



Annual Performance Report 2021

Permit EPR/AB3092CV

Parc Adfer Energy Recovery Facility

enfinium Parc Adfer Operations Limited

Year: 2021

Address: Weighbridge Road, Zone 4, Deeside Industrial Estate, Flintshire,
CH5 2LL

Prepared by: Jamie Williams

Position: Environmental Officer

Approved by: David Cottis

Position: Operations Manager

Version: 1

Issue Date: 21/01/2022

Contents		
Section	Subject	Page
1	Facility Information	3
2	Operational Summary	4
3	Operational Data	5
4	Performance Form 1	6
5	Energy Form 1	7
6	Permit Compliance	8
7	Improvements	9
8	Public Liaison	10
9	Residue Quality	11
10	Emissions to Water	12
11	Emissions to Air (periodically monitored)	13
12	Emissions to Air (continuously monitored)	14
12.1	Hydrogen Chloride emissions	15
12.2	Sulphur Dioxide emissions	16
12.3	Oxides of Nitrogen emissions	17
12.4	Total Organic Carbon emissions	18
12.5	Particulate Matter emissions	19
12.6	Carbon Monoxide emissions	20
12.7	Ammonia emissions	21

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.

Section 1: Facility Information**Plant Description and Design**

The Parc Adfer Energy Recover Facility (ERF) recovers value (primarily in the form of energy, but also recycled materials in the form of incinerator bottom ash aggregate and metals recovered from the incinerator bottom ash (IBA)) from up to 200,000 tonnes per annum of residual waste. The majority of the processed waste is residual Municipal Solid Waste (MSW) collected by the five local authorities which make up the North Wales Residual Waste Treatment Partnership. The balance is comprised of residual commercial and industrial (C&I) waste, collected by private waste management companies. The site is located to the south east of the Dee Estuary within the Deeside Industrial Estate, 2km south west of the nearest village, Puddington.

enfinium Parc Adfer Operations Limited took control of the facility on the 19th December 2019 following completion of the construction and commissioning phases.

The installation consists of one incineration line with a capacity to incinerate 29 tonnes of waste per hour. The facility processes waste using air cooled, moving grate technology. The energy recovered from the combustion of waste is utilised (in the form of high-pressure steam) to produce electrical power through a steam turbine and generator unit.

The facility has combined heat and power (CHP) capability through a blanking flange for heat/steam export from the turbine which can be utilised upon securing a suitable customer.

The facility is designed to generate approximately 19MWe and export approximately 17MWe of electricity (assuming zero heat off-take).

Summary of Operational Processes and Procedures

Waste is delivered to the facility in covered vehicles or containers. All incoming loads are weighed on arrival at the calibrated Weighbridge prior to the waste being tipped into the enclosed waste storage bunker. Only wastes detailed in the environmental permit are accepted onto site. The waste is mixed and fed into the boiler waste feed hopper using overhead cranes. The waste travels down the feed hopper and adjoining feed chute and is pushed onto the boiler grate by ram feeders.

In the combustion unit, the waste undergoes thermal treatment in line with the requirements of European Directives on the incineration of waste. The hot gases are maintained at a minimum temperature of 850°C for 2 seconds in the presence of excess oxygen in the combustion chamber to allow complete combustion of the waste. The combustion of waste releases thermal energy which is captured by the boiler at various stages. The boiler uses this energy to turn water into high pressure dry steam. This steam is used to drive a turbine-generator which generates electricity for export to the national grid.

The flue gases are treated in order to comply with the requirements of the Industrial Emissions Directive and the site environmental permit. In addition to primary and secondary air injection, additional support for combustion is provided through tertiary air injection or flue gas recirculation. Two gas oil auxiliary burners are installed to provide heat to the combustion chamber during start up and shut down. The auxiliary burners can also be utilised to ensure the required 850°C temperature is maintained, as long as incompletely burned waste is present within the combustion chamber.

Urea is added at various stages of the boiler's combustion chamber (first pass) to reduce concentrations of Nitrogen Oxides (NOx). Hydrated Lime and Powder Activated Carbon (PAC) is used within the dry flue gas treatment (FGT) system. Hydrated lime reduces acid gas emissions whilst the activated carbon reduces mercury and the formation of dioxins/furans. The by-products from both reactions are captured in the fabric filter as Air Pollution Control Residues (APCr). Duty and standby continuous emissions monitoring systems are installed to measure the concentrations of pollutants in the flue gas. Residual flue gas emissions enter the atmosphere via the 80m stack.

Incinerator Bottom Ash (IBA) remains after the combustion of the waste. The ash is discharged from the end of the combustion grate directly into an ash quench bath. The IBA is directly discharged into the IBA storage area via belt conveyors. IBA is then stored, sampled, tested, and subsequently removed off-site for further re-processing into IBA aggregate. The off-site IBA processor removes all recoverable metals from the IBA for recycling. Fly ash from the boiler fifth pass (economiser pass) is mixed with the hazardous fly ash to form the APCr, and is conveyed to an enclosed storage silo before being transported off-site for treatment or disposal.

Air cooled condensers are installed to condense residual steam back into water for re-use in the process. Boiler blowdown, ash quench water, and surface water drainage from the IBA storage area is directed to the 160m³ wastewater pit for re-use. There are no process related emissions to the public foul sewer network. Most of the site surface water run-off collects in a 2300m³ attenuation pond before it is released to an off-site surface water brook which runs along the Eastern boundary of the site. There is also a 100,000 litre underground rainwater harvesting tank installed for capture of rainwater for re-use in the process.

The site is operated using an integrated Health, Safety, Environmental and Quality Management System. The management system has been independently certified as meeting the requirements of the ISO9001, ISO14001 and ISO45001 standards. The facility has policies and procedures in place including emergency plans, operating instructions and risk assessments. The facility also has a Computerised Maintenance Management System (CMMS) to cover all maintenance tasks and defect reporting.

Section 2: Operational Summary**Summary of Plant Operations and Maintenance during the reporting year**

The facility annual maintenance outage was completed between the 12th June and 25th June 2021. The purpose of the annual shutdown was to service and maintain all items of equipment that cannot be serviced or maintained while the plant is operating throughout the year. The shutdown included cleaning and inspection works to the Boiler and Flue Gas Treatment Plant, statutory inspections, balance of plant maintenance, Engineering Procurement and Construction Contractor defect rectification works, and any outstanding annual preventative maintenance routines, some of which are listed below:

- Rope Access Cleaning
- Boiler Non-Destructive Examination
- PSSR valve and pressure vessel inspections
- Refractory Repairs
- Superheater and Economiser conveyor chain replacement
- Double flap valve maintenance
- Main Steam Stop Valve Inspection
- Internal Boiler Pressure Parts Inspection
- Rotating Fan Maintenance
- Bag House Damper Cleaning
- Bag House Filter Inspection
- Boiler and FGT Conveyor Maintenance
- Combustion Grate Maintenance
- Valve overhaul works
- Vibrating Table Maintenance
- Instrumentation Calibration
- Emissions Monitoring Equipment Maintenance
- 33/11kV Transformer Maintenance
- 11kV/LV Transformer Maintenance
- LV Switchboard Maintenance
- LV breaker maintenance
- Turbine Generator Coolant replacement
- Turbine control oil pipework modifications
- Air Cooled Condenser Clean and Maintenance
- Strainer Cleaning/replacement
- Tipping hall bay chute repairs and concrete inspections

The outage was completed on time with the plant being returned to service on 26th June 2021 as planned.

