Annual Performance Report 2022

Permit PPC/A/1136072/CP01

Millerhill RERC

FCC Waste Services (UK) Ltd

Year:	2022
Address:	Whitehill Road, Edinburgh, EH22 1SX
Tel:	
Email:	
Prepared by:	Position: [redacted]
Approved by:	Position: [redacted]
Version:	1
Issue Date:	30/01/2023

Annual Performance Report 2022 Millerhill RERC

Contents

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 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 2022 the plant processed approximately 157,000 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

Annual Performance Report 2022 Millerhill RERC

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	40,035	34,831	38,192	39,714	**152,772**
Commercial & Industrial		586	23	2,428	899	**3,937**
Hazardous						**-**
Clinical			14	42	58	**115**
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		**40,622**	**34,869**	**40,662**	**40,671**	**156,824**
Rejected Waste		1			1	**2**
Unprocessed waste transferred out						**-**
Total waste combusted		**40,621**	**34,869**	**40,662**	**40,670**	**156,821**

Energy Useage / Export	Unit	Q1	Q2	Q3	Q4	**Year Total**
Power Generated	MWh	30,380	23,900	29,354	26,745	**110,379**
Power Exported		27,573	21,770	26,721	24,252	**100,316**
Power Used on site		2,807	2,308	2,647	2,609	**10,371**
Power Imported		-	192	14	117	**323**
Parasitic Load	%	9.2%	9.6%	9.0%	9.7%	9.4%
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	913	867	984	860	**3,623**
IBA - produced		9,722	8,992	10,712	9,728	**39,154**
Metals recycling						**-**
Other		-	-	-	-	**-**
Other		-	-	-	-	**-**
Other		-	-	-	-	**-**

Raw Material Usage	Unit	Q1	Q2	Q3	Q4	**Year Total**
Mains Water	ltrs	4,786,000	3,131,000	4,320,000	4,675,000	**16,912,000**
Other Water	ltrs					**-**
Ammonia	kgs	61,589	34,871	37,710	40,986	**175,156**
Urea	kgs					**-**
Activated Carbon	kgs	9,340	8,420	9,700	12,130	**39,590**
Lime / hydrated lime	kgs	411,350	397,810	483,010	317,240	**1,609,410**
Fuel oil	ltrs	660	36,550	16,530	21,480	**75,220**
Gas	cf	-	-	-	-	**-**
Other		-	-	-	-	**-**

Summary	Line/Unit	Q1	Q2	Q3	Q4	**Year Total**
Availability of waste combustion by line, hrs	1	2,160	1,791	2,197	2,015	**8,164**
	2					**-**
	3					**-**
	4					**-**
	5					**-**

Overall Availability, mean avg. of all lines, hrs						**N/A**
Hours of turbine operations, hrs	1	2,160	1,734	2,191	2,005	**8,091**
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%
2.5%
-
0.1%
-
-
-
-
100.0%
0.0%
-
100.0%

KWh/te
704
640
66
2
-
-
erational / n/a

% inputs
2.3%
25.0%
-
-
-
-

kg or Ltr /te
107.84
-
1.12
-
0.25
10.26
0.48

93.2%
x %
x %
x %
x %

x %
92.4%
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. Availability was good, being slightly lower than in 2021 but higher than in 2020. 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 plant was also shut down to replace bottom ash conveyor from 2-10 October.

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.

2022 Annual Reporting Performance Form 1

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

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

2022 Annual Reporting of Waste Disposal and Recovery

Waste Description	Disposal Route(s)	Disposal Tonnes	Recovery Tonnes	% / tonne of waste incinerated
1) Hazardous Wastes				
APC Residues	D9	3,623.4		2.3%
IBA				-
				-
				-
Total Hazardous Waste		3,623.4	0.0	2.3%
2) Non-Hazardous Wastes				
IBA	R4	39,154.2		25.0%
Ferrous Metal				-
Process Water	D08	348.3		0.2%
				-
				-
Total Non-Hazardous Waste		39,502.5	0.0	25.2%
TOTAL WASTE		**43,125.9**	**0.0**	27.5%

Operator's comments :

2022 Annual Reporting of Water and Other Raw Material Usage

Raw Material	Usage	Unit	Specific Useage	Unit
Mains Water	16912000	m^3	107.84	m^3/te
Total Water	16912000	m^3	107.84	m^3/te
Urea / Ammonia	175156	kg	1.12	kg/te
Activated Carbon	39590	kg	0.25	kg/te
Lime / hydrated lime / Sodium Bicarb.	1609410	kg	10.26	kg/te

Operator's comments :

2022 Annual Reporting of other performance indicators

Parameter	Results by Line							
	A1	A2	A3	A4	A5		Turbine 1	Turbine 2
Operating hours for the year, hours	8164							
Number of periods of abnormal operation, qty.	0							
Cumulative hours of abnormal operation for this year, hours	0							

Operator's comments :

Signed: _____ Date: 20/01/2023

2022 Annual Reporting of Energy Usage/Export

Permit PPC/A/1136072/CP01 Operator: FCC Waste Services (UK) Ltd

Facility: Millerhill RERC Form: Energy 1

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

Energy Source	Energy Usage	Unit	Specific Useage (KWh/tonne incinerated
Electricity Produced	110,379	MWh	704
Electricity Imported	323	MWh	2
Electricity Exported	100,316	MWh	640
Diesel	23,724	tonnes	
Steam/hot water exported	0	GWh	-

Operator's comments :
Diesel volume on this page was used in hired generator during planned outage.

Signed: _____ Date: 30/01/2023

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
29/03/2022	Complaint of Odour came via SEPA with no specific c	Not substantiated. Most like	
26/08/2022	From SEPA "...complaint of odour (from 8am) at Shav	SEPA confirmed unsubstar	
18/08/2022	From SEPA "We have received a complaint about od	Unsubstantiated, no further	

*** 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.
N/A

Summary of any other improvements made to the plant or planned to be made and a summary of the resulting environmental benefits.
A second "Stackflow 200" flow meter is to be installed into the stack in 2023 for additional redundancy of the CEMs

Details of Public & Stakeholder Liasion

Summary of events held during the reporting year.	
Date	**Description**
31/01/2022	
04/02/2022	
08/02/2022	
14/02/2022	
24/02/2022	
02/03/2022	
16/03/2022	
17/05/2022	
23/06/2022	
23/06/2022	
28/07/2022	
01/09/2022	
21/09/2022	
22/09/2022	
11/11/2022	
11/09/2022	
22/11/2022	

List of events planned for next year	
Date	**Description**
23/01/2023 10/02/2023 22/02/2023 01/03/2023 Feb-23 TBC 13-Jun	

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	
			Normal Operation
Parameter (unit)	**Limit**	**Bottom ash**	**APC Residues**
Loss on Ignition (average %)	<5%	2	
Total Organic Carbon (average %)	<3%	0.81	
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

Annual Performance Report 2022 Millerhill RERC

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 un between 22-24 February 2022 and 12-14 July 2022.

