Hanson Cement, Padeswood Works

Annual Report as required by

Condition 4.2.2

Permit EA/EPR/BL1096IB/V011

For Calendar year 2014

1 Introduction

Condition 4.2.2 of PPC Permit BL1096 requires an annual performance report. This condition is specified in Variation V011:

4.2.2 A report or reports on the performance of the activities over the previous year shall be submitted to the Natural Resources Wales by 31 January (or other date agreed in writing by the 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 functioning and monitoring of the plant involved with the burning of waste derived fuels, in a format agreed with the Natural Resources Wales. The report shall, as a minimum requirement (as required by Article 12(2) of the Waste Incineration Directive) give an account of the running of the process and the emissions into air and water compared with the emission standards in the WID.

Note this replaces the requirements of the previous permit variations up to V050. An application to surrender the landfill section of the Permit was made on 18th December 2009 and the condition reported above replaces Condition 4.2.1 of previous permits and therefore no reporting will be made here on the landfill.

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). These are covered in some detail in the response to condition 4.2.1 (b).

The cement mills and associated equipment (emission points A3 to A7) and the kiln cooler (emission point A9) are the remaining major sources of emissions to air. The permit also includes emission limits and specific monitoring standards for these emission points.

Table 2.1 provides a summary of performance of these emission points based on the monitoring data collected during 2014.

Permit Reference	Description	Daily Average Limit (mg/m^3)	Annual Mean (mg/m^3)	Standard deviation	Predicted 99.7% compliance
A3	Cement Mill 1	30	Not used in 2014		
A4	Cement Mill 2	30	Not used in 2014		
A5	Cement Mill 3	30	7.76	5.09	23.0
A6	Cement Mill 4	30	0.26	0.74	2.5
A7	Cement Mill 4 classifier	30	10.93	4.78	25.3
A9	Clinker Cooler	50	5.7	6.16	24.2

Table 2.1 Summary of emissions for air monitoring points other than A8 for 2014.

The “Predicted 99.7% compliance” value is a statistical estimate of a limit value that 99.7% (or 997 out of every 1000) monitored results would be compliant.

There were no breaches from mill 3 or 4 filters, or mill 4 classifier 2014

There were a total of 3 notifications of unauthorised releases or breaches to air from the site in 2014 which are summarised in table 2.2. These are discussed again in the response to condition 4.2.2 (b) where appropriate but a similar summary follows:

Type	**Short Description**	**Date of Notification**
Limit Breach	VOC breach 51mg/Nm^3 against limit of 50 mg/Nm^3	13/04/2014
Dust	Fugitive dust from raw mill outlet air slide	02/09/2014
Limit Breach	NO_x breach 513 mg/Nm^3 against limit of 500 mg/Nm^3	06/09/2014

Table 2.2 Summary Part A notifications for 2014 for releases to air.

There was one fugitive dust release that resulted in a reportable incident. Approximately 50kg of material was ejected from the raw mill outlet airside when a blockage caused material to back up and overflow. The raw mill system was stopped on detection and blockage cleared.

There were 2 limit breaches from the kiln stack (monitoring point A8). The first was a VOC limit breach and the second from NOx.

The VOC breach is linked to naturally occurring organics within the limestone and on this occasion material from two areas of the quarry created a blend with a higher than expected carbon content.

The NOx breach was linked to the SNCR system. Due to other events a Control Room Operator failed to notice the SNCR system was not operational. As soon as it was noticed the system was restarted but the algorithm used to reduce NOx was not aggressive enough to reduce the 24hr emissions to below the daily limit.

There were no limit breaches from the cooler stack (A9) or the cement mills (A3-A7) in 2014.

2.2 Emissions to Water

The discharges to water from the installation are via emission point W1. There were no limit breaches in 2014.

2.3 Noise

There was a permit variation in September 2014 that has removed the boundary noise limits and monitoring requirements.

2.4 Compliance

In 2014 there were 3 notifications of non-compliance via Schedule 6 Notifications. Table 2.3 shows this in context with previous year's levels. Brief details of the 2014 notifications are provided in 4.2.2 (b)

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

Table 2.3 Summary of total notifications since 2006.

