WBOC
Tilbury Green Power Plant

Annual Performance Report 2022

Permit EPR/KP3936ZB

Tilbury Green Power Plant

other name of facility (if applicable)

Year:	2022
Address:	Tilbury Green Power Plant, Tilbury Docks, Tilbury, Essex, RM18 7NU
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Contents

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Section	Information	Date

Distribution

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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

Tilbury Green Power (TGP) operate a 40MWe / 116MWth power plant fuelled by grade C waste wood located within the Port of Tilbury. The TGP site comprises of a Wood Processing Facility (WPF) and Power Plant Facility (PPF) which are operated and maintained by 2 separate contractors. The main areas of the site include the following:

- Unprocessed wood storage area
- Wood processing building
- Woodchip storage bulding
- Various fuel handling coveyors
- Boilerhouse with biomass boiler and ash handling systems
- Turbine building with steam turbine & generator
- Flue gas treatment plant & stack
- Air cooled condensors
- Water treatment plant
- Stormwater basins & fire anneutation ponds
- Various storage tanks

Summary of Operational Processes and Procedures

Waste wood is received and processed on site. The combustion process employs a single travelling grate system, with the hot combustion gases passing through a boiler. The steam generated in the boiler is fed to a steam turbine which in turn drives a generator to produce electricity. Equipment within the Flue Gas Treatment Area is provided to minimise emissions to air, and comprises of selective non-catalytic reduction for control of oxides of nitrogen (by injection of urea into the furnace chamber); a multi-compartment fabric filter (for particulate matter (i.e. dust) control); dry lime (for control of acid gases by injection of lime into the exhaust gas stream prior to the fabric filters); and activated carbon (for control of dioxins, furans and metals by injection of activated carbon into the exhaust gas stream prior to the fabric filters) Whilst activated carbon has been available on site to date there has not been a need to use it in order to control dioxins, furans and metals within the exhaust gas stream. Treated flue gases are monitored and released via a 100 metre high stack.

Solid residues in the form of bottom ash (from the boiler) and fly ash (from the flue gas treatment system) are stored on site (within the Bottom Ash Store and Fly Ash Silo respectively) for subsequent removal off-site to an appropriately licence waste management facility. Process effluents are generated from boiler blow down and the water treatment plant and equipment, are collected and treated in the sedimentation tank. Treatment provides acid dosing for pH adjustment and settlement of solids prior to discharge to sewer under a trade effluent consent. Uncontaminated surface water run-off will be collected in the surface water drainage system. Where possible it will be harvested for domestic use within the Power Plant Facility, with the remainder being discharged to the Botney Channel watercourse.

Operational Data

Plant Size		320,000	tonnes pa	116	MWth	40	MWe
No. of combustion lines	1		No. of Turbines:		1		

Waste types received	Unit	Q1	Q2	Q3	Q4	**Year Total**	%
Household / Local Authority	tonnes	-	-	-	-	**-**	-
Commercial & Industrial		-	-	-	-	**-**	-
Hazardous		-	-	-	-	**-**	-
Clinical		-	-	-	-	**-**	-
Waste wood (biomass)		67,171	49,945	60,382	55,501	**232,999**	100.0%
Refuse Derived Fuel * - H'hold/LA		-	-	-	-	**-**	-
Refuse Derived Fuel * - C&I		-	-	-	-	**-**	-
Other [Please specify]		-	-	-	-	**-**	-
Other [Please specify]		-	-	-	-	**-**	-
Other [Please specify]		-	-	-	-	**-**	-
Total waste combusted		**67,171**	**49,945**	**60,382**	**55,501**	**232,999**	100.0%
Rejected Waste						**-**	-
Unprocessed waste transferred out						**-**	-

Energy Useage / Export	Unit	Q1	Q2	Q3	Q4	**Year Total**	KWh/te
Power Generated	MWh	89,741	67,397	81,018	71,820	**309,976**	1,330
Power Exported		83,913	62,857	75,390	67,017	**289,177**	1,241
Power Used on site		5,827	4,540	5,629	4,803	**20,800**	89
Power Imported		51	357	187	326	**921**	4
Parasitic Load	%	6.5%	7.2%	7.2%	7.1%	7.0%	
Thermal Energy Produced **	MWh	-	-	-	-	**-**	-
Thermal Energy Exported **		-	-	-	-	**-**	-
R1 value				-		Design / Operational / n/a	

Waste Disposal & Recovery	Unit	Q1	Q2	Q3	Q4	**Year Total**	% inputs
APC Residues - produced	tonnes	1,434	1,066	1,289	1,184	**4,972**	2.1%
IBA - produced		4,476	3,397	4,045	3,742	**15,659**	6.7%
Metals recycling		16	16	32	25	**88**	0.0%
Other		265	187	96	9	**558**	0.2%
Other		-	-	-	-	**-**	-
Other		-	-	-	-	**-**	-

Raw Material Usage	Unit	Q1	Q2	Q3	Q4	**Year Total**	kg or Ltr /te
Mains Water	m^3	19,743	14,389	16,619	13,916	**64,667**	0.28
Other Water	ltrs	-	-	-	-	**-**	-
Ammonia	kgs	-	-	-	-	**-**	-
Urea	kgs	60,640	54,880	57,840	63,390	**236,750**	1.02
Activated Carbon	kgs	-	-	-	-	**-**	-
Lime / hydrated lime	T	601	420	595	821	**2,438**	0.01
Fuel oil	ltrs	152,933	165,685	308,132	260,350	**887,100**	3.81
Gas	cf	-	-	-	-	**-**	
Other		-	-	-	-	**-**	

Summary	Line/Unit	Q1	Q2	Q3	Q4	**Year Total**	
Availability of waste combustion by line, hrs	1	2,099	1,557	1,918	1,670	**7,243**	82.7%
	2	-	-	-	-	**-**	x %
	3	-	-	-	-	**-**	x %
	4	-	-	-	-	**-**	x %
	5	-	-	-	-	**-**	x %
Overall Availability, mean avg. of all lines, hrs		2,099	1,557	1,918	1,670	**7,243**	**82.7%**

Hours of turbine operations, hrs	1	2,052	1,584	1,935	1,689	**7,259**	82.9%
Hours of turbine operations, hrs	2	-	-	-	-	**-**	x %
Hours of heat / steam export		-	-	-	-	**-**	n/a
Net Calorific Value of waste	MJ/kg	-	-	-	-	**-**	-
Abnormal Events	qty.	2	-	1	-	**3**	yes
Abnormal operation	hours	1	-	2	-	**4**	0.04%
Permit Breaches	qty.	1	4	3	-	**8**	yes

Summary of Plant Operations and Maintenance during the reporting year

The plant entered 2022 in full commercial operation following the O&M contract guidelines and guarantees. During 2022 the focus was to further optimise the plant as much as possible, so the plant was able to operate reliably and achieve the highest availability for all the stakeholders.
One maintenance outage was planned during 2022 in May to complete warranty works, routine/defect maintenance that was required to further increase reliability of the plant and tube repairs within the boiler, second pass and third pass. A further unplanned outage was undertaken in November to replace tubes within the superheater.
Modifications were made to the six rotary valves to improve reliability, reduce blockages and improve combustion stability on the boiler grate. Following a number of CO breaches during 2022, alongside the improvements made to the rotary vaves, modifications to the DCS were also made to ensure the boiler CO automated control was optimised to provide more stable combustion within the furnace and improved CO control.
The plant is currently trial running a briquette machine, utilising the extracted wood fines from the wood fuel, and turning them into a viable fuel source in the form of wood briquettes that are burned alongside the wood fuel, significantly reducing this waste stream and improving plant efficiency.

Summary of Residue Handling for the reporting year

Both IBA and APCR have been handled as hazardous waste. IBA has been sent to Augean ENRMF, or Whitemoss Landfill facility. APCR has been sent to OCO Technology who have a carbon capture utilisation process which treats and stabilises the APCR which can then be used as sustainable construction products. Full details can be found in the quarterly waste returns which have been completed and submitted throughout 2022.

