



Hanson Cement, Padeswood Works

Annual Report as required by

Condition 4.2.2

Permit EPR/BL1096IB/V016

For Calendar year 2021

1. Introduction

Condition 4.2.2 of EPR Permit BL1096IB/V016 requires an annual performance report.

4.2.2 A report or reports on the performance of the activities over the previous year shall be submitted to Natural Resources Wales by 31 January (or other date agreed in writing by Natural Resources Wales each year. The report(s) shall include as a minimum:

(a) a review of the results of the monitoring and assessment carried out in accordance with the permit including an interpretive review of that data;

(b) the performance parameters set out in schedule 4 table S4.2 using the forms specified in table S4.3 of that schedule.

(c) the functioning and monitoring of the plant involved with the burning of waste derived fuels, in a format agreed with Natural Resources Wales. The report shall, as a minimum requirement (as required by Chapter IV of the Industrial Emissions Directive (IED)) give an account of the running of the process and the emissions into air and water compared with the emission standards in the IED.

2. Condition 4.2.2 (a)

2.1. Emissions to Air

The main emissions to air from the installation are from the kiln via the main stack, emission point A8, the filters and stacks on the cement mills, emission points A3-A7 and A15, the stack on the clinker cooler, emission point A9

2.1.1. A3-A7, A9, A15

Table 2.1 provides a summary of performance of these emission points based on the monitoring data collected during 2021. It should be noted that continuous emissions monitors cannot be calibrated at low (below 10 mg/Nm³) emission levels as previously advised to NRW.

Permit Reference	Description	Daily Average Limit (mg/m ³)	Annual Mean (mg/m ³)	Standard deviation
A3	Cement Mill 1	10	1	1.2
A4	Cement Mill 2	10	0	0.3
A5	Cement Mill 3	20	6	5.8
A6	Cement Mill 4	10	-	-
A7	Cement Mill 4 classifier	20	-	-
A9	Clinker Cooler	20	4	3.9
A15	Cement Mill 5	10	2	1.2

Table 2.1 Summary of emissions for air monitoring points other than A8 for 2021.

In 2021 cement mills 1 and 2 were recommissioned to meet market demand. One schedule 5 notification was issued during the recommissioning. There were no emission breaches during production from any of the above emission points during 2021.

Date	End Date	Emission Point	Type
25/06/2021	25/06/2021	A4	Particulates

Table 2.2 Summary Schedule 5 notifications for 2021 for releases to air for emission points A3-A7, A9, A15

2.1.2. A8

Table 2.3 provides a summary of performance of this emission point based on the monitoring data collected during 2021.

Permit Reference	Description	Daily Average Limit (mg/m ³)	Annual Mean (mg/m ³)	Standard deviation
A8	Particulates	10	2	1.3
A8	SOx	200	27	27.8
A8	NOx	450	395	39.6
A8	TOC	50	20	9.4
A8	HCl	10	2	1.8
A8	CO	1200	534	84.9
A8	NH3	70	11	2.1

Table 2.3 Summary of emissions for air monitoring point A8 for 2021.

There were 3 events where emission point A8 did not comply with the environmental permit. Two of these were related to daily emission limit value breaches and one from the 6-monthly testing.

Each non-compliance is detailed in table 2.4 below.

Date	End Date	Emission Point	Type
11/11/2021	11/11/2021	Main Stack (A8)	Mercury breach
28/11/2021	28/11/2021	Main Stack (A8)	NOx breach
29/11/2021	29/11/2021	Main Stack (A8)	NOx breach

Table 2.4 Summary Schedule 5 notifications for 2021 for releases to air for emission point A8

2.1.3. A11 & 12

Two further emission points to air are the Arodo packer filter and the clinker dome filter. Indicative monitoring has been installed on each of these emission points to show deterioration in filter performance. During 2021 there were no incidences where these emission points indicated non-conformance with the permit.

2.1.4. Fugitive Emissions

There were fifteen schedule 5 notifications submitted from the site for fugitive emissions in 2021. This is shown in table 2.5 below.

