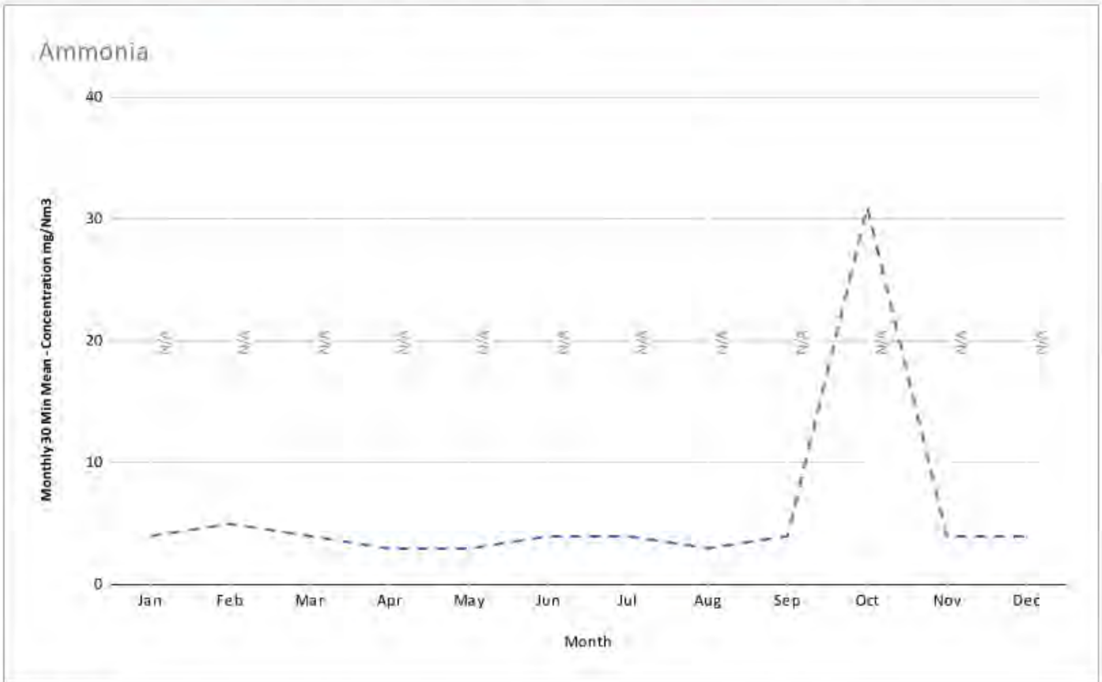
Per Combustion Line

2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly daily	Monthly daily
A1	Jan	1	1	1	1
	Feb	1	1	1	1
	Mar	1	1	1	1
	Apr	1	1	1	1
	May	1	1	1	1
	Jun	1	1	1	1
	Jul	1	1	1	1
	Aug	1	1	1	1
	Sep	1	1	1	1
	Oct	1	1	1	1
	Nov	1	1	1	1
	Dec	1	1	1	1
	Annual	1	1	1	1

Section 12.7: Monitoring of Ammonia Emissions

Whole Installation

mg/Nm3	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	**1/2 hourly NH3 ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily NH3 ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	N/A	4	27	N/A	4	6
Feb	N/A	5	21	N/A	5	8
Mar	N/A	4	36	N/A	4	9
Apr	N/A	3	11	N/A	3	5
May	N/A	3	9	N/A	3	5
Jun	N/A	4	14	N/A	4	5
Jul	N/A	4	43	N/A	4	8
Aug	N/A	3	14	N/A	3	5
Sep	N/A	4	18	N/A	4	6
Oct	N/A	31	4	N/A	4	6
Nov	N/A	4	11	N/A	4	6
Dec	N/A	4	53	N/A	4	7



Comments :
An indicated ELV value of zero in the table above means that no ammonia limit is set in the permit.

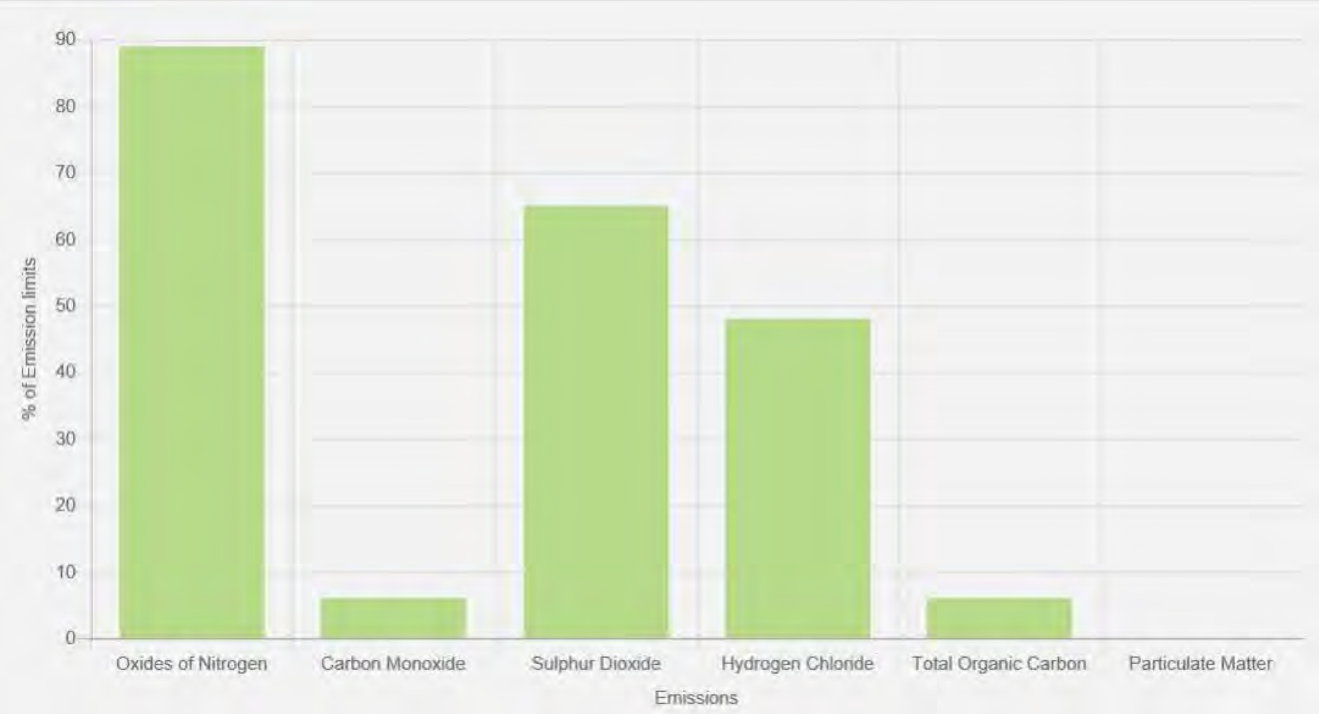
Section 12.7: Monitoring of Ammonia Emissions

Per Combustion Line

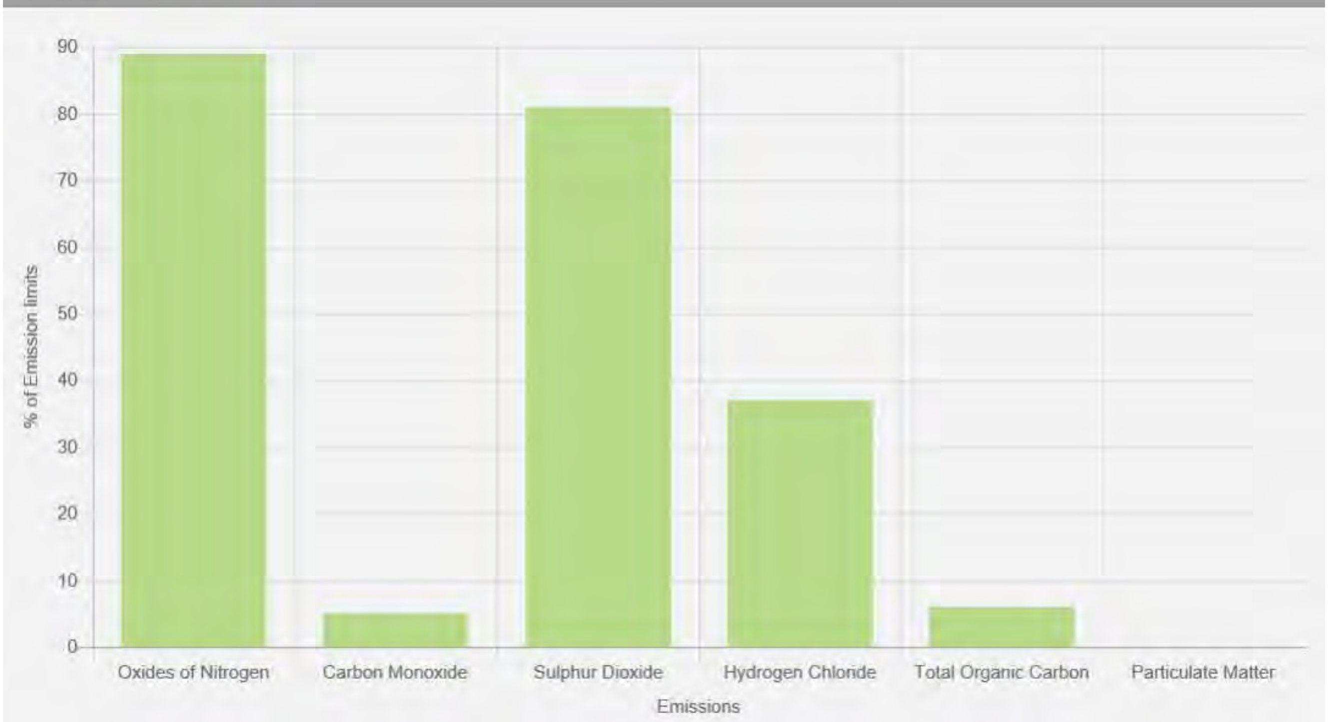
2019	mg/Nm3	Monthly 1/2	Monthly 1/2	Monthly daily	Monthly daily
	Jan	4	27	4	6
	Feb	5	21	5	8
	Mar	4	36	4	9
	Apr	3	11	3	5
	May	3	9	3	5
	Jun	4	14	4	5
A1	Jul	4	43	4	8
	Aug	3	14	3	5
	Sep	4	18	4	6
	Oct	31	4	4	6
	Nov	4	11	4	6
	Dec	4	53	4	7
	Annual	6.083333333	53	3.833333333	9