Summary of Residue Handling for the reporting year

All of the IBA which the facility generated in 2021 was transported to Blue Phoenix Limited, Johnson's Lane IBA Recycling Facility in Widnes. The Johnson's Lane facility is permitted to accept *19 01 12 bottom ash and slag other than those mentioned in 19 01 11* under permit EPR/DP3631WQ issued by the Environment Agency. enfinium Parc Adfer Operations Limited has followed the Environmental Services Association (ESA) protocol for sampling and testing incinerator bottom ash to assess its hazard status. No exceedances of the HP4, HP8, HP7 or HP14 hazardous thresholds were reported for the 24 samples which were obtained and analysed in 2021. All IBA was quarantined and held on site in batches until hazard assessment sample results for each batch were received. The off-site IBA facility processes the ash to separate coarse aggregates, fine aggregates, non-ferrous metals and ferrous metals.

Air Pollution Control Residues have been transported to two separate landfill sites in Middlesbrough and Peterborough. The material was disposed of following physico-chemical treatment to stabilise the waste. APCr is discharged directly from the storage silo into bulk tankers for transportation to the disposal sites. APCr will be utilised to construct a low permeability separation structure at a site in Middlesbrough from 1st January 2022. This processed is classified as a waste recovery operation as the APCr is being used as a substitute for virgin aggregates.

Section 3: Operational Data

Plant Size	200,000 tonnes pa	68 MWth	19 MWe
No. of combustion lines	1	No. of Turbines:	1

Waste types received	Unit	Q1	Q2	Q3	Q4	Year Total	%
Household / Local Authority	tonnes	27,751	29,773	30,886	28,036	116,445	58.4%
Commercial & Industrial		18,612	15,627	22,225	26,388	82,852	41.5%
Hazardous (clinical)		-	-	-	-	-	-
Clinical (non-haz)		51	52	48	21	172	0.1%
Waste wood (biomass)		-	-	-	-	-	-
Refuse Derived Fuel * - H'hold/LA		-	-	-	-	-	-
Refuse Derived Fuel * - C&I		-	-	-	-	-	-
Total waste received		46,413	45,452	53,159	54,445	199,469	100.0%
Rejected Waste		-	-	-	-	-	-
Unprocessed waste transferred		-	-	-	-	-	-
Total waste combusted		44,510	43,370	51,798	52,477	192,155	96.3%

Energy Usage / Export	Unit	Q1	Q2	Q3	Q4	Year Total	KWh/te
Power Generated	MW/h	31,799	33,542	41,367	41,213	147,921	770
Power Exported		28,422	29,937	36,962	36,874	132,195	688
Power Used on site		3,953	3,869	4,490	4,415	16,727	87
Power Imported		576	263	85	76	1,000	5
Parasitic Load	%	12.2%	11.4%	10.8%	10.7%	11.2%	
R1 value					0.67	Operational	

Waste Disposal & Recovery	Unit	Q1	Q2	Q3	Q4	Year Total	% inputs
APC Residues - produced	tonnes	1,506	1,193	1,259	1,297	5,255	2.7%
IBA - produced		8,817	11,501	10,733	10,052	41,103	21.4%
IBA metals recycled		Recovered by off-site processor. Weight included in above IBA figures. Annual tonnage of metals recovered from IBA - 5440.09 tonnes					
Process Water		-	-	-	-	-	-
Oily Water		0.00	0.00	0.00	8.04	8.04	0.0%
Wood		0.00	0.00	0.62	0.00	0.62	0.0%
Mixed Metals (Engineering Works)		1.38	7.82	0.00	6.42	15.62	0.0%
Hazardous waste items (batteries, aerosols, WEEE)		0.40	3.70	3.58	0.50	8.18	0.0%
Mixed recyclables		0.08	0.12	0.06	0.26	0.52	0.0%
General waste		8.60	2.72	8.26	3.56	23.14	0.0%

Raw Material Usage	Unit	Q1	Q2	Q3	Q4	Year Total	kg or Ltr /te
Mains Water	ltrs	4,330,000	4,162,000	3,683,000	3,757,000	15,932,000	82.91
Other Water	ltrs	-	-	-	-	-	-
Urea / Ammonia	kgs	17,000	22,000	27,000	28,000	94,000	0.49
Activated Carbon	kgs	22,146	23,204	25,894	26,222	97,466	0.51
Lime / hydrated lime	kgs	857,000	594,000	555,000	567,000	2,573,000	13.39
Fuel oil	ltrs	114,275	20,706	38,090	35,706	208,777	1.05

Summary	Line/Unit	Q1	Q2	Q3	Q4	Year Total	%
Availability of waste combustion by line, hrs	1	1,840	1,857	2,135	2,147	7,979	93.4%
Hours of turbine operations, hrs	1	1,668	1,797	2,126	2,137	7,728	92.0%
Net Calorific Value of waste (average)	MJ/kg	10.592	10.817	10.566	10.563	10.635	-
Abnormal Events	qty.	1.0	0.0	0.0	0.0	1	-
Abnormal operation	hours	0.5	0.0	0.0	0.0	0.5	0.01%
Permit Breaches	qty.	-	-	-	-	-	-

2021 Annual Reporting Performance Form 1

Section 4: Annual Reporting Form 1 (Waste Disposal and Recovery - 2021)

Permit EPR/AB3092CV
 Facility: Parc Adfer Energy Recovery Facility
 Reporting Period from: 01/01/2021 to: 31/12/2021

Operator: Parc Adfer Energy Recovery Facility
 Form: Performance 1

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	Augean ENMRF Kings Cliffe & Augean Port Clarence (D09)	5,255.00	0.00	2.7%
Oily Water	CSG Lanstar Manchester (D09)	8.04	0.00	0.0%
Total Hazardous Waste		5,263.04	0.00	2.7%
2) Non-Hazardous Wastes				
IBA	Blue Phoenix Widnes (R11)	0.00	41103.00	21.4%
General Waste	Veolia Bidston (R13), Thornccliffe Flintshire (R03) & Wrexham Enovert Landfill (D05.02)	6.70	16.44	0.0%
Wood Waste	Thornccliffe Flintshire (R13)	0.00	0.62	0.0%
Mixed Metals from Engineering activities	KJ Bell Scrap Merchants (R04)	0.00	15.62	0.0%
Hazardous waste items (batteries, aerosols, WEEE)	Veolia Preston Hazardous Waste Transfer Station (R13)	0.00	8.18	0.0%
Mixed Recyclables	Parry & Evans Deeside (R12)	0.00	0.52	0.0%
Total Non-Hazardous Waste		6.70	41,144.38	21.4%
TOTAL WASTE		5,269.74	41,144.38	24.2%