Date	End Date	Emission Point	Type
05/01/2021	05/01/2021	PHT	Fugitive dust
31/01/2021	31/01/2021	Silo 6	Fugitive dust
09/04/2021	09/04/2021	Cooler	Fugitive dust
15/06/2021	15/06/2021	SRF	Fugitive dust
09/07/2021	09/07/2021	Silo 6	Fugitive dust
02/08/2021	02/08/2021	BF10	Fugitive dust
17/08/2021	17/08/2021	CM3	Fugitive dust
20/08/2021	20/08/2021	Kiln	Fugitive dust
08/09/2021	08/09/2021	Bypass	Fugitive dust
10/09/2021	10/09/2021	Kiln	Fugitive dust
16/09/2021	16/09/2021	Kiln	Fugitive dust
27/09/2021	27/09/2021	CM5	Fugitive dust
10/11/2021	10/11/2021	Kiln	Fugitive dust
15/11/2021	15/11/2021	Kiln	Fugitive dust
27/11/2021	27/11/2021	Clinker storage	Fugitive dust

Table 2.5 Summary of Schedule 5 notifications for 2021 for releases to air from fugitive emissions

2.2. Emissions to Water

The discharges to water from the installation are via emission point W1.

There were no emission breaches from emission point W1 during 2021

2.3. Other Releases

In addition to the releases already stated, two small fires were reported in 2021. The first was in the SRF feed system and the second was on the tertiary air damper. Both were swiftly dealt with.

2.4. Compliance

In 2021 there were 20 notifications of non-compliance via Schedule 5 Notifications. Table 2.6 shows this in context with previous year's levels.

Year	Notifications
2006	134
2007	89
2008	40
2009	22
2010	11
2011	23
2012	17
2013	9
2014	3

2015	9
2016	7
2017	14
2018	15
2019	11
2020	8
2021	20

Table 2.6 Summary of total notifications since 2006.

In depth descriptions of each of non-conformance have been provided to NRW through the Part A & Part B notifications which were sent following the incidences.

3. Condition 4.2.2 (b)

The total substitute fuels burned in 2021 are displayed in the table below.

Parameter	Total Value	Units
Total Substitute Fuels Burned	Confidential	Tonnes
Total Hazardous Substitute Fuels Burned	Confidential	Tonnes

4. Condition 4.2.2 (c)

This report is produced using the standard NRW Annual WID Report template and is included in the following pages.

Annual Performance Report for Hanson Cement Padeswood Works: 2019

This report is required under the Waste Incineration Directive (WID) Article 12(2): - requirements on access to information and public participation. This requires the operator of an incineration or co-incineration plant to produce an annual report to the Regulator on the functioning and monitoring of the plant and to make this available to the public. To satisfy the requirements of the Directive the following information is provided:

1 Introduction

Name of company	Castle Cement Limited (trading as Hanson Cement)
Name of plant	Padeswood Works
Permit number	EPR/BL1096IB
Address	Padeswood, Mold, Flintshire, CH7 4HB.
Telephone	01244 550330
Contact name	Mr Stewart Mitchell
Position	Quality and Environment Manager
Further information	<p>There was one operational kiln at the Padeswood Works in 2021. This kiln is authorised to burn Cemfuel®, Profuel®, SRF, MBM and chipped tyres as kiln fuels in addition to more traditional fossil fuels such as coal, petcoke and kerosene. Coal and petcoke may originate anywhere in the world.</p> <p>Cemfuel® is manufactured from a range of waste streams including spent solvents, paint and ink residues, spent carbon absorbers and waste oils. The individual waste producers are located around the UK. Cemfuel® is produced specialist waste management companies via a number of processes including distillation, fractionation, grinding, melting, dissolving, filtering and blending.</p> <p>Profuel® is solid fuels produced to a tight specification. It is non-hazardous and produced from wastes such as paper, board, offcuts and scrap supplied by Manufacturers. Also includes mixed fibres/plastic from Waste Processors.</p> <p>SRF is non hazardous waste produced from sorted residual wastes by mechanical and biological treatment. The SRF is shredded to typically less than 50mm size by the suppliers.</p> <p>MBM (Meat and bone Meal) is supplied from several sources in mainland Britain and Ireland.</p> <p>Chipped tyres are derived from scrap tyres and supplied by a processing facility in Manchester. None were used in 2021.</p>

Copies of this report can be obtained via the Public Register.