2022 Annual Reporting Performance Form 1

Permit EPR/KP3936ZB
Operator: 0
Facility: Tilbury Green Power Plant
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
1) Hazardous Wastes				
APC Residues	R05	4,972.0	0.0	2.1%
	D01	0.0	0.0	-
IBA	D01	15,659.0	0.0	6.7%
				-
				-
Total Hazardous Waste		20,631.0	0.0	8.9%
2) Non-Hazardous Wastes				
IBA		0.0	0.0	-
Ferrous Metal	-	80.5	0.0	0.0%
Process Water		0.0	0.0	-
				-
				-
Total Non-Hazardous Waste		80.5	0.0	0.0%
TOTAL WASTE		**20,711.5**	**0.0**	8.9%

Operator's comments :

Ferrous metal is now internally transferred to the WPF for onward disposal/recycling and is included within the waste returns submissions.

2022 Annual Reporting of Water and Other Raw Material Usage

Raw Material	Usage	Unit	Specific Useage	Unit
Mains Water	64667	m^3	0.28	m^3/te
Total Water	64667	m^3	0.28	m^3/te
Urea / Ammonia	236,750	kg	1.02	kg/te
Activated Carbon	0	kg	-	kg/te
Lime / hydrated lime / Sodium Bicarb.	2438000	kg	10.46	kg/te

Operator's comments :

2022 Annual Reporting of other performance indicators

Parameter	Results by Line							
	A1	A2	A3	A4	A5		Turbine 1	Turbine 2
Operating hours for the year, hours	7,206.00	-	-	-	-		7259.00	-
Number of periods of abnormal operation, qty.	3	-	-	-	-		0	-
Cumulative hours of abnormal operation for this year, hours	06:59	-	-	-	-		0	-

Operator's comments :

Signed: Breanna Casey Date: ########

2022 Annual Reporting of Energy Usage/Export

Permit EPR/KP3936ZB Operator: 0

Facility: Tilbury Green Power Plant Form: Energy 1

Reporting Period from: 01 January 2022 to: 31 December 2022

Energy Source	Energy Usage	Unit	Specific Useage (KWh/tonne incinerated
Electricity Produced	309,976	MWh	1330
Electricity Imported	921.39	MWh	4
Electricity Exported	289,177	MWh	1241
Gas Oil	-	tonnes	-
Steam/hot water exported	0	GWh	-

Operator's comments :

Signed: Breanna Casey Date: #########

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		
	Half-hourly limit	
Particulates	100%	
Oxides of nitrogen	100%	
Sulphur dioxide	99.99%	
Carbon monoxide	99.96%	
Total organic carbon	100%	
Hydrogen chloride	100%	
Hydrogen fluoride	100%	
	100%	

Date	Summary of notification or non-compliance [including Line/Reference]	
20/01/2022	SO2 694.6mg/m3 for one half hourly period	The emission b
03/06/2022	CO 157.8mg/Nm3 for one half hourly period	Following inves had blocked un process. The ho
05/06/2022	CO 228.0mg/Nm3 for one half hourly period	Shift operator c feeding to the b screws off and t test run/left in s CEMs was that
06/06/2022	CO 156.4mg/m3 for one half hourly period	The CO breach blockage & wet to one of the fir up to the incide transitioning ba causing the CO
22/06/2022	CO 177.2 mg/nm3 for one half hourly period	During shift dos the line to servi chip into the thr burners were pu the second aux the blocked dos depleting. This despite the woo would keep the CO spike was i Combined with hour period end

08/07/2022	CO 166.7 mg/nm3 for one half hourly period	Following inves boiler 02% spre combustion dur so the burner d boiler and disru especially durin Upon further inv tip as a spare p out. Also, rotary has now since b
21/07/2022	CO 193.1mg/Nm3 for one half hourly period	The Plant was r blockage on fee testing following at 10% from 04 available feed s breach on the C condition as no was part of a bl
21/07/2022	CO 205.1mg/Nm3 for one half hourly period	Following inves unbalanced with and furnace sta igniter tip. This grate which the investigation it b spare part than igniter has now The boiler O2% fractionally long times causing u
10/10/2022	Unprocessed Wood in the WPF pre-shred area	Fuel had been p

Date	Summary of complaint [including Line/Reference]	
03/07/2022	Dust complaint from a business neighbour via EA.	A caller contact adjacent to the outside surroun
12/07/2022	Excess Dust internal complaint	Internal compla there is a lot of blowing into out

11/08/2022	Noise complaint at 3:15am through SEC Newgate	A lady called to was coming fro

Percentage time compliant during operation	
	Daily limit
	100%
	100%
	100%
	100%
	100%
	100%
	100%
	100%

Summary of any notifications or non-compliances under the permit

Reason	
reach was most likely caused by gyosum contamination in the fuel.	The fuel su gypsum ma
tigations by the site team it was discovered that a large build up of incinerator bottom ash derneath the furnace grate left side which was restricting air flow for the combustion opper blockage was eventually identified as the root cause of the poor combustion.	Routine ad Checks of t
leared a dosing bin blockage on bin 1 line 1 with aux burners in service and no wood oiler. Dosing bin 1 line 1 was on test run on its own with no fuel, all the other dosing bin this has flagged up a breach of 228.0mg/Nm3 for the period whilst the screw was being ervice. All dosing bins empty, no wood chip csent to the grate. The only signal on the the fuel feeder was on which was signaled by the running screw whilst testing.	We will look dosing grou done while Operators t blockages v
was caused by abnormal operating circumstances that occurred following a fuel line fuel dropping rapidly onto the grate in a large quantity. The fuel was abnormally wet due e system valves opening unexpectedly and soaking the fuel within the dosing bin leading nt. When the fuel released it rapidly dropped onto the grate while the boiler was ck onto wood feed. When the wet fuel entered the furnace, the oxygen was starved to spike rapidly and breach the ½ hour period limit.	The fire val
ing dosing bin 1 feed line 2 tripped and the operators were unable to immediately return ce. This caused a high level on dosing bin 1 and locked out the conveyor that feeds wood ee dosing bins.With no feed to supply to the dosing bins the left and right auxiliary ut into service to support the furnace. The CO spiked to 1148 mg/Nm3 at 22:52pm (when burner cut in) and then reduced below 150mg/Nm3 at 22:59pm. During the issues with ing bin 1 feed line there was still a smaller than normal fire on the grate burning but would have made the CEMs aware that we were still operating on permit conditions d feed being stopped at 22:50pm. Wood chip was then re-introduced at 22:57pm which power plant on its environmental permit operating conditions for the reporting period. The nitiated by the aux burners cutting in even with the boiler O2 at around 15% at the time. the residual heat/burn on the grate and the re-introduction of wood chip before the half led contributed to the CEMs recording a half hour breach of 177.2mg/Nm3 at 22:59pm.	Training wil in service d immediately limits set by

tigations into what could be causing CO spikes and breaches it was observed that the ad across the grate was very unbalanced with 02. The right-side aux burner that supports ing plant restart, shut down and furnace stability was suffering repeated igniter damage, oor was closed to protect the igniter tip. This has reduced an additional air flow into the pted the balance across the grate which then in turn affected grate combustion, g unstable operation. vestigation it became apparent that the ignitor lance supplier had sent a fractionally longer art than the original igniter tip and when replaced the tip was in the hot zone and burning valve one was tripping multiple times causing unstable combustion periods. The valve been replaced.	Boiler grate bladed rota this type of installation
unning on aux burner support with no wood chip feeding onto the grate due to a fuel ed line 2. The shift operators cleared the blockage, however left line 2 screw running after completion of unblocking the fuel. The blocked line feed screw on line 2 was left running :49am which has triggered the CEMS to show as running from 5am onwards. The other crews did not go back into service until 05:19am. This has registered the half hour CO CEMS. The operators were unaware that the CEMS was back on it's reporting permit rmal wood feed to the grate had not yet resumed other than running a single screw that ocked feed line for testing purposes.	Boiler grate bladed rota this type of before insta
tigations it was observed that the boiler 02% spread across the grate was very n 02. The right-side aux burner that supports combustion during plant restart, shut down bility was suffering repeated igniter damage, so the burner door was closed to protect the has reduced an additional air flow into the boiler and disrupted the balance across the n in turn affected grate combustion, especially during unstable operation. Upon further became apparent that the ignitor lance supplier had sent a fractionally longer tip as a the original igniter tip and when replaced the tip was in the hot zone and burning out. The been adjusted and the burner is now functioning normally with the chamot door open. spread is returned to normal. The site team were unaware the new burner igniter tip was er when the part was sent by the supplier. Also, rotary valve one was tripping multiple nstable combustion periods. The valve has now since been replaced.	Boiler grate bladed rota this type of installation
processed overnight for export from T1 but instead of being loaded directly into trailers it	Site Mange

