

2023 Annual Performance Report for

Tarmac Cement & Lime Ltd

Aberthaw Works

V1 18th January 2024


Environmental Coordinator
Tarmac Cement and Lime Aberthaw Works

Introduction

Tarmac Cement & Lime Ltd (the "Operator"), company registration number 66558, whose registered office is Ground Floor, T3 Trinity Park, Bickenhill Lane, Birmingham, B37 7ES 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 20th February – 15th March 2023.

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	36039.72		24.20
Petroleum coke	0.00		-
Process Fuel Oil	711.05		40.82
Tyre fluff	0.00	0.00%	-
Tyres	5875	11.53%	27.62
SRF 1	14360	20.84%	20.27
Polychip	1797.57	4.12%	32.24

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.

Summary emissions data from the continuous monitoring system is attached as Appendix 1; 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 2023 routine extractive monitoring was carried out for particulates in March and September and November (main stack retest and cement mill separator).

The gaseous testing in May and October 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 AST calibration check on the 25th – 26th May 2022, all components except NO_x on the duty passed the requirements of the standard, the test team had enough data to generate a new calibration function which passed the requirements of the standard.

A full particulate QAL 2 calibration was completed between 28th – 31st March 2022, with no follow on work required. In line with the standard an AST was performed in 2023.

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 5 schedule 5 notifications during 2023.

Summary of 2023 Schedule 5 Notifications

- See Appendix IV

Availability of Information

Copies of this report may be requested from Tarmac by contacting [REDACTED], Environmental Coordinator on telephone number [REDACTED] or via email at [REDACTED]

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 \(naturalresources.wales\)](http://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 check: 25 th October 2023 (QAL 2 25th March 2021)
	ABB Automation Products (Standby Gaseous CEM)	ACF5000 measuring system	Sira MC160309/05	Last compliance check: 25 th October 2023 (QAL 2 25th March 2021)
A1 (KILN)	Durag Particulate CEM	D-R320	Sira MC140253/01	Last compliance check: 8 th November 2023 (last QAL 2 March 2022)
A2 (CEMENT MILL)	PCME Particulate CEM	DT990	Sira MC 050049/03	Last compliance/calibration check: 22 nd September 2023
A3 (CEMENT MILL)	Durag Particulate CEM	DR800	Sira MC080123/02	Last compliance/calibration check: 8 th November 2023

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: 28th – 31st March 2022

Results of QAL2 Testing			
1.	AMS Range	=	0 – 20 mg/m ³
2.	EN 14181 Calibration Function ($y=a+bx$)	=	$y = -5.439 + 1.219 \times x$ mg/m ³
3.	EN 14181 Calibrated Range	=	0 – 19.50 mg/m ³ (offset by -0.56 mg/m ³)
4.	Calibration Valid Range, using Calibrated AMS Data	=	0 – 9.81 mg/Nm ³
5.	Extrapolation of Valid Calibration Range, using Surrogates	=	Not Applicable
6.	Test of Variability	=	Pass

