WBOC
Tilbury Green Power Plant

Annual Performance Report 2023

Permit EPR/KP3936ZB

Tilbury Green Power

other name of facility (if applicable)

Year:	2023		
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Version Control

Section	Information	Date

Distribution

Copy	Name, Role	No.

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

The Woodchip Storage Building receives woodchip from the Wood Processing Building via an enclosed Woodchip Transfer Conveyor, or directly by road trailer via the Woodchip Storage Building's Woodchip Reception Bays, and feeds woodchip to the boiler via the Boiler Feed Conveyor. The Woodchip Storage Building stores up to 14,400 m3 (3,025 tonnes) of woodchip, sufficient to supply the boiler for around 3.5 days. Processed woodchip is held within the Woodchip Storage Building for a maximum of 8 weeks. The boiler requires around 1,381,000 m3/year (290,000 tonnes/year) of woodchip and produces around 40.3 MWe.

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)		61,063	41,436	64,656	71,676	**238,831**	100.0%
Refuse Derived Fuel * - H'hold/LA						-	-
Refuse Derived Fuel * - C&I						-	-
Other [Please specify]						-	-
Other [Please specify]						-	-
Other [Please specify]						-	-
Total waste received		**61,063**	**41,436**	**64,656**	**71,676**	**238,831**	
Rejected Waste		17	13	29	51	**109**	0.0%
Unprocessed waste transferred out						-	-
Total waste combusted **		**61,063**	**41,436**	**64,656**	**71,676**	**238,831**	

Energy Usage / Export	Unit	Q1	Q2	Q3	Q4	**Year Total**	KWh/te
Power Generated	MWh	79,897	52,774	82,154	89,440	**304,266**	1,274
Power Exported		74,971	49,414	76,908	83,277	**284,571**	1,192
Power Used on site		4,926	3,360	5,246	6,163	**19,695**	82
Power Imported		225	448	155	114	**942**	4
Parasitic Load	%	6.4%	7.2%	6.6%	7.0%	6.8%	
Thermal Energy Produced ***	MWh					-	-
Thermal Energy Exported ***						-	-
R1 value (if applicable)	R1	0	0	0	0	-	0.0%

Waste Disposal & Recovery	Unit	Q1	Q2	Q3	Q4	**Year Total**	% inputs
APC Residues - produced	tonnes	1,303	884	1,380	1,530	**5,097**	2.1%
IBA - produced		4,097	2,870	4,009	4,531	**15,506**	6.5%
Metals recycling		29	16	31	37	**113**	0.0%
Other						-	-
Other						-	-
Other						-	-

Raw Material Usage	Unit	Q1	Q2	Q3	Q4	**Year Total**	kg or Ltr /te
Mains Water	ltrs	16,580	12,868	13,351	13,993	**56,792**	0.24
Other Water	ltrs					-	-
Ammonia	kgs					-	-
Urea	kgs	58	39	54	75	**226**	0.00
Activated Carbon	kgs	-	-	-	-	-	-
Lime / hydrated lime	kgs	697	460	759	909	**2,824**	0.01
Fuel oil	ltrs	200,617	210,410	285,363	257,950	**954,341**	4.00
Gas	cuf					-	
Other						-	

Summary	Line/Unit	Q1	Q2	Q3	Q4	**Year Total**	
Availability of waste combustion by line, hrs ****	1	1,822	959	1,962	2,061	**6,804**	77.7%
	2						0.0%
	3						0.0%
	4						0.0%
	5						0.0%
Overall Availability, mean avg. of all lines, hrs		**1,822**	**959**	**1,962**	**2,061**	6,804	**77.7%**
Hours of turbine operations, hrs	1	1,841	1,312	1,995	2,113	**7,261**	82.9%
Hours of turbine operations, hrs	2					**-**	0.0%
Hours of heat / steam export						**-**	n/a
Net Calorific Value of waste	MJ/kg						
Abnormal Events	qty.	-	-	-	-	**-**	no
Abnormal operation	hours	-	-	-	-	**-**	0.0%
Permit Breaches	qty.	3	1	2	1	**7**	yes

Summary of Plant Operations and Maintenance during the reporting year

The plant entered 2023 in full commercial operation following the O&M contract guidelines and guarantees. During 2023 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. Particular attention was spent on boiler reliability to reduce lost availability on tube leak events which had been an issue during 2022.

Multiple tube leaks were experienced in January, February, March, and May just prior to the annual outage. These resulted in the plant undertaking multiple shutdowns to implement repairs. The annual maintenance outage was undertaken in May and involved a vast scope of works including replacement of left and right boiler panel walls, tube and bend replacements in the superheater, shielding replacement, PSSR inspections and HVTS coating in the boiler, second pass and superheater. The outage was extended by a further 5 days following further tube leaks being identified within the superheater.

The plant suffered two forced outages in September due to a leak on the STG ESV and a failure of the double screw conveyor. Following the repairs, the plant operated well from mid-September until early November when it suffered the first tube leak following the outage in the superheater where the defective tubes and leaking bends were found following a pressure test. Following repairs, the plant operated very well until year end, achieving very good generation during December.

The plant continued to trial the briquette machines through 2023, 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. Following the trial new briquette machines were purchased and installed during December with further modifications planned for 2024 to enable conveying of the briquettes from the feeder building briquette machine into the boiler.

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 Kings Cliffe, or Augean Thornhaugh Landfill Site. 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 2023.

2023 Annual Reporting Performance Form 1

Permit EPR/KP3936ZB
Facility: Tilbury Green Power

Operator: 0
Form: Performance 1

Reporting Period from: 01 January 2023 to: 31 December 2023

2023 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	5,097.0	0.0	2.1%
IBA	D01	15,506.0	0.0	6.5%
				-
				-
Total Hazardous Waste		20,603.0	0.0	8.6%
2) Non-Hazardous Wastes				
IBA	-	0.0	0.0	-
Ferrous Metal	-	106.5	0.0	0.0%
Process Water	-	0.0	0.0	-
				-
				-
Total Non-Hazardous Waste		106.5	0.0	0.0%
TOTAL WASTE		**20,709.5**	**0.0**	8.7%

Operator's comments :

Ferrous metal is now transferred to Eskens Renewables foronward disposal/recycling and is included within the relevant reports submitted by Eskens Renewables.

2023 Annual Reporting of Water and Other Raw Material Usage

Raw Material	Usage	Unit	Specific Useage	Unit
Mains Water	56792	m^3	0.24	m^3/te
Total Water	56792	m^3	0.24	m^3/te
Urea / Ammonia	225.73	kg	0.00	kg/te
Activated Carbon	0	kg	-	kg/te
Lime / hydrated lime / Sodium Bicarb.	2824.087	kg	0.01	kg/te

Operator's comments :

2023 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	6804						7261	
Number of periods of abnormal operation, qty.	0							
Cumulative hours of abnormal operation for this year, hours	0							

Operator's comments :

Signed: _____ Date: _____

2023 Annual Reporting of Energy Usage/Export

Permit EPR/KP3936ZB Operator: 0

Facility: Tilbury Green Power Form: Energy 1

Reporting Period from: 01 January 2023 to: 31 December 2023

Energy Source	Energy Usage	Unit	Specific Useage (KWh/tonne incinerated
Electricity Produced	304,266	MWh	1274
Electricity Imported	941.98	MWh	4
Electricity Exported	284,571	MWh	1192
Gas Oil		tonnes	
Steam/hot water exported	0	GWh	-

Operator's comments :

Signed: _____ 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[Not
Particulates	99.98%
Oxides of nitrogen	100.00%
Sulphur dioxide	100.00%
Carbon monoxide	99.97%
Total organic carbon	100.00%
Hydrogen chloride	100.00%
Hydrogen fluoride	100.00%

Date	Summary of notification or non-compliance [including Line/Reference][Note 3]
03/01/2023	Particulates Half Hour Average Breach at 50.4 mg/nm3
03/01/2023	Particulates Half Hour Average Breach at 47.3 mg/nm3
03/01/2023	CO Half Hour Average Breach at 206.9 mg/nm3

11/06/2023	CO Daily Average Breach at 77.4 mg/nm3
21/09/2023	CO Half Hour Average Breach at 247 mg/nm3
27/09/2023	CO Half Hour Average Breach at 231.90 mg/nm3
15/11/2023	CO Half Hour Average Breach at 160.5 mg/nm3