3 Condition 4.2.2 (b)

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

Annual Performance Report for Hanson Cement Padeswood Works: 2014

Permit Number EA/EPR/BL1096IB/V011

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 (currently trading as Hanson Cement)
Name of plant	Padeswood Works
Permit number	EA/EPR/BL1096IB/V011
Address	Padeswood, Mold, Flintshire, CH7 4HB.
Telephone	01244 550330
Contact name	Miss Victoria Smith
Position	Works Chemist
Further information	There was one operational kiln at the Padeswood Works in 2014. 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. 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. Profuel® and SRF are solid fuels produced to a tight specification. Non-hazardous, it is produced from wastes such as paper, board, offcuts and scrap supplied by Manufacturers. Also includes mixed fibre/plastic from Waste Processors. MBM (Meat and bone Meal) is supplied from several sources in mainland Britain and Ireland. Chipped tyres are derived from scrap tyres and supplied by a processing facility in Manchester. None were used in 2014.

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^{o}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^{o}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 although only two were in operation in 2014, each ball mill is equipped with fabric filters to minimise releases of dust to air. The cement is transported pneumatically to storage silos before being despatched in bulk road tankers. The packing facility was mothballed in August 2009 following a restructure at the Works in response to the downturn in the construction industry.

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. The kiln is rated to produce *ca.* 1,000,000 tonnes per annum of cement clinker, although the actual production would be closer to 900,000 tonnes per annum inclusive of plant shutdowns.

The tonnage of cement produced is dependent on the clinker incorporation in the final product but approximates to 10% greater than the clinker production.

3.2 Annual waste throughputs.

The amount of waste burned in 2014 is summarised in the table below.

Waste type	EWC code	Tonnes used
Cemfuel®	19 02 08	12,096
MBM	02 02 03	8,621
SRF	19 12 10	16,816

Table 3: Amount of waste burned in 2014

3.3 Operational hours

The total hours of operation of the kiln and the total tonnage of cement clinker produced in 2014 is summarised in the table below.

Equipment	Annual production 2014	Operational hours 2014
Kiln 4	Confidential	Confidential

The annual shutdown of the kiln took place from the beginning of 1st January to 7th February during which time the major maintenance to the plant took place. Clinker production took place from 8th February to 9th March, with one 2 day stop. 16th March to 15th May, with three one day pauses is clinker production. 25th May to 21st July, with two 3 day stops in production. 7th August to 30th October with two 1 days pauses and final production run 11th November to 30th December with one 1 day and one 2 day stops.

3.4 Residues

The only residue which is produced by the kiln is bypass dust. 2369 tonnes of bypass dust was sent off-site in 2014 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, and total organic carbon. 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	✓	
VOC's as total organic carbon	✓	
Hydrogen chloride	✓	
Carbon monoxide	✓	
Sulphur dioxide	✓	
Oxides of nitrogen	✓	
Hydrogen fluoride		✓
Cadmium & thallium and their compounds (total)		✓
Mercury and its compounds		✓
Zinc and its compounds		✓
Group III metals* & their compounds		✓
Dioxins and furans		✓
Dioxin-like polychlorinated biphenyls (PCB's)		✓
Polycyclic aromatic hydrocarbons (PAH's)		✓
Benzene		✓
1,3-butadiene		✓

Table 4.1, Emissions measured from A8 and the frequency

** Group III metals as defined in the most recent variations of PPC Permit BL1096 are antimony, arsenic, chromium, cobalt, copper, lead, manganese, nickel and vanadium.*

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	99.8
Carbon monoxide	99.8
Sulphur dioxide	99.8
Oxides of nitrogen	99.8
Hydrogen chloride	99.8
Total organic carbon	99.8

Table 4.2, Emission monitors operating percentage

There were no substantial issues with the CEMs monitors during 2014.

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 EA/EPR/BL1096/V011 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 (routine biannual monitoring only – additional fuel trial data was accumulated and reported separately).