2 Plant description

The principal purpose of the activities at the installation is to manufacture cement.

Limestone, the main raw material, is extracted from a local quarry. This material is then crushed at the quarry in a dedicated crushing plant to a size of 95% no larger than 75 mm. The crushed stone is transported by road to the cement works where it is dried and crushed in a vertical roller mill with other minor components such as sand and pulverised fuel ash (PFA) to produce raw meal, a fine powder that is the feedstock for the cement kiln.

The raw meal is conveyed to the top of the pre heater tower. The meal is heated by the exhaust gases from the kiln as it passes down the tower until it reaches the calciner. This is a combustion chamber located between the kiln inlet and the bottom stage cyclone in which approximately 60% of the thermal energy required for the kiln is input. In the calciner the material temperature reaches ca. 900°C which results in most of the carbon dioxide in the limestone being driven off, a process called calcination. Fuels permitted to be burned in the calciner are coal, petcoke, chipped tyres, SRF, MBM and Profuel®.

The calcined material enters the kiln, which is a slightly inclined tube rotating at approximately three revolutions per minute. As the kiln rotates the material moves down to the discharge end undergoing a series of complex reactions to produce cement clinker. To complete the required chemical reactions the material must reach a temperature in the region of 1450°C. The thermal energy required at this point is supplied via the kiln burner, a co-axial pipe that is permitted to use coal, petcoke, Cemfuel®, SRF, MBM and Profuel®. The heated material leaves the kiln and is cooled to control the chemical reactions; the heat recovered is used as combustion air in the kiln and calciner. The cooled clinker is then directed to a purpose built store for later grinding in the cement mills.

The clinker is transported from the storage facility by a series of conveyor belts and transferred to the cement mill feed hoppers. The clinker is dosed, along with gypsum, limestone and other minor additives which control the properties of the finished cement, to the cement mills. There are four cement mills, which grind the material to a required fineness. Each mill is equipped with fabric filters which minimise releases of dust to air. Upon exiting the mills cement is transported pneumatically to storage silos before being despatched in bulk road tankers.

A packing facility is also operational at the works which allows the packing of the final cement into either 25kg paper or plastic bags.

3 Summary of plant operation

3.1 Plant details.

One cement kiln with the capacity to burn waste materials operates on site: for historic reasons this is known as kiln 4.

3.2 Annual waste throughputs.

The amount of waste burned in 2021 is summarised in the table 3.2 below.

Waste type	EWC code	Tonnes used
Cemfuel®	19 02 08	Confidential
SRF	19 12 10	Confidential
MBM	02 02 03	Confidential

Table 3.2: Amount of waste burned in 2021

3.3 Operational hours

The total hours of operation of the kiln and the total tonnage of cement clinker produced in 2021 is summarised in the table below.

Equipment	Annual production 2021	Operational hours 2021
Kiln 4	Confidential	Confidential

The annual shutdown of the kiln took place from the beginning of 1st January to 28th January during which time the major maintenance to the plant took place. There was also a minor planned shutdown in June detailed in the table below.

Start	Stop	Comments
09/01/2021	05/02/2021	Planned shutdown
31/07/2021	18/08/2021	Planned shutdown

Table 3.3, Planned shutdown periods 2021

3.4 Residues

The only residue which is produced by the kiln is bypass dust.

1,345 tonnes of bypass dust was sent off-site in 2021 for use as either as a land conditioning product or for further treatment.

4 Summary of plant monitoring.

4.1 Pollutants measured.

Emissions from kiln 4 main stack (point A8) are monitored continuously for particulate matter, carbon monoxide, sulphur dioxide, hydrogen chloride, oxides of nitrogen, total organic carbon and ammonia. In addition to the continuous monitoring, periodic monitoring is carried out for hydrogen fluoride, a range of metals, persistent organic pollutants, and other more volatile organic species. The following summarises the emissions measured and the frequency.

