



Annual Performance Report 2019

Permit EPR/GP3334CX

Leeds Recycling and Energy Recovery Facility

Veolia ES Leeds Limited

Year: 2019

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Distribution		
Copy	Name, Role	No.

This report is required under the Industrial Emissions Directive 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.

Section 1: Facility Information

Plant Description and Design

The site occupies an area of approximately 3.8 hectares at the Former Wholesale Market site in Cross Green, Leeds, just over 3 km to the east of Leeds City Centre. The site is located to the north of the east Leeds Link Road and to the east of Newmarket Approach.

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

The installation has a thermal capacity of 50.7 MWth. 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 and the installation design can also supply heat energy to the council district heating network.

Summary of Operational Processes and Procedures

Municipal solid wastes and commercial wastes accepted at the installation are delivered in covered vehicles or containers. All vehicles delivering the waste are weighed in at the weighbridge before entering the Tipping Hall and being allowed to discharge waste.

Waste identified within the Environmental Permit for incineration only, such as international catering waste (i.e food waste) and offensive waste along with pre-shredded waste is unloaded into the intermediate bunker to be transported directly into the Energy Recovery Facility (ERF) bunker using the ERF cranes.

All other waste is fed into shredders where any bags are broken open; the waste is then fed into the Mechanical Pre-Treatment (MPT) process via conveyors. Waste in the MPT is separated according to size using trommels. Anything over 250mm goes back on conveyors to the oversize bay in the tipping hall. Anything between 80-250 mm proceeds on conveyors through the process and anything under 80 mm proceeds on conveyors to the ERF bunker. The MPT process is controlled from the MPT control room on the ground floor of the MPT hall and is designed for the removal of recyclates (metals, plastic, paper, etc.) from the waste to create a more homogenous feedstock for improved combustion. Due to the poor quality of the extracted recyclates, available markets and hence recycle rates were lower in 2019 for both plastics and paper/cardboard.

Residual waste is moved by conveyor to the ERF bunker and is utilised as feedstock for the ERF. The waste is fed by conveyor from the MPT or by the waste bunker crane grab from the intermediate bunker. The waste in the bunker will be mixed with a crane to create a homogenous feedstock and 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. The grate is split into 5 zones; zone 1 is the drying zone; 2-3 are the main combustion zones and 4-5 are the burn out zones. 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. The ERF process is controlled from the ERF control room on the 6th floor of the admin building.

After the waste has been burned the remaining unburnt material, called incinerator bottom ash (IBA) is quenched in water and ferrous metal is removed by an overband magnet. The bottom ash is transported by conveyor to an indoor storage area. The IBA is stored here until it is sent off site to a suitably licensed waste treatment facility for re-processing/recovery.

The flue gas is treated to reduce the level of pollutants emitted. Oxides of nitrogen are abated using dry urea; acid gases such as HCl and SO₂ are abated using dry lime injection and for dioxins and mercury activated carbon abatement is used. Bag filters are utilised for the abatement of particulate matter and also collect the Air Pollution Control Residue (APCR) which is transferred to a silo then to a tanker (or sealed bags are sometimes used) for removal from the facility where it is used in acid neutralisation.

Following clean up the flue gas is emitted to air through the 75m high stack. The flue gases entering the stack are continuously monitored for HCl, SO₂, TOC, CO, NO_x, NH₃ and Particulates against limits as laid down in the Environmental Permit.

The heat from the combustion process is used to turn water into superheated steam, that steam then powers a turbine to generate electricity for internal use and for export to the National Grid and heat for the Leeds district heating system and the Pro-Fibre facility. The division between steam for electricity or steam for heat energy is automatically controlled by the turbine grid valve based on heat energy demand. Residual steam from the turbine is converted back to condensate in an air cooled condenser which feeds back into the condensate tank.

The facility operates a Business Management System (BMS) housing the processes and procedures to be followed. The facility has procedures in place including emergency procedures, operating instructions and risk assessments.

The facility has a Computer Maintenance Management System (CMMS) in place housing all maintenance tasks and defect reporting. An annual planned outage takes place to allow for boiler cleaning, statutory and essential maintenance to maintain plant reliability and efficiency.

Section 2: Operational Summary

Summary of Plant Operations and Maintenance During the Reporting Year

The plant performance improved on last year with increased availability of the boiler and turbine.

The annual planned maintenance outage was completed successfully with the duration reduced from planned by 1.5 days. The Following main outage tasks were completed:

- Replacement of carbon steel tubing with carbon steel with inconel overlay in the 2nd pass walls, header tubes for the front and divider wall.
- Overhaul of rappers; vibrators and the shower cleaning system.
- Long and short ash conveyor system repairs.
- A full boiler clean.
- Grit blast cleaning of Inconel furnace and the 5th Pass.
- Minor turbine inspections and repairs to bearing temperature sensors.
- Statutory inspection for pressure parts and NDT.
- Inspections of the Martin Grate feeder system, ash discharge ducting and water chute wall.
- Alternator inspections.
- Inspection of inconel tubing in the furnace.
- Instrument calibrations.

