

2021 Annual Performance Report for

Tarmac Cement & Lime Ltd

Aberthaw Works

V2 31st January 2022

Daniel Bound
Environmental Coordinator
Tarmac Cement and Lime Aberthaw Works

Introduction

Tarmac Cement & Lime Ltd (the "Operator"), company registration number 66558, whose registered office is Portland House, Bickenhill Lane, Solihull, B37 7BQ operate a cement manufacturing installation at Aberthaw Cement Plant, East Aberthaw, Barry, CF62 3ZR.

The cement manufacturing activities carried out at the above installation are authorised by Permit EPR/BL3986ID issued by Natural Resources Wales, which includes permission to burn waste derived fuels (WDFs).

Condition 4.2.2 of the Permit requires the Operator to submit an annual performance report on the functioning and monitoring of the process. This report gives an account of the running of the process and the emissions into air and water compared with the emission standards in the permit.

Plant Description

The main purpose of the activities at the installation is the production and grinding of cement clinker to produce various cement products. Tarmac Cement & Lime operate one dry preheater process cement kiln at the Aberthaw site, which has the capacity to produce 565,000 tonnes of clinker per year. Tarmac Cement UK maintains registration to the ISO14001 environmental management system. Certification for ISO 50001 was achieved in November 2013.

Aberthaw Cement Plant uses traditional fossil fuels (coal, pet coke and oil) and waste derived fuels (WDFs) Polymer chip, end of life whole tyres and Solid Recovered Fuel (SRF). Polymer chip was first used as a fuel in February 2013. Whole tyres were introduced in July 2012 and SRF was first used in May 2013.

Polymer chip and SRF are introduced into the kiln along with a pulverised coal via a firing pipe at the front end of the kiln. Whole tyres are burnt in the kiln at the back end via the pre-heater tower and kiln hearth.

The WDFs replace some of the fossil fuels that are traditionally used to produce cement clinker. The use of WDFs has a number of environmental benefits including:

- Practical solution to the disposal of waste products, which are currently disposed of via conventional waste disposal methods, whilst at the same time producing a valuable product;
- Reduction in the use of finite fossil fuels;
- Contribution towards carbon reduction commitments.

No additional residues are produced as a result of using WDFs at Aberthaw Works. The fuels are combusted at approximately 1450°C at which temperature all residues are incorporated into the cement clinker.

Plant Performance

Aberthaw Cement Plant has one cement kiln, which has run throughout the year in accordance with its Environmental Permit to operate.

Planned maintenance was held from 15th April – 1st May 2021. There were two additional stops, one was due to a de-stock between 4th – 19th January 2021, and then a planned maintenance stop between the 24th October - 1st November 2021 to change cooler tube 4.

Fuel usage and the percentage substitution rate of WDFs are regularly monitored. This data is submitted to NRW on the appropriate form quarterly as required by the Environmental Permit, and is summarized below. The table shows the tonnes used of fossil fuels and WDFs, and the relative thermal input of each WDF as a percentage.

Fuel	Quantity burned Tonnes	Relative thermal input of waste derived fuels	Average calorific value MJ/kg
Coal	41040.71		27.23
Petroleum coke	0.00		0.00
Process Fuel Oil	495.02		40.714
Tyre fluff	0.00	0%	0.00
Tyres	6571.00	11.21%	27.559
SRF 1	7404.03	9.79%	20.64
Polychip	1717.24	3.98%	33.59

Plant Monitoring – Emissions to Air

Two types of air emission monitoring are carried out at the main release point (stack) from the kiln. Automatic instruments (CEMs) as required by the permit to continuously monitor some emission species. A list of the CEMS used at the site is contained in Appendix I.

An independent accredited external test body monitors other emissions species every six months. The tables below summarises those species that are continuously monitored and those that are periodically monitored.

Pollutants measured	Continuously	Periodically
Particulates	x	
Oxides of Nitrogen	x	
Sulphur Dioxide	x	
Carbon Monoxide	x	
Total Organic Carbon	x	
Hydrogen Chloride	x	
Ammonia	x	
Mercury		x
Cadmium and Thallium		x
Group III Metals		x
Dioxins and Furans		x
Hydrogen Fluoride		x

Continuously monitored species are controlled to a limit based on the average of a 24-hour period (12:00-12:00). The daily averages are compared to the 24-hour limit and reported to NRW on a quarterly basis.

During the combustion of WDFs the continuous monitoring equipment at Aberthaw Works was operating normally for 100% of the kiln operating time.

Summary emissions data from the continuous monitoring system is attached as Appendix I; this is based on the same data that is supplied to NRW on a quarterly basis.

Periodically monitored species are tested using techniques and procedures that meet European and National Standards. These include all species listed above and particulates on the cement mills. The results of this monitoring are compared directly to the limit prescribed in the permit and are reported to NRW. The 2021 routine extractive monitoring was carried out for particulate in March and September, during our September monitoring, we exceeded our Coal Mill (A4) stack and so further testing was undertaken in November following investigation and remedial work. The retest returned a compliant result.

The gaseous testing in March and December for the remaining routine requirements, all testing performed by independent, UKAS & MCERTS accredited third party organisations.

The kiln gaseous CEMs were subject to a full BS EN 14181 QAL 2 calibration on the 25th March 2021, all components passed the requirements of the standard and no follow-on work is required.

A full particulate QAL 2 calibration was last completed in April 2019, and then successfully passed an AST assessment on the 22nd June 2021, again fully passing the requirements of the standard.

On the 27th October 2020, a new ABB ACF-5000 was installed replacing one of the ABB ACF-NT analysers, the second ACF-5000 was installed and commissioned on the 22nd February 2021 and a full QAL 2 was performed on both analysers on the 25th March 2021.