2021 Annual Reporting of Water and Other Raw Material Usage

Raw Material	Usage	Unit	Specific Usage	Unit
Mains Water	15932	m ³	0.08	m ³ /te
Total Water	15932	m ³	0.08	m ³ /te
Urea / Ammonia	94	tonnes	0.49	kg/te
Activated Carbon	97.47	tonnes	0.51	kg/te
Lime / hydrated lime / Sodium Bicarb.	2573	tonnes	13.39	kg/te

2021 Annual Reporting of other performance indicators

Parameter	Results by Line	
	A1	Turbine 1
Operating hours for the year, hours	7979	7728
Number of periods of abnormal operation, qty.	1	
Cumulative hours of abnormal operation for this year, hours	0.5	

Operator's comments :

Signed: _____

Date: 21/01/2022

2021 Annual Reporting of Energy Usage/Export

Section 5: Energy Form 1

Permit EPR/AB3092CV

Operator: Parc Adfer Operations Limited

Facility: Parc Adfer Energy Recovery Facility

Form: Energy 1

Reporting Period from: 01/01/2021

to: 31/12/2021

Energy Source	Energy Usage	Unit	Specific Usage (KWh/tonne incinerated)	Primary Energy (note 1) MWh
Electricity Produced	147,921	MWh	770	-
Electricity Imported	1000	MWh	5	2600
Electricity Exported	132,195	MWh	688	-
Fuel Oil	171 (208,777 litres)	tonnes	-	-
Steam/hot water exported	0	GWh	-	-

Note 1 Conversion factor for imported electricity to primary energy = 2.6

Operator's comments :

Density of fuel oil for calculation - 0.82kg/l

Signed: 

Date: 21/01/2022

Section 6: Summary of Permit Compliance**Compliance with permit limits for continuously monitored pollutants**

The plant met its emission limits as shown in the table below:

Substance	Percentage time compliant during operation	
	Half-hourly limit	Daily limit
Particulates	100%	100%
Oxides of nitrogen	100%	100%
Sulphur dioxide	100%	100%
Carbon monoxide	100%	100%
Total organic carbon	100%	100%
Hydrogen chloride	100%	100%
Hydrogen fluoride	100%	100%

Summary of any notifications or non-compliances under the permit	
Date	Summary of notification or non-compliance [including Line/Reference]
14/01/2021	CO release exceeding EPR 30 minute limit at 207.43mg/Nm ³ - occurred during plant shutdown, not classified as a permit breach.
13/04/2021	SO ₂ release exceeding EPR 30 minute limit at 248.51mg/Nm ³ - abnormal operation, not classified as a permit breach.

Summary of any complaints received and actions to taken to resolve them.			
Date	Summary of complaint [including Line/Reference]	Reason	Measures taken to prevent reoccurrence
11/05/2021	Litter escaping from third party waste haulage vehicle en route to Parc Adfer. Vehicle netting inspected on arrival and deemed to be inadequate. Load netting cover repaired and vehicle returned to service. Complainant informed of outcome and corrective action taken.	Defective load covering netting.	Hauliers reminded to undertake daily vehicle inspection checks. Netting repaired to vehicle in question.

Section 7: Summary of Plant Improvements**Summary of any efficiency improvements that have been completed within the year.**

Online cleaning of boiler completed every 3 months to increase boiler efficiency and to avoid plant shutdowns to remove boiler fouling.

Increased frequency of incoming waste compliance checks to identify and remove any oversized items which could potentially block the ash dischargers and cause plant downtime. Increased the number of waste supplier site audits to ensure suppliers are conforming to the waste specification.

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

Improvement conditions 1, 2, 3, 4 & 5 fully discharged as confirmed by Natural Resources Wales.

IC6 required the organisation to submit a summary report to NRW confirming the results of calibration and verification testing for the Continuous Emission Monitors. The QAL1 and QAL2 processes have been completed and evidence of such tests are held on record. QAL3 tests are completed weekly on both the duty and standby analysers. A full summary report to satisfy IC6 detailing the performance of the Continuous Emissions Monitoring Systems was submitted to NRW on 7th October 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.

The following permit variations have been issued in 2021:

- 1) Minor technical variation to change the emission limit and reference period for CO in Table S3.1 from 100mg/m³ as a ½ hourly average to 150mg/m³ as a 10-minute average. Natural Resources Wales issued the revised permit on 18th January 2021.
- 2) Minor technical variation submitted to increase annual permitted waste tonnage by 32,000 tonnes to an annual allowance of 232,000 tonnes. Natural Resources Wales advised on 7th December 2020 that this proposal should be classified as a substantial variation rather than a minor. The substantial variation application was submitted to Natural Resources Wales on 1st April 2021. enfinium Parc Adfer Operations Limited decided to withdraw the application on 9th July 2021.
- 3) An administrative name change variation was completed on 21st July 2021 to update the operator name to enfinium Parc Adfer Operations Limited following company re-branding.
- 4) A permit application to add 20-01-99 EWC code to the list of acceptable wastes was submitted to NRW on 5th October 2021. This variation was limited to 20-01-99 as dog waste faeces from collection bins mixed with litter from park waste bins. This variation was amended on 15th November 2021 to include Absorbent Hygiene Products (AHP) under EWC code 20-01-99. The varied permit including the 20-01-99 EWC code was issued on 20th December 2021.

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

Numerous environmental improvements have been implemented or achieved during 2021. The list below details some of the completed improvements:

- 1) BIOMA software installed to continuously monitor biogenic and fossil carbon content of waste.
- 2) Site biodiversity assessment completed by independent Ecologist with areas for potential biodiversity enhancement highlighted which are in the process of being implemented.
- 3) Additional warning alarms implemented into distributed control system to alert Operators of instances where the CEMS may not be collecting data or where the data being collected is not accurate.
- 4) CEMS fault finding and preventative maintenance training completed by Electrical, Control & Instrumentation Technicians.
- 5) Full site drainage CCTV survey completed to ensure drainage network is in good condition.

Section 8: Details of Public & Stakeholder Liaison

Summary of events held during the reporting year.	
Date	Description
27/01/2021	Community Liaison Group (CLG) Meeting
27/07/2021	Community Liaison Group (CLG) Meeting

List of events planned for next year	
Date	Description
	Six monthly Community Liaison Group (CLG) meetings to be arranged in due course.

