



**Annual Performance Report 2022**

**Permit EPR/LP3030XA**

**Cardiff Energy Recovery Facility**

**Trident Park ERF**

**VIRIDOR TRIDENT PARK LIMITED**

Year: 2022

Address: Trident Park  
Glass Avenue  
Ocean Way  
Cardiff  
CF24 5EN

Tel: 02920501149

Email: [DCGJones@viridor.co.uk](mailto:DCGJones@viridor.co.uk)

Prepared by: Gwyn Jones Position: EHS Manager

Approved by: Tim Stamper Position: Plant Manager

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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.

**Plant Description and Design**

Cardiff Energy Recovery Facility is located immediately north of Cardiff Docks. The facility will process approximately 22.96 tonnes of residual municipal and C&I waste per line, per hour and has the capability of exporting approximately 30MW of electrical power.

In accordance with the requirements of Condition 4.2.2, Schedule 4 and Table S4.1 of Permit EPR/LP3030XA issued by Natural Resources Wales to Viridor Waste Management Limited (Viridor) on 4th November 2010, Viridor is required to produce an annual performance report which is to be submitted to Natural Resources Wales by the 31 January (or as agreed in writing with Natural Resources Wales) each year.

Viridor took over the operation of the Plant on 31st January 2015.

This report summarises the environmental and performance data collected at the site 1st January – 31st December 2022 and fulfils the reporting requirement of Chapter IV, Article 55 (2) of the Industrial Emissions Directive.

**Summary of Operational Processes and Procedures**

Incoming waste is mainly received from local authorities that have joined together to form two contract hubs - Prosiect Gwyrdd and Tomorrows Valley, some waste is received from Pembrokeshire County Council and the rest of the waste is received from third party businesses. Waste is received into an enclosed waste bunker. The waste is loaded into one of two furnaces, which combust the waste at >850°C. The hot gases are put through a variety of heat exchangers used to heat demineralised water to create superheated steam which drives a turbine generator. The turbine generator produces around 37MWh and exports around 33MWh. Combusted waste (incinerator bottom ash) is sent to a third party for further processing. The gases are treated with Lime, Activated carbon and Urea to remove potential pollution leaving the stacks. The powder containing reacted gas particulates (APCr) is removed and sent via a third party for reprocessing. Emissions are monitored via Continuous Emissions Monitoring equipment (CEMs) that are serviced by a contractor.

**Operational Data**

Plant Size	425,000 tonnes pa	MWth	MWe
No. of combustion lines	2	No. of Turbines:	1

Waste types received	Unit	Q1	Q2	Q3	Q4	Year Total	%
Household / Local Authority	tonnes	58,056	58,829	65,353	64,949	<b>247,187</b>	68.6%
Commercial & Industrial		19,558	16,299	33,169	38,287	<b>107,313</b>	29.8%
Hazardous		-	-	-	-	-	-
Clinical		1,247	1,260	1,581	1,601	<b>5,689</b>	1.6%
Waste wood (biomass)		-	-	-	-	-	-
Refuse Derived Fuel * - H'hold/LA		-	-	-	-	-	-
Refuse Derived Fuel * - C&I		-	-	-	-	-	-
<b>Total waste received</b>		<b>78,861</b>	<b>76,388</b>	<b>100,103</b>	<b>104,837</b>	<b>360,189</b>	100.0%
Rejected Waste		-	-	-	-	-	-
Unprocessed waste transferred out		-	-	-	-	-	-
<b>Total waste combusted</b>	<b>78,861</b>	<b>76,388</b>	<b>100,103</b>	<b>104,837</b>	<b>360,189</b>	100.0%	

Energy Usage / Export	Unit	Q1	Q2	Q3	Q4	Year Total	KWh/te
Power Generated	MWh	58,059	59,150	80,733	79,580	<b>277,522</b>	770
Power Exported		51,537	52,281	71,847	71,019	<b>246,684</b>	685
Power Used on site		7,260	6,756	8,679	8,421	<b>31,116</b>	86
Power Imported		348	447	186	251	<b>1,232</b>	3
Parasitic Load	%	11.8%	12.3%	11.2%	11.0%	11.5%	-
Thermal Energy Produced **	MWh	-	-	-	-	-	-
Thermal Energy Exported **		-	-	-	-	-	-
R1 value		Operational				Design / Operational / n/a	

Waste Disposal & Recovery	Unit	Q1	Q2	Q3	Q4	Year Total	% inputs
APC Residues - produced 190107	tonnes	788	831	1,125	1,115	<b>3,859</b>	1.1%
IBA - produced 190112		13,605	15,676	20,048	17,539	<b>66,868</b>	18.6%
Metals recycling 190102		417	148	208	198	<b>971</b>	0.3%
other wastes (including mixtures of materials) from		-	-	-	-	-	-

Raw Material Usage	Unit	Q1	Q2	Q3	Q4	Year Total	kg or Ltr /te
Mains Water	ltrs	10,094,000	11,880,000	16,224,000	13,636,000	<b>51,834,000</b>	143.91
Other Water	ltrs	-	-	-	-	-	-
Ammonia	kgs	-	-	-	-	-	-
Urea	kgs	107,860	105,460	139,440	124,560	<b>477,320</b>	1.3
Activated Carbon	kgs	27,280	28,420	35,920	42,380	<b>134,000</b>	0.37
Lime / hydrated lime	kgs	1,036,440	907,940	1,268,580	1,226,040	<b>4,439,000</b>	12.32
Fuel oil	ltrs	100,179	110,958	63,541	67,220	<b>341,898</b>	0.95
Other	-	-	-	-	-	-	-

Summary	Line/Unit	Q1	Q2	Q3	Q4	Year Total	
Availability of waste combustion by line, hrs	1	1,268	1,703	2,148	2,063	<b>7,182</b>	81.8%
	2	1,962	1,593	2,150	2,119	<b>7,824</b>	89.1%
Overall Availability, mean avg. of all lines, hrs		3,230	3,296	4,298	4,182	<b>7,503</b>	85.4%
Hours of turbine operations, hrs	1	1,913	1,918	2,137	2,091	<b>8,059</b>	91.7%
Hours of heat / steam export		-	-	-	-	-	n/a
Net Calorific Value of waste	MJ/kg	9.69	10.01	10.10	9.40	-	-
Abnormal Events	qty.	-	-	2	-	<b>2</b>	yes
Abnormal operation	hours	-	-	2	-	<b>2</b>	0.02%
Permit Breaches	qty.	1	-	1	-	<b>2</b>	yes

### Summary of Plant Operations and Maintenance during the reporting year

The main purpose of the facility is to burn non-hazardous municipal, commercial and industrial waste and to recover energy by producing steam. The steam will be used to produce electricity for export to the local grid and has the potential for further heat export to local consumers. The installation includes waste receipt and storage, two waste combustion units with associated waste heat boilers and exhaust gas abatement systems, on-site storage of residues and all systems for controlling and monitoring incinerator operation. The plant is designed to process approximately 26.48 tonnes per hour in two parallel and identical combustion units. Taking into account the expected long term availability of the facility, the annual permitted throughput of the facility is 425,000 tonnes of waste per annum.