The facility aided in acceptance of NHS Scotland (orange bag) clinical waste under environmental dispensation from Dec 18 - May 19.

Summary of Residue Handling for the Reporting Year

The residues produced from the incineration process include Incinerator Bottom Ash (IBA) and Air Pollution Control Residues (APCR). The facility have Procedures in place as part of the BMS system for the handling of such residues.

The IBA is sampled and sent to an approved testing laboratory twice a month for a full hazard analysis. All hazard analysis results have demonstrated the IBA to be non-hazardous. Once metals are removed for recycling using the over band magnet the remaining IBA is sent offsite to a fully licenced site for re-processing.

APCR is sampled and tested by the same approved laboratory once per quarter. Due to the hazardous nature of the APCR this is sent to Veolia's Empire Works Site for use in acid neutralisation treatment or is bagged and sent to Veolia Minosus for storage.

All testing of residues in carried out in accordance with the Industrial Emissions Directive and the ESA sampling and testing protocol.

Section 3: Operational Data

Plant Size	179, 580	tonnes pa	50.70	MWth	15	MWe
No. of combustion lines	1	No. of Turbines:	1			

Waste types received	Unit	Q1	Q2	Q3	Q4	Year Total	%
Household / Local Authority	tonnes	40,867	41,674	41,416	42,544	166,501	87.4%
Commercial & Industrial		3,787	5,955	3,962	6,900	20,605	10.8%
Hazardous (clinical)		1,774	628	-	-	2,402	1.3%
Clinical (non-haz)		175	273	249	297	993	0.5%
Waste wood (biomass)		-	-	-	-	-	-
Refuse derived fuel		-	-	-	-	-	-
Solid recovered fuel		-	-	-	-	-	-
Other [Please specify]		-	-	-	-	-	-
Other [Please specify]		-	-	-	-	-	-
Other [Please specify]		-	-	-	-	-	-
Total waste received		46,603	48,530	45,626	49,741	190,501	100.0%
Rejected Waste		-	-	-	-	-	-
Waste transferred out		-	-	3,453	164	3,617	1.9%

Total Waste Processed through ERF:						173,907	Tonnes
Energy Usage / Export	Unit	Q1	Q2	Q3	Q4	Year Total	KWh/te*
Power Generated	MWh	29,065	30,372	25,264	29,741	114,442	658
Power Exported		25,612	26,792	22,200	26,089	100,693	579
Power Used on site		3,453	3,580	3,064	3,652	13,749	72
Power Imported		60	4	361	40	465	3
Parasitic Load	%	12.1%	11.8%	13.4%	12.4%	12.4%	
Thermal Energy Produced	GWh	-	-	0.20	1.94	2.14	0.01
Thermal Energy Exported		-	-	0.20	1.94	2.14	0.01
R1 value					0.75	Design / Operational / n/a	

Waste Disposal & Recovery	Unit	Q1	Q2	Q3	Q4	Year Total	% inputs*
APC Residues - produced	tonnes	1,009	1,136	943	1,223	4,311	2.5%
IBA - produced		8,718	9,469	8,070	9,604	35,861	20.6%
Metals recycling*		512	480	589	1,091	2,672	1.5%
Other		-	-	-	-	-	-
Other		-	-	-	-	-	-
Other		-	-	-	-	-	-

*metals recycled from the IBA (does not include metals recycled from front end)

Raw Material Usage	Unit	Q1	Q2	Q3	Q4	Year Total	kg or Ltr /te*
Mains Water	m3	2,090	2,795	2,914	7,217	15,016	86.35
Other Water	m3	-	-	-	-	-	-
Ammonia / Urea	kgs	48,950	41,000	39,000	40,000	168,950	0.97
Activated Carbon	kgs	12,802	13,000	12,000	14,000	51,802	0.30
Lime / hydrated lime	kgs	487,220	667,000	457,000	600,000	2,211,220	12.71
Fuel oil	ltrs	14,667	4,501	98,646	23,448	141,262	0.81
Gas	cf	-	-	-	-	-	-
Other		-	-	-	-	-	-

The waste processed through the ERF figure (173,907 tonne) has been used to calculate the parameters indicated with an asterisks (). This is different from the waste received as not all waste received at site is processed through the ERF. Some has been removed as recyclates in the MPT process; there are some process losses and some waste was transferred offsite during the plant maintenance outage.