2. Publicly reported continuously monitored emissions reports

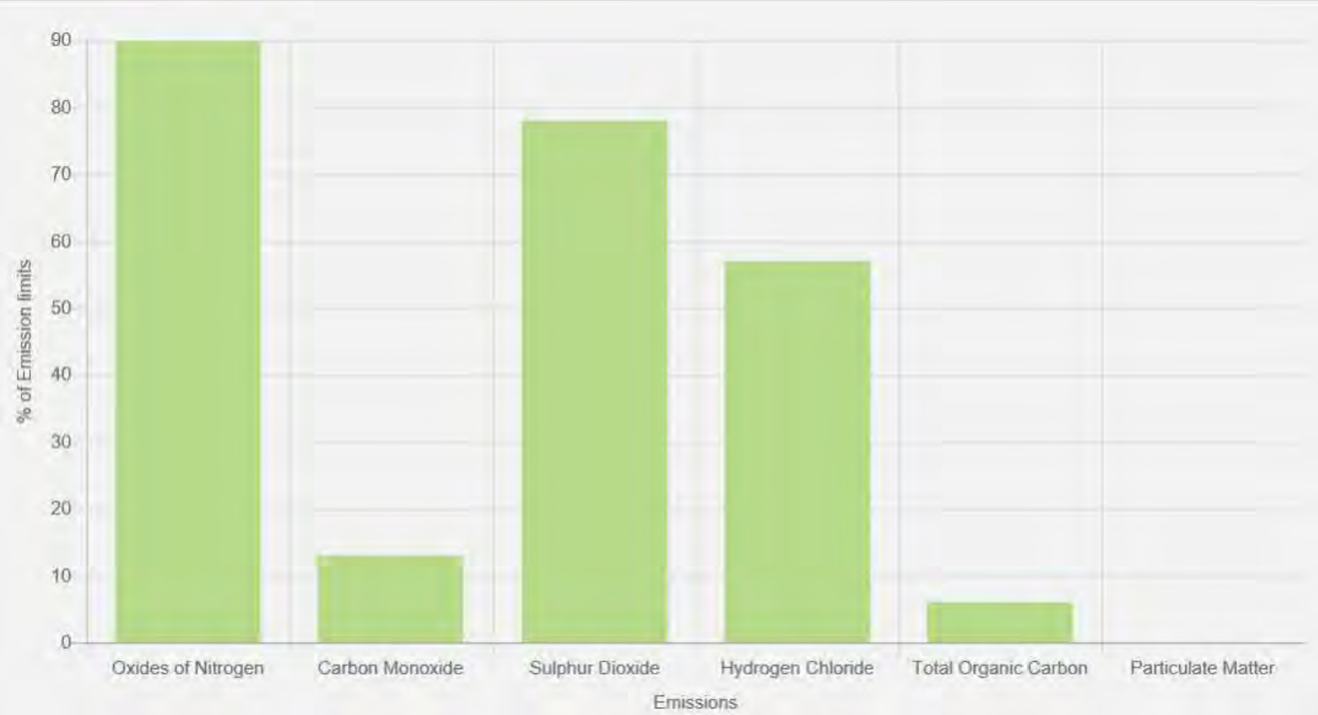
January 2019



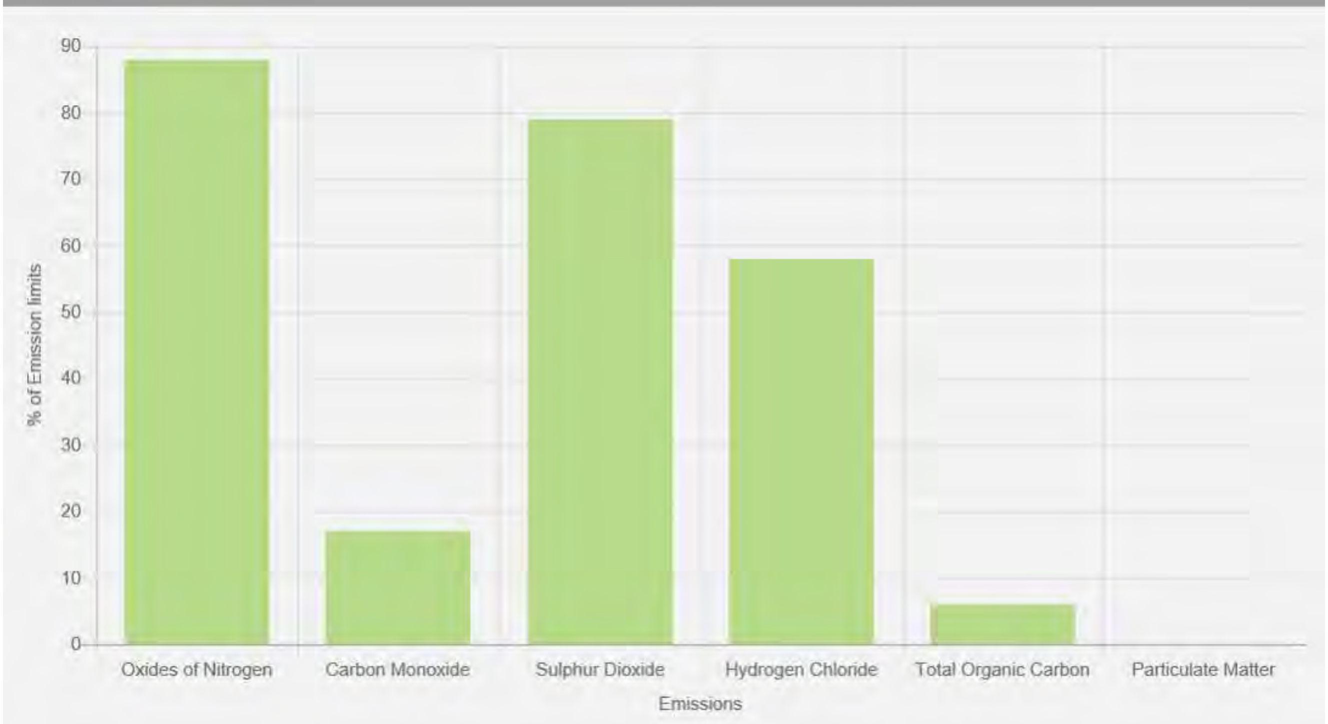
February 2019



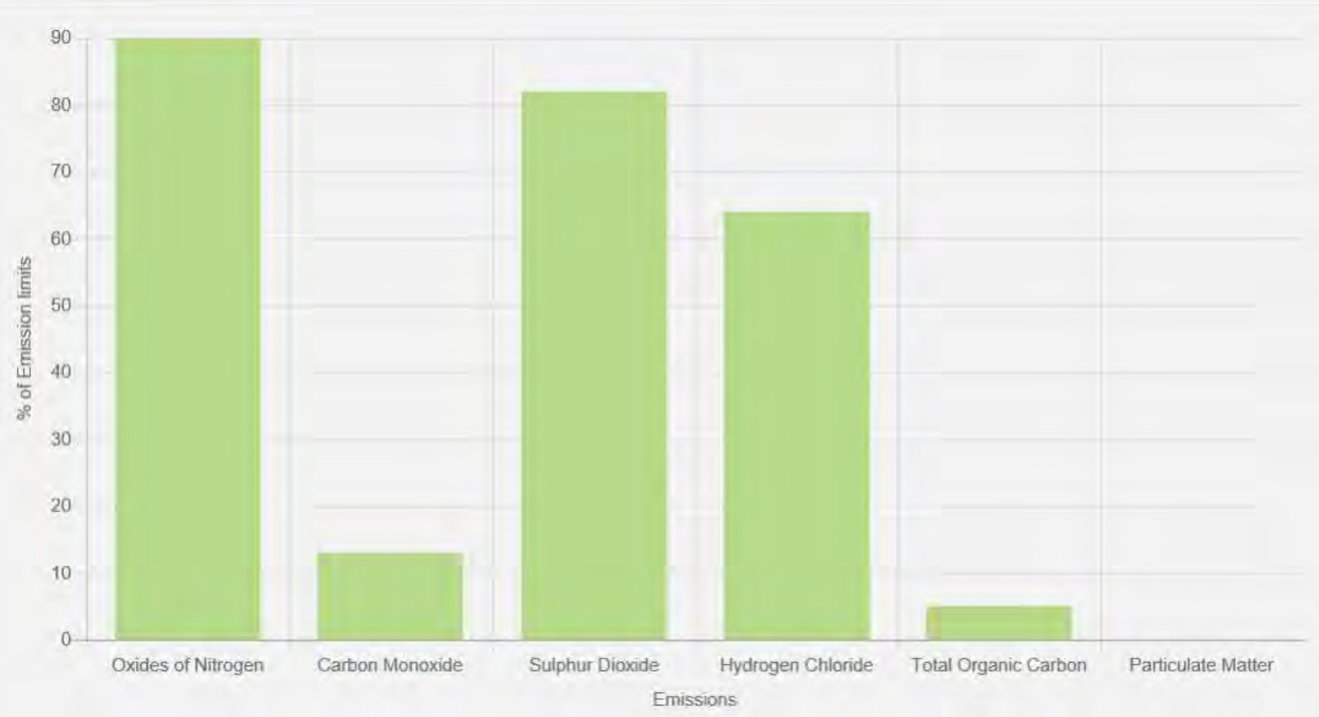
March 2019



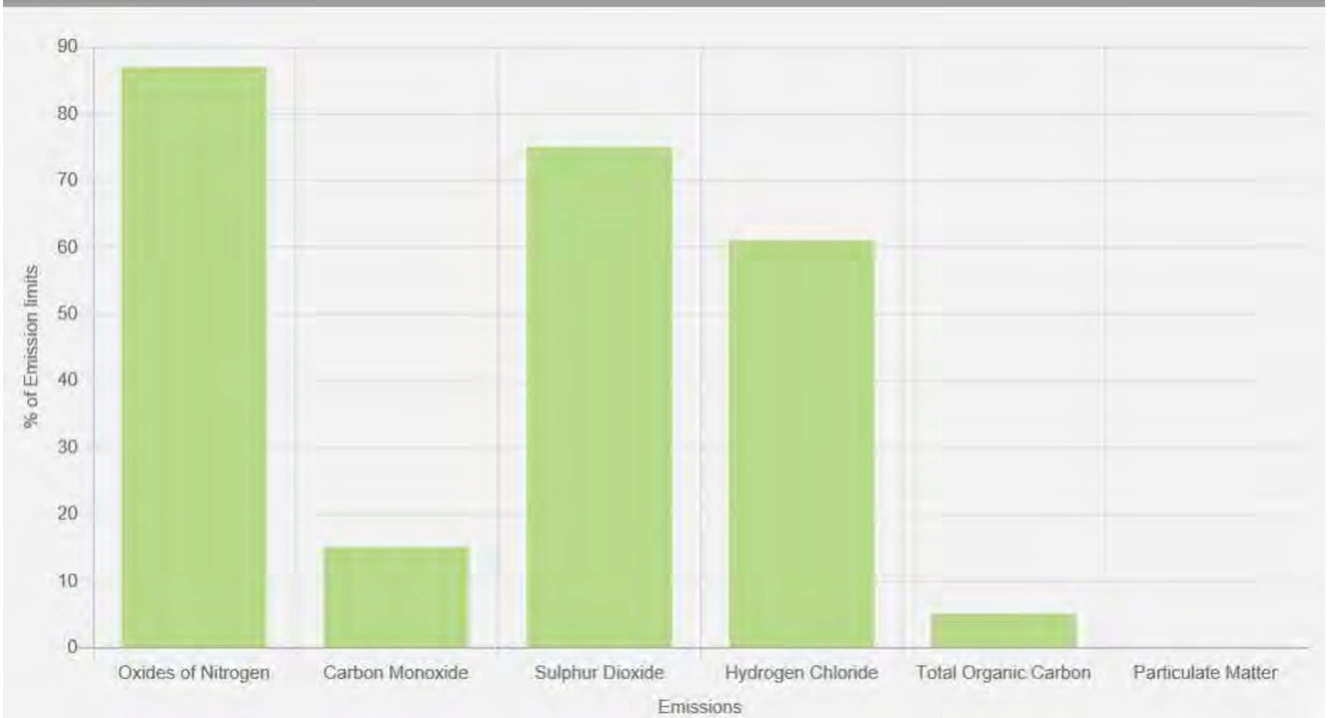
April 2019



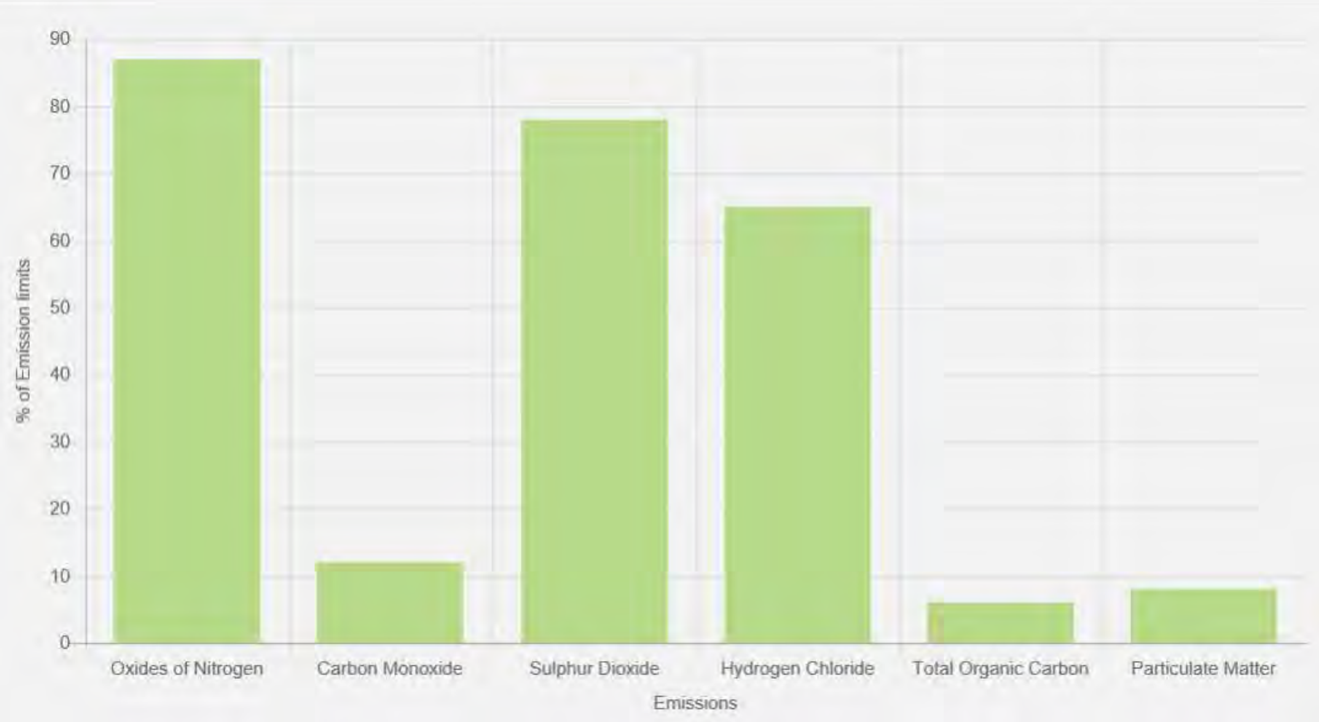
May 2019



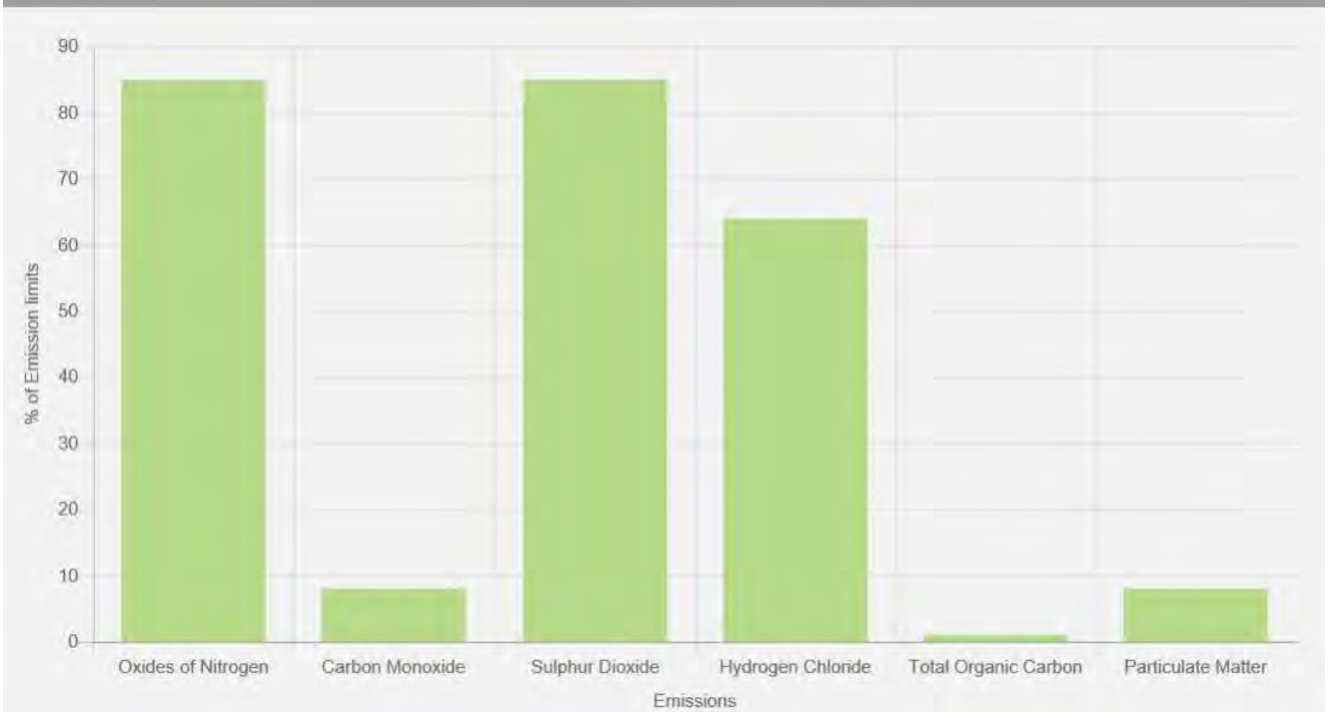
June 2019



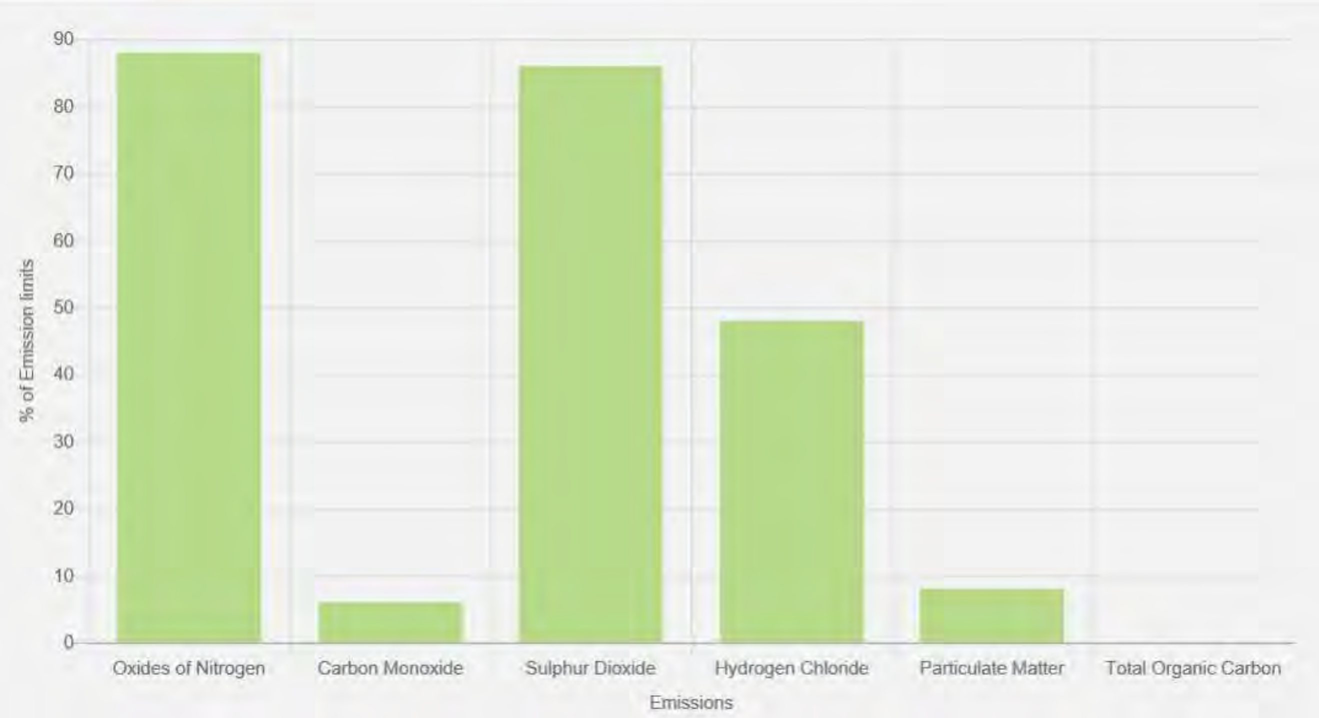
July 2019



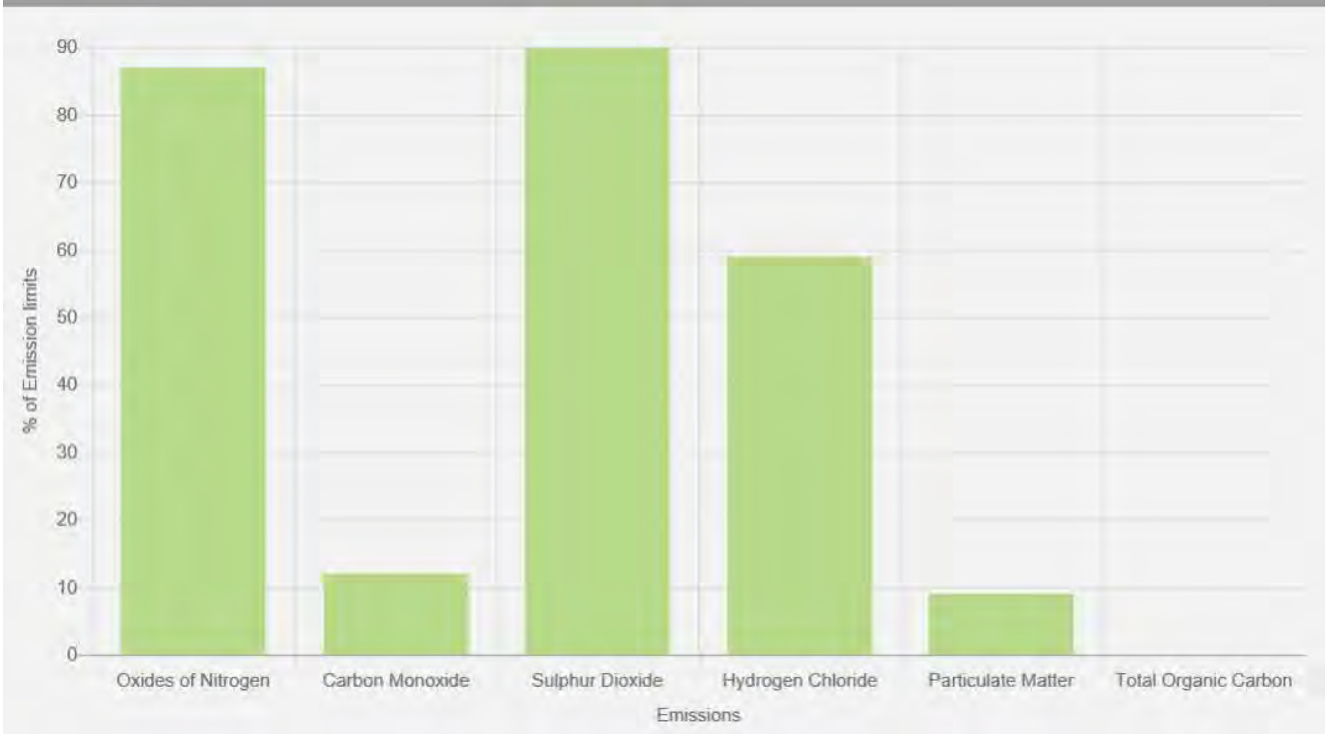
August 2019



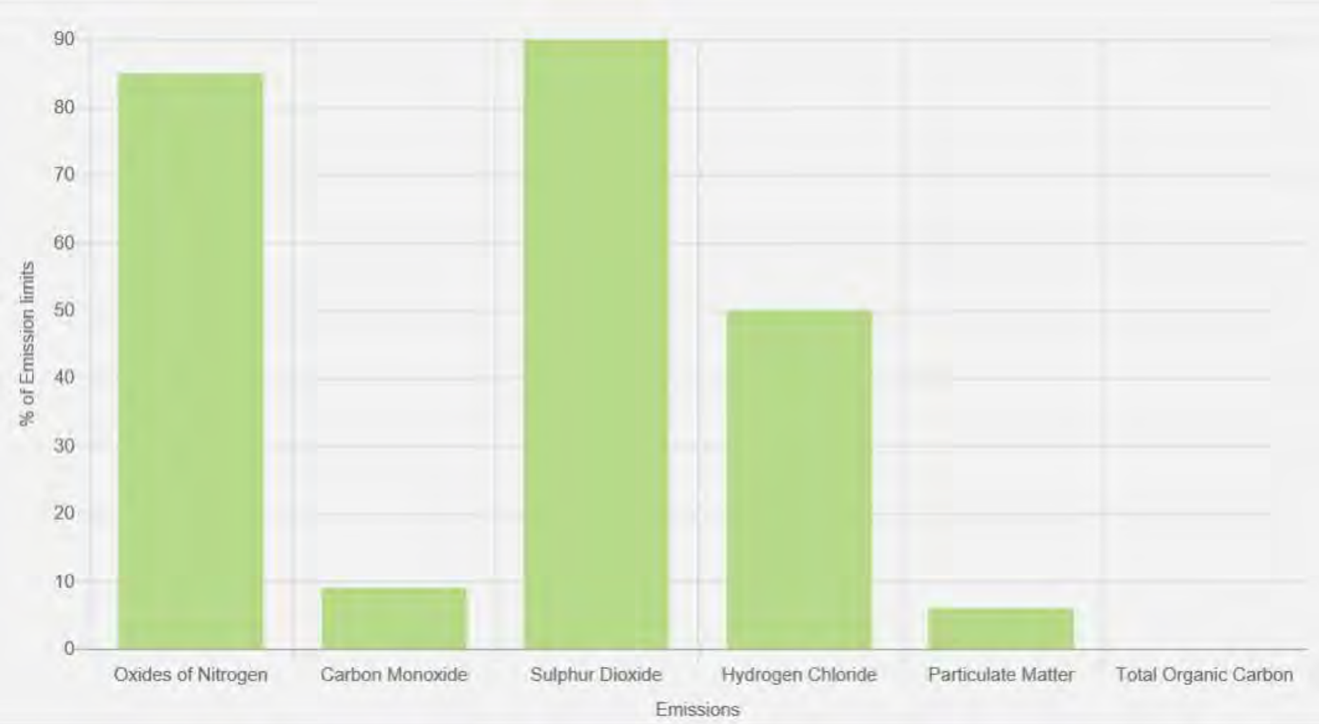
September 2019



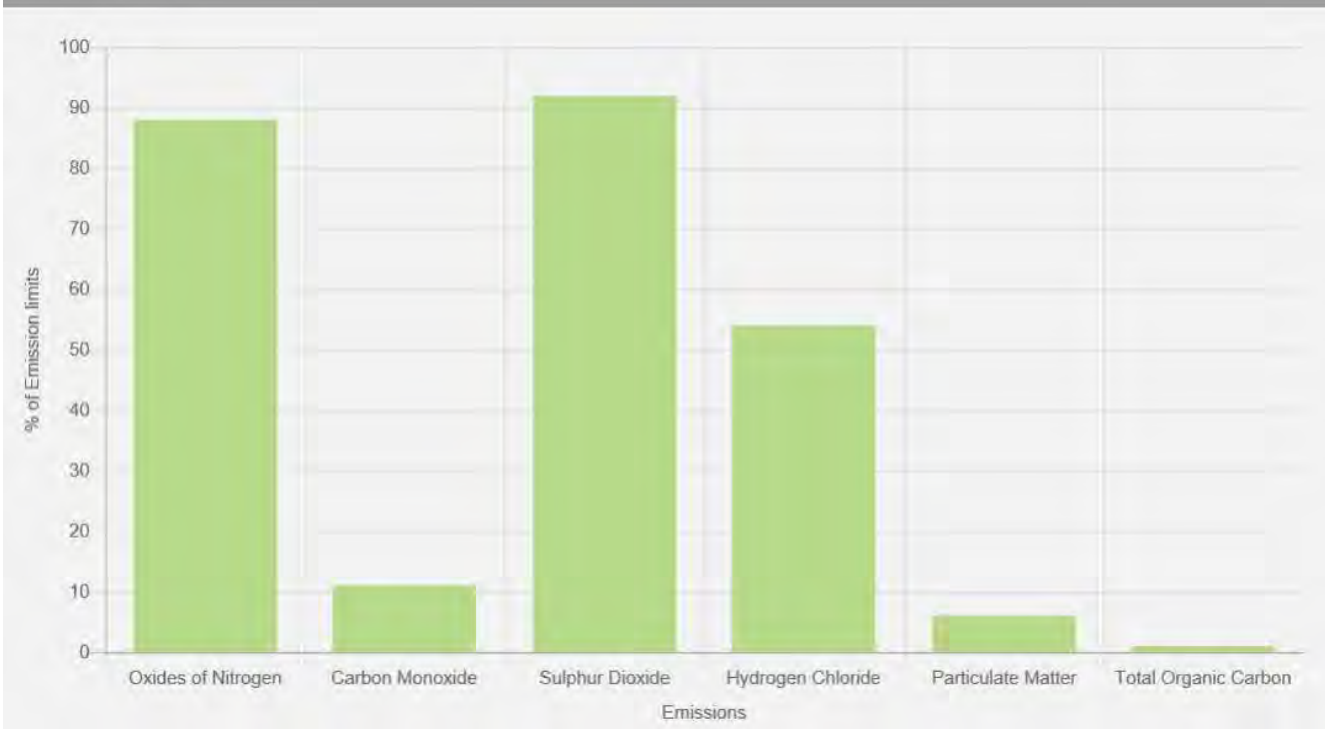
October 2019



November 2019



December 2019



F.3 2018 Emissions

1. Extracts of Emissions Information from Leeds Annual Performance Report 2018

Annual performance report for: **Veolia ES Leeds Limited, Leeds RERF**

Permit Number: **EPR/ GP3334CX**

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	Leeds Recycling and Energy Recovery Facility Newmarket Approach Cross Green Industrial Estate Leeds West Yorkshire LS9 0RJ
Description of waste input	Predominantly Leeds City residual domestic waste, with third party commercial/ industrial waste and clinical waste.
Operator contact details if members of the public have any questions	Site main contact number 02035678430

2. Plant description

The installation consists of one incineration line with a capacity of 20.5 tonnes per hour. The installation accepts mainly municipal solid waste and also some commercial wastes.

Waste is delivered in covered vehicles or containers to the tipping hall, where it will be tipped to be sorted through the mechanical pre-treatment (MPT) or moved directly into the waste bunker via the intermediate bunker. The MPT can remove metals, plastics, paper and card for recycling. Treatment will be by shredders, screens, magnets, eddy current separators and near infra red optical sorting. The treatment is designed to remove waste for recycling, create a more homogenous feedstock for improved combustion. After treatment waste is transported by conveyor to the waste bunker.

The waste in the bunker will be mixed with a crane to prevent anaerobic conditions and hence odour.

Waste is loaded into the incinerator, using the crane, via the feed hopper. The waste feeds onto a moving reverse acting grate, where it is burned. Primary and secondary air supply is controlled to ensure good combustion conditions. A temperature of at least 850°C for at least 2 seconds is achieved.

Unburnt material is called bottom ash and is quenched in water, ferrous metal is removed by magnet. The bottom ash is transported by conveyor to an indoor storage area. It is then sent off site to a suitably licensed waste treatment facility for recovery.

Combustion air is treated to reduce the level of pollutants emitted. SNCR using dry urea, is used for oxides of nitrogen. Bag filters for particulate matter, dry lime injection for acidic gases and activated carbon injection for dioxins and mercury. After clean up, the gases will be emitted to air through a 75m high stack.

The bag filters will collect Air Pollution Control (APC) residues. These are transferred to a silo then to a tanker for removal from site. Sealed bags are sometimes used instead of a tanker. APC residues are taken off site for disposal or sent for use in waste neutralisation at a suitably licensed facility.

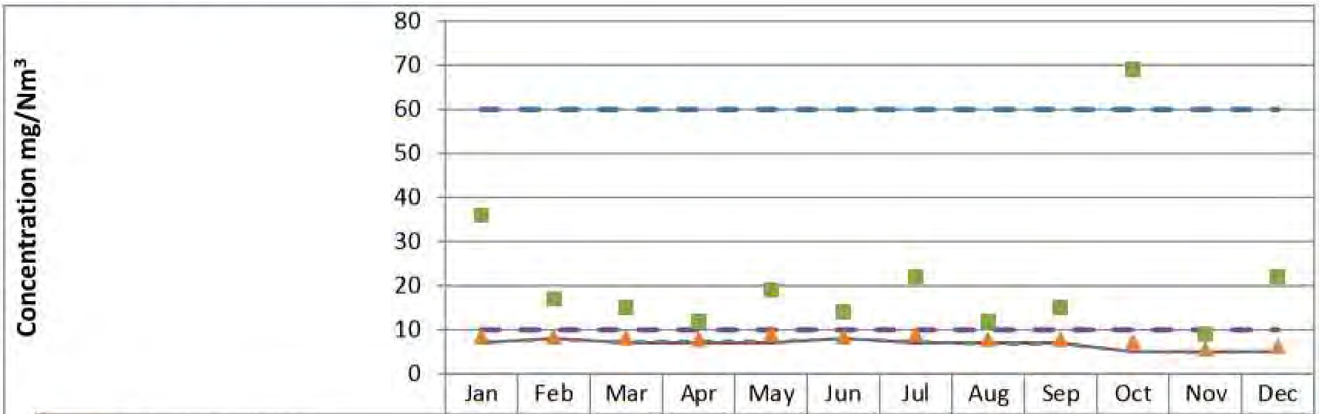
Steam is generated in the boiler and this steam is used to drive a turbine to generate electricity. Approximately 11MW will be exported to grid per hour. The installation is designed so that it can also supply heat energy to the council district heating network which is currently in the construction stage.

4. Summary of Plant Emissions

4.1 Summary of continuous emissions monitoring results for emissions to air

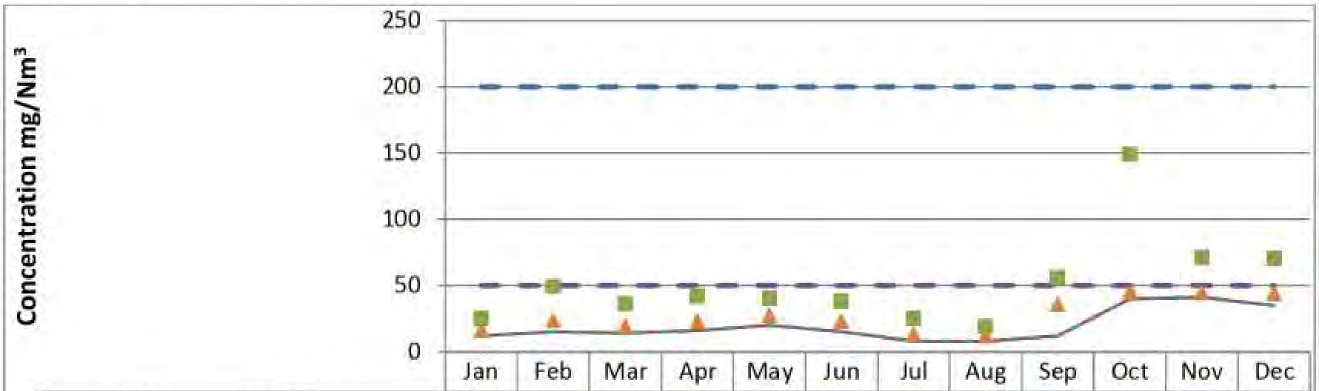
The following charts show the performance of the plant against its emission limit values (ELVs) for substances that are continuously monitored.

Line 1 - Hydrogen chloride



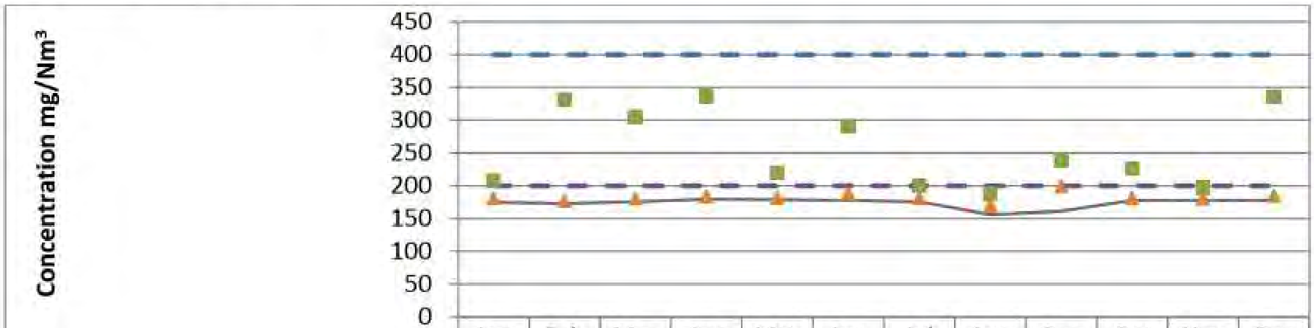
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly HCl ELV	60	60	60	60	60	60	60	60	60	60	60	60
Monthly 1/2 hourly mean	7	8	7	7	7	8	7	7	7	5	5	5
Monthly 1/2 hourly maximum	36	17	15	12	19	14	22	12	15	69	9	22
Daily HCl ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	7.33	7.59	7.3	7.42	7.47	7.83	7.4	6.64	6.72	5.03	4.73	5.13
Monthly daily maximum	8.43	8.4	8.2	7.83	9.11	8.5	8.94	7.82	7.85	7.22	5.64	6.29

Line 1 – Sulphur dioxide



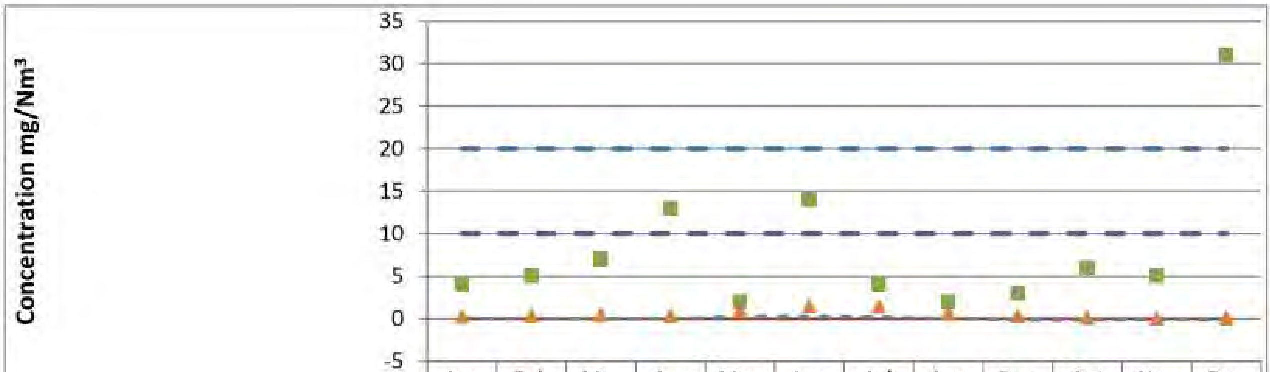
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly SO2 ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly 1/2 hourly mean	12	15	14	16	20	15	8	8	12	40	41	35
Monthly 1/2 hourly maximum	25	49	36	42	40	38	25	19	56	149	71	70
Daily SO2 ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	11.81	14.95	13.89	15.87	20.42	15.27	8.46	8.05	11.62	40.13	41.21	35.24
Monthly daily maximum	15.87	23.36	19.25	23.04	27.47	22.75	12.84	11.91	35.81	45.3	44.46	43.74

Line 1 – Oxides of nitrogen



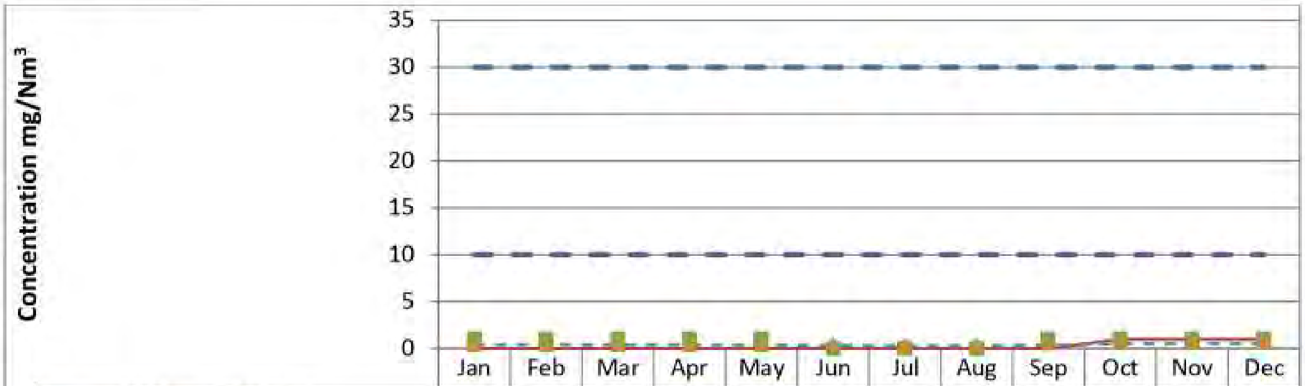
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly NOx ELV	400	400	400	400	400	400	400	400	400	400	400	400
Monthly 1/2 hourly mean	175	173	176	180	179	178	176	156	161	178	178	178
Monthly 1/2 hourly maximum	207	331	305	336	219	290	200	187	239	226	196	335
Daily NOx ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly daily mean	175.27	173.32	176.3	179.84	179.49	177.73	176	156.27	161.48	177.65	177.91	177.61
Monthly daily maximum	181.22	176.77	180.79	183.76	182.12	187.83	181.26	170.04	199.13	181.17	179.97	184.54

Line 1 – Total organic carbon



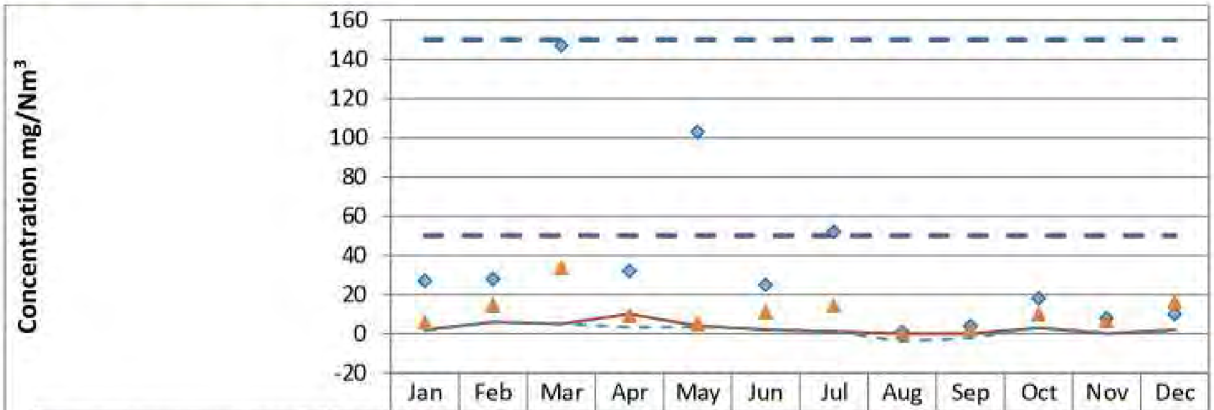
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly TOC ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hourly mean	0	0	0	0	0	0	0	0	0	0	0	0
Monthly 1/2 hourly maximum	4	5	7	13	2	14	4	2	3	6	5	31
Daily TOC ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.14	0.02	-0.03	0.02	0.32	0.33	0.24	0.08	-0.17	-0.19	-0.15	-0.16
Monthly daily maximum	0.26	0.37	0.45	0.33	0.97	1.45	1.4	0.67	0.37	0.1	0.02	0.04

Line 1 – Particulates



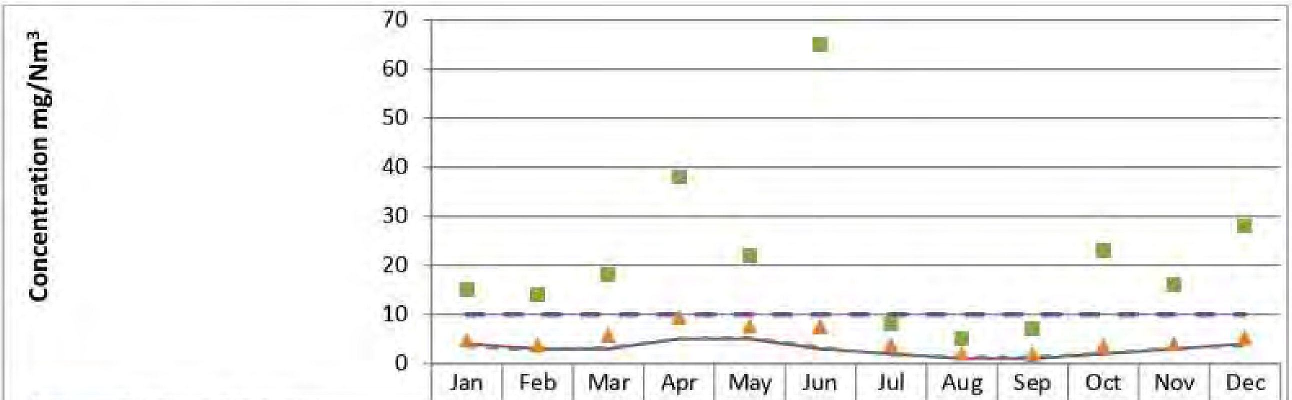
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly PM ELV	30	30	30	30	30	30	30	30	30	30	30	30
Monthly 1/2 hourly mean	0	0	0	0	0	0	0	0	0	1	1	1
Monthly 1/2 hourly maximum	1	1	1	1	1	0	0	0	1	1	1	1
Daily PM ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.42	0.43	0.42	0.4	0.38	0.34	0.31	0.34	0.38	0.55	0.57	0.58
Monthly daily maximum	0.45	0.47	0.47	0.43	0.41	0.39	0.37	0.36	0.54	0.65	0.63	0.64

Line 1 – Carbon monoxide



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10 minute CO ELV (95%)	150	150	150	150	150	150	150	150	150	150	150	150
Monthly 95% 10 minute maximum	27	28	147	32	103	25	52	1	4	18	8	10
Monthly 10 minute mean	2	6	5	10	4	2	1	0	0	3	0	2
Daily CO ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	1.51	5.92	4.99	3.24	3.44	2.31	0.99	-3.77	-2.18	3.07	0.38	1.16
Monthly daily maximum	5.77	14.57	33.71	9.32	5.23	11.21	14.35	0.79	2.58	10	6.78	16.34

Line 1 – Ammonia



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly NH3 ELV												
Monthly 1/2 hourly mean	4	3	3	5	5	3	2	1	1	2	3	4
Monthly 1/2 hourly maximum	15	14	18	38	22	65	8	5	7	23	16	28
Daily NH3 ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	3.48	2.65	3.29	5.06	5.35	3.37	1.72	1.42	1.35	2.14	3.16	3.56
Monthly daily maximum	4.71	3.69	5.72	9.39	7.55	7.47	3.7	1.9	1.85	3.49	4.03	5.27

4.2 Summary of periodic monitoring results for emissions to air

The table below shows the results of periodically monitored substances.

Substance	Emission limit value	Results	
		09-11/04/18	01-03/10/18
Mercury and its compounds	0.05 mg/m^3	0.0005 mg/m^3	0.001 mg/m^3
Cadmium & thallium and their compounds (total)	0.05 mg/m^3	0.001 mg/m^3	<0.001 mg/m^3
Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m^3	0.0182 mg/m^3	0.021 mg/m^3
Dioxins and furans (I-TEQ)	0.1 ng/m^3	0.0009 – 0.0010 ng/m^3	0.0012 ng/m^3
Hydrogen Fluoride	2 mg/m^3	<0.05 mg/m^3	<0.03 mg/m^3

5. Summary of Permit Compliance

5.1 Compliance with permit limits for continuously monitored pollutants

The plant met its emission limits as shown in the table below.

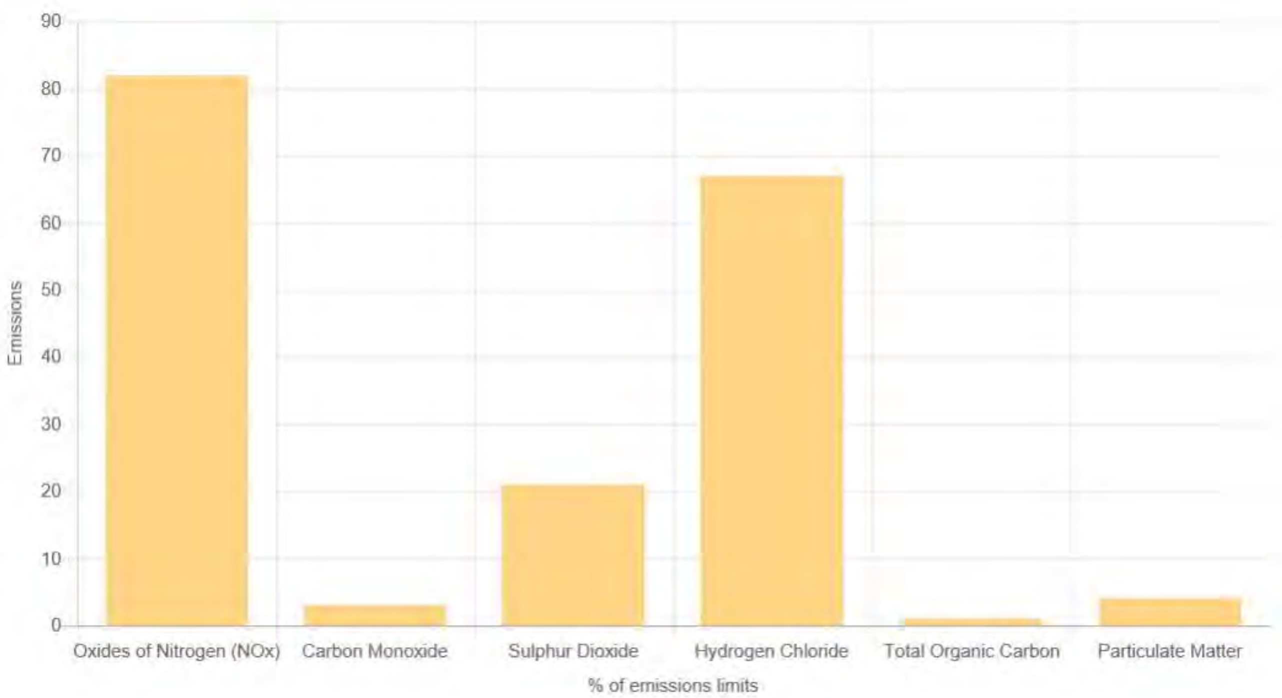
Substance	Percentage time compliant during operation	
	Half-hourly limit	Daily limit
Particulates	100 %	100 %
Oxides of nitrogen	100 %	100 %
Sulphur dioxide	100 %	100 %
Carbon monoxide	100 % (95% of 10-min averages)	100 %
Total organic carbon	99.99 %	100 %
Hydrogen chloride	99.99 %	100 %
Hydrogen fluoride	100 %	100 %

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

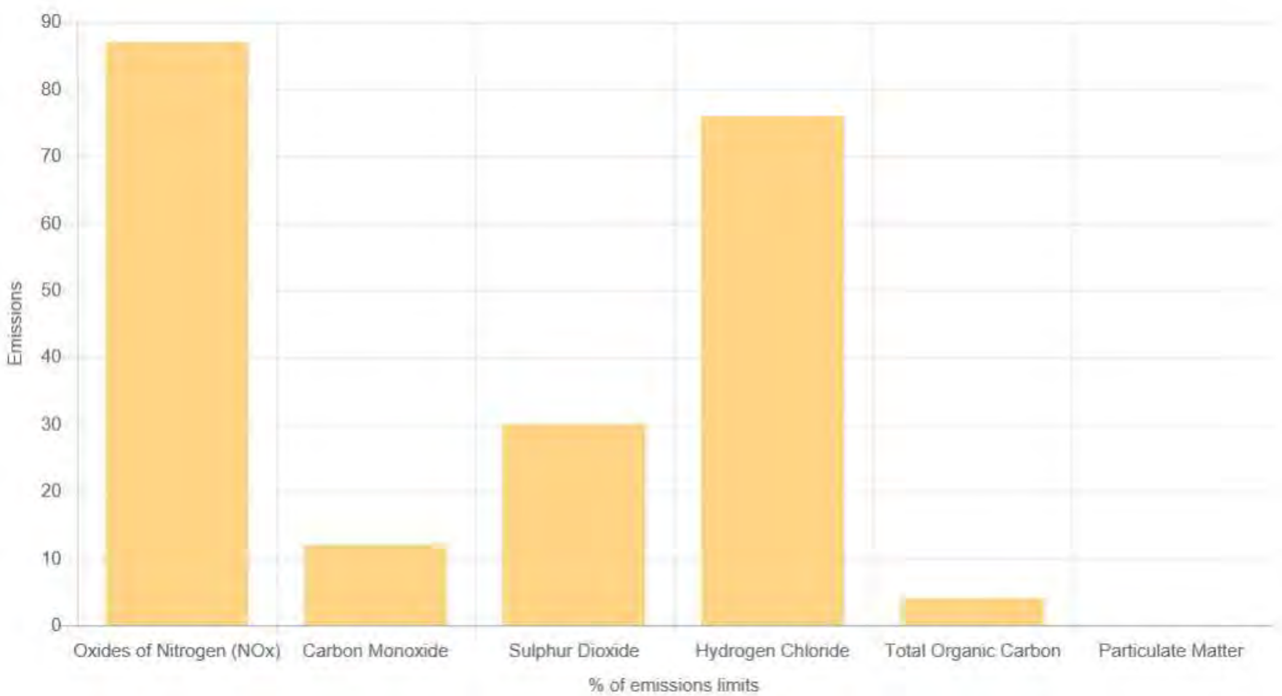
Date	Summary of notification or non-compliance	Reason	Measures taken to prevent reoccurrence
22/10/2018	Notification for half hourly HCl ELV exceedance	High levels of plastic introduced to the feed chute	Increased mixing of bulky plastics, identification of load carrier to prevent the material from coming on site again.
03/12/2018	Notification for half hourly TOC ELV exceedance	Explosion of waste on grate moved waste out of combustion zone into burn out lower zone preventing complete combustion of waste.	Increased vigilance from staff when loading waste from lower levels of ERF waste bunker.