The incoming municipal waste is loaded into the furnace via a feed hopper from the reception hall, where the waste vehicles deposit their loads into the storage bunker. After entering the combustion chamber via the refuse feed ram the waste is allowed to fall onto the grate in a controlled manner. The moving grate mechanisms are used to agitate the waste as it progresses down to the ash discharger. As the waste moves along, primary air is introduced from beneath the grate causing the waste to go through a series of drying and burning areas. Secondary air is introduced from above the grate for combustion control. An auxiliary oil fired burner is located in each combustion chamber to both establish minimum temperature on start up and to maintain the combustion gas temperature at a minimum of 850°C for 2 seconds in the combustion chamber before passing to the boiler, economiser and abatement plant. The furnace is equipped with a water tube boiler raising steam at 60 bar and 400°C. Economisers are fitted down stream of the boiler unit to pre-heat the incoming feed water. Each furnace unit is fitted with an independent dry urea injection system in order to reduce the facility's emissions of Oxides of Nitrogen (NOx) to air through selective non-catalytic reduction. A dry hydrated lime flue gas treatment system is used to neutralise acid flue gases with the injection of lime reagent into the reaction chamber. Activated carbon is injected into the flue gas stream in order to 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. The facility has a 90m stack containing the separate flue gas streams from each combustion unit, via which the combustion gases are released to air. Each flue gas stream is equipped with a Continuous Emission Monitoring System (CEMS) which continuously monitor for particulates, carbon monoxide (CO), ammonia (NH3), sulphur dioxide (SO2), hydrogen chloride (HCl), oxygen (O2), nitrogen oxides (NOx) and volatile organic compounds (VOC's).

There is a discharge of process effluent to sewer in accordance with a Trade Effluent Consent issued by Dwr Cymru Welsh Water. Uncontaminated surface and roof waters are discharged to the surface water drainage system via a series of interceptors, attenuation lagoons and isolation valves. Trident Park's annual plant maintenance outage was held from 4 May to 9 June 2022. During this period planned maintenance and repair of equipment was undertaken.

### Summary of Residue Handling for the reporting year

Bottom ash from the incinerator grate is quenched with water and then conveyed via a metals extraction system to a concrete storage area prior to removal from site. There have been no hazardous results from IBA testing during the year.

Air pollution control residues (APCr) from the bag filter systems are collected continuously and stored in two dedicated silos. APCr is collected by direct transfer from the on site silos into transport tanker and goes to either for reprocessing or disposal. When taken for reprocessing APCr is taken through accelerated carbonation technology. These carbonated wastes are blended with binders and fillers and pelletised to form an aggregate. If APCr is sent for disposal it is placed within a hazardous waste cell in the landfill.

## 2022 Annual Reporting Performance Form 1

Permit EPR/LP3030XA

Operator: Viridor Trident Park Limited

Facility: Cardiff Energy Recovery Facility

Form: Performance 1

Reporting Period from:

01 January 2022

to:

31 December 2022

### 2022 Annual Reporting of Waste Disposal and Recovery

Waste Description	Disposal Route(s)	Disposal Tonnes	Recovery Tonnes	% / tonne of waste incinerated
<b>1) Hazardous Wastes</b>				
APC Residues	D05.03	1,504.0	2,781.1	1.2%
IBA	0.0			-
Total Hazardous Waste		1,504.0	2,781.1	1.2%
<b>2) Non-Hazardous Wastes</b>				
IBA	R05		57,030.6	15.8%
Ferrous Metal	R04	0.0	971.8	0.3%
Process Water (other wastes (including mixtures of materials))	D05.02			-
Total Non-Hazardous Waste		0.0	58,002.4	16.1%
<b>TOTAL WASTE</b>		<b>1,504.0</b>	<b>60,783.5</b>	<b>17.3%</b>

Operator's comments :

### 2022 Annual Reporting of Water and Other Raw Material Usage

Mains Water	51834000	litres	143.91	l/te
Urea / Ammonia	477320	kg	1.33	kg/te
Activated Carbon	134000	kg	0.37	kg/te
Lime	4439000	kg	12.32	kg/te

Operator's comments :

### 2022 Annual Reporting of other performance indicators

	A1	A2	Turbine	
Operating hours for the year, hours	7182	7824		8059
Number of periods of abnormal operation, qty.	0	2		N/A
Cumulative hours of abnormal operation for this year, hours	0	2		N/A

Operator's comments :

Signed: G Jones

Date: 31 1 2023

## 2022 Annual Reporting of Energy Usage/Export

Permit EPR/LP3030XA

Operator: Viridor Trident Park Limited

Facility: Cardiff Energy Recovery Facility

Form: Energy 1

Reporting Period from:

01 January 2022

to:

31 December 2022

Energy Source	Energy Usage	Unit	Specific Usage (KWh/tonne incinerated)
Electricity Produced	277,522	MWh	770
Electricity Imported	1231.9	MWh	3
Electricity Exported	246,684	MWh	685
Diesel Oil	341898	litres	
Steam/hot water exported	0	GWh	-

**Operator's comments :**

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Signed: G Jones

Date: 31 1 2023

**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	100.00%	100.00%
Oxides of nitrogen	100.00%	100.00%
Sulphur dioxide	100.00%	100.00%
Carbon monoxide	99.74% (of all 95% 10 min. averages)	100.00%
Total organic carbon	100.00%	100.00%
Hydrogen chloride	100.00%	99.90%
Hydrogen fluoride	100.00%	100.00%
	<b>100.00%</b>	<b>99.99%</b>

**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
23_2_2022	Localised fire within LINE 1 waste feed hopper causing smoke to be release	Fire within waste hopper	Review of event.
10_7_2022	LINE 2 Abnormal Operation of abatement equipment from 16:49h to 18:30h. HCl Daily = 10.59mg/m <sup>3</sup> .	Abnormal Operation.	Review of event.
27_7_2022	LINE 2 Abnormal Operation of abatement equipment from 23:30 to 23:59h. HCl Daily = 10.02mg/m <sup>3</sup> .	Abnormal Operation.	Review event.

