Annual Performance Report 2021

Permit PPC/A/1136072/CP01

Millerhill RERC

FCC Waste Services (UK) Ltd

Year:	2021
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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

The Millerhill Recycling and Energy Recover Centre (RERC) is a single-line thermal treatment plant utilising moving grate technology. The aggregate amount of the wastes specified in Condition 4.1.1 that may be incinerated in the Permitted Installation is up to 189,500 tonnes in any calendar year. In 2021 the plant processed approximately 160,000 tonnes of residual waste, ~97% of which comes from households within the Edinburgh, Midlothian and East Lothian regions. Millerhill RERC currently exports ~13MW of electricity with the potential to export up to 20MW of heat.

Summary of Operational Processes and Procedures

Waste is received within the tipping hall and stored within the bunker. Waste can be pre-treated or fed directly into the boiler where combustion takes place in accordance with the requirements of the waste incineration directive. Flue gases are treated using ammonia injection within the combustion zone and following heat recovery activated carbon and lime are added to complete the treatment process. The flue gas passed through bag filters to remove fine particulate before being discharged to atmosphere. The heat generated within the boiler raises HP steam from which the energy is recovered through a turbine. The energy generates power allowing the plant to export 13 MW of power once the parasitic load of the plant has been supplied. The potential to export heat is available with bleeds from the turbine having the capacity to meet a heat demand (at the expense of power) of 20 MW.

Millerhill RERC have achieved certification to the standards: ISO 14001, ISO 9001, ISO 45001, and ISO 50001

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Operational Data

Plant Size		tonnes pa		MWth	
No. of combustion lines	1	No. of Turbines:		1	

Waste types received	Unit	Q1	Q2	Q3	Q4	**Year Total**
Household / Local Authority	tonnes	39,751	34,643	41,392	40,676	**156,461**
Commercial & Industrial		1,166	342	890	1,839	**4,237**
Hazardous						**-**
Clinical						**-**
Waste wood (biomass)						**-**
Refuse Derived Fuel * - H'hold/LA						**-**
Refuse Derived Fuel * - C&I						**-**
Other [Please specify]						**-**
Other [Please specify]						
Other [Please specify]						
Total waste received		**40,917**	**34,985**	**42,282**	**42,515**	**160,698**
Rejected Waste						**-**
Unprocessed waste transferred out						**-**
Total waste combusted		**40,917**	**34,985**	**42,282**	**42,515**	**160,698**

Energy Useage / Export	Unit	Q1	Q2	Q3	Q4	**Year Total**
Power Generated	MWh	29,743	24,722	28,933	30,891	**114,289**
Power Exported		26,908	22,450	26,324	28,078	**103,760**
Power Used on site		2,834	2,376	2,674	2,827	**10,712**
Power Imported			75	62	13	**150**
Parasitic Load	%	9.5%	9.5%	9.2%	9.1%	9.3%
Thermal Energy Produced **	MWh					**-**
Thermal Energy Exported **						**-**
R1 value						Design / Ope

Waste Disposal & Recovery	Unit	Q1	Q2	Q3	Q4	**Year Total**
APC Residues - produced	tonnes	1,013	906	958	998	**3,875**
IBA - produced		10,085	9,478	10,832	10,076	**40,471**
Metals recycling						**-**
Other		-	-	-	-	**-**
Other		-	-	-	-	**-**
Other		-	-	-	-	**-**

Raw Material Usage	Unit	Q1	Q2	Q3	Q4	**Year Total**
Mains Water	ltrs	5,351,000	4,758,000	5,371,000	5,102,000	**20,582,000**
Other Water	ltrs					**-**
Ammonia	kgs	56,247	50,248	54,402	62,970	**223,867**
Urea	kgs					**-**
Activated Carbon	kgs	12,630	8,700	12,760	12,570	**46,660**
Lime / hydrated lime	kgs	414,100	446,380	405,840	449,560	**1,715,880**
Fuel oil	ltrs	330	23,430	38,295	12,275	**74,330**
Gas	cf	-	-	-	-	**-**
Other		-	-	-	-	**-**

Summary	Line/Unit	Q1	Q2	Q3	Q4	**Year Total**
Availability of waste combustion by line, hrs	1	2,160	1,796	2,139	2,202	**8,298**
	2					**-**
	3					**-**
	4					**-**
	5					**-**

Overall Availability, mean avg. of all lines, hrs						**N/A**
Hours of turbine operations, hrs	1	2,160	1,796	2,128	2,196	**8,280**
Hours of turbine operations, hrs	2					**-**
Hours of heat / steam export						**-**
Net Calorific Value of waste	MJ/kg					
Abnormal Events	qty.					**-**
Abnormal operation	hours					**-**
Permit Breaches	qty.					**-**

MWe

%
97.4%
2.6%
-
-
-
-
-
-
100.0%
-
-
100.0%

KWh/te
711
646
67
1
-
-
erational / n/a

% inputs
2.4%
25.2%
-
-
-
-

kg or Ltr /te
128.08
-
1.39
-
0.29
10.68
0.46

x %
x %
x %
x %
x %

x %
x %
x %
n/a
-
no
0.00%
no

Summary of Plant Operations and Maintenance during the reporting year

The plant has operated well throughout the year with a higher availability in comparison to 2021 achieved enabling throughput and electricity generation to be increased. Throughout the year emissions have been well within the permitted levels.

The plant is managed 24/7 by an Operations team, led by a Shift Team Leader. Daily morning meetings take place in which the operation over the previous shift is discussed, along with any planned maintenance tasks, contractors, training etc. that is planned for that day. Operational checks are conducted for each shift (2 x 24 hours), including a daily site inspection. This is supplemented by a more comprehensive weekly site inspection.

The routine and preventative maintenance of the plant is governed by a specialist software program that generates tasks to be undertaken on a daily, weekly, monthly and annual basis. In support of the general maintenance routine, site specific maintenance and call off contracts have been issued for key items of plant and equipment. National contracts are in place for other services and equipment. A planned outage was completed in April/May to undertake the majority of the preventative maintenance programme. The continued covid-19 pandemic did not have a noticeable impact on plant operations in 2021, although a change in waste composition is believe to be the cause of a temporary increase in SO2 levels. There have been no occasions where the minimum operational requirements could not be met.

Summary of Residue Handling for the reporting year

FCC Millerhill produces Incinerator Bottom Ash (IBA), which consists of the inorganic, non-combustible fraction of the waste, and Air Pollution Control residue (APCr), which is a product of the flue gas cleaning process. The IBA is non-hazardous and can be used for a number of end uses, subject to strict controls. The APCr is a hazardous material and must be appropriately disposed of. All IBA is taken to FCC's Greengairs site, where it is stored on a dedicated pad pending processing. Processing takes place periodically by an appropriately permitted company which uses a mobile separation plant to separate the IBA into ferrous and non-ferrous metals and various size fractions. Metals are recycled and the resultant aggregate is used where possible in road building and infrastructure within the permitted area of the landfill site itself. FCC Millerhill follows the ESA's IBA Sampling Protocol and conducts hazard analysis on representative samples of IBA twice a month. To date, none of the samples have been classed as hazardous.
APCr is discharged directly from storage silos into a receiving vehicle and taken to an appropriately permitted site where it is used to neutralise alkaline wastes and then landfilled.