Zero and span checks (QAL3) are made at site level on a weekly and monthly basis to ensure that the analysers are performing within the specified ranges and that they continue to operate effectively. Trained personnel conduct these checks and the records are kept on site.

Plant Monitoring – Emissions to Water

Monthly samples of water are taken from the site's operational discharge point (W1) and are sent to an external UKAS accredited laboratory for analysis for suspended solids, pH and oils and greases. The results of the analysis are compared to the ELVs specified in the permit.

Plant Compliance

Aberthaw cement plant submitted 6 schedule 5 notifications during the course of 2021

Summary of 2021 Schedule 5 Notifications

- See Appendix IV

Availability of Information

Copies of this report may be requested from Tarmac by contacting Daniel Bound, Environmental Coordinator on telephone number 07483 397697 or via email at daniel.bound@tarmac.com

Further information can be requested directly from Natural Resources Wales by calling the general enquiries line, 0300 065 3000.

Public Registers are available online at The NRW Online Public Registers website: [Public register - Customer Portal \(naturalresources.wales\)](#) Information on Tarmac can be found on the company website: <http://www.tarmac.com/>

Appendix I Continuous Emissions Monitors

TARMAC CEMENT ABERTHAW WORKS – ENVIRONMENTAL PERMIT EPR/BL3986ID

SUMMARY OF CEMS

LOCATION	MAKE	MODEL	MCERTS CERTIFICATE	STATUS
A1 (KILN)	ABB Automation Products (Duty Gaseous CEM)	ACF5000 measuring system	Sira MC160309/05	Last compliance 24 th March and 2nd December. (QAL 2 25th March 2021)
	ABB Automation Products (Standby Gaseous CEM)	ACF5000 measuring system	Sira MC160309/05	Last compliance 24 th March and 2nd December. (QAL 2 25th March 2021)
A1 (KILN)	Durag Particulate CEM	D-R320	Sira MC140253/01	Last compliance check: 8 th November 2021 (last QAL 2 April 2019)
A2 (CEMENT MILL)	PCME Particulate CEM	DT990	Sira MC 050049/03	Last compliance/calibration check: 14 th September 2021
A3 (CEMENT MILL)	Durag Particulate CEM	DR800	Sira MC080123/02	Last compliance/calibration check: 14 th September 2021

BS EN 14181 summary
QAL 2 Duty system - 25th March 2021

Parameter	Calibration Function derived from QAL2?	EN 14181 Procedure used to Derive the Calibration Function	Calibration Function Derived	Result of Variability Test	Valid Calibration Range @ REF Conditions	Range after Surrogate Extension @ REF Conditions	Calibration Function to Apply to the Data Acquisition Handling Software (See Conclusions)
Total VOCs	Yes	Procedure B	$y = 1.4424x + 0.0000$	Pass	0 to 51.8 mg/m ³	N/A	$y = 1.4424x + 0.0000$
Oxides of Nitrogen (as NO ₂)	Yes	Procedure A	$y = 1.0446x - 6.9973$	Pass	0 to 484 mg/m ³	N/A	$y = 1.0446x - 6.9973$
Sulphur Dioxide	Yes	Procedure A	$y = 1.0303x - 3.5775$	Pass	0 to 430 mg/m ³	N/A	$y = 1.0303x - 3.5775$
Carbon Monoxide	Yes	Procedure A	$y = 1.0961x - 33.0936$	Pass	0 to 2596 mg/m ³	N/A	$y = 1.0961x - 33.0936$
Hydrogen Chloride	Yes	Procedure A	$y = 0.1150x + 3.1552$	Pass	0 to 6.44 mg/m ³	N/A	$y = 0.1150x + 3.1552$
Ammonia	Yes	Procedure A	$y = 0.8864x + 2.2853$	Pass	0 to 66.4 mg/m ³	N/A	$y = 0.8864x + 2.2853$
Water Vapour (% v/v)	Yes	Procedure B	$y = 1.0023x + 0.0000$	Pass	0 to 18.5 % v/v	N/A	$y = 1.0023x + 0.0000$
Oxygen (D) (% v/v)	Yes	Procedure A	$y = 1.0332x + 0.4133$	Pass	0 to 12.4 % v/v	N/A	$y = 1.0332x + 0.4133$

QAL 2 standby system – 25th March 2021

Parameter	Calibration Function derived from QAL2?	EN 14181 Procedure used to Derive the Calibration Function	Calibration Function Derived	Result of Variability Test	Valid Calibration Range @ REF Conditions	Range after Surrogate Extension @ REF Conditions	Calibration Function to Apply to the Data Acquisition Handling Software (See Conclusions)
Total VOCs	Yes	Procedure B	$y = 1.3206x + 0.0000$	Pass	0 to 48.9 mg/m ³	N/A	$y = 1.3206x + 0.0000$
Oxides of Nitrogen (as NO ₂)	Yes	Procedure A	$y = 1.0471x - 6.8880$	Pass	0 to 484 mg/m ³	N/A	$y = 1.0471x - 6.8880$
Sulphur Dioxide	Yes	Procedure A	$y = 1.0202x - 0.6741$	Pass	0 to 439 mg/m ³	N/A	$y = 1.0202x - 0.6741$
Carbon Monoxide	Yes	Procedure A	$y = 1.1085x - 29.9384$	Pass	0 to 2587 mg/m ³	N/A	$y = 1.1085x - 29.9384$
Hydrogen Chloride	Yes	Procedure A	$y = 0.0612x + 3.2516$	Pass	0 to 5.50 mg/m ³	N/A	$y = 0.0612x + 3.2516$
Ammonia	Yes	Procedure A	$y = 0.9735x + 1.1458$	Pass	0 to 65.9 mg/m ³	N/A	$y = 0.9735x + 1.1458$
Water Vapour (% v/v)	Yes	Procedure B	$y = 1.0358x + 0.0000$	Pass	0 to 18.5 % v/v	N/A	$y = 1.0358x + 0.0000$
Oxygen (S) (% v/v)	Yes	Procedure A	$y = 1.0385x + 0.8553$	Pass	0 to 12.4 % v/v	N/A	$y = 1.0385x + 0.8553$