2. Publicly reported continuously monitored emissions reports

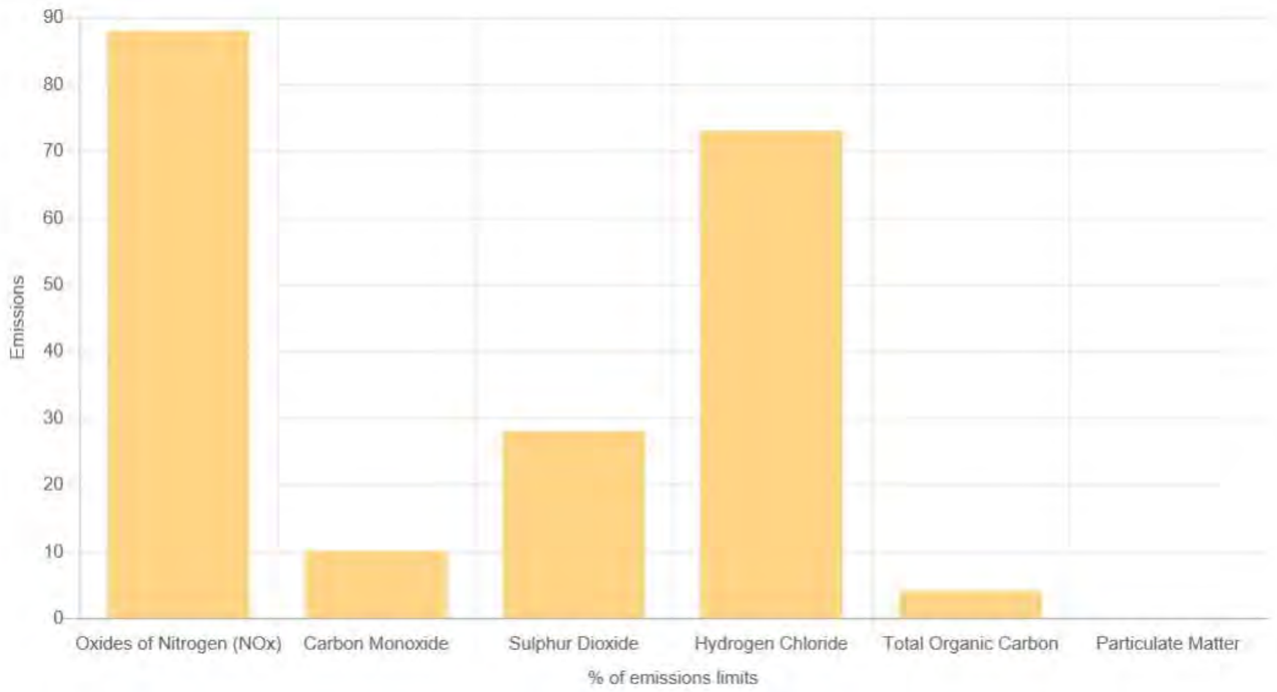
January 2018



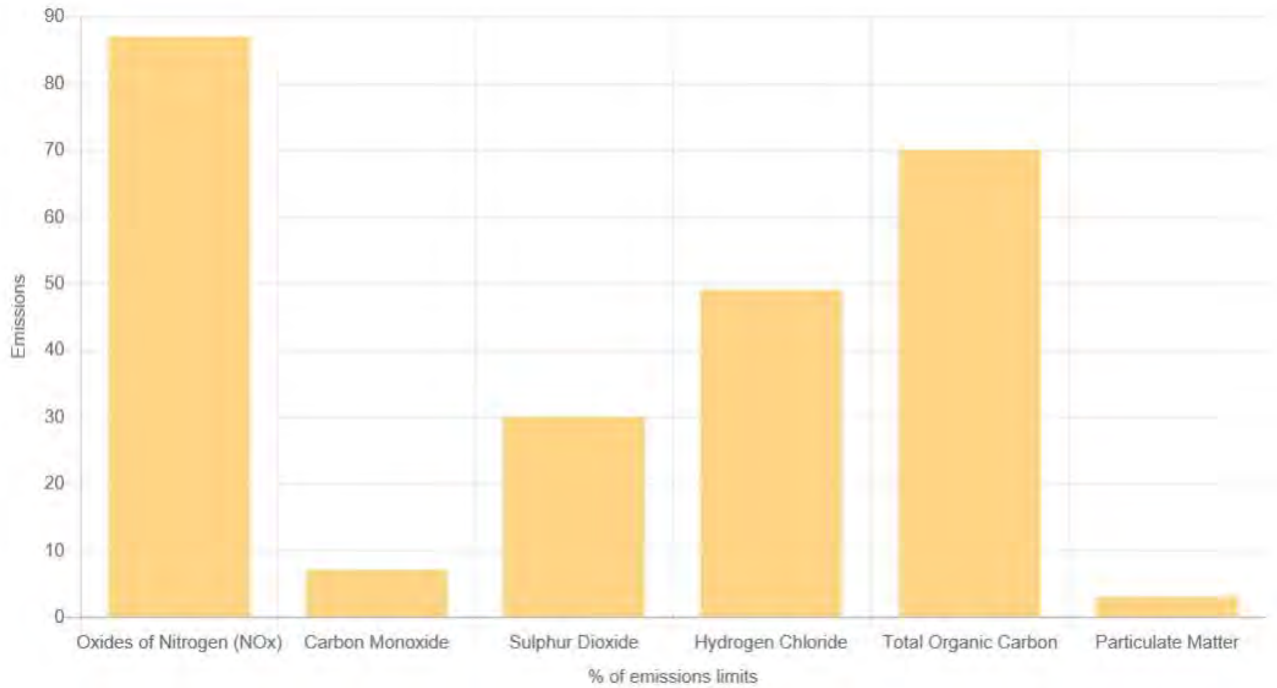
February 2018



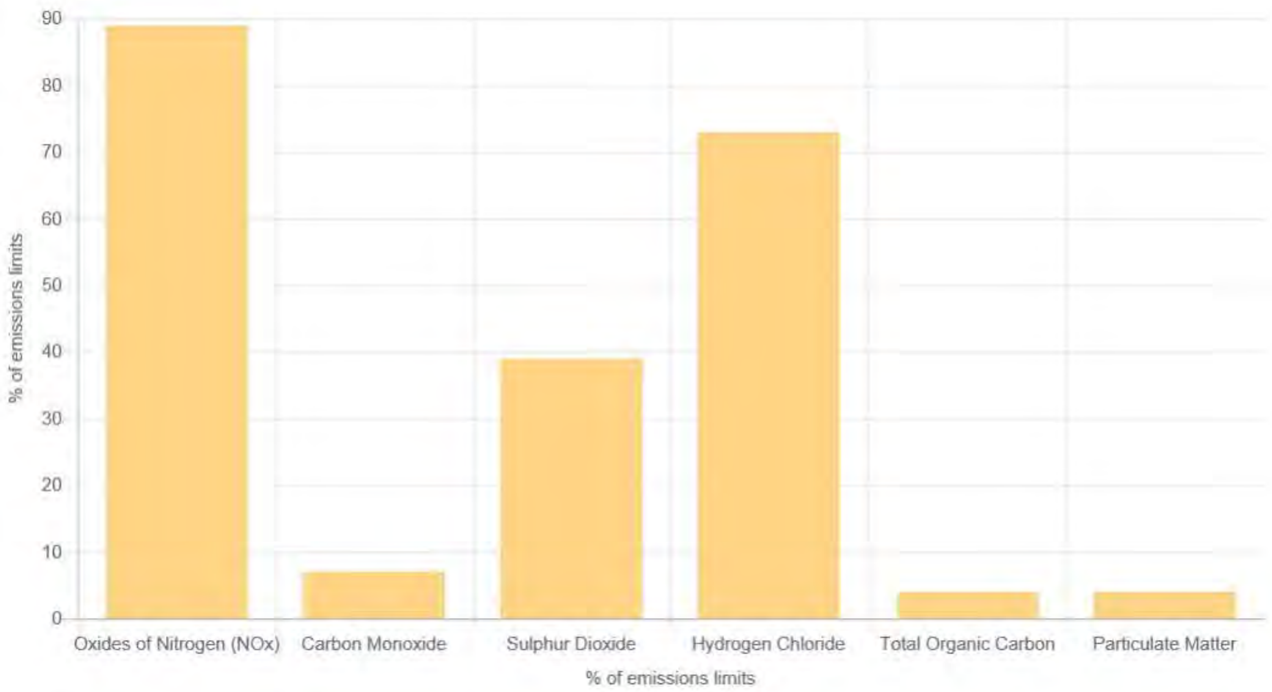
March 2018



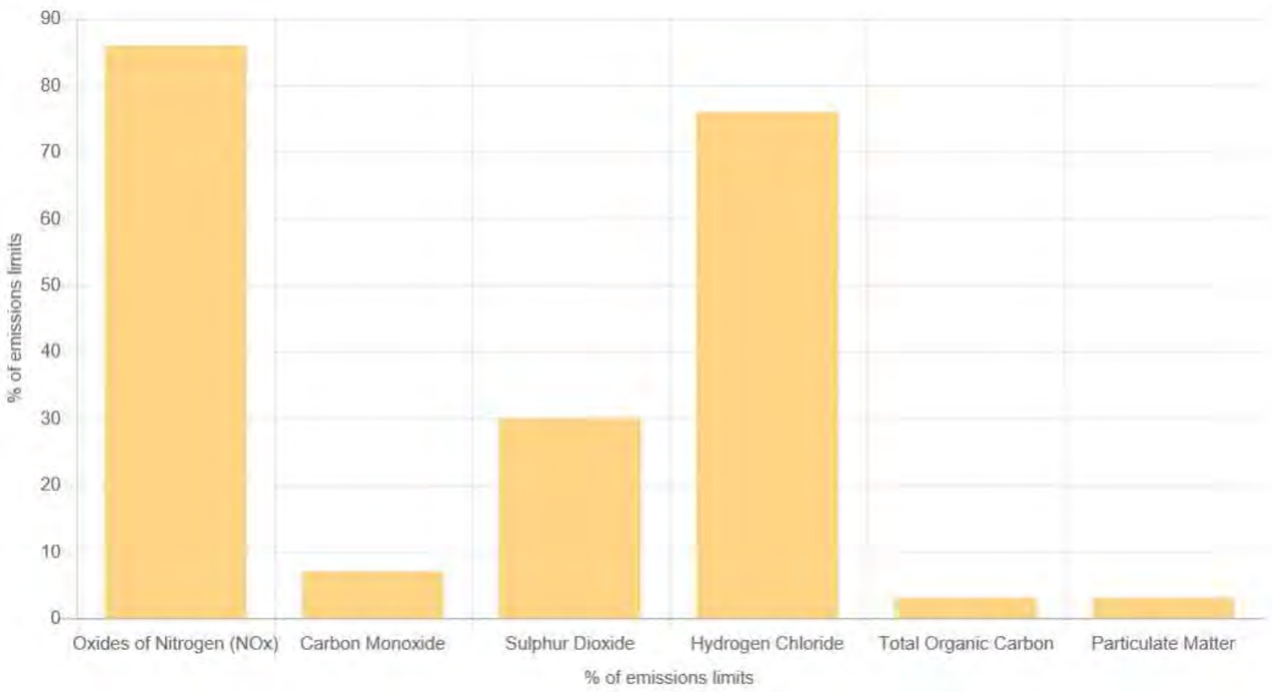
April 2018



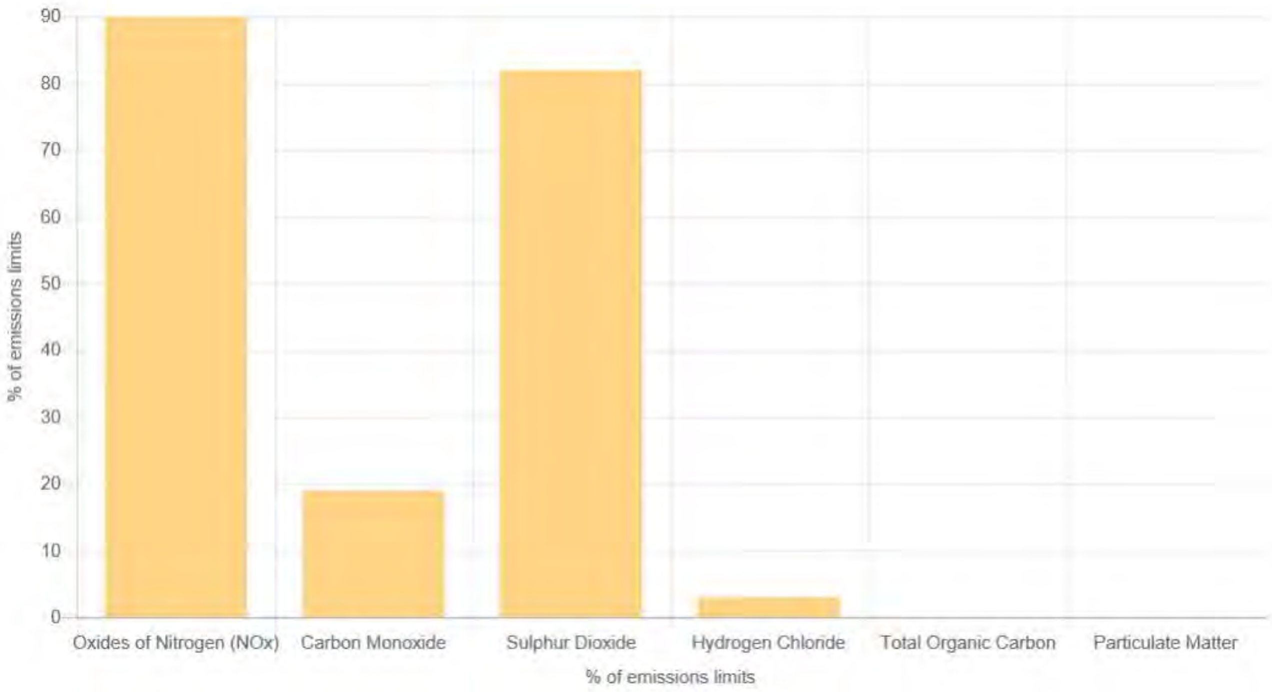
May 2018



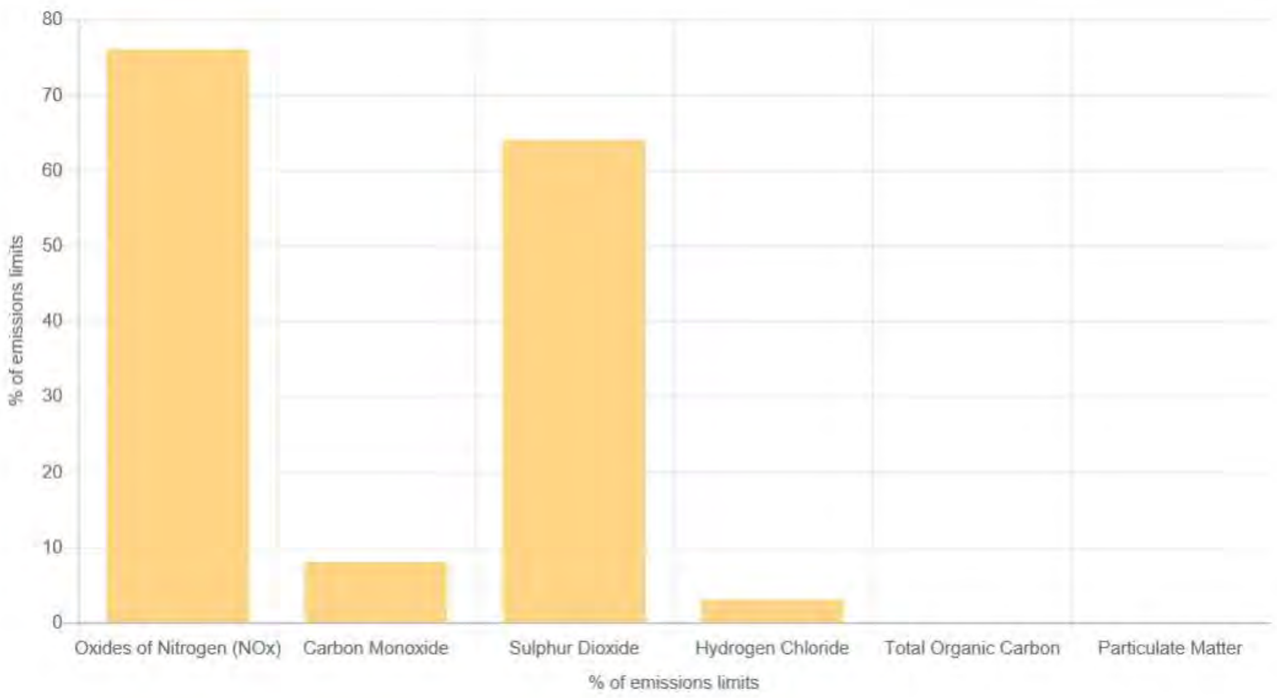
June 2018



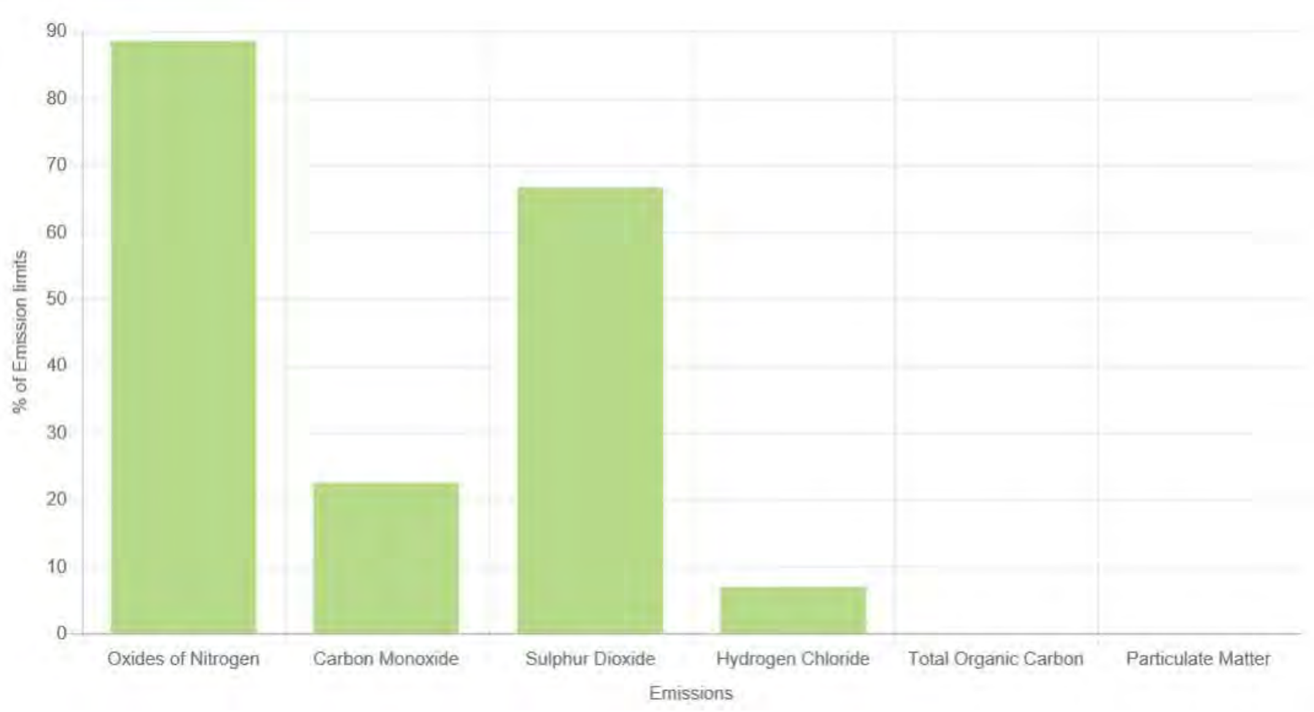
July 2018



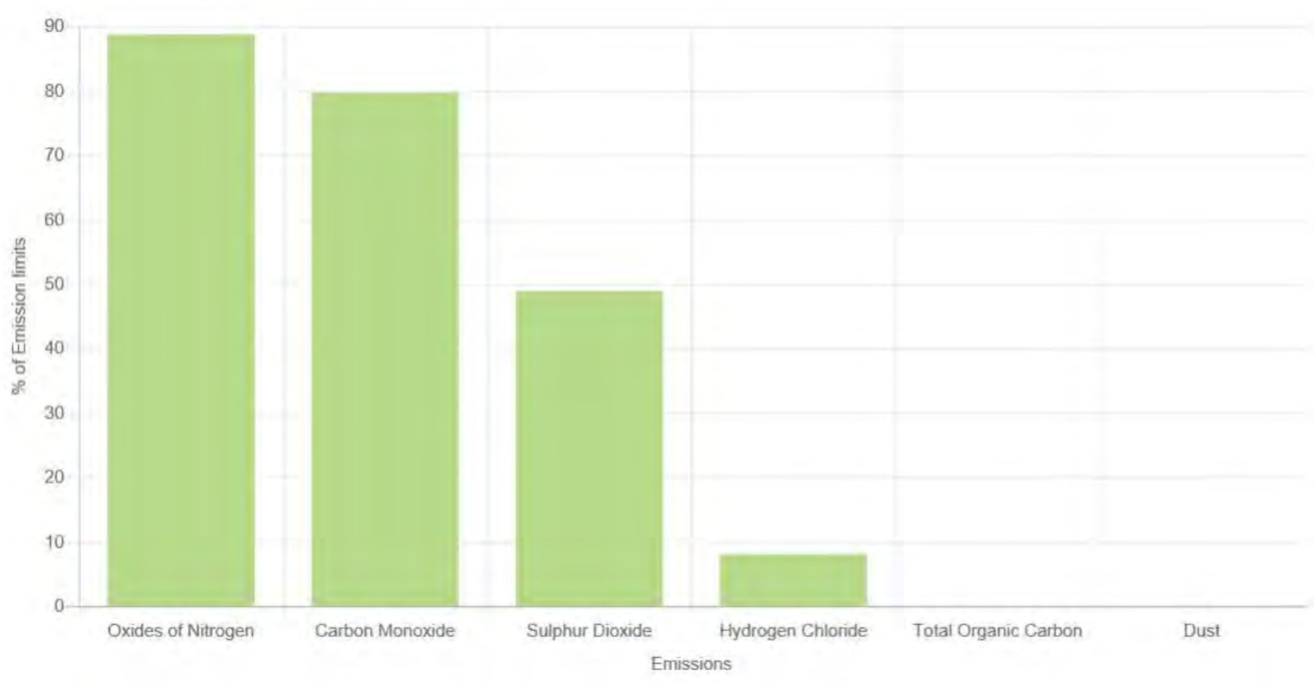
August 2018



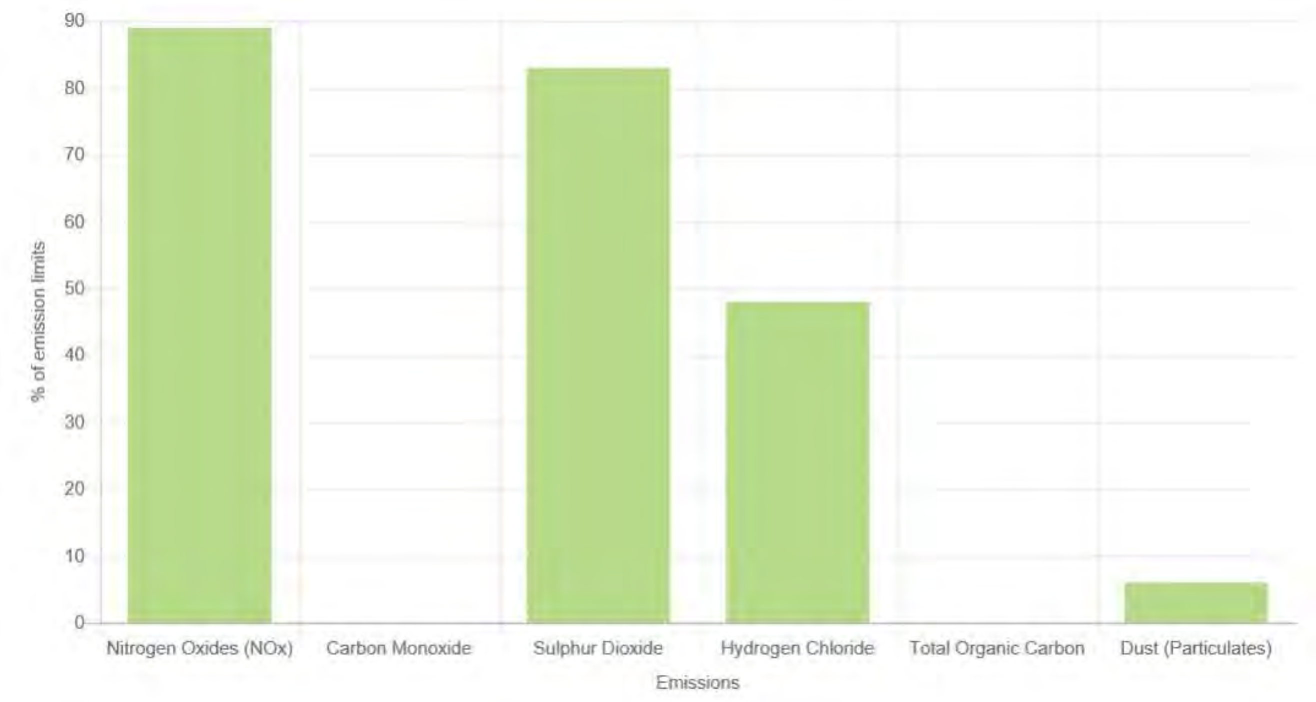
September 2018



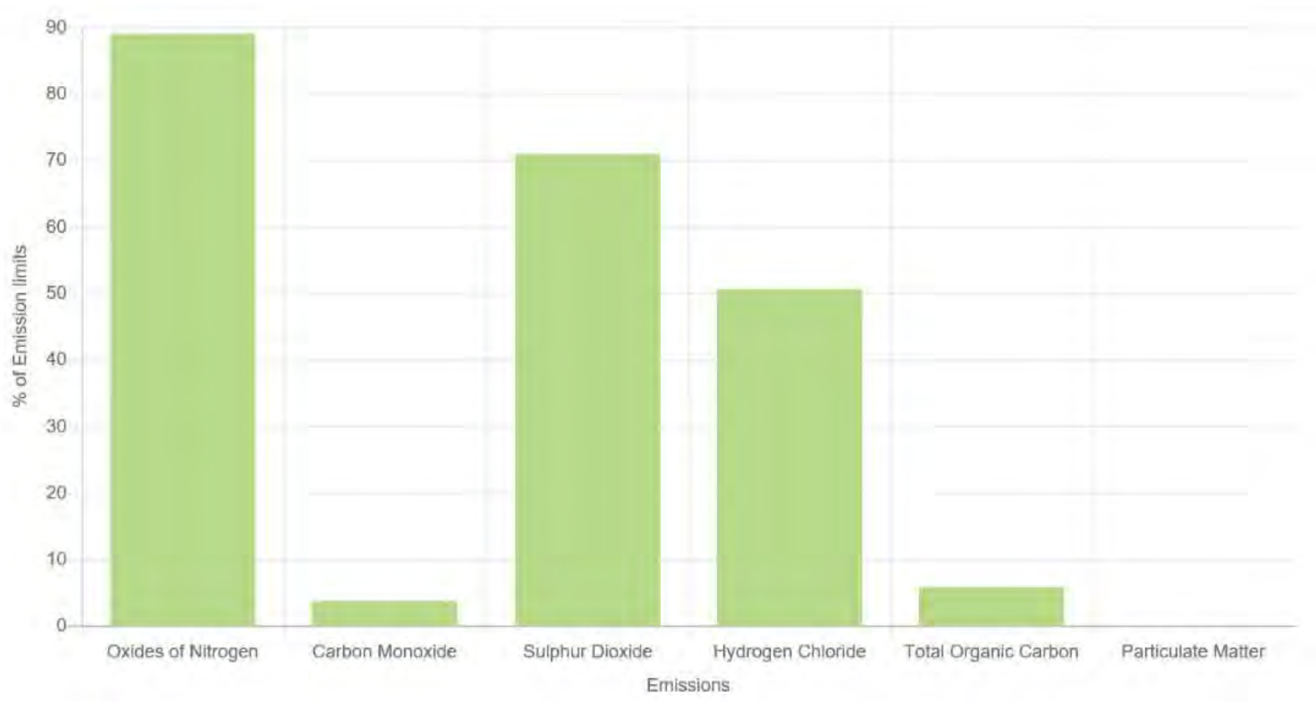
October 2018



November 2018

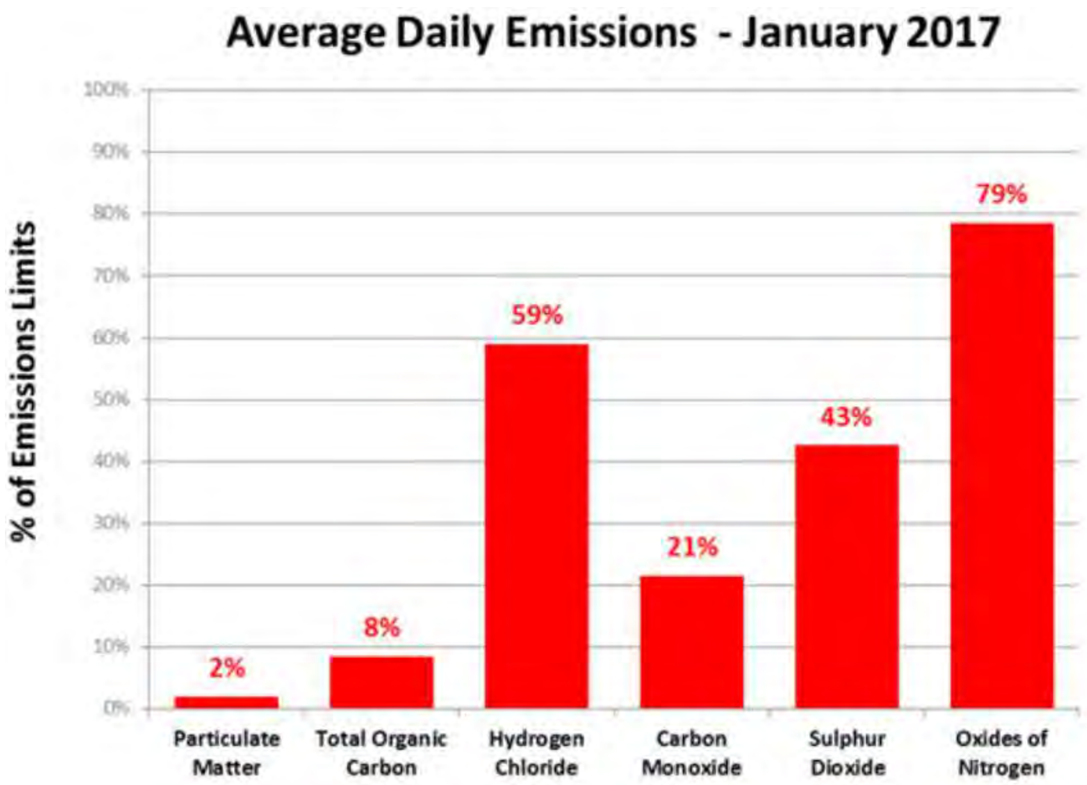


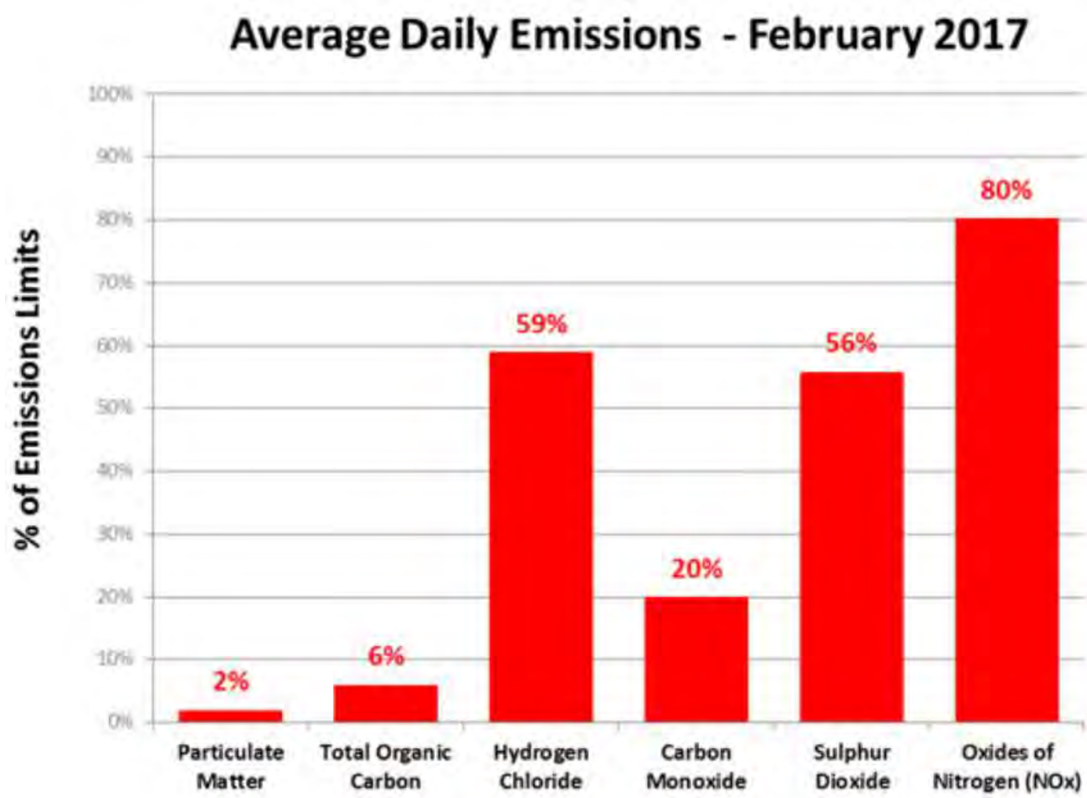
December 2018

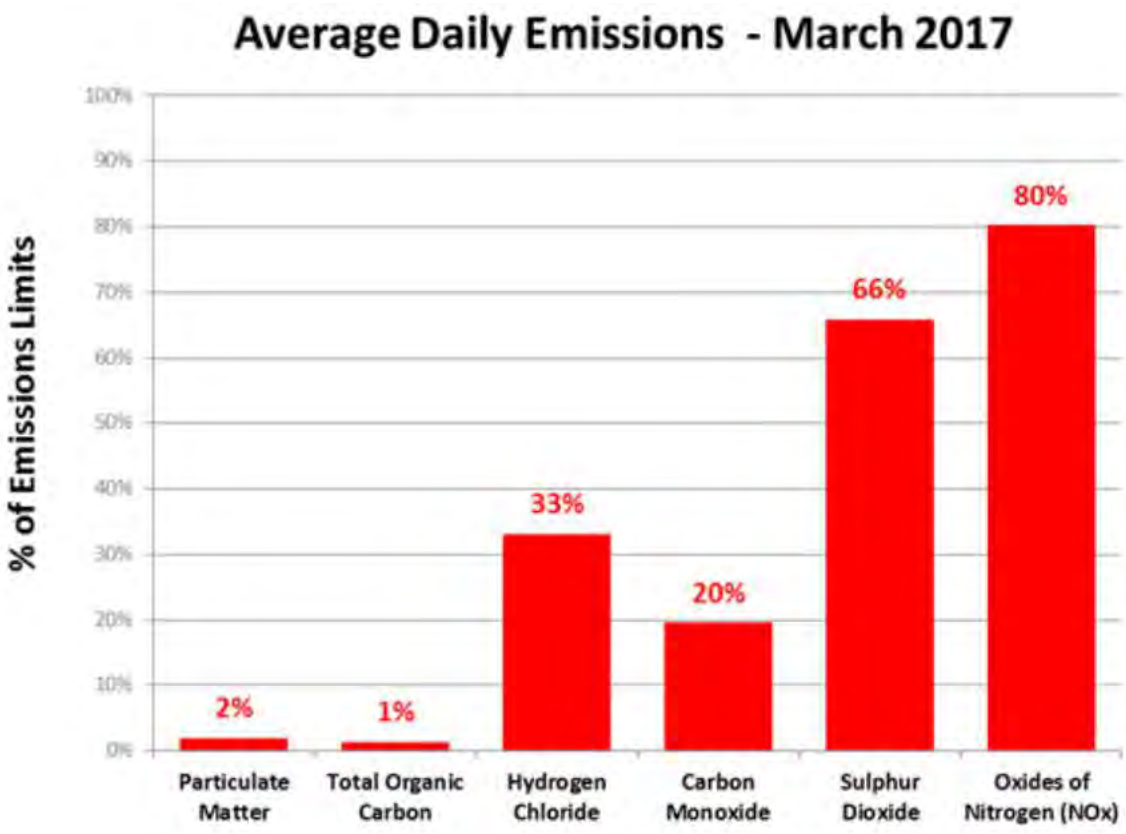


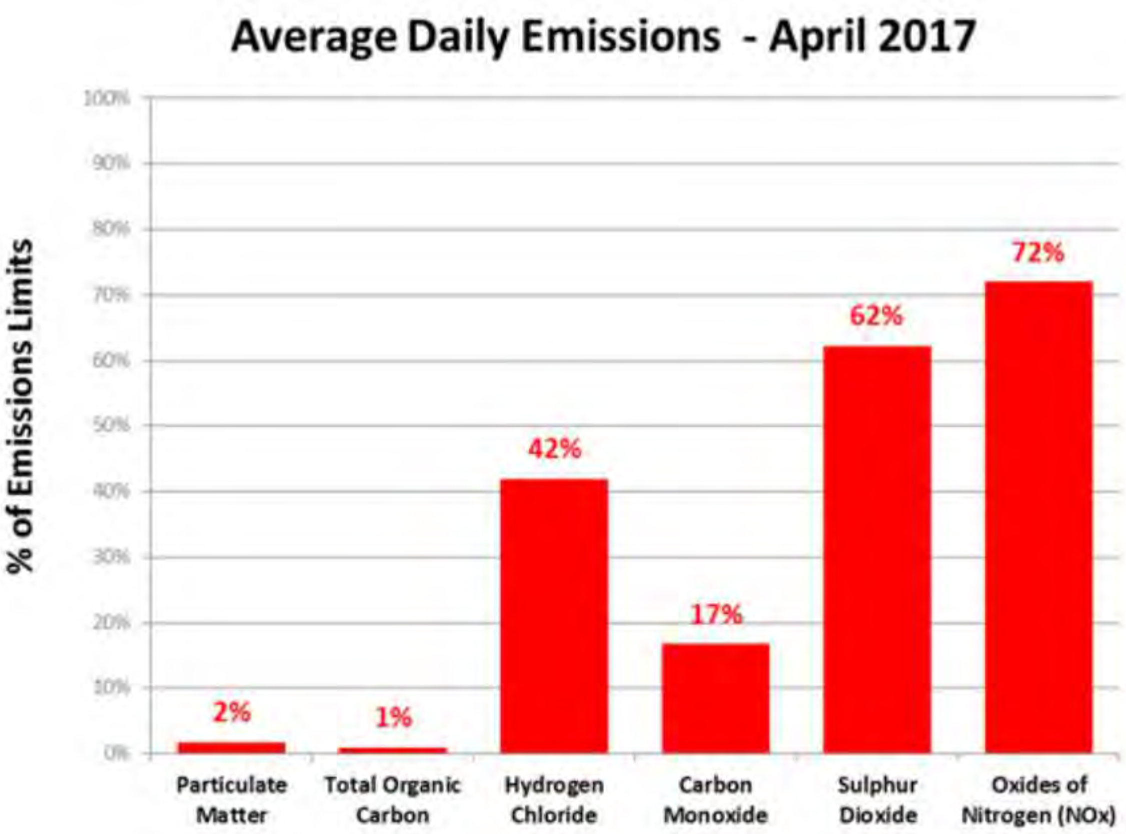
F.4 2017 Emissions

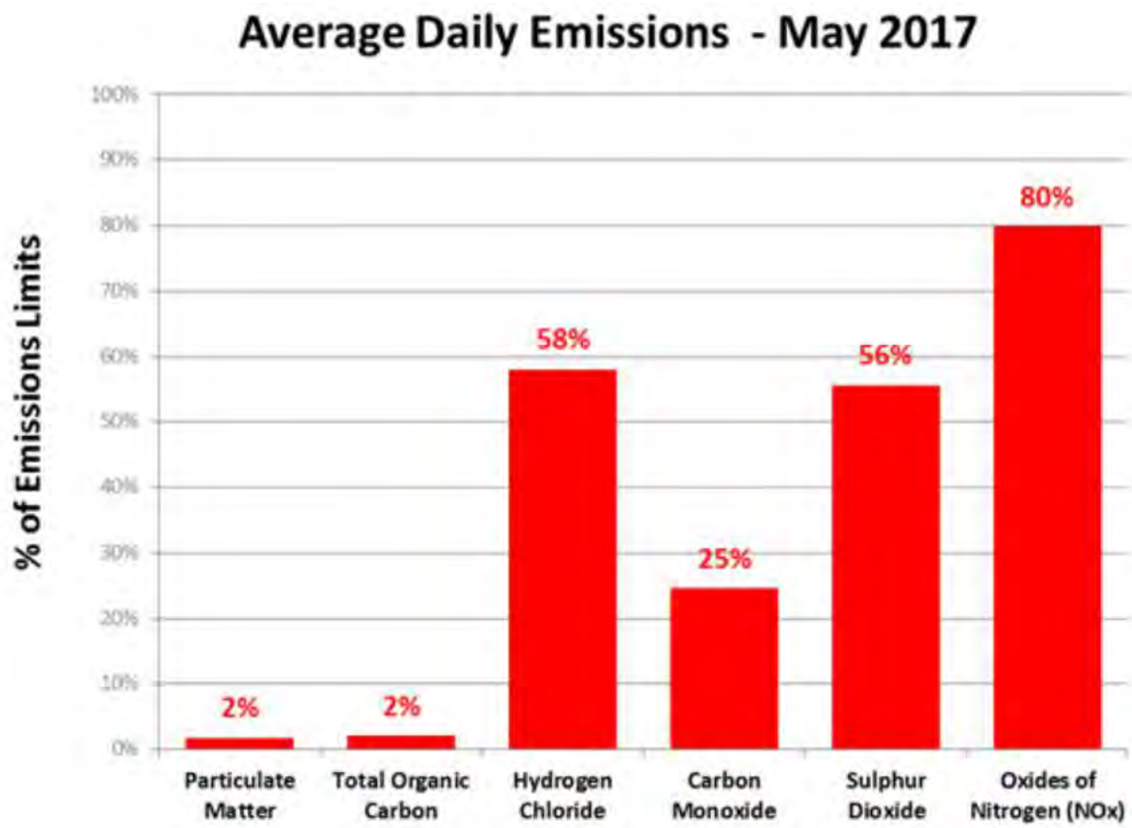
1. <u>Publicly reported continuously monitored emissions reports</u>