29_7_2022	Fire in the bunker causing smoke to be released through roller shutter doors servicing the Tipping Hal. The roller shutter doors were opened at teh request of the South Wales FRS inorder to view and assess the exent of the event.	Fire caused by unknown cause	Review event with South Wales FRS.



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

Lighting within the Waste Bunker and IBA Hall have changed from fluorescent bulbs to LED lighting.

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

Historical Improvement Conditions (ICs) associated with the ERFs Environmental Permit EPR/LP3030XA/v007 were completed prior to 2022. Additional ICs have been included within the variation v008 dated 21 December 2022. These shall be addressed during 2023.

**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.**

A NRW initiated variation was issued to Viridor Trident Park Limited on 21 December 2022. This variation (v008) varied the permit following the publication of the revised BAT Reference Document (BRef) for Waste Incineration.

**During the In the near future it is possible Summary of any other improvements made to the plant or planned to be made and a summary of the resulting environmental benefits.**

Due partly to ongoing contract negotiations on-site progress with the District Heat Network has been limited to a single ground investigation survey to prove the exact location of a mains gas pipe that runs near to the ERFs southern boundary fence. This work was overseen by a technician from Wales and West Utilities. The survey went well and the exact datum point will now be used to inform the design and siting of on-site infrastructure for the project.

**Details of Public & Stakeholder Liasion**

<b>Summary of events held during the reporting year.</b>	
<b>Date</b>	<b>Description</b>
11_01_2022	Community Liasion Meeting held over video conference call.
12_04_2022	Community Liasion Meeting held over video conference call.
12_07_2022	Community Liasion Meeting held on site
11_10_2022	Community Liasion Meeting held on site

<b>List of events planned for next year</b>	
<b>Date</b>	<b>Description</b>
Jan-23	Meeting to be held on-site conditions permitting
Apr-23	Meeting to be held on-site conditions permitting
Jul-23	Meeting to be held on-site conditions permitting
Oct-23	Meeting to be held on-site conditions permitting
	2 open dates are scheduled to be held during 2023. Dates are "to be confirmed".

**If you wish to be involved in the public liasion programme, please contact Gwyn Jones**

**Residue Quality Monitoring Requirements**

<b>Summary of monitoring undertaken and compliance A5:G1A5:G39</b>
During the calendar year of 2022, 24 combined Metals and 8 TOC analysis (1 sample per quarter per line). All IBA samples completed undergo hazard analysis in line with the ESA protocol. 8 APCr samples were also taken (1 sample per quarter per line).
APCr is sampled quarterly as required by the permit.

**Commentary on any specific events**

Date & Event	Description

**Residue Quality Monitoring Results**

Parameter (unit)	Limit	Normal Operation	
		Bottom ash	APC Residues
Loss on Ignition (average %)	<5%	3.53	<del> </del>
Total Organic Carbon (average %)	<3%	L1 1.53% L2 1.08%	<del> </del>
No. of Assessments Undertaken	---	32	4 samples per line = 8
No. of Hazardous Results	---	0	<del> </del>

**Comments :**

Annual Performance Report 2 Cardiff Energy Recovery Facility

**Emissions to Water**

<b>Summary of monitoring undertaken and compliance</b>
The monitoring of emissions to water form W1 is not required under Cardiff Energy Recovery Facility Environmental Permit EPR/LP3030XA/V004. The discharge must remain visibly free of any solids, oil or grease. Inspections are carried out periodically by site staff and also on a monthly basis by a contractor.

<b>Commentary on any specific events</b>	
<b>Date &amp; Event</b>	<b>Description</b>
	No adverse events during year.

<b>Emissions to Water / Sewer</b>					
<b>Parameter</b>	<b>Monitoring Frequency</b>	<b>Limit</b>	<b>Target</b>	<b>Max.</b>	<b>Average</b>
No parameters set	Access Weekly, not required.	No limits set. Discharge to be free of any visible solids, oil or grease	-	-	-

## 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 H1		Average H2	
			A1	A2	A1	A2
Nitrous Oxide	Periodic over 30 minutes. Maximum 8 hours	None set	9.26	9.44	7.5	8.6
Hydrogen fluoride		2 mg/m <sup>3</sup>	0.02	0.01	0.01	0
Hg and its compounds		0.05 mg/m <sup>3</sup>	0.0027	0.0005	0.0083	0.0044
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	6-8hrs	0.5 mg/m <sup>3</sup>	0.035	0.0147	0.015	0.13
Dioxins & Furans (I-TEQ)	6-8hrs	0.1 ng/m <sup>3</sup>	0.015	0.0036	0.0148	0.0023
PCBs (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m <sup>3</sup>	0.0021	0.0004	0.001	0.0002
PCBs (WHO-TEQ Fish)	6-8hrs	None set ng/m <sup>3</sup>	0.0001	0.0001	0.0001	0
PCBs (WHO-TEQ Birds)	6-8hrs	None set ng/m <sup>3</sup>	0.0039	0.004	0.0027	0.0008
Dioxins & Furans (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m <sup>3</sup>	0.0133	0.0033	0.0136	0.0021
Dioxins & Furans (WHO-TEQ Fish)	6-8hrs	None set ng/m <sup>3</sup>	0.016	0.0038	0.0159	0.0023
Dioxins & Furans (WHO-TEQ Birds)	6-8hrs	None set ng/m <sup>3</sup>	0.024	0.0056	0.0318	0.0045
Anthanthrene	6-8hrs	None set µg/m <sup>3</sup>	<0.001	<0.001	<0.001	<0.001
Benzo(a)anthracene	6-8hrs	None set µg/m <sup>3</sup>	0	0	<0.001	<0.001
Benzo(a)pyrene	6-8hrs	None set µg/m <sup>3</sup>	<0.001	<0.001	<0.001	<0.001
Benzo(b)fluoranthene	6-8hrs	None set µg/m <sup>3</sup>	0	0	<0.001	<0.001
Benzo(b)naphtho(2,1-d)thiophene	6-8hrs	None set µg/m <sup>3</sup>	<0.001	0	0	0
Benzo(c)phenanthrene	6-8hrs	None set µg/m <sup>3</sup>	0.01	0	<0.001	<0.001
Benzo(ghi)perylene	6-8hrs	None set µg/m <sup>3</sup>	<0.001	0	<0.001	<0.001
Benzo(k)fluoranthene	6-8hrs	None set µg/m <sup>3</sup>	<0.001	<0.001	<0.001	<0.001
Cholanthrene	6-8hrs	None set µg/m <sup>3</sup>	<0.001	<0.001	<0.001	<0.001
Chrysene	6-8hrs	None set µg/m <sup>3</sup>	0.03	<0.001	<0.001	<0.001
Cyclopenta(cd)pyrene	6-8hrs	None set µg/m <sup>3</sup>	<0.001	0.02	<0.001	<0.001
Dibenzo(ai)pyrene	6-8hrs	None set µg/m <sup>3</sup>	<0.001	<0.001	<0.001	<0.001
Dibenzo(ah)anthracene	6-8hrs	None set µg/m <sup>3</sup>	<0.001	<0.001	<0.001	<0.001
Fluoranthene	6-8hrs	None set µg/m <sup>3</sup>	0.03	0.14	0	0
Indeno(123-cd) pyrene	6-8hrs	None set µg/m <sup>3</sup>	<0.001	<0.001	<0.001	<0.001
Naphthalene	6-8hrs	None set µg/m <sup>3</sup>	1.23	0.84	0	0

