



Annual Performance Report 2021

Permit EPR/LP3030XA

Cardiff Energy Recovery Facility

Trident Park ERF

VIRIDOR TRIDENT PARK LIMITED

Year: 2021

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Version: D1

Issue Date: 31-Jan-22

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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; therefore the 2021 Report is the 7th document.

This report summarises the environmental and performance data collected at the site 1st January – 31st December 2021 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	69,369	68,799	68,532	68,129	274,829	72.6%
Commercial & Industrial		28,079	17,055	20,060	34,215	99,409	26.3%
Hazardous		-	-	-	-	-	-
Clinical		1,221	1,086	1,278	579	4,164	1.1%
Waste wood (biomass)		-	-	-	-	-	-
Refuse Derived Fuel * - H'hold/LA		-	-	-	-	-	-
Refuse Derived Fuel * - C&I		-	-	-	-	-	-
Total waste received		98,669	86,940	89,870	102,923	378,402	100.0%
Rejected Waste		-	-	-	-	-	-
Unprocessed waste transferred out		6.1	-	3.2	-	9	0.0%
Total waste combusted		98,663	86,940	89,867	102,923	378,393	100.0%

Energy Usage / Export	Unit	Q1	Q2	Q3	Q4	Year Total	KWh/te
Power Generated	MWh	71,317	65,560	70,657	78,172	285,706	755
Power Exported		63,902	58,719	62,473	69,968	255,062	674
Power Used on site		7,266	8,264	7,947	7,910	31,387	83
Power Imported		223	320	155	48	746	2
Parasitic Load	%	10.7%	10.9%	11.8%	10.5%	11.0%	-
Thermal Energy Produced **	MWh	-	-	-	-	-	-
Thermal Energy Exported **		-	-	-	-	-	-
R1 value	0.8	Operational				Design / Operational / n/a	

Waste Disposal & Recovery	Unit	Q1	Q2	Q3	Q4	Year Total	% inputs
APC Residues - produced 190107	tonnes	2,266	1,955	2,080	2,299	8,600	2.3%
IBA - produced 190112		19,401	17,252	17,819	20,951	75,423	19.9%
Metals recycling 190102		2,173	2,218	1,717	1,252	7,360	1.9%
other wastes (including mixtures of t		-	-	-	-	-	-

Raw Material Usage	Unit	Q1	Q2	Q3	Q4	Year Total	kg or Ltr /te
Mains Water	ltrs	9,992	10,431	12,190	12,080	44,693	0.12
Urea	kgs	105,000.00	93,000	130,000	138,000	466,000	1.23
Activated Carbon	kgs	34,000	32,000	34,000	37,000	137,000	0.36
Lime / hydrated lime	kgs	1,148,000	1,035,000	1,124,000	1,182,000	4,489,000	11.86
Fuel oil	ltrs	179,679	105,069	161,387	100,707	546,842	1.45
Other		-	-	-	-	-	-

Summary	Line/Unit	Q1	Q2	Q3	Q4	Year Total	
Availability of waste combustion by line, hrs	1	1,969	1,964	1,762	1,963	7,658	87.2%
	2	1,968	1,627	2,202	2,202	7,999	91.1%
Overall Availability, mean avg. of all lines, hrs		3,937	3,591	3,964	4,165	7,829	89.1%
Hours of turbine operations, hrs	1	2,083	1,968	2,169	2,192	8,412	95.8%
Hours of heat / steam export		-	-	-	-	-	n/a
Net Calorific Value of waste	MJ/kg	9.61	10.04	10.15	9.80	-	-
Abnormal Events	qty.	-	-	-	-	-	no
Abnormal operation	hours	-	-	-	-	-	0.00%
Permit Breaches	qty.	2	-	2	2	6	yes

Summary of Plant Operations and Maintenance during the reporting year
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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 8 June to 10 July 2021. 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 in 2021.

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. APCr sent for disposal is mixed with water before it is transferred to a hazardous waste cell in the landfill.

2021 Annual Reporting Performance Form 1

Permit EPR/LP3030XA

Facility: Cardiff Energy Recovery Facility

Operator: Viridor Trident Park Limited

Form: Performance 1

Reporting Period from:

01 January 2021

to:

31 December 2021

2021 Annual Reporting of Waste Disposal and Recovery

Waste Description	Disposal Route(s)	Disposal Tonnes	Recovery Tonnes	% / tonne of waste incinerated
1) Hazardous Wastes				
APC Residues	D05.03	1,504.0	2,781.1	1.1%
IBA	0.0	0.0	0.0	-
Total Hazardous Waste		1,504.0	2,781.1	1.1%
2) Non-Hazardous Wastes				
IBA	R05	0.0	57,030.6	15.1%
Ferrous Metal	R04	0.0	7,284.1	1.9%
Process Water (other wastes (including mixtures of materials))	D05.02	0.0	0.0	-
Total Non-Hazardous Waste		0.0	64,314.7	17.0%
TOTAL WASTE		1,504.0	67,095.8	18.1%

Operator's comments :

2021 Annual Reporting of Water and Other Raw Material Usage

Mains Water	44693	litres	0.12	l/te
Urea / Ammonia	466000	kg	1.23	kg/te
Activated Carbon	137000	kg	0.36	kg/te
Lime	4489000	kg	11.86	kg/te

Operator's comments :

2021 Annual Reporting of other performance indicators

	A1	A2			Turbine
Operating hours for the year, hours	7658	7999			8412
Number of periods of abnormal operation, qty.	0	0			N/A
Cumulative hours of abnormal operation for this year, hours	0	0			N/A

Operator's comments :