Pollutants Measured	**Unit**	**1st half 2014**	**2nd half 2014**
Hydrogen fluoride	mg/Nm^3	<0.021	<0.023
Cadmium & thallium & their compounds (total)	mg/Nm^3	0.0020	0.00042
Mercury and its compounds	mg/Nm^3	0.0099	0.0063
Zinc and its compounds	mg/Nm^3	0.014	0.0052
Group III metals* & their compounds	mg/Nm^3	0.036	0.041
Dioxins / Furans (I-TEQ)	ng/Nm^3 (Min-Max)	0.0099 to 0.012	0.010 to 0.011
Dioxins / Furans (WHO – TEQ Mammals)	ng/Nm^3 (Min-Max)	0.0078 to 0.010	0.0094 to 0.010
Dioxins / Furans (WHO – TEQ Fish)	ng/Nm^3 (Min-Max)	0.0090 to 0.012	0.011 to 0.011
Dioxins / Furans (WHO – TEQ Birds)	ng/Nm^3 (Min-Max)	0.020 to 0.023	0.017 to 0.018
Dioxin – like PCBs (WHO – TEQ Humans/ Mammals)	ng/Nm^3 (Min-Max)	0.000058 to 0.00016	0.00085 to 0.00085
Dioxin – like PCBs (WHO – TEQ Fish)	ng/Nm^3 (Min-Max)	0.0000020 to 0.0000082	0.000041 to 0.000041
Dioxin – like PCBs (WHO – TEQ Birds)	ng/Nm^3 (Min-Max)	0.00087 to 0.0012	0.0018 to 0.0018
Polycyclic aromatic hydrocarbons (PAH's)	mg/Nm^3	0.161	0.0489
Benzene	mg/Nm^3	1.55 (mean of two results)	3.4 (mean of two results)
1,3-butadiene	mg/Nm^3	<0.24 (mean of two results)	0.71 (mean of two results)

Table 4.4, Results of periodic monitoring of emissions

** Group III metals as defined in the most recent variations of PPC Permit BL1096 are antimony, arsenic, chromium, cobalt, copper, lead, manganese, nickel and vanadium.*

5 Summary of plant compliance.

For continuously monitored emissions from the kiln 4 stack (Point A8) the plant met its particulate matter, sulphur dioxide, HCl and carbon monoxide emission limit values (ELV's) 100% of the time.

There was one exceedence of the daily ELV for oxides of Nitrogen, which equates to the plant meeting the daily ELV 99.6% of the time. The NOx breach was linked to the SNCR system. Due to other events ongoing at the time a Control Room Operator failed to notice the SNCR system was none operational. As soon as it was noticed the system in fault it was restarted but the algorithm used to reduce NOx was not aggressive enough to reduce the 24hr emissions to below the daily limit. A warning message has been added to the control system that flags failures of the SNCR after a set period of time.

There was also one exceedence for volatile organic carbon which equated to 99.6% compliance. This was caused by variations in the naturally occurring organic materials within the limestone coming from the quarry a blending plan was in place at the time but the variation in quality was greater than expected causing more impact that indicated from the analysis available. The blend was altered when the increase was noticed but took a period of time for the changed blend to work through the plant.

There were no further breaches to emission limits for A8: extractive monitoring and therefore 100% compliance.

Also there were no limit breaches for discharge point (W1) again equating to a compliance of 100%.

In addition to the non-compliances resulting from exceedences of the ELV's discussed above one further Schedule 6 Notifications (Part A's) was submitted to NRW

- Approximately 50kg of material was ejected from the raw mill outlet airside when a blockage caused material to back up and overflow causing a cover to lift and material to be expelled from the system. The raw mill system was stopped on detection of the spillage and the blockage cleared and appropriate repairs affected.

Padeswood received no warning letters or enforcement notices in 2014.

6 Summary of plant improvements.

Plant improvements carried out in 2014 included full Service of SRF, MBM and Cemfuel & coal systems, MBM available to main burner and enable loop control on calciner to improve the alternative fuels burning systems.

Replacement bags in the coal & cooler bag filters were installed and repairs made to the by-pass filter to assist in meeting emission limits from the main stack system. Mill 3 filter bags were also replaced in 2014.