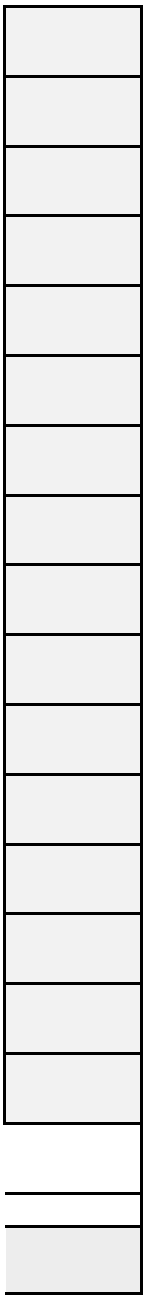
Results of emissions to air that are periodically monitored

Substance	Ref. Period	Emission Limit Value	Average			
			A1	A2	A3	A4
Particulates	Ave value consecutive 3 x 30mins	30 mg/m^3	0.535			
Oxides of nitrogen	Ave value consecutive 3 x 30mins	200 mg/m^3	181			
Sulphur dioxide	Ave value consecutive 3 x 30mins	200 mg/m^3	24.0			
Carbon monoxide	Ave value consecutive 3 x 30mins	100 mg/m^3	2.71			
Total organic carbon	Ave value consecutive 3 x 30mins	20 mg/m^3	1.055			
Hydrogen chloride	Ave value consecutive 3 x 30mins	60 mg/m^3	3.125			
Hydrogen fluoride	Ave value consecutive 3 x 30mins	4 mg/m^3	0.485			
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	0.81			
Nitrous Oxide	Ave value consecutive 3 x 30mins	mg/m^3	1.6			
Cd and Th and their compounds	Ave value consecutive 3 x 30mins	0.05 mg/m^3	0.0018			
Hg and its compounds	Ave value consecutive 3 x 30mins	0.05 mg/m^3	0.00319			
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	Ave value consecutive 3 x 30mins	0.5 mg/m^3	0.0582			
Dioxins & Furans (I-TEQ)	Ave value over single measurement of 6-8 hours	0.1 ng/m^3	0.00572			
PCBs (WHO-TEQ Humans / Mammals)	Ave value over single measurement of 6-8 hours	None set ng/m^3	0.000356			
PCBs (WHO-TEQ Fish)	Ave value over single measurement of 6-8 hours	None set ng/m^3	0.0000165			
PCBs (WHO-TEQ Birds)	Ave value over single measurement of 6-8 hours	None set ng/m^3	0.000722			
Dioxins & Furans (WHO-TEQ Humans / Mammals)	Ave value over single measurement of 6-8 hours	None set ng/m^3	0.0084945			
Dioxins & Furans (WHO-TEQ Fish)	Ave value over single measurement of 6-8 hours	None set ng/m^3	0.008553			
Dioxins & Furans (WHO-TEQ Birds)	Ave value over single measurement of 6-8 hours	None set ng/m^3	0.013298			
Anthanthrene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0048			

Benzo(a)anthracene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0048			
Benzo(a)pyrene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0048			
Benzo(b)fluoranthene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0048			
Benzo(b)naptho(2,1-d) thiophene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0073			
Benzo(c)phenanthrene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0048			
Benzo(ghi)perylene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0073			
Benzo(k)fluoranthene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0048			
Cholanthrene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0048			
Chrysene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0073			
Cyclopenta(cd)pyrene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0048			
Dibenzo(ai)pyrene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0048			
Dibenzo(ah)anthracene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0048			
Fluoranthene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.035			
Indeno(123-cd) pyrene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.0048			
Naphthalene	Ave value consecutive 3 x 30mins	None set µg/m^3	0.895			
	Ave value consecutive 3 x 30mins					
Date of QAL2 /AST:	22 & 23 February 2022					
Comments :						

ıdertaken

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	178.00	168.97								
	½ hourly mean	400 mg/m^3	205.00	169.08								
Particulates	Daily mean	10 mg/m^3	1.00	0.82								
	½ hourly mean	30 mg/m^3	2.00	1.00								
Total Organic Carbon	Daily mean	10 mg/m^3	0	0.10								
	½ hourly mean	20 mg/m^3	8.00	0.00								
Hydrogen chloride	Daily mean	10 mg/m^3	6.00	2.00								
	½ hourly mean	60 mg/m^3	14.00	1.92								
Sulphur dioxide	Daily mean	50 mg/m^3	49.00	19.00								
	½ hourly mean	200 mg/m^3	159.00	18.92								
Nitrous Oxide	Daily mean	No limit set	1.00	0.19								
	½ hourly mean	No limit set	3.00	0.08								
Carbon monoxide	Daily mean	50 mg/m^3	5.00	1.61								
	½ hourly mean *	100 mg/m^3 *	171.00	1.50								
	95%ile 10-min avg *	150 mg/m^3 *	525.46	1.61								