Signed: G Jones

Date: 30 1 2021

2021 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 2021

to:

31 December 2021

Energy Source	Energy Usage	Unit	Specific Usage (KWh/tonne incinerated)
Electricity Produced	285,706	MWh	755
Electricity Imported	746	MWh	2
Electricity Exported	255,062	MWh	674
Diesel Oil	546842	litres	
Steam/hot water exported	0	GWh	-

Operator's comments :

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Signed: G Jones

Date: 30 1 2022

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	99.92%	100.00%
Sulphur dioxide	99.92%	100.00%
Carbon monoxide	100% (of all 95% 10 min. averages)	100.00%
Total organic carbon	99.97%	100.00%
Hydrogen chloride	99.92%	100.00%
Hydrogen fluoride	100.00%	100.00%
	99.95%	100.00%

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
4_1_2021	VOC release Line 1 14:30H – 14:59H 63.22mg/m3 15:00H – 15:29H 36.33mg/m3 15:30H - 15:59H 21.71mg/m3	Power loss causing a technically unavoidable stoppage. Control Room undertook safe shutdown. Feed chute dampers closed on both lines initiating the shutdown of both boilers for repairs to take place and CEMS OFF signal to be triggered. Modelling of the incident has concluded there was no significant impact to the environment from this event	RCA undertaken
23_1_2021	VOC Line 1. 07:30 - 07:59H = 29.06mg/m3 08:00 - 08:29H = 22.29mg/m3	Line 1 was returning to service after tube leak.	A review of the start-up process
6_8_2021	45 gallon drum fire in the Bulky Bay.	Residue in an old drum that was brought into site within a waste load.	Targetted inspection on waste suppliers.
12_9_2021	Line 2. Communication between CEMS Room and Master CDAS PC failed. For HCl, SO ₂ , NO _x and CO.	Shift Team Leader (STL) authorised a re-zero of Line 2 Duty analyser, FID and GR52. The CDAS computer was re-booted and returned to normal data collection.	
31/10/2021	Line 2 VOC 21:30H - 21:59H 29.68mg/m3	No further action required; analyser returned to below ELV after external (WPD) power loss event. Telephone call made to NRW at 21:05H to inform regulator of a power loss event	

20/12/2021	Line 1 14:30H - 14:59H 72.47mg/m3	HCl	Upon detection of HCl spike the boiler load was reduced and the Stand-by reagent dosing line was started to supplement the Duty reagent dosing line. This intervention was successful in returning subsequent half hourly averages to normal levels.	

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

Date	Summary of complaint [including Line/Reference]	Reason *	Measures taken to prevent reoccurrence
8_1_2021	Viridor - caller reporting greyish / white emissions coming out from the stack at the site most of the morning. Says the cloud is going about 10 metres in the air and then falling to ground.	Unsubstantiated.	This complaint was unable to be substantiated so further measures to prevent reoccurrence could not be concluded.
20_1_2021	Caller reporting emissions from the stack at viridor are blowing directly over the properties. Horrible noticeable odour at present .	Unsubstantiated.	This complaint was unable to be substantiated so further measures to prevent reoccurrence could not be concluded.
25_1_2021	E-mail from NRW (site inspector) with photo of plume dispersion	Unsubstantiated as tube leak on Line 1. There were no reportable emissions.	No further action.
5_2_2021	Caller reporting strong burning odour from Viridor Site - Which has started approx 45 mins ago.	Unsubstantiated.	Shift Team Leader undertook site walk no odour detected.
16_2_2021	Caller reporting "Cardiff being engulfed in incineration emissions from the Viridor stacks" on Sunday 14th Feb 2020 at 21:55	Unsubstantiated. No action could be taken as delay in submitting complaint.	This complaint was unable to be substantiated so further measures to prevent reoccurrence could not be concluded.
5_5_2021	Received from ICC Caller reporting heavy emissions and air pollution from the Viridor plant today around 5-6pm	Unsubstantiated. Feedback provided to NRW	No further action.
7_5_2021	Received from ICC Reporter stated that he could see "steam pouring out" of the main building at the Viridor site in Cardiff.	Unsubstantiated. Feedback provided to NRW	No further action.
19_11_2021	Received from NRW Site Inspector reports that several residents in the Splott/Tremorfa area have found white ash around the area. The media seem to be aware of the issue.	Unsubstantiated. Feedback provided to NRW	No further action.
23_12_2021	Received from NRW site inspector Ash fallout in the area	Unsubstantiated	No further action

23_12_2021	Received from ICC Caller reporting that all waste that Viridor are bringing in is being stored outside of the site and is piling up.	Unsubstantiated. Feedback and photos provided to NRW site inspector	E-mail received from NRW site inspector confirming photos showed no waste was being stored outside.
	* including whether substantiated by the operator or the EA		

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

Western Power Distribution built and completed a sub station (with upgraded power connection) that allowed Trident Park ERF to export more electricity onto the National Grid.

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

All Improvement Conditions associated with Cardiff Energy Recovery Facility's Environmental Permit EPR/LP3030XA were completed prior to the calendar year of 2021.

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.

On the 21_1_2021 a transfer notice (T006) was issued to Viridor Trident Park Limited. On the 21_1_2021 a variation notice (V007) was issued to add one EWC code to the permit.

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.

Within the next 2 years it is hoped that a District Heat Network shall be established using heat that is generated during the energy from waste process. Viridor have been in discussion with Cardiff County Council regarding the funding, use and maintenance of the heat network.

