Hanson Cement, Padeswood Works

Annual Report as required by

Condition 4.2.2

Permit EA/EPR/BL1096IB/V011

For Calendar year 2013

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 2013.

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 2013		
A4	Cement Mill 2	30	Not used in 2013		
A5	Cement Mill 3	30	7.55	5.35	23.6
A6	Cement Mill 4	30	0.33	0.72	2.5
A7	Cement Mill 4 classifier	30	4.52	3.22	14.2
A9	Clinker Cooler	50	9.50	10.21	40.1

Table 2.1 Summary of emissions for air monitoring points other than A8 for 2013.

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 2013

There were a total of 9 notifications of unauthorised releases or breaches to air from the site in 2013 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	NO_x breach 549 mg/Nm^3 against limit of 500 mg/Nm^3	28/02/2013
Limit Breach	NO_x breach 516 mg/Nm^3 against limit of 500 mg/Nm^3	07/07/2013
Limit Breach	HCl breach 13.5 mg/Nm^3 against limit of 10 mg/Nm^3	11/07/2013
Limit Breach	HCl breach 11.2 mg/Nm^3 against limit of 10 mg/Nm^3	18/07/2013
Dust	Kiln Over-pressurisation ~ 50-100kg	25/07/2013
Limit Breach	HCl breach 11.0 mg/Nm^3 against limit of 10 mg/Nm^3	19/09/2013
Limit Breach	VOC breach 54.0 mg/Nm^3 against limit of 50 mg/Nm^3	27/09/2013
Dust	Fugitive dust from Raw Meal silo ~150kg	10/10/2013
Dust	Fugitive dust from material drop in Preheater tower ~ 15 kg	16/11/2013

Table 2.2 Summary Part A notifications for 2013 for releases to air.

There were 3 dust and/or fumes releases during the year that resulted in reportable incidents. The largest was approximately 150 kg occurred when a recirculating screw snapped in the raw meal transport system. This caused a surge of material to build up and drop to the bottom of the Raw Meal silos, some of which was blown outside of the building causing a visible dust plume. The system was stopped and the spillage cleared.

The next largest fugitive dust incident was of approximately 100kg and occurred when a temperature probe on cyclone 5 failed which caused the control loop to reduce fuels and lead to instability in the system causing a short period of over pressurisation.

The final fugitive dust release was caused by cleaning operations in cyclone one, at the top of the preheater tower leading to a surge of material falling through the kiln system overwhelming the clinker transport. This was largely contained within the cooler building with a minimal escape to atmosphere.

There were 6 limit breaches from the kiln stack (monitoring point A8). These were HCl (3 occasions), NOx (2 instances) and VOC (1 breach). The HCl breaches were caused by the lack of additional raw mill scrubbing whilst undergoing maintenance.

The two NOx breaches are linked to the SNCR system. One resulted from a malfunction and the delay in obtaining parts for repair. The other has led to further works to improve its response to changing feed rates and fuels.

The VOC breach is linked to naturally occurring organics within the limestone and a review of the blending plan to take this into consideration was undertaken.

There were no limit breaches from the cooler stack (A9) or the cement mills (A3-A7) in 2013.

2.2 Emissions to Water

The discharges to water from the installation are via emission point W1. There were no limit breaches in 2013.

2.3 Noise

There was a permit variation in September 2013 that has removed the boundary noise limits and monitoring requirements. There were however no limit breaches for noise prior to this change

2.4 Compliance

In 2013 there were 9 notifications of non-compliance via Schedule 6 Notifications. Table 2.3 shows this in context with previous year's levels. Brief details of the 2013 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

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: 2013

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 2013. 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 2013.

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 2013, 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 2013 is summarised in the table below.

Waste type	EWC code	Tonnes used
Cemfuel®	19 02 08	14,512
MBM	02 02 03	3,210
SRF	19 12 10	12,435

Table 3: Amount of waste burned in 2013

3.3 Operational hours

The total hours of operation of the kiln and the total tonnage of cement clinker produced in 2013 is summarised in the table below.

Equipment	Annual production 2013	Operational hours 2013
Kiln 4	Confidential	Confidential

The annual shutdown of the kiln took place January during which time the major maintenance to the plant took place. Clinker production took place from last week in February until end of March. No clinker production was undertaken in April. The next production run was from 1st may through to 10th June followed by a two week stop. Production recommence from the 24th June through to 11th August. Following an 18 day stop production started again 30th August to 30th September. Another 10 day stop was then followed by production from 12th October through to end of December with 2 four days disruptions for essential maintenance.