Summary of Hours	Line/Unit	Q1	Q2	Q3	Q4	Year Total	
Hours of waste combustion, total	1	2,099	2,184	1,888	2,204	8,375	95.6 %
Hours of waste combustion, total	2	N/A	N/A	N/A	N/A	-	N/A
Hours of waste combustion, total	3	N/A	N/A	N/A	N/A	-	N/A
Hours of waste combustion, total	4	N/A	N/A	N/A	N/A	-	N/A
Hours of waste combustion, total	5	N/A	N/A	N/A	N/A	-	N/A
Hours of turbine operations, total	1	2,095	2,183	1,841	2,188	8,307	94.85 %
Hours of turbine operations, total	2	N/A	N/A	N/A	N/A	-	N/A
Hours of heat / steam export		-	-	-	-	-	N/A
Abnormal Events	qty.	-	-	-	-	-	NO
Abnormal operation	hours	-	-	-	-	-	0.00%
Permit Breaches	qty.	-	-	-	-	-	NO

Section 4: Annual Reporting Performance Form 1 (Waste Disposal and Recovery) - 2019

Permit EPR/GP3334CX

Operator: Veolia Leeds RERF

Facility: Leeds Recycling and Energy Recovery Facility

Form: Performance 1

Reporting Period from:

1-Jan-2019

to:

31-Dec-2019

Total Waste Processed through ERF: 173,907 Tonnes

Waste Description	Disposal Route(s)	Disposal Tonnes	Recovery Tonnes	% / tonne of waste incinerated
1) Hazardous Wastes				
APC Residues	Veolia Empire Works APCR	4,277.7	4,277.7	2.46%
	Cheshire Minosis	33.0	33.0	0.02%
IBA	-	0.0	0.0	-
				-
				-
Total Hazardous Waste		4,310.7	4,310.7	2.5%
2) Non-Hazardous Wastes				
IBA	Ballast Phoenix Sheffield	35,861.2	35,861.2	20.6%
Ferrous Metal	Morris Metals Doncaster (LIM)	2,672.0	2,672.0	1.5%
				-
Process Water	-	0.0	0.0	-
				-
				-
Total Non-Hazardous Waste		38,533.2	38,533.2	22.2%
TOTAL WASTE		42,843.9	42,843.9	24.6%

Other non-haz waste	Disposal Route(s)	Disposal Tonnes	Recovery Tonnes	% of total waste received
(recyclates removed)	Morris Metals Doncaster (Non-Ferrous)	941.7	941.7	0.989%
	Morris Metals Doncaster (Ferrous)	1,581.9	1,581.9	1.661%
	European Metal Recycling Ltd Leeds	27.6	27.6	0.029%
	Veolia Pro-Fibre Leeds (Paper/Fibre)	396.4	396.4	0.416%
	Clean Tech UK Ltd (PET)	1.0	1.0	0.001%
	Imerplast UK Ltd (PP)	18.1	18.1	0.019%
	Monoworld Ltd (PP)	55.6	55.6	0.058%
	Van Werven UK Ltd (PP)	22.1	22.1	0.023%
	Plasgran Ltd (PP)	4.6	4.6	0.005%
(waste removed - TS)	Veolia ES Sheffield Ltd	338.8	338.8	0.356%
	Renewi Wath Upon Dearne	1,133.7	1,133.7	1.190%
	AmeyCespa	392.4	392.4	0.412%
	Associated Waste Management Ltd	1,752.4	1,752.4	1.840%
TOTAL		6,666.4	6,666.4	6.999%

Operator's comments :

The waste processed figure (173,907 tonne) has been used to calculate the % per tonne of waste incinerated. This is different from the waste received as not all waste received at site is processed through the ERF. Some has been removed as recyclates in the MPT process; there are some process losses and some waste was transferred offsite during the plant maintenance outage.

Annual Reporting of Water and Other Raw Material Usage

Raw Material	Usage	Unit	Specific Usage	Unit
Mains Water	15,016	m3	0.08	m3/te
Total Water	15,016	m3	0.08	m3/te
Urea / Ammonia	168,950	kg	0.89	kg/te
Activated Carbon	51,802	kg	0.27	kg/te
Lime / hydrated lime / Sodium Bicarb.	2,211,220	kg	11.61	kg/te

Operator's comments :

-

Annual Reporting of Other Performance Indicators

Parameter	Results by Line							
	A1	Turbine 1						
Operating hours for the year, hours	8375	8307						
Number of periods of abnormal operation, qty.	0	0						
Cumulative hours of abnormal operation for this year, hours	0	0						

Operator's comments :

The facility operates a one incineration line (A1) and one turbine (turbine 1)

Signed: F. GormleyDate: 22/01/20

Section 5: Annual Reporting of Energy Usage/Export

Permit EPR/GP3334CX

Facility: Leeds Recycling and Energy Recovery Facility

Form: Energy 1

Reporting Period from: 01/01/2019

to: 31/12/2019

Energy Source	Energy Usage	Unit	Specific Usage (KWh/tonne incinerated)
Electricity Produced	114,442	MWh	658
Electricity Imported	465	MWh	3
Electricity Exported	100,693	MWh	579
Gas / Oil	117.24746	tonnes	
Steam/hot water exported	2	GWh	0.01

Operator's comments :

Note: for fuel oil calculation specific gravity = 0.83Kg/l

Signed: F. Gormley

Date: 22/01/2020

Section 6: Summary of Plant Improvements**Summary of any efficiency improvements that have been completed within the year.**

The Facility is designed to generate electricity for export into the local network. However, the steam turbine is designed to extract low grade steam for a district heating system. The provision of heat over generating electricity is recognised as being more efficient due to the minimisation of losses. Installations have been put in place to provide steam and condensate return from the Leeds ERF facility in 2018 to the Pro-Fibre Facility and the Leeds district heating system from September 2019 hence maximising thermal efficiency.