Details of Public & Stakeholder Liasion

Summary of events held during the reporting year.	
Date	Description
12_1_2021	Community Liasion Meeting held over video conference call.
13_4_2021	Community Liasion Meeting held over video conference call.
20_7_2021	Community Liasion Meeting held over video conference call.
14_9_2021	Open day
16_9_2021	Open day
11_10_2021	Community Liasion Meeting held over video conference call.

List of events planned for next year	
Date	Description
Jan-22	11 Jan 2022 Community Liasion Meeting was held via TEAMS conference call.
Apr-22	Due to the ongoing Coronavirus Pandemic it is likely that Community Liasion Meetings shall be continue to be undertaken over video conference call.
Jul-22	A decision on how this CLG will be held (TEAMS or meeting) TBC
Oct-22	A decision on how this CLG will be held (TEAMS or meeting) TBC
TBC	2 open dates are scheduled to be held during 2022. Dates are "to be confirmed".

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

Residue Quality Monitoring Requirements

Summary of monitoring undertaken and compliance A5:G1A5:G39
During the calendar year of 2021, 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%	2.7%	
Total Organic Carbon (average %)	<3%	L1 1.1% L2 1.1%	
No. of Assessments Undertaken	---	32	8
No. of Hazardous Results	---	0	

Comments :

Annual Performance Report 2 Cardiff Energy Recovery Facility

Emissions to Water

Summary of monitoring undertaken and compliance
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.

Commentary on any specific events	
Date & Event	Description
	No adverse events during year.

Emissions to Water / Sewer					
Parameter	Monitoring Frequency	Limit	Target	Max.	Average
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	9.54	21.3	10.2	8.98
Hydrogen fluoride		2 mg/m ³	0.11	0.02	0.01	0.01
Hg and its compounds		0.05 mg/m ³	0.0011	0.0029	0.0031	0.0034
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	6-8hrs	0.5 mg/m ³	0.008	0.017	0.044	0.0332
Dioxins & Furans (I-TEQ)	6-8hrs	0.1 ng/m ³	0.0376	0.0135	0.0255	0.0037
PCBs (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m ³	0.00202	0.00103	0.022	0.0013
PCBs (WHO-TEQ Fish)	6-8hrs	None set ng/m ³	0.00011	0.00005	0.0001	0.0001
PCBs (WHO-TEQ Birds)	6-8hrs	None set ng/m ³	0.00534	0.00222	0.0042	0.0026
Dioxins & Furans (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m ³	0.0348	0.0125	0.0202	0.0226
Dioxins & Furans (WHO-TEQ Fish)	6-8hrs	None set ng/m ³	0.0389	0.0142	0.0258	0.027
Dioxins & Furans (WHO-TEQ Birds)	6-8hrs	None set ng/m ³	0.0688	0.0064	0.0404	0.0375
Anthanthrene	6-8hrs	None set µg/m ³	<0.001	<0.001	<0.0011	<0.0011
Benzo(a)anthracene	6-8hrs	None set µg/m ³	<0.001	0.05	0.01	0
Benzo(a)pyrene	6-8hrs	None set µg/m ³	<0.001	0	0	0
Benzo(b)fluoranthene	6-8hrs	None set µg/m ³	<0.001	0.01	0.01	0
Benzo(b)naptho(2,1-d) thiophene	6-8hrs	None set µg/m ³	<0.001	<0.001	0	0
Benzo(c)phenanthrene	6-8hrs	None set µg/m ³	<0.001	<0.001	<0.0011	<0.0011
Benzo(ghi)perylene	6-8hrs	None set µg/m ³	0	0.01	0.01	0.01
Benzo(k)fluoranthene	6-8hrs	None set µg/m ³	<0.001	0	<0.0011	0
Cholanthrene	6-8hrs	None set µg/m ³	<0.001	<0.001	<0.0011	<0.0011
Chrysene	6-8hrs	None set µg/m ³	<0.001	<0.001	0.01	0.01
Cyclopenta(cd)pyrene	6-8hrs	None set µg/m ³	<0.001	<0.001	<0.0011	<0.0011
Dibenzo(ai)pyrene	6-8hrs	None set µg/m ³	<0.001	<0.001	<0.0011	<0.0011
Dibenzo(ah)anthracene	6-8hrs	None set µg/m ³	<0.001	<0.001	<0.0011	<0.0011
Fluoranthene	6-8hrs	None set µg/m ³	0.01	1.41	0.03	0.04
Indeno(123-cd) pyrene	6-8hrs	None set µg/m ³	<0.001	0	0.01	0
Naphthalene	6-8hrs	None set µg/m ³	0.15	0.11	0.33	0.34

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 ³	175.77		180.66		191.51		184.79	
	½ hourly mean	400 mg/m ³	315.70		279.82		286.44		342.18	
Particulates	Daily mean	10 mg/m ³	0.56		0.59		0.78		0.62	
	½ hourly mean	30 mg/m ³	0.68		0.89		2.27		0.90	
Total Organic Carbon	Daily mean	10 mg/m ³	0.86		0.08		0.10		0.40	
	½ hourly mean	20 mg/m ³	63.22		4.44		2.46		7.81	
Hydrogen chloride	Daily mean	10 mg/m ³	9.37		9.49		9.21		9.38	
	½ hourly mean	60 mg/m ³	27.31		34.35		44.46		72.47	
Sulphur dioxide	Daily mean	50 mg/m ³	34.65		30.87		38.50		33.68	
	½ hourly mean	200 mg/m ³	102.95		82.22		82.05		100.65	
Carbon monoxide	Daily mean	50 mg/m ³	10.50		8.53		6.55		21.86	
	95%ile 10-min avg	150 mg/m ³	111.29		3.85		5.11		71.85	