2021 Annual Reporting Performance Form 1

Permit PPC/A/1136072/CP01 Operator: 0
Facility: Millerhill RERC Form: Performance 1

Reporting Period from: 01 January 2021 to: 31 December 2021

2021 Annual Reporting of Waste Disposal and Recovery

Waste Description	Disposal Route(s)	Disposal Tonnes	Recovery Tonnes	% / tonne of waste incinerated
1) Hazardous Wastes				
APC Residues	D9	3,874.7		2.4%
IBA				-
				-
				-
Total Hazardous Waste		3,874.7	0.0	2.4%
2) Non-Hazardous Wastes				
IBA	R4	40,471.0		25.2%
Ferrous Metal				-
Process Water	D08	270.3		0.2%
				-
				-
Total Non-Hazardous Waste		40,741.3	0.0	25.4%
TOTAL WASTE		**44,616.0**	**0.0**	27.8%

Operator's comments :

2021 Annual Reporting of Water and Other Raw Material Usage

Raw Material	Usage	Unit	Specific Useage	Unit
Mains Water	20582000	m^3	128.08	m^3/te
Total Water	20582000	m^3	128.08	m^3/te
Urea / Ammonia	223867.28	kg	1.39	kg/te
Activated Carbon	46660	kg	0.29	kg/te
Lime / hydrated lime / Sodium Bicarb.	1715880	kg	10.68	kg/te

Operator's comments :

2021 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	8298							
Number of periods of abnormal operation, qty.	0							
Cumulative hours of abnormal operation for this year, hours	0							

Operator's comments :

Signed: _____ Date: 28/01/2022

2021 Annual Reporting of Energy Usage/Export

Permit PPC/A/1136072/CP01 Operator: 0

Facility: Millerhill RERC Form: Energy 1

Reporting Period from: 01 January 2021 to: 31 December 2021

Energy Source	Energy Usage	Unit	Specific Useage (KWh/tonne incinerated
Electricity Produced	114,289	MWh	711
Electricity Imported	150	MWh	1
Electricity Exported	103,760	MWh	646
Gas Oil	19000	litres	
Steam/hot water exported	0	GWh	-

Operator's comments :

Gas Oil volume on this page was used in hired generator during planned outage.
Energy balance: the summation of exported power and power used on-site with imported power subtracted exceeds the total generated by kWhrs. The difference represents power generated from a temporary generator during the planned outage in April.

Signed: _____ Date: 28/01/2022

Summary of Permit Compliance

Compliance with permit limits for continuously monitored pollutants

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

Substance	Percentage time compliant during operation	
	*97%ile or 100%ile Half-hourly limits	Daily limit
Particulates	100%	100%
Oxides of nitrogen	100%	100%
Sulphur dioxide	100%	100%
Carbon monoxide	100% 95% of 10-min averages	100%
Total organic carbon	100%	100%
Hydrogen chloride	100%	100%
Hydrogen fluoride	100%	100%
Ammonia	100%	100%

Summary of any notifications or non-compliances under the permit

Date	Summary of notification or non-compliance [including Line/Reference]	Reason	Measures taken to prevent reoccurrence

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
08/02/2021	Noise like a jet engine or a huge fan running constantly, worse at night, and increased over this last week.	No change in site operation or noise levels before, during or after complaint. advised to contact the railyard which we have found to be noisy at night.	No change - not substantiated.

*** including whether substantiated by the operator or SEPA**

Summary of Plant Improvements

Summary of any efficiency improvements that have been completed within the year.
none

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

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.

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

Details of Public & Stakeholder Liasion

Summary of events held during the reporting year.	
Date	**Description**
	none - COV19 postponement

List of events planned for next year	
Date	**Description**
	to be arranged

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

Residue Quality Monitoring Requirements

Summary of monitoring undertaken and compliance
FCC Millerhill follows the ESA's Ash Sampling protocol. Samples are sent for analysis twice a month and to date all samples have been non-hazardous

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

		Residue Quality Monitoring Results	
Parameter (unit)	**Limit**	**Normal Operation**	
		Bottom ash	**APC Residues**
Loss on Ignition (average %)	<5%	2.64	
Total Organic Carbon (average %)	<3%	1	
No. of Assessments Undertaken	---	24	4
No. of Hazardous Results	---	0	

Comments :

Emissions to Water

Summary of monitoring undertaken and compliance

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

Emissions to Water / Sewer

Parameter	Monitoring Frequency	Limit	Target	Max.	Average

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Emissions to Air (periodically monitored)

Summary of monitoring undertaken, standards used and compliance
The reported values have been calculated by taking the Mean of both sets of results of periodic emissions monitoring u between 23-25 February 2021 and 13-15 September 2021.

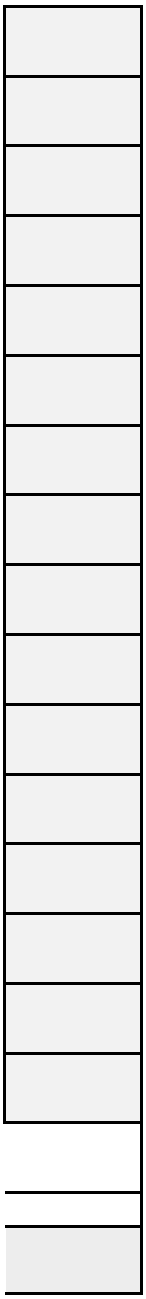
Results of emissions to air that are periodically monitored

Substance	Ref. Period	Emission Limit Value	Average			
			A1	A2	A3	A4
Particulates	Ave value consecutive 3 x 30mins	30 mg/m^3	3.33			
Oxides of nitrogen	Ave value consecutive 3 x 30mins	200 mg/m^3	177.95			
Sulphur dioxide	Ave value consecutive 3 x 30mins	200 mg/m^3	17.285			
Carbon monoxide	Ave value consecutive 3 x 30mins	100 mg/m^3	1.59			
Total organic carbon	Ave value consecutive 3 x 30mins	20 mg/m^3	2.35			
Hydrogen chloride	Ave value consecutive 3 x 30mins	60 mg/m^3	2.475			
Hydrogen fluoride	Ave value consecutive 3 x 30mins	4 mg/m^3	0.025			
PM10	Ave value consecutive 3 x 30mins	mg/m^3	n/a			
PM2.5	Ave value consecutive 3 x 30mins	mg/m^3	n/a			
Ammonia	Ave value consecutive 3 x 30mins	10 mg/m^3	1.575			
Nitrous Oxide	Ave value consecutive 3 x 30mins	mg/m^3	1.925			
Cd and Th and their compounds	Ave value consecutive 3 x 30mins	0.05 mg/m^3	0.0249			
Hg and its compounds	Ave value consecutive 3 x 30mins	0.05 mg/m^3	0.0019			
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	Ave value consecutive 3 x 30mins	0.5 mg/m^3	0.0325			
Dioxins & Furans (I-TEQ)	Ave value over single measurement of 6-8 hours	0.1 ng/m^3	0.00505			
PCBs (WHO-TEQ Humans / Mammals)	Ave value over single measurement of 6-8 hours	None set ng/m^3	0.0003			
PCBs (WHO-TEQ Fish)	Ave value over single measurement of 6-8 hours	None set ng/m^3	0			
PCBs (WHO-TEQ Birds)	Ave value over single measurement of 6-8 hours	None set ng/m^3	0.0016			
Dioxins & Furans (WHO-TEQ Humans / Mammals)	Ave value over single measurement of 6-8 hours	None set ng/m^3	0.00445			
Dioxins & Furans (WHO-TEQ Fish)	Ave value over single measurement of 6-8 hours	None set ng/m^3	0.0052			
Dioxins & Furans (WHO-TEQ Birds)	Ave value over single measurement of 6-8 hours	None set ng/m^3	0.0088			
Anthanthrene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.00535			