Palfinger installation on ERF feed hopper allowing easier clearance of waste feed chute blockages to ensure a continued feed of waste, the main energy source, to the incinerator in turn increasing energy recovery from the waste. Completed May 2019.

Replacement of second pass side walls, furnace division wall and evaporator feed tubes with inconel overlay tubes which are less susceptible to corrosion reducing leaks which in turn will reduce downtime and improve efficiency. Completed September 2019.

Individual air supplies to 3rd pass rappers to improve their clearance of fly ash build up and maintain efficient heat transfer surfaces and hence an optimal combustion process. Completed December 2019.

Summary of any permit improvement conditions that have been completed within the year and the resulting environmental benefits.

N/A

All permit improvement conditions already complied with as of 2017.

Summary of any changes to the plant or operating techniques which required a variation to the permit and a summary of the resulting environmental impact.

N/A

Summary of any other improvements made to the plant or planned to be made and a summary of the resulting environmental benefits.

Installation of actuators on emergency blowdown and feed reg bypass valves which will increase reaction times, reduce downtime and improve efficiency. Planned for 2020.

Installation of fire suppression systems in the switch rooms (HV, LV and FGT) giving rise to increased fire protection and hence increased environmental protection in the event of a fire. Planned for 2020.

Replacement of diesel generator powering the contractors welfare area with a private wire supply from the ERF plant giving rise to efficiency improvements and reduced environmental impact of burning diesel. Planned 2020.

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 8: Details of Public & Stakeholder Liaison

Summary of events held during the reporting year.	
Date	Description
13/06/2019	Community Liaison Group Meeting
21/11/2019	Community Liaison Group Meeting

List of events planned for next year	
Date	Description
25th June 2020	Community Liaison Group Meeting
November 2020	Community Liaison Group Meeting

If you wish to be involved in the public liaison programme, please contact: 'leeds.enquiries@veolia.co.uk'

Section 9: Residue Quality Monitoring Requirements

Summary of Monitoring Undertaken and Compliance
The residues produced from the incineration process include Incinerator Bottom Ash (IBA) and Air Pollution Control Residues (APCR). The IBA is sampled and sent to an approved testing laboratory twice a month for full hazard analysis and APCR is sent for a analysis once per quarter. All hazard analysis results have demonstrated the IBA to be non-hazardous, APCR is hazardous by nature and disposed of accordingly. All testing of residues in carried out in accordance with the Industrial Emissions Directive and the ESA sampling and testing protocol.

Commentary on Any Specific Events	
Date & Event	Description
01/01/2019 - 31/12/2019	No specific events, all IBA for 2019 was classed as non-hazardous.

Residue Quality Monitoring Results			
Parameter (unit)	Limit	Normal Operation	
		Bottom Ash	APC Residues
Loss on Ignition (%)	<5%	Q1 - 2.59 Q2 - 3.53 Q3 - 2.72 Q4 - 4.92 Average - 3.44	-
ToC (%)	<3%	Q1 - 0.70 Q2 - 1.00 Q3 - 1.20 Q4 - 1.20 Average - 1.03	-
No. of Assessments Undertaken	---	24	4
No. of Hazard Assessments	---	24	4

Comments :
All IBA in 2019 was classed as non-hazardous after analysis at an accredited laboratory.

Section 10: Emissions to Water**Summary of monitoring undertaken and compliance**

Emission to water for the facility come under a 'Discharge of Trade Effluent to Sewer' Consent issued by Yorkshire Water. This consent sets out the conditions as per the below table. No specific monitoring frequency is set in the consent however Veolia ES Leeds conduct periodic testing to demonstrate compliance.

The below 'Average' results for the parameters set are results of analysis undertaken by an accredited laboratory on 28th Nov 2019.