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 ³	187.08		188.78		188.33		192.42	
	½ hourly mean	400 mg/m ³	345.81		395.19		271.71		354.63	
Particulates	Daily mean	10 mg/m ³	0.55		0.43		0.42		0.92	
	½ hourly mean	30 mg/m ³	0.71		1.12		0.64		1.53	
Total Organic Carbon	Daily mean	10 mg/m ³	0.58		0.09		0.67		0.22	
	½ hourly mean	20 mg/m ³	6.07		5.59		4.41		29.68	
Hydrogen chloride	Daily mean	10 mg/m ³	9.19		9.33		9.59		9.65	
	½ hourly mean	60 mg/m ³	36.28		17.37		31.00		57.84	
Sulphur dioxide	Daily mean	50 mg/m ³	28.68		24.46		33.64		41.70	
	½ hourly mean	200 mg/m ³	60.45		94.16		59.44		160.29	
Carbon monoxide	Daily mean	50 mg/m ³	24.49		9.59		23.42		20.12	
	95%ile 10-min avg	150 mg/m ³	16.00		9.46		7.64		43.55	

Comments :

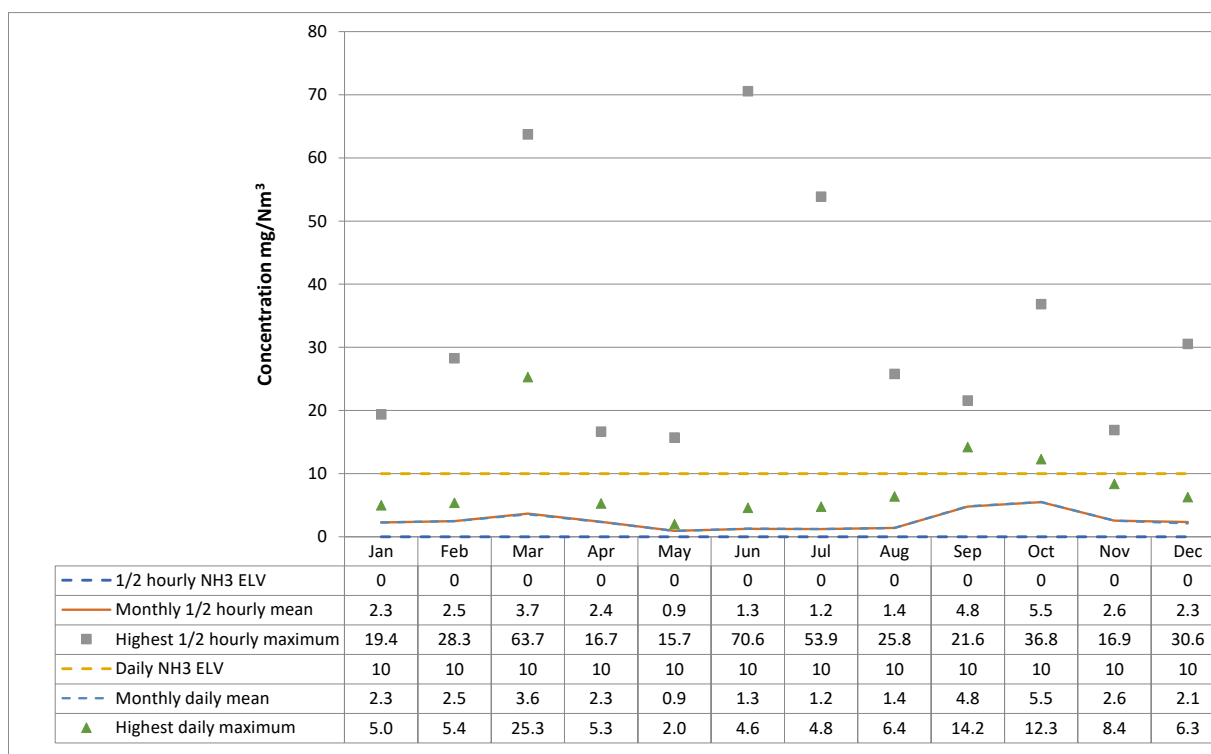
CEMS data figures are adjusted for the method uncertainty

Monitoring of Ammonia emissions

Whole Installation

See Notes in Cell Q3

mg/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	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	2.3	19.4	10	2.3	5.0
Feb	0	2.5	28.3	10	2.5	5.4
Mar	0	3.7	63.7	10	3.6	25.3
Apr	0	2.4	16.7	10	2.3	5.3
May	0	0.9	15.7	10	0.9	2.0
Jun	0	1.3	70.6	10	1.3	4.6
Jul	0	1.2	53.9	10	1.2	4.8
Aug	0	1.4	25.8	10	1.4	6.4
Sep	0	4.8	21.6	10	4.8	14.2
Oct	0	5.5	36.8	10	5.5	12.3
Nov	0	2.6	16.9	10	2.6	8.4
Dec	0	2.3	30.6	10	2.1	6.3