## Comments :

## Emissions to Air (continuously monitored)

Summary of monitoring undertaken, standards used and compliance									

Results of emissions to air that are continuously monitored (maximum and average values for each line)										
Substance	Reference Period	Emission Limit Value	Q1 A1		Q2 A1		Q3 A1		Q4 A1	
			Max.		Max.		Max.		Max.	
Oxides of nitrogen	Daily mean	200 mg/m <sup>3</sup>	190.18		186.39		186.46		186.40	
	½ hourly mean	400 mg/m <sup>3</sup>	316.53		340.79		297.39		292.07	
Particulates	Daily mean	10 mg/m <sup>3</sup>	0.56		0.63		0.65		0.57	
	½ hourly mean	30 mg/m <sup>3</sup>	0.73		0.93		0.86		0.77	
Total Organic Carbon	Daily mean	10 mg/m <sup>3</sup>	0.13		0.08		-0.01		0.06	
	½ hourly mean	20 mg/m <sup>3</sup>	8.27		5.51		3.93		5.18	
Hydrogen chloride	Daily mean	10 mg/m <sup>3</sup>	9.59		9.30		9.48		9.24	
	½ hourly mean	60 mg/m <sup>3</sup>	35.32		29.90		15.63		18.71	
Sulphur dioxide	Daily mean	50 mg/m <sup>3</sup>	38.52		36.33		35.81		27.73	
	½ hourly mean	200 mg/m <sup>3</sup>	76.67		161.03		65.94		81.85	
Carbon monoxide	Daily mean	50 mg/m <sup>3</sup>	1.64		8.76		17.16		7.43	
	95%ile 10-min avg	150 mg/m <sup>3</sup>	6.43		16.37		14.41		20.09	

## Comments :

CEMS data figures are adjusted for the method uncertainty

Results of emissions to air that are continuously monitored (maximum and average values for each quarter for Line 2)										
Substance	Reference Period	Emission Limit Value	Q1 A2		Q2 A2		Q3 A2		Q4 A2	
			Max.		Max.		Max.		Max.	
Oxides of nitrogen	Daily mean	200 mg/m <sup>3</sup>	193.14		183.72		185.38		184.67	
	½ hourly mean	400 mg/m <sup>3</sup>	362.50		307.76		328.91		279.83	
Particulates	Daily mean	10 mg/m <sup>3</sup>	0.83		1.27		3.03		0.44	
	½ hourly mean	30 mg/m <sup>3</sup>	1.31		1.84		4.10		0.54	
Total Organic Carbon	Daily mean	10 mg/m <sup>3</sup>	0.90		0.60		1.65		0.48	
	½ hourly mean	20 mg/m <sup>3</sup>	10.41		3.61		10.63		8.25	
Hydrogen chloride	Daily mean	10 mg/m <sup>3</sup>	9.44		9.36		10.59		9.97	
	½ hourly mean	60 mg/m <sup>3</sup>	24.63		26.54		48.59		39.08	
Sulphur dioxide	Daily mean	50 mg/m <sup>3</sup>	46.54		36.18		18.22		20.89	
	½ hourly mean	200 mg/m <sup>3</sup>	112.09		78.53		40.12		59.67	
Carbon monoxide	Daily mean	50 mg/m <sup>3</sup>	10.65		4.48		9.28		14.76	
	95%ile 10-min avg	150 mg/m <sup>3</sup>	9.20		8.73		17.97		47.09	

## Comments :

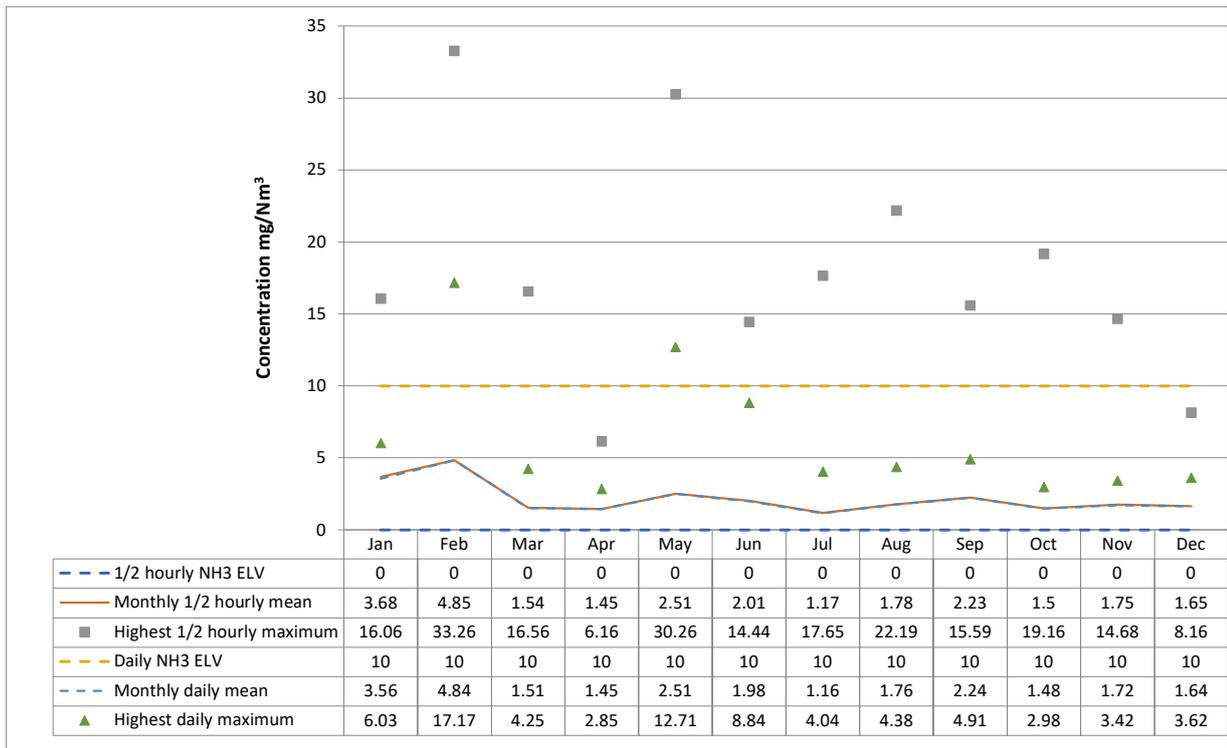
CEMS data figures are adjusted for the method uncertainty