Date	Summary of complaint [including Line/Reference]
21/03/2023	A member of the public contact TGP about our pigeon scarer.
23/04/2023	Dust complaint from Berth 47.
02/08/2023	Noise Complaint

	Percentage time compliant during operation[Note 1]
e 2	Daily
	100
	100
	100
	99.
	100
	100
	100

Summary of any notifications or non-compliances under the permit

Reason	
Loaded up towards 75MWT a draw on the ID fan had caused the dust emissions to increase at 03:20am and peaked at 561mg/Nm3 uncorrected causing the half hourly average to come in at 50.4mg/Nm3. The dust emissions started to reduce five minutes after at 03:25am, however this was not enough to prevent a half hour particulate breach of 50.4mg/Nm3. Particulates emission's recovered and normal operation resumed. It was later discovered that a boiler port hole was found open which had caused mass imbalance on the boiler fan groups, once this was closed the levels returned to normal.	Following th checked a by locat
Loaded up towards 110MWT a draw on the ID fan had caused the dust emissions to increase at 04:38am and peaked at 267mg/Nm3 uncorrected causing the half hourly average to come in at 47.3mg/Nm3. The dust emissions started to fall off thirteen minutes later at 04:52am, however this was not enough to prevent a half hour particulate breach of 47.3mg/Nm3. Particulates emission's recovered and normal operation resumed until the duty day shift arrived, reduced the boiler load, and eventually switched of wood feed at 07:32am. It was later discovered that a boiler port hole was found open which had caused mass imbalance on the boiler fan groups, once this was closed the levels returned to normal.	Following th checked a by locat
02 in the boiler which was cooling the furnace temperature and also causing an unbalanced O2 spread across the boiler. At 04:39am the boiler load was increased from 75MWT up to 110MWT which caused the CO to rise to a peak of 373mg/Nm3(uncorrected) meaning the half hour period came in at 206.9mg/Nm3. The event occurred at shift change so the oncoming day shift immediately started to bring the boiler load down to control CO emissions and prevent another breach. CO emissions immediately came down as soon as this action was carried out. The day shift managed the CO emissions below ELV whilst trying to resolve the issue with excess boiler air and finally came of wood chip at 07:32am with no further CO breaches recorded. Checks were carried out around the boiler and a port hole was found open letting in excess air causing the issue, so the port hole was closed and the plant returned to normal operation.	Following th checked a by locat

Elevated CO emissions levels have been corrected and have been running as per normal parameters at full operational load since Monday the 19th of June. There have been no CO emissions breaches since the initial issues faced on Sunday the 11th of June. To manage CO emissions from the initial breach of the daily ELV on the 11th of June and until CO emissions were completely back to normal running parameters the power station/boiler load was run at a lower output to ensure that no further emissions breaches occurred. During the May outage the whole of the boiler tubes were significantly cleaned by removing hard ash formations that build up due to fouling from the fuel that produces ash. Following the return to service this significantly affected the heat transfer inside the boiler and had a big impact on combustion setting parameters that contributed to the combustion process. From the initial issues with the CO when the plant was returned to service a dedicated OEM engineer was remotely dialed in daily to assist with fine tuning the combustion settings so that CO emissions could be reduced. Over the days following the CO emissions breach the OEM engineer and shift operators had managed to progressively improve the condition of elevated CO whilst gradually increasing the plant load all whilst running under ELV limits for half hour limits and daily averages. By Monday the 19th of June the OEM engineer had tuned the combustion system as best possible and a significant improvement to the previous week's performance had been made. During the same day it was observed on the plant that a three-inch flange that was normally bolted tight was loose and allowing air ingress back into the second and third pass lower section of the boiler. This would be enough to re-ignite any carbon/fuel in the flue gas and contribute to elevated CO emissions. As soon as the flange bolts were tightened the CO emissions dropped of further and allowed the plant to run at expected CO emissions levels at full boiler load.	Measures t mode com Also, a mo any part of Major w
The breach occurred when co-firing on wood chip and aux fuel during the transitional period. It was also discovered/noted that fuel chute 6 was blocked with wood chip during this period. To gather more accurate information on this breach the duty shift will have to be interviewed and supporting trends gathered. Following further investigation into the contributing factors that caused the CO half hour breach there were a number of operational issues being faced during the re-introduction of wood chip on the plant start up. One being that one of the six wood chip feed lines had blocked which gave the operations team challenges in achieving the 850 degrees required for the feeding of wood chip, the supporting aux burners had to be in service for a longer duration whilst transitioning back onto wood chip as they were required during this start up due to the temperature challenges. The alarm for high CO had come in on the DCS and remained in during the half hour breach, however due to the complexity of the startup this was unfortunately missed by the duty panel operator.	Once the ELV. This service and
Prior to the plant restarting the plant was shut down and the wood chip in the feed line conveying route was contaminated with NEXTECH fire suppression in some areas, including the dosing bins. The wood would have been wet from testing of the de-misting water spray system. A more thorough investigation will be conducted, and the boiler OEM has been asked for support. But at this stage it is very possible the initial wood chip fed to the boiler grate was struggling to combust due to being wet and covered in fire suppression powder causing incomplete combustion. After further investigation it has become apparent that wet wood chip was fed onto the boiler grate and had taken longer than normal to combust. The wood chip had been soaked due to testing of the dosing bin misting system prior to start up. The grate was overfed and when the wood chip eventually caught alight it caused a very high CO spike. The duty operator ceased wood feed to the grate with good intentions but then re-introduced wood chip back onto the grate within the same half hour period while the CO half hour period was still in alarm. This recorded a half hour breach on the CEMS.	The operat the same and guida introduced th It has also wet ten
During shift a very large amount of slag fell onto the boiler grate from the front wall. This restricted the air flow on the right side of the grate and a large CO spike occurred. The spike reduced back to normal parameters over a three-minute period, however this was not enough to reduce the limit below 150mg/Nm3 inside the reporting half hour period. The boiler load was reduced and the boiler O2% stabilized to prevent any more CO spikes or a plant trip but as noted was not enough to bring in the CO. The spike	The duty combustio hard to mi 10-minute period. Th CO is instantaneo

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

Reason *	
A member of the public takes an interest in local birds, and he says that a new bird scarer was installed at the site about a month ago, to keep the pigeons away. He understands the need for this but says it has had an additional impact this time. There has been a local pair of peregrine falcons, and they too have disappeared in the last month – they have been local for around 30 years, and he attributes their departure to the bird scarer.	The investig Through the area albeit In addition, 'We don't e complaint is area out of heard some concerns, b The range approximat Given the n still in the a
Berth 47 have been having issues with dust. They have received a couple of complaints last week stating in summary, that the power station was "pumping out powder embers" , "ash" They have concerns over breathing in the dust and it going over trucks/cars they state it is ruining the paintwork and scratching windows."	TGP circula that there h monitoring, linked to thi TGP met w their emplo The substa TGP sent a analysed by carbohydra Upon revie the visible s
A individual reported that there are frequent bouts of an incessant squealing / squeaking noise that happen at different times of the day and night and can run for 10-20 minutes at a time. One of his neighbours said it was coming from Amazon but he is convinced it is coming from TGP. He likened it to the sound of a freight training coming into brake on the rails.	The plant w morning). T noise from t during the r could poten Seabrook s plant notice actions to m

*** including whether substantiated by the operator**

y limit
.00%
.00%
.00%
64%
.00%
.00%
.00%

Measures taken to prevent reoccurrence
his incident a procedure will be developed for all man way and port hole doors to be after any major work is carried out on the boiler. The procedure will list all openings ion and numerical ID. The location and numerical ID will also be identifiable with signage at each area. Tool box talks and training will be delivered to all shift operators.
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hat will be put in place to prevent this happening again will firstly be to set up a fuel
bustion setting in the DCS logic in the event major boiler tube cleaning is required
for an outage as this upset the fixed settings currently in place.
re robust pre-start checks sheet for all the site plant systems that can draw air into
the furnace will be immediately developed. This will include double cross-checking
for any intrusive work carried out on those systems.
ork was carried out of the affected area during the outage along with operational
blockages thereafter.

duty shift settled out the operational issues the CO was managed to levels below
included having enough thermal heat in the boiler to remove the aux burners from
l load up the plant after heat soaking the turbine and improving vacuum conditions.

or ceased wood chip feeding at around 11:35pm but re-introduced wood chip within
half hour period while the CO was in alarm for the half hour period. Some training
nce has been given to the operator to advise that wood chip should have been re-
during the next half hour period to prevent the breach when CO was stabilized. All
e shifts have been advised of this breach to prevent this happening again.
been updated in the CO control procedure that if wood chip is, or suspected to be
the wood introduction to the grate will be slowed down for an extended period.

shift operators are aware of how to reduce CO spikes that occur due to unstable
n the furnace grate within minutes. However, the nature of this type of event is very
tigate over the half hour recording period as the CO spikes scale too high to bring
back within ELV.