Benzo(a)anthracene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.00535			
Benzo(a)pyrene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.00535			
Benzo(b)fluoranthene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.00535			
Benzo(b)naptho(2,1-d) thiophene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.00535			
Benzo(c)phenanthrene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.00535			
Benzo(ghi)perylene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.00535			
Benzo(k)fluoranthene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.00535			
Cholanthrene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.00535			
Chrysene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.00535			
Cyclopenta(cd)pyrene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.00535			
Dibenzo(ai)pyrene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.00535			
Dibenzo(ah)anthracene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.00535			
Fluoranthene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0575			
Indeno(123-cd) pyrene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.00535			
Naphthalene	Ave value consecutive 3 x 30mins	None set µg/m^3	1.1			
	Ave value consecutive 3 x 30mins					
Date of QAL2 /AST:	23 & 24 February 2021					
Comments :						

undertaken

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	200 mg/m^3	172	168.75								
	½ hourly mean	400 mg/m^3	273	168.75								
Particulates	Daily mean	10 mg/m^3	4	1.59								
	½ hourly mean	30 mg/m^3	7	1.67								
Total Organic Carbon	Daily mean	10 mg/m^3	0	0.10								
	½ hourly mean	20 mg/m^3	6	0								
Hydrogen chloride	Daily mean	10 mg/m^3	2	1.21								
	½ hourly mean	60 mg/m^3	9	1.17								
Sulphur dioxide	Daily mean	50 mg/m^3	44	21.99								
	½ hourly mean	200 mg/m^3	102	22.08								
Nitrous Oxide	Daily mean	No limit set	1	0.55								
	½ hourly mean	No limit set	9	0.67								
Carbon monoxide	Daily mean	50 mg/m^3	3	1.44								
	½ hourly mean *	100 mg/m^3 *	121	1.5								
	95%ile 10-min avg *	150 mg/m^3 *	2.38	0								

Ammonia	Daily mean	No limit set	1	0.43								

* = delete or amend as appropriate

Comments :

Note that FCC Millerhill's permit allows for a half-hourly exceedance of CO as long as the 95% 10 minute limit is complied with. The CO spikes reported do not constitute a permit breach as the plant was within the 95% 10-minute CO limit at all times. Such instances are reported to SEPA as a courtesy at the time.

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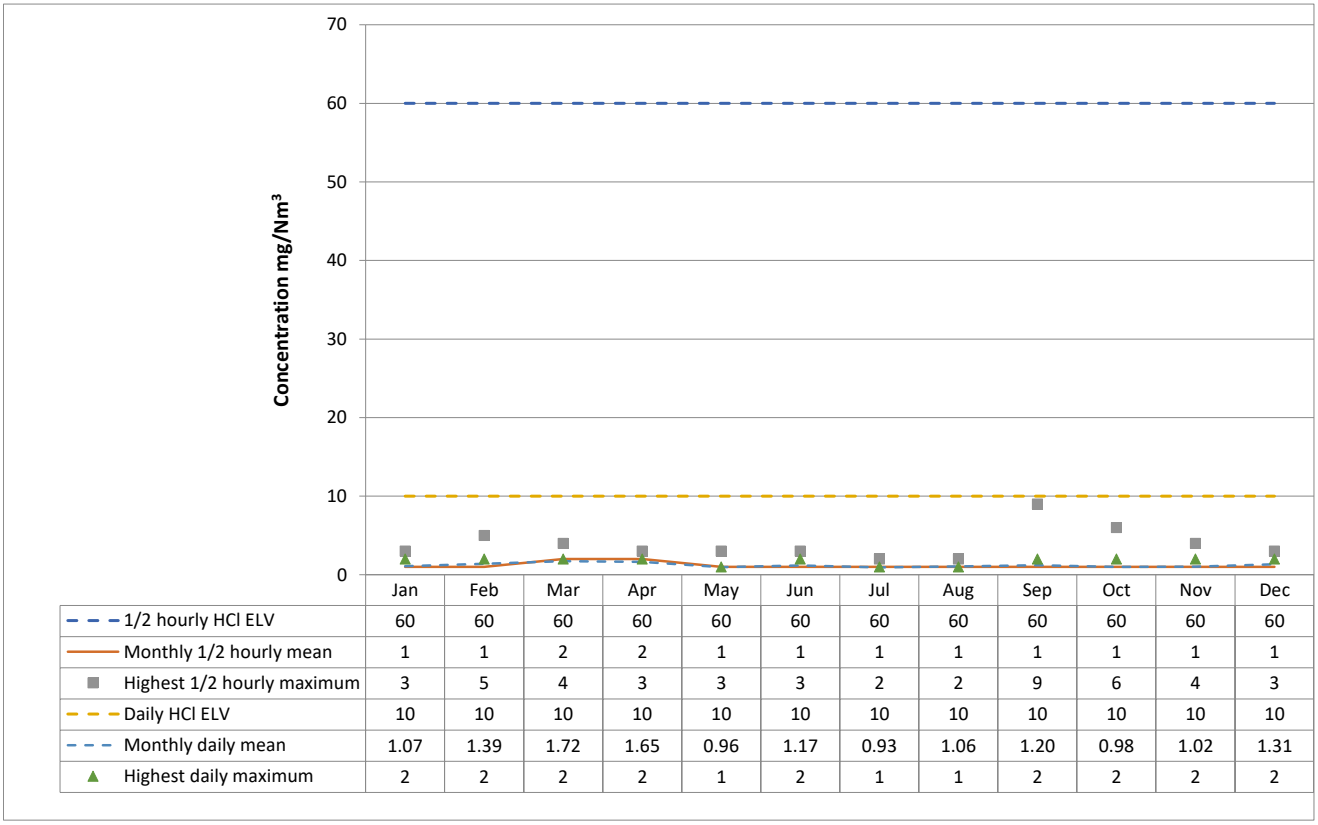
Monitoring of Hydrogen Chloride emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**1/2 hourly HCl ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily HCl ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	60	1	3	10	1.07	2
Feb	60	1	5	10	1.39	2
Mar	60	2	4	10	1.72	2
Apr	60	2	3	10	1.65	2
May	60	1	3	10	0.96	1
Jun	60	1	3	10	1.17	2
Jul	60	1	2	10	0.93	1
Aug	60	1	2	10	1.06	1
Sep	60	1	9	10	1.20	2
Oct	60	1	6	10	0.98	2
Nov	60	1	4	10	1.02	2
Dec	60	1	3	10	1.31	2