**Comments :**

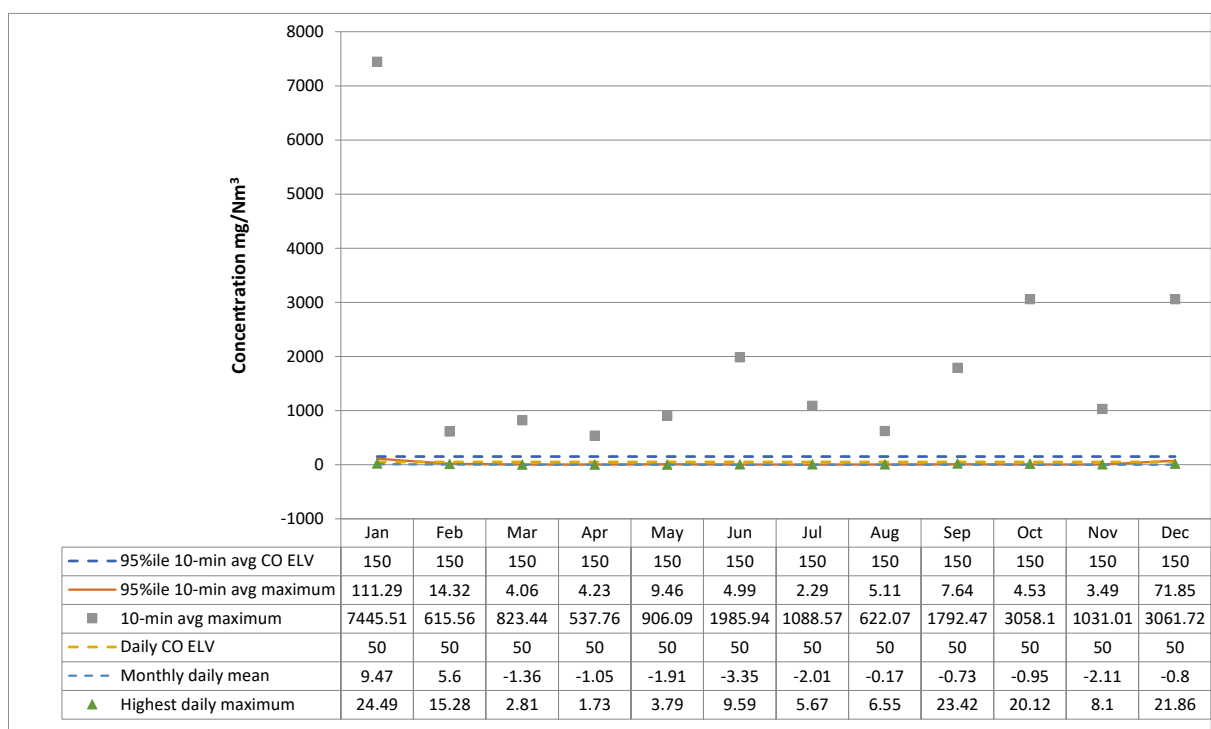
An indicated ELV value of zero in the table above means that no ammonia limit is set in the permit.

Monitoring of Carbon Monoxide (10-minute avg)

Whole Installation

See Notes in Cell S3

mg/Nm ³	10-minute Reference Periods				Daily Reference Periods		
2021	95 th ile 10-min avg CO ELV	95 th 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	111.29	10.94	7445.51	50	9.47	24.49
Feb	150	14.32	5.68	615.56	50	5.6	15.28
Mar	150	4.06	-1.32	823.44	50	-1.36	2.81
Apr	150	4.23	-1.04	537.76	50	-1.05	1.73
May	150	9.46	-1.72	906.09	50	-1.91	3.79
Jun	150	4.99	-3.12	1985.94	50	-3.35	9.59
Jul	150	2.29	-1.78	1088.57	50	-2.01	5.67
Aug	150	5.11	-0.16	622.07	50	-0.17	6.55
Sep	150	7.64	-0.69	1792.47	50	-0.73	23.42
Oct	150	4.53	-0.06	3058.1	50	-0.95	20.12
Nov	150	3.49	-2.05	1031.01	50	-2.11	8.1
Dec	150	71.85	-0.93	3061.72	50	-0.8	21.86



Comments :

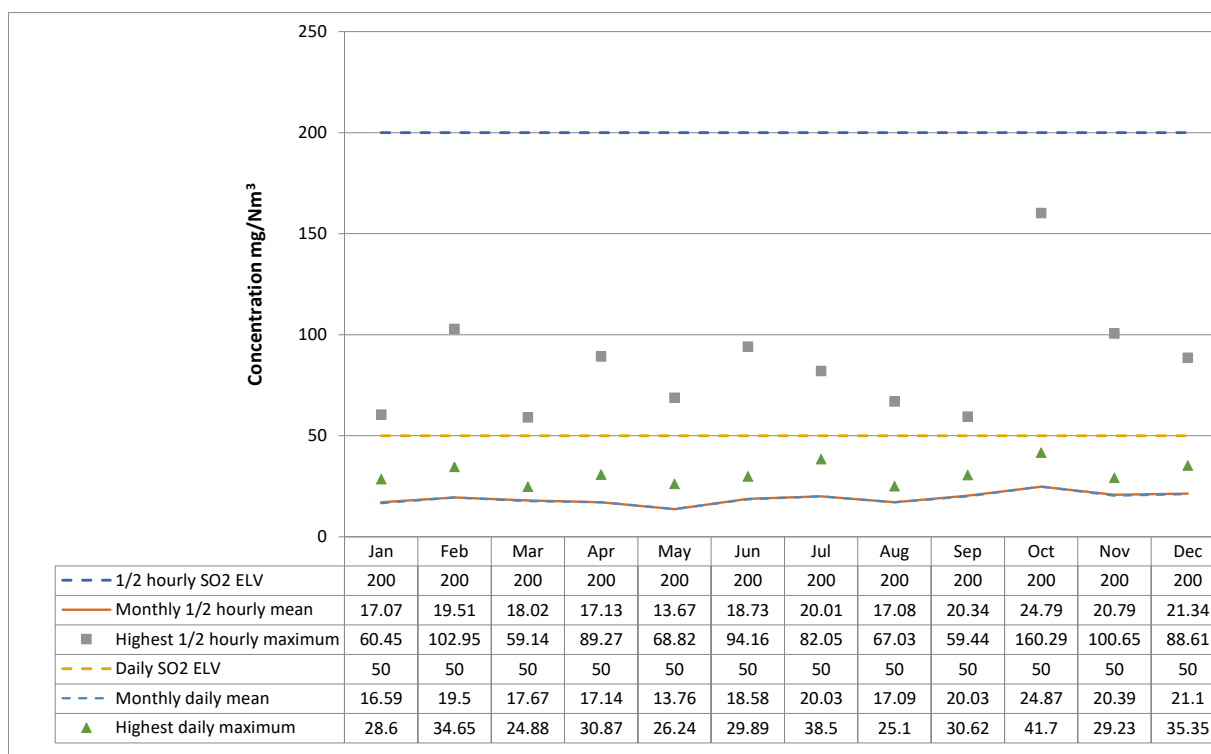
Environment Agency explanatory note: The 10-minute average ELV is based on the "95th percentile". In this case this means that 95% of the 10 minute averages in the relevant 24-hour period (i.e. 137) must be below 150 mg/Nm³, and 5% (i.e. 7) are allowed to be any value above 150 mg/Nm³. Whilst we expect 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 ³	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	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	17.07	60.45	50	16.59	28.6
Feb	200	19.51	102.95	50	19.5	34.65
Mar	200	18.02	59.14	50	17.67	24.88
Apr	200	17.13	89.27	50	17.14	30.87
May	200	13.67	68.82	50	13.76	26.24
Jun	200	18.73	94.16	50	18.58	29.89
Jul	200	20.01	82.05	50	20.03	38.5
Aug	200	17.08	67.03	50	17.09	25.1
Sep	200	20.34	59.44	50	20.03	30.62
Oct	200	24.79	160.29	50	24.87	41.7
Nov	200	20.79	100.65	50	20.39	29.23
Dec	200	21.34	88.61	50	21.1	35.35