CO recording intervals would likely eradicate this type of breach over a 30-minute
is could be explored as an option. Removal of in day averages on CO should also
be explored as per other sites.

ssues are not a problem with normal operation but do present challenges with
ous spikes due to combustion issues that can disturb the boiler oxygen levels as the
case with this incident.

Measures taken to prevent reoccurrence
gation has been completed. e Port of Tilbury we have identified that a pair of peregrine falcons are still in the not in their usual nesting spot. Birdgard have confirmed the following: ver hear the complaint that the sounds produced scared off raptors. So, your s very unusual. If anything, the distress sounds bring the predator birds in to the curiosity wondering if they might find a free meal. It is possible that these falcons e of the predator calls from the units and responded as they did out of territorial ut we do not have any data to support that is the case.' on the equipment is limited, dispersed in a conical shape with a width of base of ely 50m. inimal range of the equipment, and the confirmation that the peregrine falcons are rea it is unlikely that our pigeon deterrent has had a negative impact on the falcons.
ated the complaint to the operator of the WPF and the PPF. Both parties confirmed ad been no environmental breaches. The PP has continuous emissions which were all inside our limits. Ash from our processes is not considered to be s complaint as they are stringently monitored and controlled. ith the Port of Tilbury and Berth 47 to observe the dust that has been collecting on yees' cars. nce was a yellow / orange colour and does not match any of TGP's by-products. sample of the substance to Socotec for testing. A portion of the sample was / FTIR; the sample was found to have some stretches consistent with a te. The laboratory was not able to distinguish the type of carbohydrate. w of the microscopic images with our wood supplier and the lab, we have agreed structure was not consistent with wood dust.
as operational on the 1st August and 2nd August (periods of part load mid The wood processing facility staff and the power plant staff confirmed no unusual the plant. TGP contacted the Port of Tilbury to understand if freight trains run night. The Port ruled out the trains within the Port as a course but highlighted it itially be linked to the mainline trains braking and switching as they approach iding. TGP will continue to monitor for abnormal noise. Whenever operators at the any abnormal noise, they immediately investigate the issue and take necessary nitigate the issue.

or the EA

Summary of Plant Improvements

Summary of any efficiency improvements that have been completed within the year.
Throughout 2023 there has been an ongoing project to improve the combustion within the boiler, for the purposes of increasing efficiency, reducing fouling and decreasing emissions. Identified passing valves and repaired them during the annual maintenance outage to improve water consumption and reduce energy loss. A recirculation loop was installed into the water treatment plant drain to reduce water loss.

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.
Ongoing trial of briquette machines concluded during Q4 2023 and new machines purchased and installed in December. This has resulted in a considerable reduction in waste wood fines/dust going to landfill and improving plant effiency.

Details of Public & Stakeholder Liasion

Summary of events held during the reporting year.	
Date	**Description**
01/07/2023	TGP Newletter Circulated
18/07/2023	Community Liason Group Meeting

List of events planned for next year	
Date	**Description**
Q1/Q2	Newsletter
Q1/Q2	Community Meeting
Q3/Q4	Newsletter
Q3/Q4	Community Meeting

If you wish to be involved in the public liasion programme, please contact TGP through the website

ɔon dioxide emissions and biogenic content of waste inputs

ɔon dioxide emissions (all types of plant)

Annual mass of carbon dioxide released	128211.58 tonnes	
Annual mass of carbon dioxide released per tonne of waste burned	0.54 t CO_2 / t waste	
Annual mass of carbon dioxide released per MWh of energy exported	0.45 t CO_2 / MWh export	
Description of how annual carbon dioxide mass emission has been calculated. See Note 1	CEMS annual report data calculated using Avogadro's Law	

ɔus oxide emissions (only plants which use ammonia or urea to abate NOx emissions)

Annual mass emissions of nitrous oxide	0.072 tonnes N_2O	
Description of how annual nitrous oxide mass emission has been calculated See Note 2	Periodic monitoring results calculated by average hourly flow rate and hours plant was operational (i.e. burning waste)	
l annual carbon dioxide and nitrous e emissions. Note 3.	128233.03 tonnes CO_2e	

ɹenic CO2 emissions (See Note 4)

Percentage of total carbon dioxide emissions arising from biogenic waste	%	
No. of measurements undertaken	Number	
Description of how percentage biogenic carbon dioxide emissions have been measured or calculated. See Note 5		

ɹenic fraction of waste feedstock (See Note 4)

Yearly average biogenic percentage of the waste by net calorific value (NCV)	%	
If sampling undertaken, no. of samples used to ascertain average biogenic % above	Number	

Description of how biogenic percentage (by NCV) has been calculated or estimated. See Note 6	

Comments:

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%	5.3	
Total Organic Carbon (average %)	<3%	2.1	
No. of Assessments Undertaken	---	Quarterly when in operation	Monthly when in operation
No. of Hazardous Results	---	N/A	

Comments :
Bottom Ash quarterly results for loss on ignition are as follows: Q1 - 4.2 Q2 - 5.1 Q3 - 5.6 Q4 - 6.4

Emissions to Water

Summary of monitoring undertaken and compliance
There is no environmental permit conditions for trade effluent. A trade effluent consent is in place with Anglian wate
Anglian Water attend site on a quarterly basis to conduct sampling and testing of the trade effluent.
WBOC undertake sampling of the neutralisation pit (trade effluent water) on a weekly basis to create a monthly composite sample which is then sent to an accredited lab to ensure it is compliant with the consent.

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
Biannual MCERTS accredited monitoring undertaken by Socotec.

Results of emissions to air that are periodically monitored - oxygen reference 6%

Substance	Ref. Period	Emission Limit Value*	Average			
			A1	A2	A3	A4
Hydrogen fluoride	240 minutes	3 mg/m^3	0.076			
Cd and Th and their compounds	63 minutes	0.05 mg/m^3	0.000945			
Hg and its compounds	63 minutes	0.05 mg/m^3	0.00093			
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	63 minutes	0.5 mg/m^3	0.04			
Dioxins & Furans (I-TEQ)	360 minutes	0.1 ng/m^3	0.00077			
PCBs (WHO-TEQ Humans / Mammals)	360 minutes	None set ng/m^3	0.000066			
PCBs (WHO-TEQ Fish)	360 minutes	None set ng/m^3	0.0000063			
PCBs (WHO-TEQ Birds)	360 minutes	None set ng/m^3	0.0004			
Dioxins & Furans (WHO-TEQ Humans / Mammals)	360 minutes	None set ng/m^3	0.00075			
Dioxins & Furans (WHO-TEQ Fish)	360 minutes	None set ng/m^3	0.000675			
Dioxins & Furans (WHO-TEQ Birds)	360 minutes	None set ng/m^3	0.00143			
Anthanthrene	360 minutes	None set µg/m^3	0.0013			
Benzo(a)anthracene	360 minutes	None set µg/m^3	0.0014			
Benzo(a)pyrene	360 minutes	None set µg/m^3	0.0013			
Benzo(b)fluoranthene	360 minutes	None set µg/m^3	0.0015			
Benzo(b)naptho(2,1-d) thiophene	360 minutes	None set µg/m^3	0.0013			
Benzo(c)phenanthrene	360 minutes	None set µg/m^3	0.0013			
Benzo(ghi)perylene	360 minutes	None set µg/m^3	0.0021			
Benzo(k)fluoranthene	360 minutes	None set µg/m^3	0.0013			
Cholanthrene	360 minutes	None set µg/m^3	0.0013			
Chrysene	360 minutes	None set µg/m^3	0.0014			
Cyclopenta(cd)pyrene	360 minutes	None set µg/m^3	0.0013			
Dibenzo(ai)pyrene	360 minutes	None set µg/m^3	0.0013			
Dibenzo(ah)anthracene	360 minutes	None set µg/m^3	0.0013			
Fluoranthene	360 minutes	None set µg/m^3	0.0353			
Indeno(123-cd) pyrene	360 minutes	None set µg/m^3	0.0014			
Naphthalene	360 minutes	None set µg/m^3	0.0839			