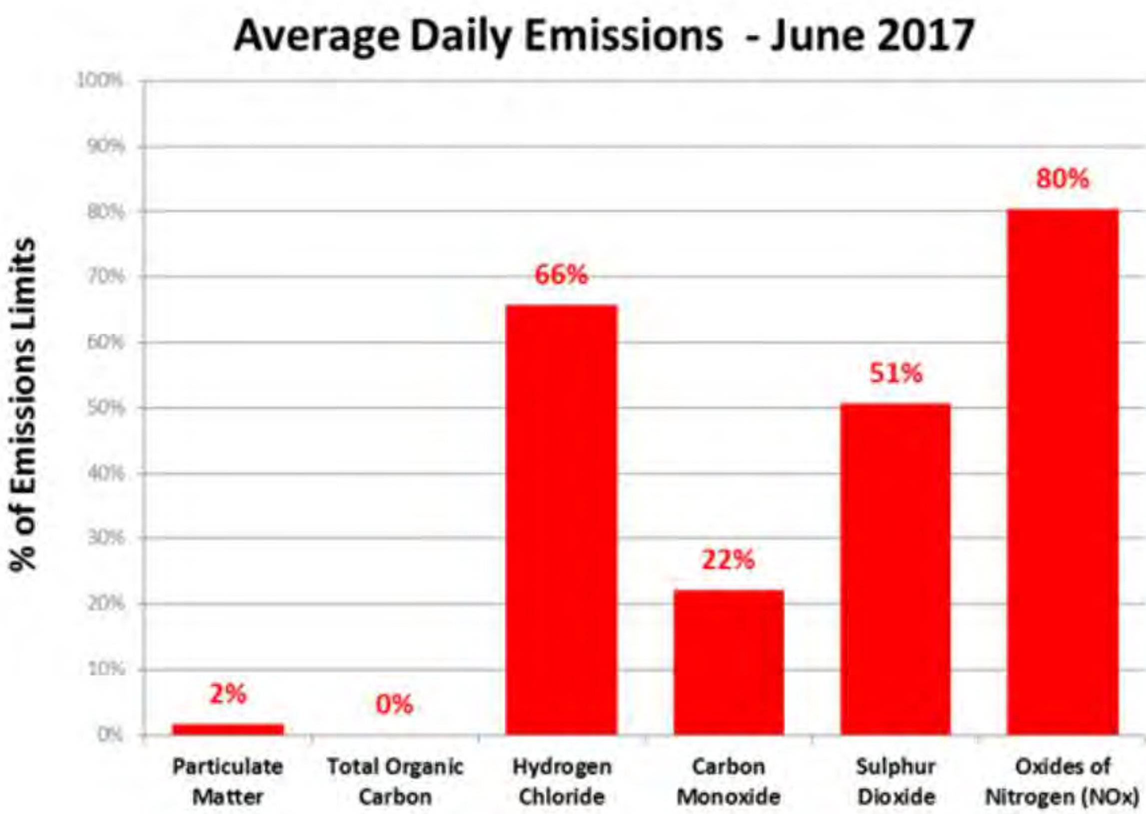


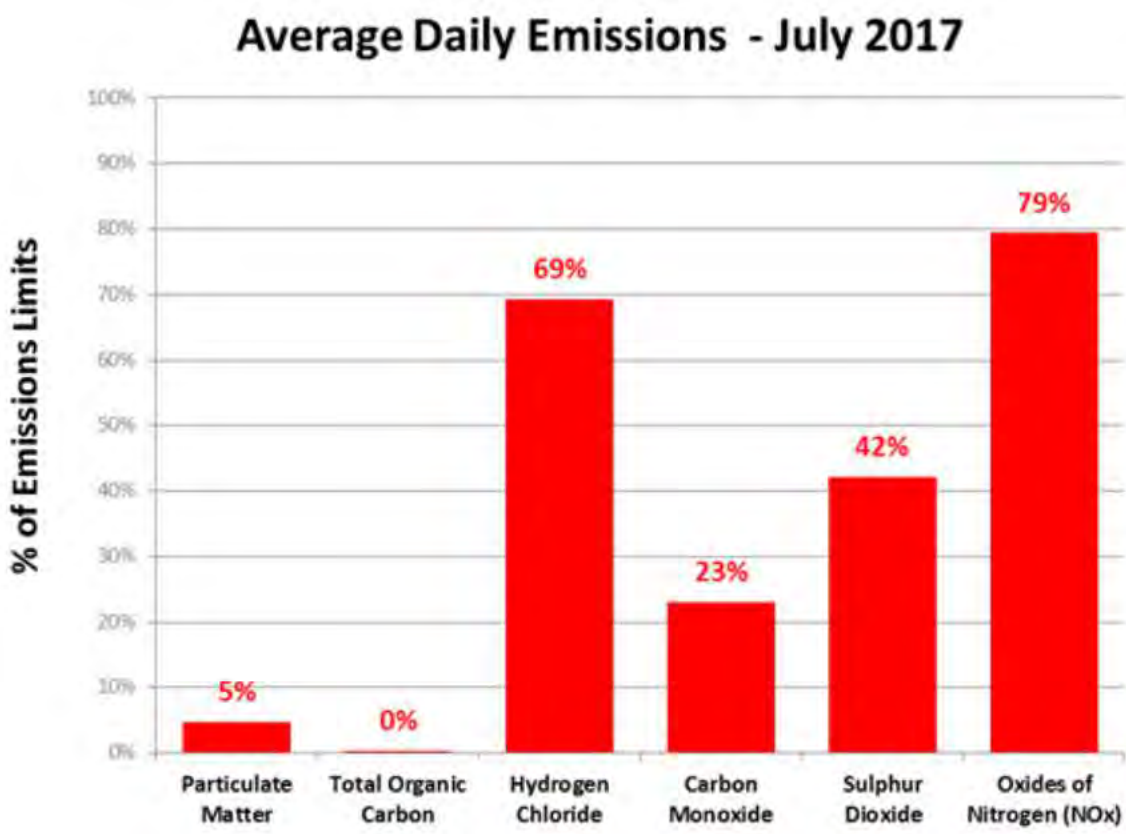


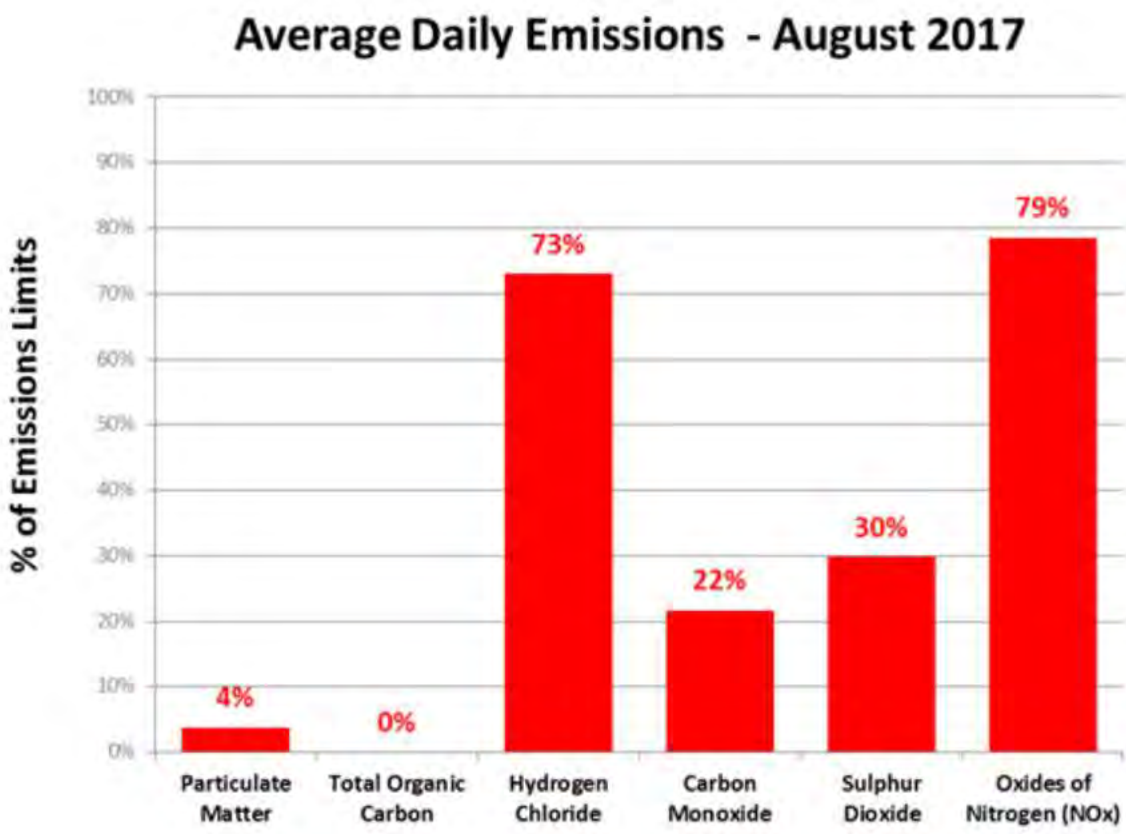

Average Daily Emissions - March 2017
% of Emissions Limits
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2%
1%
33%
20%
66%
80%
Particulate Matter
Total Organic Carbon
Hydrogen Chloride
Carbon Monoxide
Sulphur Dioxide
Oxides of Nitrogen (NOx)

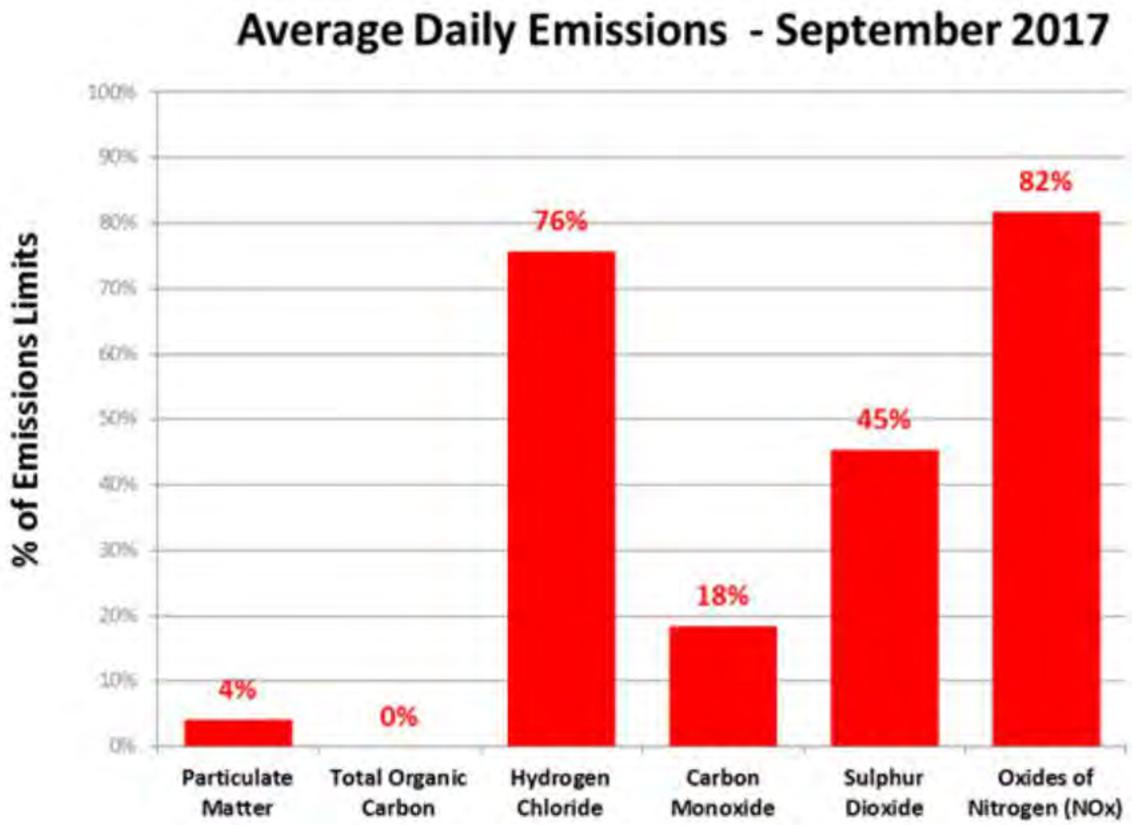

Average Daily Emissions - April 2017
% of Emissions Limits
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2%
1%
42%
17%
62%
72%
Particulate Matter
Total Organic Carbon
Hydrogen Chloride
Carbon Monoxide
Sulphur Dioxide
Oxides of Nitrogen (NOx)

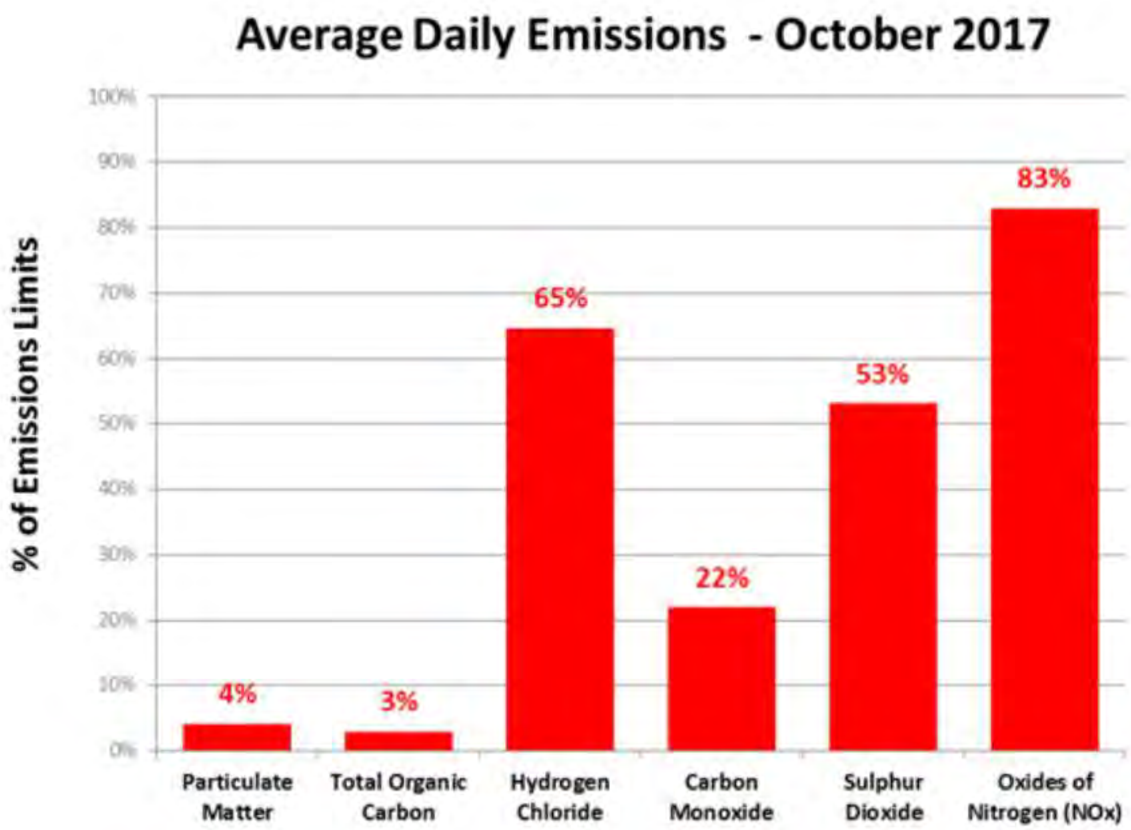

Average Daily Emissions - May 2017
% of Emissions Limits
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2%
2%
58%
25%
56%
80%
Particulate Matter
Total Organic Carbon
Hydrogen Chloride
Carbon Monoxide
Sulphur Dioxide
Oxides of Nitrogen (NOx)

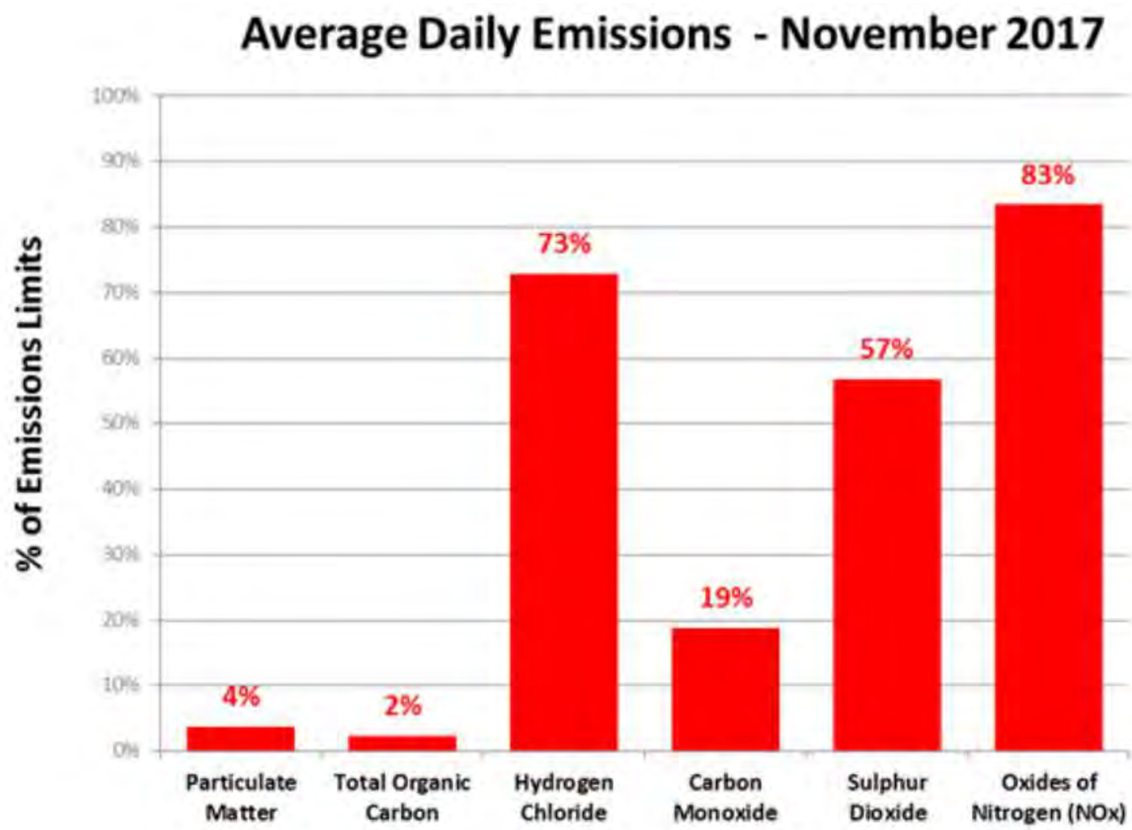

Average Daily Emissions - June 2017
% of Emissions Limits
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2%
0%
66%
22%
51%
80%
Particulate Matter
Total Organic Carbon
Hydrogen Chloride
Carbon Monoxide
Sulphur Dioxide
Oxides of Nitrogen (NOx)


Average Daily Emissions - July 2017
% of Emissions Limits
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
5%
0%
69%
23%
42%
79%
Particulate Matter
Total Organic Carbon
Hydrogen Chloride
Carbon Monoxide
Sulphur Dioxide
Oxides of Nitrogen (NOx)

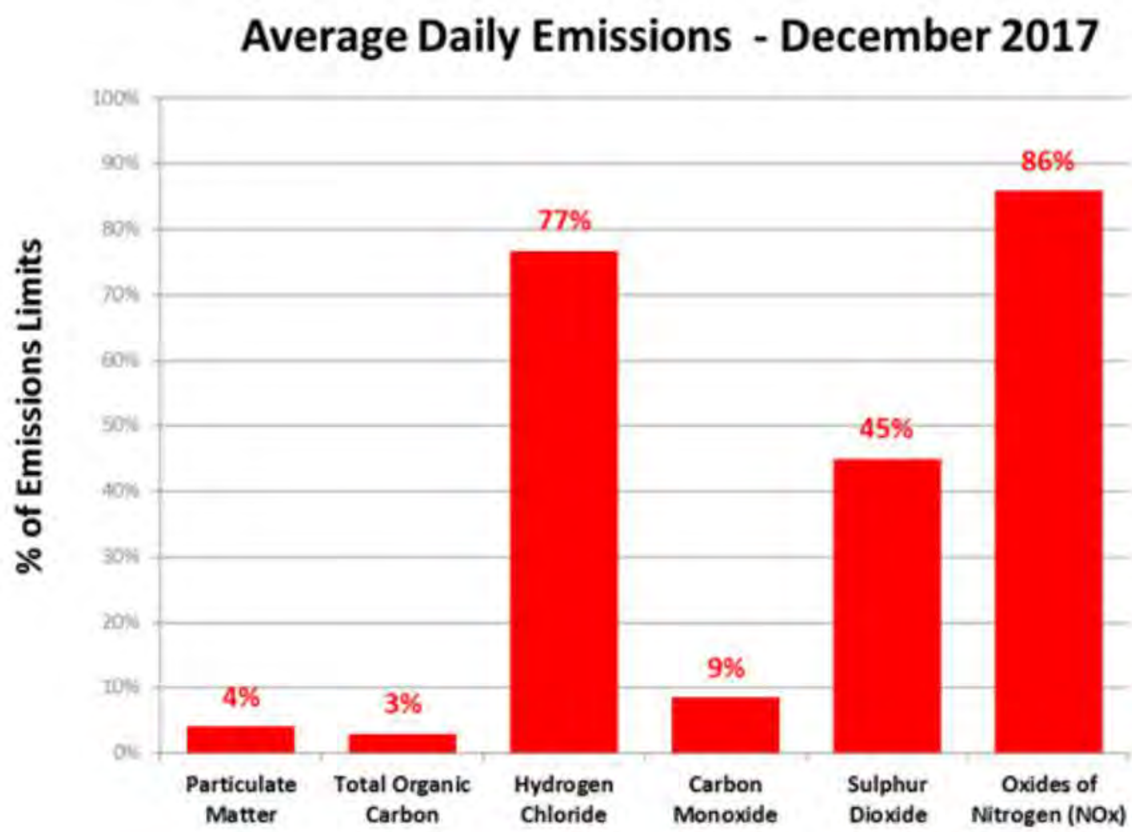

Average Daily Emissions - August 2017
% of Emissions Limits
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
4%
0%
73%
22%
30%
79%
Particulate Matter
Total Organic Carbon
Hydrogen Chloride
Carbon Monoxide
Sulphur Dioxide
Oxides of Nitrogen (NOx)


Average Daily Emissions - September 2017
% of Emissions Limits
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
4%
0%
76%
18%
45%
82%
Particulate Matter
Total Organic Carbon
Hydrogen Chloride
Carbon Monoxide
Sulphur Dioxide
Oxides of Nitrogen (NOx)


Average Daily Emissions - October 2017
% of Emissions Limits
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
4%
3%
65%
22%
53%
83%
Particulate Matter
Total Organic Carbon
Hydrogen Chloride
Carbon Monoxide
Sulphur Dioxide
Oxides of Nitrogen (NOx)



Average Daily Emissions - November 2017
% of Emissions Limits
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
4%
2%
73%
19%
57%
83%
Particulate Matter
Total Organic Carbon
Hydrogen Chloride
Carbon Monoxide
Sulphur Dioxide
Oxides of Nitrogen (NOx)



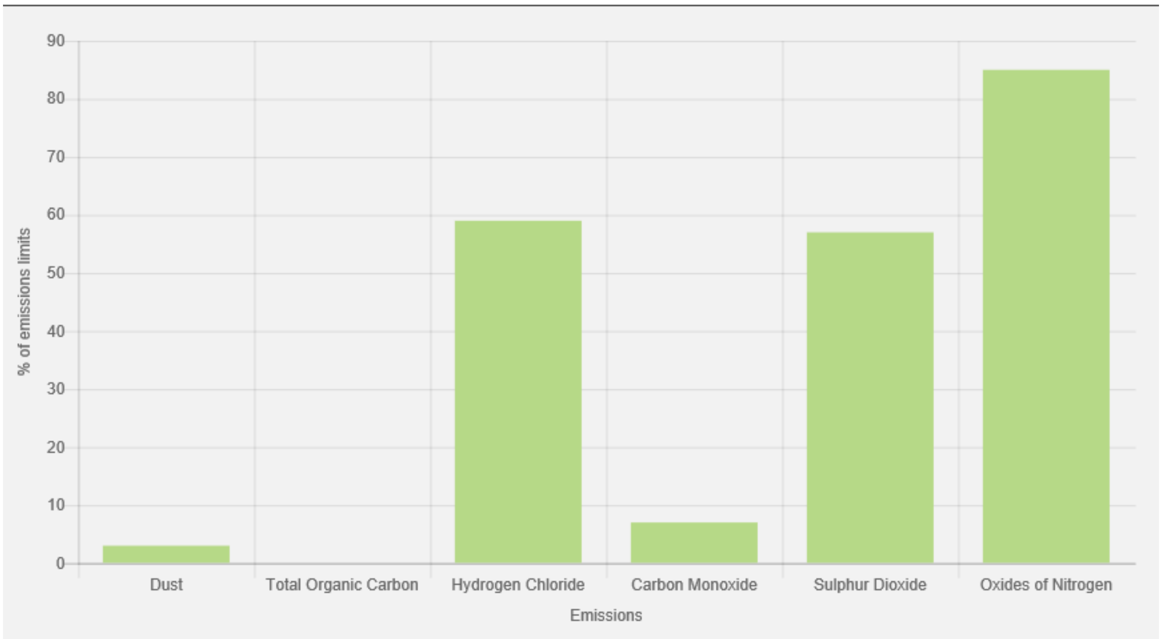
Average Daily Emissions - December 2017
% of Emissions Limits
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
4%
3%
77%
9%
45%
86%
Particulate Matter
Total Organic Carbon
Hydrogen Chloride
Carbon Monoxide
Sulphur Dioxide
Oxides of Nitrogen (NOx)