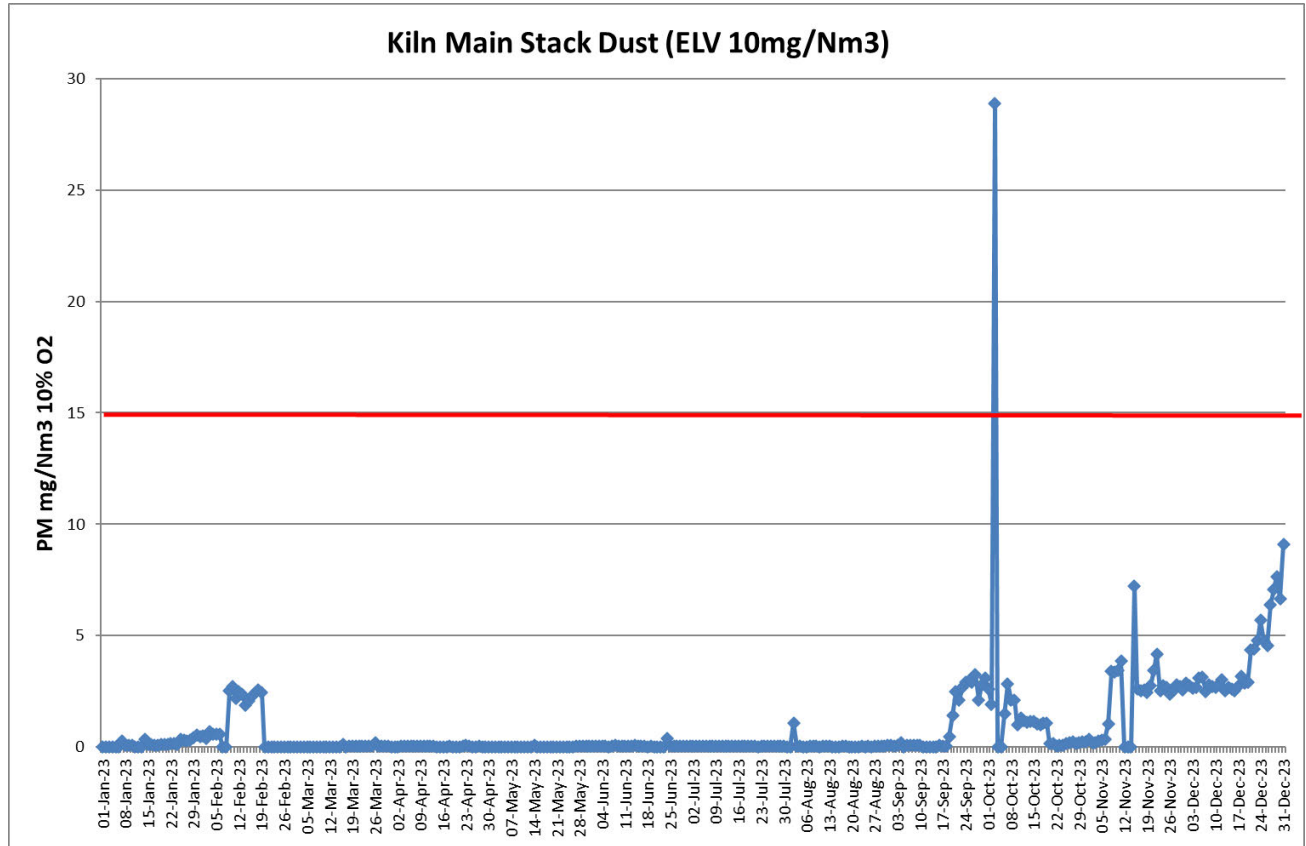
QAL 3 alarm and warning limits

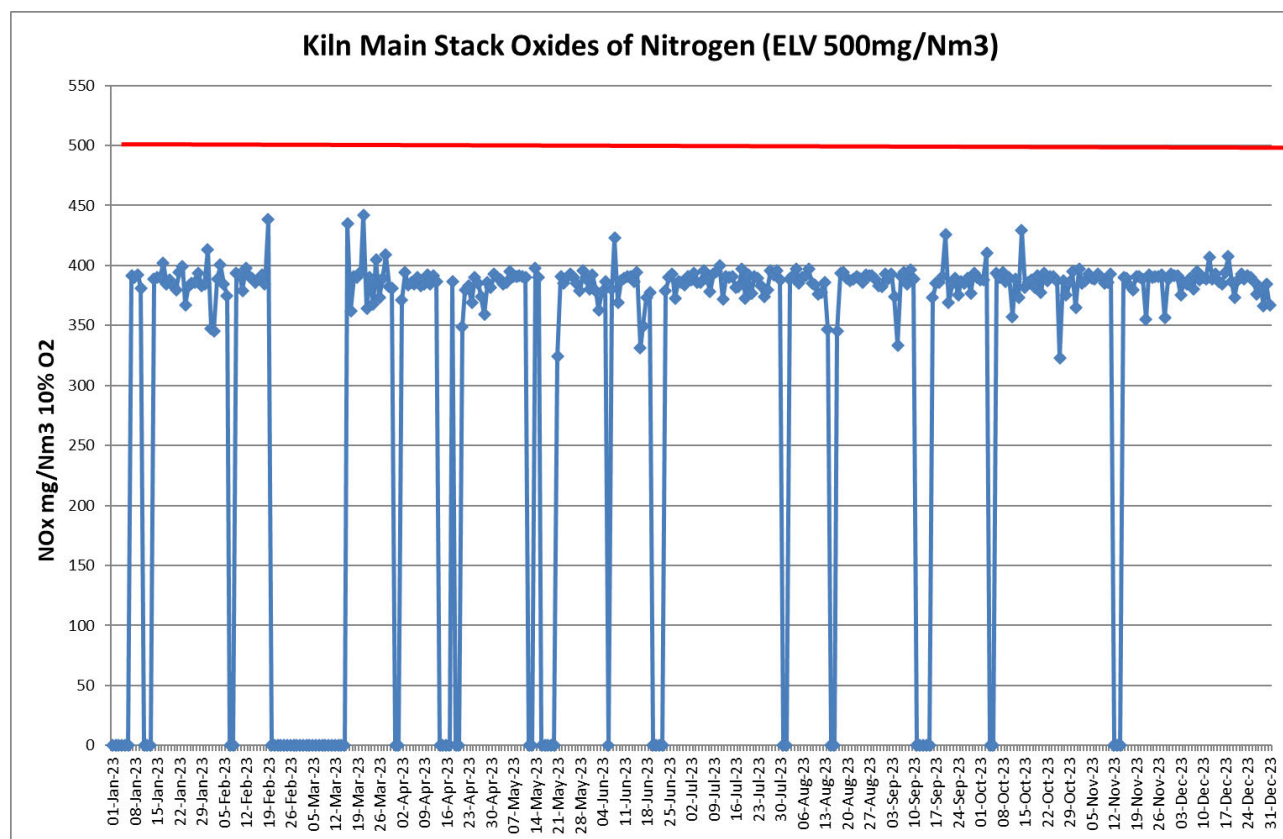
As per the guidance in the BS EN 14181 standard the S_{AMS} is generated by the use of zero and span data, the action alarm for all of the control charts is set at 2 S_{AMS} and the warning limit set at 1 S_{AMS} .