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly HCl ELV	60	60	60	60	60	60	60	60	60	60	60	60
Monthly 1/2 hourly mean	1	1	2	2	1	1	1	1	1	1	1	1
Highest 1/2 hourly maximum	3	5	4	3	3	3	2	2	9	6	4	3
Daily HCl ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	1.07	1.39	1.72	1.65	0.96	1.17	0.93	1.06	1.20	0.98	1.02	1.31
Highest daily maximum	2	2	2	2	1	2	1	1	2	2	2	2

Comments :

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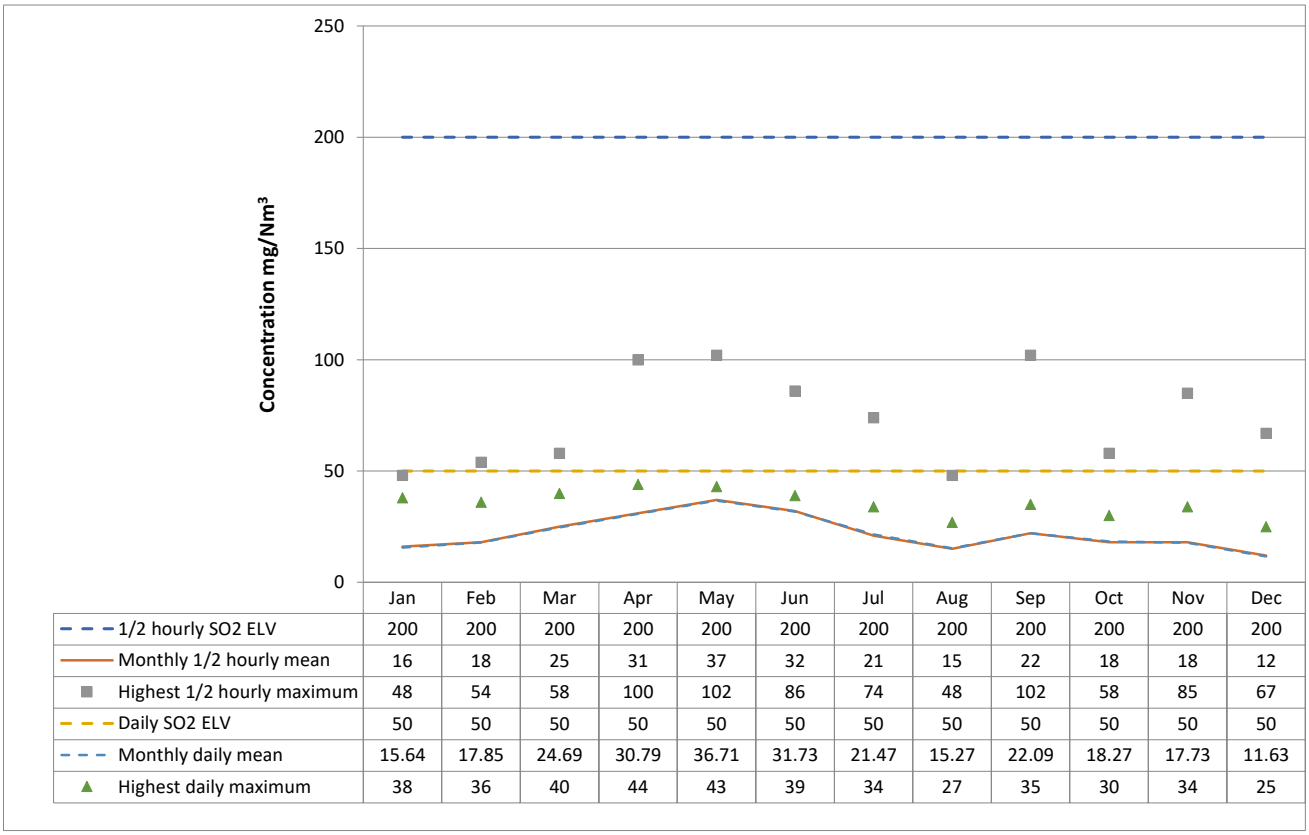
Monitoring of Sulphur dioxide emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**1/2 hourly SO2 ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily SO2 ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	200	16	48	50	15.64	38
Feb	200	18	54	50	17.85	36
Mar	200	25	58	50	24.69	40
Apr	200	31	100	50	30.79	44
May	200	37	102	50	36.71	43
Jun	200	32	86	50	31.73	39
Jul	200	21	74	50	21.47	34
Aug	200	15	48	50	15.27	27
Sep	200	22	102	50	22.09	35
Oct	200	18	58	50	18.27	30
Nov	200	18	85	50	17.73	34
Dec	200	12	67	50	11.63	25



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly SO2 ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly 1/2 hourly mean	16	18	25	31	37	32	21	15	22	18	18	12
Highest 1/2 hourly maximum	48	54	58	100	102	86	74	48	102	58	85	67
Daily SO2 ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	15.64	17.85	24.69	30.79	36.71	31.73	21.47	15.27	22.09	18.27	17.73	11.63
Highest daily maximum	38	36	40	44	43	39	34	27	35	30	34	25

Comments :

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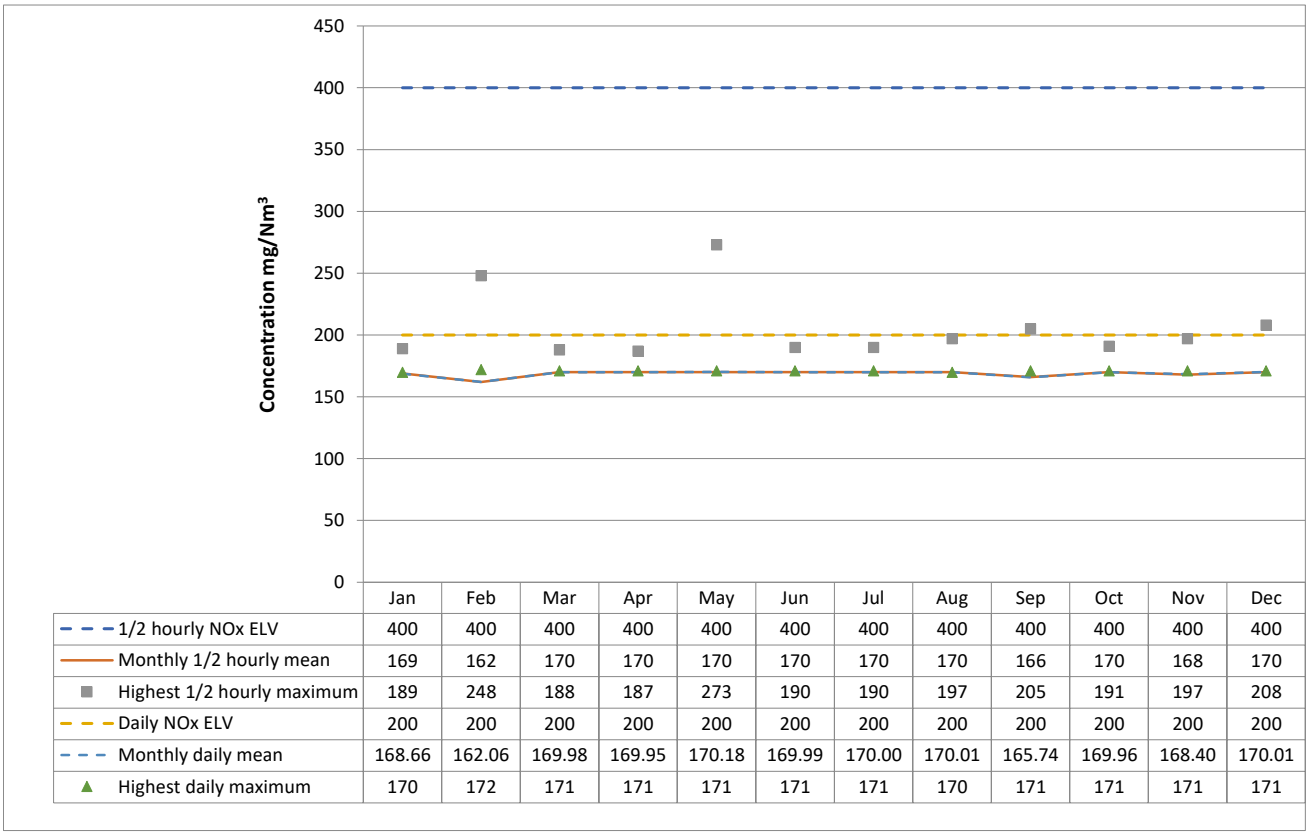
Monitoring of Oxides of Nitrogen emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**1/2 hourly NOx ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily NOx ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	400	169	189	200	168.66	170
Feb	400	162	248	200	162.06	172
Mar	400	170	188	200	169.98	171
Apr	400	170	187	200	169.95	171
May	400	170	273	200	170.18	171
Jun	400	170	190	200	169.99	171
Jul	400	170	190	200	170.00	171
Aug	400	170	197	200	170.01	170
Sep	400	166	205	200	165.74	171
Oct	400	170	191	200	169.96	171
Nov	400	168	197	200	168.40	171
Dec	400	170	208	200	170.01	171