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 and Public Health Wales also attend this meeting.

The 2014 Hanson UK Sustainability report can be downloaded via the website at www.heidelbergcement.com/uk/en/hanson/home.htm

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:

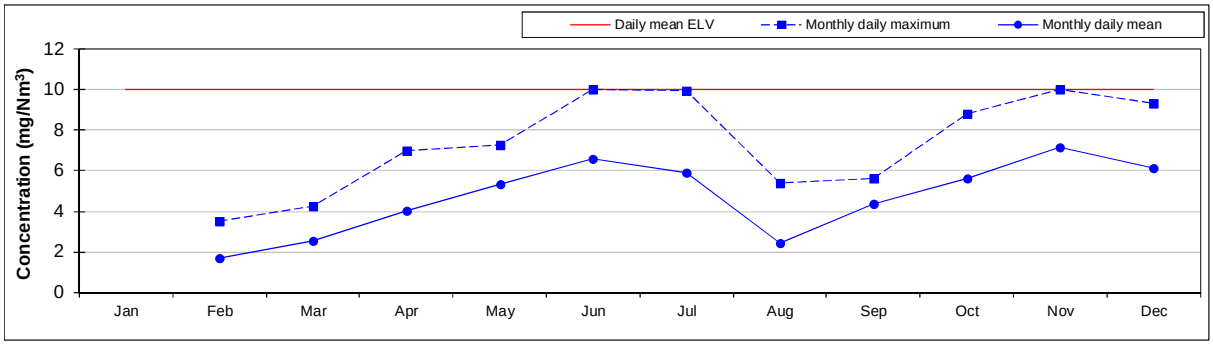
By post:	Hanson Cement, Padeswood Works, Padeswood, Mold, Flintshire, CH7 4HB.
By e-mail:	enquiries@hanson.com
By telephone:	01244 550330

Appendix 1

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

A1 Particulate matter.

Pollutant: Particulate Matter

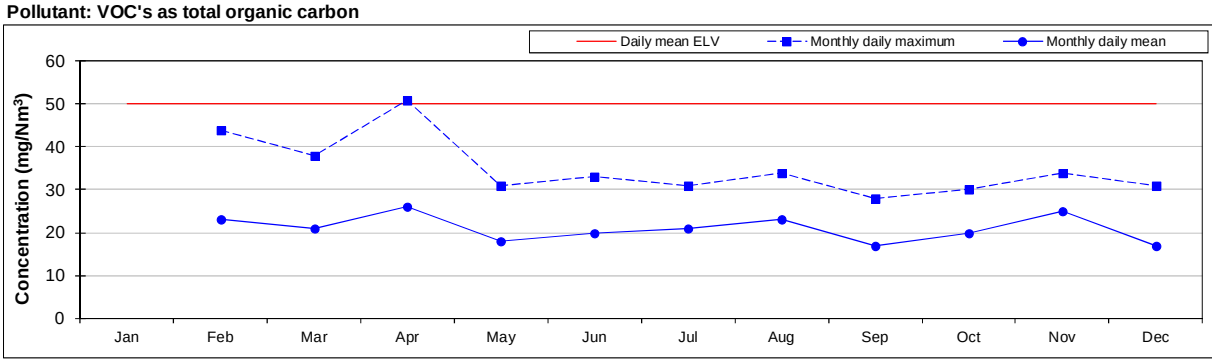


	Annual Summary		Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			Daily mean ELV	10	10	10	10	10	10	10	10	10	10	10	10
Daily mean	Annual daily maximum	10.00	Monthly daily maximum		3.5	4.2	7.0	7.3	10.0	10.0	5.4	5.6	8.8	10.0	9.3
	Annual daily mean	0.53	Monthly daily mean		1.7	2.6	4.0	5.3	6.6	5.9	2.4	4.4	5.6	7.2	6.2

Exceedences												
Daily Limit	0	0	0	0	0	0	0	0	0	0	0	0

A2 VOC's as total organic carbon.