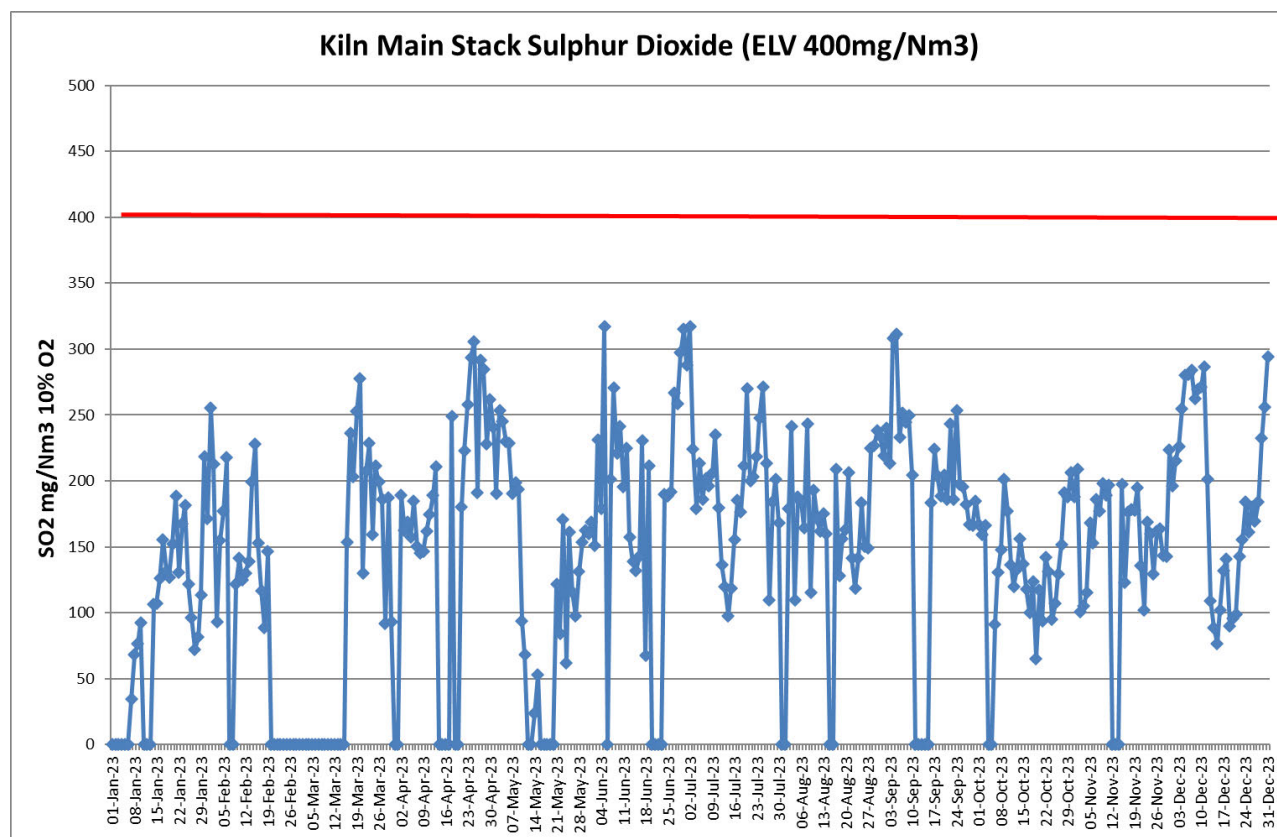
Full records of the QAL 2, AST and QAL 3 data are stored on site and available for discussion.