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

Reason *	
ed the EA to report dust coming from Biomass Power Plant. Caller was from a business site. The individual described visible small dust particles in the air which are landing on ding area, vehicles and potentially inside the building.	Additional c are being c
int. It was noticed that the bowling alley misting cannons were not being used and that airborne dust floating around and being drawn into the ACC. The dust was observed neighbours yard.	Eskens Re tractor was diesel. TGF

say she heard a very loud noise around 3.15am and wanted to understand whether it m TGP plant or whether it was another source.	Operational abnormal o The WPF w It is unlikely

*** including whether substantiated by the**

Measures taken to prevent reoccurrence
pplier was notified of the incident and requested to ensure that their QA/QC checks to remove terials from the fuel were being followed correctly to prevent future occurrence.
ded on the plant rounds to check the grate hoppers for any signs of build up every 24hrs. he grate hoppers on plant outages will be carried out and cleaning as required.
k into modifying the control system, so the CEMS only starts reporting when the woodchip up controller is active. This will then allow test runs of individual pieces of equipment to be fuel is not being sent to the grate and not activate the CEMS system incorrectly during testing. o be made aware not to test run and leave a screw in service whilst carrying out dosing bin whilst on aux burner support.
ve has since been inspected, reset, and placed back in service without further issue.
l have to be delivered to the operations department staff. If one dosing bin feed system is not ue to malfunctions, then the plant would have to be secured on aux burners support y and no wood chip shall be re-introduced until any emissions limits are below the environment the EA on the site permit.

O2 spread unbalance issue rectified by using the correct sized burner lance. New rubber ry valve installed to improve stable combustion operations. All six feed lines will be fitted with rotary valve.Procedures updated to ensure the aux burner igniter lances are measured before so correct length can be set.

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r has advised that only himself and one other Supervisor can initiate fuel exports and has

Measures taken to prevent reoccurrence

lust suppression has been installed within the Bowling Alley WC 11/07/2022 and dust levels losely monitored.

newables immediately contacted to rectify the issue. Water cannon were on all day and the suppressing the wood pile the only time it was off is when it needed filling with water and / Esken in the process of applying more dust suppression measures for this area.

l data from this time was reviewed. The PP was running at the time but there were no perations or noises noted.

vas not running at this time.

TGP was the source of this disturbance.

operator or the EA

Summary of Plant Improvements

Summary of any efficiency improvements that have been completed within the year.
The IMS has continued to be reviewed with set KPI's being monitored and achieved, with the intention to achieve ISO accreditations under ISO 45001/9001/14001. Environmental awareness campaigns and training continued to be delivered to site personnel in terms of permit requirements, waste management, environmental management and process improvements.

Summary of any permit improvement conditions that have been completed within the year and the resulting environmental benefits.
All permit improvement conditions completed and submitted successfully. Ongoing environmental benefits to be monitored.

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.
Trialling of briquette machines to utilise extracted wood fines from wood fuel, as an additional fuel source with a view to reduce or negate waste stream and disposal requirements in this regard. Solutions to reduce the overall dust content of the fuel are also being discussed. A fogging system for dust supression in the bowling alley is also been proposed and is under review. Additional CEMS equipment has been ordered for installation in 2023.

Details of Public & Stakeholder Liasion

Summary of events held during the reporting year.	
Date	**Description**

List of events planned for next year	
Date	**Description**
Q1/Q2 2023	Community liaison / engagement meeting to be held.

If you wish to be involved in the public liasion programme, please contact TGP's PR officer via the website phone number

Residue Quality Monitoring Requirements

Summary of monitoring undertaken and compliance
Quarterly samples collected and sent for analysis
Biannual onsite monitoring undertaken by SOCOTEC.

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%	N/A	
Total Organic Carbon (average %)	<3%	All samples <3%	
No. of Assessments Undertaken	---	Quarterly when in operation	Monthly when in operation
No. of Hazardous Results	---	N/A	

Comments :

Emissions to Water

Summary of monitoring undertaken and compliance
There a no environmental permit conditions for the site. A trade effluent consent is in place with Anglian Water.
All trade effulent reports were PASS.

Commentary on any specific events	
Date & Event	**Description**

Emissions to Water / Sewer

Parameter	Monitoring Frequency	Limit	Target	Max.	Average

Emissions to Air (periodically monitored)

Summary of monitoring undertaken, standards used and compliance
Bi-annual emissions monitoring to various ISO and EN standards (dependent on substance).

Results of emissions to air that are periodically monitored

Substance	Ref. Period	Emission Limit Value	Average			
			A1	A2	A3	A4
Hydrogen fluoride	1 hr	2 mg/m^3	0.0495			
Cd and Th and their compounds	6-8hrs	0.05 mg/m^3	0.001			
Hg and its compounds	6-8hrs	0.05 mg/m^3	0.00038			
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	6-8hrs	0.5 mg/m^3	0.019			
Dioxins & Furans (I-TEQ)	6-8hrs	0.1 ng/m^3	0.00155			
PCBs (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m^3	0.000411			
PCBs (WHO-TEQ Fish)	6-8hrs	None set ng/m^3	0.000005			
PCBs (WHO-TEQ Birds)	6-8hrs	None set ng/m^3	0.0004			
Dioxins & Furans (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m^3	0.0015			
Dioxins & Furans (WHO-TEQ Fish)	6-8hrs	None set ng/m^3	0.00165			
Dioxins & Furans (WHO-TEQ Birds)	6-8hrs	None set ng/m^3	0.0028			
Anthanthrene	6-8hrs	None set $\mu g/m^3$	0.0013			
Benzo(a)anthracene	6-8hrs	None set $\mu g/m^3$	0.0026			
Benzo(a)pyrene	6-8hrs	None set $\mu g/m^3$	0.0026			
Benzo(b)fluoranthene	6-8hrs	None set $\mu g/m^3$	0.0046			
Benzo(b)naptho(2,1-d) thiophene	6-8hrs	None set $\mu g/m^3$	0.0071			
Benzo(c)phenanthrene	6-8hrs	None set $\mu g/m^3$	0.0027			
Benzo(ghi)perylene	6-8hrs	None set $\mu g/m^3$	0.0028			
Benzo(k)fluoranthene	6-8hrs	None set $\mu g/m^3$	0.0028			
Cholanthrene	6-8hrs	None set $\mu g/m^3$	0.0013			
Chrysene	6-8hrs	None set $\mu g/m^3$	0.0053			
Cyclopenta(cd)pyrene	6-8hrs	None set $\mu g/m^3$	0.0025			
Dibenzo(ai)pyrene	6-8hrs	None set $\mu g/m^3$	0.0013			
Dibenzo(ah)anthracene	6-8hrs	None set $\mu g/m^3$	0.0013			
Fluoranthene	6-8hrs	None set $\mu g/m^3$	0.095			
Indeno(123-cd) pyrene	6-8hrs	None set $\mu g/m^3$	0.0027			
Naphthalene	6-8hrs	None set $\mu g/m^3$	0.18			