If you wish to be involved in the public liaison programme, please contact Jamie Williams
(jamie.williams@enfinium.co.uk)

Section 9: Residue Quality Monitoring Requirements

Residue Quality Monitoring Results			
Parameter (unit)	Limit	Normal Operation	
		Bottom ash (annual mean average)	APC Residues (annual mean average)
Loss on Ignition (%)	<5%	2.7	N/A
Total Organic Carbon (%)	<3%	1.0	N/A
Sb (mg/kg)	---	86.3	1184.5
Cd (mg/kg)	---	9.2	299.5
Tl (mg/kg)	---	<0.37	0.7
Hg (mg/kg)	---	2.5	7.5
Pb (mg/kg)	---	715.0	2462.5
Cr (mg/kg)	---	119.4	43.8
Cu (mg/kg)	---	2203.3	662.8
Mn (mg/kg)	---	1129.3	429.5
Ni (mg/kg)	---	101.0	37.4
As (mg/kg)	---	10.8	71.6
Co (mg/kg)	---	41.0	7.0
V (mg/kg)	---	76.7	33.7
Zn (mg/kg)	---	3070.5	17092.3
Dioxins & Furans I-TEQ (ng/kg)	---	2.3	422.8
Dioxins, Furans & Dioxin-Like PCBs WHO-TEQ (ng/kg) - Humans/mammals	---	2.4	390.9
Dioxins, Furans & Dioxin-Like PCBs WHO-TEQ (ng/kg) - Birds	---	4.4	954.3
Dioxins, Furans & Dioxin-Like PCBs WHO-TEQ (ng/kg) - Fish	---	2.4	445.5

Comments

The above table details the average results for the quarterly EPR compliance samples as required by permit table S3.4. Results for samples analysed under the ESA protocol are not included. EPR compliance testing was completed in each quarter of 2021. All bottom ash LOI and TOC results were within the EPR limits. IBA was sampled and tested twice per month to conform with the requirements of the ESA protocol. All residue testing in 2021 was completed by UKAS accredited laboratory WrcAsh.

Section 10: Emissions to Water

Summary of monitoring undertaken and compliance
Surface water which accumulates in the attenuation pond is visually checked at least once per week by the site Environmental Officer. Spot samples are taken to visually check for suspended solids, oils, and grease. pH and temperature measurements are also recorded. The Surface Water Attenuation Pond discharge penstock valve is usually left closed, until pond levels increase to a level which indicates a release of water is required. The penstock valve is then opened slightly to allow a low velocity of surface water to discharge into the off-site brook. The site does not discharge any process waters to the surface water or foul water systems. All process waters are recycled for use as ash quenching water.

Commentary on any specific events	
Date & Event	Description
2021	No specific events to report - all discharges free of any visible solids, oils, or grease.

Emissions to Water / Sewer					
Parameter	Monitoring Frequency	Limit	Target	Max.	Average
N/A	N/A	N/A	N/A	N/A	N/A

Section 11: Emissions to Air (periodically monitored)

Summary of monitoring undertaken, standards used and compliance
MCERTS and UKAS accredited stack emissions testing company Environmental Compliance Limited completed bi-annual EPR compliance stack monitoring on behalf of enfinium Parc Adfer Operations Limited in 2021. No ELV breaches were reported in the reporting period.
In addition to the bi-annual EPR compliance stack emissions testing, one PM10 & PM2.5 survey was completed in April.

Results of emissions to air that are periodically monitored					
Substance	Ref. Period	Emission Limit Value	Jan-Jun	Jul-Dec	Average
Hydrogen fluoride	1 hr	2 mg/m ³	0.02	0.4	0.21
Cd and Th and their compounds	6-8hrs	0.05 mg/m ³	0.00043	0.00053	0.00048
Hg and its compounds	6-8hrs	0.05 mg/m ³	0.00022	0.0013	0.00076
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	6-8hrs	0.5 mg/m ³	0.036	0.014	0.025
Dioxins & Furans (I-TEQ)	6-8hrs	0.1 ng/m ³	0.011	0.0053	0.00815
PCBs (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m ³	0.00086	0.00047	0.000665
PCBs (WHO-TEQ Fish)	6-8hrs	None set ng/m ³	0.000046	0.000026	0.000036
PCBs (WHO-TEQ Birds)	6-8hrs	None set ng/m ³	0.0026	0.0013	0.00195
Dioxins & Furans (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m ³	0.013	0.0064	0.0097
Dioxins & Furans (WHO-TEQ Fish)	6-8hrs	None set ng/m ³	0.012	0.0061	0.00905
Dioxins & Furans (WHO-TEQ Birds)	6-8hrs	None set ng/m ³	0.016	0.0098	0.0129
Anthanthrene	6-8hrs	None set µg/m ³	0.0014	0.0012	0.00083
Benzo(a)anthracene	6-8hrs	None set µg/m ³	0.0014	0.0012	0.0013
Benzo(a)pyrene	6-8hrs	None set µg/m ³	0.0017	0.0012	0.00145
Benzo(b)fluoranthene	6-8hrs	None set µg/m ³	0.0014	0.0014	0.0014
Benzo(b)naphtho(2,1-d)thiophene	6-8hrs	None set µg/m ³	0.0014	0.0012	0.0013
Benzo(c)phenanthrene	6-8hrs	None set µg/m ³	0.0014	0.0013	0.00135
Benzo(ghi)perylene	6-8hrs	None set µg/m ³	0.0016	0.0012	0.0014
Benzo(k)fluoranthene	6-8hrs	None set µg/m ³	0.0014	0.0012	0.0013
Cholanthrene	6-8hrs	None set µg/m ³	0.0014	0.0012	0.0013
Chrysene	6-8hrs	None set µg/m ³	0.0014	0.0044	0.0029
Cyclopenta(cd)pyrene	6-8hrs	None set µg/m ³	0.0014	0.0012	0.0013
Dibenzo(ai)pyrene	6-8hrs	None set µg/m ³	0.0014	0.0012	0.0013
Dibenzo(ah)anthracene	6-8hrs	None set µg/m ³	0.0014	0.0012	0.0013
Fluoranthene	6-8hrs	None set µg/m ³	0.011	0.016	0.0135
Indeno(123-cd) pyrene	6-8hrs	None set µg/m ³	0.0014	0.0012	0.0013
Naphthalene	6-8hrs	None set µg/m ³	0.33	0.21	0.27

Values in italics are "non-detect" and represent the analysis technique limit of detection.

Section 12: Emissions to Air (continuously monitored)**Summary of monitoring undertaken, standards used and compliance**

HCl, SO₂, Particulates, NO_x, TOC, CO and NH₃ all have limits set out in the Environmental Permit; these pollutants are continuously monitored by the CEMS in compliance with EN14181. O₂, CO₂, stack flow and water vapour are also continuously monitored by the CEMS.

HCl, SO₂, NO_x, TOC, NH₃, CO, CO₂ and water vapour are extractive monitored using ENVEA MIR FT CEMS (MCERTS number MC 040041/07).