Ammonia	Daily mean	No limit set	1.00	0.25								

* = delete or amend as appropriate

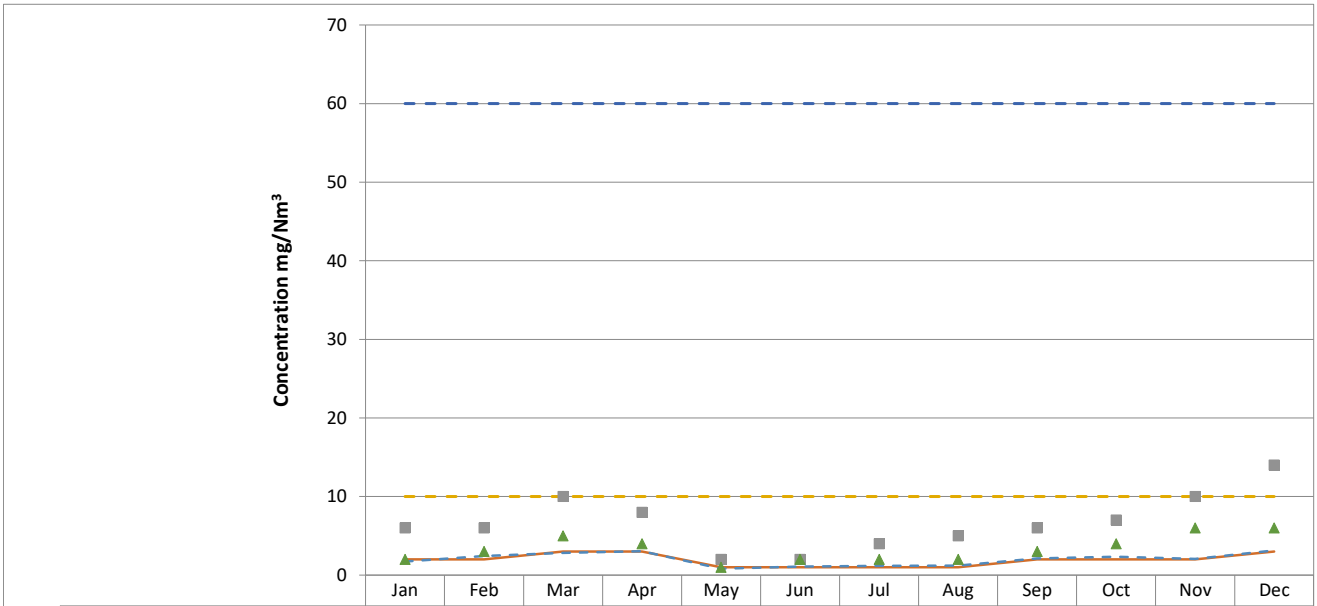
Comments :

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.

Annual Performance Report 2022 Millerhill RERC

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

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2022	**1/2 hourly HCl ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily HCl ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	60	2	6	10	1.72	2
Feb	60	2	6	10	2.44	3
Mar	60	3	10	10	2.84	5
Apr	60	3	8	10	3.04	4
May	60	1	2	10	0.82	1
Jun	60	1	2	10	1.07	2
Jul	60	1	4	10	1.17	2
Aug	60	1	5	10	1.20	2
Sep	60	2	6	10	2.12	3
Oct	60	2	7	10	2.35	4
Nov	60	2	10	10	2.07	6
Dec	60	3	14	10	3.14	6



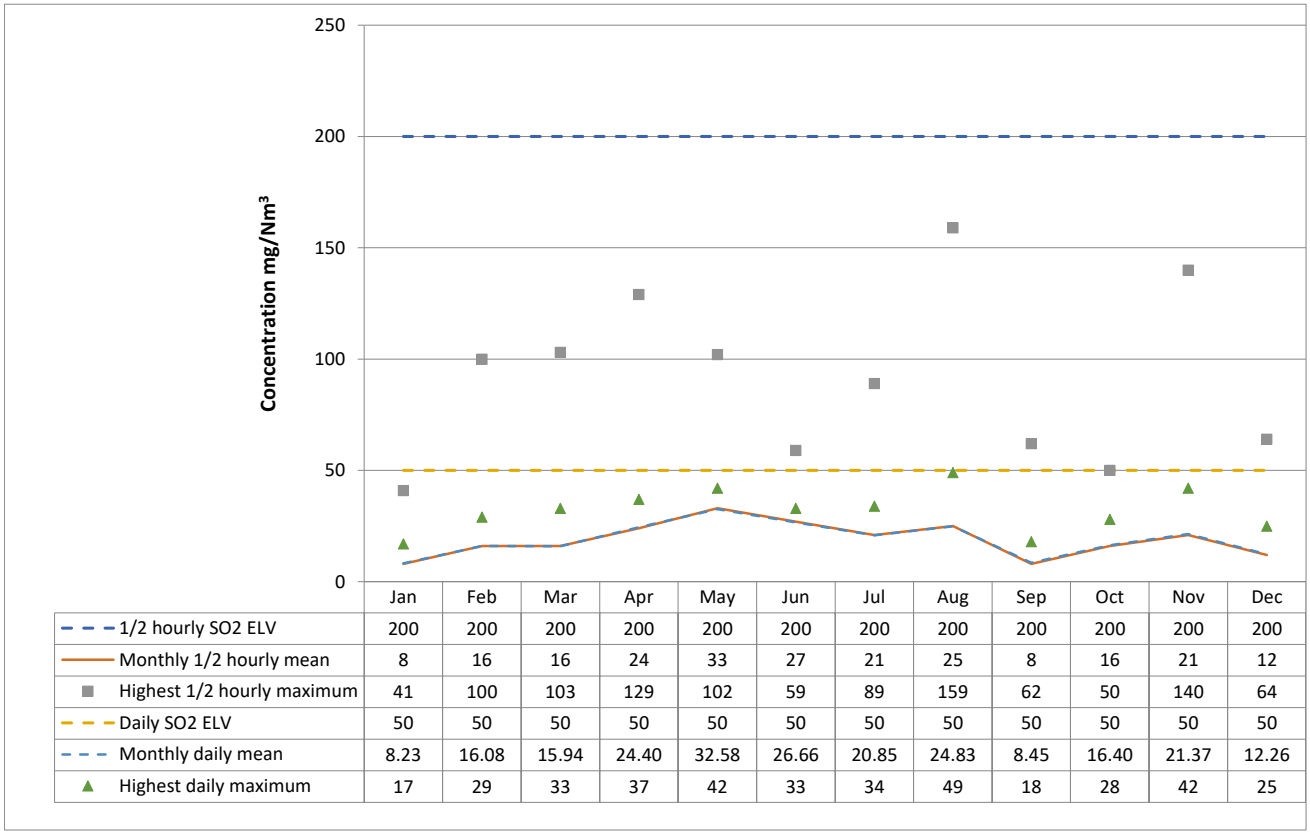
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly HCl ELV	60	60	60	60	60	60	60	60	60	60	60	60
Monthly 1/2 hourly mean	2	2	3	3	1	1	1	1	2	2	2	3
Highest 1/2 hourly maximum	6	6	10	8	2	2	4	5	6	7	10	14
Daily HCl ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	1.72	2.44	2.84	3.04	0.82	1.07	1.17	1.20	2.12	2.35	2.07	3.14
Highest daily maximum	2	3	5	4	1	2	2	2	3	4	6	6

Comments :