Comments :

A5

Emissions to Air (continously monitored)

Summary of monitoring undertaken, standards used and compliance
MCERTS accredited CEMS (Sick UK)

Results of emissions to air that are continuously monitored (maximum and average values for each line) - oxygen reference 6%

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	302.8	190.01								
	½ hourly mean*	600 mg/m^3 *	378.5	237.5								
Particulates	Daily mean	15 mg/m^3	50.3	0.03								
	½ hourly mean*	45 mg/m^3 *	71.9	0.04								
Total Organic Carbon	Daily mean	15 mg/m^3	4.4	0.9								
	½ hourly mean*	30 mg/m^3 *	6.3	1.3								
Hydrogen chloride	Daily mean	15 mg/m^3	26.3	0.8								
	½ hourly mean*	90 mg/m^3 *	43.8	1.4								
Sulphur dioxide	Daily mean	75 mg/m^3	216.1	55.1								
	½ hourly mean*	300 mg/m^3 *	270.14	68.9								
Carbon monoxide	Daily mean	75 mg/m^3	247.7	39.5								
	½ hourly mean*	150mg/m^3 *	275.2	43.9								
	95%ile 10-min avg*	225 mg/m^3 *	-	-								
Ammonia	Daily mean	No limit set until 03/12/23	165.07	1.2								

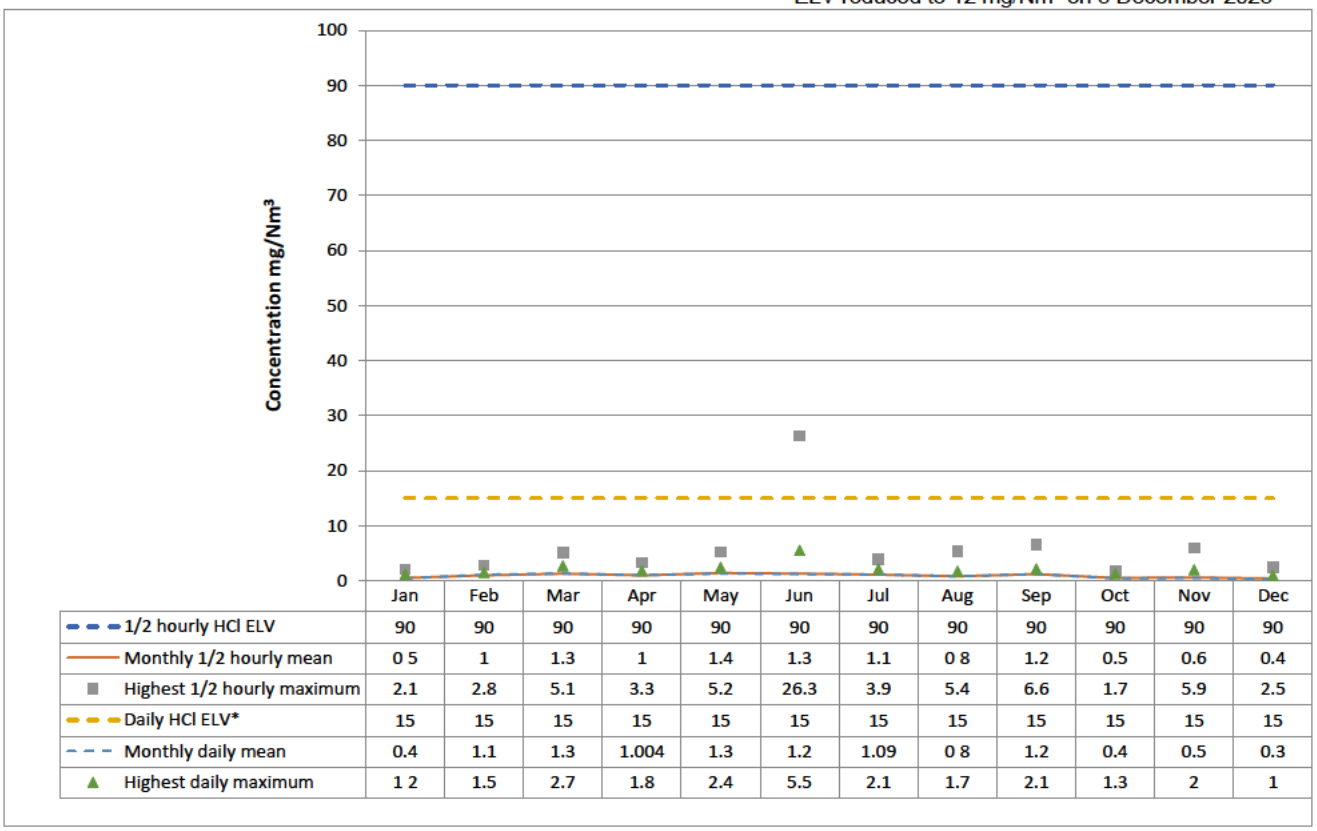
* = delete if your plant does not have these limits

Comments :

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

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2023	**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	0.5	2.1	15	0.4	1.2
Feb	90	1	2.8	15	1.1	1.5
Mar	90	1.3	5.1	15	1.3	2.7
Apr	90	1	3.3	15	1.004	1.8
May	90	1.4	5.2	15	1.3	2.4
Jun	90	1.3	26.3	15	1.2	5.5
Jul	90	1.1	3.9	15	1.09	2.1
Aug	90	0.8	5.4	15	0.8	1.7
Sep	90	1.2	6.6	15	1.2	2.1
Oct	90	0.5	1.7	15	0.4	1.3
Nov	90	0.6	5.9	15	0.5	2
Dec	90	0.4	2.5	15	0.3	1

* ELV reduced to 12 mg/Nm^3 on 3 December 2023



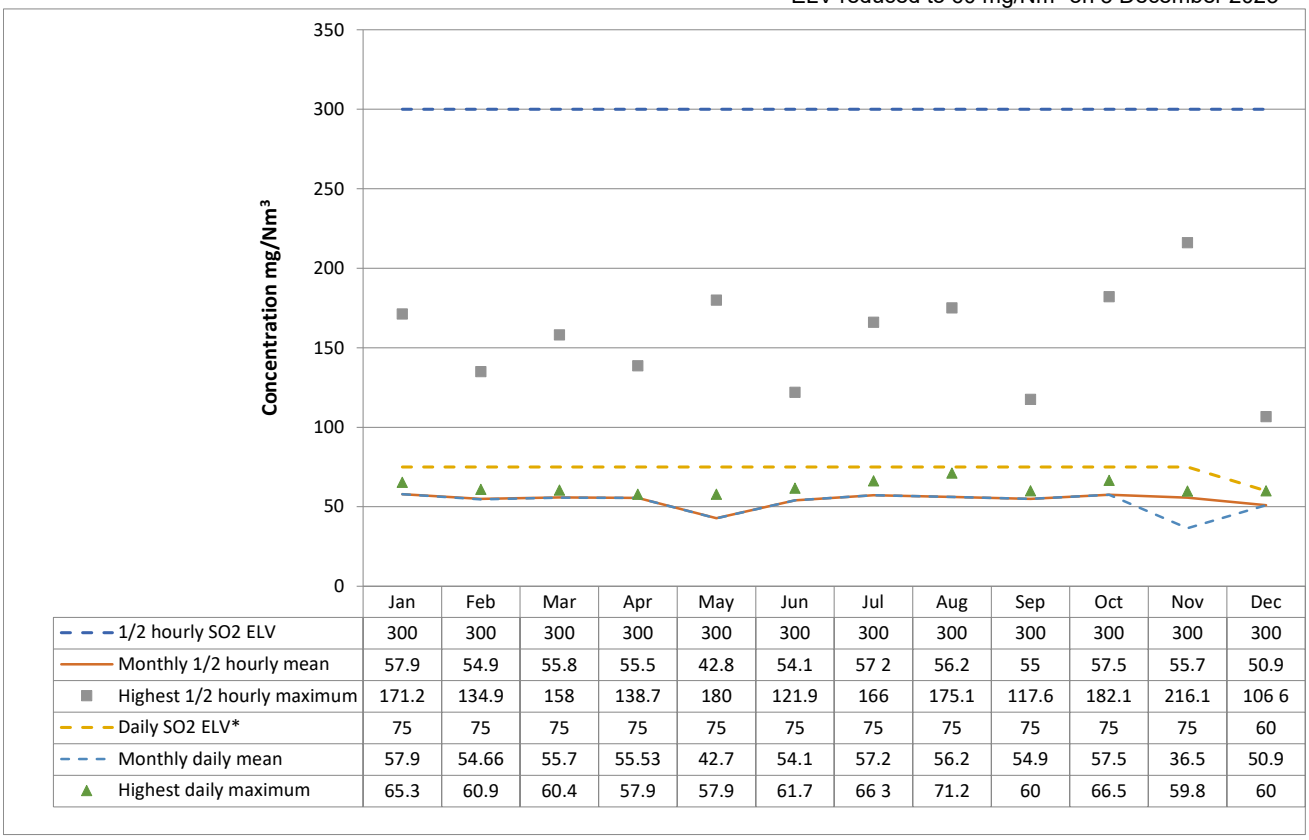
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly HCl ELV	90	90	90	90	90	90	90	90	90	90	90	90
Monthly 1/2 hourly mean	0 5	1	1.3	1	1.4	1.3	1.1	0 8	1.2	0.5	0.6	0.4
Highest 1/2 hourly maximum	2.1	2.8	5.1	3.3	5.2	26.3	3.9	5.4	6.6	1.7	5.9	2.5
Daily HCl ELV*	15	15	15	15	15	15	15	15	15	15	15	15
Monthly daily mean	0.4	1.1	1.3	1.004	1.3	1.2	1.09	0 8	1.2	0.4	0.5	0.3
Highest daily maximum	1 2	1.5	2.7	1.8	2.4	5.5	2.1	1.7	2.1	1.3	2	1