TOC is extractive monitored using ENVEA Graphite 52M CEMS (MCERTS number MC 060082/08).

Particulate is monitored in-situ using PCME QAL 181 CEMS (MCERTS number MC 090152/01).

Oxygen (wet) is measured using ABB Endura AZ20 / AZ30 (MCERTS MC 110191/03)

Temperature and Pressure are monitored and recorded using PCME Stackflow 200 (MCERTS MC160315/00).

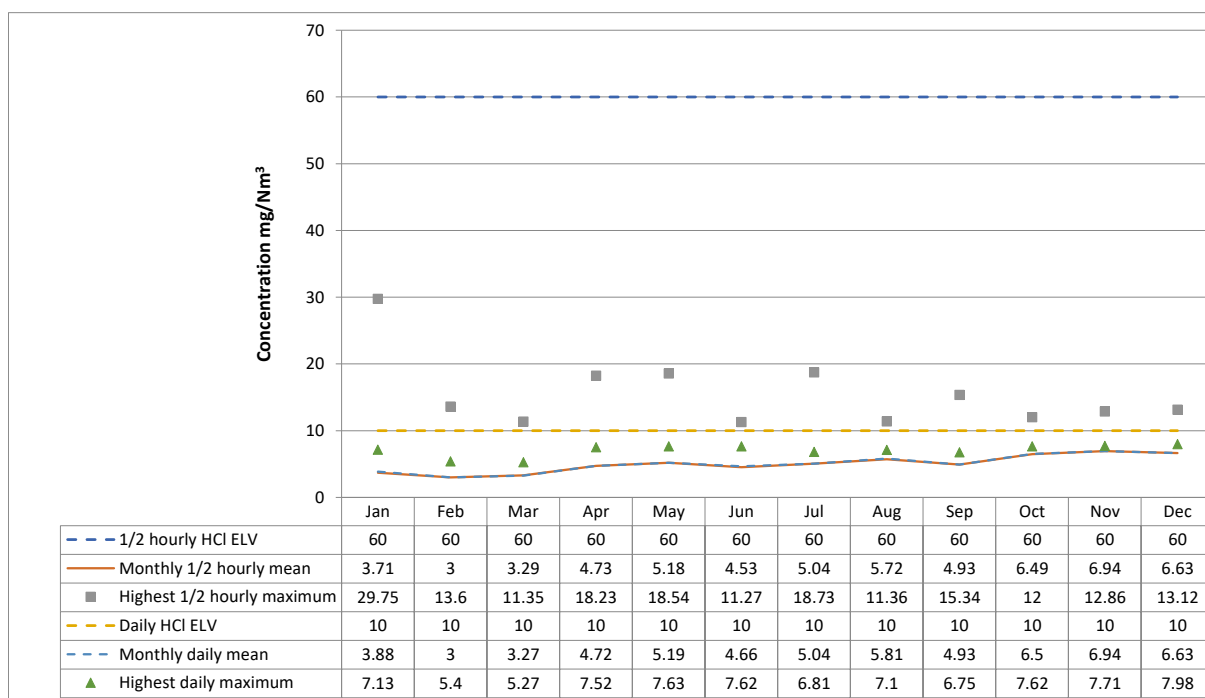
All instruments are QAL1 compliant. An Annual Surveillance Test (AST) was completed between 19th and 21st April 2021. The AST passed for all parameters except for NO_x on the standby analyser. A subsequent QAL2 survey was completed on the standby analyser for NO_x only to derive a new calibration function. Weekly reports are generated and reviewed to assess the number and percentage of readings which have fallen outside of the valid calibration range. QAL3 tests are completed each week on both the duty and standby analysers by the site EC&I Technicians. There is a service agreement in place with CEMS service provider a1-CBISS, which includes emergency callouts.

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

Substance	Reference Period	Emission Limit Value	A1	
			Max.	Avg.
Oxides of nitrogen	Daily mean	200 mg/m ³	187.89	174.09
	½ hourly mean	400 mg/m ³	241.28	174.03
Particulates	Daily mean	10 mg/m ³	0.25	0.14
	½ hourly mean	30 mg/m ³	2.15	0.14
Total Organic Carbon	Daily mean	10 mg/m ³	1.61	0.65
	½ hourly mean	20 mg/m ³	7.95	0.65
Hydrogen chloride	Daily mean	10 mg/m ³	7.98	5.05
	½ hourly mean	60 mg/m ³	29.75	5.02
Sulphur dioxide	Daily mean	50 mg/m ³	44.73	18.75
	½ hourly mean	200 mg/m ³	248.51	18.69
Carbon monoxide	Daily mean	50 mg/m ³	32.35	8.04
	10 minute mean (95%ile)	150 mg/m ³	126.57	8.13
Ammonia	Daily mean	10 mg/m ³	1.86	0.14

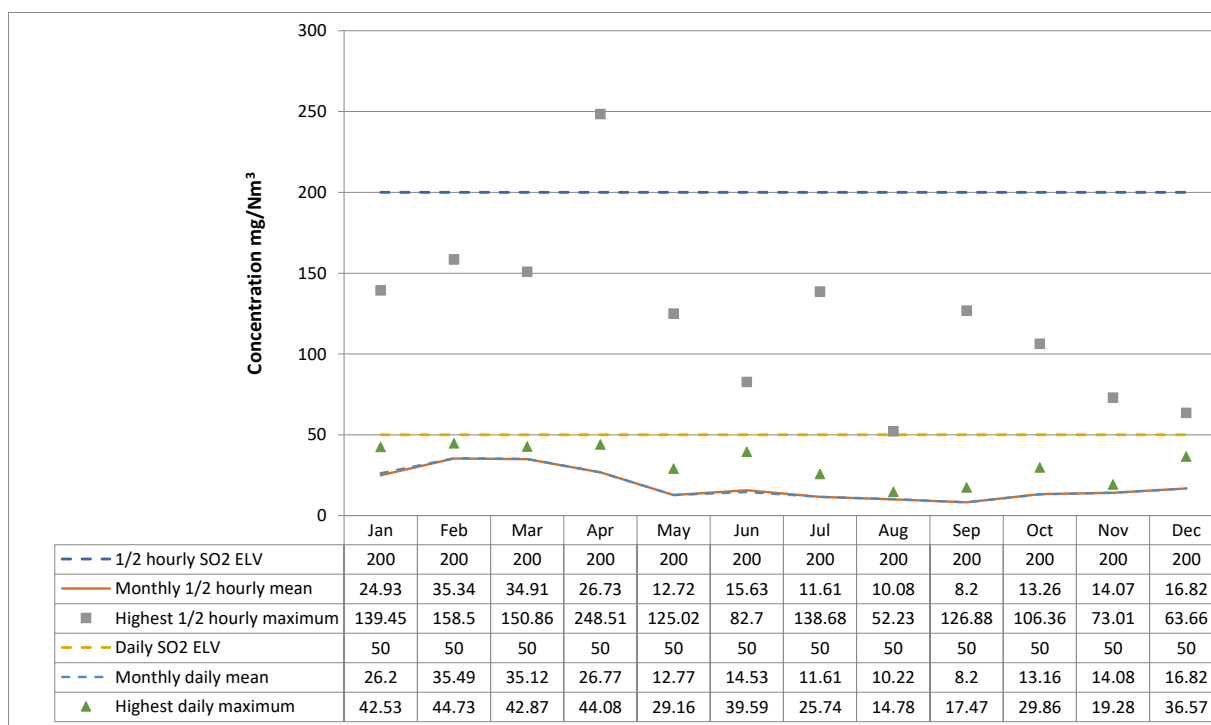
Section 12.1: Monitoring of Hydrogen Chloride emissions