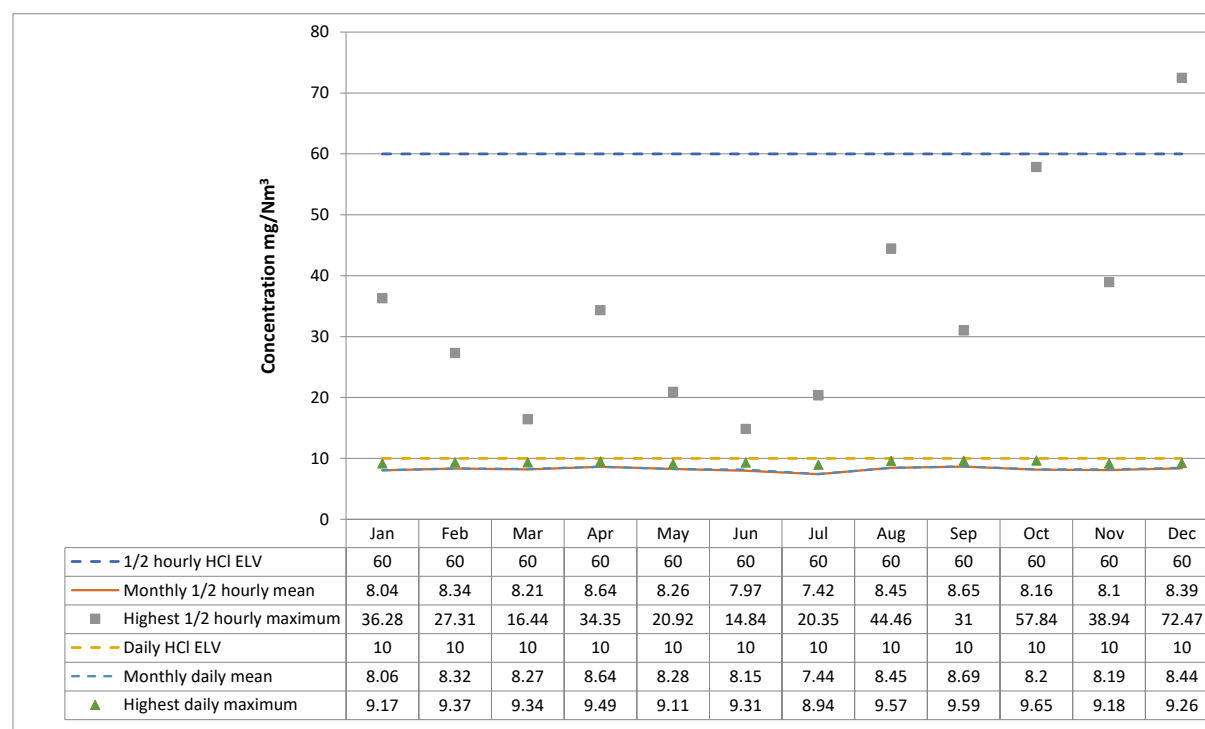
Comments :

Monitoring of Hydrogen Chloride emissions

Whole Installation

See Notes in Cell Q3

mg/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	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	8.04	36.28	10	8.06	9.17
Feb	60	8.34	27.31	10	8.32	9.37
Mar	60	8.21	16.44	10	8.27	9.34
Apr	60	8.64	34.35	10	8.64	9.49
May	60	8.26	20.92	10	8.28	9.11
Jun	60	7.97	14.84	10	8.15	9.31
Jul	60	7.42	20.35	10	7.44	8.94
Aug	60	8.45	44.46	10	8.45	9.57
Sep	60	8.65	31	10	8.69	9.59
Oct	60	8.16	57.84	10	8.2	9.65
Nov	60	8.1	38.94	10	8.19	9.18
Dec	60	8.39	72.47	10	8.44	9.26