Pollutants Measured	Continuously	Periodically
Particulate matter	✓	
Total Organic Carbon (TOC)	✓	
Hydrogen chloride	✓	
Carbon monoxide	✓	
Sulphur dioxide	✓	
Oxides of nitrogen (NO & NO ₂ expressed as NO ₂)	✓	
Ammonia	✓	
Hydrogen fluoride		✓
Cadmium & thallium and their compounds (total)		✓
Mercury and its compounds		✓
Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)		✓
Dioxins / furans (I-TEQ)		✓
Dioxins / furans (WHO-TEQ) Humans / Mammals / fish / birds.		✓

Table 4.1, Emissions measured from A8 and the frequency

4.2 Availability of continuous emissions monitors.

The percentage of time during the year when the kiln was in operation that the continuous emission monitors were operating normally is summarised in the table below.

Continuous emission monitor	% Time operating normally
Particulates	100
Carbon monoxide	99.8
Sulphur dioxide	99.8
Oxides of nitrogen	99.8
Ammonia	99.8
Hydrogen chloride	99.8
Total organic carbon	99.8

Table 4.2, Emission monitors operating percentage

4.3 Summary of Continuous Emissions Monitor data.

Continuous emission data is submitted monthly to the Natural Resources Wales. This information is required by permit EPR/BL1096 and provides the daily average emission concentration for the month, the maximum daily mean concentration, the number of days in the month the relevant limit was exceeded for each pollutant and the number of invalid hours.

A summary of emission data is shown graphically and in tabulated form in Appendix 1

4.4 Results of periodic monitoring.

Results of periodic monitoring of emissions are shown in the table below

Substance / Parameter	Emission Limit Level	Result /Nm ³		Test Method ⁽²⁾
		First 6 Months	Second 6 Months	
Hydrogen Fluoride	1mg/Nm ³ over minimum 1 hour period	<0.024 mg/Nm ³	<0.023 mg/Nm ³	ISO 15713
Cadmium & thallium and their compounds (total)	0.05mg/Nm ³ over minimum 30 min, max 8 hr period	0.0019 mg/Nm ³	0.0006 mg/Nm ³	EN 14385
Mercury and its compounds	0.05mg/Nm ³ over minimum 30 min, max 8 hr period	0.026 mg/Nm ³	0.051 mg/Nm ³	EN 13211
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, and V and their compounds (total)	0.5mg/Nm ³ over minimum 30 min, max 8 hr period	0.021 mg/Nm ³	0.0098 mg/Nm ³	EN 14385
Dioxins / Furans (I-TEQ) ⁶	0.1ng/Nm ³ over minimum 6hr, max 8 hr period	0.016 ng/Nm ³	0.008 ng/Nm ³	EN 1948
Dioxins / Furans (WHO – TEQ Humans/ Mammals) ⁶	No Limit	0.014 ng/Nm ³	0.0079 ng/Nm ³	EN 1948
Dioxins / Furans (WHO – TEQ Fish) ⁶	No Limit	0.013 ng/Nm ³	0.0087 ng/Nm ³	EN 1948
Dioxins / Furans (WHO – TEQ Birds) ⁶	No Limit	0.08 ng/Nm ³	0.021 ng/Nm ³	EN 1948

Table 4.4, Results of periodic monitoring of emissions 2021

5 Summary of plant compliance.

For continuously monitored emissions from the kiln 4 stack (Point A8) the plant met its total organic carbon, carbon monoxide, sulphur dioxide, hydrogen chloride, ammonia, and particulate matter emission limit values (ELV's) 100% of the time. Two breaches were reported for NOx achieving a 99% compliance against the NOx ELV.

The result of the second 6 months testing for mercury and its compounds was above the ELV on emission point A8. This breach was reported using a schedule 5 notification.

6 Summary of plant improvements.

There were no improvement conditions relating to the burning of waste materials due in 2021.

Summary of information made available.

Monthly emission data reported to the Natural Resources Wales is published in the public register. The register is held at the following address:

Natural Resources Wales
Chester Road
Buckley
Mold
CH7 3AJ

Hanson Cement Liaison Committee meetings are held quarterly on the second Monday of the month. This meeting provides a forum for local residents, local groups and elected representatives of local parish and District councils to discuss matters of concern with the company. Representatives of Natural Resources Wales also attend this meeting.