Appendix G. Staffordshire EfW emissions data

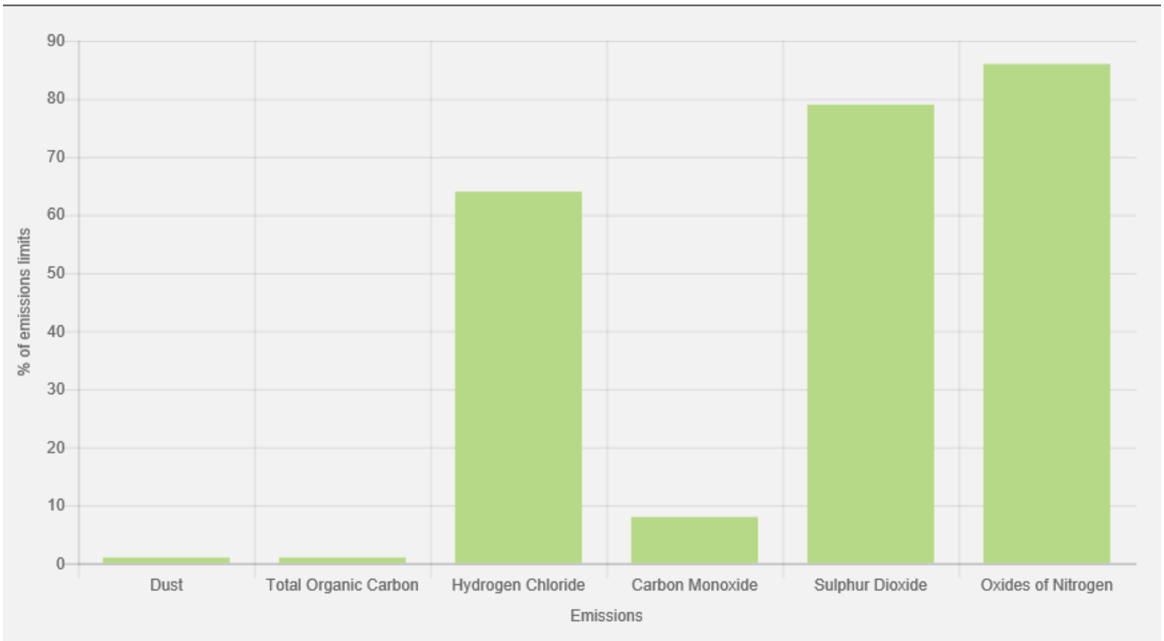
G.1 2020 Emissions

1. <u>Publicly reported continuously monitored emissions reports</u>

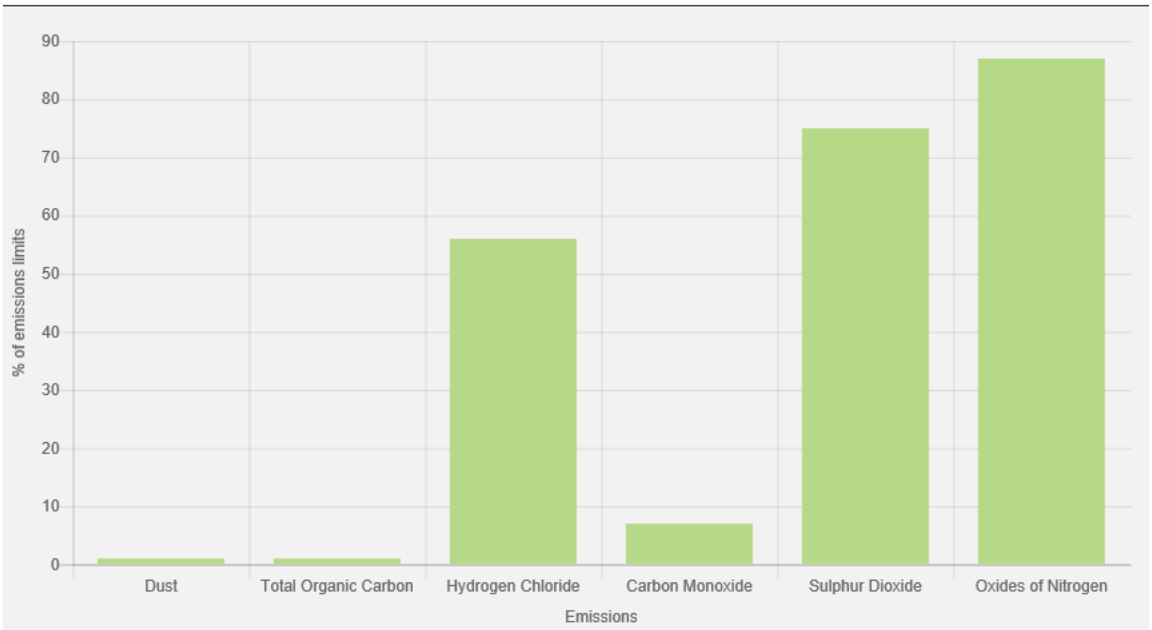
January 2020 Average Daily Emissions



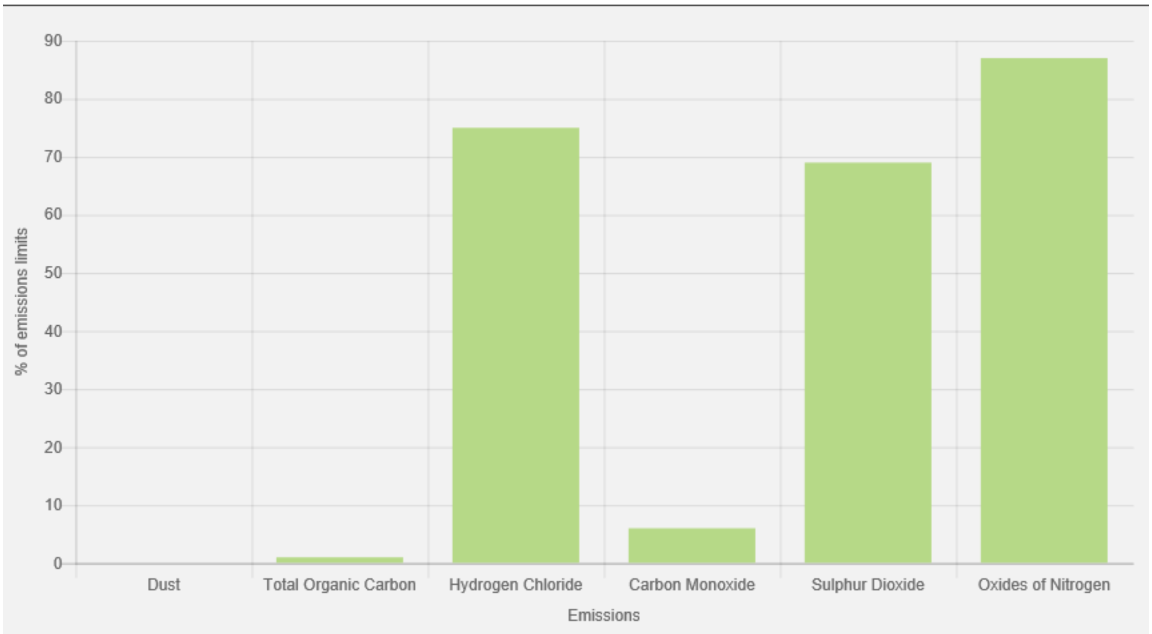
February 2020 Average Daily Emissions



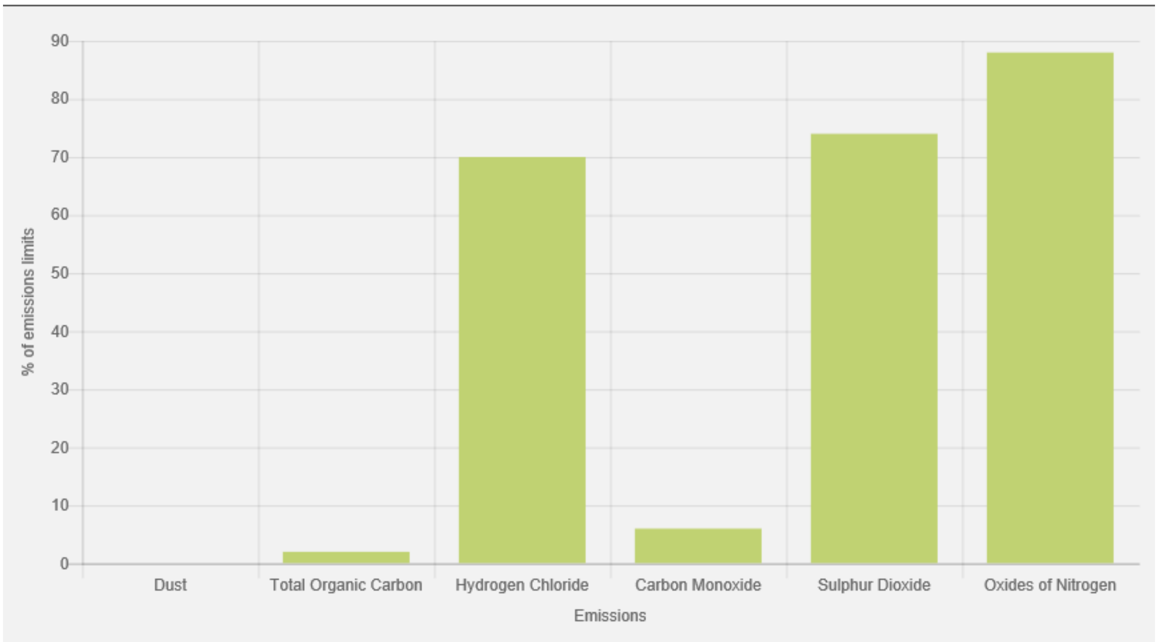
March 2020 Average Daily Emissions



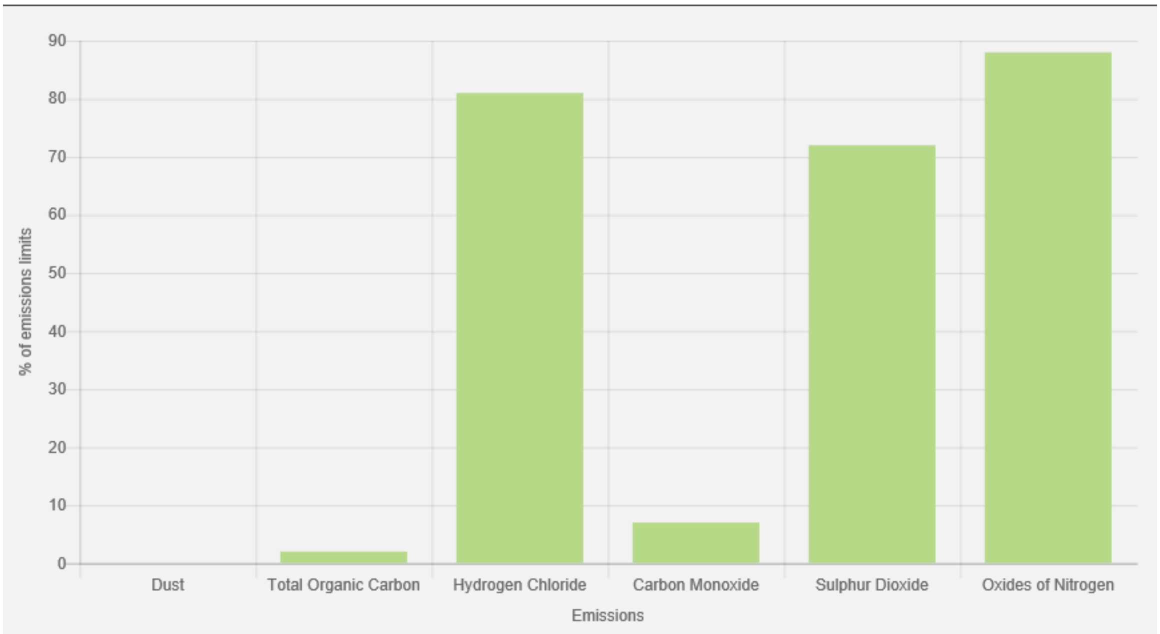
April 2020 Average Daily Emissions



May 2020 Average Daily Emissions



June 2020 Average Daily Emissions



G.2 2019 Emissions

1. <u>Extracts of Emissions Information from Staffordshire Annual Performance Report 2019</u>

w2R

VEOLIA

Annual Performance Report 2019

Permit EPR/HP3431HK

Staffordshire Energy Recovery Facility

Veolia ES Staffordshire Limited

Year:	2019		
Address:	The Dell, Enerprise Drive, Four Ashes, Wolverhampton, Staffordshire WV10 7DF		
Tel:	0203 567 6300		
Email:	christine.skaramaga@veolia.com		
Prepared by:	Christine Skaramaga	Position:	Midlands Region Environmental Engineer
Approved by:	Philip Burgess	Position:	Facility Manager
Version:	1		
Issue Date:	27/01/2019		

Summary of Permit Compliance

Compliance with permit limits for continuously monitored pollutants

The plant met its emission limits as shown in the table below:

Substance	Percentage time compliant during operation	
	Half-hourly limit	Daily limit
Particulates	100%	100%
Oxides of nitrogen	100%	100%
Sulphur dioxide	100%	100%
Carbon monoxide	100% of 95% of 10-min averages	100%
Total organic carbon	100%	100%
Hydrogen chloride	100%	100%

Summary of any notifications or non-compliances under the permit

Date	Summary of notification or non-compliance [including Line/Reference]	Reason	Measures taken to prevent reoccurrence

Summary of any complaints received and actions to taken to resolve them.

Date	Summary of complaint [including Line/Reference]	Reason *	Measures taken to prevent reoccurrence

* including whether substantiated by the operator or the EA

Emissions to Air (periodically monitored)

Summary of monitoring undertaken, standards used and compliance
As Permit requirements & TGN M2 v.12

Results of emissions to air that are periodically monitored

Substance	Ref. Period	Emission Limit Value	A1 (Q1/2)	A2 (Q1/2)	A1 (Q3/4)	A2 (Q3/4)	Average A1	Average A2
Hydrogen fluoride	1 hr	2 mg/m^3	0.02	0.03	0.02	0.02	0.02	0.025
Cd and Th and their compounds	6-8hrs	0.05 mg/m^3	0.0012	0.0016	0.0011	0.0012	0.00115	0.0014
Hg and its compounds	6-8hrs	0.05 mg/m^3	0.0006	0.00044	0.00087	0.00036	0.000735	0.0004
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	6-8hrs	0.5 mg/m^3	0.023	0.012	0.014	0.023	0.0185	0.0175
Dioxins & Furans (I-TEQ)	6-8hrs	0.1 ng/m^3	0.019	0.029	0.036	0.02	0.0275	0.0245
PCBs (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m^3	0.0029	0.0041	0.0069	0.0032	0.0049	0.00365
PCBs (WHO-TEQ Fish)	6-8hrs	None set ng/m^3	0.00015	0.00022	0.00036	0.00017	0.000255	0.000195
PCBs (WHO-TEQ Birds)	6-8hrs	None set ng/m^3	0.0075	0.0097	0.015	0.0077	0.01125	0.0087
Dioxins & Furans (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m^3	0.021	0.032	0.04	0.022	0.0305	0.027
Dioxins & Furans (WHO-TEQ Fish)	6-8hrs	None set ng/m^3	0.019	0.031	0.038	0.021	0.0285	0.026
Dioxins & Furans (WHO-TEQ Birds)	6-8hrs	None set ng/m^3	0.028	0.047	0.055	0.029	0.0415	0.038
Nitrous Oxide (N2O)	1 hr	None set mg/m3	0.34	0.23	0.27	0.2	0.305	0.215
PAH Total	6-8hrs	None set µg/m^2	0.4	0.73	0.32	0.43	0.36	0.58
Anthanthrene	6-8hrs	None set µg/m^3	0.013	0.014	0.013	0.029	0.013	0.0215
Benzo(a)anthracene	6-8hrs	None set µg/m^3	0.013	0.014	0.013	0.014	0.013	0.014
Benzo(a)pyrene	6-8hrs	None set µg/m^3	0.013	0.029	0.038	0.043	0.0255	0.036
Benzo(b)fluoranthene	6-8hrs	None set µg/m^3	0.013	0.014	0.013	0.014	0.013	0.014
Benzo(b)naptho(2,1-d) thiophene	6-8hrs	None set µg/m^3	0.013	0.014	0.013	0.014	0.013	0.014
Benzo(c)phenanthrene	6-8hrs	None set µg/m^3	0.013	0.014	0.013	0.014	0.013	0.014
Benzo(ghi)perylene	6-8hrs	None set µg/m^3	0.013	0.014	0.013	0.043	0.013	0.0285
Benzo(k)fluoranthene	6-8hrs	None set µg/m^3	0.013	0.014	0.013	0.014	0.013	0.014
Cholanthrene	6-8hrs	None set µg/m^3	0.013	0.014	0.013	0.014	0.013	0.014
Chrysene	6-8hrs	None set µg/m^3	0.013	0.014	0.013	0.014	0.013	0.014
Cyclopenta(cd)pyrene	6-8hrs	None set µg/m^3	0.013	0.014	0.013	0.014	0.013	0.014
Dibenzo(al)pyrene	6-8hrs	None set µg/m^3	0.013	0.014	0.013	0.014	0.013	0.014
Dibenzo(ah)anthracene	6-8hrs	None set µg/m^3	0.013	0.014	0.013	0.014	0.013	0.014
Fluoranthene	6-8hrs	None set µg/m^3	0.013	0.043	0.013	0.014	0.013	0.0285
Indeno(123-cd) pyrene	6-8hrs	None set µg/m^3	0.013	0.014	0.063	0.058	0.038	0.036
Naphthalene	6-8hrs	None set µg/m^3	0.081	0.47	0.051	0.1	0.066	0.285

Comments :

Emissions to Air (continously monitored)

Summary of monitoring undertaken, standards used and compliance
MCERTS CEM System

Results of emissions to air that are continuously monitored

Substance	Reference Period	Emission Limit Value	A1		A2		A3		A4		A5	
			Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.
Oxides of nitrogen	Daily mean	200 mg/m³	192.1	176.3	196.2	173.9						
	½ hourly mean	400 mg/m³	336.8	176.1	350.7	174.0						
Particulates	Daily mean	10 mg/m³	1.2	0.5	0.2	0.1						
	½ hourly mean	30 mg/m³	5.2	0.6	3.8	0.1						
Total Organic Carbon	Daily mean	10 mg/m³	0.9	0.0	0.8	0.1						
	Oxides of Nitrogen	20 mg/m³	8.4	0.1	12.5	0.1						
Hydrogen chloride	Daily mean	10 mg/m³	9.5	7.0	9.7	6.4						
	½ hourly mean	60 mg/m³	44.5	7.1	38.2	6.4						
Sulphur dioxide	Daily mean	50 mg/m³	48.5	37.2	48.5	36.8						
	½ hourly mean	200 mg/m³	134.9	37.1	166.7	36.8						
Carbon monoxide	Daily mean	50 mg/m³	8.4	3.2	9.5	3.2						
	95%ile 10-min avg *	150 mg/m³ *	264.6	7.4	485.1	7.3						

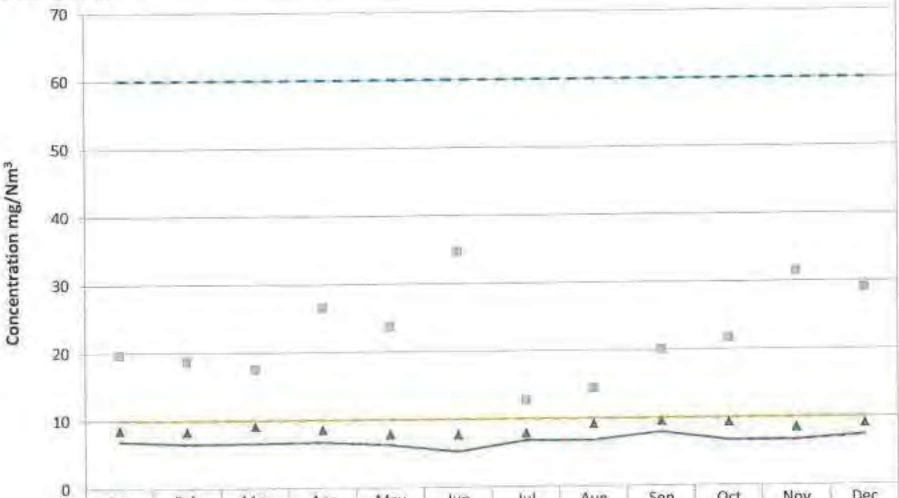
* = delete or amend as appropriate

Comments :

Monitoring of Hydrogen Chloride emissions   Whole Installation   *See Notes in Cell Q3*

mg/Nm³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly HCl ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily HCl ELV	Monthly daily mean	Highest daily maximum
Jan	60	7.0	19.7	10	7.0	8.6
Feb	60	6.6	18.8	10	6.5	8.4
Mar	60	6.6	17.6	10	6.7	9.2
Apr	60	6.8	26.6	10	6.7	8.6
May	60	6.3	23.8	10	6.3	7.9
Jun	60	5.3	34.7	10	5.2	7.8
Jul	60	6.9	12.8	10	6.8	7.9
Aug	60	6.8	14.5	10	6.8	9.2
Sep	60	8.0	20.1	10	7.9	9.6
Oct	60	6.7	21.8	10	6.7	9.3
Nov	60	6.7	31.5	10	6.6	8.5
Dec	60	7.4	29.0	10	7.3	9.1

Oxides of Nitrogen emissions



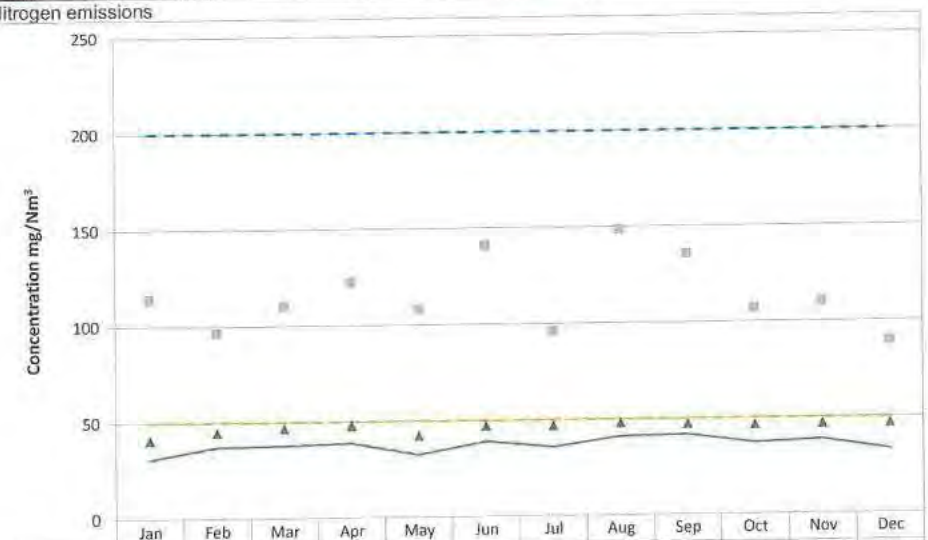
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly HCl ELV	60	60	60	60	60	60	60	60	60	60	60	60
Monthly 1/2 hourly mean	7.0	6.6	6.6	6.8	6.3	5.3	6.9	6.8	8.0	6.7	6.7	7.4
Highest 1/2 hourly maximum	19.7	18.8	17.6	26.6	23.8	34.7	12.8	14.5	20.1	21.8	31.5	29.0
Daily HCl ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	7.0	6.5	6.7	6.7	6.3	5.2	6.8	6.8	7.9	6.7	6.6	7.3
Highest daily maximum	8.6	8.4	9.2	8.6	7.9	7.8	7.9	9.2	9.6	9.3	8.5	9.1

Comments :

Monitoring of Sulphur dioxide emissions   Whole Installation   *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	**1/2 hourly SO2 ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily SO2 ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	200	31.1	114.3	50	31.0	41.0
Feb	200	37.3	96.9	50	37.0	44.9
Mar	200	37.7	110.5	50	37.9	46.9
Apr	200	38.8	122.8	50	39.0	47.9
May	200	32.5	108.3	50	32.7	42.6
Jun	200	39.1	141.0	50	39.0	47.2
Jul	200	35.8	96.3	50	35.9	46.9
Aug	200	41.0	148.7	50	41.0	48.0
Sep	200	41.6	135.8	50	41.6	47.2
Oct	200	37.2	107.0	50	37.2	46.6
Nov	200	38.7	110.3	50	38.7	46.7
Dec	200	33.3	89.6	50	33.2	46.9

Oxides of Nitrogen emissions



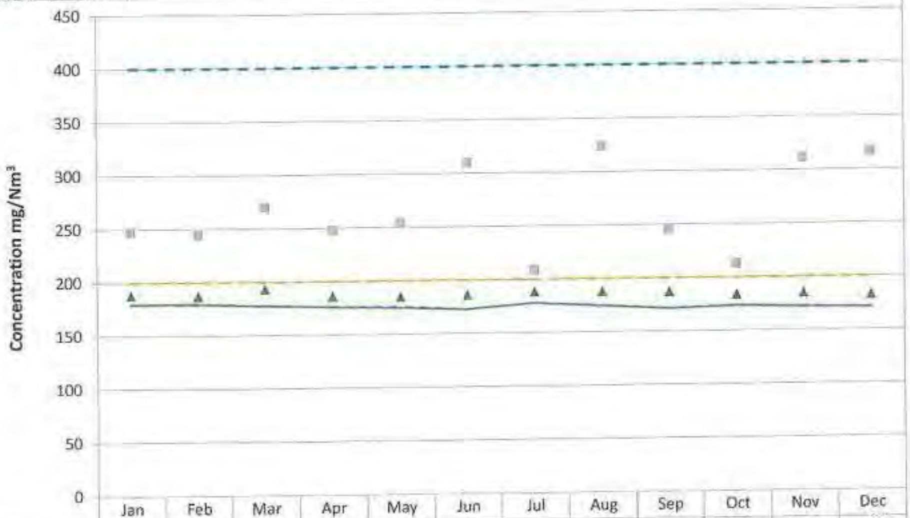
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly SO2 ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly 1/2 hourly mean	31.1	37.3	37.7	38.8	32.5	39.1	35.8	41.0	41.6	37.2	38.7	33.3
Highest 1/2 hourly maximum	114.3	96.9	110.5	122.8	108.3	141.0	96.3	148.7	135.8	107.0	110.3	89.6
Daily SO2 ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	31.0	37.0	37.9	39.0	32.7	39.0	35.9	41.0	41.6	37.2	38.7	33.2
Highest daily maximum	41.0	44.9	46.9	47.9	42.6	47.2	46.9	48.0	47.2	46.6	46.7	46.9

Comments :

Monitoring of Oxides of Nitrogen emissions Whole Installation *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	**1/2 hourly NOx ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily NOx ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	400	179.6	247.2	200	179.6	188.3
Feb	400	179.6	244.4	200	179.2	187.2
Mar	400	177.6	270.1	200	177.6	193.4
Apr	400	176.1	247.6	200	176.1	185.8
May	400	174.8	254.1	200	175.6	185.0
Jun	400	172.6	309.7	200	172.7	186.1
Jul	400	177.9	208.9	200	177.8	188.2
Aug	400	174.6	323.8	200	174.8	188.0
Sep	400	171.6	245.2	200	171.6	186.9
Oct	400	173.6	212.4	200	173.5	183.9
Nov	400	172.0	311.4	200	172.2	184.9
Dec	400	171.1	316.9	200	170.8	182.7

Oxides of Nitrogen emissions



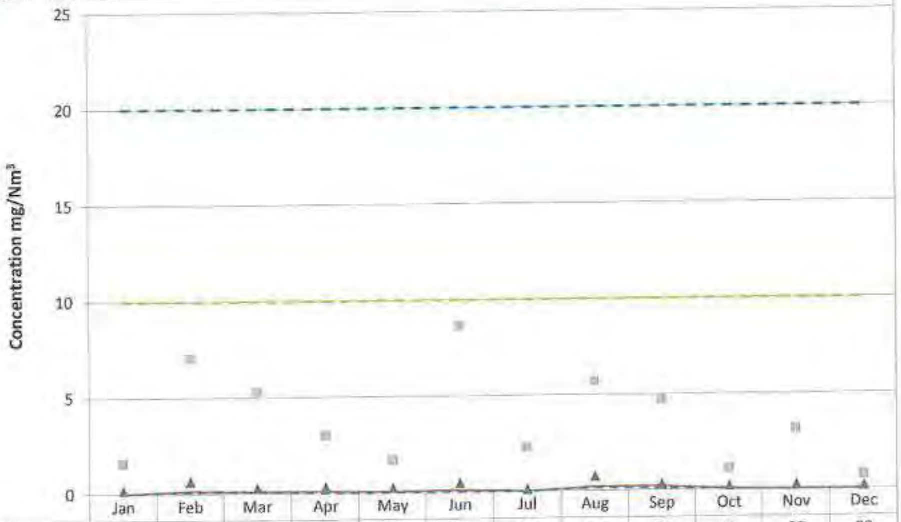
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly NOx ELV	400	400	400	400	400	400	400	400	400	400	400	400
Monthly 1/2 hourly mean	179.6	179.6	177.6	176.1	174.8	172.6	177.9	174.6	171.6	173.6	172.0	171.1
Highest 1/2 hourly maximum	247.2	244.4	270.1	247.6	254.1	309.7	208.9	323.8	245.2	212.4	311.4	316.9
Daily NOx ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly daily mean	179.6	179.2	177.6	176.1	175.6	172.7	177.8	174.8	171.6	173.5	172.2	170.8
Highest daily maximum	188.3	187.2	193.4	185.8	185.0	186.1	188.2	188.0	186.9	183.9	184.9	182.7

Comments :

Monitoring of Total organic carbon emissions | Whole Installation | *See Notes in Cell Q3*

mg/Nm³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly TOC ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily TOC ELV	Monthly daily mean	Highest daily maximum
Jan	20	0.0	1.6	10	0.0	0.2
Feb	20	0.2	7.1	10	0.1	0.7
Mar	20	0.1	5.3	10	0.1	0.3
Apr	20	0.1	3.0	10	0.0	0.3
May	20	0.1	1.7	10	0.0	0.3
Jun	20	0.1	8.7	10	0.0	0.5
Jul	20	0.0	2.3	10	0.0	0.1
Aug	20	0.2	5.7	10	0.2	0.8
Sep	20	0.2	4.8	10	0.1	0.3
Oct	20	0.1	1.1	10	0.1	0.2
Nov	20	0.0	3.2	10	0.0	0.3
Dec	20	0.0	0.8	10	0.0	0.2

Oxides of Nitrogen emissions



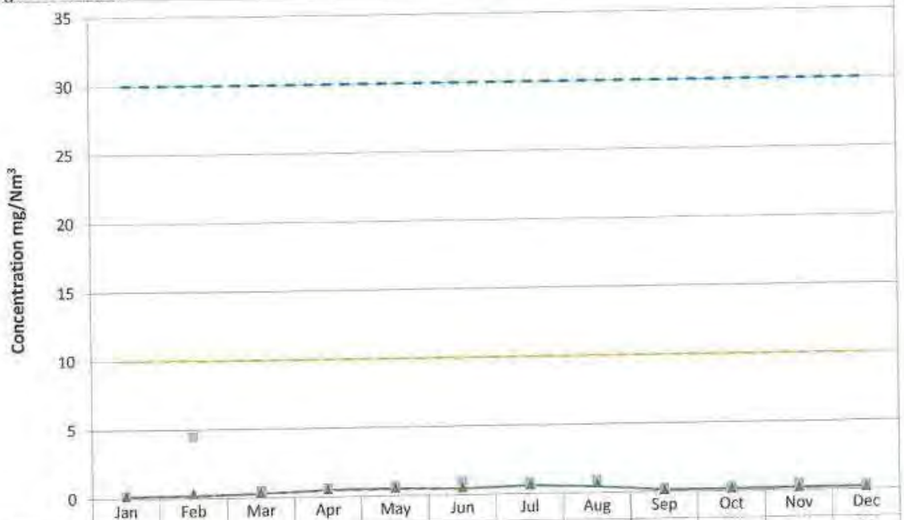
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly TOC ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hourly mean	0.0	0.2	0.1	0.1	0.1	0.1	0.0	0.2	0.2	0.1	0.0	0.0
Highest 1/2 hourly maximum	1.6	7.1	5.3	3.0	1.7	8.7	2.3	5.7	4.8	1.1	3.2	0.8
Daily TOC ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0
Highest daily maximum	0.2	0.7	0.3	0.3	0.3	0.5	0.1	0.8	0.3	0.2	0.3	0.2

Comments :

Monitoring of Particulate matter emissions Whole Installation *See Notes in Cell Q3*

mg/Nm³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly PM ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily PM ELV	Monthly daily mean	Highest daily maximum
Jan	30	0.2	0.2	10	0.2	0.2
Feb	30	0.2	4.5	10	0.2	0.4
Mar	30	0.3	0.5	10	0.3	0.4
Apr	30	0.5	0.7	10	0.5	0.6
May	30	0.6	0.7	10	0.5	0.6
Jun	30	0.5	1.0	10	0.5	0.6
Jul	30	0.6	0.9	10	0.6	0.7
Aug	30	0.5	1.0	10	0.5	0.7
Sep	30	0.2	0.3	10	0.2	0.2
Oct	30	0.2	0.3	10	0.2	0.2
Nov	30	0.2	0.5	10	0.2	0.2
Dec	30	0.2	0.3	10	0.2	0.2

Oxides of Nitrogen emissions



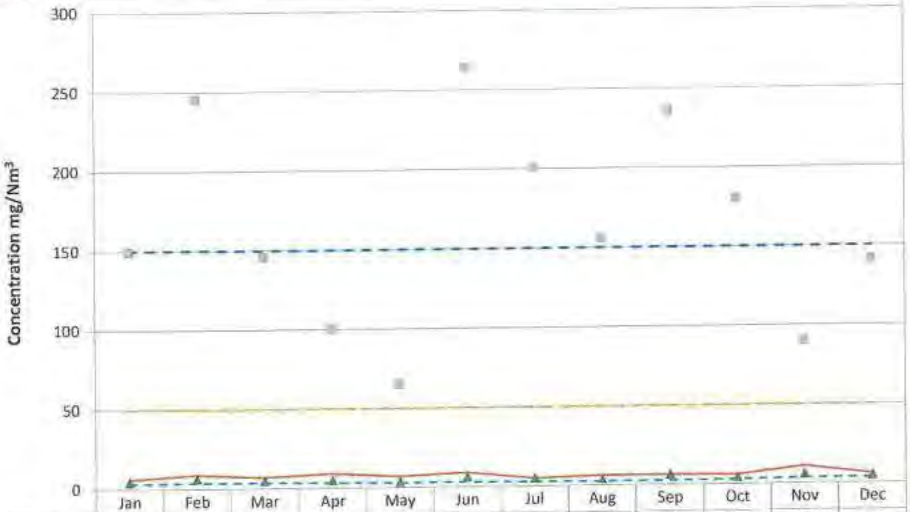
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly PM ELV	30	30	30	30	30	30	30	30	30	30	30	30
Monthly 1/2 hourly mean	0.2	0.2	0.3	0.5	0.6	0.5	0.6	0.5	0.2	0.2	0.2	0.2
Highest 1/2 hourly maximum	0.2	4.5	0.5	0.7	0.7	1.0	0.9	1.0	0.3	0.3	0.5	0.3
Daily PM ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.2	0.2	0.3	0.5	0.5	0.5	0.6	0.5	0.2	0.2	0.2	0.2
Highest daily maximum	0.2	0.4	0.4	0.6	0.6	0.6	0.7	0.7	0.2	0.2	0.2	0.2

Comments :

Monitoring of Carbon Monoxide (10-minute avg) Whole Installation *See Notes in Cell S3*

mg/Nm³	10-minute Reference Periods				Daily Reference Periods		
2019	95%ile 10-min avg CO ELV	95%ile 10-min avg maximum	Monthly CO 10-min avg mean	10-min avg maximum	Daily CO ELV	Monthly daily mean	Highest daily maximum
Jan	150	5.9	3.3	149.2	50	3.3	4.4
Feb	150	8.8	3.6	245.3	50	3.6	6.4
Mar	150	7.2	3.8	145.7	50	3.7	5.1
Apr	150	9.3	3.4	100.3	50	3.3	4.8
May	150	7.1	3.1	65.3	50	3.0	3.9
Jun	150	9.1	3.1	264.0	50	3.1	6.3
Jul	150	4.9	2.8	200.6	50	2.7	4.8
Aug	150	6.3	2.7	155.9	50	2.6	4.1
Sep	150	6.4	2.7	236.0	50	2.7	6.5
Oct	150	6.1	3.0	180.4	50	2.9	4.5
Nov	150	11.2	3.7	90.1	50	3.6	5.9
Dec	150	6.0	3.7	141.3	50	3.7	4.9

Oxides of Nitrogen emissions

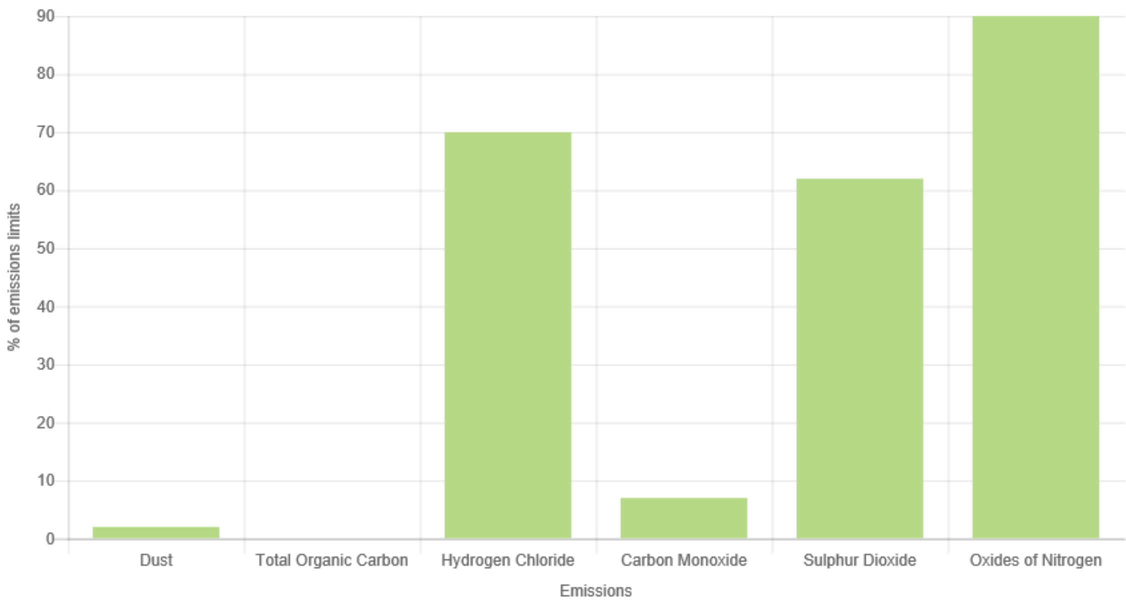


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
95%ile 10-min avg CO ELV	150	150	150	150	150	150	150	150	150	150	150	150
95%ile 10-min avg maximum	5.9	8.8	7.2	9.3	7.1	9.1	4.9	6.3	6.4	6.1	11.2	6.0
10-min avg maximum	149.2	245.3	145.7	100.3	65.3	264.0	200.6	155.9	236.0	180.4	90.1	141.3
Daily CO ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	3.3	3.6	3.7	3.3	3.0	3.1	2.7	2.6	2.7	2.9	3.6	3.7
Highest daily maximum	4.4	6.4	5.1	4.8	3.9	6.3	4.8	4.1	6.5	4.5	5.9	4.9

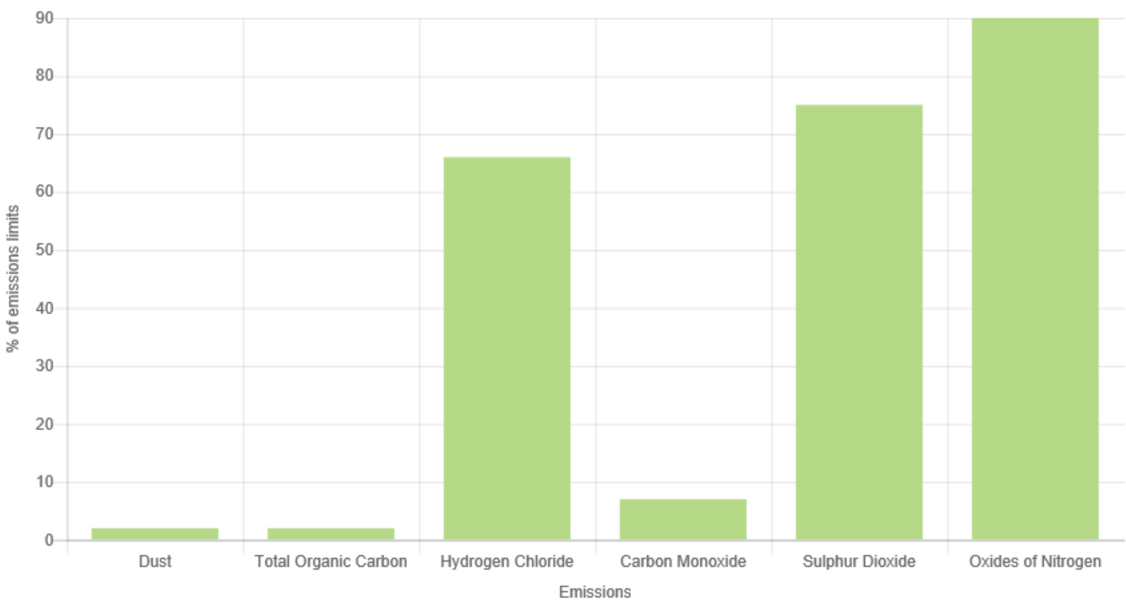
Comments :
Environment Agency explanatory note: The 10-minute average ELV is based on the "95th percentile". In this case this means that 95% of the 10 minute averages in the relevant 24-hour period (i.e. 137) must be below 150 mg/Nm3, and 5% (i.e. 7) are allowed to be any value above 150 mg/Nm3. Whilst we expect operators to minimise CO emissions at all times, it is perfectly acceptable for the value of the maximum 10-minute average to be above 150 mg/Nm3, provided the 95th percentile ELV has been met for that period.