Pollutant: VOC's as total organic carbon

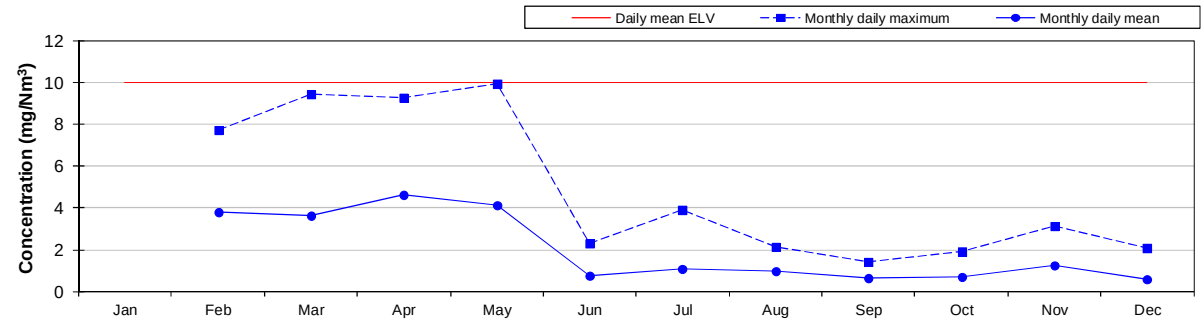


	Annual Summary		Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			Daily mean ELV	50	50	50	50	50	50	50	50	50	50	50	50
Daily mean	Annual daily maximum	51.0	Monthly daily maximum		44	38	51	31	33	31	34	28	30	34	31
	Annual daily mean	21.0	Monthly daily mean		23	21	26	18	20	21	23	17	20	25	17

Exceedences												
Daily Limit	0	0	0	1	0	0	0	0	0	0	0	0

A3 Hydrogen chloride.

Pollutant: Hydrogen chloride

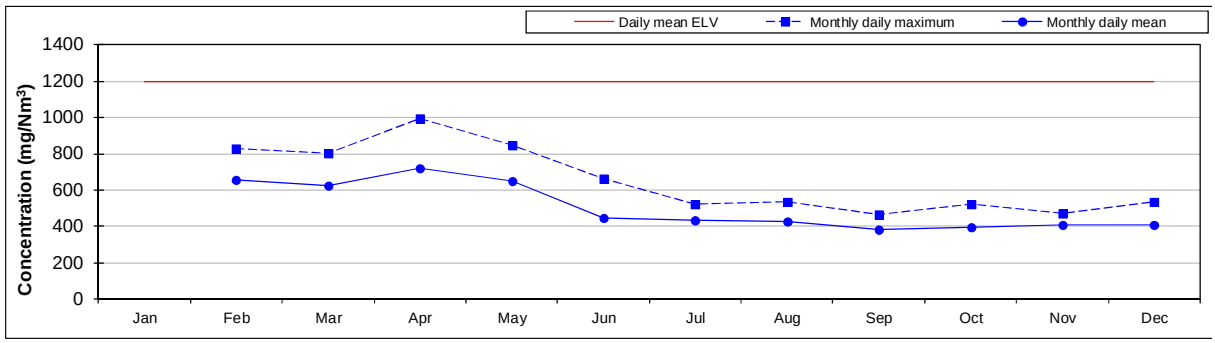


	Annual Summary		Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			Daily mean ELV	10	10	10	10	10	10	10	10	10	10	10	10
Daily mean	Annual daily maximum	10.0	Monthly daily maximum		7.7	9.4	9.3	10.0	2.3	3.9	2.1	1.4	1.9	3.1	2.1
	Annual daily mean	2.0	Monthly daily mean		3.8	3.6	4.7	4.2	0.8	1.1	1.0	0.7	0.7	1.3	0.6

Exceedences													
Daily Limit	0	0	0	0	0	0	0	0	0	0	0	0	

A4 Carbon monoxide.