Annual Performance Report 2022 Millerhill RERC

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

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2022	**1/2 hourly SO2 ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily SO2 ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	200	8	41	50	8.23	17
Feb	200	16	100	50	16.08	29
Mar	200	16	103	50	15.94	33
Apr	200	24	129	50	24.40	37
May	200	33	102	50	32.58	42
Jun	200	27	59	50	26.66	33
Jul	200	21	89	50	20.85	34
Aug	200	25	159	50	24.83	49
Sep	200	8	62	50	8.45	18
Oct	200	16	50	50	16.40	28
Nov	200	21	140	50	21.37	42
Dec	200	12	64	50	12.26	25



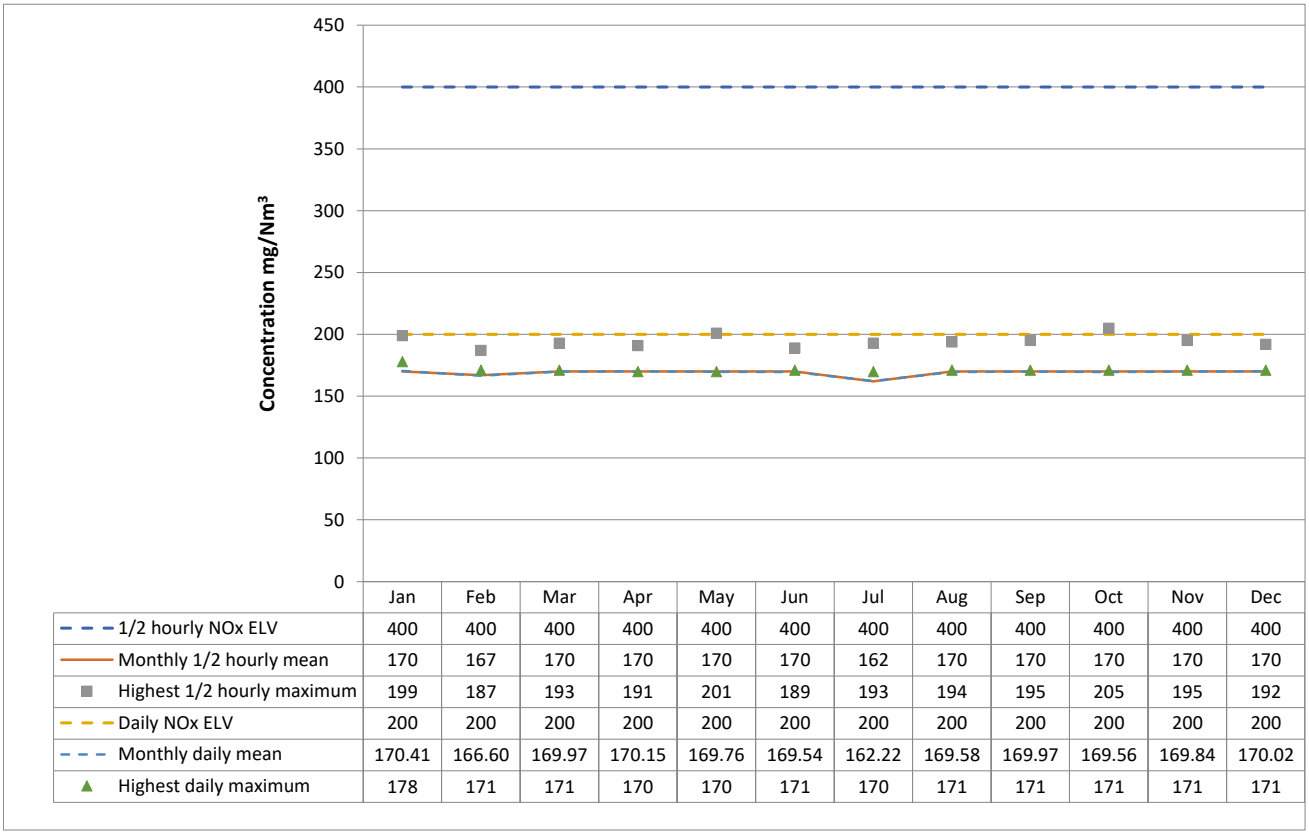
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly SO2 ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly 1/2 hourly mean	8	16	16	24	33	27	21	25	8	16	21	12
Highest 1/2 hourly maximum	41	100	103	129	102	59	89	159	62	50	140	64
Daily SO2 ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	8.23	16.08	15.94	24.40	32.58	26.66	20.85	24.83	8.45	16.40	21.37	12.26
Highest daily maximum	17	29	33	37	42	33	34	49	18	28	42	25

Comments :

Annual Performance Report 2022 Millerhill RERC

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

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2022	**1/2 hourly NOx ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily NOx ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	400	170	199	200	170.41	178
Feb	400	167	187	200	166.60	171
Mar	400	170	193	200	169.97	171
Apr	400	170	191	200	170.15	170
May	400	170	201	200	169.76	170
Jun	400	170	189	200	169.54	171
Jul	400	162	193	200	162.22	170
Aug	400	170	194	200	169.58	171
Sep	400	170	195	200	169.97	171
Oct	400	170	205	200	169.56	171
Nov	400	170	195	200	169.84	171
Dec	400	170	192	200	170.02	171