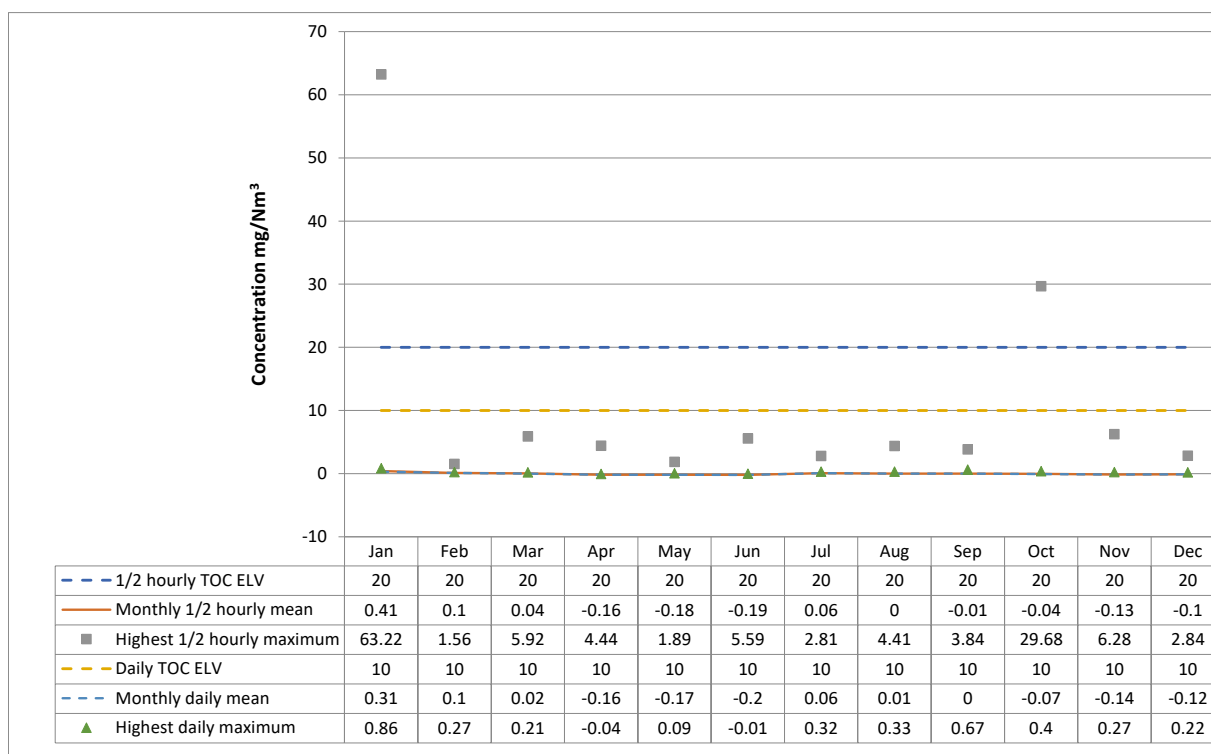
Comments :

Monitoring of Total organic carbon emissions

Whole Installation

See Notes in Cell Q3

mg/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	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	0.41	63.22	10	0.31	0.86
Feb	20	0.1	1.56	10	0.1	0.27
Mar	20	0.04	5.92	10	0.02	0.21
Apr	20	-0.16	4.44	10	-0.16	-0.04
May	20	-0.18	1.89	10	-0.17	0.09
Jun	20	-0.19	5.59	10	-0.2	-0.01
Jul	20	0.06	2.81	10	0.06	0.32
Aug	20	0	4.41	10	0.01	0.33
Sep	20	-0.01	3.84	10	0	0.67
Oct	20	-0.04	29.68	10	-0.07	0.4
Nov	20	-0.13	6.28	10	-0.14	0.27
Dec	20	-0.1	2.84	10	-0.12	0.22



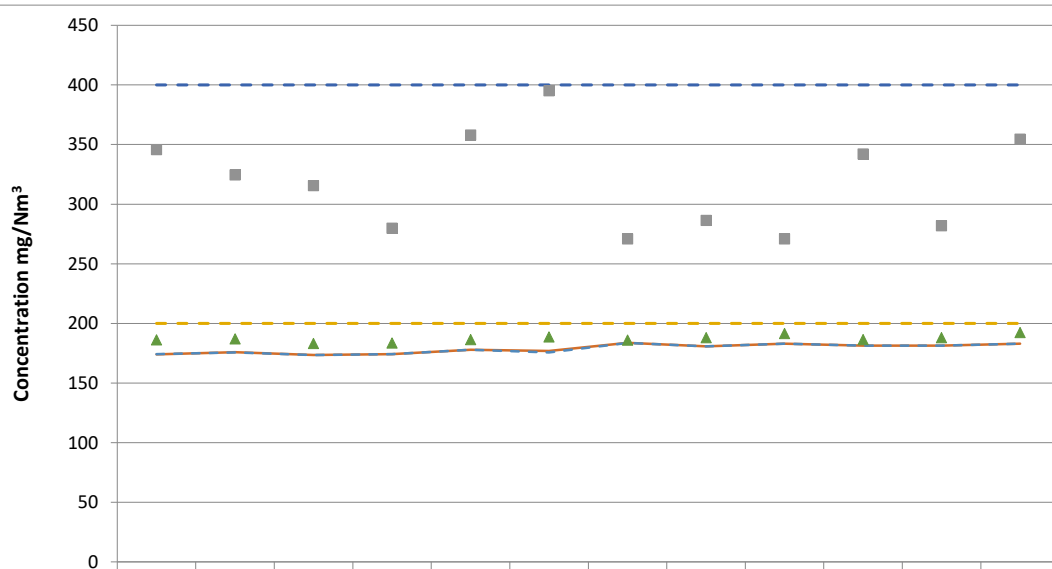
Comments :