Comments :

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

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2023	**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	57.9	171.2	75	57.9	65.3
Feb	300	54.9	134.9	75	54.66	60.9
Mar	300	55.8	158	75	55.7	60.4
Apr	300	55.5	138.7	75	55.53	57.9
May	300	42.8	180	75	42.7	57.9
Jun	300	54.1	121.9	75	54.1	61.7
Jul	300	57.2	166	75	57.2	66.3
Aug	300	56.2	175.1	75	56.2	71.2
Sep	300	55	117.6	75	54.9	60
Oct	300	57.5	182.1	75	57.5	66.5
Nov	300	55.7	216.1	75	36.5	59.8
Dec	300	50.9	106.6	60	50.9	60

* ELV reduced to 60 mg/Nm^3 on 3 December 2023



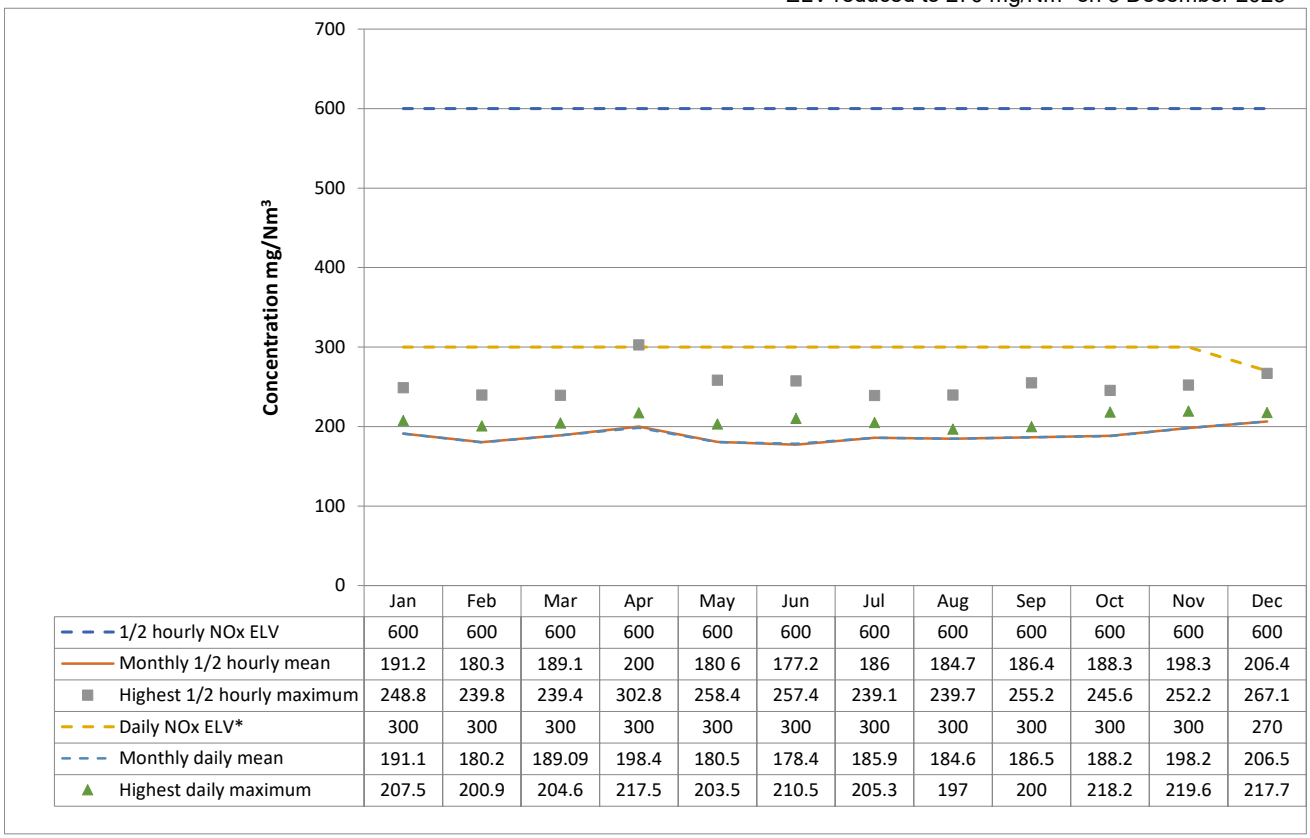
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly SO2 ELV	300	300	300	300	300	300	300	300	300	300	300	300
Monthly 1/2 hourly mean	57.9	54.9	55.8	55.5	42.8	54.1	57 2	56.2	55	57.5	55.7	50.9
Highest 1/2 hourly maximum	171.2	134.9	158	138.7	180	121.9	166	175.1	117.6	182.1	216.1	106 6
Daily SO2 ELV*	75	75	75	75	75	75	75	75	75	75	75	60
Monthly daily mean	57.9	54.66	55.7	55.53	42.7	54.1	57.2	56.2	54.9	57.5	36.5	50.9
Highest daily maximum	65.3	60.9	60.4	57.9	57.9	61.7	66 3	71.2	60	66.5	59.8	60

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		
2023	**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	191.2	248.8	300	191.1	207.5
Feb	600	180.3	239.8	300	180.2	200.9
Mar	600	189.1	239.4	300	189.09	204.6
Apr	600	200	302.8	300	198.4	217.5
May	600	180.6	258.4	300	180.5	203.5
Jun	600	177.2	257.4	300	178.4	210.5
Jul	600	186	239.1	300	185.9	205.3
Aug	600	184.7	239.7	300	184.6	197
Sep	600	186.4	255.2	300	186.5	200
Oct	600	188.3	245.6	300	188.2	218.2
Nov	600	198.3	252.2	300	198.2	219.6
Dec	600	206.4	267.1	270	206.5	217.7