Comments :

A5

Emissions to Air (continously monitored)

Summary of monitoring undertaken, standards used and compliance

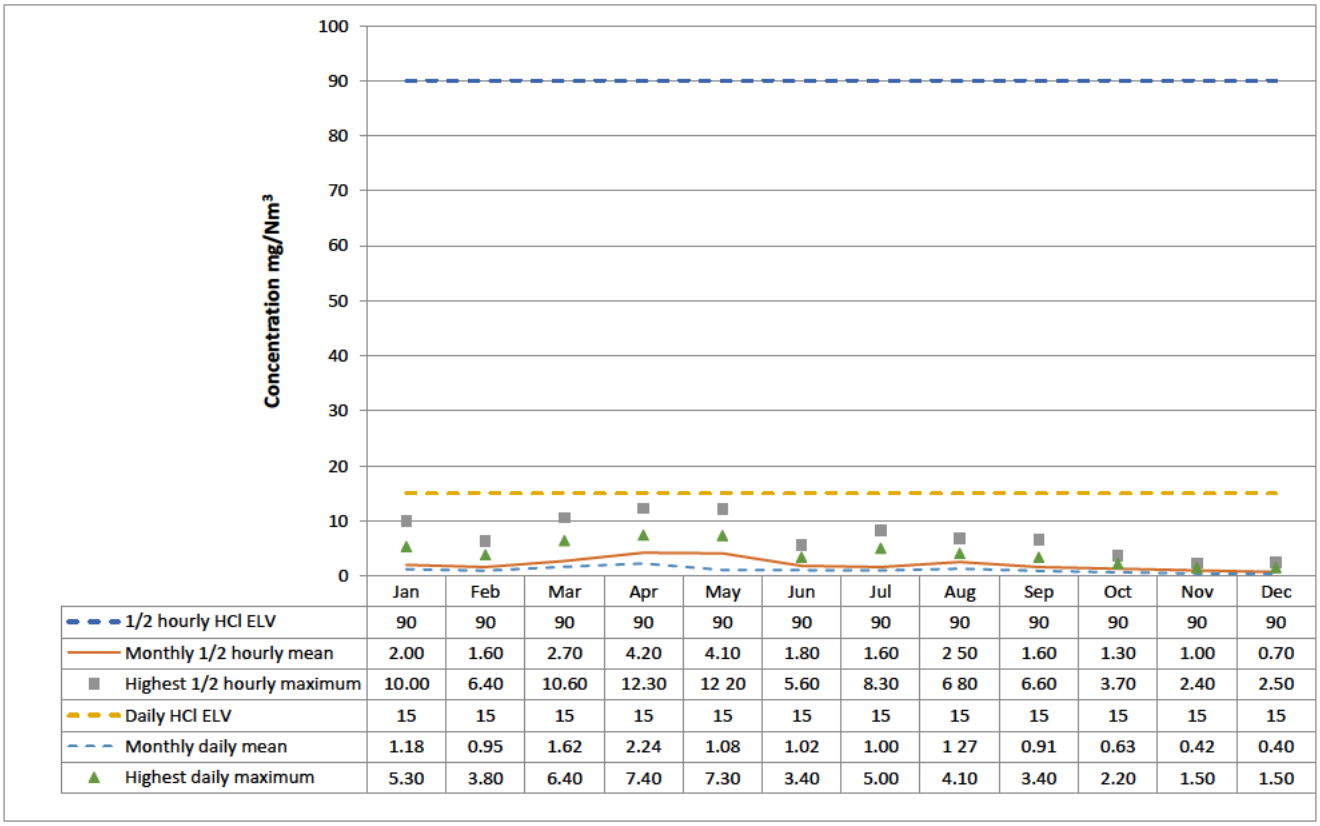
Results of emissions to air that are continuously monitored (maximum and average values for each line)

Substance	**Reference Period**	**Emission Limit Value**	**A1**		**A2**		**A3**		**A4**		**A5**	
			Max.	**Avg.**	**Max.**	**Avg.**	**Max.**	**Avg.**	**Max.**	**Avg.**	**Max.**	**Avg.**
Oxides of nitrogen	Daily mean	300 mg/m^3	216.76	169.37								
	½ hourly mean	600 mg/m^3	282.50	233.12								
Particulates	Daily mean	15 mg/m^3	3.68	0.09								
	½ hourly mean	45 mg/m^3	10.61	0.03								
Total Organic Carbon	Daily mean	30 mg/m^3	1.10	0.84								
	½ hourly mean	15 mg/m^3	2.00	1.29								
Hydrogen chloride	Daily mean	15 mg/m^3	2.19	1.06								
	½ hourly mean	90 mg/m^3	7.08	2.03								
Sulphur dioxide	Daily mean	75 mg/m^3	82.65	47.85								
	½ hourly mean	300 mg/m^3	210.78	66.73								
Carbon monoxide	Daily mean	75 mg/m^3	59.53	34.41								
	½ hourly mean *	150 mg/m^3 *	131.49	41.78								
	95%ile 10-min avg *	150 mg/m^3 *										
Ammonia	Daily mean	No limit set	33.52	14.60								

Comments :

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

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2022	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	90	2.00	10.00	15	1.18	5.30
Feb	90	1.60	6.40	15	0.95	3.80
Mar	90	2.70	10.60	15	1.62	6.40
Apr	90	4.20	12.30	15	2.24	7.40
May	90	4.10	12.20	15	1.08	7.30
Jun	90	1.80	5.60	15	1.02	3.40
Jul	90	1.60	8.30	15	1.00	5.00
Aug	90	2.50	6.80	15	1.27	4.10
Sep	90	1.60	6.60	15	0.91	3.40
Oct	90	1.30	3.70	15	0.63	2.20
Nov	90	1.00	2.40	15	0.42	1.50
Dec	90	0.70	2.50	15	0.40	1.50

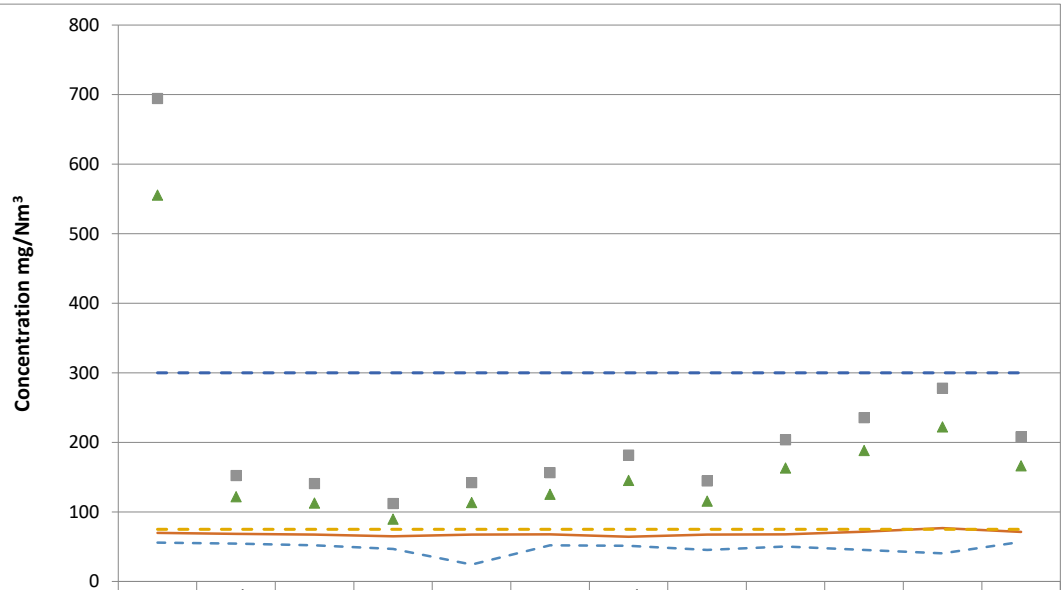


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly HCl ELV	90	90	90	90	90	90	90	90	90	90	90	90
Monthly 1/2 hourly mean	2.00	1.60	2.70	4.20	4.10	1.80	1.60	2 50	1.60	1.30	1.00	0.70
Highest 1/2 hourly maximum	10.00	6.40	10.60	12.30	12 20	5.60	8.30	6 80	6.60	3.70	2.40	2.50
Daily HCl ELV	15	15	15	15	15	15	15	15	15	15	15	15
Monthly daily mean	1.18	0.95	1.62	2.24	1.08	1.02	1.00	1 27	0.91	0.63	0.42	0.40
Highest daily maximum	5.30	3.80	6.40	7.40	7.30	3.40	5.00	4.10	3.40	2.20	1.50	1.50