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	3.71	29.75	10	3.88	7.13
Feb	60	3	13.6	10	3	5.4
Mar	60	3.29	11.35	10	3.27	5.27
Apr	60	4.73	18.23	10	4.72	7.52
May	60	5.18	18.54	10	5.19	7.63
Jun	60	4.53	11.27	10	4.66	7.62
Jul	60	5.04	18.73	10	5.04	6.81
Aug	60	5.72	11.36	10	5.81	7.1
Sep	60	4.93	15.34	10	4.93	6.75
Oct	60	6.49	12	10	6.5	7.62
Nov	60	6.94	12.86	10	6.94	7.71
Dec	60	6.63	13.12	10	6.63	7.98



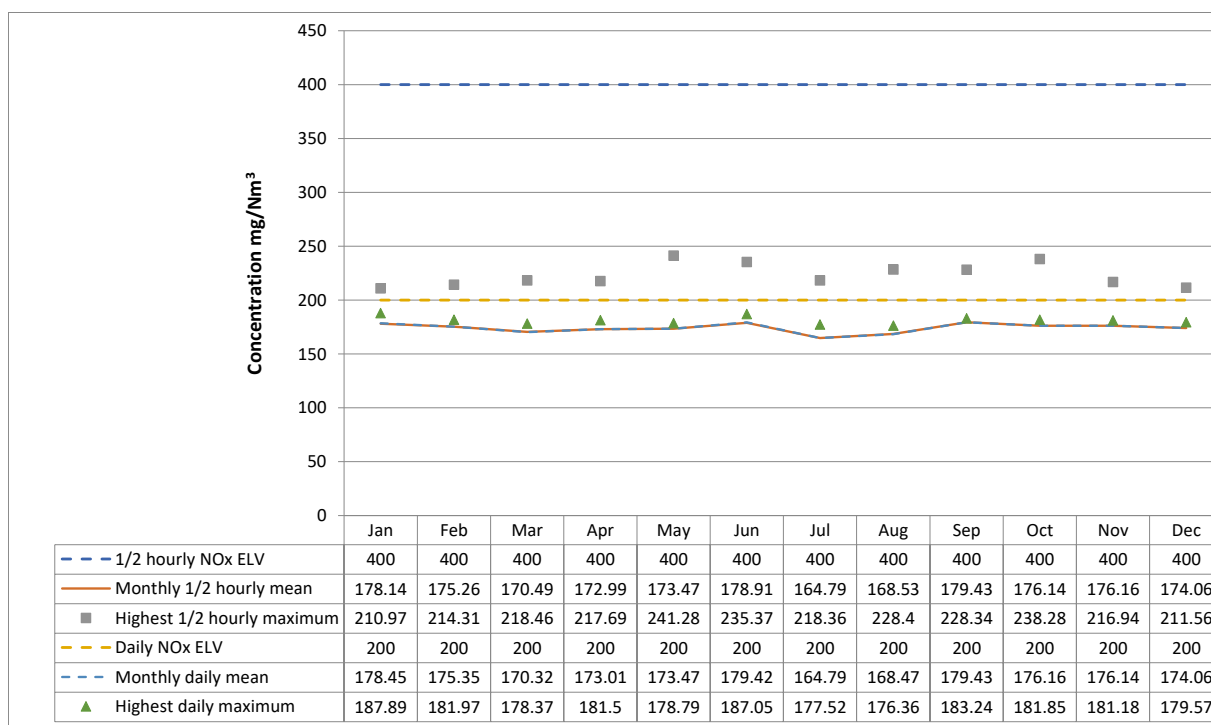
Section 12.2: Monitoring of Sulphur dioxide emissions

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	24.93	139.45	50	26.2	42.53
Feb	200	35.34	158.5	50	35.49	44.73
Mar	200	34.91	150.86	50	35.12	42.87
Apr	200	26.73	248.51	50	26.77	44.08
May	200	12.72	125.02	50	12.77	29.16
Jun	200	15.63	82.7	50	14.53	39.59
Jul	200	11.61	138.68	50	11.61	25.74
Aug	200	10.08	52.23	50	10.22	14.78
Sep	200	8.2	126.88	50	8.2	17.47
Oct	200	13.26	106.36	50	13.16	29.86
Nov	200	14.07	73.01	50	14.08	19.28
Dec	200	16.82	63.66	50	16.82	36.57



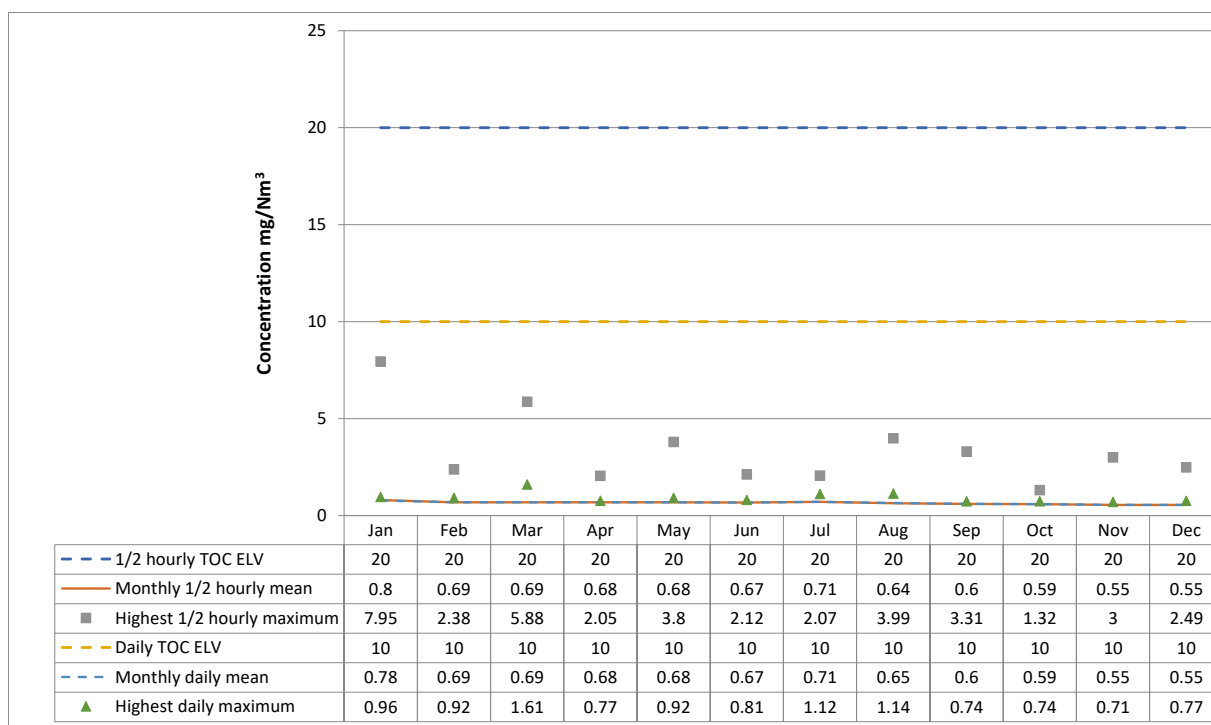
Section 12.3: Monitoring of Oxides of Nitrogen emissions