Particulate matter QAL 2 – 2nd April 2019

Results of QAL2 Testing			
1.	AMS Range	=	0 – 20 mg/m ³
2.	EN 14181 Calibration Function ($y=a+bx$)	=	$y = -5.399 + 1.310 \cdot x$ mg/m ³
3.	EN 14181 Calibrated Range	=	0 – 20.97 mg/m ³ (offset by -0.16 mg/m ³)
4.	Calibration Valid Range, using Calibrated AMS Data	=	0 – 5.11 mg/Nm ³
5.	Extrapolation of Valid Calibration Range, using Surrogates	=	Not Applicable
6.	Test of Variability	=	Pass

Particulate matter AST - 22nd June 2021

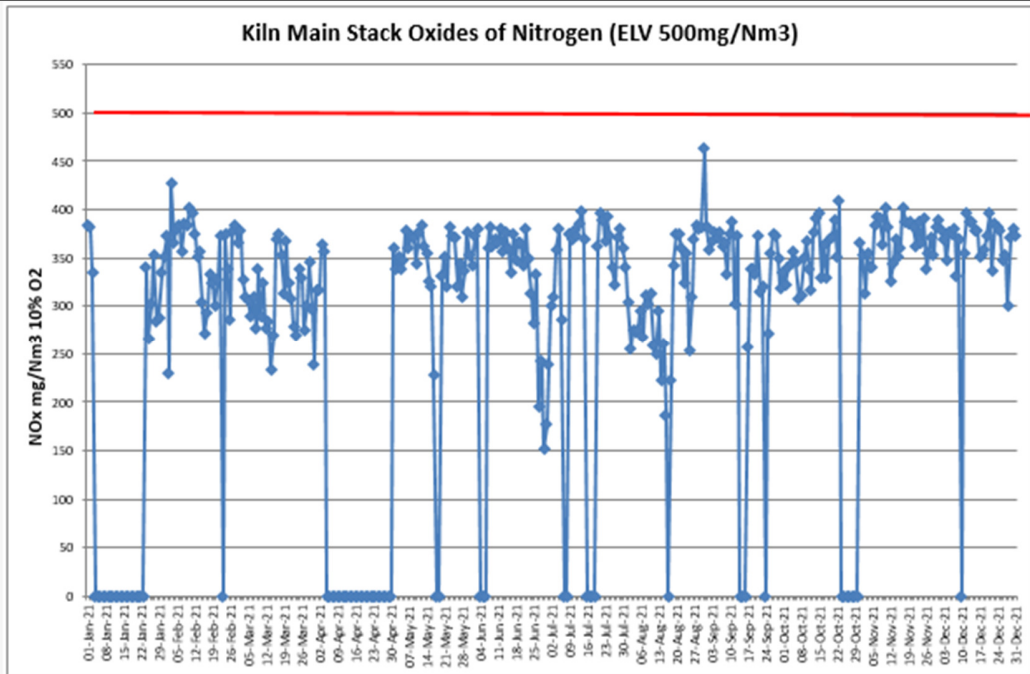
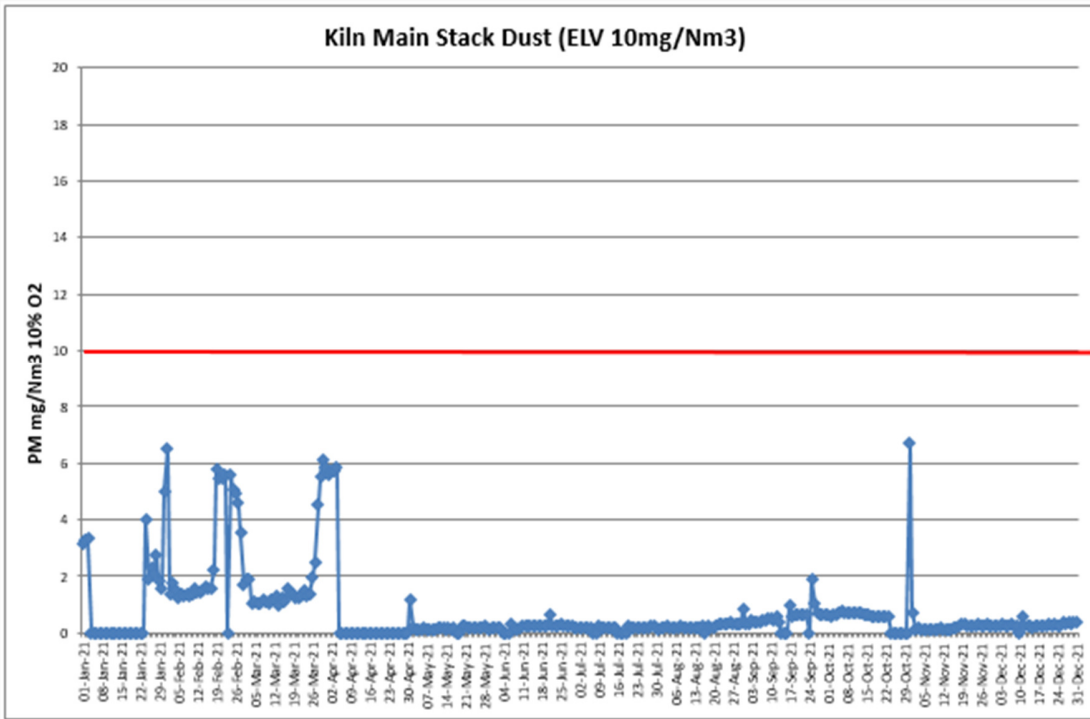
Results of AST Testing			
1.	AMS Range	=	0 – 20 mg/m ³
2.	EN 14181 Calibration Function ($y=a+bx$)	=	$y = -5.399 + 1.310 \cdot x$ mg/m ³
3.	EN 14181 Calibrated Range	=	0 – 20.97 mg/m ³ (offset by -0.16 mg/m ³)
4.	Calibration Valid Range, using Calibrated AMS Data	=	0 – 5.11 mg/Nm ³
5.	Extrapolation of Valid Calibration Range, using Surrogates	=	Not Applicable
6.	Test of Variability	=	Pass
7.	Calibration Acceptance	=	Pass