Hanson Cement operates an 'open door' policy enabling members of the public to contact the company to arrange a visit to the site or obtain information. The company can be contacted by the following methods:

By post: Hanson Cement, Padeswood Works, Padeswood, Mold, Flintshire, CH7 4HB.

By e-mail: enquiries@hanson.com

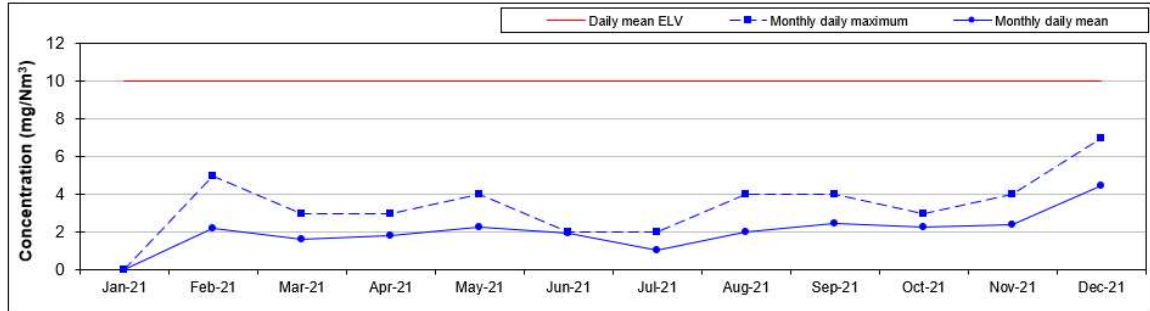
By telephone: 01244 550330

Appendix 1

The graphs show the annual emission to air of the continuously monitored pollutants:

Particulate matter.

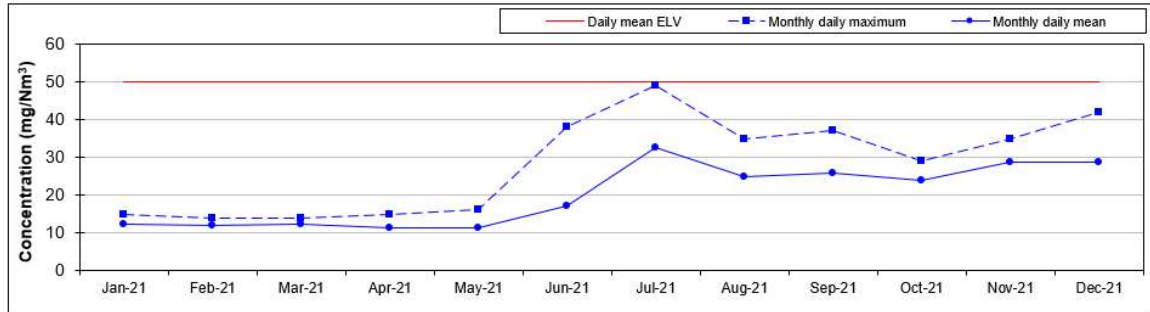
Pollutant: Particulate Matter



Annual Summary			Month	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
Daily mean	Daily mean ELV			10	10	10	10	10	10	10	10	10	10	10	10
	Annual daily maximum	7	Monthly daily maximum	0	5	3	3	4	2	2	4	4	3	4	7
	Annual daily mean	2	Monthly daily mean	0	2	2	2	2	2	1	2	2	2	2	4
Exceedences															
Daily Limit				0	0	0	0	0	0	0	0	0	0	0	0

TOC as total organic carbon.