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	178.14	210.97	200	178.45	187.89
Feb	400	175.26	214.31	200	175.35	181.97
Mar	400	170.49	218.46	200	170.32	178.37
Apr	400	172.99	217.69	200	173.01	181.5
May	400	173.47	241.28	200	173.47	178.79
Jun	400	178.91	235.37	200	179.42	187.05
Jul	400	164.79	218.36	200	164.79	177.52
Aug	400	168.53	228.4	200	168.47	176.36
Sep	400	179.43	228.34	200	179.43	183.24
Oct	400	176.14	238.28	200	176.16	181.85
Nov	400	176.16	216.94	200	176.14	181.18
Dec	400	174.06	211.56	200	174.06	179.57



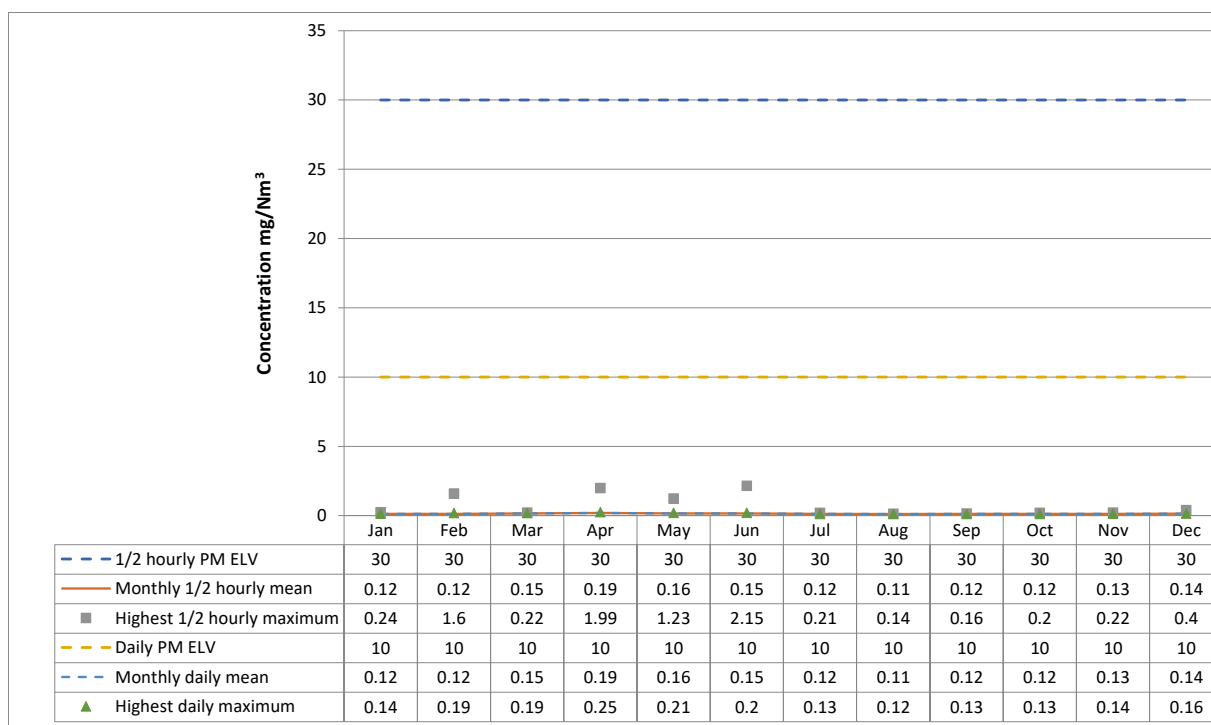
Section 12.4: Monitoring of Total organic carbon emissions

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	0.8	7.95	10	0.78	0.96
Feb	20	0.69	2.38	10	0.69	0.92
Mar	20	0.69	5.88	10	0.69	1.61
Apr	20	0.68	2.05	10	0.68	0.77
May	20	0.68	3.8	10	0.68	0.92
Jun	20	0.67	2.12	10	0.67	0.81
Jul	20	0.71	2.07	10	0.71	1.12
Aug	20	0.64	3.99	10	0.65	1.14
Sep	20	0.6	3.31	10	0.6	0.74
Oct	20	0.59	1.32	10	0.59	0.74
Nov	20	0.55	3	10	0.55	0.71
Dec	20	0.55	2.49	10	0.55	0.77