Monitoring of Ammonia emissions

Whole Installation

See Notes in Cell Q3

mg/Nm <sup>3</sup>	1/2 Hourly Reference Periods			Daily Reference Periods		
	1/2 hourly NH3 ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily NH3 ELV	Monthly daily mean	Highest daily maximum
2022						
Jan	0	3.68	16.06	10	3.56	6.03
Feb	0	4.85	33.26	10	4.84	17.17
Mar	0	1.54	16.56	10	1.51	4.25
Apr	0	1.45	6.16	10	1.45	2.85
May	0	2.51	30.26	10	2.51	12.71
Jun	0	2.01	14.44	10	1.98	8.84
Jul	0	1.17	17.65	10	1.16	4.04
Aug	0	1.78	22.19	10	1.76	4.38
Sep	0	2.23	15.59	10	2.24	4.91
Oct	0	1.5	19.16	10	1.48	2.98
Nov	0	1.75	14.68	10	1.72	3.42
Dec	0	1.65	8.16	10	1.64	3.62



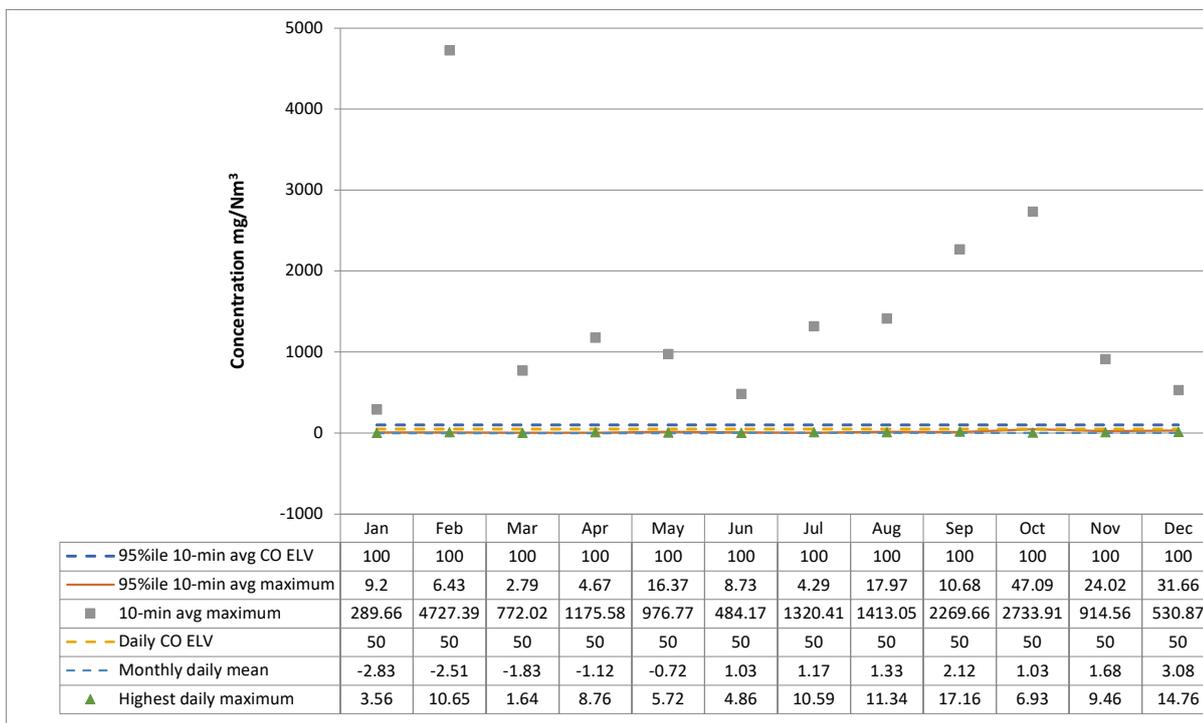
**Comments :**  
 An indicated ELV value of zero in the table above means that no ammonia limit is set in the permit.

Monitoring of Carbon Monoxide (10-minute avg)

Whole Installation

See Notes in Cell S3

mg/Nm <sup>3</sup>	10-minute Reference Periods				Daily Reference Periods		
	95 <sup>th</sup> ile 10-min avg CO ELV	95 <sup>th</sup> ile 10-min avg maximum	Monthly CO 10-min avg mean	10-min avg maximum	Daily CO ELV	Monthly daily mean	Highest daily maximum
2022							
Jan	100	9.2	-2.96	289.66	50	-2.83	3.56
Feb	100	6.43	-1.72	4727.39	50	-2.51	10.65
Mar	100	2.79	-1.72	772.02	50	-1.83	1.64
Apr	100	4.67	-1.12	1175.58	50	-1.12	8.76
May	100	16.37	-0.73	976.77	50	-0.72	5.72
Jun	100	8.73	1.04	484.17	50	1.03	4.86
Jul	100	4.29	1.24	1320.41	50	1.17	10.59
Aug	100	17.97	1.37	1413.05	50	1.33	11.34
Sep	100	10.68	2.08	2269.66	50	2.12	17.16
Oct	100	47.09	1.99	2733.91	50	1.03	6.93
Nov	100	24.02	1.63	914.56	50	1.68	9.46
Dec	100	31.66	3.08	530.87	50	3.08	14.76



Comments :