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly NOx ELV	400	400	400	400	400	400	400	400	400	400	400	400
Monthly 1/2 hourly mean	169	162	170	170	170	170	170	170	166	170	168	170
Highest 1/2 hourly maximum	189	248	188	187	273	190	190	197	205	191	197	208
Daily NOx ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly daily mean	168.66	162.06	169.98	169.95	170.18	169.99	170.00	170.01	165.74	169.96	168.40	170.01
Highest daily maximum	170	172	171	171	171	171	171	170	171	171	171	171

Comments :

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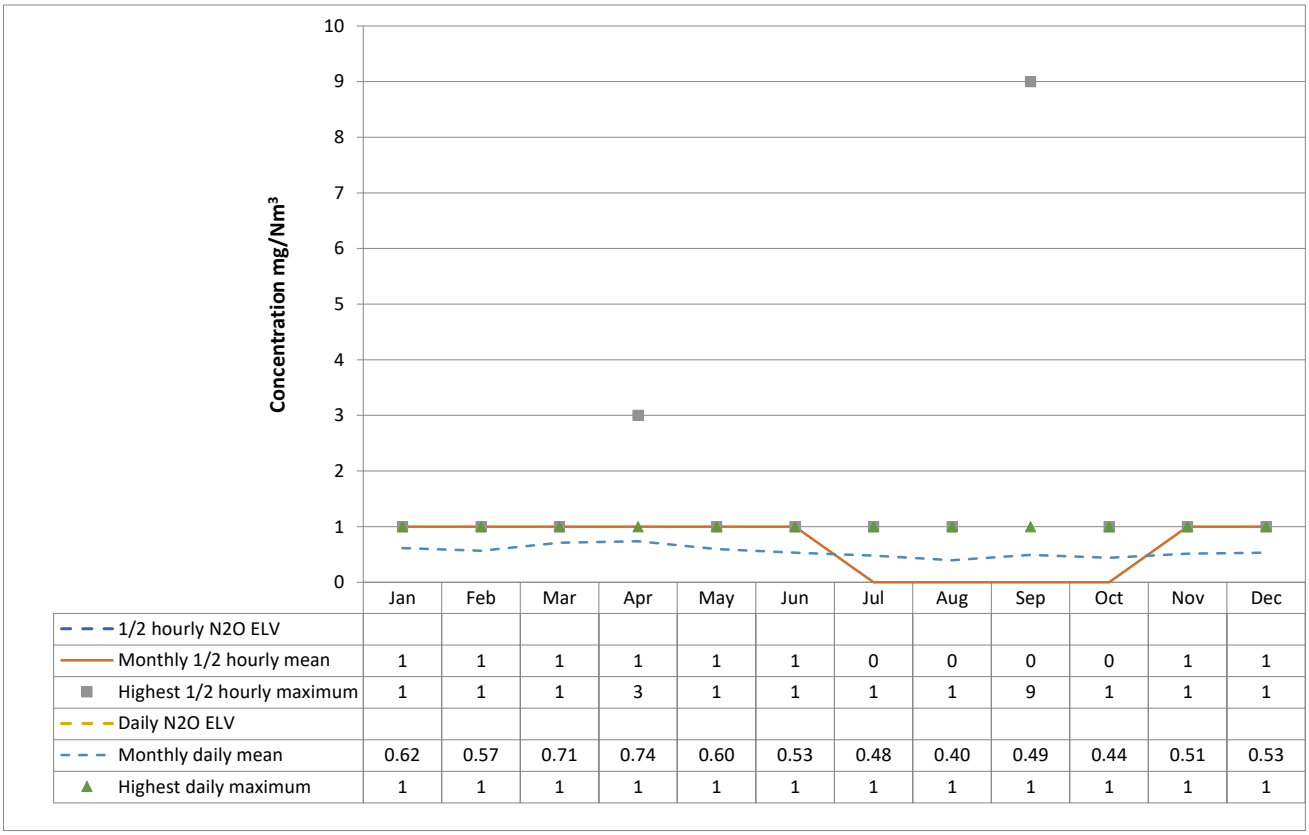
Monitoring of Nitrous Oxide emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**1/2 hourly N_2O ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily N_2O ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan		1	1		0.62	1
Feb		1	1		0.57	1
Mar		1	1		0.71	1
Apr		1	3		0.74	1
May		1	1		0.60	1
Jun		1	1		0.53	1
Jul		0	1		0.48	1
Aug		0	1		0.40	1
Sep		0	9		0.49	1
Oct		0	1		0.44	1
Nov		1	1		0.51	1
Dec		1	1		0.53	1



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly N2O ELV												
Monthly 1/2 hourly mean	1	1	1	1	1	1	0	0	0	0	1	1
Highest 1/2 hourly maximum	1	1	1	3	1	1	1	1	9	1	1	1
Daily N2O ELV												
Monthly daily mean	0.62	0.57	0.71	0.74	0.60	0.53	0.48	0.40	0.49	0.44	0.51	0.53
Highest daily maximum	1	1	1	1	1	1	1	1	1	1	1	1

Comments :