Monitoring of Oxides of Nitrogen emissions

Whole Installation

See Notes in Cell Q3

mg/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	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	173.95	345.81	200	174.24	186.2
Feb	400	175.77	324.66	200	175.72	187.08
Mar	400	173.5	315.7	200	173.46	183.17
Apr	400	174.25	279.82	200	174.22	183.59
May	400	177.97	358.06	200	177.83	186.5
Jun	400	176.93	395.19	200	175.65	188.78
Jul	400	183.71	270.88	200	183.61	186.08
Aug	400	180.8	286.44	200	180.79	188.13
Sep	400	183.02	270.9	200	183.07	191.51
Oct	400	181.4	342.18	200	181.42	186.45
Nov	400	181.38	281.95	200	181.34	188.08
Dec	400	182.92	354.63	200	183.05	192.42



	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	173.95	175.77	173.5	174.25	177.97	176.93	183.71	180.8	183.02	181.4	181.38	182.92
■ Highest 1/2 hourly maximum	345.81	324.66	315.7	279.82	358.06	395.19	270.88	286.44	270.9	342.18	281.95	354.63
— Daily NOx ELV	200	200	200	200	200	200	200	200	200	200	200	200
— Monthly daily mean	174.24	175.72	173.46	174.22	177.83	175.65	183.61	180.79	183.07	181.42	181.34	183.05
▲ Highest daily maximum	186.2	187.08	183.17	183.59	186.5	188.78	186.08	188.13	191.51	186.45	188.08	192.42

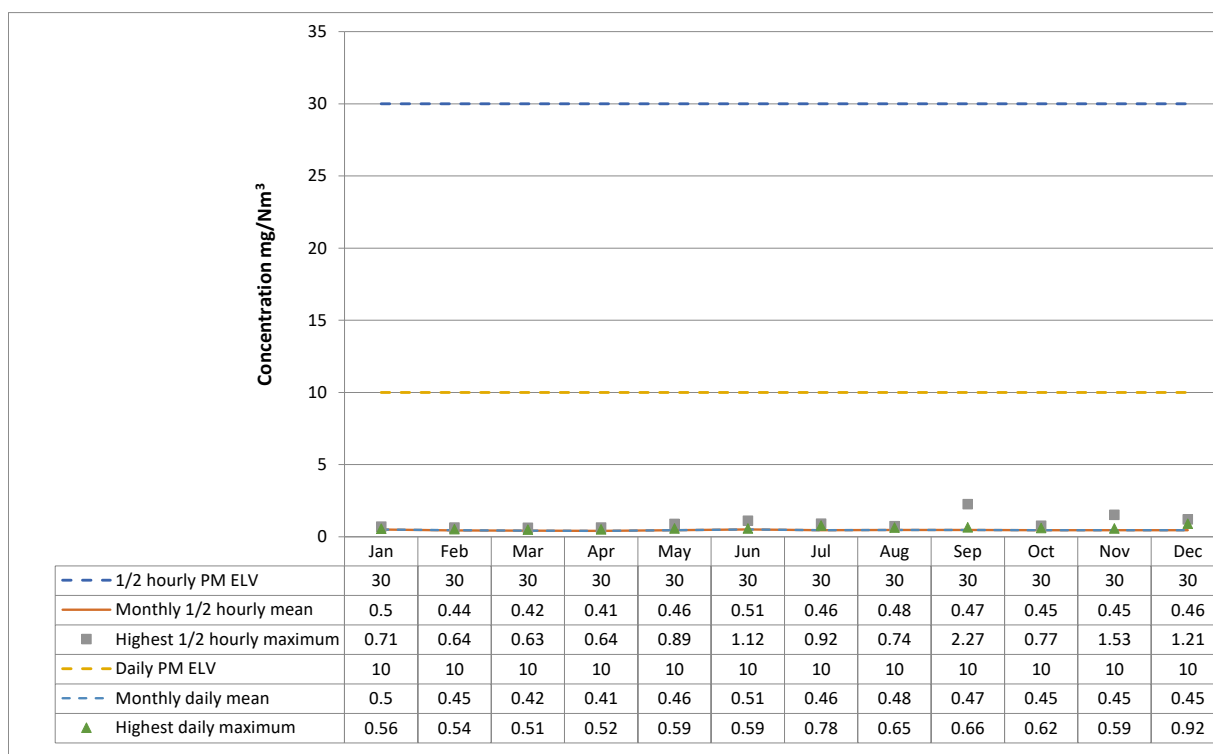
Comments :

Monitoring of Particulate matter emissions

Whole Installation

See Notes in Cell Q3

mg/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	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	0.71	10	0.5	0.56
Feb	30	0.44	0.64	10	0.45	0.54
Mar	30	0.42	0.63	10	0.42	0.51
Apr	30	0.41	0.64	10	0.41	0.52
May	30	0.46	0.89	10	0.46	0.59
Jun	30	0.51	1.12	10	0.51	0.59
Jul	30	0.46	0.92	10	0.46	0.78
Aug	30	0.48	0.74	10	0.48	0.65
Sep	30	0.47	2.27	10	0.47	0.66
Oct	30	0.45	0.77	10	0.45	0.62
Nov	30	0.45	1.53	10	0.45	0.59
Dec	30	0.46	1.21	10	0.45	0.92



Comments :