Commentary on any specific events

Date & Event	Description
-	-

Emissions to Water / Sewer

Parameter	Monitoring Frequency	Limit	Target	Max.	Average
Temperature	N/A	43.3oC	N/A	N/A	<43oC
pH	N/A	pH 6-10	N/A	N/A	pH 7.4
Settled Chemical Oxygen Demand	N/A	1000 mg/l	N/A	N/A	85 mg/l
Settleable Solids	N/A	500 mg/l	N/A	N/A	<2 mg/l
Total Ammonia (as N)	N/A	20 mg/l	N/A	N/A	0.84 mg/l
Total Oil and Gas	N/A	10 mg/l	N/A	N/A	<1 mg/l

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)naphtho(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)

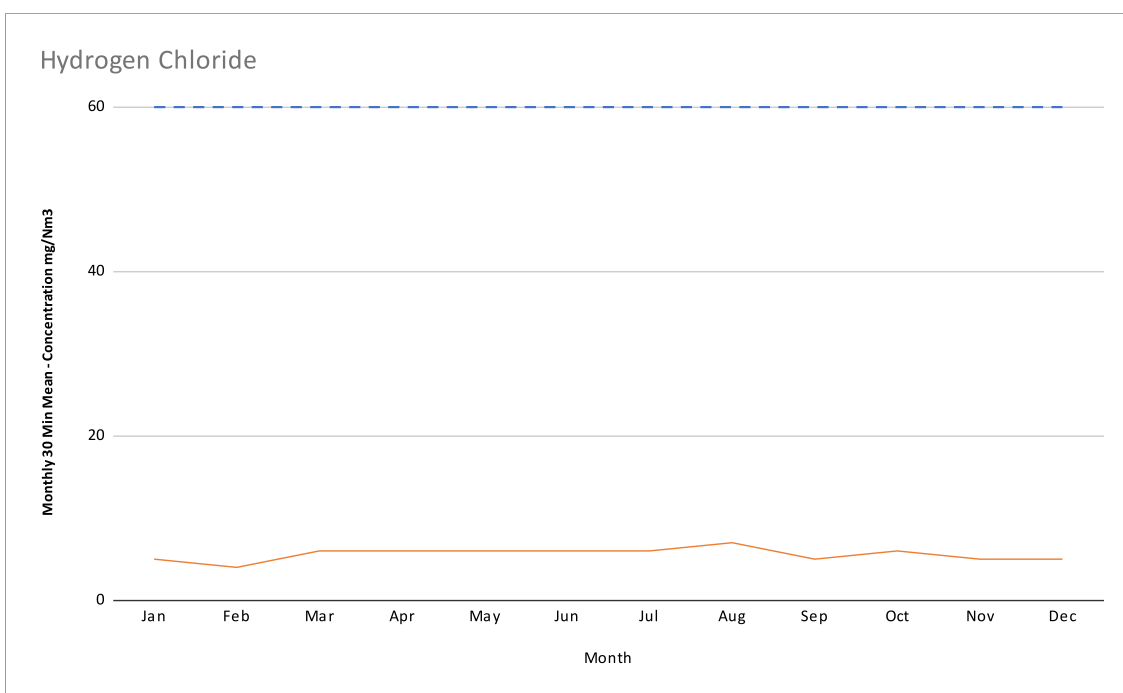
Summary of Monitoring Undertaken, Standards Used and Compliance				
HCl, SO ₂ , NO _x , TOC and CO all have limits set out in the Environmental Permit; these determinands are continuously monitored by the CEMS in compliance with EN 14181. NH ₃ , O ₂ , CO ₂ and Water Vapour are also continuously monitored by the CEMS.				
HCl, SO ₂ , NO _x , TOC, NH ₃ , CO, CO ₂ 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/m ³	192	178.7
	½ hourly mean	400 mg/m ³	375	178.6
Particulates	Daily mean	10 mg/m ³	1	1
	½ hourly mean	30 mg/m ³	1	1
Total Organic Carbon	Daily mean	10 mg/m ³	1	0.083
	½ hourly mean	20 mg/m ³	8	0.083
Hydrogen chloride	Daily mean	10 mg/m ³	8	5.58
	½ hourly mean	60 mg/m ³	22	5.58
Sulphur dioxide	Daily mean	50 mg/m ³	49	41.5
	½ hourly mean	200 mg/m ³	109	41.6
Carbon monoxide	Daily mean	50 mg/m ³	26	5.2
	95%ile 10-min avg	150 mg/m ³ *	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