Comments :

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

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2022	**1/2 hourly SO2 ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily SO2 ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	300	69.70	694.60	75	55.76	555.70
Feb	300	68.60	152.30	75	54.52	121.90
Mar	300	67.40	141.00	75	52.03	112.80
Apr	300	65.10	112.30	75	46.78	89.80
May	300	67.40	142.10	75	24.33	113.70
Jun	300	67.80	156.70	75	51.82	125.40
Jul	300	64.30	181.80	75	51.40	145.40
Aug	300	67.40	144.80	75	45.18	115.80
Sep	300	67.80	203.90	75	50.28	163.20
Oct	300	71.40	235.70	75	45.35	188.50
Nov	300	76.70	277.90	75	40.39	222.30
Dec	300	71.30	208.10	75	56.90	166.50

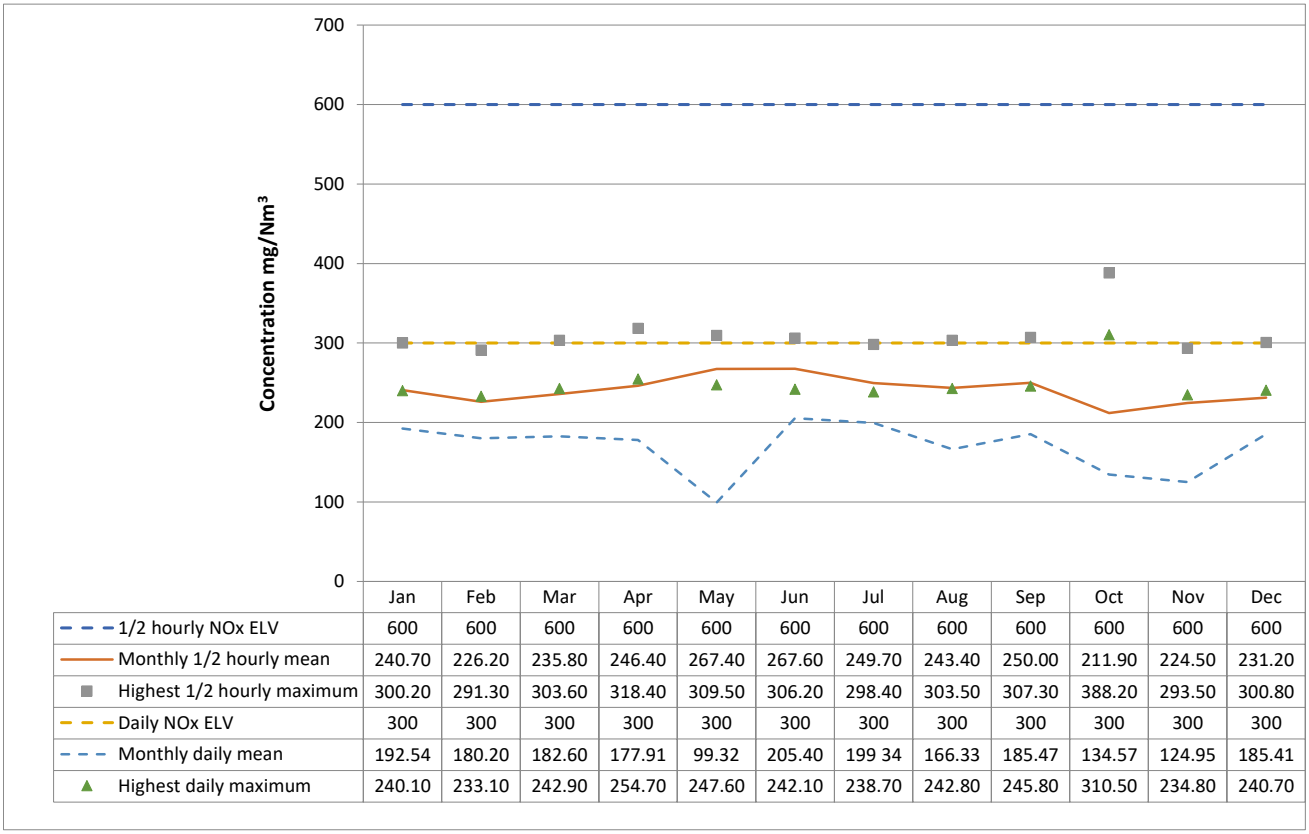


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly SO2 ELV	300	300	300	300	300	300	300	300	300	300	300	300
Monthly 1/2 hourly mean	69.70	68.60	67.40	65.10	67.40	67.80	64.30	67.40	67 80	71.40	76.70	71.30
Highest 1/2 hourly maximum	694.60	152.30	141.00	112.30	142.10	156.70	181 80	144.80	203.90	235.70	277.90	208.10
Daily SO2 ELV	75	75	75	75	75	75	75	75	75	75	75	75
Monthly daily mean	55.76	54.52	52.03	46.78	24.33	51.82	51.40	45.18	50 28	45.35	40.39	56.90
Highest daily maximum	555.70	121.90	112.80	89.80	113.70	125.40	145.40	115.80	163.20	188.50	222.30	166.50

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		
2022	**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	600	240.70	300.20	300	192.54	240.10
Feb	600	226.20	291.30	300	180.20	233.10
Mar	600	235.80	303.60	300	182.60	242.90
Apr	600	246.40	318.40	300	177.91	254.70
May	600	267.40	309.50	300	99.32	247.60
Jun	600	267.60	306.20	300	205.40	242.10
Jul	600	249.70	298.40	300	199.34	238.70
Aug	600	243.40	303.50	300	166.33	242.80
Sep	600	250.00	307.30	300	185.47	245.80
Oct	600	211.90	388.20	300	134.57	310.50
Nov	600	224.50	293.50	300	124.95	234.80
Dec	600	231.20	300.80	300	185.41	240.70

