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# **Stack Particulate Management Plan Annual Stack Particulate Report**

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**Period: October 2019 – September 2020**

**Licensed site: Adelaide Brighton Cement, Angaston Works**

**845, Stockwell Road, Angaston, SA 5353**

**EPA Licence number: 35**

**Date of Submission: 31 October 2020**

**Version Number: 1**



Report Submitted by: Sustainability/Environmental Engineer

*I certify that to the best of my knowledge and ability all the information in this report is a true and accurate reflection of the regulatory monitoring performed.*

## Glossary

<b>Term</b>	<b>Definition</b>
$\mu\text{g}/\text{m}^3$	micrograms per cubic metre
$\text{mg}/\text{m}^3$	milligrams per cubic metre
m	metre
$\text{m}^3$	cubic metres
$\text{m}^3/\text{s}$	cubic metres per second
$\text{Nm}^3$	Gas volume in cubic metres at STP dry basis
<b>Abbreviations</b>	<b>Definition</b>
Air EPP	Environment Protection (Air Quality) Policy 2016
SA EPA	South Australian Environment Protection Authority
STP	Standard Temperature and Pressure (zero degrees Celsius and 101.3 kilo Pascals absolute)
TSP	Total Suspended Particulates
SPMP	Stack Particulate Management Plan

<p><b>Monitoring Objective</b></p>	<p>All stack particulate emissions events for the reporting period, where levels have exceeded the reporting thresholds:</p> <ul style="list-style-type: none"> <li>• 100 mg/Nm<sup>3</sup> (1-hour averaging period) on Kiln Stack 1</li> <li>• 100 mg/Nm<sup>3</sup> (1-hour averaging period) on Kiln Stack 2</li> <li>• 25 mg/Nm<sup>3</sup> (1-hour averaging period) on Kiln Stack 3</li> </ul> <p>An annual report will be prepared and submitted by the last day of October of each year that provides an analysis of the 1-hour particulate reporting events including:</p> <ul style="list-style-type: none"> <li>• A table detailing the number and cause of reporting events for Kiln Stacks 1,2 and 3 <ul style="list-style-type: none"> <li>• date, time and duration</li> <li>• the measured particulate concentration mg/Nm<sup>3</sup> (STP-dry)</li> <li>• immediate actions taken to reduce particulate emissions</li> <li>• cause and corrective actions taken to prevent future reoccurrence</li> </ul> </li> <li>• A trend analysis of magnitude and duration of 1-hour notifications on a time series graph for each stack for the current year</li> <li>• A trend analysis of community complaints by type against 1-hour reporting events by cause on a time series graph for each stack</li> <li>• A table comparing the number of 1-hour reporting events by cause for the current and previous 1, 3 and 5 years. To provide consistency in data management, the new licence reporting requirements will be phased in as follows;</li> </ul> <table border="1"> <thead> <tr> <th>Reporting year</th> <th>Comparison with previous reporting years</th> </tr> </thead> <tbody> <tr> <td>2019 - 2020 data</td> <td>No comparison</td> </tr> <tr> <td>2020 - 2021 data</td> <td>1 year comparison</td> </tr> <tr> <td>2021 - 2022 data</td> <td>1 and 3 year comparison</td> </tr> <tr> <td>2022 - 2023 data</td> <td>1 and 3 year comparison</td> </tr> <tr> <td>2023 - 2024 data</td> <td>1, 3 and 5 year comparison</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>• Identification of opportunities for improvement to decrease the frequency, duration and magnitude of 1-hour reporting events</li> </ul>	Reporting year	Comparison with previous reporting years	2019 - 2020 data	No comparison	2020 - 2021 data	1 year comparison	2021 - 2022 data	1 and 3 year comparison	2022 - 2023 data	1 and 3 year comparison	2023 - 2024 data	1, 3 and 5 year comparison
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2023 - 2024 data	1, 3 and 5 year comparison												
<p><b>Monitoring Plan</b></p>	<p>This monitoring report has been prepared in line with the Stack Particulate Management Plan approved on 25 October 2019 by the South Australian EPA.</p> <p>The Plan is available on the ABC Angaston Community Website:  <a href="https://www.angastoncommunity.com.au">https://www.angastoncommunity.com.au</a></p>												