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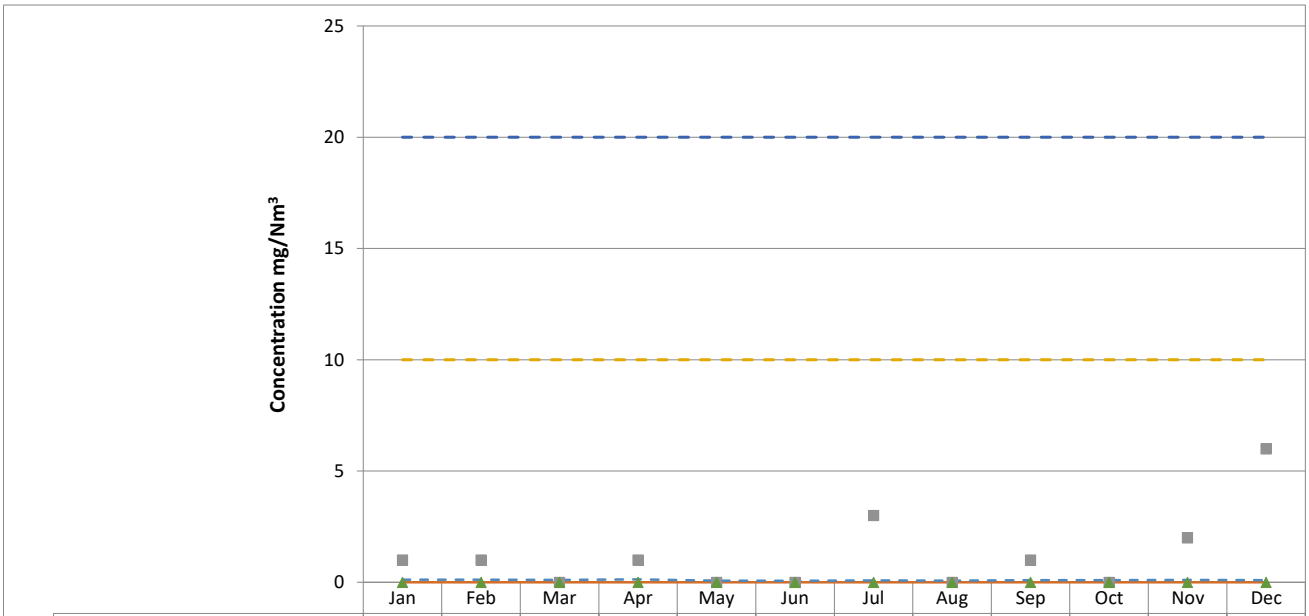
Monitoring of Total organic carbon emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**1/2 hourly TOC ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily TOC ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	20	0	1	10	0.11	0
Feb	20	0	1	10	0.11	0
Mar	20	0	0	10	0.10	0
Apr	20	0	1	10	0.13	0
May	20	0	0	10	0.07	0
Jun	20	0	0	10	0.07	0
Jul	20	0	3	10	0.09	0
Aug	20	0	0	10	0.07	0
Sep	20	0	1	10	0.10	0
Oct	20	0	0	10	0.09	0
Nov	20	0	2	10	0.11	0
Dec	20	0	6	10	0.09	0



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly TOC ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hourly mean	0	0	0	0	0	0	0	0	0	0	0	0
Highest 1/2 hourly maximum	1	1	0	1	0	0	3	0	1	0	2	6
Daily TOC ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.11	0.11	0.10	0.13	0.07	0.07	0.09	0.07	0.10	0.09	0.11	0.09
Highest daily maximum	0	0	0	0	0	0	0	0	0	0	0	0

Comments :

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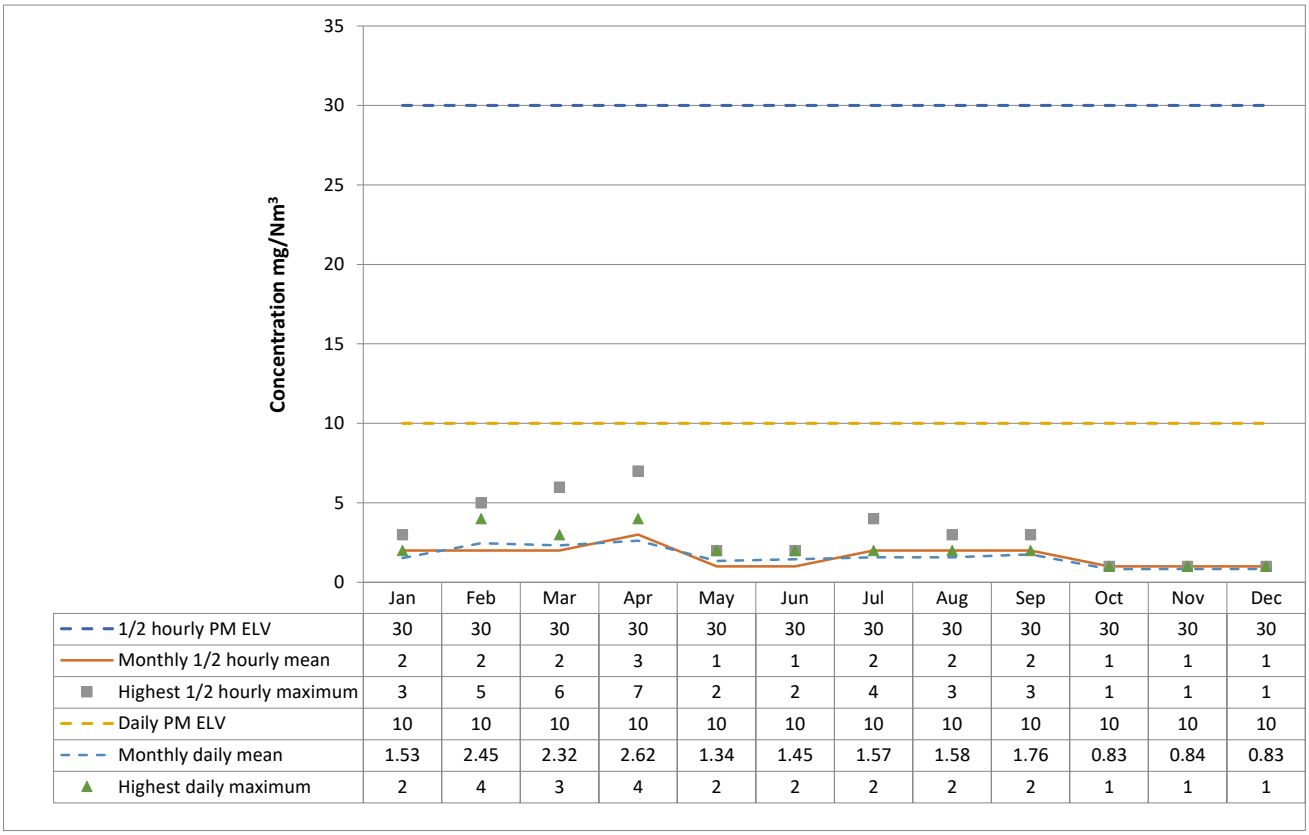
Monitoring of Particulate matter emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**1/2 hourly PM ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily PM ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	30	2	3	10	1.53	2
Feb	30	2	5	10	2.45	4
Mar	30	2	6	10	2.32	3
Apr	30	3	7	10	2.62	4
May	30	1	2	10	1.34	2
Jun	30	1	2	10	1.45	2
Jul	30	2	4	10	1.57	2
Aug	30	2	3	10	1.58	2
Sep	30	2	3	10	1.76	2
Oct	30	1	1	10	0.83	1
Nov	30	1	1	10	0.84	1
Dec	30	1	1	10	0.83	1