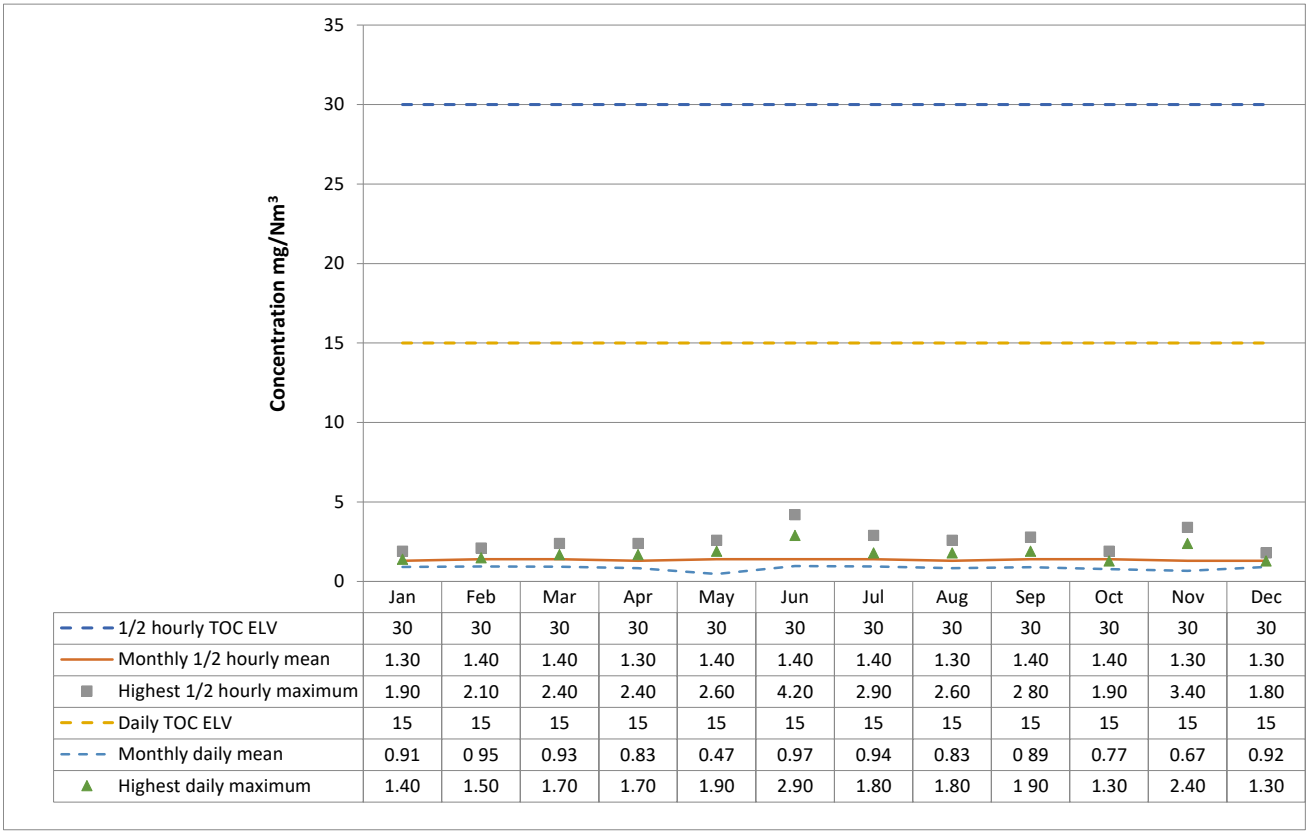


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly NOx ELV	600	600	600	600	600	600	600	600	600	600	600	600
Monthly 1/2 hourly mean	240.70	226.20	235.80	246.40	267.40	267.60	249.70	243.40	250.00	211.90	224.50	231.20
Highest 1/2 hourly maximum	300.20	291.30	303.60	318.40	309.50	306.20	298.40	303.50	307.30	388.20	293.50	300.80
Daily NOx ELV	300	300	300	300	300	300	300	300	300	300	300	300
Monthly daily mean	192.54	180.20	182.60	177.91	99.32	205.40	199 34	166.33	185.47	134.57	124.95	185.41
Highest daily maximum	240.10	233.10	242.90	254.70	247.60	242.10	238.70	242.80	245.80	310.50	234.80	240.70

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		
2022	**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	30	1.30	1.90	15	0.91	1.40
Feb	30	1.40	2.10	15	0.95	1.50
Mar	30	1.40	2.40	15	0.93	1.70
Apr	30	1.30	2.40	15	0.83	1.70
May	30	1.40	2.60	15	0.47	1.90
Jun	30	1.40	4.20	15	0.97	2.90
Jul	30	1.40	2.90	15	0.94	1.80
Aug	30	1.30	2.60	15	0.83	1.80
Sep	30	1.40	2.80	15	0.89	1.90
Oct	30	1.40	1.90	15	0.77	1.30
Nov	30	1.30	3.40	15	0.67	2.40
Dec	30	1.30	1.80	15	0.92	1.30

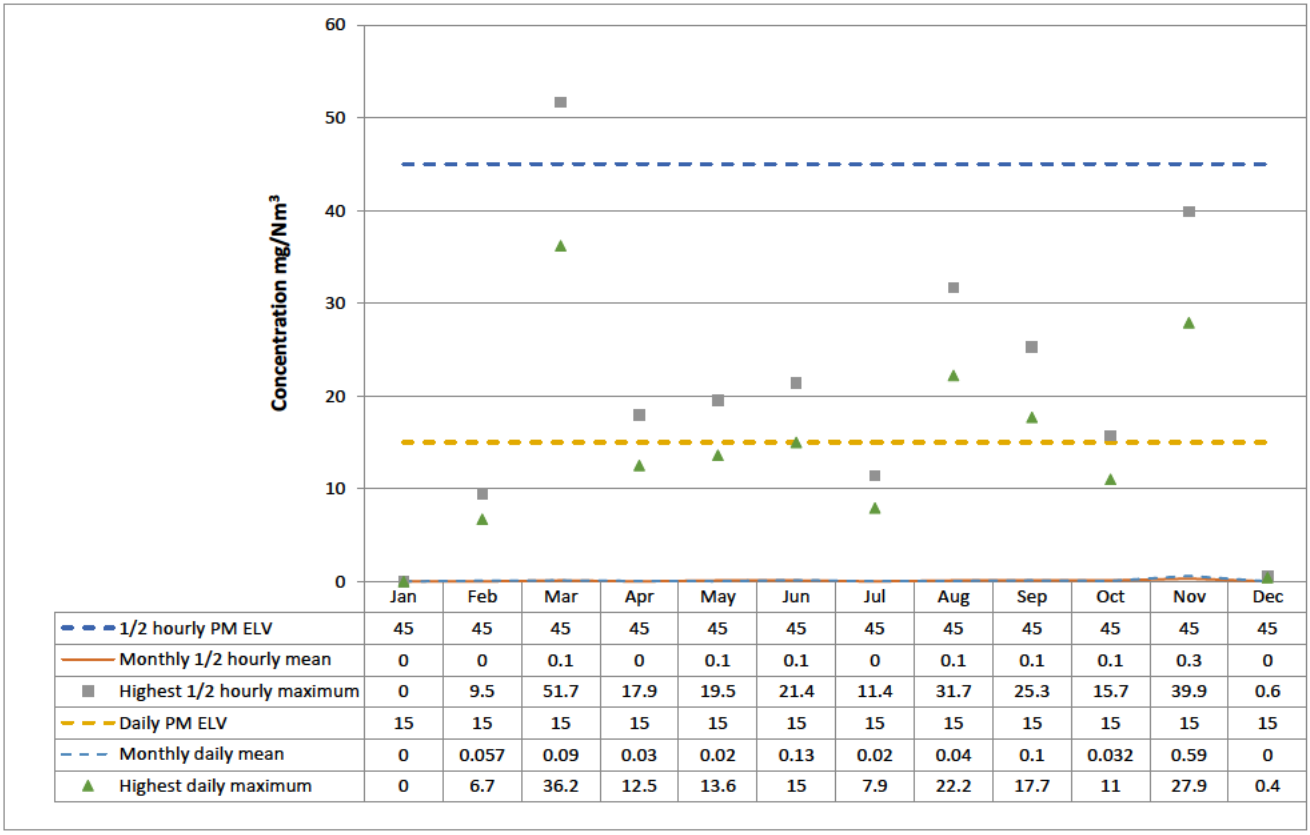


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly TOC ELV	30	30	30	30	30	30	30	30	30	30	30	30
Monthly 1/2 hourly mean	1.30	1.40	1.40	1.30	1.40	1.40	1.40	1.30	1.40	1.40	1.30	1.30
Highest 1/2 hourly maximum	1.90	2.10	2.40	2.40	2.60	4.20	2.90	2.60	2 80	1.90	3.40	1.80
Daily TOC ELV	15	15	15	15	15	15	15	15	15	15	15	15
Monthly daily mean	0.91	0 95	0.93	0.83	0.47	0.97	0.94	0.83	0 89	0.77	0.67	0.92
Highest daily maximum	1.40	1.50	1.70	1.70	1.90	2.90	1.80	1.80	1 90	1.30	2.40	1.30