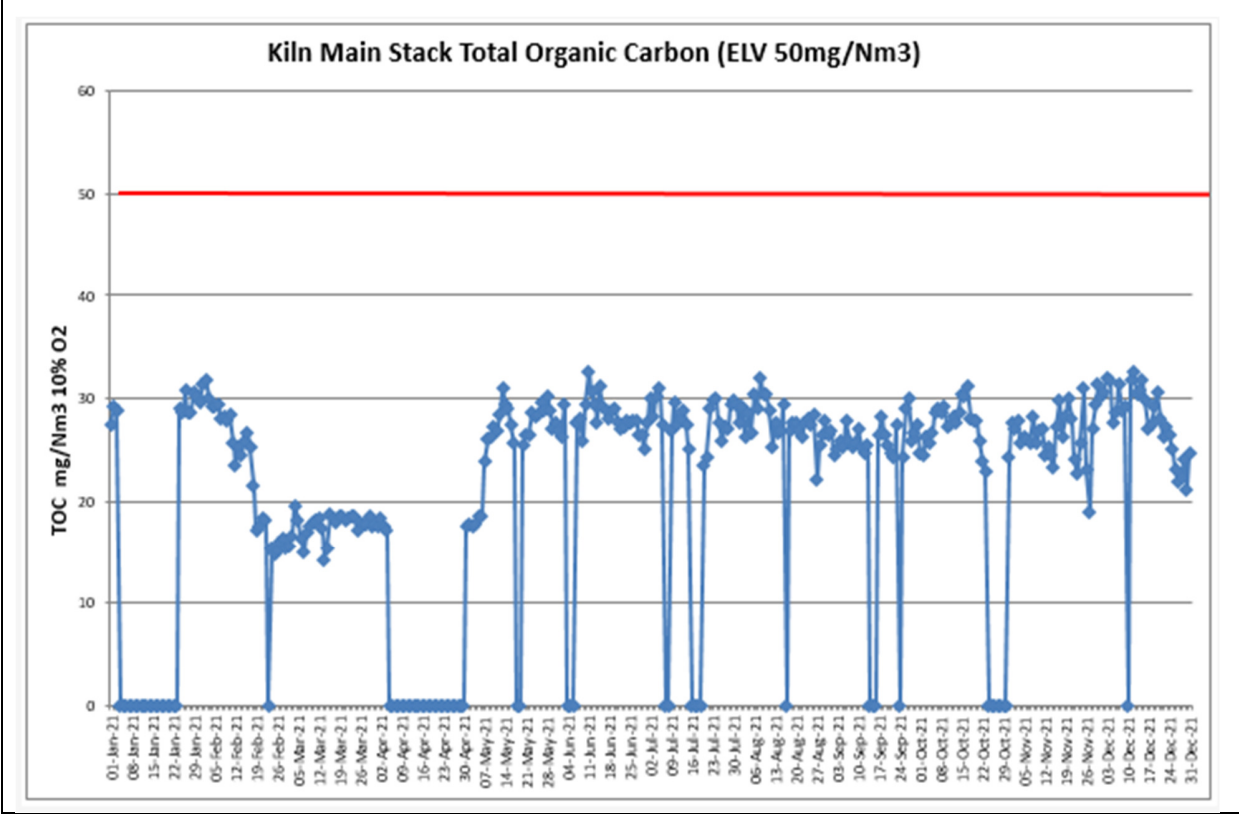
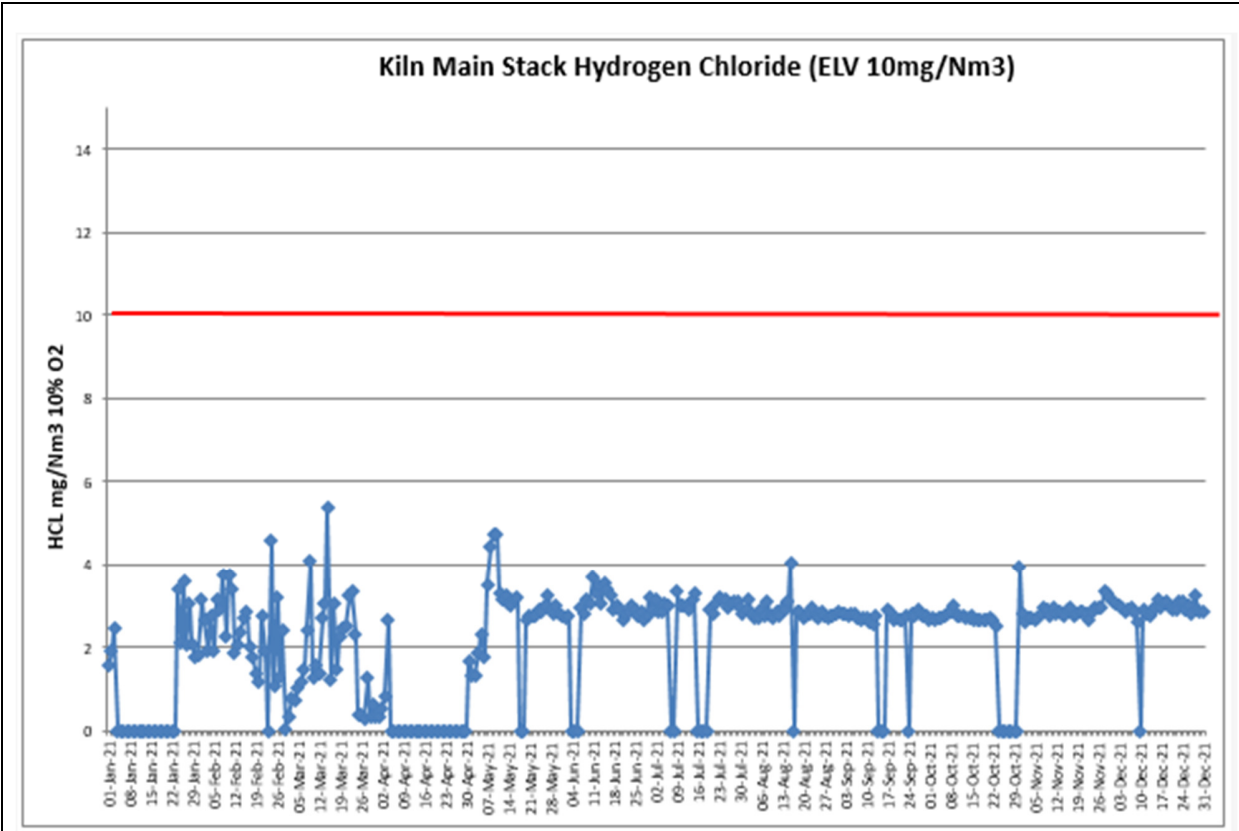
QAL 3 alarm and warning limits