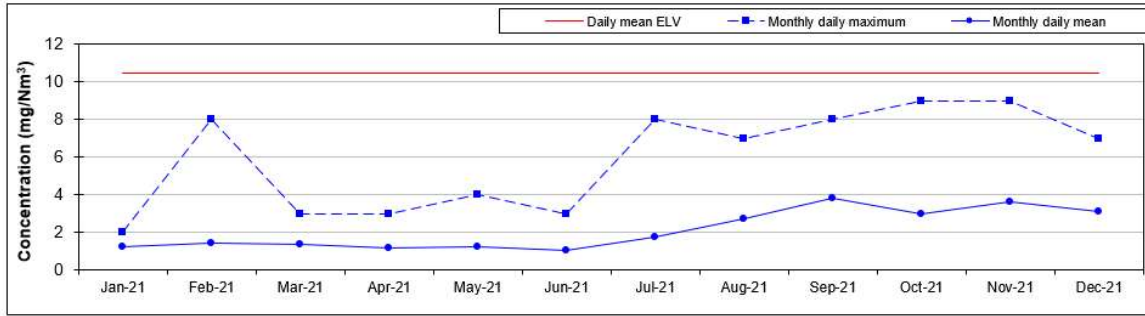
Pollutant: TOC



Annual Summary			Month	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
Daily mean	Daily mean ELV			50	50	50	50	50	50	50	50	50	50	50	50
	Annual daily maximum	49	Monthly daily maximum	15	14	14	15	16	38	49	35	37	29	35	42
	Annual daily mean	20	Monthly daily mean	12	12	12	11	11	17	33	25	26	24	29	29
Exceedences															
Daily Limit				0	0	0	0	0	0	0	0	0	0	0	0

Hydrogen chloride.

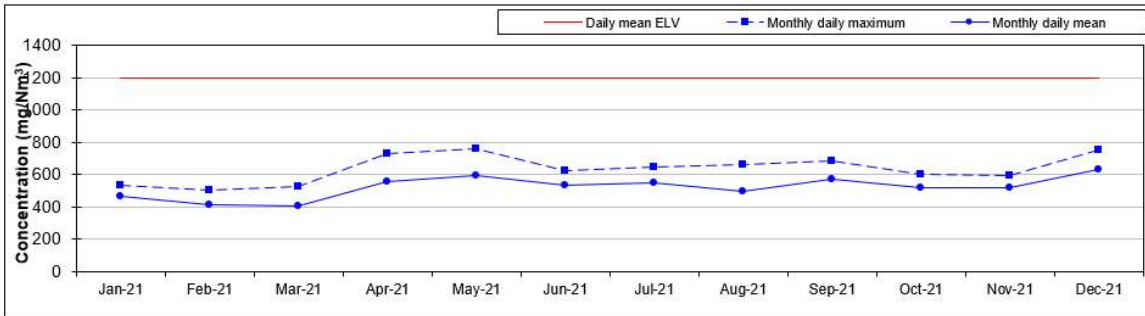
Pollutant: HCL



Annual Summary		Month	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
Daily mean		Daily mean ELV	10	10	10	10	10	10	10	10	10	10	10	10
	Annual daily maximum	9	2	8	3	3	4	3	8	7	8	9	9	7
	Annual daily mean	2	1	1	1	1	1	1	2	3	4	3	4	3
Exceedences														
Daily Limit			0	0	0	0	0	0	0	0	0	0	0	0

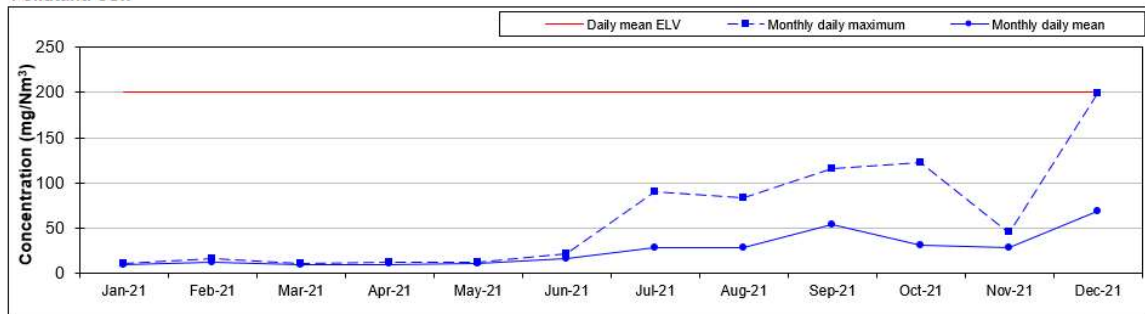
Carbon monoxide.