3.4 Residues

The only residue which is produced by the kiln is bypass dust. Commissioning of the bypass system commenced during 2008 and was completed in 2009. 2688 tonnes of bypass dust was sent off-site in 2013 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	*99.2*
Total organic carbon	*99.8*

Table 4.2, Emission monitors operating percentage

There were no substantial issues with the CEMs monitors except for HCl which failed to zero and was out of use for a total of 16.5hrs.

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 2013**	**2nd half 2013**
Hydrogen fluoride	mg/Nm^3	<0.022	<0.021
Cadmium & thallium & their compounds (total)	mg/Nm^3	0.00037	0.00030
Mercury and its compounds	mg/Nm^3	0.040	0.0018
Zinc and its compounds	mg/Nm^3	0.0089	0.040
Group III metals* & their compounds	mg/Nm^3	0.0081	0.027
Dioxins / Furans (I-TEQ)	ng/Nm^3 (Min-Max)	0.015 to 0.015	0.026 to 0.026
Dioxins / Furans Mammals)	ng/Nm^3 (Min-Max)	0.013 to 0.014	0.025 to 0.025
Dioxins / Furans (WHO – TEQ Fish)	ng/Nm^3 (Min-Max)	0.015 to 0.016	0.028 to 0.028
Dioxins / Furans (WHO – TEQ Birds)	ng/Nm^3 (Min-Max)	0.029 to 0.030	0.049 to 0.049
Dioxin – like PCBs (WHO – TEQ Humans/ Mammals)	ng/Nm^3 (Min-Max)	0.0011 to 0.0011	0.0032 to 0.0032
Dioxin – like PCBs (WHO – TEQ Fish)	ng/Nm^3 (Min-Max)	0.00006 to 0.00006	0.00016 to 0.00016
Dioxin – like PCBs (WHO – TEQ Birds)	ng/Nm^3 (Min-Max)	0.0041 to 0.0041	0.0067 to 0.0067
Polycyclic aromatic hydrocarbons (PAH's)	mg/Nm^3	0.103	0.0351
Benzene	mg/Nm^3	1.75 (mean of two results)	1.95 (mean of two results)
1,3-butadiene	mg/Nm^3	0.59 (mean of two results)	0.20 (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 and carbon monoxide emission limit values (ELV's) 100% of the time.

There were two exceedences of the daily ELV for oxides of Nitrogen, which equates to the plant meeting the daily ELV 99.4% of the time. For the first of these the NO_x abatement system whilst broadly managing the levels failed to control within rapidly changing kiln conditions in the latter part of the day causing a breach of the limit. A more aggressive NO_x reduction recipe is now being used on the SNCR system.

In the second case a malfunction of the SNCR required parts to be sourced from a 3rd party as they were not available on site. It was not possible to run the SNCR system safely with this malfunction resulting in a limit breach.

There were three exceedences of the ELV for Hydrogen Chloride which equates to 98.4% compliance. HCl is an acidic gas which is efficiently removed by the high turbulence of the gas stream loaded with highly alkaline, fine, and reactive particles. This occurs mainly in the kiln and preheater system. Some HCl is carried over from the preheater and under normal operating conditions is scrubbed out by the limestone dust present in the raw mill which is produced by the crushing of the stone. In all cases because the mill was stopped, for routine maintenance, thus HCl was not reduced further. Work flows are being looked at to minimise mill down time and therefore length of time the reduced scrubbing occurs.

There was also one exceedence for volatile organic carbon which equated to 99.7% compliance. This was caused by variations in the naturally occurring organic materials within the limestone coming from the quarry. Increased awareness of this issue and alterations to the blending plans has reduced this effect.