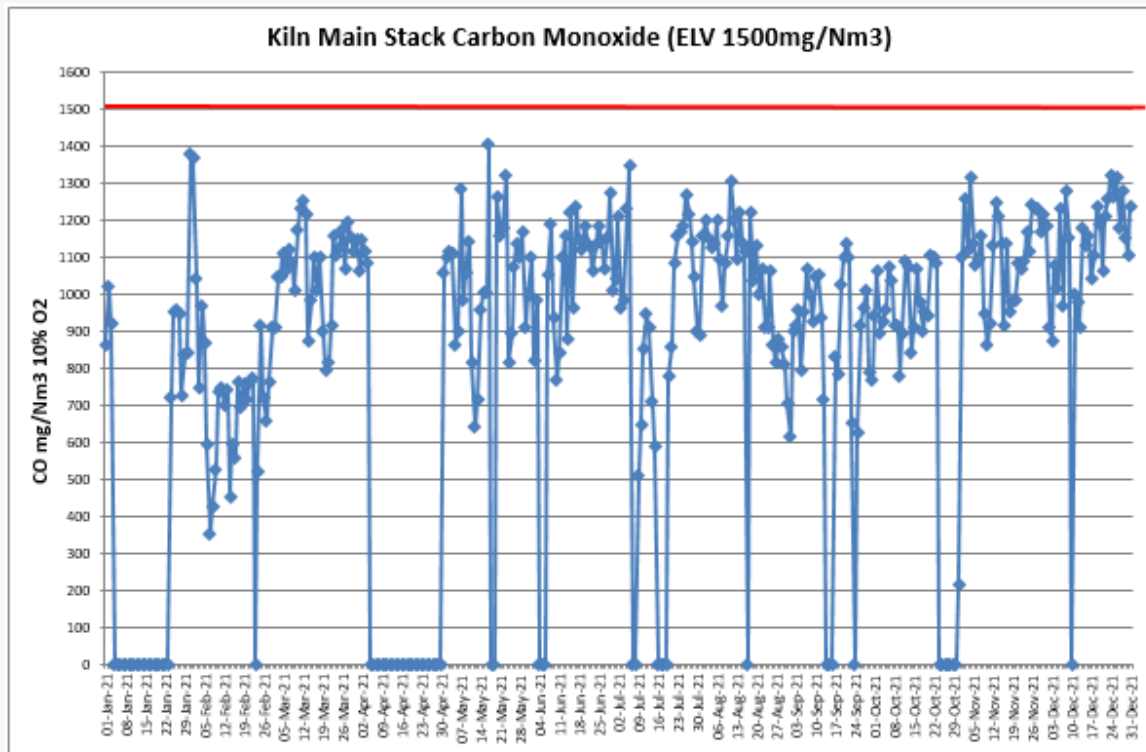
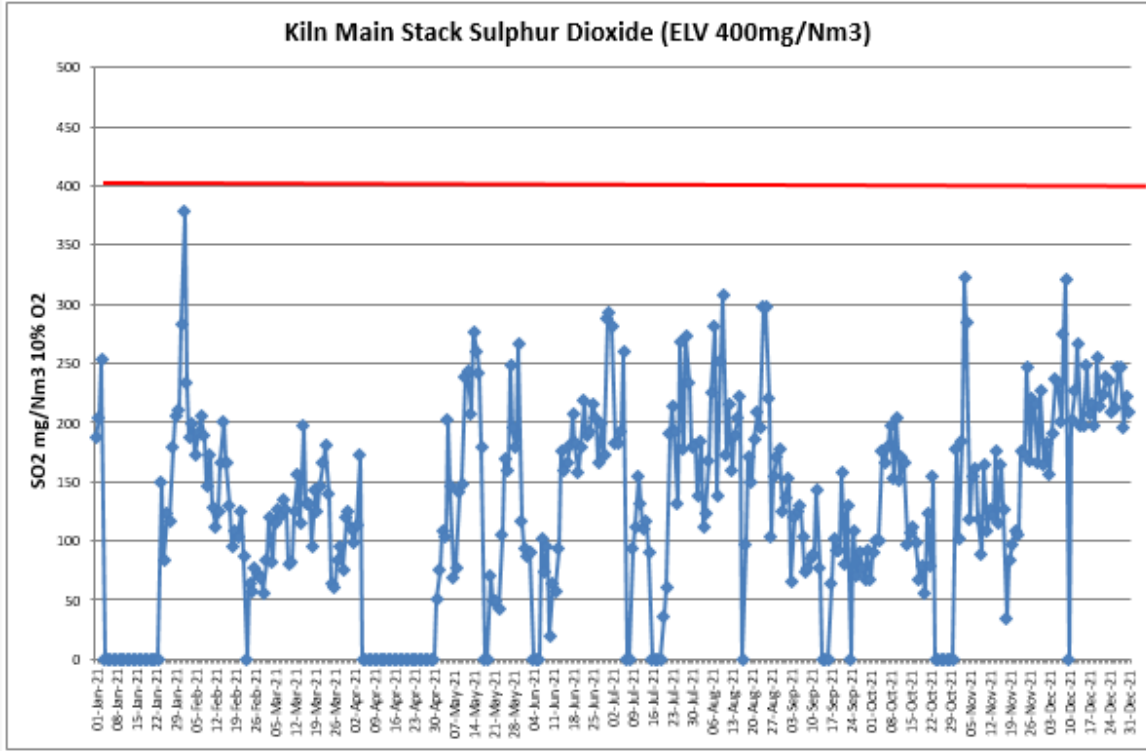
As per the guidance in the BS EN 14181 standard the S_{AMS} is generated by the use of zero and span data, the action alarm for all of the control charts is set at $2 S_{AMS}$ and the warning limit set at $1 S_{AMS}$.