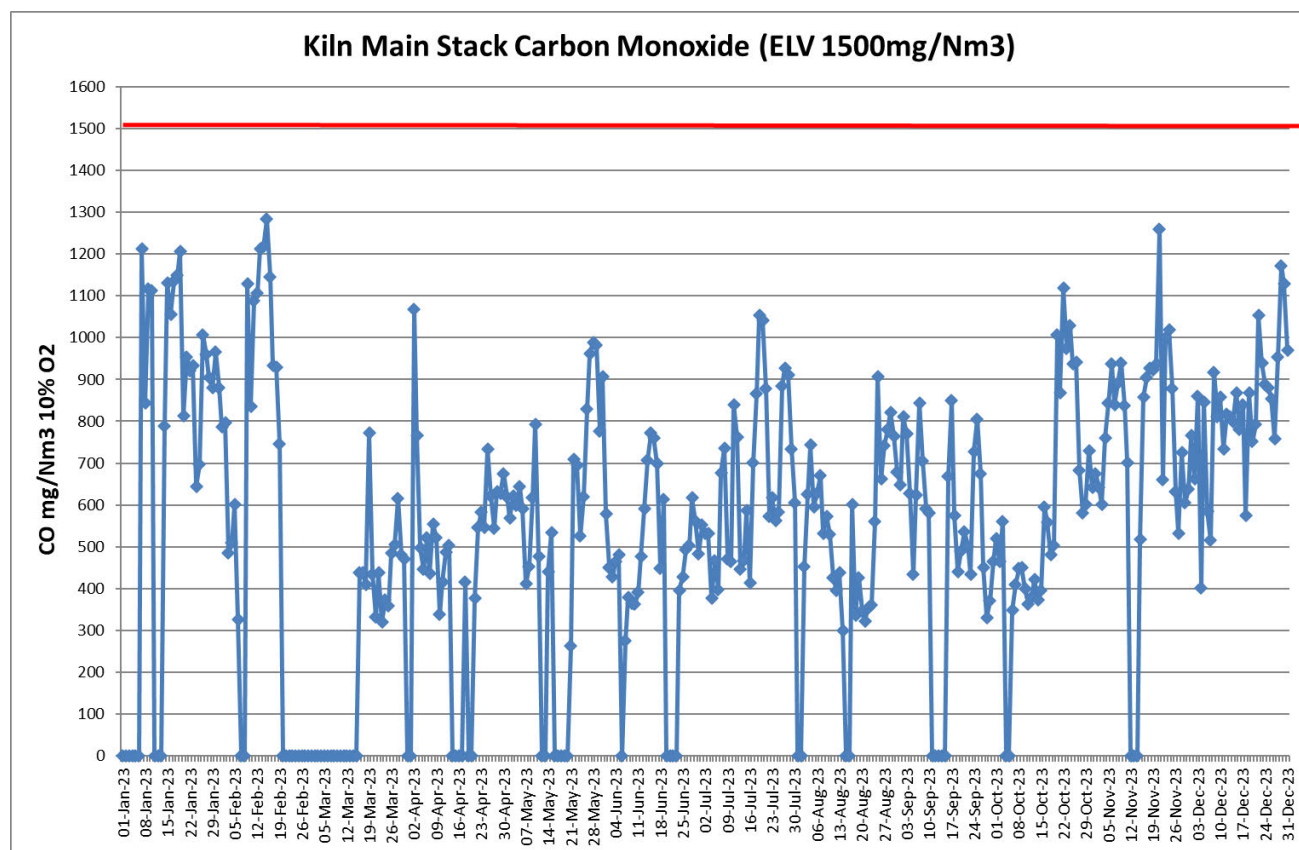
Appendix II

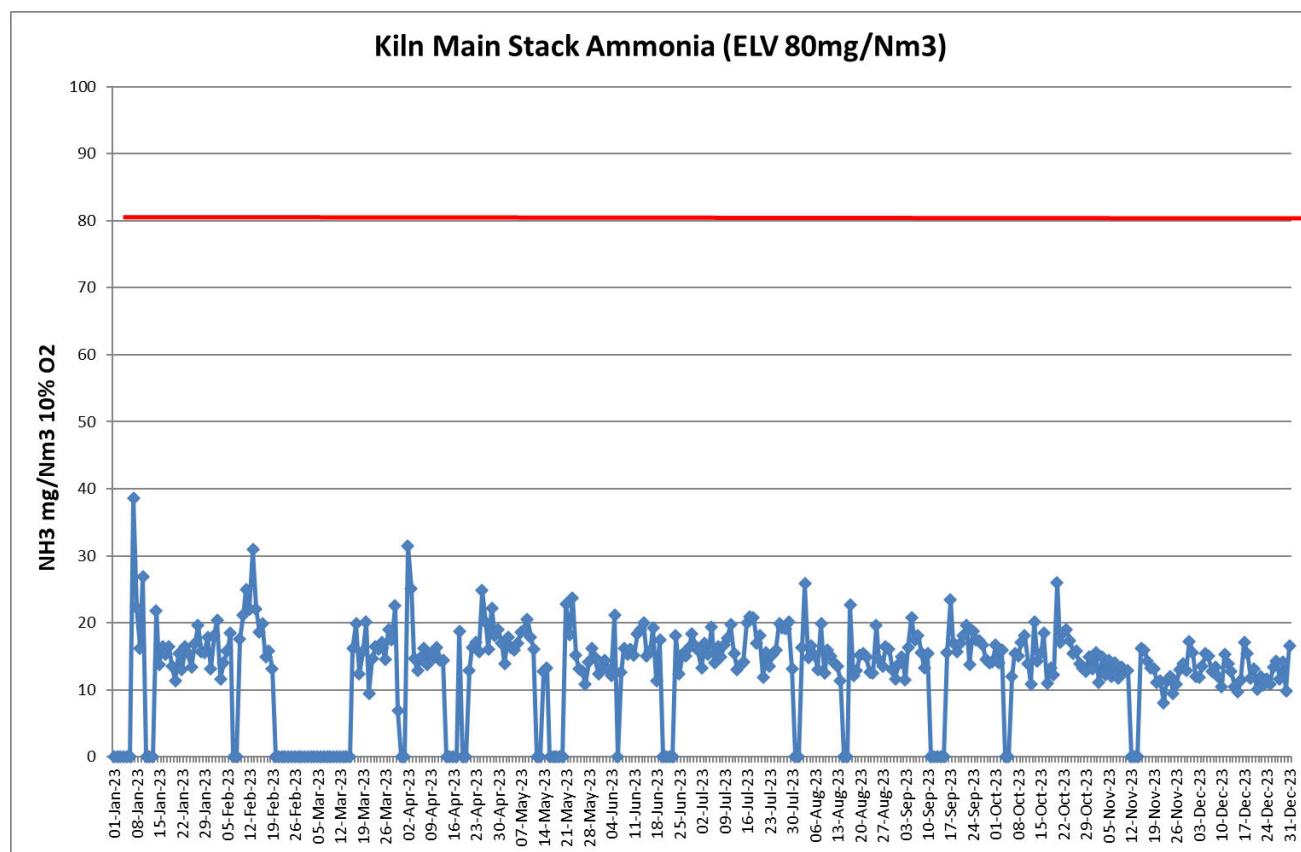
Continuous Emissions Monitor Results