2. Publicly reported continuously monitored emissions reports

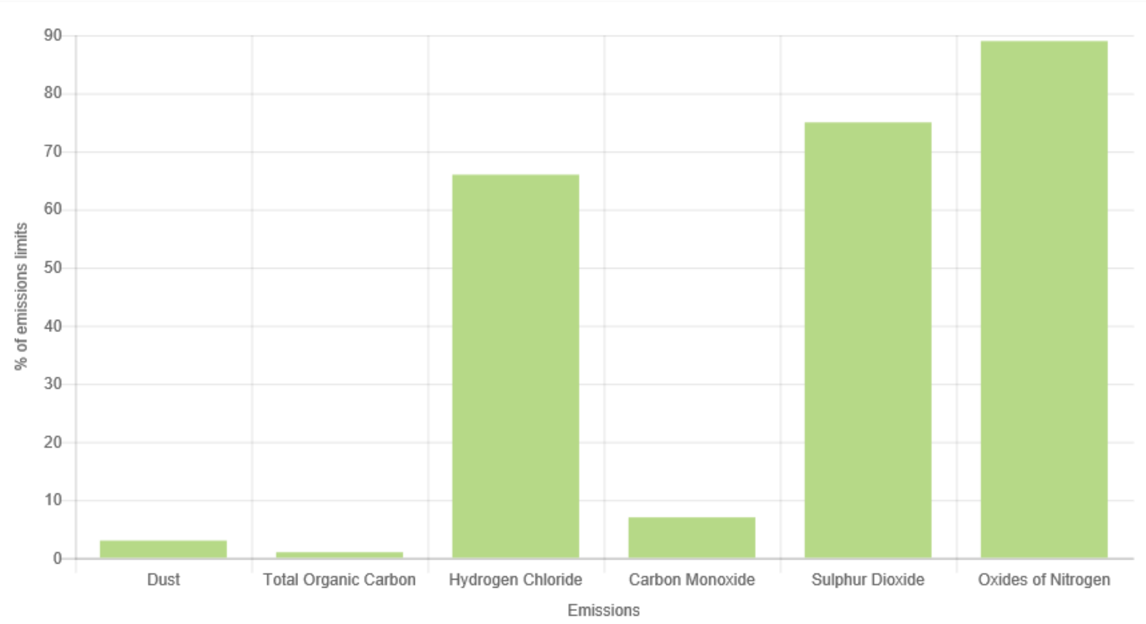
January 2019 Average Daily Emissions



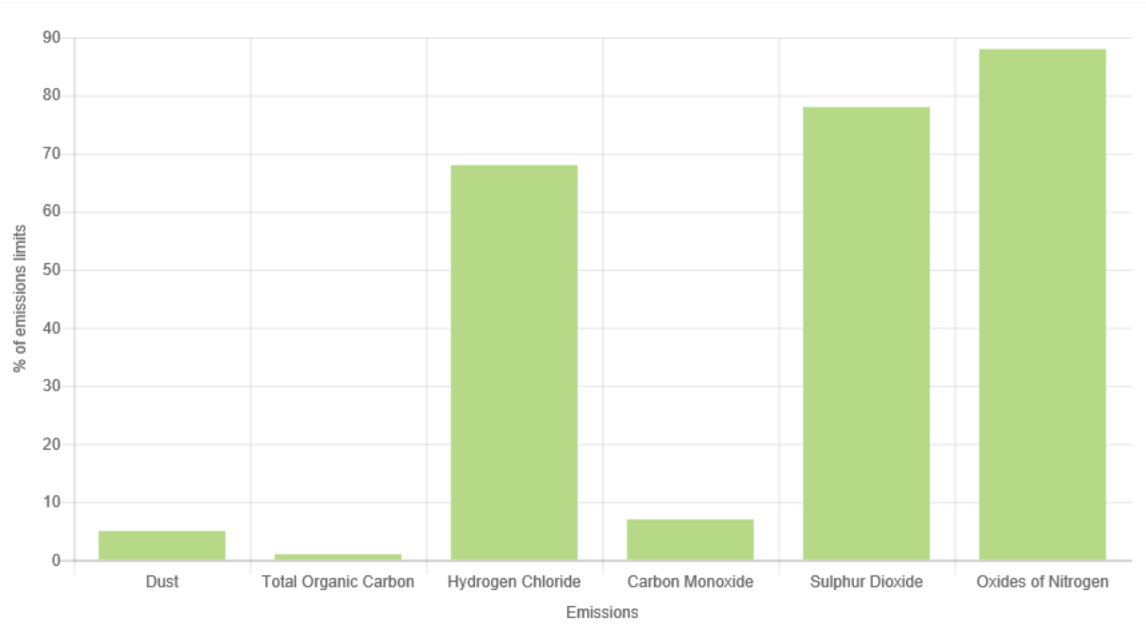
February 2019 Average Daily Emissions



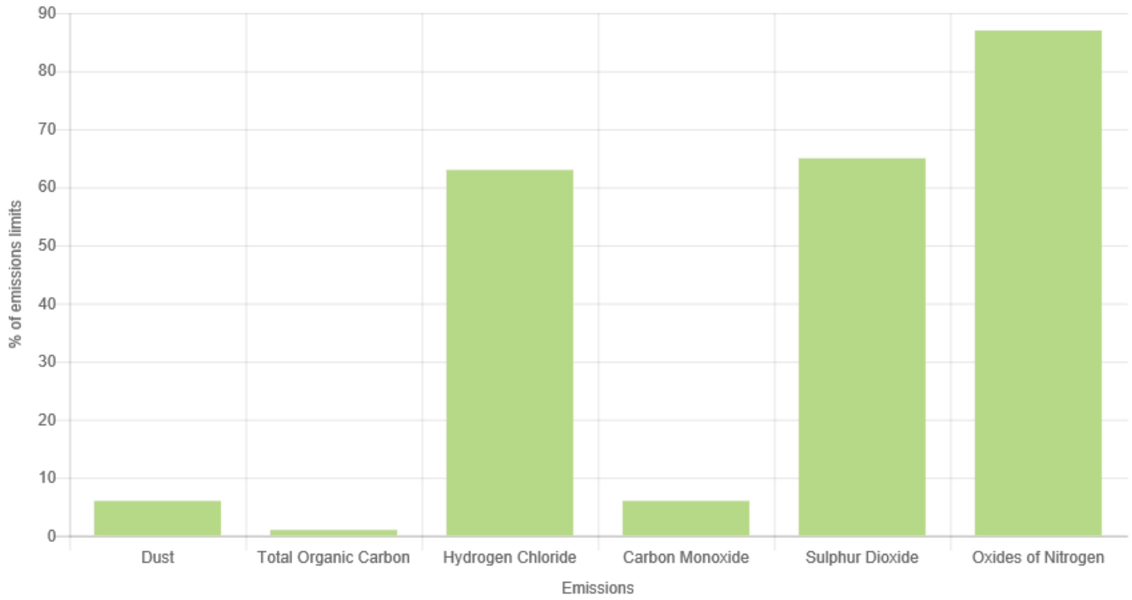
March 2019 Average Daily Emissions



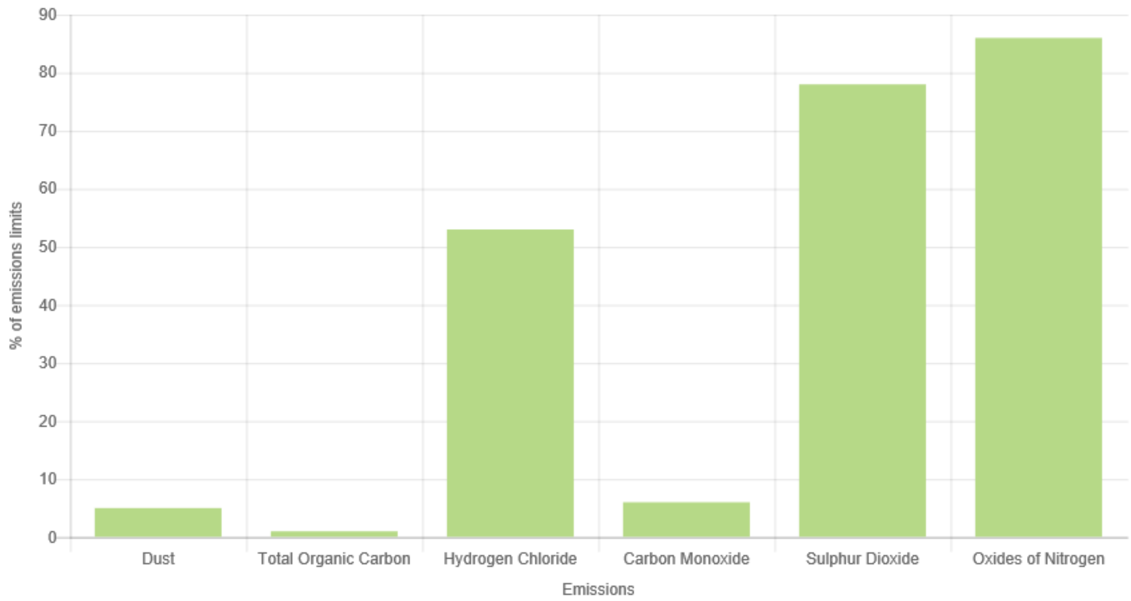
April 2019 Average Daily Emissions



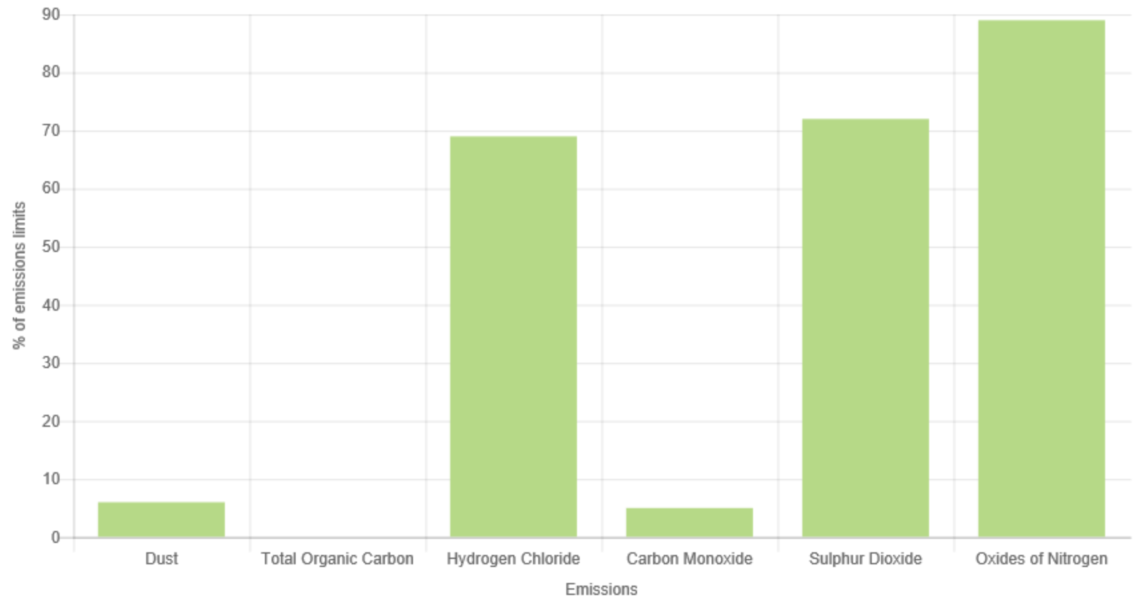
May 2019 Average Daily Emissions



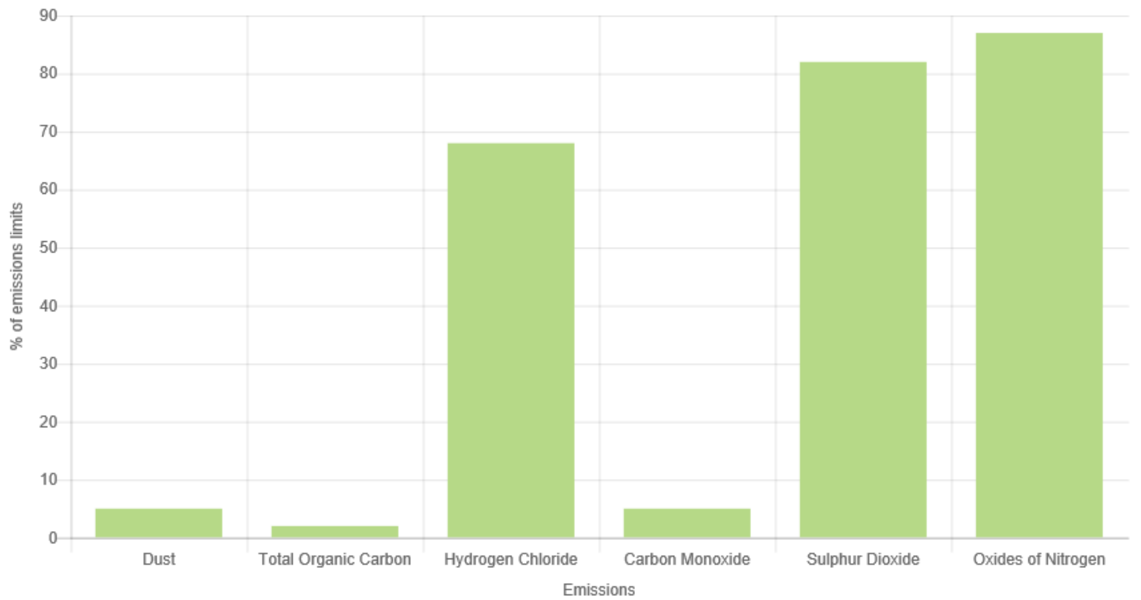
June 2019 Average Daily Emissions



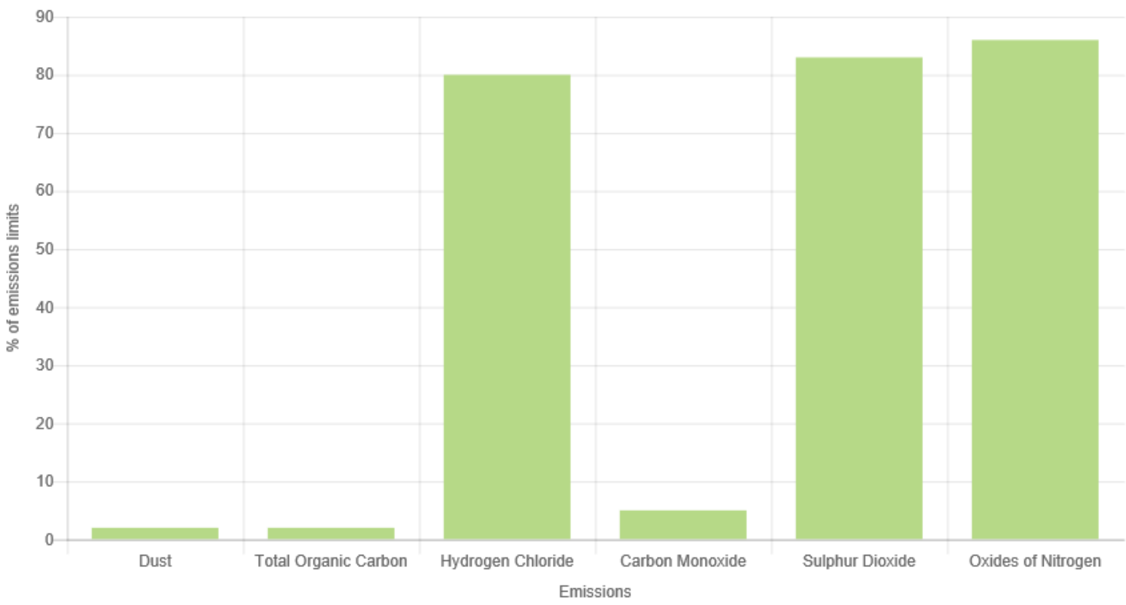
July 2019 Average Daily Emissions



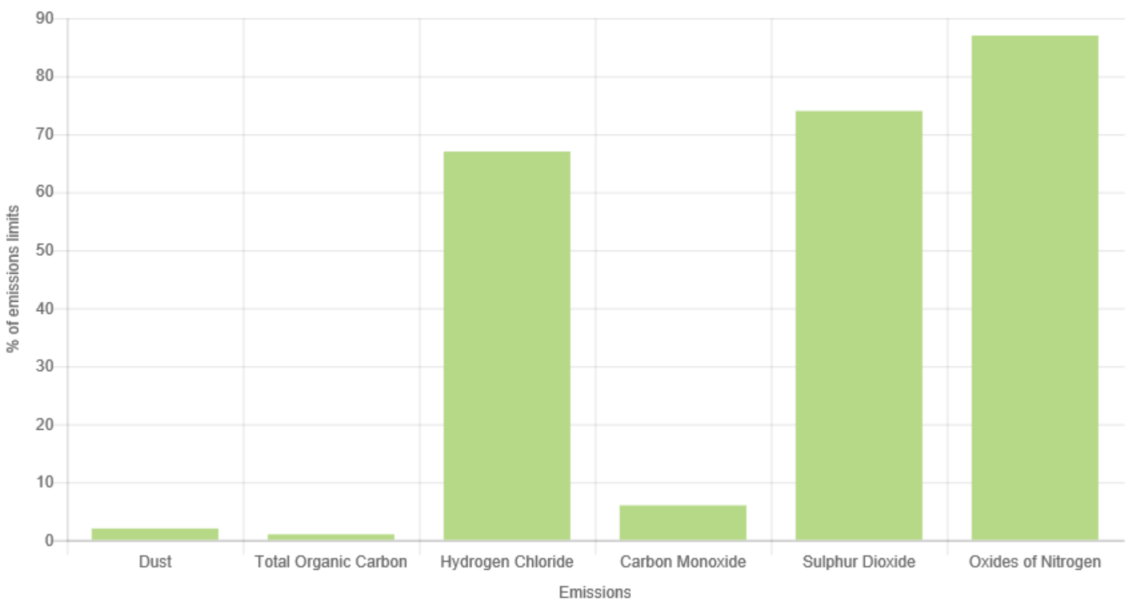
August 2019 Average Daily Emissions



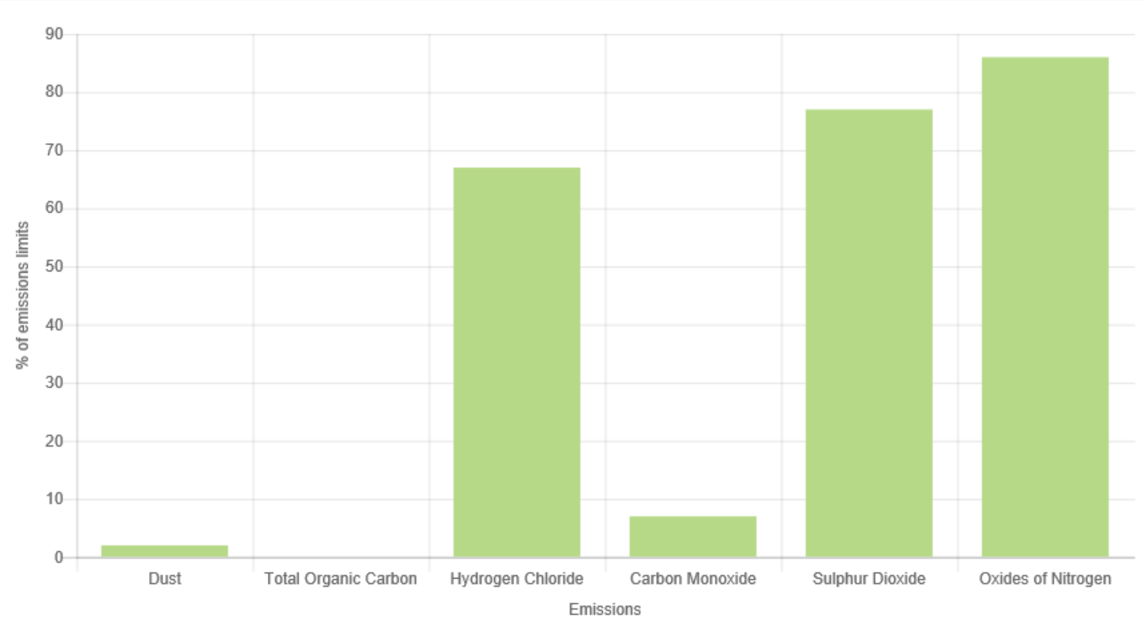
September 2019 Average Daily Emissions



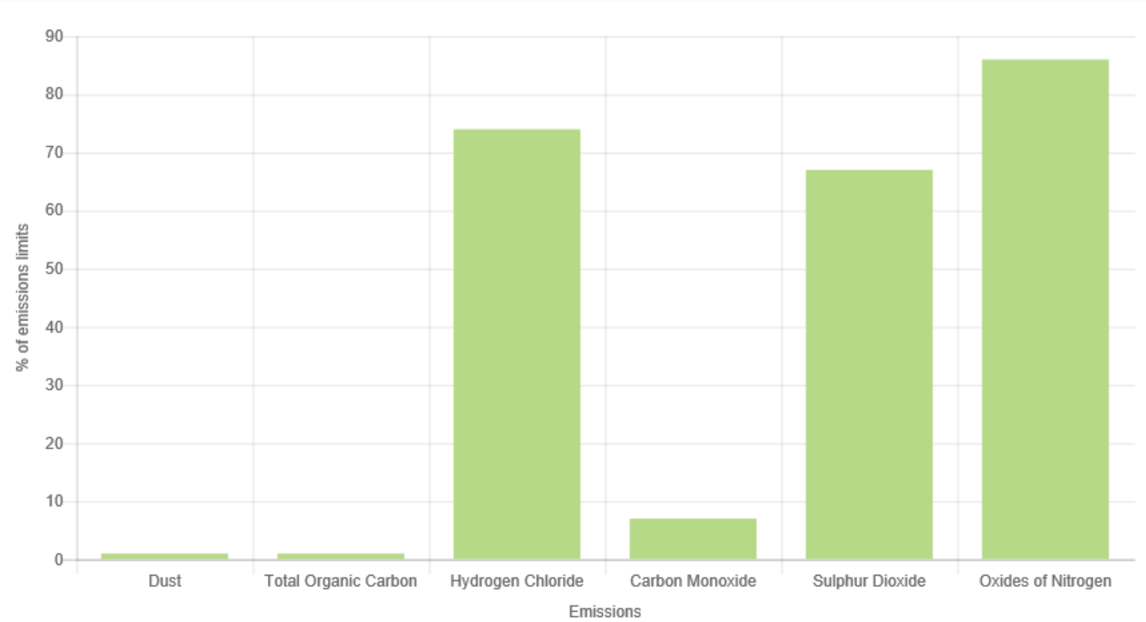
October 2019 Average Daily Emissions



November 2019 Average Daily Emissions

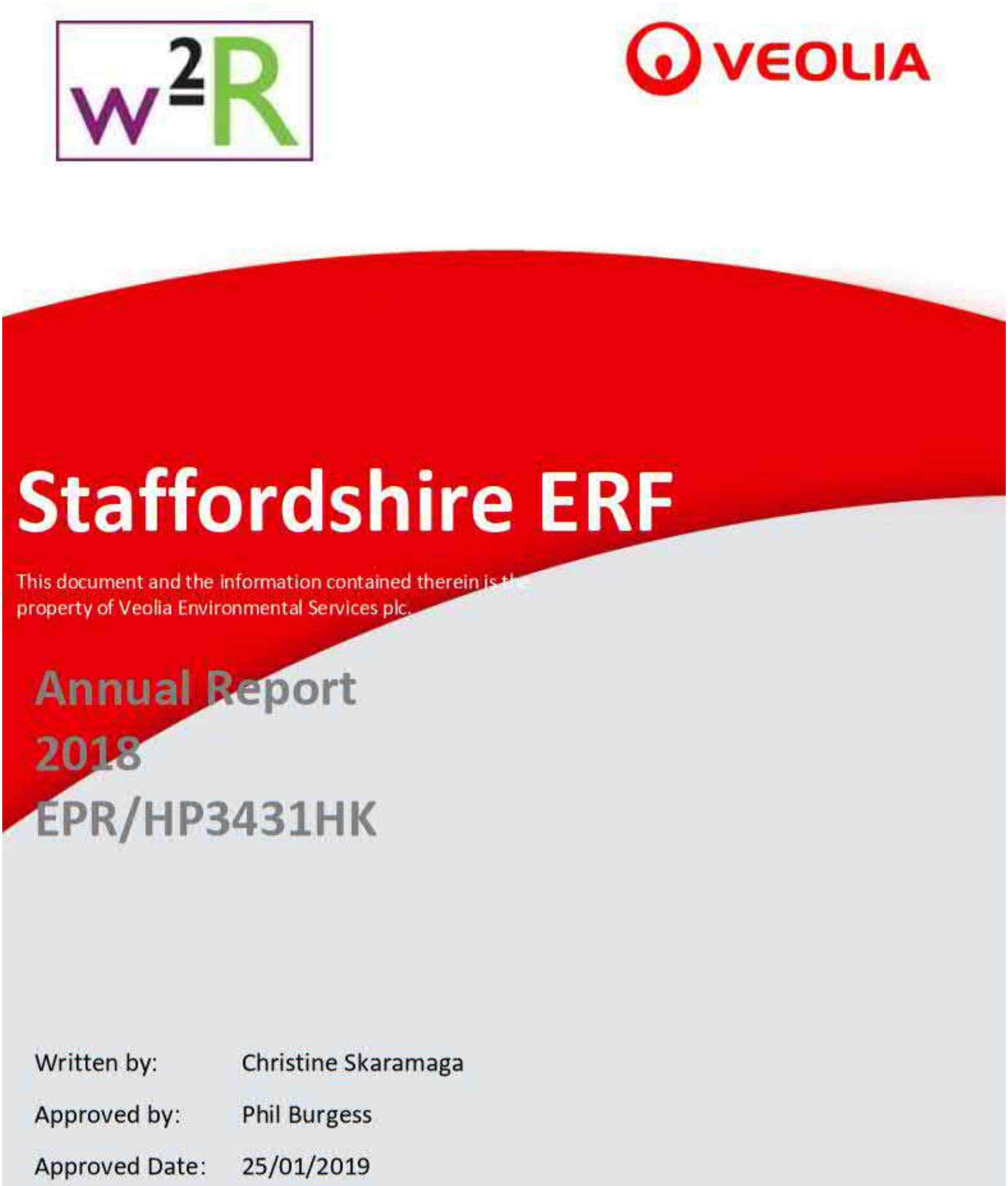


December 2019 Average Daily Emissions



G.3 2018 Emissions

1. <u>Extracts of Emissions Information from Staffordshire Annual Performance Report 2018</u>



Staffordshire ERF

This document and the information contained therein is the property of Veolia Environmental Services plc.

Annual Report
2018
EPR/HP3431HK

Written by: Christine Skaramaga

Approved by: Phil Burgess

Approved Date: 25/01/2019

4. EMISSIONS TO AIR

All gaseous emissions generated during the combustion process pass through an extensive flue gas cleaning process which starts in the boiler directly above the furnace with injected ammonia to reduce the levels of oxides of nitrogen. After the boiler, super heater and economiser the gases are cooled to approximately 150 degrees centigrade. Activated carbon is added to remove metals and dioxins, and lime is added to remove acidic gases such as SO_2 and HCL. Most of this reaction occurs in the bag filters where particulates are removed and APCr is formed. There is a recirculation of APC where the used lime and carbon is recirculated further to remove chlorinated gases via a recirculation silo. This secondary reactant is recirculated back to the original process via a lab loop. The cleaned gasses are finally released into the atmosphere through the chimney after the bag house.

In compliance with the IED and EPR Permit, the flue gasses are continuously monitored using MCERTS accredited equipment. In addition to the continuous monitoring, an extractive sampling campaign is undertaken on a quarterly basis by an approved service supplier. The organisation used for analysis and monitoring are accredited by the United Kingdom Accreditation Service (UKAS) and the Environment Agency's Monitoring Certification Scheme (MCERTS).

The parameters measured and their frequency of monitoring are summarised below.

Parameters	Continuous	Jan – Jun	Jul – Dec
Particulate Matter	✓		
TOC	✓		
Hydrogen Chloride	✓		
Oxides of Nitrogen	✓		
Carbon Monoxide	✓		
Sulphur Dioxides	✓		
Ammonia	✓		
Nitrous Oxide		✓	✓
Hydrogen Fluoride		✓	✓
Mercury		✓	✓
Arsenic		✓	✓
Cadmium		✓	✓
Chromium		✓	✓
Copper		✓	✓
Cobalt		✓	✓
Nickel		✓	✓
Manganese		✓	✓
Antinomy		✓	✓
Lead		✓	✓
Thallium		✓	✓
Vanadium		✓	✓
Dioxins and Furans		✓	✓
Dioxin-like PCBs		✓	✓
PAHs		✓	✓

4.1 Continuous Emissions

Through the process there is continuous emissions monitoring of six main pollutants with ELVs using MCERTS approved instruments. The pollutants measured in this way comprise: particulates, total organic carbon, carbon monoxide, sulphur dioxide and oxides of nitrogen.

Each pollutant has its own Emission Limit Value (ELV). A summary is shown below.

Pollutant	Chemical Symbol	ELV	Measurement	Monitoring Standard
Particulates	PMx	30mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		10mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Total Organic Carbon	TOC	20mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		10mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Hydrogen Chloride	HCL	60mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		10mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Carbon Monoxide	CO	150mg/m3	10 minute average	BS EN 14181 and BS EN 15267-3
		50mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Sulphur Dioxide	SO2	200mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		50mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Oxides of Nitrogen	NO and NO2 as NOX	400mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		200mg/m3	daily average	BS EN 14181 and BS EN 15267-3

A summary of the continuous emissions can be seen below for 2018 for average daily figures per month:

Stream 1 **Monthly mean**

	ELV	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dust	10	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2
Total Organic Carbon	10	0.1	0.1	0.1	0	0.1	0.1	0.1	0.1	0	0	0.1	0.1
Hydrogen Chloride	10	7	7.2	7.4	6.5	6.7	5.1	6.6	7.5	7.8	7.6	6.4	7.4
Carbon Monoxide	50	3.9	6.1	5.7	5.1	3.8	3.1	4	5.3	4.7	5	5.4	5.8
Sulphur Dioxide	50	26.5	31	29	29.9	23	28.4	22.9	25.7	28.3	31.5	36.4	33.2
Oxides of Nitrogen	200	155.4	156.1	160.8	161.8	164.4	167.7	167.6	169.8	170.7	177.5	169.8	161.7

Stream 2 **Monthly mean**

	ELV	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dust	10	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1
Total Organic Carbon	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0.1	0
Hydrogen Chloride	10	6.2	6.4	6.4	6.6	5.6	5.7	7.1	7.7	6.8	6.7	5.3	6.4
Carbon Monoxide	50	2.7	4.5	4.4	3.9	3.3	3.3	2.8	3.6	4.2	4.1	4.6	4.2
Sulphur Dioxide	50	25.8	32.3	26.5	31	27.6	31.3	27.9	29.9	31.2	35	37.6	35.7
Oxides of Nitrogen	200	152.3	154.9	161.7	166.5	167.8	173.3	173.7	176.7	177.3	182.9	178.5	179.3

An interpretation shows that the emission levels are consistently stable from month to month. This data is communicated monthly to the public via our Veolia website in terms of a percentage of each ELV. A more detailed IED report is sent to the EA each month showing emissions per pollutant per line, per month in terms of half hourly averages and daily averages.