Pollutant: Carbon monoxide

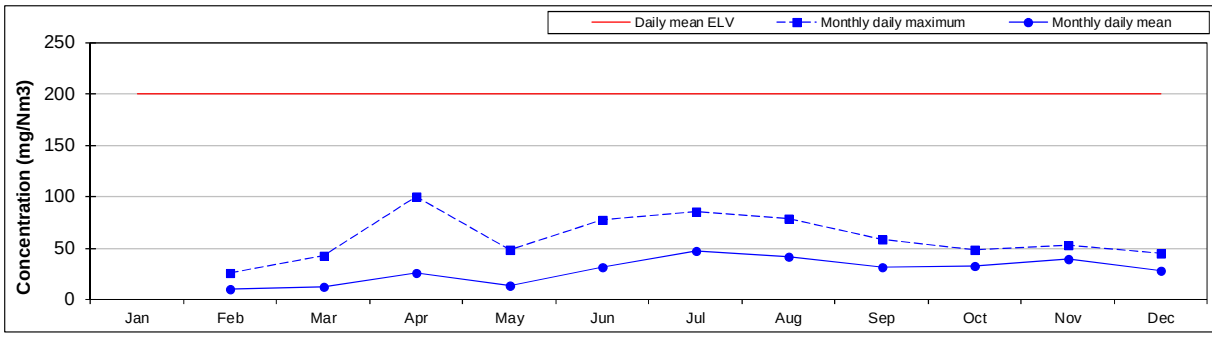


	Annual Summary		Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			Daily mean ELV	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
Daily mean	Annual daily maximum	991	Monthly daily maximum		826	802	991	849	664	521	538	468	524	475	535
	Annual daily mean	505	Monthly daily mean		654	627	719	650	448	436	431	384	394	406	406

Exceedences													
Daily Limit	0	0	0	0	0	0	0	0	0	0	0	0	

A5 Sulphur dioxide.

Pollutant: Sulfur Dioxide

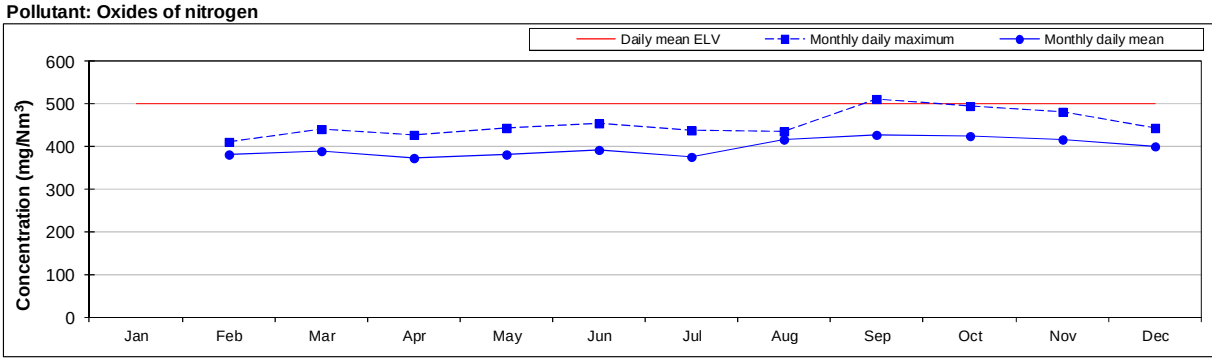


	Annual Summary		Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			Daily mean ELV	200	200	200	200	200	200	200	200	200	200	200	200
Daily mean	Annual daily maximum	100	Monthly daily maximum		26	43	100	48	78	86	79	59	48	53	45
	Annual daily mean	29	Monthly daily mean		10	12	26	13	32	47	42	32	33	39	28

Exceedences													
Daily Limit	0	0	0	0	0	0	0	0	0	0	0	0	

A6 Oxides of nitrogen.

Pollutant: Oxides of nitrogen



	Annual Summary		Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily mean			Daily mean ELV	500	500	500	500	500	500	500	500	500	500	500	500
	Annual daily maximum	513	Monthly daily maximum		411	442	429	445	455	439	437	513	495	482	445
	Annual daily mean	357	Monthly daily mean		382	389	375	382	394	377	416	427	424	418	402
			Exceedences												
			Daily Limit	0	0	0	0	0	0	0	0	1	0	0	0