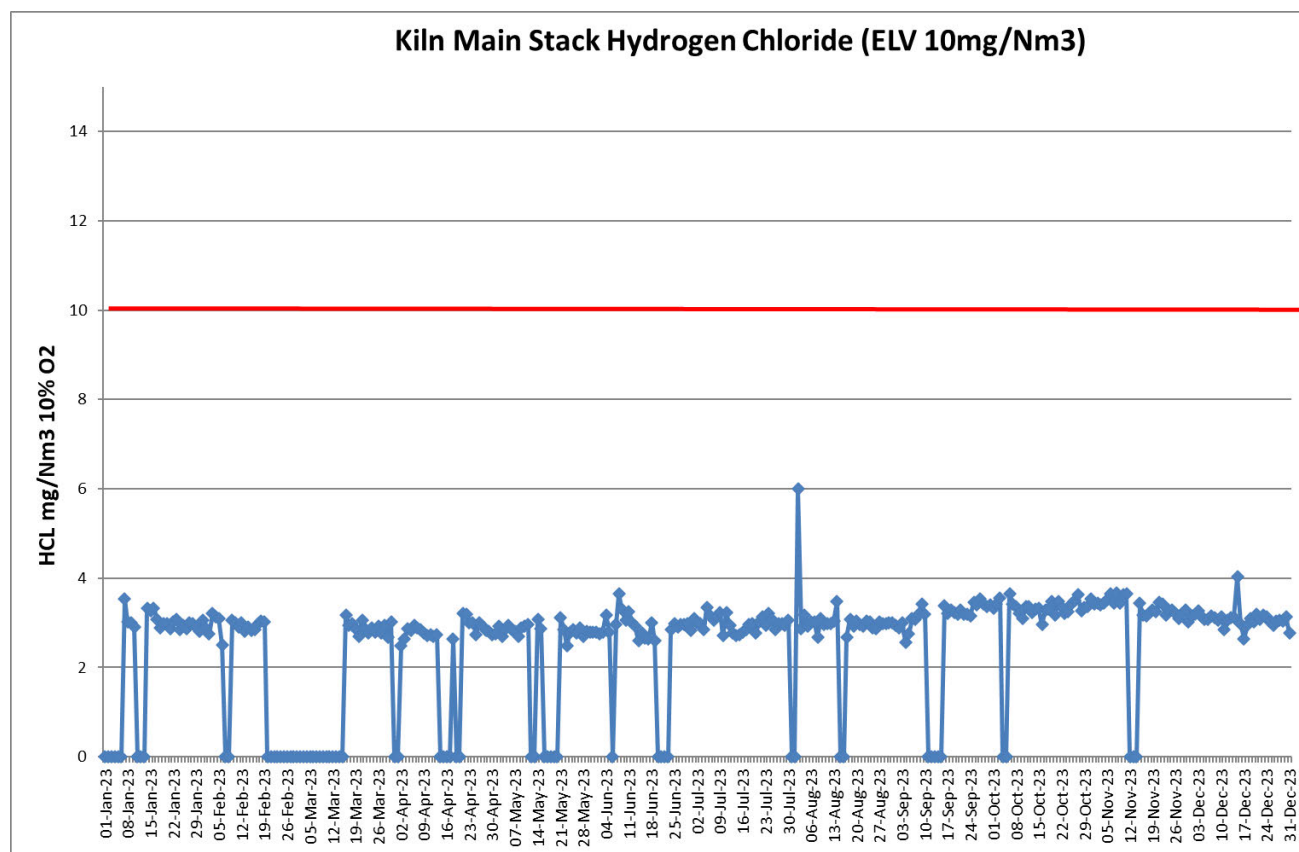


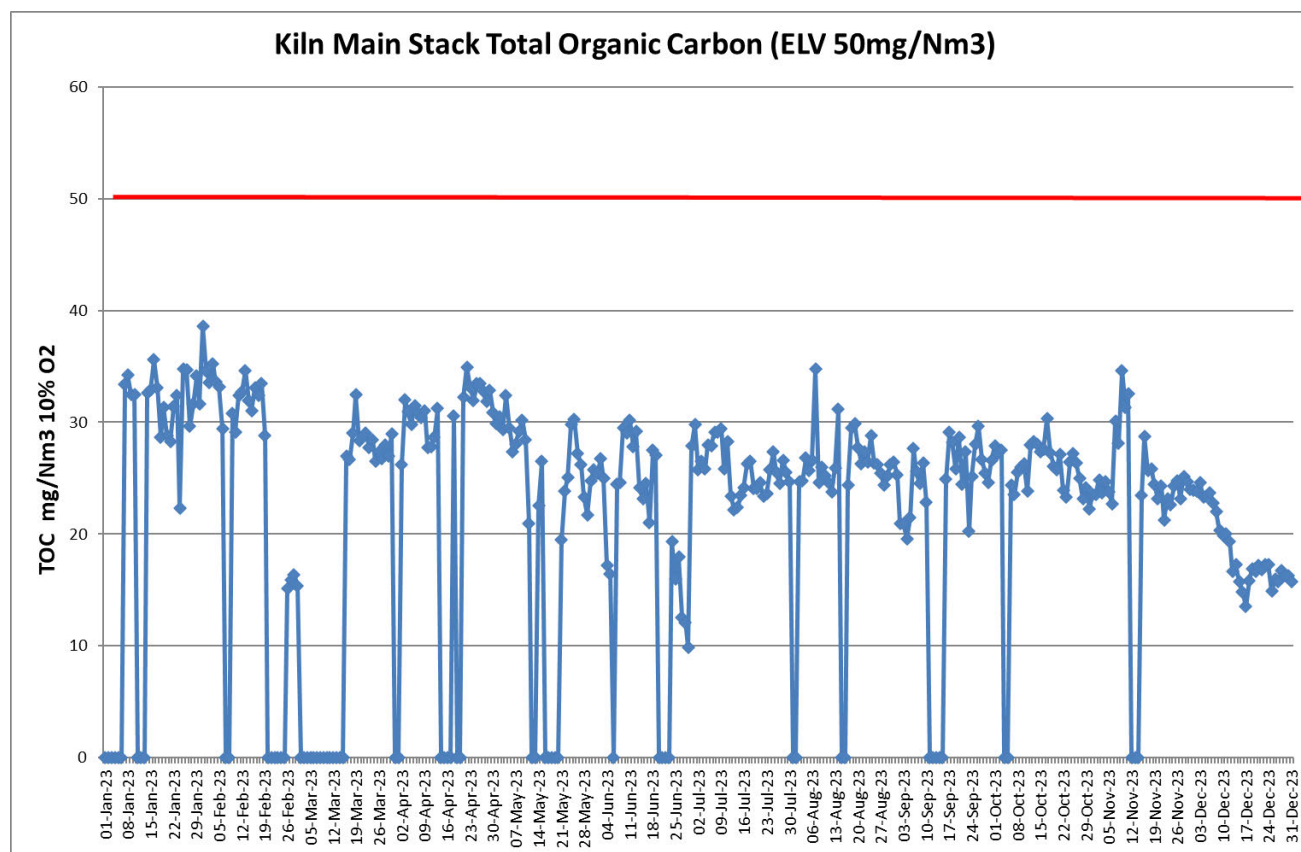


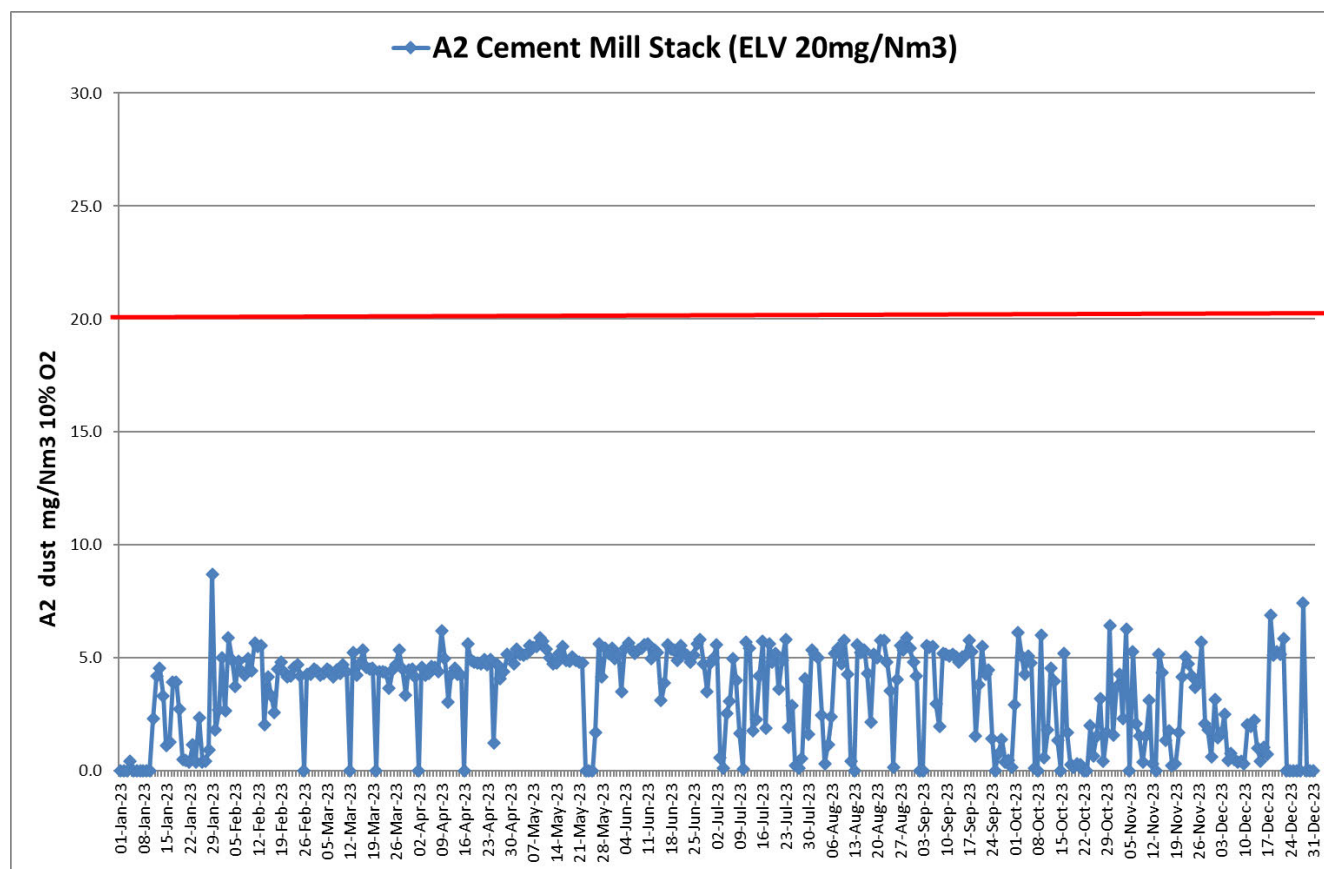


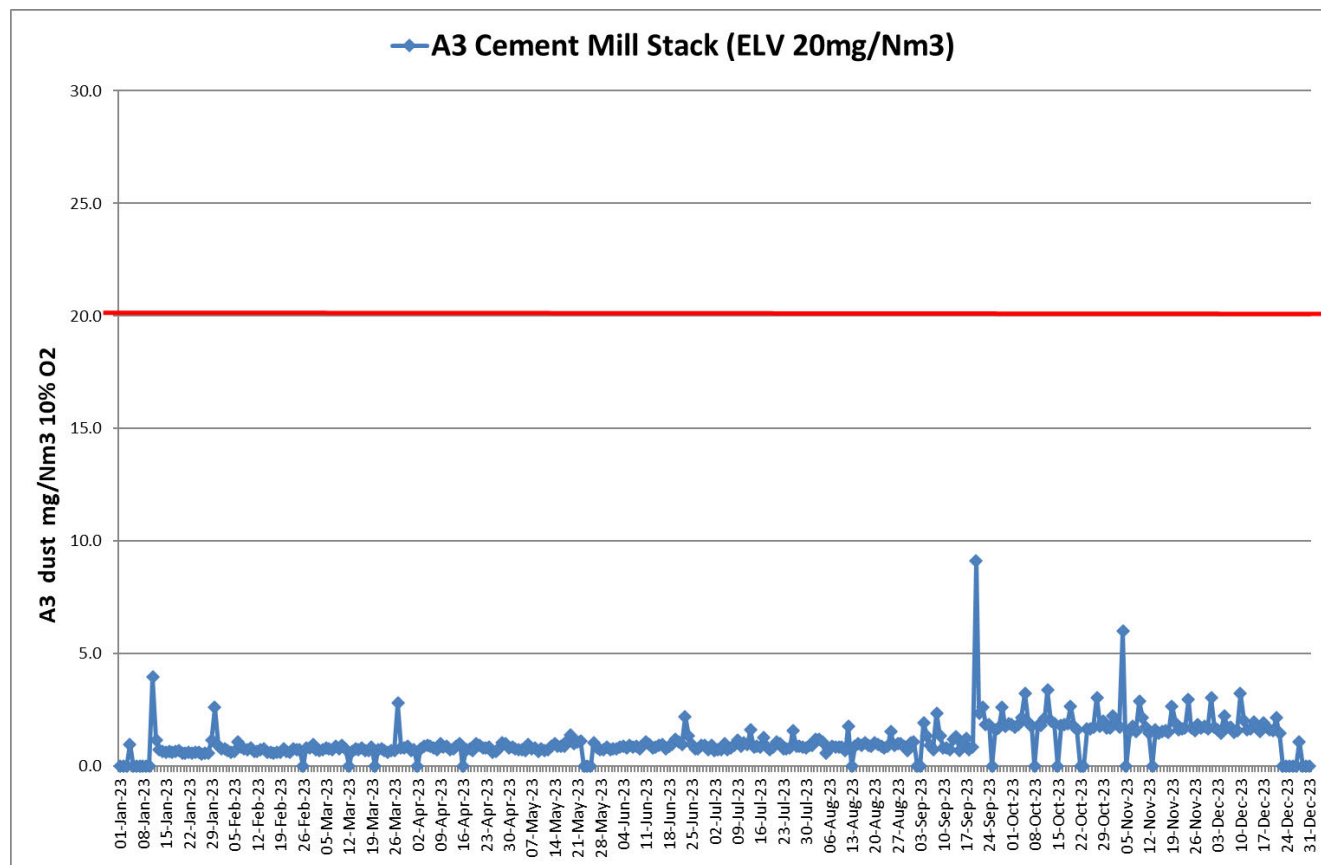












Appendix III
Periodic Monitoring Results

Species	Limit mg/m3	Kiln 1 Test 1 mg/m3	Kiln 1 Test 2 mg/m3
Mercury	0.05	0.002	0.00054
Cadmium and Thallium	0.05	0.0019	0.0014
Group III Metals	0.5	0.012	0.013
Hydrogen Fluoride	1	<0.07	<0.047
Dioxins and Furans	0.1*	0.0006	0.0004