4.2 Extractive Sampling

Typically these pollutants are far harder to measure and are only present in very low concentrations so are taken from the stack using appropriate methodologies.

Extractive testing data is shown in Appendix B.

An interpretation of the data shows that the extractive samples are an order of magnitude below the prescribed limits in the permit.

4.3 Annual Mass Emissions

CEMS gas mass emissions are calculated by the MCERT Software developed by Envirosoft. These are shown in Appendix B.

An interpretation of the CEMS Mass Emission is that there is generally a steady state of control. Extractive mass emissions are calculated by using CEMS data and extractive results.

Annual Mass Emissions		
Parameter	Units	Annual Total
Hydrogen Fluoride	Kg	247.9
Mercury	Kg	1.8
Arsenic	Kg	1.0
Cadmium	Kg	1.2
Chromium	Kg	3.1
Copper	Kg	4.8
Nickel	Kg	4.3
Manganese	Kg	7.9
Antimony	Kg	1.6
Lead	Kg	2.8
Thallium	Kg	1.0
Dioxins and Furans*	Kg	0.00003
PAHs	Kg	0.9
PCBs*	Kg	0.0007
Cobalt	Kg	1.0
Vanadium	Kg	1.0

*Measured concentrations were used to derive these mass emissions ie NOT converted to toxic equivalence first. Non-detects included

APPENDIX A

Permit Number: ERR/HP3431HK Operator: Veolia ES Staffordshire Ltd
Facility: Staffordshire ERF Form Number: Air7 / 01/01/2012
Reporting of periodically monitored emissions to air for the period from 01/01/18 to 30/06/18

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result [1]	Test Method	Result Date and Time [2]	Uncertainty [3]
A1 & A2	Hydrogen fluoride	2 mg/m³	Periodic over minimum 1-hour period	A1: 0.02 mg/m³ A2: 0.03 mg/m³	BS ISO 15713	A1: 9/03/2018 7:25 – 8:25 A2: 7/03/2018 12:15 – 13:15	14% 14%
A1 & A2	Cadmium & thallium and their compounds (total)	0.05 mg/m³	over minimum 30 minute, maximum 8 hour period	A1: 0.0011 mg/m³ A2: 0.0011 mg/m³	BS EN 14385	A1: 9/03/2018 7:30 – 9:32 A2: 8/03/2018 9:15 – 11:21	8% 8%
A1 & A2	Mercury and its compounds	0.05 mg/m³	over minimum 30 minute, maximum 8 hour period	A1: 0.0012 mg/m³ A2: 0.00083 mg/m³	BS EN 14385	A1: 9/03/2018 7:30 – 9:32 A2: 8/03/2018 9:15 – 11:21	14% 14%
A1 & A2	Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m³	over minimum 30 minute, maximum 8 hour period	A1: 0.02 mg/m³ A2: 0.014 mg/m³	BS EN 14385	A1: 9/03/2018 7:30 – 9:32 A2: 8/03/2018 9:15 – 11:21	8% 4%
A1 & A2	N_2O	N/A	Periodic Over minimum 1-hour period	A1: 0.31 mg/m³ A2: 0.32 mg/m³	EA TGN M22	A1: 6/03/2018 12:30-13:30 A2: 7/03/2018 12:30-13:30	8% 8%
A1 & A2	Dioxins / Furans (I-TEQ)	0.1 ng/m³	over minimum 6 hour period, maximum 8 hour period	A1: 0.013-0.015 ng/m³ A2: 0.011-0.014 ng/m³	BS EN 1948	A1: 6/03/2018 7:45 – 14:26 A2: 7/03/2018 7:30 – 13:33	15% 14%
A1 & A2	Dioxin-like PCBs (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.0032-0.0032 ng/m³ A2: 0.0025-0.0025 ng/m³	BS EN 1948	A1: 6/03/2018 7:45 – 14:26 A2: 7/03/2018 7:30 – 13:33	21% 21%
A1 & A2	Dioxin-like PCBs (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.00018-0.00018 ng/m³ A2: 0.00014-0.00014 ng/m³	BS EN 1948	A1: 6/03/2018 7:45 – 14:26 A2: 7/03/2018 7:30 – 13:33	19% 19%
A1 & A2	Dioxin-like PCBs (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.011-0.011 ng/m³ A2: 0.0065-0.0065 ng/m³	BS EN 1948	A1: 6/03/2018 7:45 – 14:26 A2: 7/03/2018 7:30 – 13:33	13% 13%
A1 & A2	Dioxins / furans (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.013-0.017 ng/m³ A2: 0.011-0.016 ng/m³	BS EN 1948	A1: 6/03/2018 7:45 – 14:26 A2: 7/03/2018 7:30 – 13:33	16% 15%
A1 & A2	Dioxins / furans (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.012-0.016 ng/m³ A2: 0.0084-0.014 ng/m³	BS EN 1948	A1: 6/03/2018 7:45 – 14:26 A2: 7/03/2018 7:30 – 13:33	17% 17%
A1 & A2	Dioxins / furans (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.023-0.026 ng/m³ A2: 0.02-0.025 ng/m³	BS EN 1948	A1: 6/03/2018 7:45 – 14:26 A2: 7/03/2018 7:30 – 13:33	18% 17%

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result [1]	Test Method	Result Date and Time [2]	Uncertainty [3]
A1 & A2	Poly-cyclic aromatic hydrocarbons (PAHs) Total	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.42 $\mu g/m^3$ A2: 0.63 $\mu g/m^3$	BS ISO 11338-1 and BS ISO 11338-2	12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	14% 15%
A1 & A2	Anthanthrene	No limit applies		A1: 0.012 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	>100% >100%
A1 & A2	Benzo{a}anthracene	No limit applies		A1: 0.012 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	>100% >100%
A1 & A2	Benzo[b]fluoranthene	No limit applies		A1: 0.012 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	>100% >100%
A1 & A2	Benzo[k]fluoranthene	No limit applies		A1: 0.012 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	>100% >100%
A1 & A2	Benzo[b]naph(2,1-d)thiophene	No limit applies		A1: 0.012 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	>100% >100%
A1 & A2	Benzo[c]phenanthrene	No limit applies		A1: 0.012 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	>100% >100%
A1 & A2	Benzo[ghi]perylene	No limit applies		A1: 0.012 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	>100% >100%
A1 & A2	Benzo[a]pyrene	No limit applies		A1: 0.012 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	>100% >100%
A1 & A2	Cholanthrene	No limit applies		A1: 0.012 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	>100% >100%
A1 & A2	Chrysene	No limit applies		A1: 0.012 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	>100% >100%
A1 & A2	Cyclopenta(c,d)pyrene	No limit applies		A1: 0.012 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	>100% >100%
A1 & A2	Dibenzo[ah]anthracene	No limit applies		A1: 0.012 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	>100% >100%
A1 & A2	Dibenzo[a,l]pyrene	No limit applies		A1: 0.012 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	>100% >100%
A1 & A2	Fluoranthene	No limit applies		A1: 0.047 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	18% >100%
A1 & A2	Indo[1,2,3-cd]pyrene	No limit applies		A1: 0.012 $\mu g/m^3$ A2: 0.013 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	>100% >100%
A1 & A2	Naphthalene	No limit applies		A1: 0.21 $\mu g/m^3$ A2: 0.43 $\mu g/m^3$		12/03/18 7:10 – 13:11 8/03/18 7:20 – 13:21	18% 18%

[1] For dioxins and dioxin-like PCBs, the result are to be reported as a range based on: All congeners less than the detection limit assumed to be zero as a minimum, and all congeners less than the detection limit assumed to be at the detection limit as a maximum

[2] The date and time of the sample that produced the result is given.

[3] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Signed .... Date 17/7/18 (authorised to sign as representative of Operator)

Permit Number: ERR/HP3431HK Operator: Veolia ES Staffordshire Ltd
Facility: Staffordshire ERF Form Number: Air7 / 01/01/2012
Reporting of periodically monitored emissions to air for the period from 01/07/18 to 31/12/18

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result [1]	Test Method	Result Date and Time [2]	Uncertainty [3]
A1 & A2	Hydrogen fluoride	2 mg/m^3	Periodic over minimum 1-hour period	A1: 0.08 mg/m^3 A2: 0.38 mg/m^3	BS ISO 15713	A1: 13/09/2018 8:00 – 9:00 A2: 12/09/2018 9:00 – 10:00	14% 14%
A1 & A2	Cadmium & thallium and their compounds (total)	0.05 mg/m^3	over minimum 30 minute, maximum 8 hour period	A1: 0.0018 mg/m^3 A2: 0.0012 mg/m^3	BS EN 14385	A1: 14/09/2018 7:15 – 9:16 A2: 14/09/2018 9:50 – 11:51	10% 8%
A1 & A2	Mercury and its compounds	0.05 mg/m^3	over minimum 30 minute, maximum 8 hour period	A1: 0.0012 mg/m^3 A2: 0.00078 mg/m^3	BS EN 14385	A1: 14/09/2018 7:15 – 9:16 A2: 14/09/2018 9:50 – 11:51	15% 14%
A1 & A2	Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m^3	over minimum 30 minute, maximum 8 hour period	A1: 0.017 mg/m^3 A2: 0.01 mg/m^3	BS EN 14385	A1: 14/09/2018 7:15 – 9:16 A2: 14/09/2018 9:50 – 11:51	5% 4%
A1 & A2	N_2O	N/A	Periodic Over minimum 1-hour period	A1: 0.74 mg/m^3 A2: 0.22 mg/m^3	EA TGN M22	A1: 13/09/2018 11:00-12:00 A2: 12/09/2018 11:00-12:00	10% 10%
A1 & A2	Dioxins / Furans (I-TEQ)	0.1 ng/m^3	over minimum 6 hour period, maximum 8 hour period	A1: 0.013-0.017 ng/m^3 A2: 0.012-0.013 ng/m^3	BS EN 1948	A1: 13/09/2018 7:15 – 13:18 A2: 12/09/2018 7:20 – 13:23	13% 13%
A1 & A2	Dioxin-like PCBs (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.0045-0.0045 ng/m^3 A2: 0.0034-0.0041 ng/m^3	BS EN 1948	A1: 13/09/2018 7:15 – 13:18 A2: 12/09/2018 7:20 – 13:23	21% 21%
A1 & A2	Dioxin-like PCBs (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.00022-0.00023 ng/m^3 A2: 0.00018-0.00022 ng/m^3	BS EN 1948	A1: 13/09/2018 7:15 – 13:18 A2: 12/09/2018 7:20 – 13:23	20% 19%
A1 & A2	Dioxin-like PCBs (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.0069-0.0088 ng/m^3 A2: 0.007-0.0092 ng/m^3	BS EN 1948	A1: 13/09/2018 7:15 – 13:18 A2: 12/09/2018 7:20 – 13:23	14% 13%
A1 & A2	Dioxins / furans (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.015-0.019 ng/m^3 A2: 0.014-0.015 ng/m^3	BS EN 1948	A1: 13/09/2018 7:15 – 13:18 A2: 12/09/2018 7:20 – 13:23	13% 13%
A1 & A2	Dioxins / furans (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.015-0.018 ng/m^3 A2: 0.013-0.014 ng/m^3	BS EN 1948	A1: 13/09/2018 7:15 – 13:18 A2: 12/09/2018 7:20 – 13:23	14% 14%
A1 & A2	Dioxins / furans (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.02-0.024 ng/m^3 A2: 0.019-0.02 ng/m^3	BS EN 1948	A1: 13/09/2018 7:15 – 13:18 A2: 12/09/2018 7:20 – 13:23	18% 17%

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result [1]	Test Method	Result Date and Time [2]	Uncertainty [3]
A1 & A2	Poly-cyclic aromatic hydrocarbons (PAHs) Total	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.35 μg/m³ A2: 0.36 μg/m³	BS ISO 11338-1 and BS ISO 11338-2	17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	13% 14%
A1 & A2	Anthanthrene	No limit applies		A1: 0.014 μg/m³ A2: 0.043 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	>100% 18%
A1 & A2	Benzo{a}anthracene	No limit applies		A1: 0.014 μg/m³ A2: 0.014 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	>100% >100%
A1 & A2	Benzo[b]fluoranthene	No limit applies		A1: 0.027 μg/m³ A2: 0.029 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	18% 18%
A1 & A2	Benzo[k]fluoranthene	No limit applies		A1: 0.027 μg/m³ A2: 0.029 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	18% 18%
A1 & A2	Benzo[b]naph(2,1-d}thiophene	No limit applies		A1: 0.014 μg/m³ A2: 0.014 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	>100% >100%
A1 & A2	Benzo[c]phenanthrene	No limit applies		A1: 0.014 μg/m³ A2: 0.014 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	>100% >100%
A1 & A2	Benzo[ghi]perylene	No limit applies		A1: 0.068 μg/m³ A2: 0.043 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	18% 18%
A1 & A2	Benzo[a]pyrene	No limit applies		A1: 0.027 μg/m³ A2: 0.014 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	18% >100%
A1 & A2	Cholanthrene	No limit applies		A1: 0.014 μg/m³ A2: 0.014 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	>100% >100%
A1 & A2	Chrysene	No limit applies		A1: 0.014 μg/m³ A2: 0.014 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	18% >100%
A1 & A2	Cyclopenta(c,d)pyrene	No limit applies		A1: 0.014 μg/m³ A2: 0.014 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	>100% >100%
A1 & A2	Dibenzo[ah]anthracene	No limit applies		A1: 0.014 μg/m³ A2: 0.014 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	>100% >100%
A1 & A2	Dibenzo[a,i]pyrene	No limit applies		A1: 0.014 μg/m³ A2: 0.014 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	>100% >100%
A1 & A2	Fluoranthene	No limit applies		A1: 0.054 μg/m³ A2: 0.058 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	18% 18%
A1 & A2	Indo[1,2,3-cd]pyrene	No limit applies		A1: 0.014 μg/m³ A2: 0.014 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	18% >100%
A1 & A2	Naphthalene	No limit applies		A1: 0.014 μg/m³ A2: 0.014 μg/m³		17/09/18 7:35 – 13:36 18/09/18 7:15 – 13:16	>100% >100%

[1] For dioxins and dioxin-like PCBs, the result are to be reported as a range based on: All congeners less than the detection limit assumed to be zero as a minimum, and all congeners less than the detection limit assumed to be at the detection limit as a maximum

[2] The date and time of the sample that produced the result is given.

[3] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Signed .... **Date**....24/1/19.......... **(authorised to sign as representative of Operator)**

APPENDIX B

OPERATIONAL SUMMARY for each month of the YEAR 2018

Operator: Veolia

Installation: Stafford EfW

Confidence adjusted values

Release Point: Unit 1

Average concentrations from valid 30 min (10 min for CO) averages.

Month	NO x (mg/m3)	CO (mg/m3)	SO2 (mg/m3)	HCl (mg/m3)	VOC (mg/m3)	NH3 (mg/m3)	Dust (mg/m3)	Flow (Nm3/hr)
January	155.4	3.9	26.5	7.04	0.05	4.84	0.23	123727
February	156.1	4	31	7.21	0.1	5.5	0.24	123739
March	160.8	3.8	29	7.41	0.07	4.55	0.23	127658
April	168.1	3.3	29.9	6.52	0.04	4.68	0.23	122896
May	164.4	2.6	23	6.67	0.09	5.44	0.23	120456
June	167.7	2.2	28.4	5.06	0.08	4.64	0.12	121474
July	167.6	1.7	22.9	6.65	0.07	3.55	0.14	115922
August	169.8	2.2	25.7	7.53	0.06	4.18	0.2	117558
September	170.7	3.2	28.3	7.79	0.04	5.23	0.24	120360
October	177.5	3.4	31.5	7.58	0.02	3.85	0.23	122250
November	169.8	3.8	36.4	6.39	0.1	4.26	0.23	121638
December	161.7	4.2	33.2	7.38	0.09	4.4	0.23	122187
Yearly Average	**165.8**	**3.2**	**29**	**6.9**	**0.1**	**4.6**	**0.2**	**121655**

OPERATIONAL SUMMARY for each month of the YEAR 2018

Operator: Veolia

Installation: Stafford EfW

Confidence adjusted values

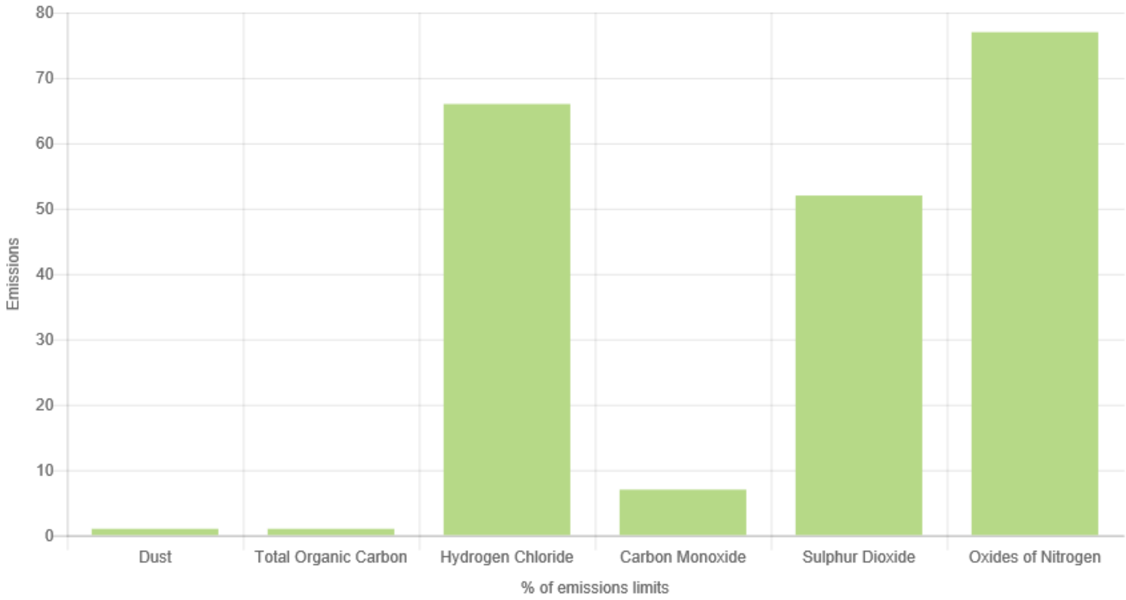
Release Point: Unit 2

Average concentrations from valid 30 min (10 min for CO) averages.

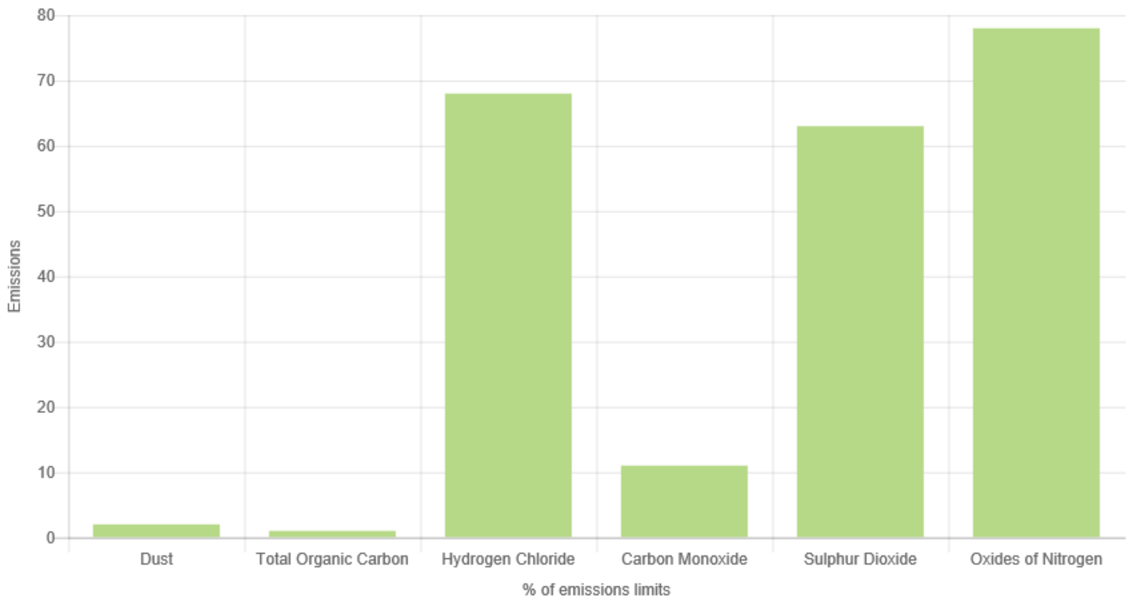
Month	NO x (mg/m3)	CO (mg/m3)	SO2 (mg/m3)	HCl (mg/m3)	VOC (mg/m3)	NH3 (mg/m3)	Dust (mg/m3)	Flow (Nm3/hr)
January	152.3	2.7	25.8	6.2	0.08	5.56	0.00	127612
February	154.9	2.9	32.3	6.42	0.11	6.23	0.00	128189
March	161.7	3.1	26.5	6.35	0.11	4.23	0.00	126462
April	166.5	2.4	31	6.62	0.09	4.21	0.00	126370
May	167.8	1.8	27.6	5.57	0.13	3.88	0.01	122829
June	173.3	2.1	31.3	5.66	0.08	2.81	0.00	124387
July	173.7	1.1	27.9	7.05	0.08	2.73	0.01	117275
August	176.7	1.6	29.9	7.72	0.08	3.06	0.02	119517
September	177.3	3	31.2	6.8	0.03	2.73	0.11	124864
October	182.9	2.8	35	6.71	0.02	2.08	0.11	126076
November	178.5	3.1	37.6	5.27	0.06	2.03	0.11	125065
December	179.3	2.8	35.7	6.44	0.03	1.89	0.11	125371
Yearly Average	**170**	**2.5**	**31**	**6.4**	**0.1**	**3.5**	**0.04**	**124501**