Comments :

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

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2022	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	45	0	0	15	0	0
Feb	45	0	9.5	15	0.057	6.7
Mar	45	0.1	51.7	15	0.09	36.2
Apr	45	0	17.9	15	0.03	12.5
May	45	0.1	19.5	15	0.02	13.6
Jun	45	0.1	21.4	15	0.13	15
Jul	45	0	11.4	15	0.02	7.9
Aug	45	0.1	31.7	15	0.04	22.2
Sep	45	0.1	25.3	15	0.1	17.7
Oct	45	0.1	15.7	15	0.032	11
Nov	45	0.3	39.9	15	0.59	27.9
Dec	45	0	0.6	15	0	0.4

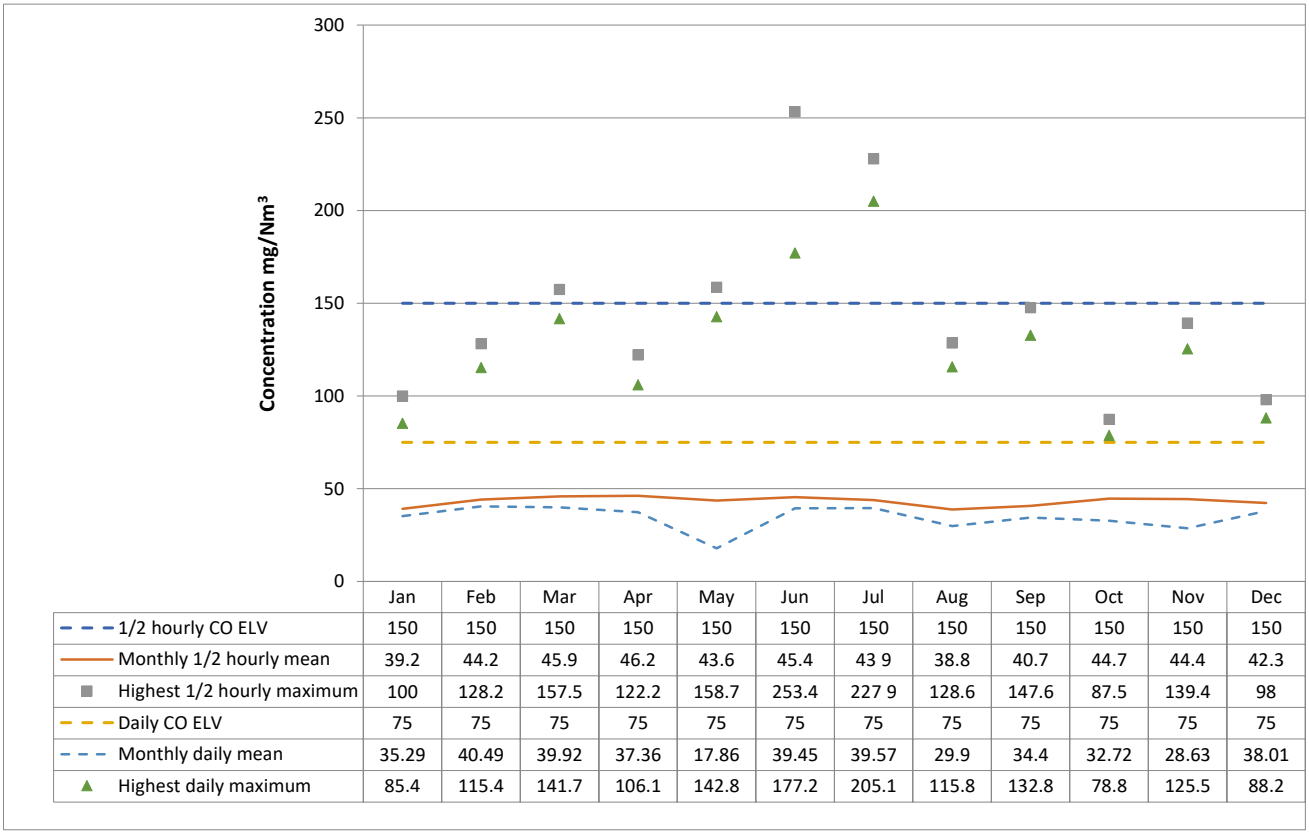


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly PM ELV	45	45	45	45	45	45	45	45	45	45	45	45
Monthly 1/2 hourly mean	0	0	0.1	0	0.1	0.1	0	0.1	0.1	0.1	0.3	0
Highest 1/2 hourly maximum	0	9.5	51.7	17.9	19.5	21.4	11.4	31.7	25.3	15.7	39.9	0.6
Daily PM ELV	15	15	15	15	15	15	15	15	15	15	15	15
Monthly daily mean	0	0.057	0.09	0.03	0.02	0.13	0.02	0.04	0.1	0.032	0.59	0
Highest daily maximum	0	6.7	36.2	12.5	13.6	15	7.9	22.2	17.7	11	27.9	0.4

Comments :

Monitoring of Carbon Monoxide (half hourly) **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2022	**1/2 hourly CO ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily CO ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	150	39.2	100	75	35.29	85.4
Feb	150	44.2	128.2	75	40.49	115.4
Mar	150	45.9	157.5	75	39.92	141.7
Apr	150	46.2	122.2	75	37.36	106.1
May	150	43.6	158.7	75	17.86	142.8
Jun	150	45.4	253.4	75	39.45	177.2
Jul	150	43.9	227.9	75	39.57	205.1
Aug	150	38.8	128.6	75	29.9	115.8
Sep	150	40.7	147.6	75	34.4	132.8
Oct	150	44.7	87.5	75	32.72	78.8
Nov	150	44.4	139.4	75	28.63	125.5
Dec	150	42.3	98	75	38.01	88.2