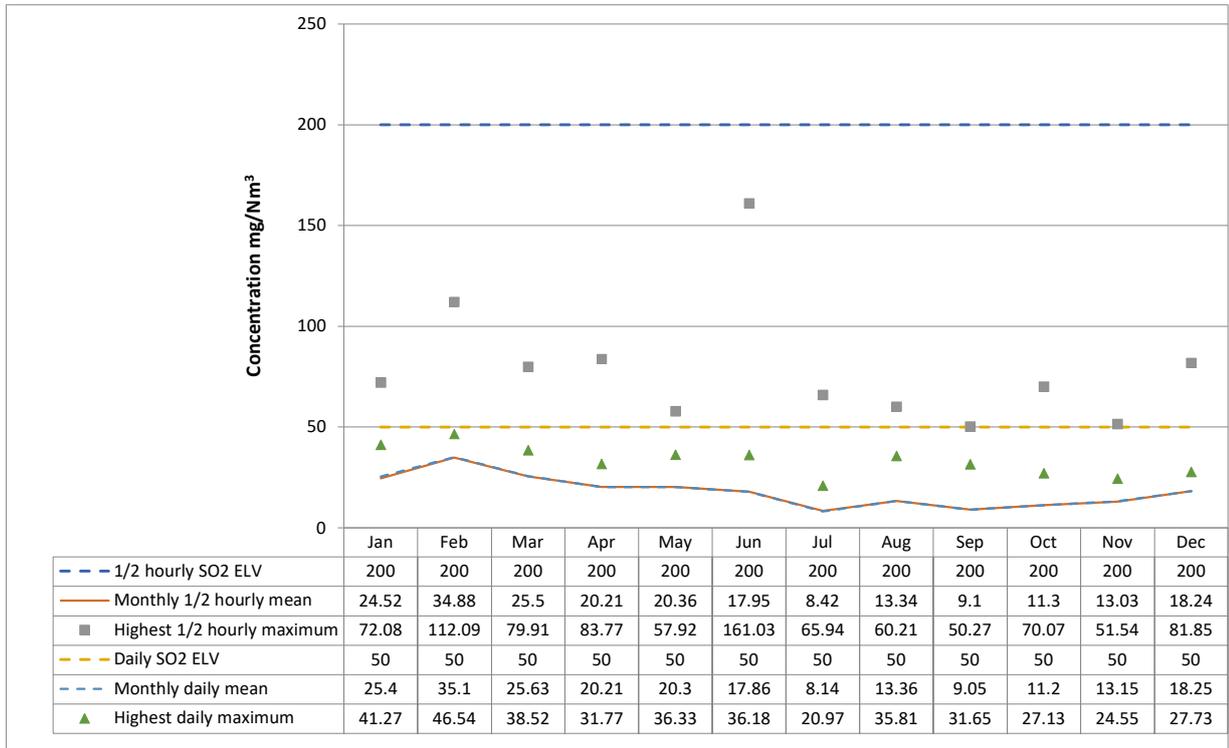
Environment Agency explanatory note: The 10-minute average ELV is based on the “95th percentile”. In this case this means that 95% of the 10 minute averages in the relevant 24-hour period (i.e. 137) must be below 150 mg/Nm3, and 5% (i.e. 7) are allowed to be any value above 150 mg/Nm3. Whilst we expect 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.

Monitoring of Sulphur dioxide emissions

Whole Installation

See Notes in Cell Q3

mg/Nm <sup>3</sup>	1/2 Hourly Reference Periods			Daily Reference Periods		
	1/2 hourly SO2 ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily SO2 ELV	Monthly daily mean	Highest daily maximum
2022						
Jan	200	24.52	72.08	50	25.4	41.27
Feb	200	34.88	112.09	50	35.1	46.54
Mar	200	25.5	79.91	50	25.63	38.52
Apr	200	20.21	83.77	50	20.21	31.77
May	200	20.36	57.92	50	20.3	36.33
Jun	200	17.95	161.03	50	17.86	36.18
Jul	200	8.42	65.94	50	8.14	20.97
Aug	200	13.34	60.21	50	13.36	35.81
Sep	200	9.1	50.27	50	9.05	31.65
Oct	200	11.3	70.07	50	11.2	27.13
Nov	200	13.03	51.54	50	13.15	24.55
Dec	200	18.24	81.85	50	18.25	27.73



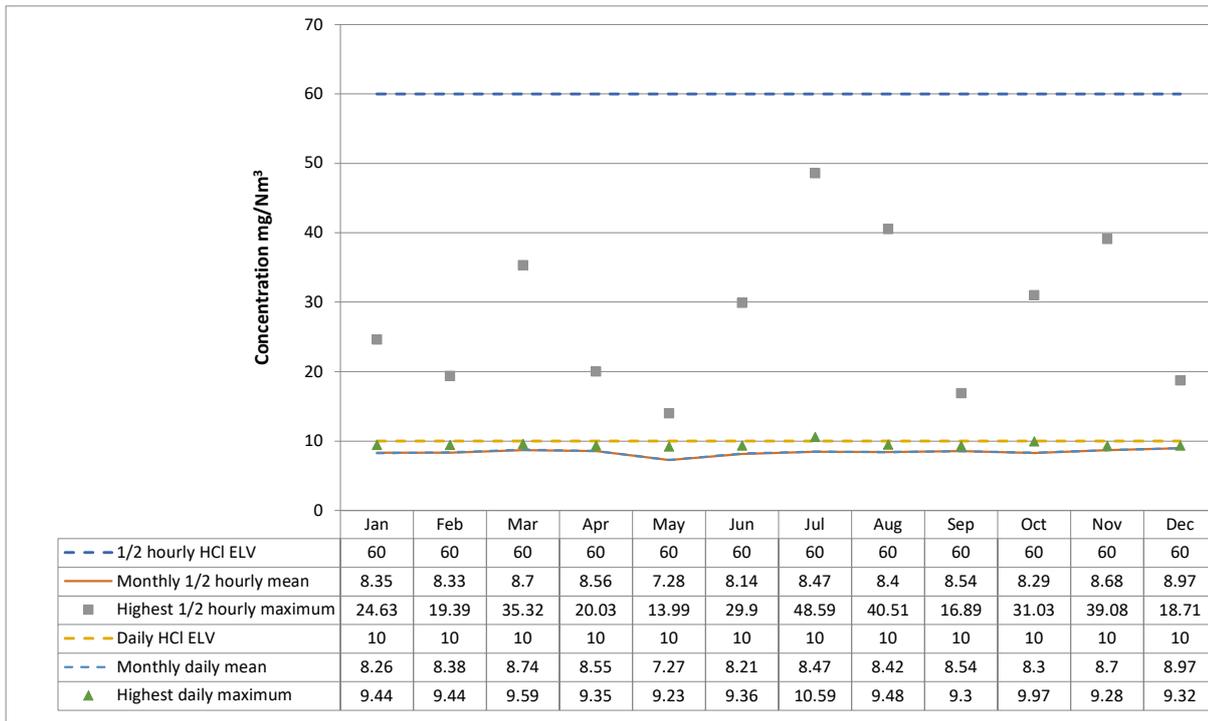
**Comments :**

Monitoring of Hydrogen Chloride emissions

Whole Installation

See Notes in Cell Q3

mg/Nm <sup>3</sup>	1/2 Hourly Reference Periods			Daily Reference Periods		
	1/2 hourly HCl ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily HCl ELV	Monthly daily mean	Highest daily maximum
2022						
Jan	60	8.35	24.63	10	8.26	9.44
Feb	60	8.33	19.39	10	8.38	9.44
Mar	60	8.7	35.32	10	8.74	9.59
Apr	60	8.56	20.03	10	8.55	9.35
May	60	7.28	13.99	10	7.27	9.23
Jun	60	8.14	29.9	10	8.21	9.36
Jul	60	8.47	48.59	10	8.47	10.59
Aug	60	8.4	40.51	10	8.42	9.48
Sep	60	8.54	16.89	10	8.54	9.3
Oct	60	8.29	31.03	10	8.3	9.97
Nov	60	8.68	39.08	10	8.7	9.28
Dec	60	8.97	18.71	10	8.97	9.32