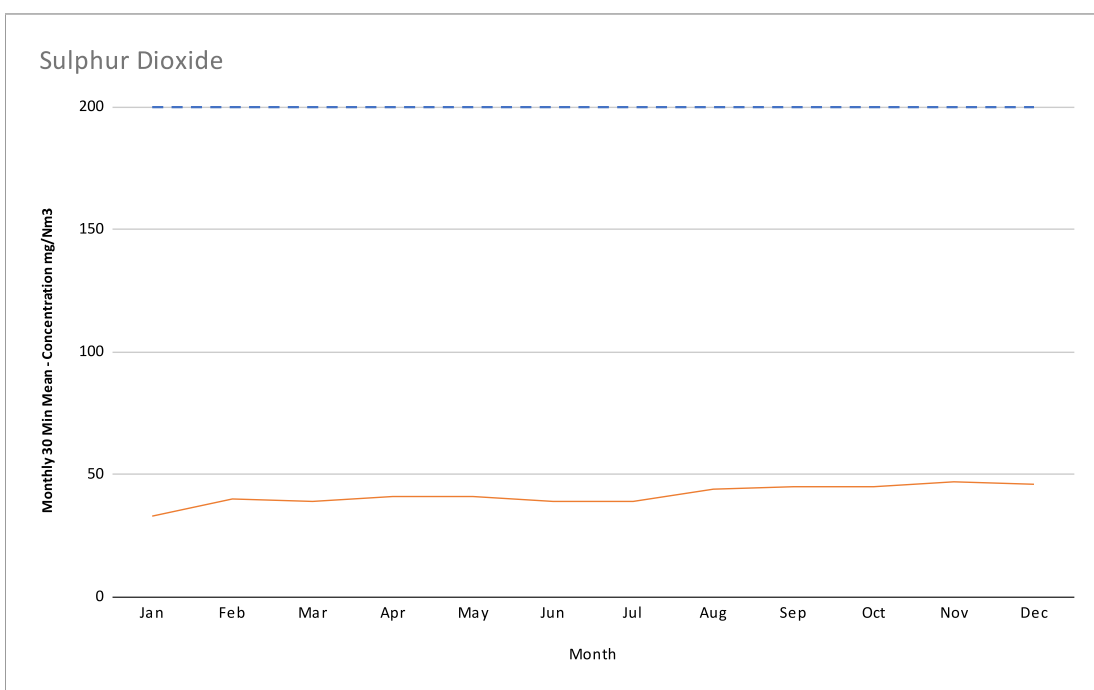
Per Combustion Line

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/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly SO ₂ ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily SO ₂ 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

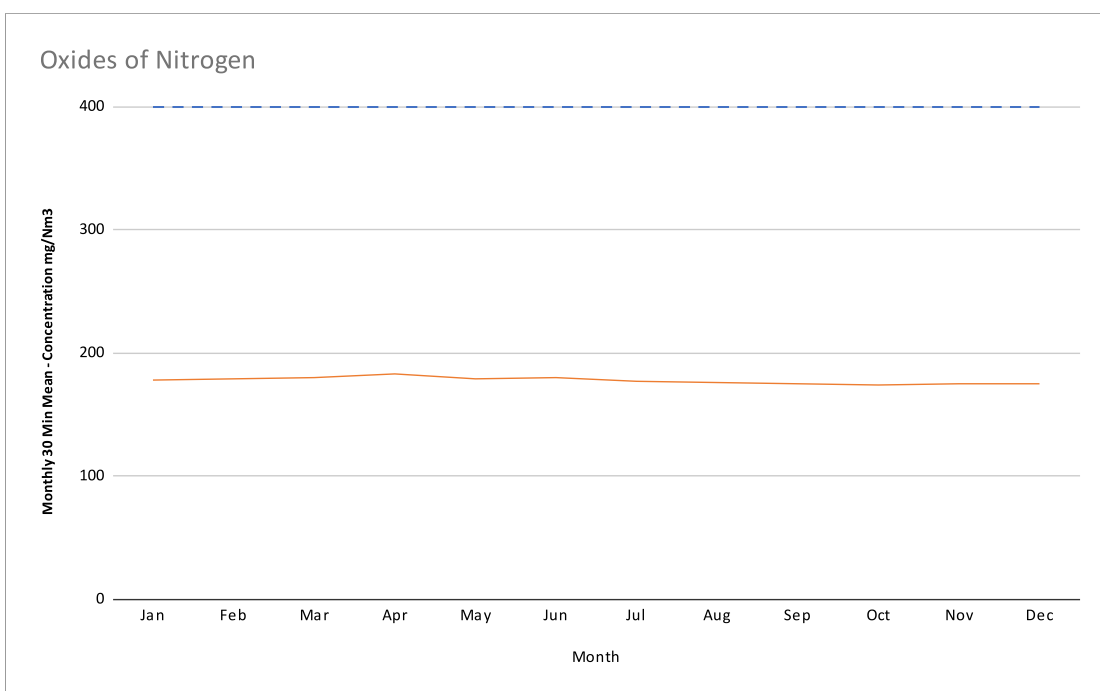
Per Combustion Line

2019	mg/Nm ³	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/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	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 :