* ELV reduced to 270 mg/Nm^3 on 3 December 2023

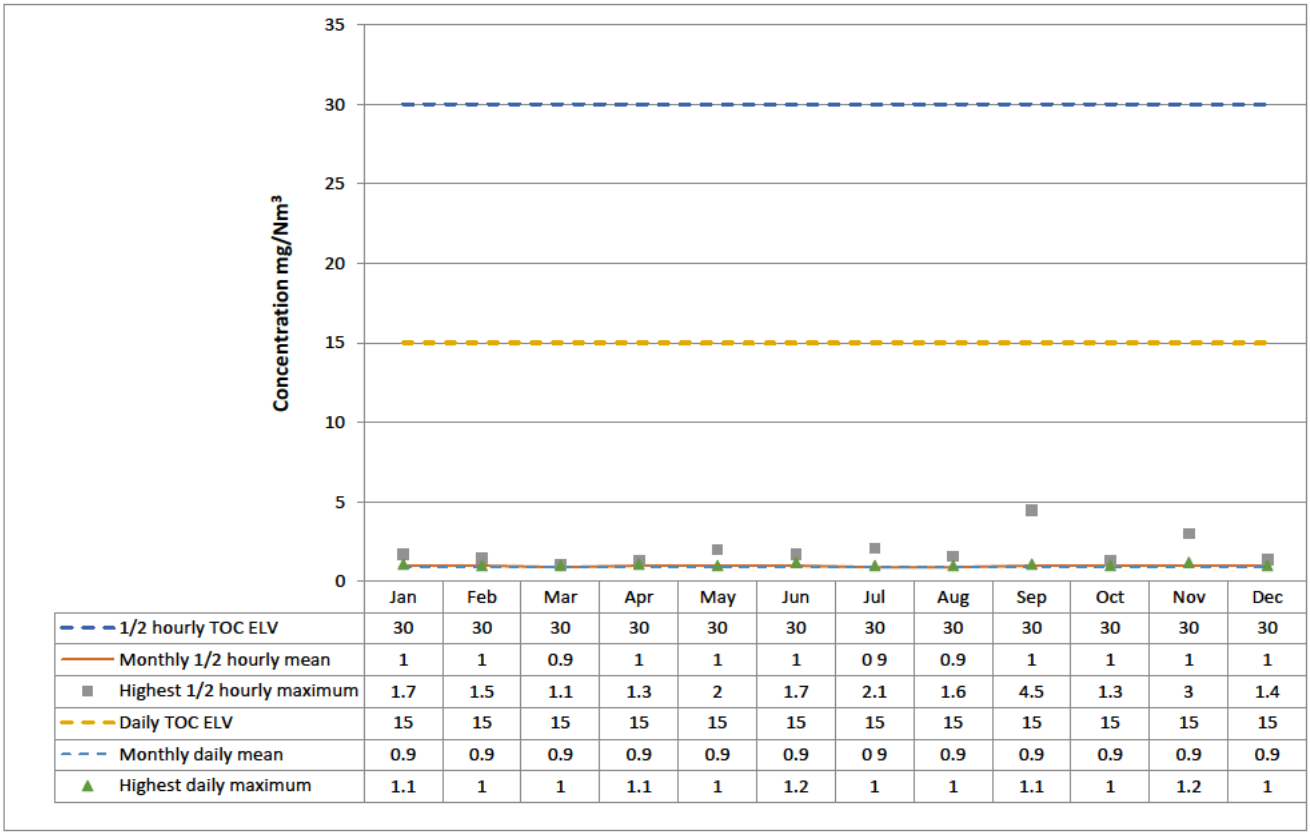


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly NOx ELV	600	600	600	600	600	600	600	600	600	600	600	600
Monthly 1/2 hourly mean	191.2	180.3	189.1	200	180 6	177.2	186	184.7	186.4	188.3	198.3	206.4
Highest 1/2 hourly maximum	248.8	239.8	239.4	302.8	258.4	257.4	239.1	239.7	255.2	245.6	252.2	267.1
Daily NOx ELV*	300	300	300	300	300	300	300	300	300	300	300	270
Monthly daily mean	191.1	180.2	189.09	198.4	180.5	178.4	185.9	184.6	186.5	188.2	198.2	206.5
Highest daily maximum	207.5	200.9	204.6	217.5	203.5	210.5	205.3	197	200	218.2	219.6	217.7

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		
2023	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	1.7	15	0.9	1.1
Feb	30	1	1.5	15	0.9	1
Mar	30	0.9	1.1	15	0.9	1
Apr	30	1	1.3	15	0.9	1.1
May	30	1	2	15	0.9	1
Jun	30	1	1.7	15	0.9	1.2
Jul	30	0.9	2.1	15	0.9	1
Aug	30	0.9	1.6	15	0.9	1
Sep	30	1	4.5	15	0.9	1.1
Oct	30	1	1.3	15	0.9	1
Nov	30	1	3	15	0.9	1.2
Dec	30	1	1.4	15	0.9	1



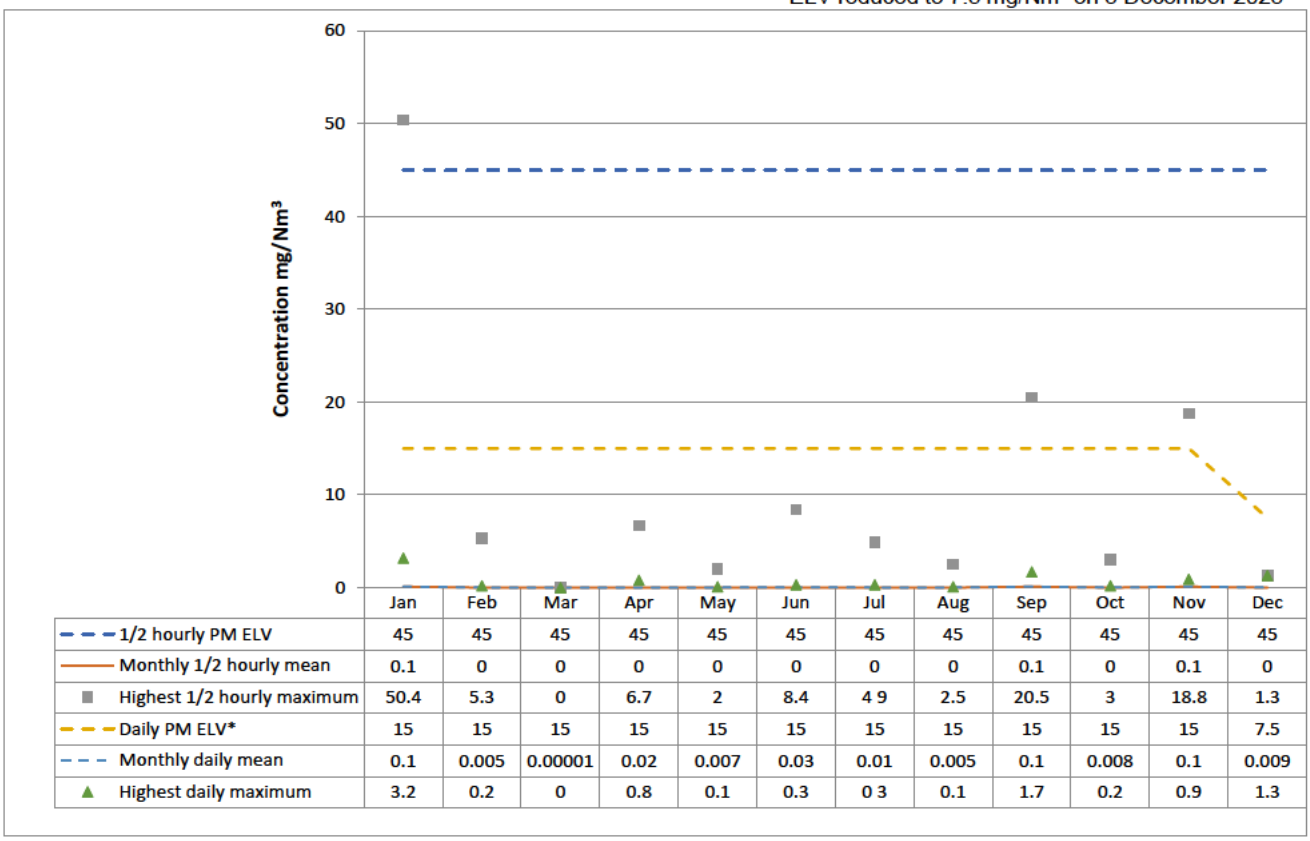
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly TOC ELV	30	30	30	30	30	30	30	30	30	30	30	30
Monthly 1/2 hourly mean	1	1	0.9	1	1	1	0 9	0.9	1	1	1	1
Highest 1/2 hourly maximum	1.7	1.5	1.1	1.3	2	1.7	2.1	1.6	4.5	1.3	3	1.4
Daily TOC ELV	15	15	15	15	15	15	15	15	15	15	15	15
Monthly daily mean	0.9	0.9	0.9	0.9	0.9	0.9	0 9	0.9	0.9	0.9	0.9	0.9
Highest daily maximum	1.1	1	1	1.1	1	1.2	1	1	1.1	1	1.2	1