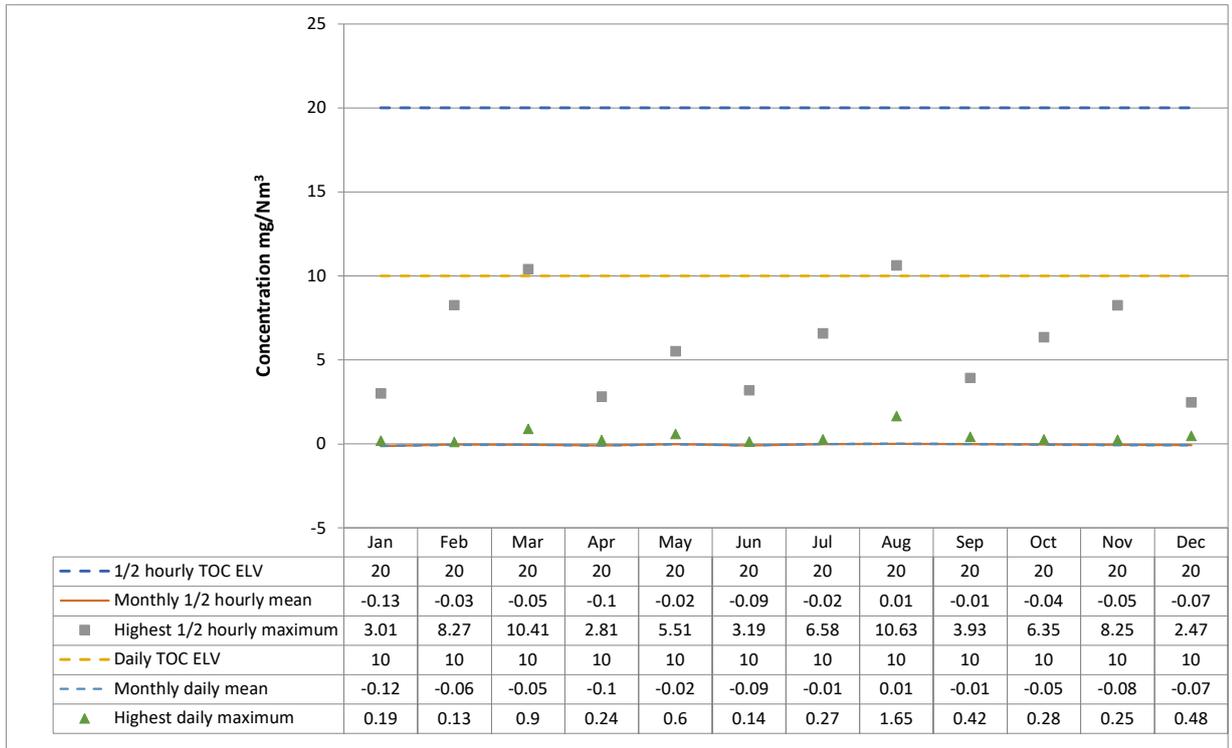


**Comments :**

Monitoring of Total organic carbon emissions Whole Installation

See Notes in Cell Q3

mg/Nm <sup>3</sup>	1/2 Hourly Reference Periods			Daily Reference Periods		
	1/2 hourly TOC ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily TOC ELV	Monthly daily mean	Highest daily maximum
2022						
Jan	20	-0.13	3.01	10	-0.12	0.19
Feb	20	-0.03	8.27	10	-0.06	0.13
Mar	20	-0.05	10.41	10	-0.05	0.9
Apr	20	-0.1	2.81	10	-0.1	0.24
May	20	-0.02	5.51	10	-0.02	0.6
Jun	20	-0.09	3.19	10	-0.09	0.14
Jul	20	-0.02	6.58	10	-0.01	0.27
Aug	20	0.01	10.63	10	0.01	1.65
Sep	20	-0.01	3.93	10	-0.01	0.42
Oct	20	-0.04	6.35	10	-0.05	0.28
Nov	20	-0.05	8.25	10	-0.08	0.25
Dec	20	-0.07	2.47	10	-0.07	0.48