2. Publicly reported continuously monitored emissions reports

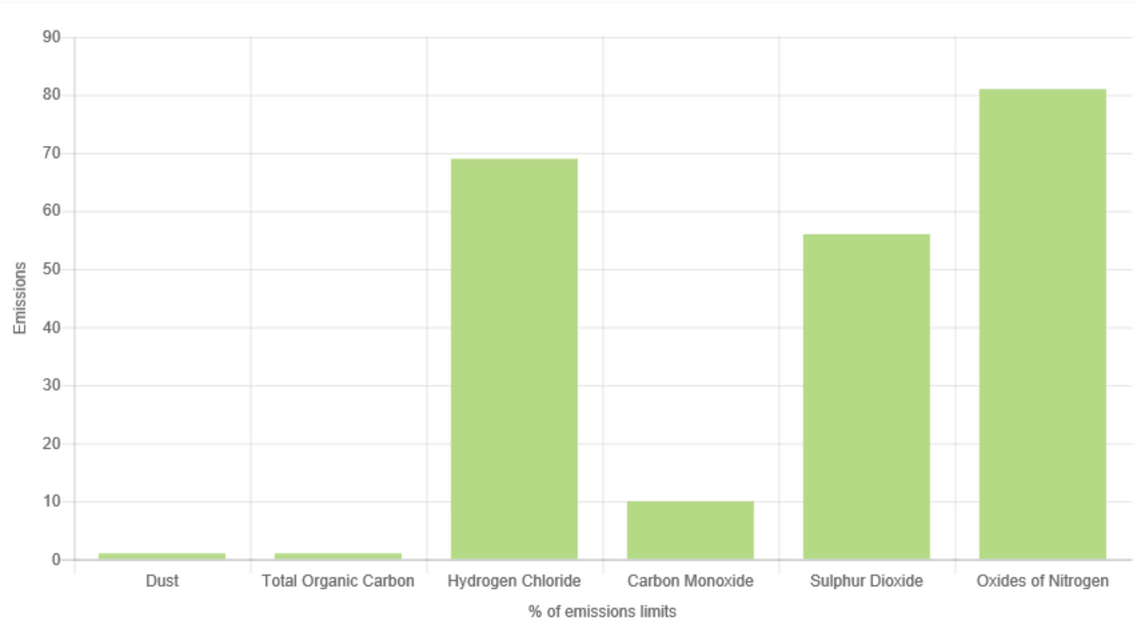
January 2018 Average Daily Emissions



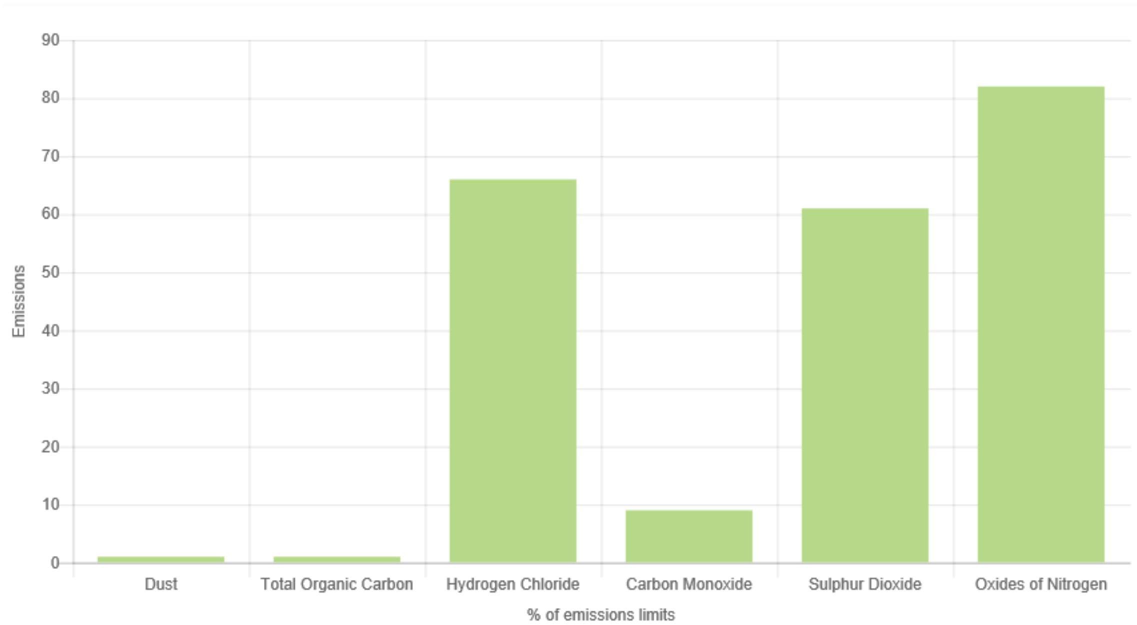
February 2018 Average Daily Emissions



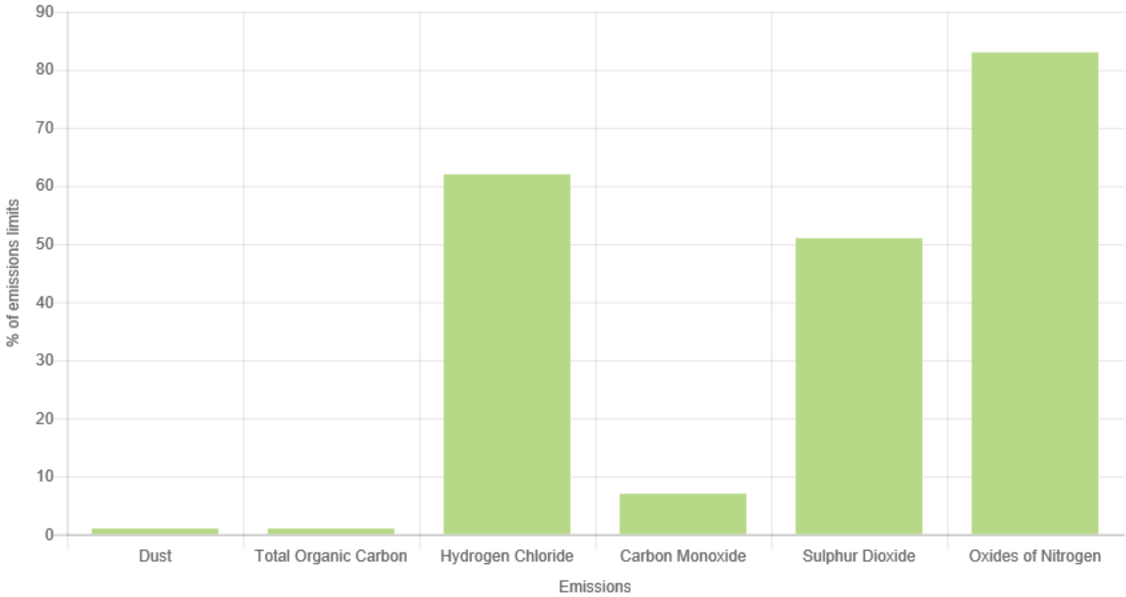
March 2018 Average Daily Emissions



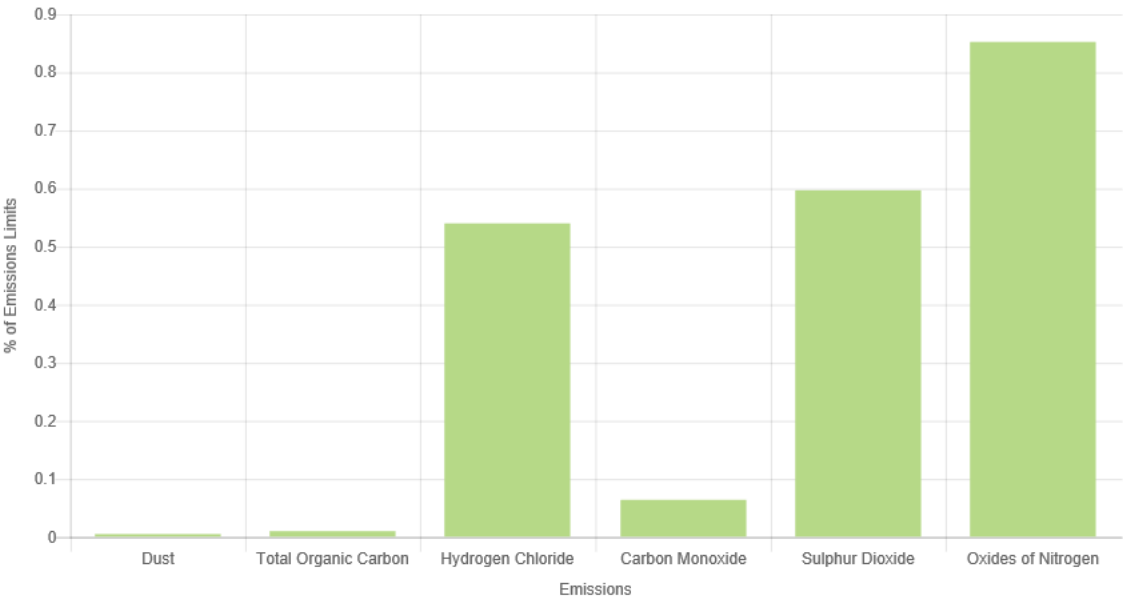
April 2018 Average Daily Emissions



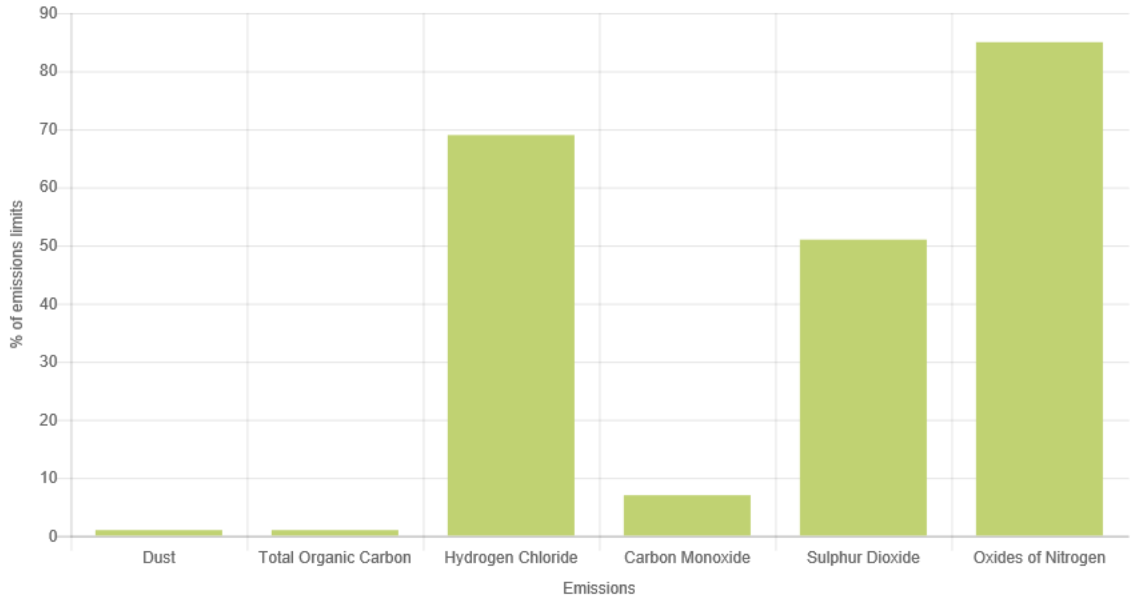
May 2018 Average Daily Emissions



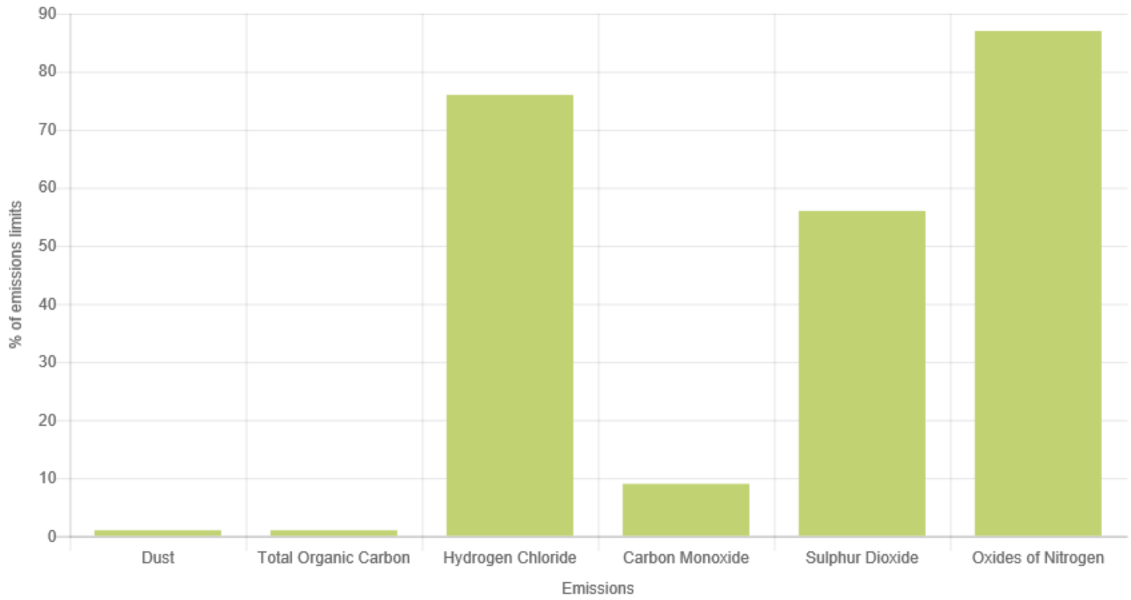
June 2018 Average Daily Emissions



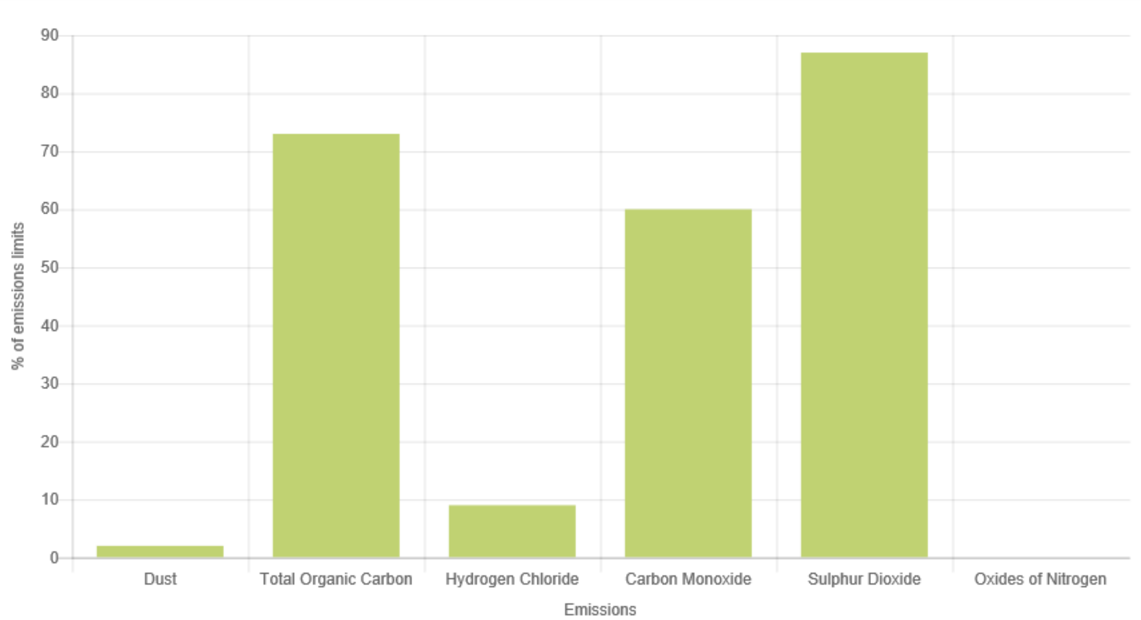
July 2018 Average Daily Emissions



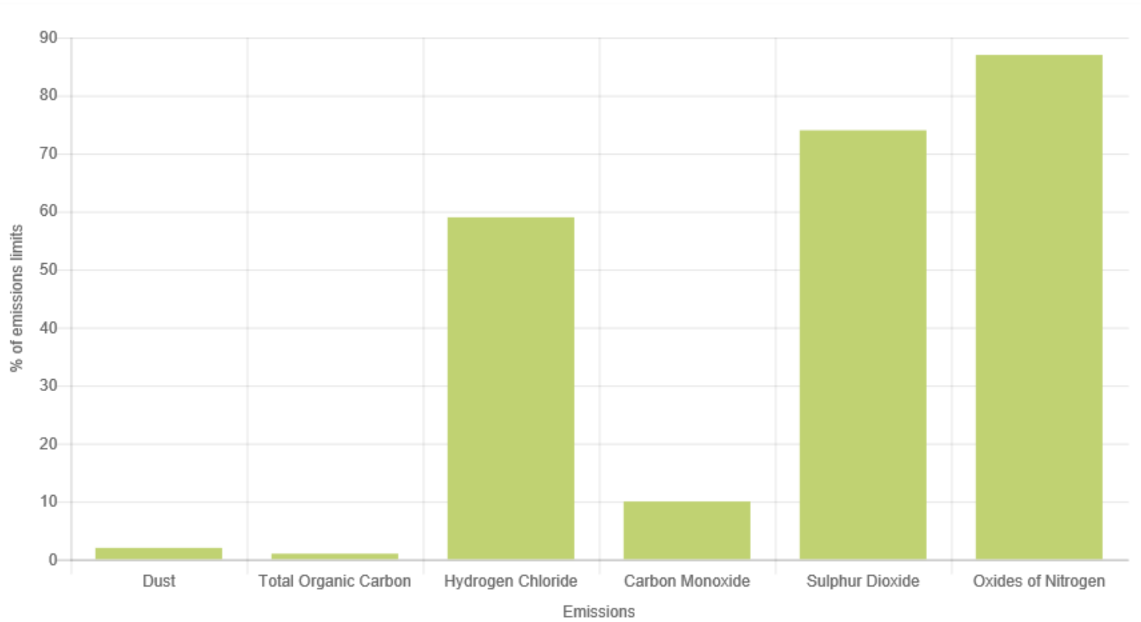
August 2018 Average Daily Emissions



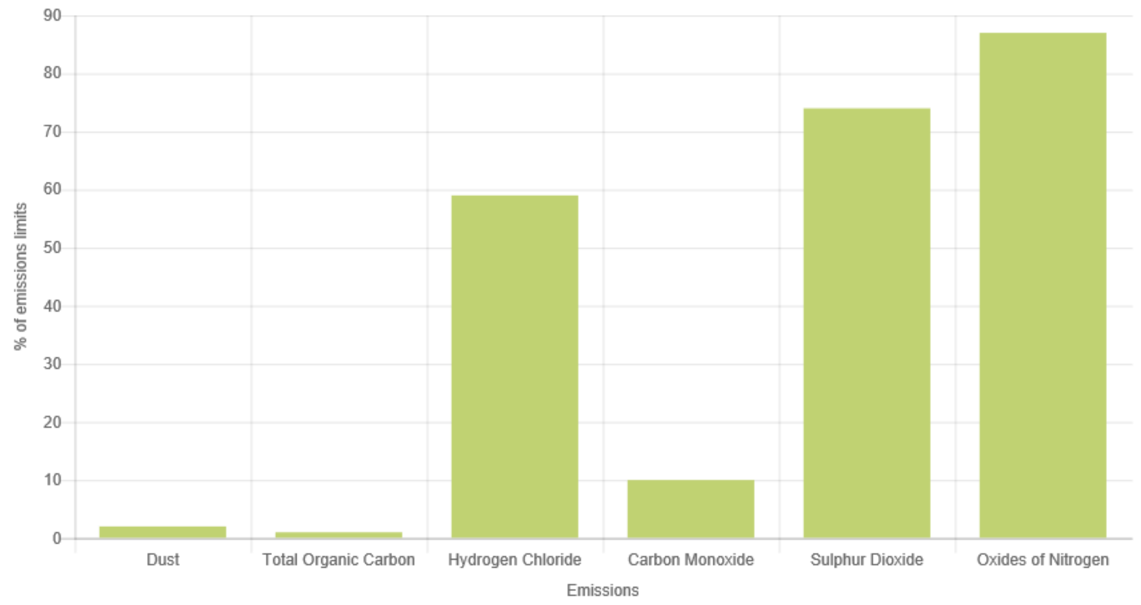
September 2018 Average Daily Emissions



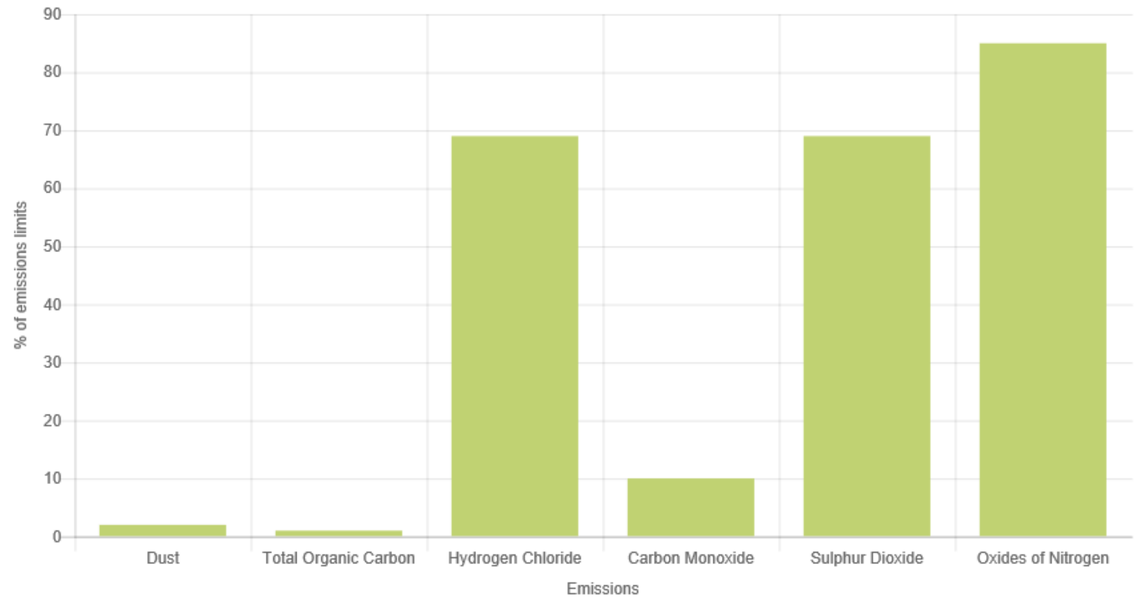
October 2018 Average Daily Emissions



November 2018 Average Daily Emissions

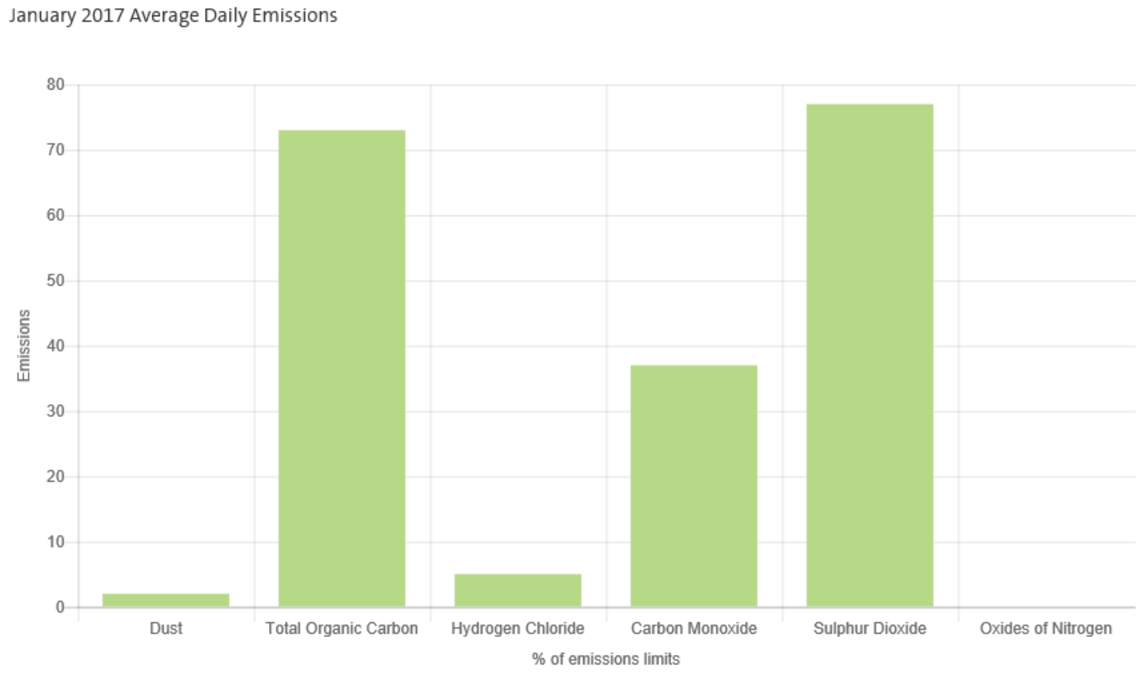


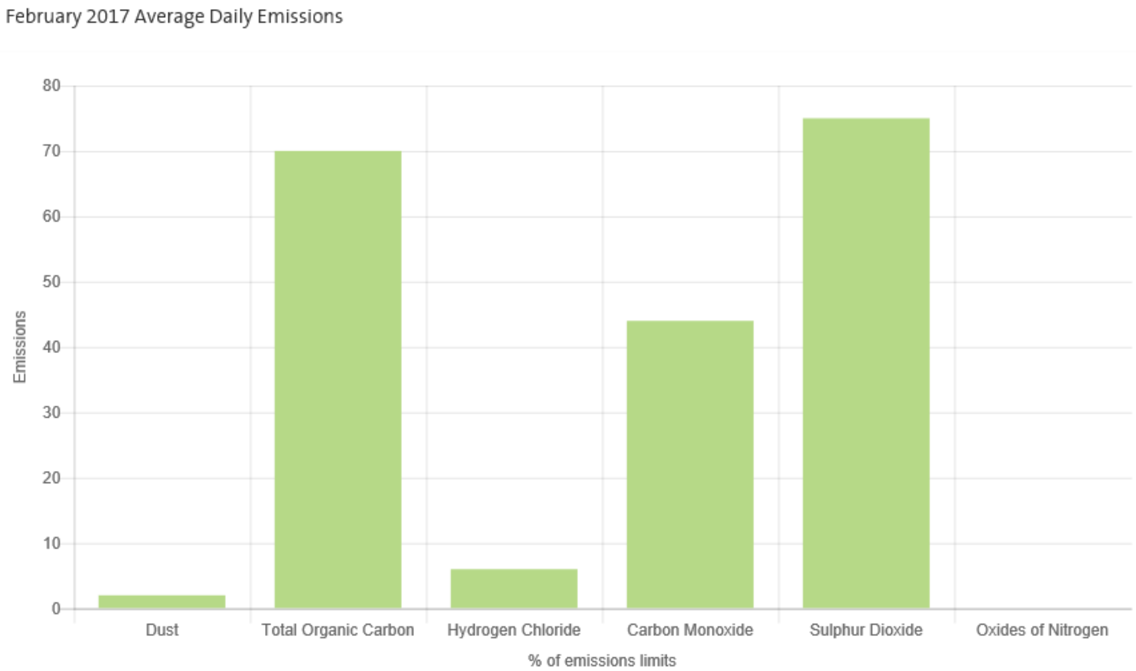
December 2018 Average Daily Emissions



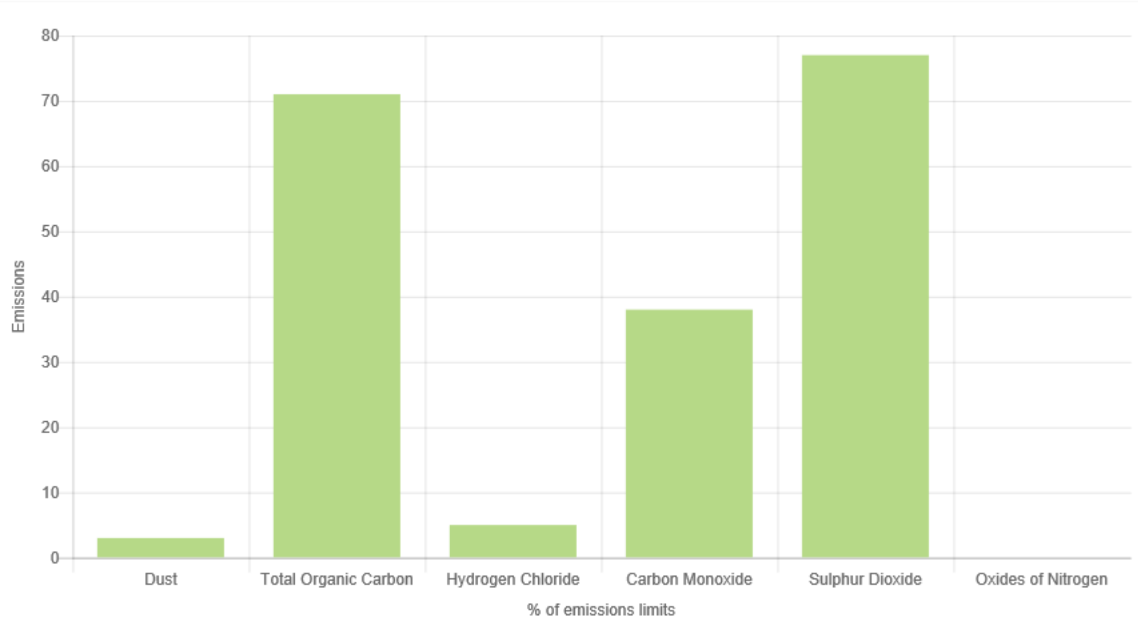
G.4 2017 Emissions

1. Publicly reported continuously monitored emissions reports

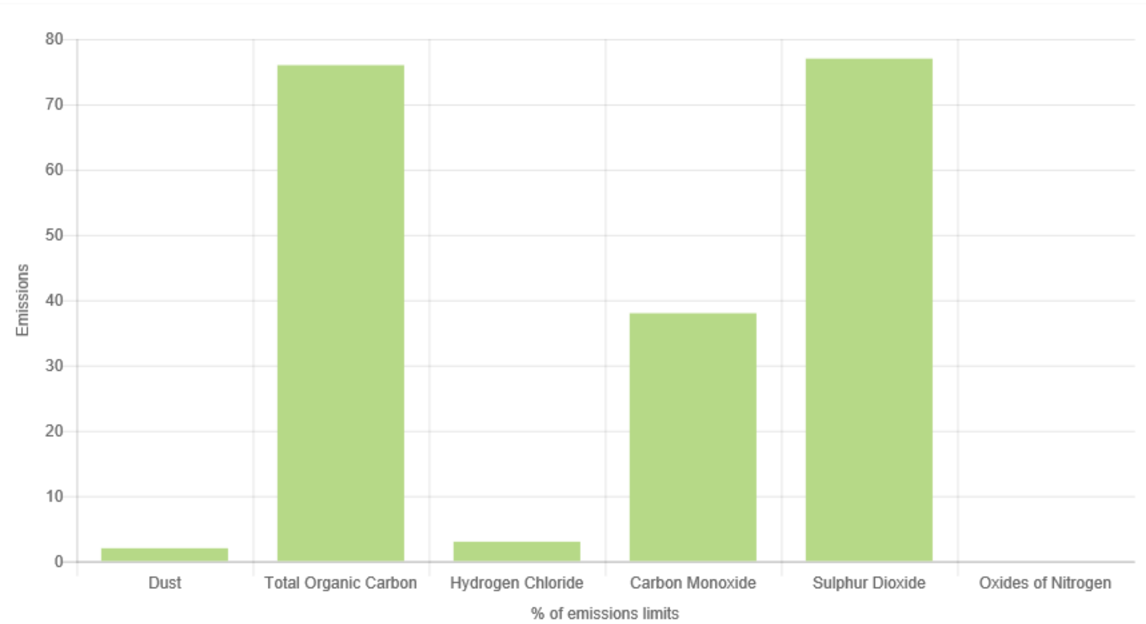




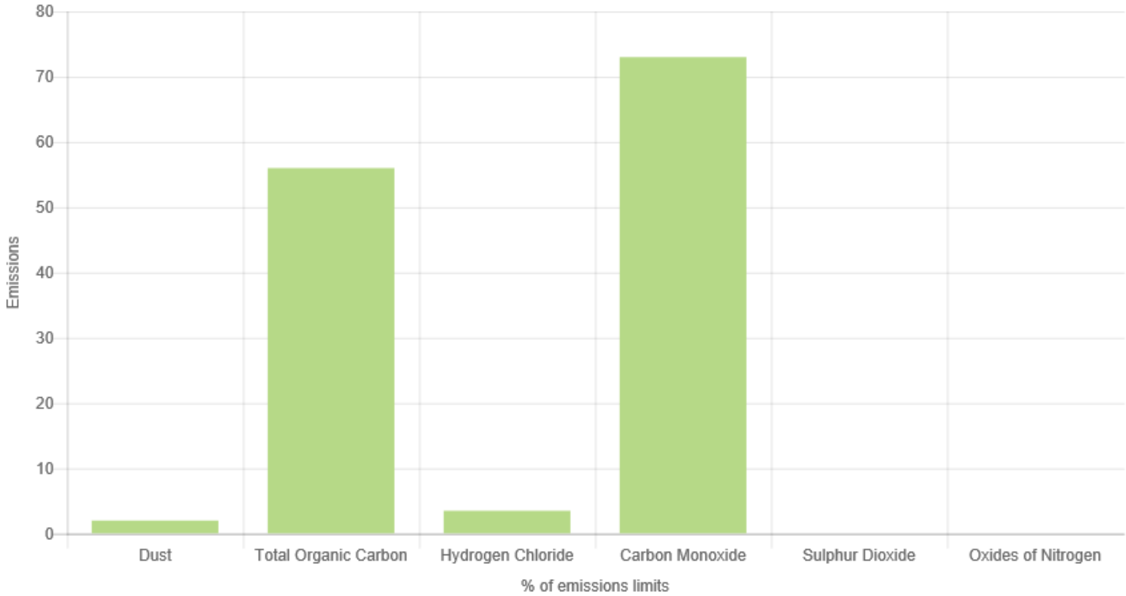
March 2017 Average Daily Emissions



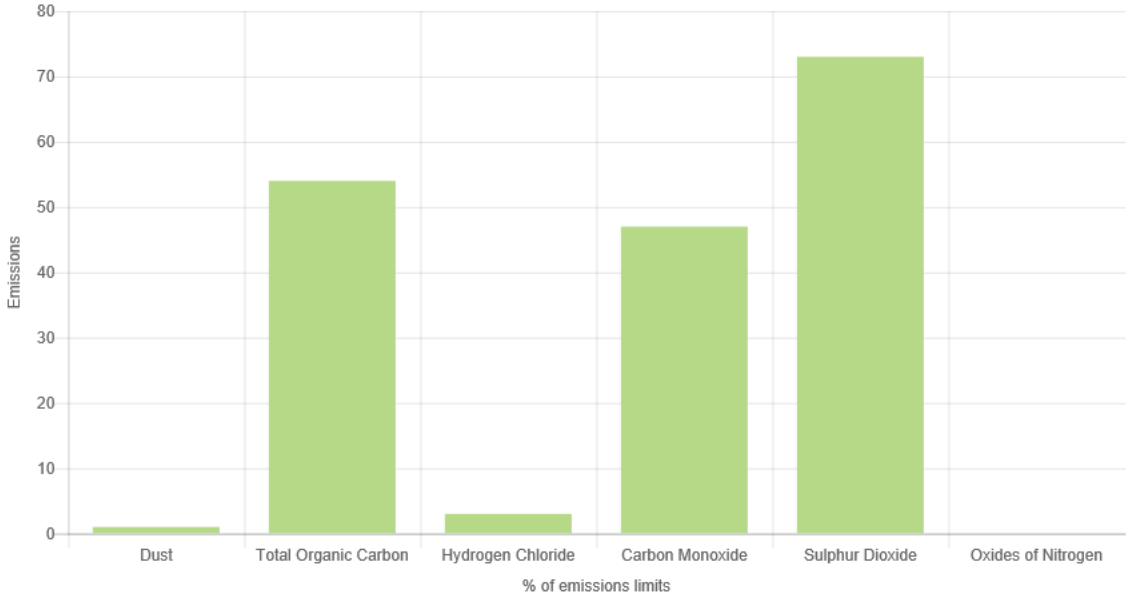
April 2017 Average Daily Emissions



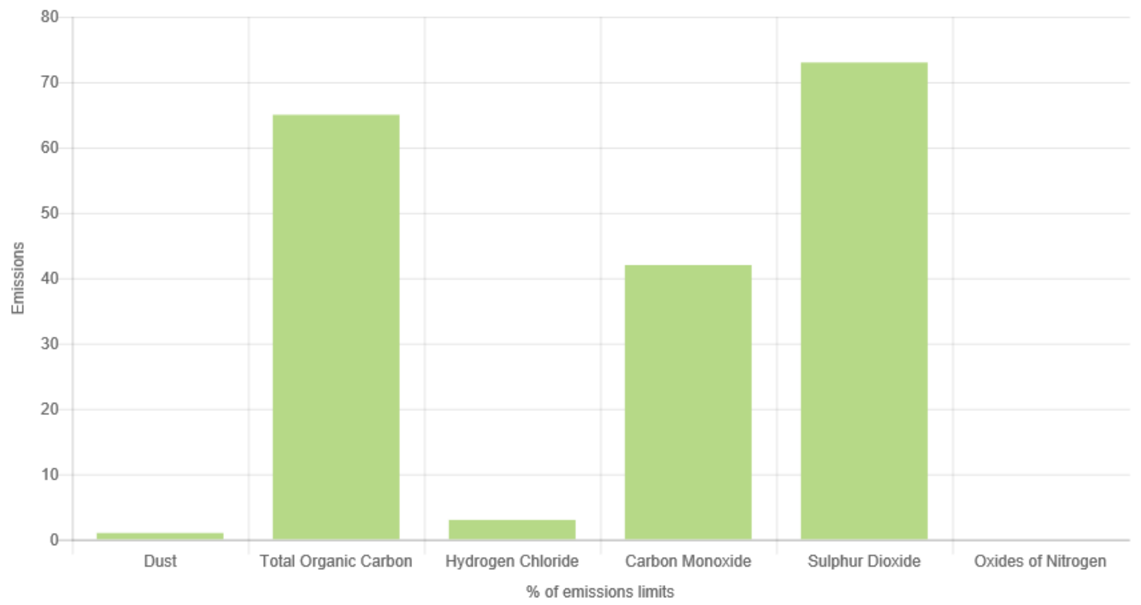
May 2017 Average Daily Emissions



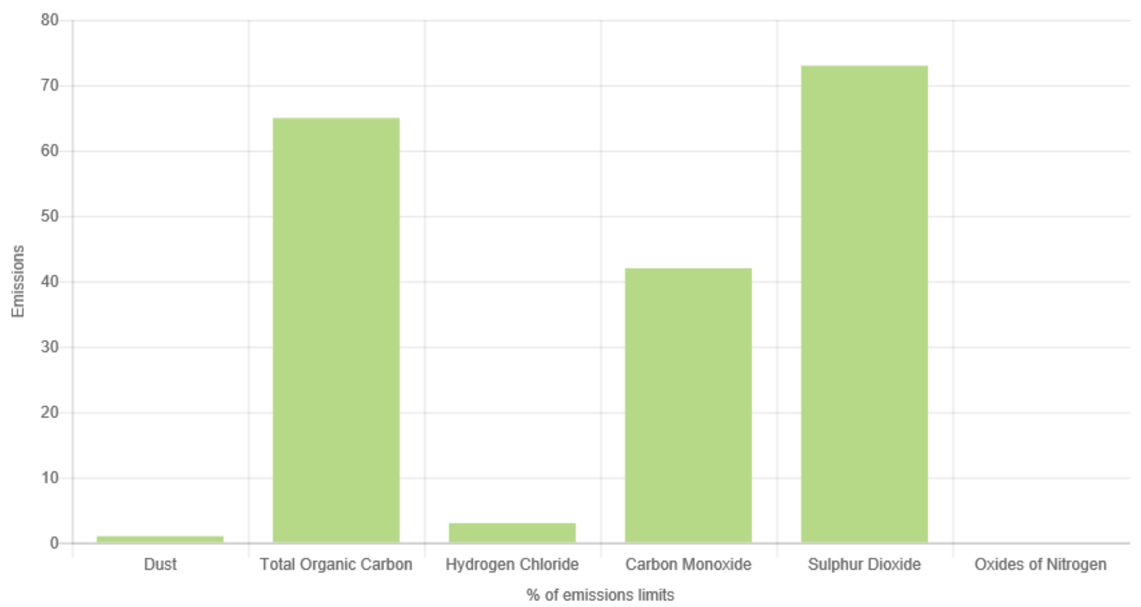
June 2017 Average Daily Emissions



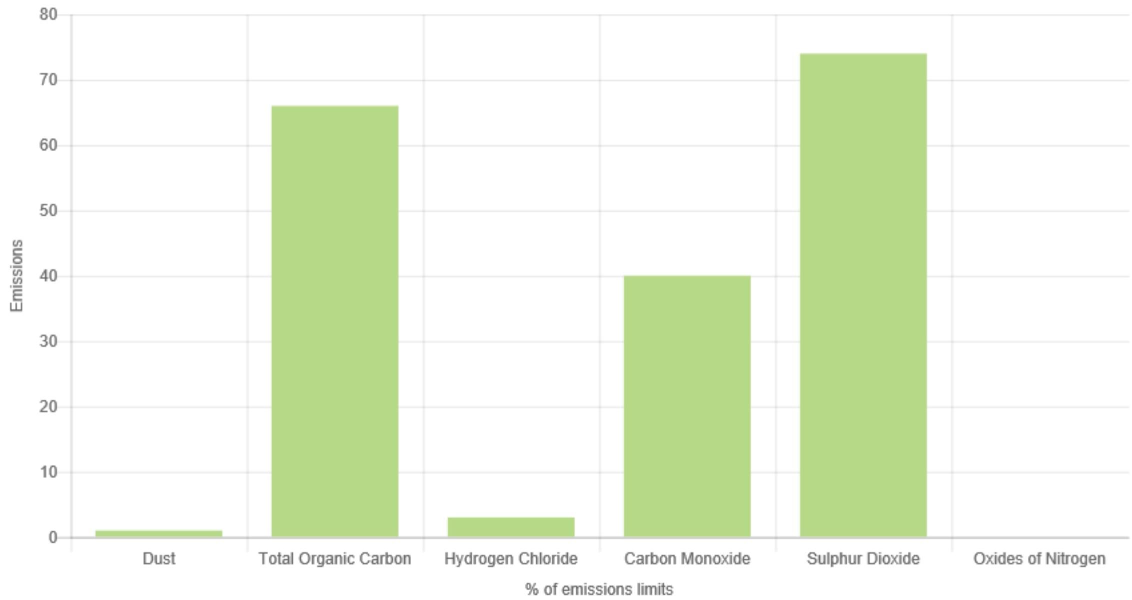
July 2017 Average Daily Emissions



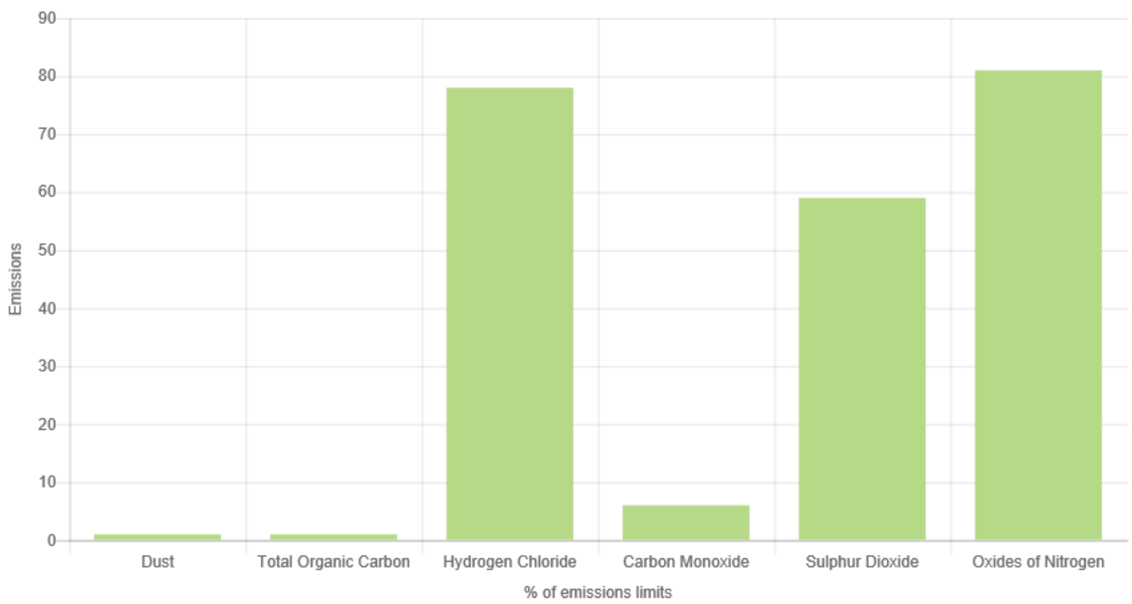
August 2017 Average Daily Emissions



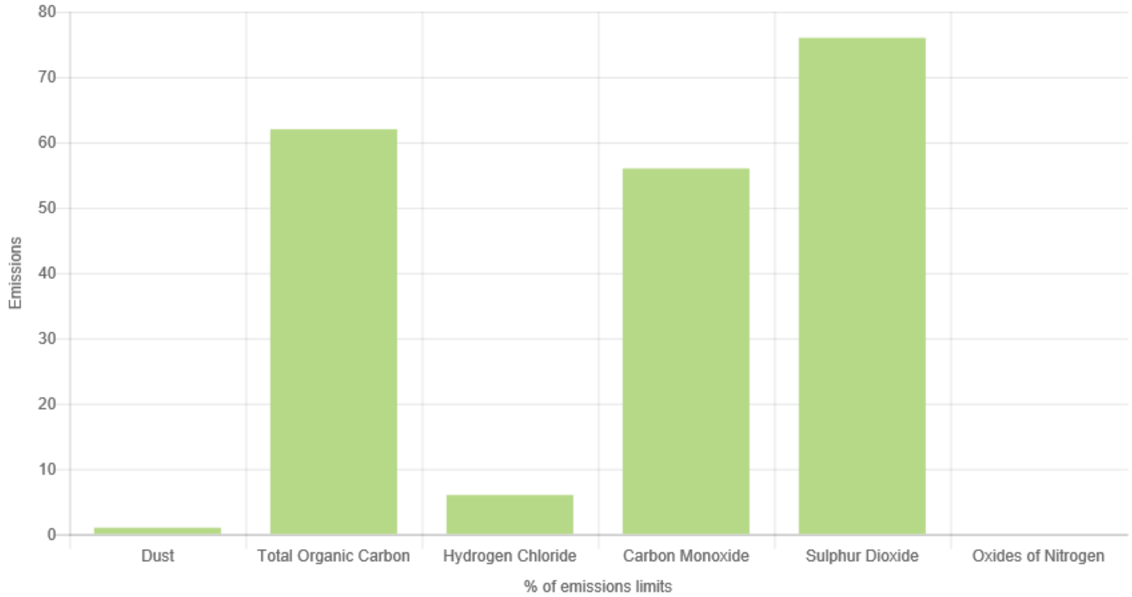
September 2017 Average Daily Emissions



October 2017 Average Daily Emissions



November 2017 Average Daily Emissions



December 2017 Average Daily Emissions