Comments :

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

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2023	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	0.1	50.4	15	0.1	3.2
Feb	45	0	5.3	15	0.005	0.2
Mar	45	0	0	15	0.00001	0
Apr	45	0	6.7	15	0.02	0.8
May	45	0	2	15	0.007	0.1
Jun	45	0	8.4	15	0.03	0.3
Jul	45	0	4.9	15	0.01	0.3
Aug	45	0	2.5	15	0.005	0.1
Sep	45	0.1	20.5	15	0.1	1.7
Oct	45	0	3	15	0.008	0.2
Nov	45	0.1	18.8	15	0.1	0.9
Dec	45	0	1.3	7.5	0.009	1.3

* ELV reduced to 7.5 mg/Nm^3 on 3 December 2023



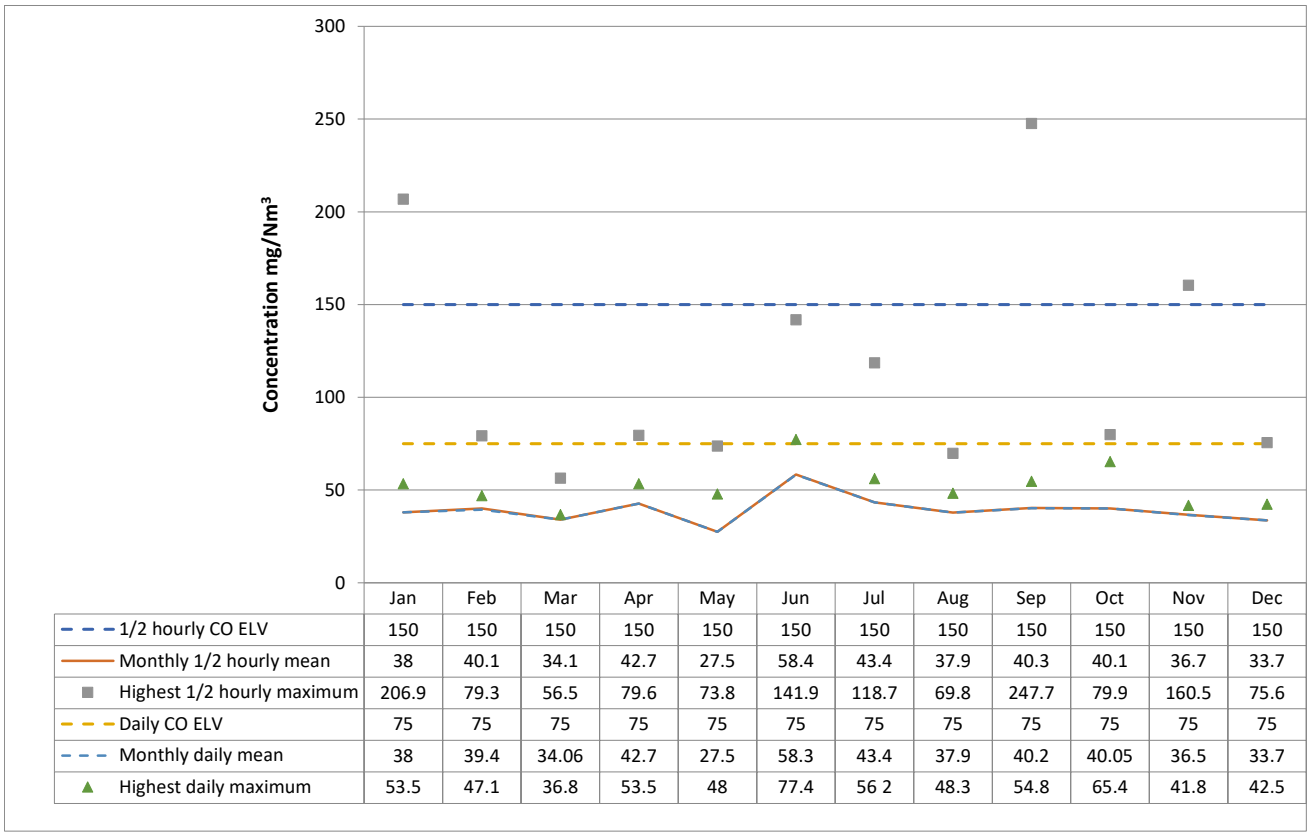
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly PM ELV	45	45	45	45	45	45	45	45	45	45	45	45
Monthly 1/2 hourly mean	0.1	0	0	0	0	0	0	0	0.1	0	0.1	0
Highest 1/2 hourly maximum	50.4	5.3	0	6.7	2	8.4	4 9	2.5	20.5	3	18.8	1.3
Daily PM ELV*	15	15	15	15	15	15	15	15	15	15	15	7.5
Monthly daily mean	0.1	0.005	0.00001	0.02	0.007	0.03	0.01	0.005	0.1	0.008	0.1	0.009
Highest daily maximum	3.2	0.2	0	0.8	0.1	0.3	0 3	0.1	1.7	0.2	0.9	1.3

Comments :

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

If your plant has no short-term (half-hourly or 10-minute) CO ELVs, please complete this tab (stating "none" in the 1/2 hourly CO column) and ignore the CO 95% 10 min tab; otherwise, complete the relevant CO tab for your plant

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2023	**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	38	206.9	75	38	53.5
Feb	150	40.1	79.3	75	39.4	47.1
Mar	150	34.1	56.5	75	34.06	36.8
Apr	150	42.7	79.6	75	42.7	53.5
May	150	27.5	73.8	75	27.5	48
Jun	150	58.4	141.9	75	58.3	77.4
Jul	150	43.4	118.7	75	43.4	56.2
Aug	150	37.9	69.8	75	37.9	48.3
Sep	150	40.3	247.7	75	40.2	54.8
Oct	150	40.1	79.9	75	40.05	65.4
Nov	150	36.7	160.5	75	36.5	41.8
Dec	150	33.7	75.6	75	33.7	42.5