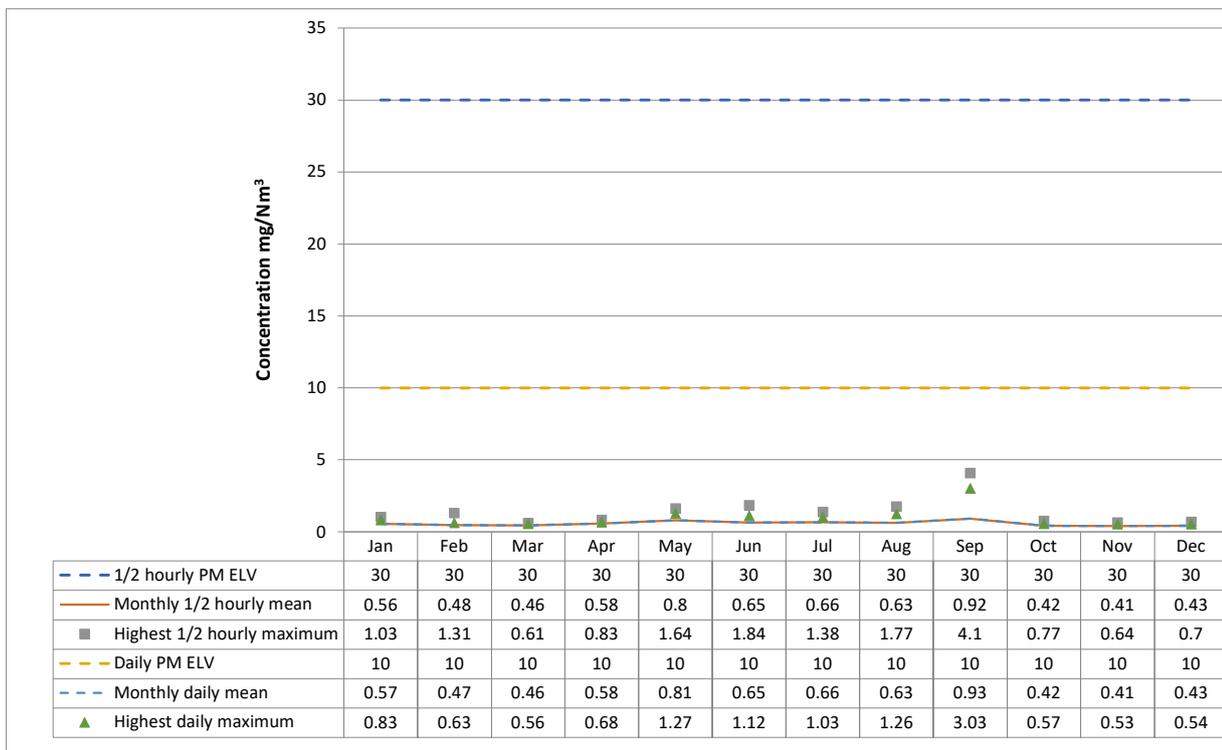
**Comments :**

Monitoring of Particulate matter emissions

Whole Installation

See Notes in Cell Q3

mg/Nm <sup>3</sup>	1/2 Hourly Reference Periods			Daily Reference Periods		
	1/2 hourly PM ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily PM ELV	Monthly daily mean	Highest daily maximum
2022						
Jan	30	0.56	1.03	10	0.57	0.83
Feb	30	0.48	1.31	10	0.47	0.63
Mar	30	0.46	0.61	10	0.46	0.56
Apr	30	0.58	0.83	10	0.58	0.68
May	30	0.8	1.64	10	0.81	1.27
Jun	30	0.65	1.84	10	0.65	1.12
Jul	30	0.66	1.38	10	0.66	1.03
Aug	30	0.63	1.77	10	0.63	1.26
Sep	30	0.92	4.1	10	0.93	3.03
Oct	30	0.42	0.77	10	0.42	0.57
Nov	30	0.41	0.64	10	0.41	0.53
Dec	30	0.43	0.7	10	0.43	0.54



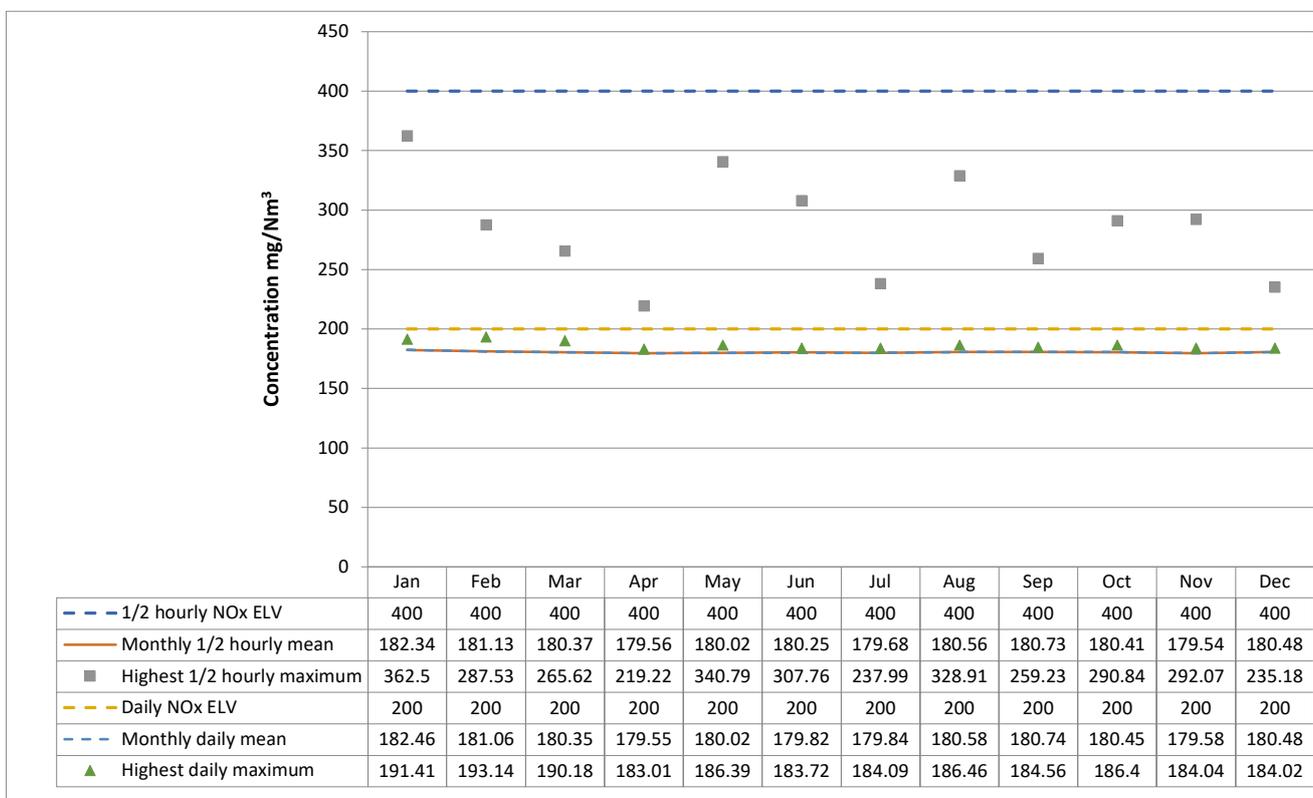
**Comments :**

Monitoring of Oxides of Nitrogen emissions

Whole Installation

See Notes in Cell Q3

mg/Nm <sup>3</sup>	1/2 Hourly Reference Periods			Daily Reference Periods		
	1/2 hourly NOx ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily NOx ELV	Monthly daily mean	Highest daily maximum
2022						
Jan	400	182.34	362.5	200	182.46	191.41
Feb	400	181.13	287.53	200	181.06	193.14
Mar	400	180.37	265.62	200	180.35	190.18
Apr	400	179.56	219.22	200	179.55	183.01
May	400	180.02	340.79	200	180.02	186.39
Jun	400	180.25	307.76	200	179.82	183.72
Jul	400	179.68	237.99	200	179.84	184.09
Aug	400	180.56	328.91	200	180.58	186.46
Sep	400	180.73	259.23	200	180.74	184.56
Oct	400	180.41	290.84	200	180.45	186.4
Nov	400	179.54	292.07	200	179.58	184.04
Dec	400	180.48	235.18	200	180.48	184.02



Comments :