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 a further 3 Schedule 6 Notifications (Part A's) were submitted to the EA/NRW

- There were 2 Part A notifications submitted for dust and / or fume releases from the kiln – cooler system. The largest of which was estimated at 100kg.
- This was due to instability in the pressure in the kiln system, resulting from a failed temperature probe and the control loop which reduced fuels to compensate, leading to a short period of positive pressure. This then caused minor emissions of dust/fumes. There is no evidence that the material emitted left site.
- The second mush smaller emission amounted to around 15kg and was caused when cleaning in the top cyclone, cyclone 1, dislodged material travelled down through the preheater and kiln system, overwhelming the clinker transport leading to spillage of hot material onto the cooler building floor. Some hot dust gas and fumes did leave the building but this dissipated rapidly.
- The largest dust emission estimated at 150kg was caused by a failure in the raw meal transport system that resulted in a surge of material dropping through the system and

venting to outside the silos. This system was immediately shut down for repairs and cleaning undertaken. Again there is no evidence that material left site.

Padeswood received no warning letters or enforcement notices in 2013.

6 Summary of plant improvements.

Plant improvements carried out in 2013 included works to the by-pass system for improved operation and installation of new pipework to assist in the return of filter dust to the tertiary air duct. Both of which improve dust handling within the kiln system reducing handling and cleaning.

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 change to quarterly after a unanimous vote during the first half of the year. 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 2013 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:

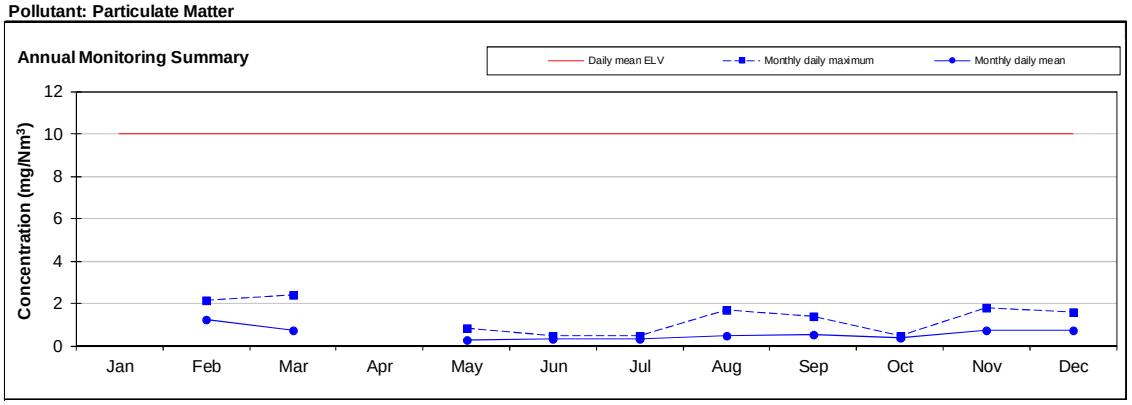
By post:	Hanson Cement, Padeswood Works, Padeswood, Mold, Flintshire, CH7 4HB.
By e-mail:	enquiries@hanson.com
By telephone:	01244 550330

Appendix 1

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

A1 Particulate matter.

Pollutant: Particulate Matter

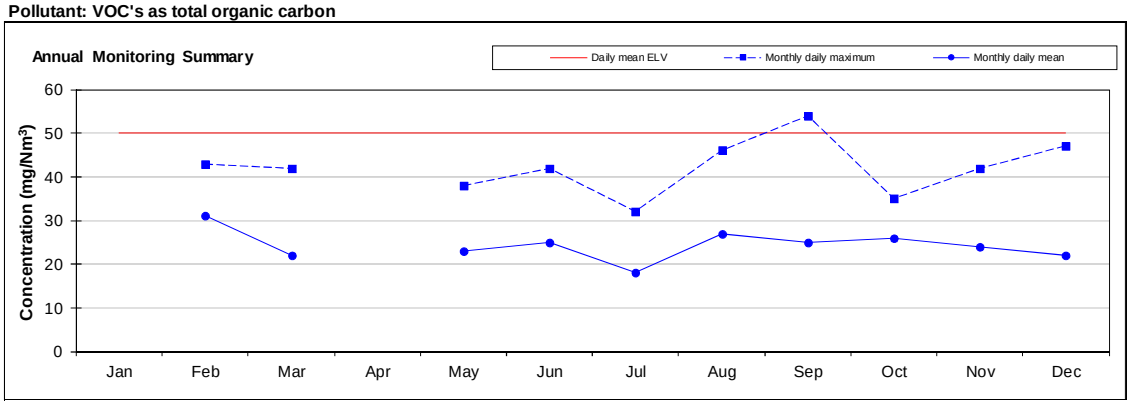


	Annual Summary		Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			Daily mean ELV	10	10	10	10	10	10	10	10	10	10	10	10
Daily mean	Annual daily maximum	2.41	Monthly daily maximum		2.14	2.41		0.85	0.47	0.49	1.71	1.37	0.49	1.82	1.58
	Annual daily mean	0.53	Monthly daily mean		1.24	0.72		0.30	0.34	0.31	0.50	0.52	0.37	0.72	0.72