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly PM ELV	30	30	30	30	30	30	30	30	30	30	30	30
Monthly 1/2 hourly mean	2	2	2	3	1	1	2	2	2	1	1	1
Highest 1/2 hourly maximum	3	5	6	7	2	2	4	3	3	1	1	1
Daily PM ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	1.53	2.45	2.32	2.62	1.34	1.45	1.57	1.58	1.76	0.83	0.84	0.83
Highest daily maximum	2	4	3	4	2	2	2	2	2	1	1	1

Comments :

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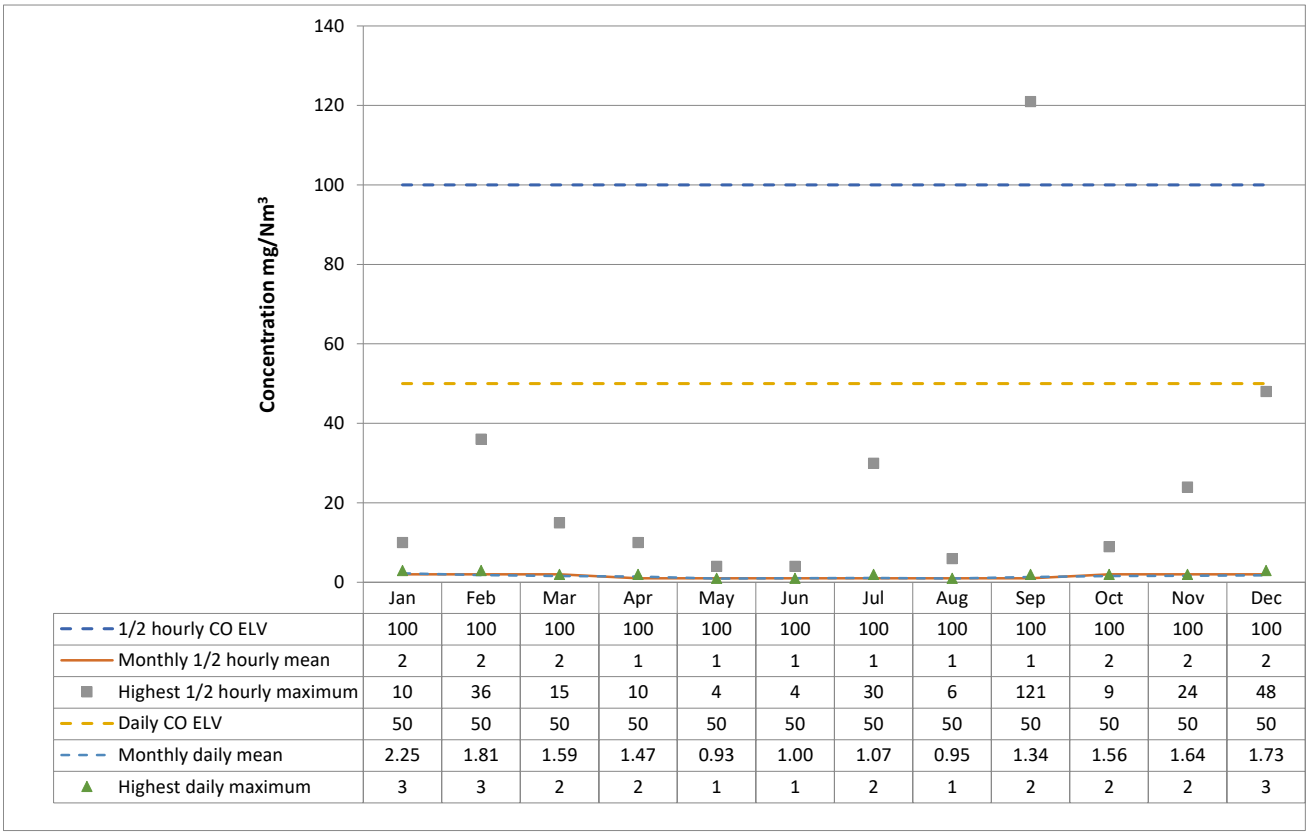
Monitoring of Carbon Monoxide (half hourly) **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**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	100	2	10	50	2.25	3
Feb	100	2	36	50	1.81	3
Mar	100	2	15	50	1.59	2
Apr	100	1	10	50	1.47	2
May	100	1	4	50	0.93	1
Jun	100	1	4	50	1.00	1
Jul	100	1	30	50	1.07	2
Aug	100	1	6	50	0.95	1
Sep	100	1	121	50	1.34	2
Oct	100	2	9	50	1.56	2
Nov	100	2	24	50	1.64	2
Dec	100	2	48	50	1.73	3



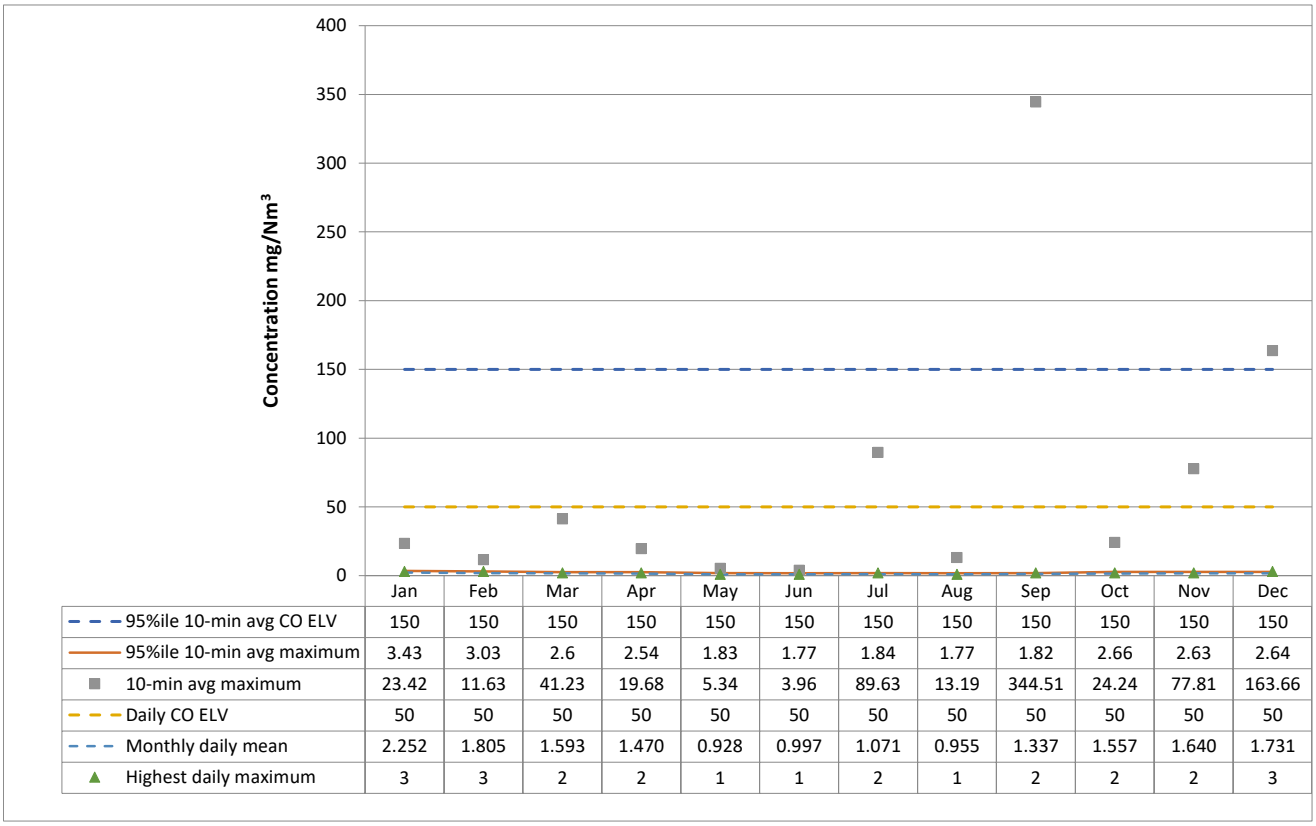
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly CO ELV	100	100	100	100	100	100	100	100	100	100	100	100
Monthly 1/2 hourly mean	2	2	2	1	1	1	1	1	1	2	2	2
Highest 1/2 hourly maximum	10	36	15	10	4	4	30	6	121	9	24	48
Daily CO ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	2.25	1.81	1.59	1.47	0.93	1.00	1.07	0.95	1.34	1.56	1.64	1.73
Highest daily maximum	3	3	2	2	1	1	2	1	2	2	2	3