Pollutant: CO



Annual Summary		Month	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
Daily mean		Daily mean ELV	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	Annual daily maximum	758	535	504	525	734	758	625	650	660	687	602	593	750
	Annual daily mean	534	469	412	408	558	595	534	552	496	574	519	522	631
Exceedences														
Daily Limit			0	0	0	0	0	0	0	0	0	0	0	0

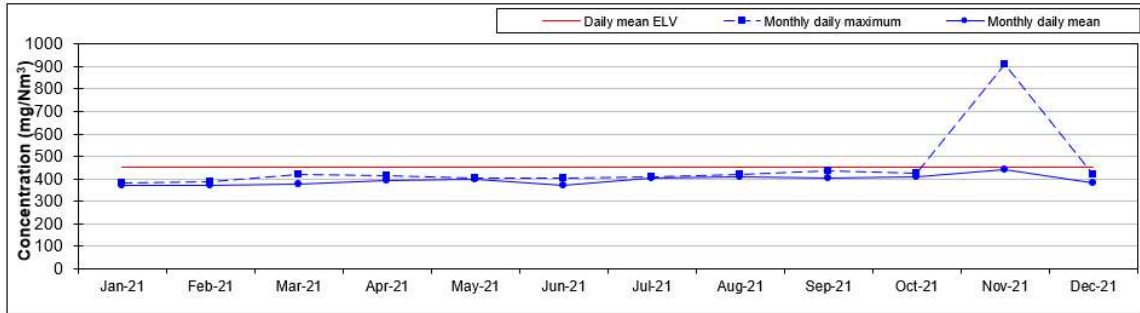
Sulphur dioxide.

Pollutant: SO_x

Annual Summary		Month	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
Daily mean		Daily mean ELV	200	200	200	200	200	200	200	200	200	200	200	200
	Annual daily maximum	199	10	16	11	12	12	22	90	84	116	122	45	199
	Annual daily mean	27	10	11	10	10	10	17	28	28	53	31	28	68
Exceedences														
Daily Limit			0	0	0	0	0	0	0	0	0	0	0	0

Oxides of nitrogen.

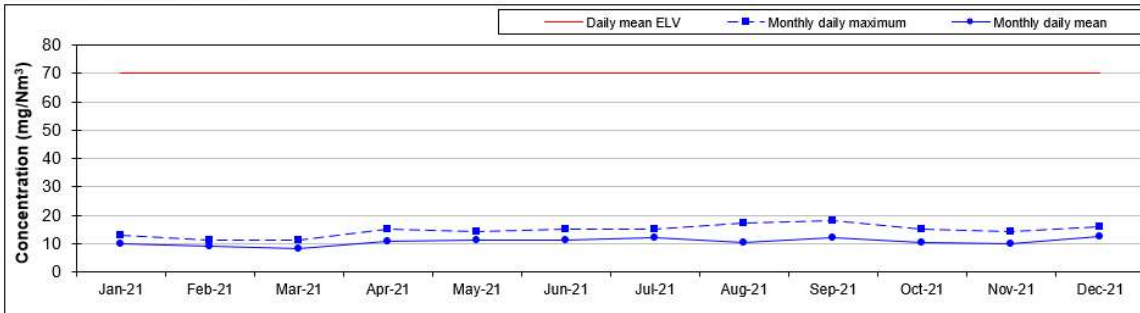
Pollutant: NOx



	Annual Summary		Month	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
Daily mean			Daily mean ELV	450	450	450	450	450	450	450	450	450	450	450	450
	Annual daily maximum	909	Monthly daily maximum	380	386	419	415	402	405	411	418	438	425	909	418
	Annual daily mean	395	Monthly daily mean	371	373	377	394	399	373	403	409	401	407	440	383
Exceedences															
Daily Limit				0	0	0	0	0	0	0	0	0	0	2	0

Ammonia , NH3

Pollutant: Particulate Matter



	Annual Summary		Month	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
Daily mean			Daily mean ELV	70	70	70	70	70	70	70	70	70	70	70	70
	Annual daily maximum	18	Monthly daily maximum	13	11	11	15	14	15	15	17	18	15	14	16
	Annual daily mean	11	Monthly daily mean	10	9	8	11	11	11	12	10	12	10	10	12
Exceedences															
Daily Limit				0	0	0	0	0	0	0	0	0	0	0	0