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

Appendix IV

Summary of all Schedule 5 Reports submitted in 2023

12/04/2023 Coal mill particulate breach H1 external testing

External monitoring result above ELV: 12.73mg/m³. Initial measurement was carried out only 30 minutes after coal mill had started running. At this point the running conditions were considered sub-optimal for accurate particulate monitoring as temperature was below optimal, and other factors may have affected result such as insufficient layer of 'cake' having built up on filters. Additionally, only two tests were carried out to obtain the average; second result significantly lower than first, so third measurement may have brought the average below the ELV. Typical bag filter operation often shows a spike on start up, followed by the spike quickly coming back down and the dust stabilises as a good layer of cake builds up on the bags. Initial investigation has concluded that this is likely to be the case on this occasion.

Internal testing to be carried out using gravimat to determine dust levels after start up of coal mill. CES instructed to wait at least 1 hour after coal mill started before commencing testing to allow normal operating conditions to be reached. Three tests to be carried out in future to obtain average of three rather than two results.

31/07/2023 Cyclone 4 dust release

Kiln underwent a controlled stop at 02:04 on Monday 31st July 2023 due to several issues including an ID fan vibration issue. While off, it was decided that a full clean down of cyclone 4 would take place. This involved opening doors on cyclone 4 for full access without the bag filter fan running. This is not standard procedure for tower cleaning as the bag filter fan would normally be running. On this occasion, this wasn't possible as repairs on the ID fan meant the bag filter fan needed to be off as its operation would have caused the ID fan to turn.

Tower cleaning not to be conducted without bag filter fan running to prevent reoccurrence.

Arrangement made for extra vehicle cleaning for the complainant.

14/08/2023 Cooler tube dust release

Release of clinker onto ground below cooler tube. Suspected clinker dust detected on neighbour's vehicles during visit to follow up on complaint. Kiln stopped immediately upon detection to prevent further emissions. Small split developed in cooler tube wall causing release of clinker particulates. This had been observed the previous week and was being monitored. It's apparent that over the course of the following weekend the split became larger causing dust to be released. Repairs made to split in tube: Crack welded together and saddle plate added for support. Cooler tube scheduled for replacement in shutdown early 2024.

Emergency procedures have been updated and TBT issued - Shift teams re-educated on procedure for emergency response including weekend /out of hours requirements.

Extra car cleaning service provided to residents on Burton Hill affected by dust. Additional

cleaning provided to [REDACTED] to clean dust from patio and garden furniture, etc.

20/09/2023 Loss of Durag signal

During external monitoring of particulates by CES, human error lead to a cable not being reconnected following servicing of the Durag particulates monitoring probe. The kiln was not operational at the time of the incident. The kiln was restarted at 19:44, with 80tph being reached at 22:19. The signal from the probe was compromised until 08:21 on the morning of 21/9/23 after which the cable was reconnected. During this time a total of 22 invalid half hours were recorded, with one invalid day.

CES contacted by P Firth - procedures to be reviewed.

Emergency preparedness and response procedure reviewed, updated and additional signage installed in CCR and fitters workshop.

EPR toolbox talk reviewed and updated, scheduled for completion.

SOP (EOP1 Appendix 2-1 Aberthaw CEM (Kiln) reviewed and updated.

03/10/2023 Main stack particulates breach

Provisional results from external monitoring were returned on 3rd October 2023 and showed that the average result of 20.9mg/m³ was in breach of the ELV of 10mg/m³. The full report was received on 16th October which confirmed this. The results differed from the TDM data at the time of the monitoring which showed that particulates were well below the ELV and were reading between 0-1 mg/m³. However, following servicing of the probe by CES on 20th September a step change was observed in the particulates readings of between 2-6 mg/m³ on TDM, which because the indicated concentration was still below the ELV the kiln was kept running. When the provisional results of CES' testing were received the kiln was off for an unrelated issue, so the opportunity was taken to remove the probe at this time to inspect, with no obvious defects noted, and then replaced. After kiln restart on 03/10/23 particulates measurements increased above 20mg/m³ overnight, so on the morning of 4/10/23 a decision was made to swap over the probe with the identical model on the kiln hood filter to identify whether there was an issue with the probe. When the probe from the kiln hood filter was installed, particulates readings came down to ~20mg/m³ in line with the provisional results received from CES.

The kiln was then taken off immediately for inspections of the bag filter. Five damaged bags were identified in a number of compartments. Prior to this no indicators were noted that suggested the bag filter was compromised in any way. It is suspected that the probe may have become misaligned leading to the damped/low signal.

Kiln bag filter isolated and fully inspected on 05/10/23. Five damaged bags were identified and replaced.