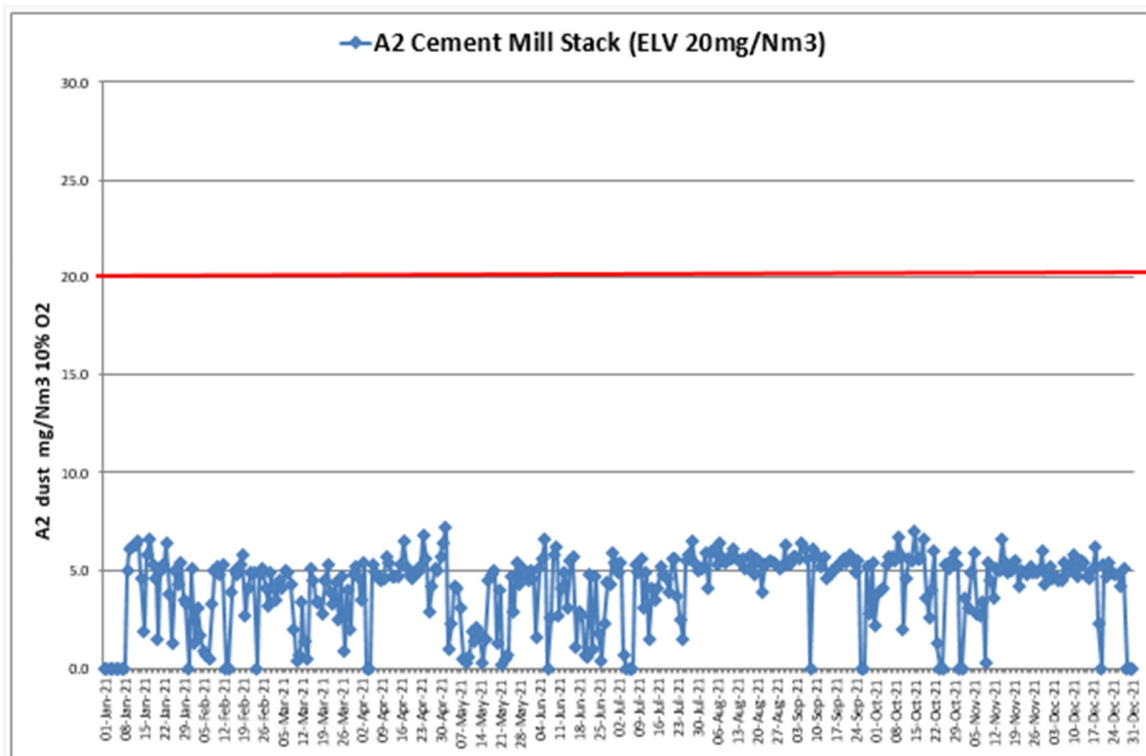
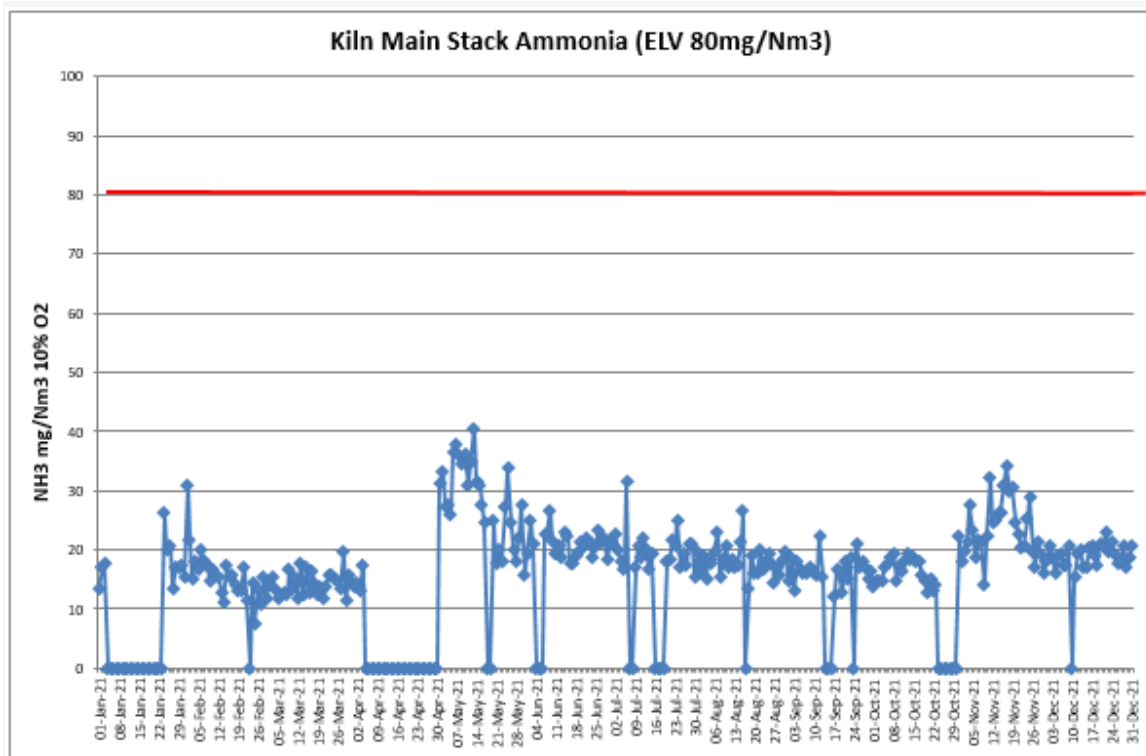
Full records of the QAL 2, AST and QAL 3 data are stored on site and available for discussion.