Exceedences													
Daily Limit	0	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

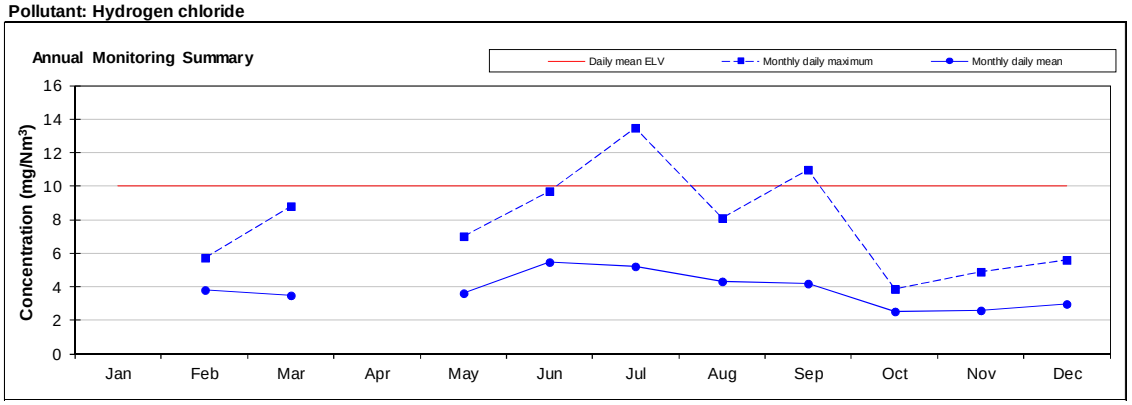


	Annual Summary		Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			Daily mean ELV	50	50	50	50	50	50	50	50	50	50	50	50
Daily mean	Annual daily maximum	54.0	Monthly daily maximum		43	42		38	42	32	46	54	35	42	47
	Annual daily mean	24.3	Monthly daily mean		31	22		23	25	18	27	25	26	24	22

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

A3 Hydrogen chloride.

Pollutant: Hydrogen chloride

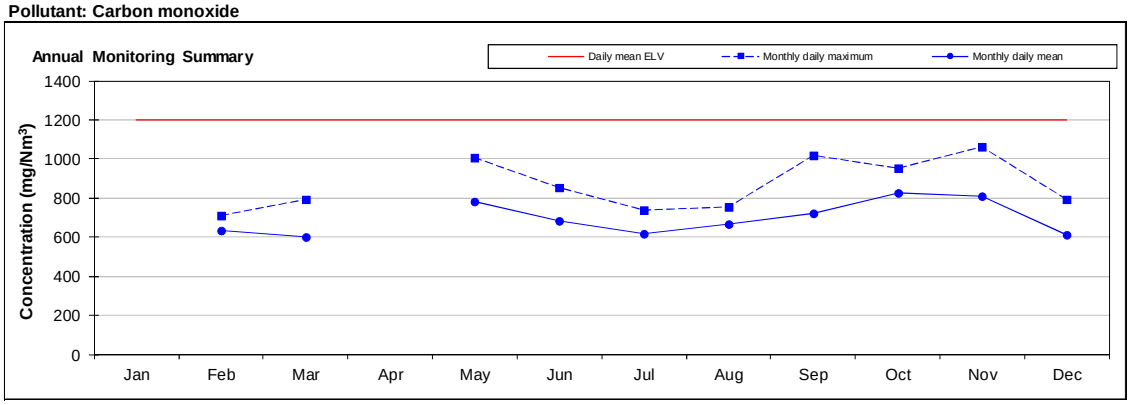


	Annual Summary		Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			Daily mean ELV	10	10	10	10	10	10	10	10	10	10	10	10
Daily mean	Annual daily maximum	13.5	Monthly daily maximum		5.7	8.8		7.0	9.7	13.5	8.1	11.0	3.9	4.9	5.6
	Annual daily mean	3.8	Monthly daily mean		3.8	3.5		3.6	5.5	5.2	4.3	4.2	2.5	2.6	3.0

Exceedences													
Daily Limit	0	0	0	0	0	0	2	0	1	0	0	0

A4 Carbon monoxide.