Comments :

Annual Performance Report 2021 Millerhill RERC

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

mg/Nm^3	10-minute Reference Periods				Daily Reference Periods		
2021	**95%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	3.43		23.42	50	2.252	3
Feb	150	3.03		11.63	50	1.805	3
Mar	150	2.6		41.23	50	1.593	2
Apr	150	2.54		19.68	50	1.470	2
May	150	1.83		5.34	50	0.928	1
Jun	150	1.77		3.96	50	0.997	1
Jul	150	1.84		89.63	50	1.071	2
Aug	150	1.77		13.19	50	0.955	1
Sep	150	1.82		344.51	50	1.337	2
Oct	150	2.66		24.24	50	1.557	2
Nov	150	2.63		77.81	50	1.640	2
Dec	150	2.64		163.66	50	1.731	3



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
95%ile 10-min avg CO ELV	150	150	150	150	150	150	150	150	150	150	150	150
95%ile 10-min avg maximum	3.43	3.03	2.6	2.54	1.83	1.77	1.84	1.77	1.82	2.66	2.63	2.64
10-min avg maximum	23.42	11.63	41.23	19.68	5.34	3.96	89.63	13.19	344.51	24.24	77.81	163.66
Daily CO ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	2.252	1.805	1.593	1.470	0.928	0.997	1.071	0.955	1.337	1.557	1.640	1.731
Highest daily maximum	3	3	2	2	1	1	2	1	2	2	2	3

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.

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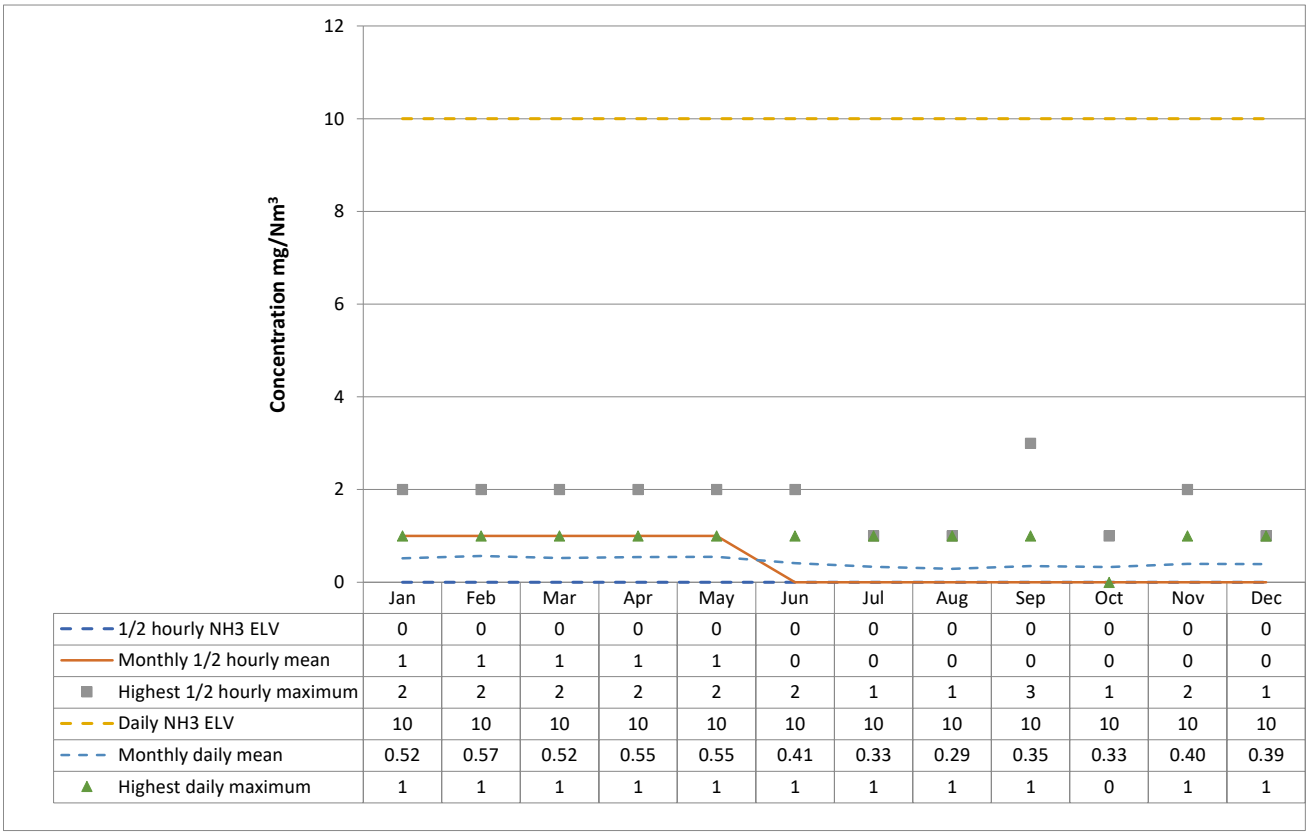
Monitoring of Ammnonia emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**1/2 hourly NH3 ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily NH3 ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	0	1	2	10	0.52	1
Feb	0	1	2	10	0.57	1
Mar	0	1	2	10	0.52	1
Apr	0	1	2	10	0.55	1
May	0	1	2	10	0.55	1
Jun	0	0	2	10	0.41	1
Jul	0	0	1	10	0.33	1
Aug	0	0	1	10	0.29	1
Sep	0	0	3	10	0.35	1
Oct	0	0	1	10	0.33	0
Nov	0	0	2	10	0.40	1
Dec	0	0	1	10	0.39	1



	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	1	1	0	0	0	0	0	0	0
Highest 1/2 hourly maximum	2	2	2	2	2	2	1	1	3	1	2	1
Daily NH3 ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.52	0.57	0.52	0.55	0.55	0.41	0.33	0.29	0.35	0.33	0.40	0.39
Highest daily maximum	1	1	1	1	1	1	1	1	1	0	1	1

Comments :

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