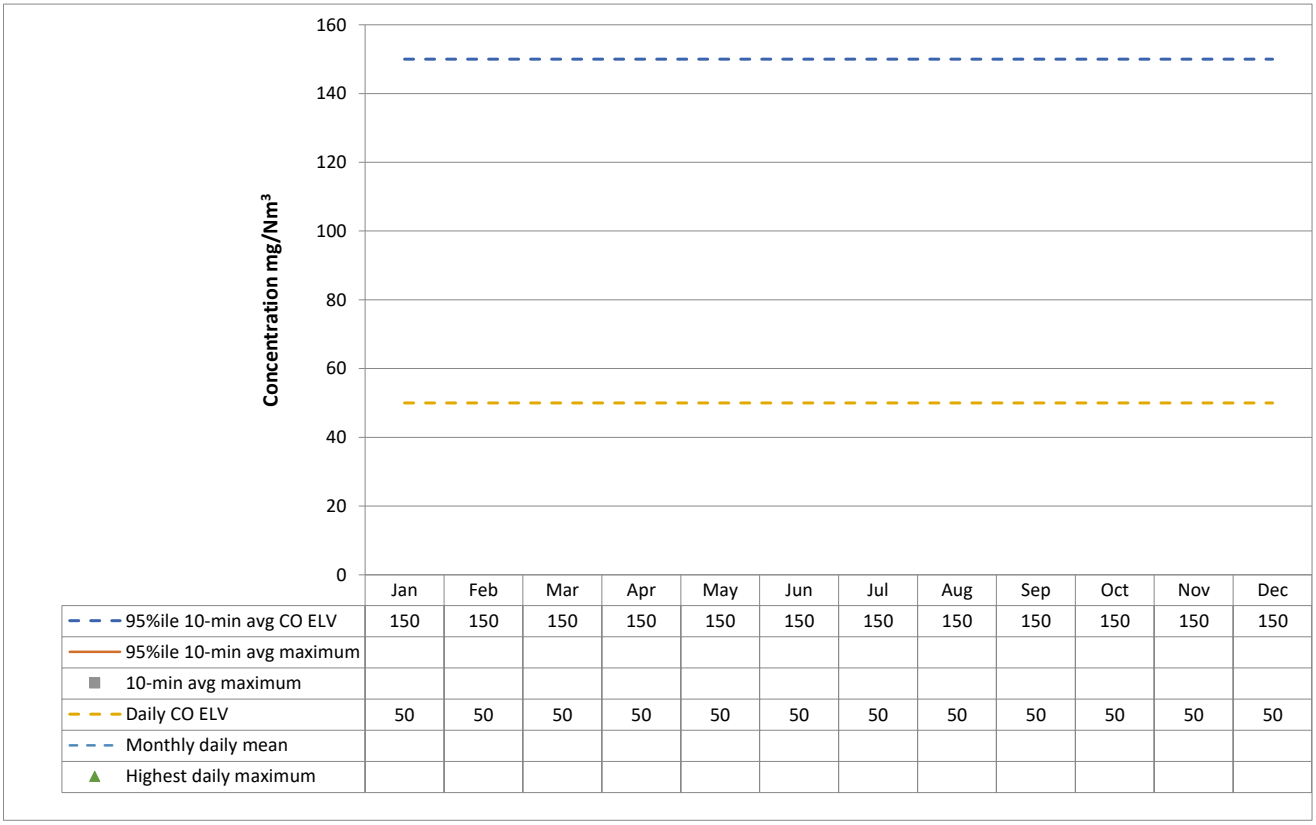


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly CO ELV	150	150	150	150	150	150	150	150	150	150	150	150
Monthly 1/2 hourly mean	39.2	44.2	45.9	46.2	43.6	45.4	43 9	38.8	40.7	44.7	44.4	42.3
Highest 1/2 hourly maximum	100	128.2	157.5	122.2	158.7	253.4	227 9	128.6	147.6	87.5	139.4	98
Daily CO ELV	75	75	75	75	75	75	75	75	75	75	75	75
Monthly daily mean	35.29	40.49	39.92	37.36	17.86	39.45	39.57	29.9	34.4	32.72	28.63	38.01
Highest daily maximum	85.4	115.4	141.7	106.1	142.8	177.2	205.1	115.8	132.8	78.8	125.5	88.2

Comments :

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

mg/Nm^3	10-minute Reference Periods				Daily Reference Periods		
2022	95%ile 10-min avg CO ELV	95%ile 10-min avg maximum	Monthly CO 10-min avg mean	10-min avg maximum	Daily CO ELV	Monthly daily mean	Highest daily maximum
Jan	150				50		
Feb	150				50		
Mar	150				50		
Apr	150				50		
May	150				50		
Jun	150				50		
Jul	150				50		
Aug	150				50		
Sep	150				50		
Oct	150				50		
Nov	150				50		
Dec	150				50		

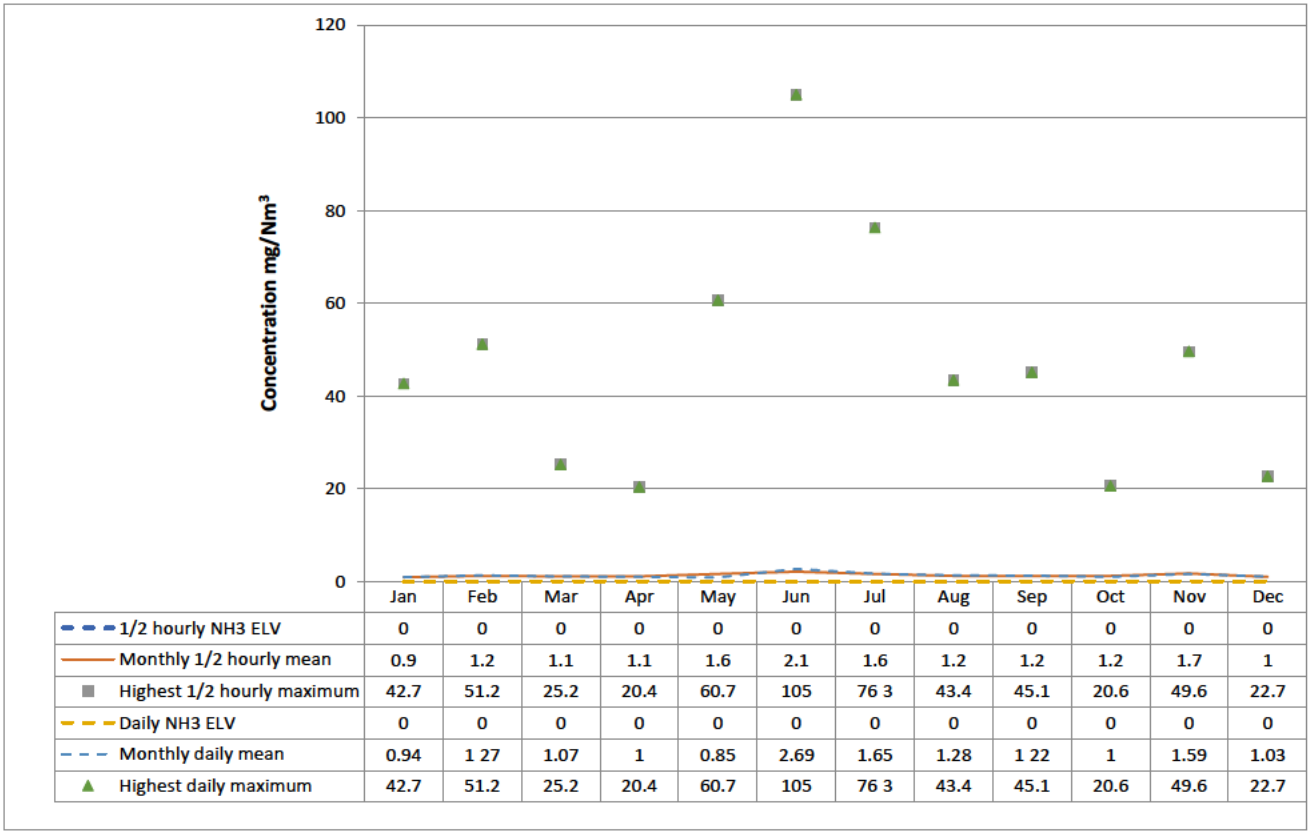


Comments :

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 Ammnonia emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2022	1/2 hourly NH3 ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily NH3 ELV	Monthly daily mean	Highest daily maximum
Jan	0	0.9	42.7	0	0.94	42.7
Feb	0	1.2	51.2	0	1.27	51.2
Mar	0	1.1	25.2	0	1.07	25.2
Apr	0	1.1	20.4	0	1	20.4
May	0	1.6	60.7	0	0.85	60.7
Jun	0	2.1	105	0	2.69	105
Jul	0	1.6	76.3	0	1.65	76.3
Aug	0	1.2	43.4	0	1.28	43.4
Sep	0	1.2	45.1	0	1.22	45.1
Oct	0	1.2	20.6	0	1	20.6
Nov	0	1.7	49.6	0	1.59	49.6
Dec	0	1	22.7	0	1.03	22.7



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly NH3 ELV	0	0	0	0	0	0	0	0	0	0	0	0
Monthly 1/2 hourly mean	0.9	1.2	1.1	1.1	1.6	2.1	1.6	1.2	1.2	1.2	1.7	1
Highest 1/2 hourly maximum	42.7	51.2	25.2	20.4	60.7	105	76 3	43.4	45.1	20.6	49.6	22.7
Daily NH3 ELV	0	0	0	0	0	0	0	0	0	0	0	0
Monthly daily mean	0.94	1 27	1.07	1	0.85	2.69	1.65	1.28	1 22	1	1.59	1.03
Highest daily maximum	42.7	51.2	25.2	20.4	60.7	105	76 3	43.4	45.1	20.6	49.6	22.7

Comments :

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