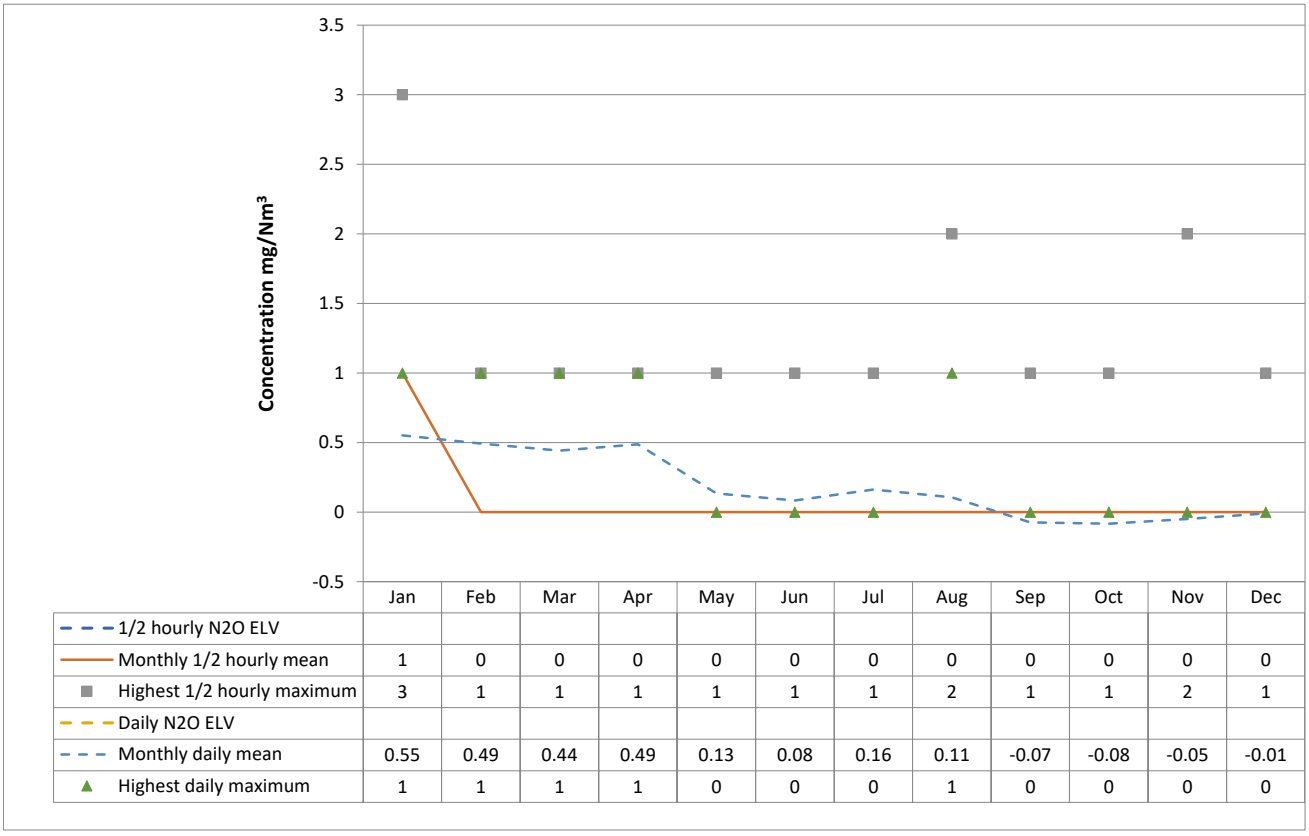
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly NOx ELV	400	400	400	400	400	400	400	400	400	400	400	400
Monthly 1/2 hourly mean	170	167	170	170	170	170	162	170	170	170	170	170
Highest 1/2 hourly maximum	199	187	193	191	201	189	193	194	195	205	195	192
Daily NOx ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly daily mean	170.41	166.60	169.97	170.15	169.76	169.54	162.22	169.58	169.97	169.56	169.84	170.02
Highest daily maximum	178	171	171	170	170	171	170	171	171	171	171	171

Comments :

Annual Performance Report 2022 Millerhill RERC

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

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2022	**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	3		0.55	1
Feb		0	1		0.49	1
Mar		0	1		0.44	1
Apr		0	1		0.49	1
May		0	1		0.13	0
Jun		0	1		0.08	0
Jul		0	1		0.16	0
Aug		0	2		0.11	1
Sep		0	1		-0.07	0
Oct		0	1		-0.08	0
Nov		0	2		-0.05	0
Dec		0	1		-0.01	0



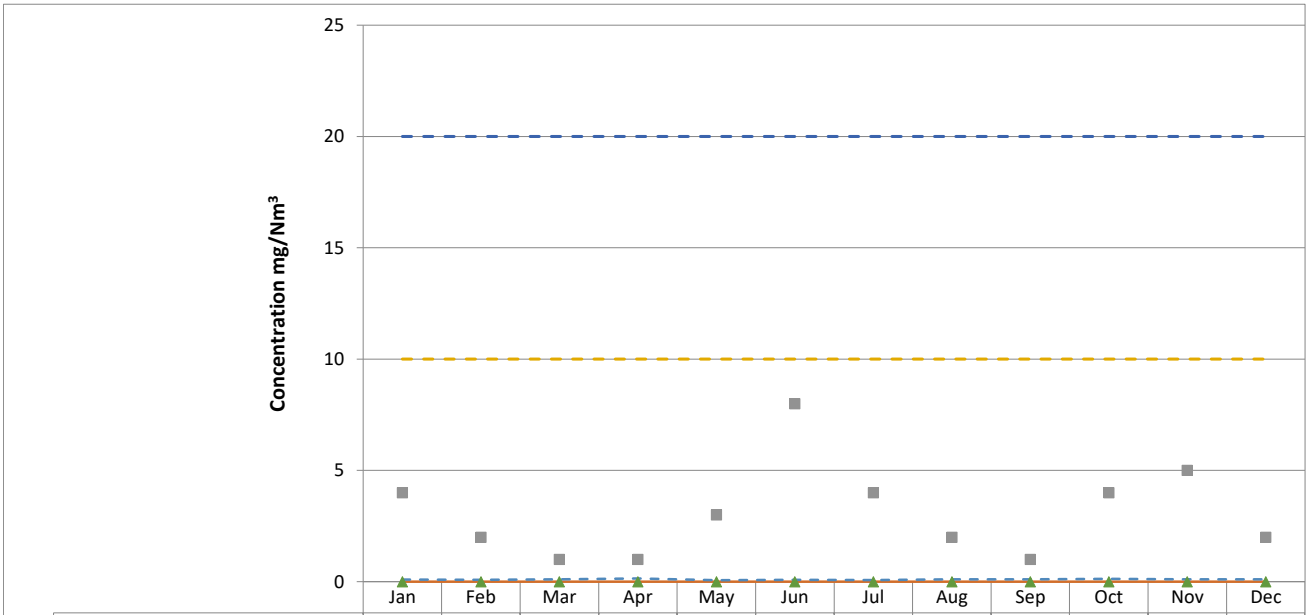
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly N2O ELV												
Monthly 1/2 hourly mean	1	0	0	0	0	0	0	0	0	0	0	0
Highest 1/2 hourly maximum	3	1	1	1	1	1	1	2	1	1	2	1
Daily N2O ELV												
Monthly daily mean	0.55	0.49	0.44	0.49	0.13	0.08	0.16	0.11	-0.07	-0.08	-0.05	-0.01
Highest daily maximum	1	1	1	1	0	0	0	1	0	0	0	0

Comments :

Annual Performance Report 2022 Millerhill RERC

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

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2022	**1/2 hourly TOC ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily TOC ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	20	0	4	10	0.093	0
Feb	20	0	2	10	0.080	0
Mar	20	0	1	10	0.111	0
Apr	20	0	1	10	0.144	0
May	20	0	3	10	0.066	0
Jun	20	0	8	10	0.083	0
Jul	20	0	4	10	0.076	0
Aug	20	0	2	10	0.104	0
Sep	20	0	1	10	0.107	0
Oct	20	0	4	10	0.126	0
Nov	20	0	5	10	0.107	0
Dec	20	0	2	10	0.108	0