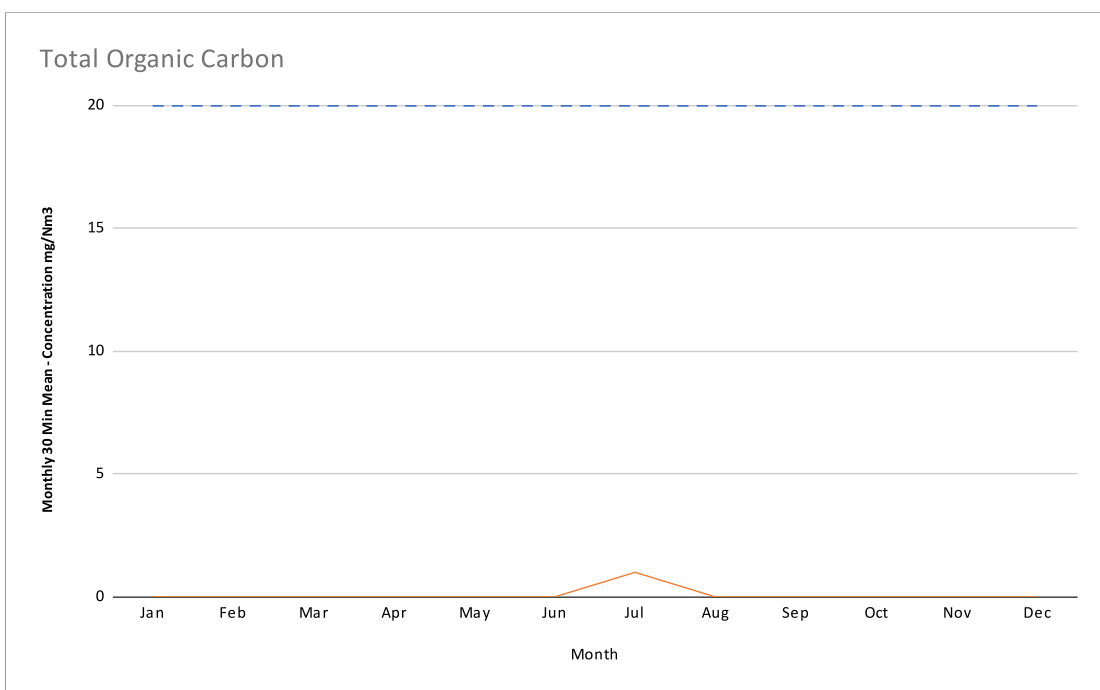
Section 12.3: Monitoring of Oxides of Nitrogen Emissions

Per Combustion Line

2019	mg/Nm ³	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



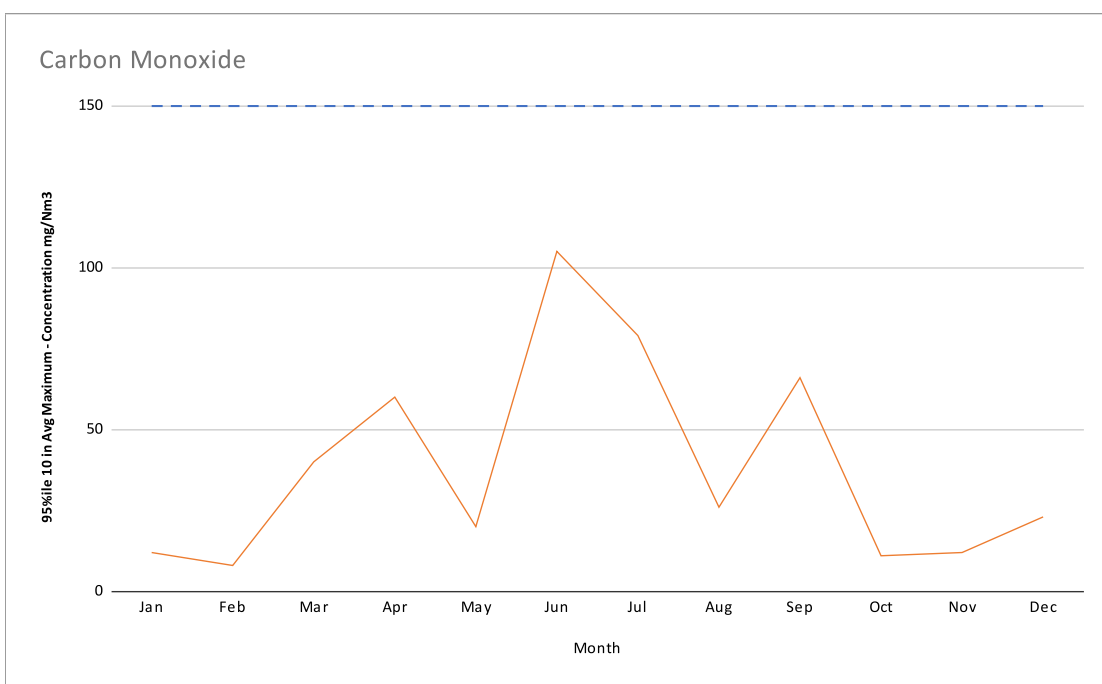
Comments :

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		0.0833333333	9	0.0833333333	1

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

mg/Nm ³	10-minute Reference Periods				Daily Reference Periods		
	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
2019							
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)