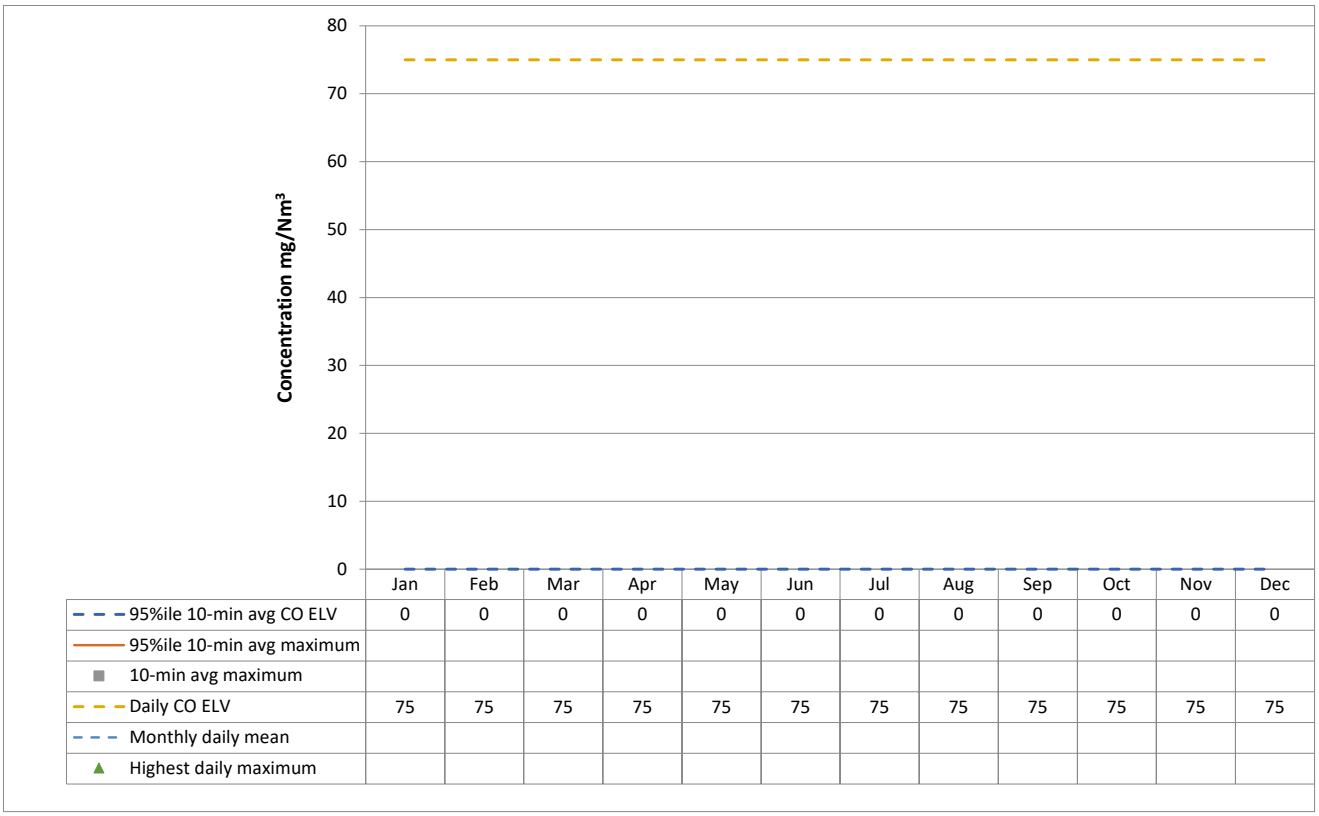
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly CO ELV	150	150	150	150	150	150	150	150	150	150	150	150
Monthly 1/2 hourly mean	38	40.1	34.1	42.7	27.5	58.4	43.4	37.9	40.3	40.1	36.7	33.7
Highest 1/2 hourly maximum	206.9	79.3	56.5	79.6	73.8	141.9	118.7	69.8	247.7	79.9	160.5	75.6
Daily CO ELV	75	75	75	75	75	75	75	75	75	75	75	75
Monthly daily mean	38	39.4	34.06	42.7	27.5	58.3	43.4	37.9	40.2	40.05	36.5	33.7
Highest daily maximum	53.5	47.1	36.8	53.5	48	77.4	56 2	48.3	54.8	65.4	41.8	42.5

Comments :

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

If your plant has no short-term (half-hourly or 10-minute) CO ELVs, please ignore this tab and instead complete the CO 0.5 hourly tab; otherwise, please complete the relevant CO tab for your plant

mg/Nm^3	10-minute Reference Periods				Daily Reference Periods		
2023	**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	ELV or none				75		
Feb	ELV or none				75		
Mar	ELV or none				75		
Apr	ELV or none				75		
May	ELV or none				75		
Jun	ELV or none				75		
Jul	ELV or none				75		
Aug	ELV or none				75		
Sep	ELV or none				75		
Oct	ELV or none				75		
Nov	ELV or none				75		
Dec	ELV or none				75		



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
95%ile 10-min avg CO ELV	0	0	0	0	0	0	0	0	0	0	0	0
95%ile 10-min avg maximum												
10-min avg maximum												
Daily CO ELV	75	75	75	75	75	75	75	75	75	75	75	75
Monthly daily mean												
Highest daily maximum												

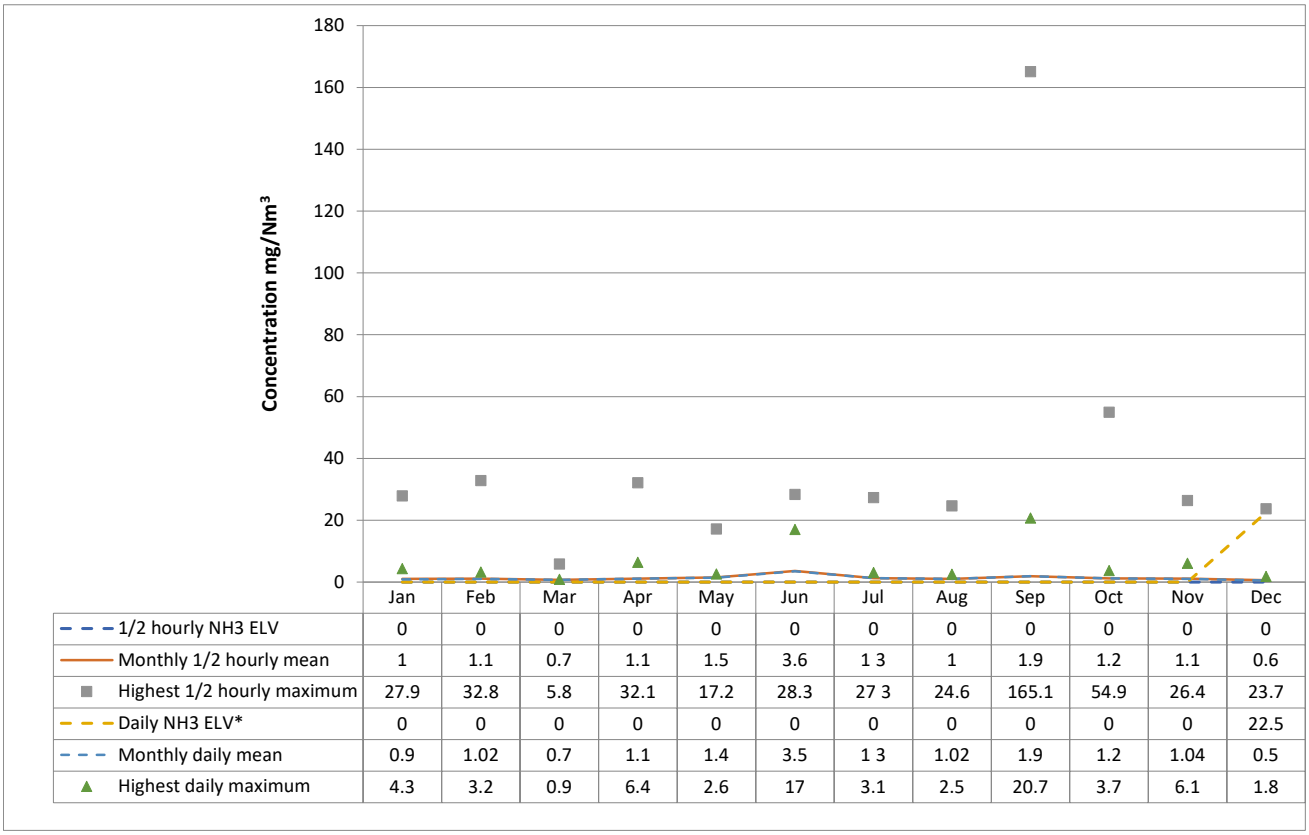
Comments :

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		
2023	**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	None	1	27.9	None	0.9	4.3
Feb	None	1.1	32.8	None	1.02	3.2
Mar	None	0.7	5.8	None	0.7	0.9
Apr	None	1.1	32.1	None	1.1	6.4
May	None	1.5	17.2	None	1.4	2.6
Jun	None	3.6	28.3	None	3.5	17
Jul	None	1.3	27.3	None	1.3	3.1
Aug	None	1	24.6	None	1.02	2.5
Sep	None	1.9	165.1	None	1.9	20.7
Oct	None	1.2	54.9	None	1.2	3.7
Nov	None	1.1	26.4	None	1.04	6.1
Dec	None	0.6	23.7	22.5	0.5	1.8

* ELV came into force on 3 December 2023



	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	1	1.1	0.7	1.1	1.5	3.6	1 3	1	1.9	1.2	1.1	0.6
Highest 1/2 hourly maximum	27.9	32.8	5.8	32.1	17.2	28.3	27 3	24.6	165.1	54.9	26.4	23.7
Daily NH3 ELV*	0	0	0	0	0	0	0	0	0	0	0	22.5
Monthly daily mean	0.9	1.02	0.7	1.1	1.4	3.5	1 3	1.02	1.9	1.2	1.04	0.5
Highest daily maximum	4.3	3.2	0.9	6.4	2.6	17	3.1	2.5	20.7	3.7	6.1	1.8

Comments :

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