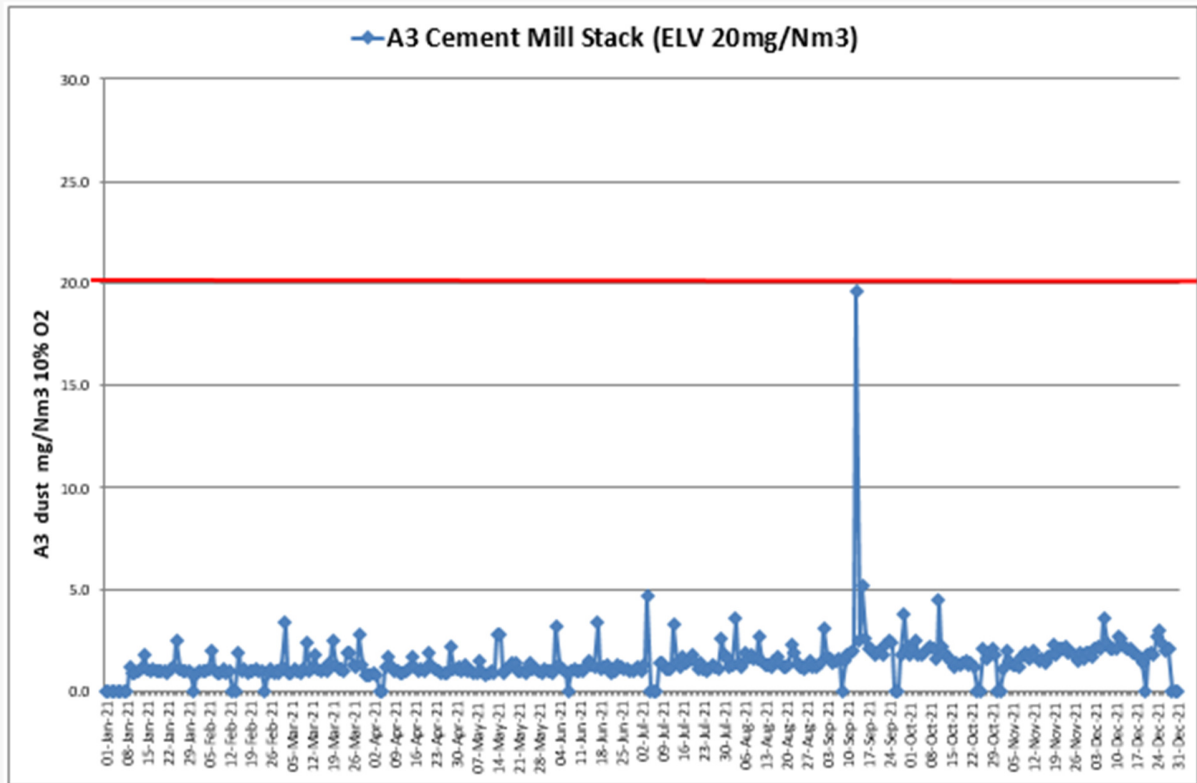
Appendix II
Continuous Emissions Monitor Results