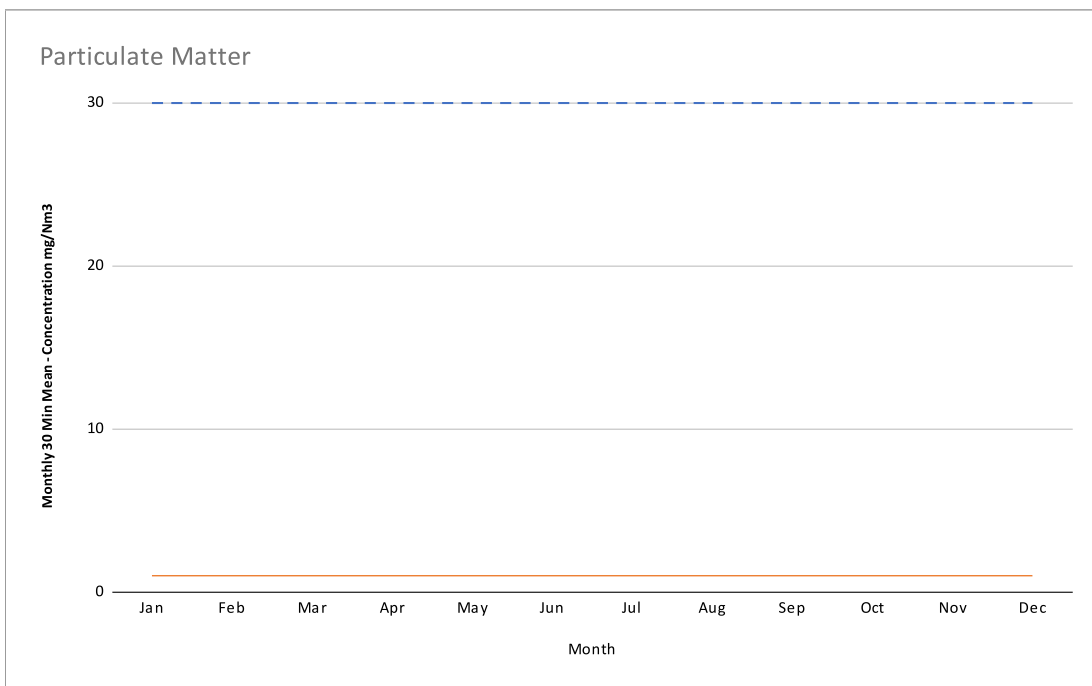
Per Combustion Line

2019	mg/Nm ³	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

mg/Nm3	From EA graphs			from KPI		
	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

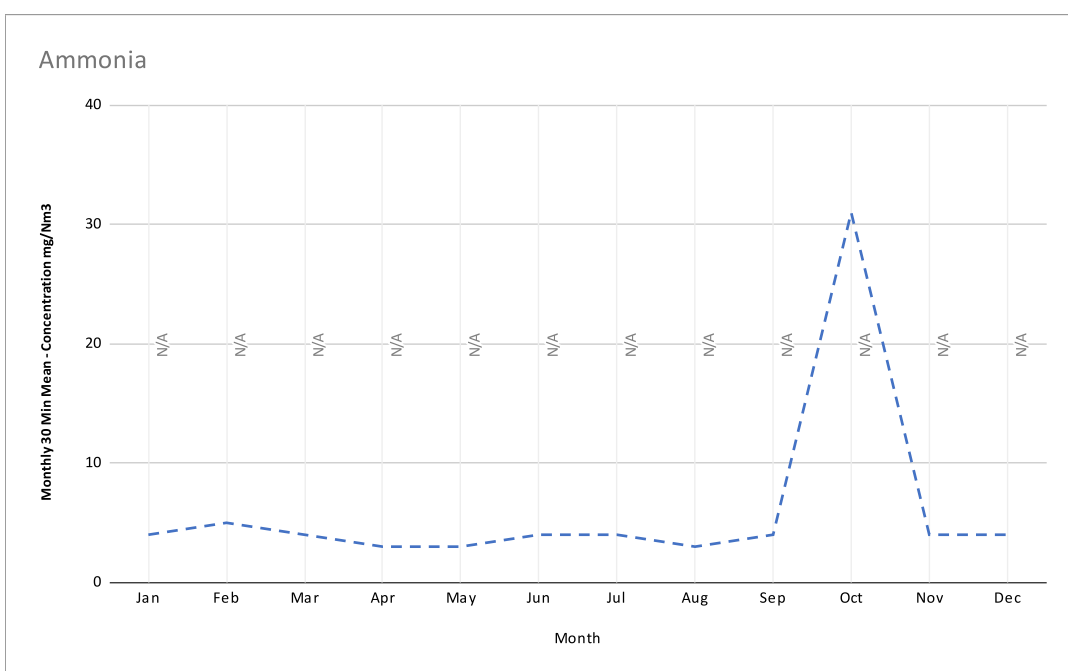
Per Combustion Line

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/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
2019	1/2 hourly NH ₃ ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily NH ₃ 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/Nm ³	Monthly 1/2	Monthly 1/2	Monthly daily	Monthly daily
A1	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
	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