Pollutant: Carbon monoxide

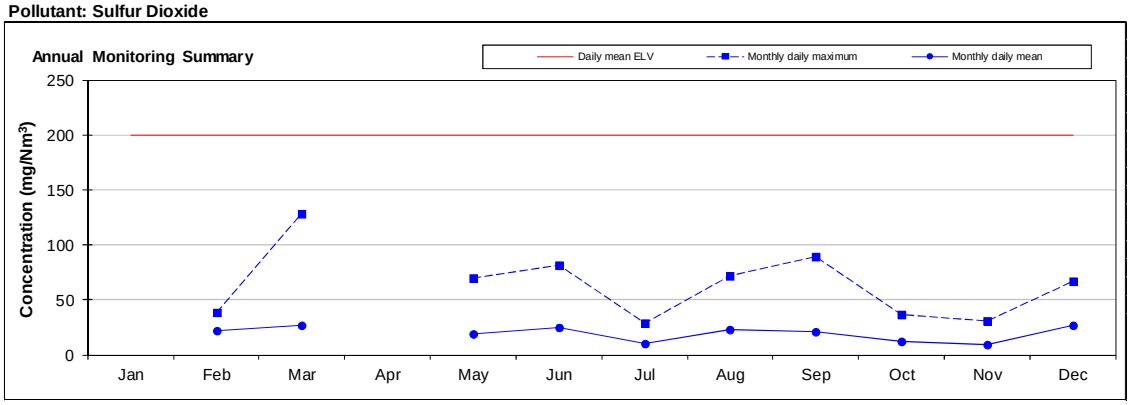


	Annual Summary		Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			Daily mean ELV	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
Daily mean	Annual daily maximum	1061	Monthly daily maximum		709	792		1008	855	736	755	1019	951	1061	791
	Annual daily mean	695	Monthly daily mean		633	600		781	684	619	666	723	826	808	610

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

A5 Sulphur dioxide.

Pollutant: Sulfur Dioxide

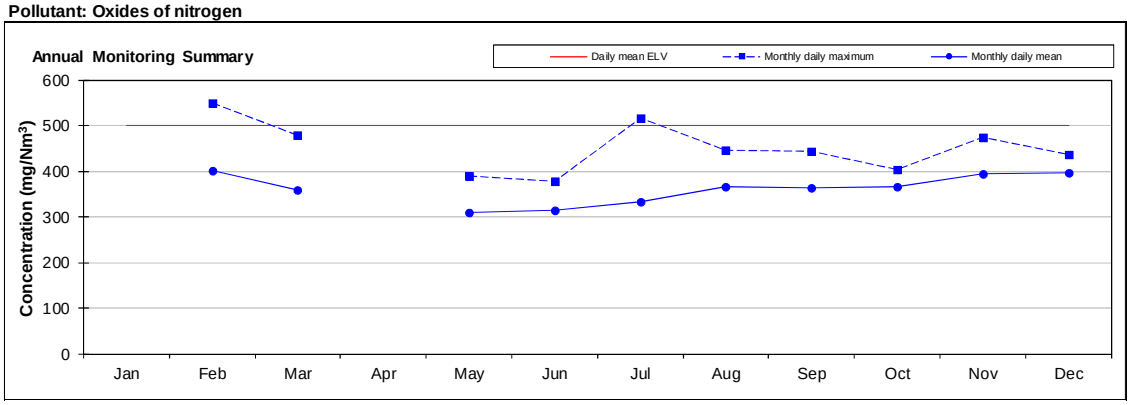


	Annual Summary		Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			Daily mean ELV	200	200	200	200	200	200	200	200	200	200	200	200
Daily mean	Annual daily maximum	128	Monthly daily maximum		39	128		70	82	29	72	89	37	31	67
	Annual daily mean	19	Monthly daily mean		22	27		19	25	10	23	21	12	9	27

Exceedences													
Daily Limit	0	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 ELV	500	500	500	500	500	500	500	500	500	500	500	500
Daily mean	Annual daily maximum	549	Monthly daily maximum		549	480		389	378	516	445	444	404	473	436
	Annual daily mean	357	Monthly daily mean		401	359		309	314	333	365	364	365	393	396

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