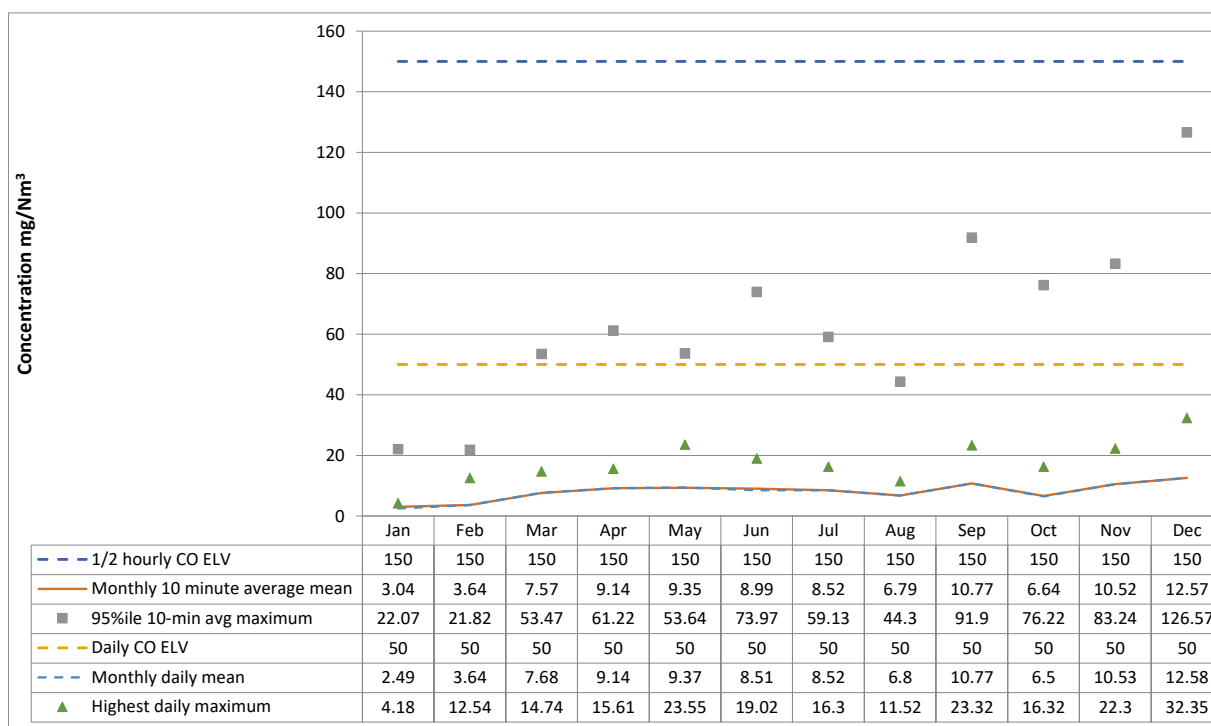
Section 12:5: Monitoring of Particulate matter emissions

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	0.12	0.24	10	0.12	0.14
Feb	30	0.12	1.6	10	0.12	0.19
Mar	30	0.15	0.22	10	0.15	0.19
Apr	30	0.19	1.99	10	0.19	0.25
May	30	0.16	1.23	10	0.16	0.21
Jun	30	0.15	2.15	10	0.15	0.2
Jul	30	0.12	0.21	10	0.12	0.13
Aug	30	0.11	0.14	10	0.11	0.12
Sep	30	0.12	0.16	10	0.12	0.13
Oct	30	0.12	0.2	10	0.12	0.13
Nov	30	0.13	0.22	10	0.13	0.14
Dec	30	0.14	0.4	10	0.14	0.16



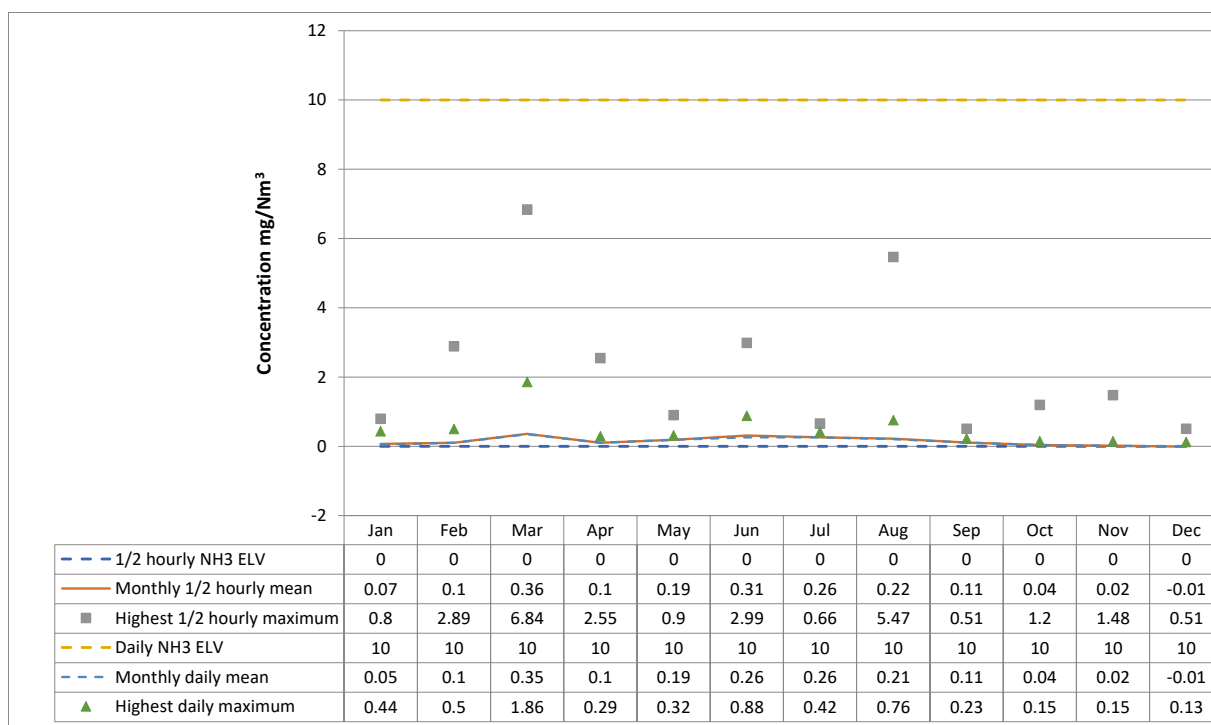
Section 12.6: Monitoring of Carbon Monoxide (10 min averages)

mg/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	1/2 hourly CO ELV	Monthly 10 minute average mean	95%ile 10-min avg maximum	Daily CO ELV	Monthly daily mean	Highest daily maximum
Jan	150	3.04	22.07	50	2.49	4.18
Feb	150	3.64	21.82	50	3.64	12.54
Mar	150	7.57	53.47	50	7.68	14.74
Apr	150	9.14	61.22	50	9.14	15.61
May	150	9.35	53.64	50	9.37	23.55
Jun	150	8.99	73.97	50	8.51	19.02
Jul	150	8.52	59.13	50	8.52	16.3
Aug	150	6.79	44.3	50	6.8	11.52
Sep	150	10.77	91.9	50	10.77	23.32
Oct	150	6.64	76.22	50	6.5	16.32
Nov	150	10.52	83.24	50	10.53	22.3
Dec	150	12.57	126.57	50	12.58	32.35



Section 12.7: Monitoring of Ammonia emissions

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	0.07	0.8	10	0.05	0.44
Feb	0	0.1	2.89	10	0.1	0.5
Mar	0	0.36	6.84	10	0.35	1.86
Apr	0	0.1	2.55	10	0.1	0.29
May	0	0.19	0.9	10	0.19	0.32
Jun	0	0.31	2.99	10	0.26	0.88
Jul	0	0.26	0.66	10	0.26	0.42
Aug	0	0.22	5.47	10	0.21	0.76
Sep	0	0.11	0.51	10	0.11	0.23
Oct	0	0.04	1.2	10	0.04	0.15
Nov	0	0.02	1.48	10	0.02	0.15
Dec	0	-0.01	0.51	10	-0.01	0.13



Comments :

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