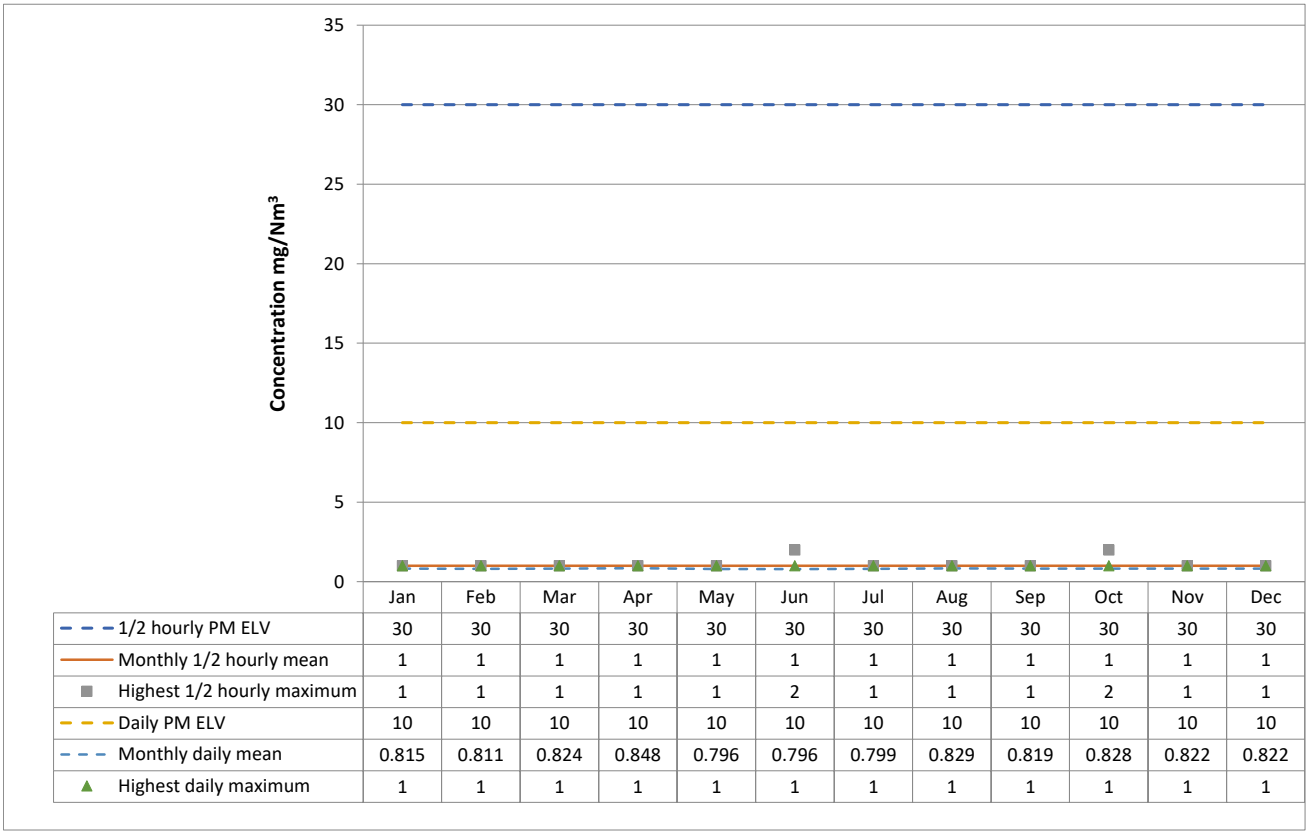
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly TOC ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hourly mean	0	0	0	0	0	0	0	0	0	0	0	0
Highest 1/2 hourly maximum	4	2	1	1	3	8	4	2	1	4	5	2
Daily TOC ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.093	0.080	0.111	0.144	0.066	0.083	0.076	0.104	0.107	0.126	0.107	0.108
Highest daily maximum	0	0	0	0	0	0	0	0	0	0	0	0

Comments :

Annual Performance Report 2022 Millerhill RERC

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

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2022	**1/2 hourly PM ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily PM ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	30	1	1	10	0.815	1
Feb	30	1	1	10	0.811	1
Mar	30	1	1	10	0.824	1
Apr	30	1	1	10	0.848	1
May	30	1	1	10	0.796	1
Jun	30	1	2	10	0.796	1
Jul	30	1	1	10	0.799	1
Aug	30	1	1	10	0.829	1
Sep	30	1	1	10	0.819	1
Oct	30	1	2	10	0.828	1
Nov	30	1	1	10	0.822	1
Dec	30	1	1	10	0.822	1