Appendix III
Periodic Monitoring Results

Species	Limit mg/m3	Kiln 1 Test 1 mg/m3	Kiln 1 Test 2 mg/m3
Mercury	0.05	0.02	0.0011
Cadmium and Thallium	0.05	0.013	0.0023
Group III Metals	0.5	0.063	0.0873
Hydrogen Fluoride	1	0.45**	<0.046
Dioxins and Furans	0.1*	0.0036	0.0074

* Dioxin and Furan results in ng/m3 NATO I TEQ

** Average HF result from Element reports EMT-00599 & EMT-00897

Appendix IV Summary of all Schedule 5 Reports submitted in 2021

25/03/2021 kiln dust release

A hole in the back-end kiln seal developed during the morning, which resulted in a dust release on each rotation. This continued as the kiln was brought under a controlled Stop. The Kiln cannot be stopped instantly as an uncontrolled stop can also result in a dust release as well as further risks of dust release from a “dirty start” if the kiln is full of material. Estimate is less than 100kg at source of which a small proportion may have left the site boundary. The immediate issue was rectified at time of the incident by welding plate over area where recess in kiln shell at the outside facing location of the lifter (thus creating a reinforced outside seal). Following the investigation from inside of the kiln, it was confirmed that the lifter had burnt through in two locations. As a precaution, we welded further plates on the outside of the kiln over every hole that had the potential to experience the same issue. We are confident, given the measures now put in place that this issue is unlikely to be repeated.

09/04/2021 CC05 clinker conveyor fugitive dust

This was an essential maintenance job to replace conveyor building sheeting. The sheeting has over time, become damaged in places and this sheet replacement work will provide a better seal to CCO5, a high-level conveyor that has historically been a risk area for fugitive dust.

This was a planned job, and mitigation measures had been put in place to control the release of material as far as could be practicably achieved, by undertaking the removal of built up sheet surface (crust) material inside the building prior to removal of the sheets.

As part of improvement work during the annual shutdown, the sheeting on the sides of clinker conveyor ‘CC05’ is being replaced due to its age and condition. The inside of the existing sheeting has developed a thick crust of old clinker material over the years and this had to be removed from the old sheet prior to removal.

This approach was taken in order to control, contain and mitigate the mobility of surface crust on the sheeting, which would otherwise fall off in an uncontrolled manner upon removing and wrecking the sheets. By using this approach, the material was contained within the building. Following removal of the sheets, the crust was then cleaned by contractors using an industrial vacuum. It was not possible to undertake such cleaning work when the sides of the sheet remained intact, as there would be no safe access for the cleaning contractors.

It was the process of undertaking this vacuum cleaning work on the, now open sided, conveyor building, which allowed some material to be disturbed- which subsequently escaped the area as fugitive dust.

01/05/2021 Kiln startup dust release

Localised dust release following the start-up of the kiln. Received complaint from Burton Hill resident a few days later on the 4.5.21 about dust on his car. He claimed to have seen dust on site around the time of the kiln start up.

Neighbour called to say that they had noticed dust on their car which indicates that material has left the site boundary. A sample of the dust was taken and will be sent to Dustscan for laboratory analysis.

Kiln start up is generally accompanied by a sudden and localised release of dust. The kiln hood will capture the dust but it is not possible to capture all of this in its entirety.

Spoke with the complainant and offered to clean his car but he declined – said the forecast rain would wash it off.

11/06/2021 Kiln trip dust release

The kiln trip caused one of the main process suction fans to stop. The suction large fan which controls and drives the gas flows through our entire kiln system – when the suction stopped it resulted in a sudden release of dust. At this point, the damper valve automatically closed the purpose of which is to prevent further fugitive dust, however residual dust in the system continued to escape for a time.

Following investigations, it was found that the Kiln tripped due to the Bag Filter inlet temperature rising above maximum limit which resulted in the Preheater ID Fan trip and Kiln off. The Bag Filter inlet temperature control failed due to a slow response from its control logic. The Electrical team have now altered setting to improve the temperature control logic.

16/08/2021 Kiln trip dust

The kiln schenk head drum had failed on the afternoon of the 16/08/21. Whilst the repairs were underway operators switched the kiln feed system to the standby/emergency Hassler system in order to keep the kiln running.

At approx. 2pm, the afternoon operator went to make a change to the volume of kiln feed and instead of entering % he entered the number in tonnage, which in turn opened the valve on the hassler sending too much feed to the kiln for the system to cope with. As a result, the excess meal pressurised the system causing an uncontrolled release from various points of the kiln system.

Kiln was stopped to clear the system of material and to allow operators to investigate cause and resolve.

Investigations found that there were no mechanical issues with the Hassler system or associated infrastructure including preheater tower or elevators.

Following an RCA, it was concluded that the issue was down to operator error. The system is very rarely used and some staff are not completely familiar with the Hassler system. Training will now be provided to all shift teams by the Kiln Coach to ensure they fully understand how to operate the Hassler System in the event it is ever needed again.

In addition, a restriction has also been installed on the Hassler system to ensure the dosing valve cannot be opened past a specific point to control feed rates and ensure a large scale overfill is not able to reoccur – removing the likelihood of human error.

13/09/2021 Coal particulate breach following CES testing

Upon receipt of provisional results following testing on 13/09/21 an internal inspection of the filter was carried out and filter bag was replaced as required. CES have since retested the coal stack on 09/11/21, with provisional results showing parameter is now within ELV. Filter bag changed during shutdown (25/10/21 - 31/10/21). Inspection frequency increased from every 8 weeks to every 4 weeks.

Continued monitoring of dustscan results and reports. Continued monitoring of complaints. No complaints received referring specifically to coal dust.