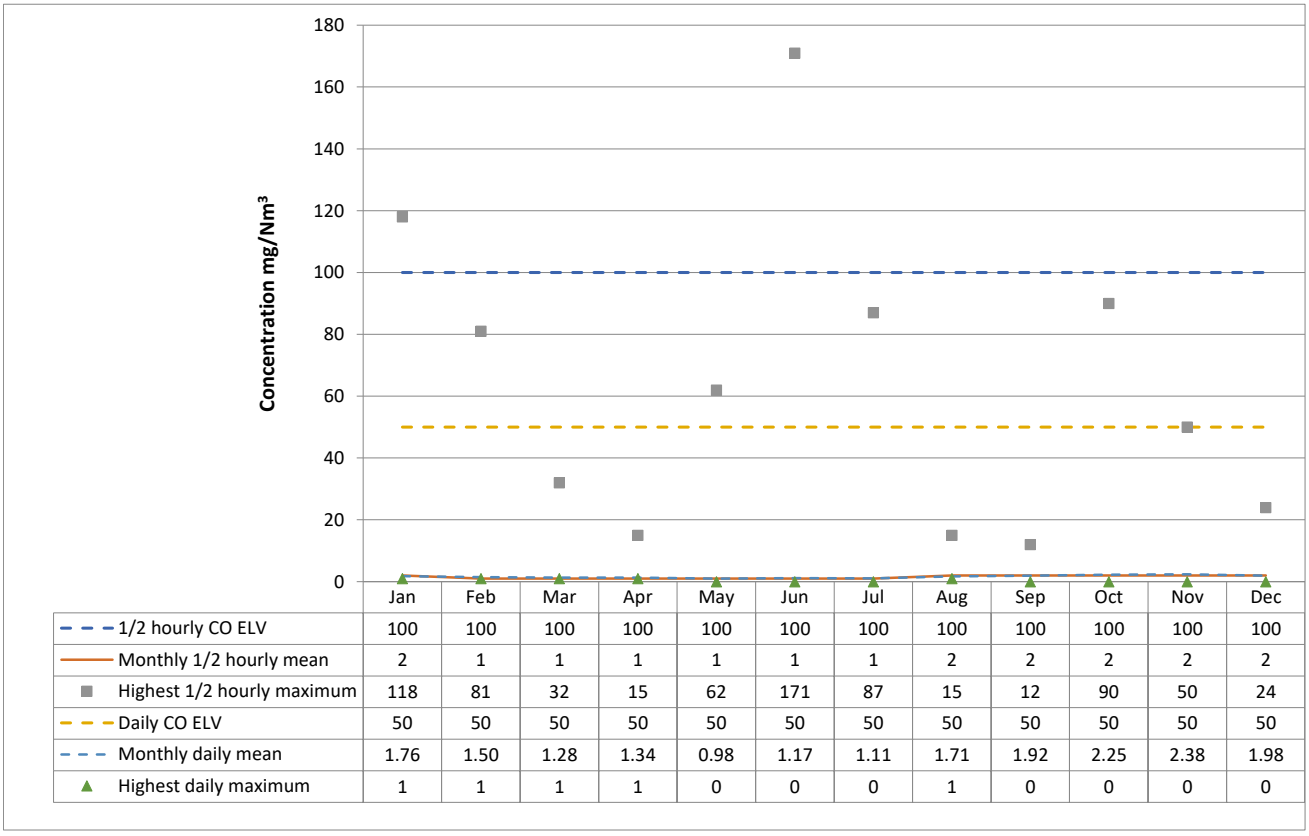
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly PM ELV	30	30	30	30	30	30	30	30	30	30	30	30
Monthly 1/2 hourly mean	1	1	1	1	1	1	1	1	1	1	1	1
Highest 1/2 hourly maximum	1	1	1	1	1	2	1	1	1	2	1	1
Daily PM ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.815	0.811	0.824	0.848	0.796	0.796	0.799	0.829	0.819	0.828	0.822	0.822
Highest daily maximum	1	1	1	1	1	1	1	1	1	1	1	1

Comments :

Annual Performance Report 2022 Millerhill RERC

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

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2022	**1/2 hourly CO ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily CO ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	100	2	118	50	1.76	1
Feb	100	1	81	50	1.50	1
Mar	100	1	32	50	1.28	1
Apr	100	1	15	50	1.34	1
May	100	1	62	50	0.98	0
Jun	100	1	171	50	1.17	0
Jul	100	1	87	50	1.11	0
Aug	100	2	15	50	1.71	1
Sep	100	2	12	50	1.92	0
Oct	100	2	90	50	2.25	0
Nov	100	2	50	50	2.38	0
Dec	100	2	24	50	1.98	0



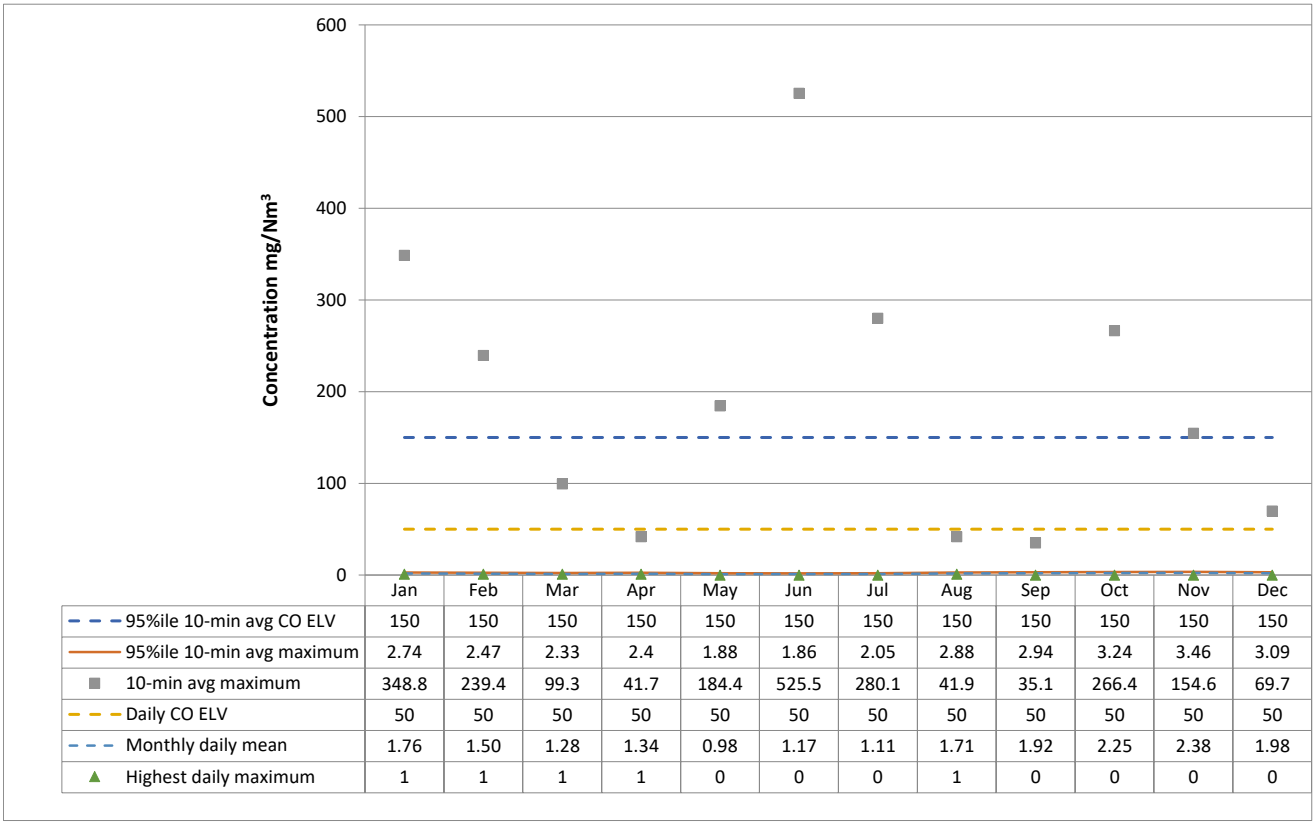
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly CO ELV	100	100	100	100	100	100	100	100	100	100	100	100
Monthly 1/2 hourly mean	2	1	1	1	1	1	1	2	2	2	2	2
Highest 1/2 hourly maximum	118	81	32	15	62	171	87	15	12	90	50	24
Daily CO ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	1.76	1.50	1.28	1.34	0.98	1.17	1.11	1.71	1.92	2.25	2.38	1.98
Highest daily maximum	1	1	1	1	0	0	0	1	0	0	0	0

Comments :

Annual Performance Report 2022 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		
2022	**95%ile 10-min avg CO ELV**	**95%ile 10-min avg maximum**	**Monthly CO 10-min avg mean**	**10-min avg maximum**	**Daily CO ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	150	2.74		348.8	50	1.76	1
Feb	150	2.47		239.4	50	1.50	1
Mar	150	2.33		99.3	50	1.28	1
Apr	150	2.4		41.7	50	1.34	1
May	150	1.88		184.4	50	0.98	0
Jun	150	1.86		525.5	50	1.17	0
Jul	150	2.05		280.1	50	1.11	0
Aug	150	2.88		41.9	50	1.71	1
Sep	150	2.94		35.1	50	1.92	0
Oct	150	3.24		266.4	50	2.25	0
Nov	150	3.46		154.6	50	2.38	0
Dec	150	3.09		69.7	50	1.98	0



	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	2.74	2.47	2.33	2.4	1.88	1.86	2.05	2.88	2.94	3.24	3.46	3.09
10-min avg maximum	348.8	239.4	99.3	41.7	184.4	525.5	280.1	41.9	35.1	266.4	154.6	69.7
Daily CO ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	1.76	1.50	1.28	1.34	0.98	1.17	1.11	1.71	1.92	2.25	2.38	1.98
Highest daily maximum	1	1	1	1	0	0	0	1	0	0	0	0

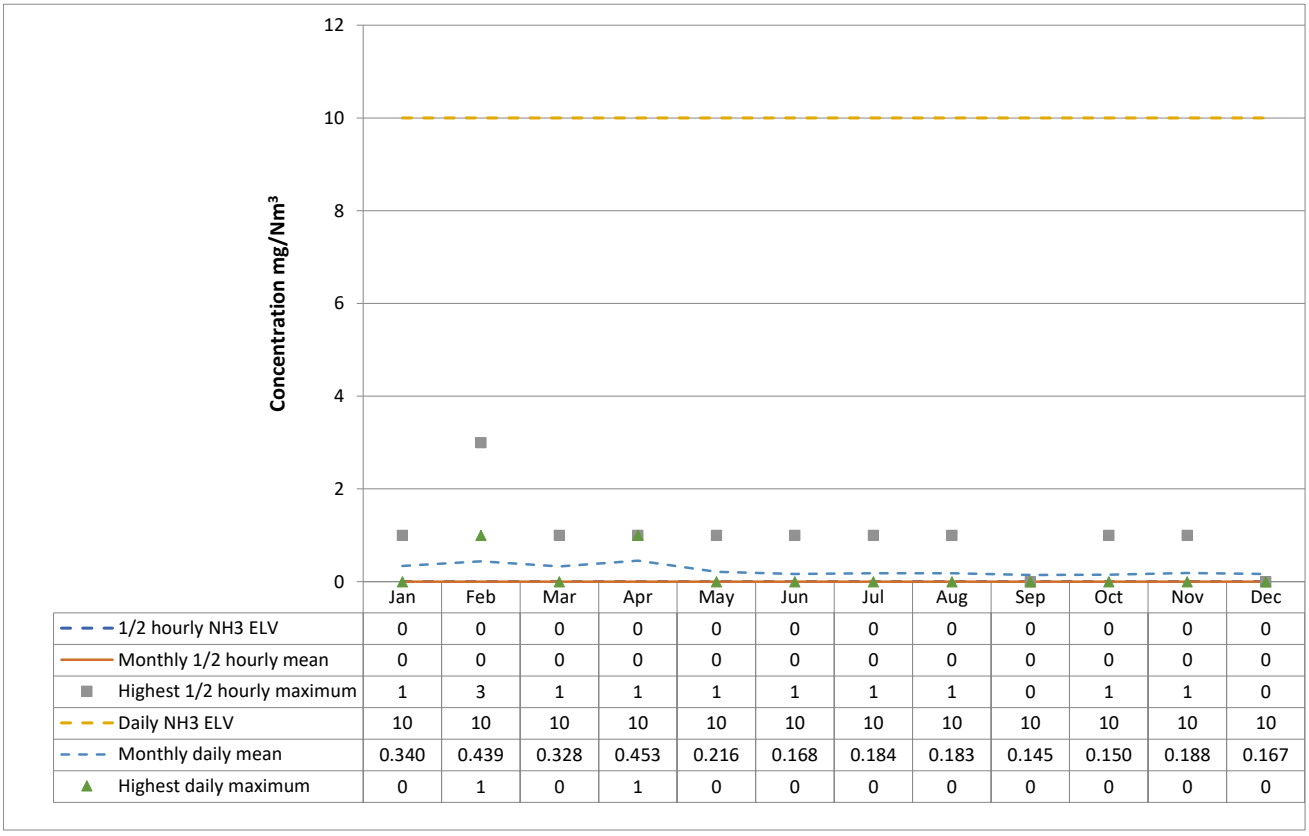
Comments :

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.

Annual Performance Report 2022 Millerhill RERC

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

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2022	**1/2 hourly NH3 ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily NH3 ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	0	0	1	10	0.340	0
Feb	0	0	3	10	0.439	1
Mar	0	0	1	10	0.328	0
Apr	0	0	1	10	0.453	1
May	0	0	1	10	0.216	0
Jun	0	0	1	10	0.168	0
Jul	0	0	1	10	0.184	0
Aug	0	0	1	10	0.183	0
Sep	0	0	0	10	0.145	0
Oct	0	0	1	10	0.150	0
Nov	0	0	1	10	0.188	0
Dec	0	0	0	10	0.167	0



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly NH3 ELV	0	0	0	0	0	0	0	0	0	0	0	0
Monthly 1/2 hourly mean	0	0	0	0	0	0	0	0	0	0	0	0
Highest 1/2 hourly maximum	1	3	1	1	1	1	1	1	0	1	1	0
Daily NH3 ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.340	0.439	0.328	0.453	0.216	0.168	0.184	0.183	0.145	0.150	0.188	0.167
Highest daily maximum	0	1	0	1	0	0	0	0	0	0	0	0

Comments :

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