## Kiln - 1 Stack – Summary of 1-hr Reporting events for the period 1/10/2019 to 30/9/2020

No emission report as kiln was off for the period 1/10/2019 to 30/09/2020

## Kiln - 2 Stack – Summary of 1-hr Reporting events for the period 1/10/2019 to 30/9/2020

No 1- hr reporting events (particulate emissions exceeding 100 mg/Nm<sup>3</sup>)

## Kiln-3 Stack – Summary of 1-hr Reporting events for the period 1/10/2019 to 30/9/2020

The table below provides a summary of the 1-hr reporting events (particulate emissions greater than 25 mg/Nm<sup>3</sup>)

Event number	Start Date Time	End Date Time	Duration (mins)	Magnitude (mg/Nm <sup>3</sup> )	Cause	Immediate Actions Taken	Actions Taken to Prevent Reoccurrence
1	3/04/2020 10:32	3/04/2020 10:37	0:04:50	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
2	4/04/2020 17:57	4/04/2020 18:02	0:04:50	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
3	5/04/2020 4:52	5/04/2020 4:57	0:04:50	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
4	6/04/2020 7:58	6/04/2020 8:02	0:03:40	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
5	7/04/2020 4:35	7/04/2020 5:17	0:41:40	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
6	8/04/2020 22:37	8/04/2020 22:42	0:04:50	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
7	17/04/2020 12:17	17/04/2020 12:22	0:04:50	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
8	19/04/2020 22:59	19/04/2020 23:01	0:02:40	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.

Event number	Start Date Time	End Date Time	Duration (mins)	Magnitude (mg/Nm3)	Cause	Immediate Actions Taken	Actions Taken to Prevent Reoccurrence
9	24/04/2020 2:36	24/04/2020 3:01	0:24:50	28	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
10	24/04/2020 3:31	24/04/2020 3:46	0:14:50	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
11	25/04/2020 20:04	25/04/2020 21:16	1:11:40	27	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
12	27/04/2020 6:44	27/04/2020 7:56	1:11:50	27	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
13	30/04/2020 22:23	30/04/2020 23:06	0:42:40	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
14	1/05/2020 07:51	1/05/2020 08:06	0:15:00	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
15	1/05/2020 22:46	1/05/2020 22:51	0:04:50	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
16	1/05/2020 22:51	1/05/2020 22:56	0:04:50	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
17	2/05/2020 1:06	2/05/2020 1:11	0:04:50	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
18	2/05/2020 1:56	2/05/2020 2:00	0:04:10	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
19	2/05/2020 3:16	2/05/2020 3:21	0:04:50	28	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
20	2/05/2020 5:21	2/05/2020 5:26	0:04:50	27	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
21	2/05/2020 13:51	2/05/2020 14:11	0:19:50	27	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
22	3/05/2020 03:51	3/05/2020 03:56	0:04:50	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
23	3/05/2020 04:31	3/05/2020 04:36	0:04:50	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.

Event number	Start Date Time	End Date Time	Duration (mins)	Magnitude (mg/Nm <sup>3</sup> )	Cause	Immediate Actions Taken	Actions Taken to Prevent Reoccurrence
24	3/05/2020 10:41	3/05/2020 10:46	0:04:50	26	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
25	6/05/2020 0:56	6/05/2020 01:26	0:29:50	27	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
26	6/05/2020 01:26	6/05/2020 01:31	0:04:50	27	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
27	6/05/2020 05:46	6/05/2020 05:51	0:04:50	28	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
28	6/05/2020 22:36	6/05/2020 22:41	0:04:50	27	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.
29	7/05/2020 00:46	7/05/2020 00:51	0:04:50	27	Damaged filter bags.	Isolated purge air lines with suspected damaged filter bags.	Capped all damaged bags during down days. Cleaned the Baghouse.

The plant persisted with trying to manage the intermittent low-level particulate emission reporting events by adjusting the process to assess the capability of controlling particulate emissions by reducing flow rates.

However, there is a limit to how far flow rates can be lowered without causing process upsets and further particulate emissions. When this point is reached a shutdown of the kiln is required to be able to cool down the bag house for maintenance activities.

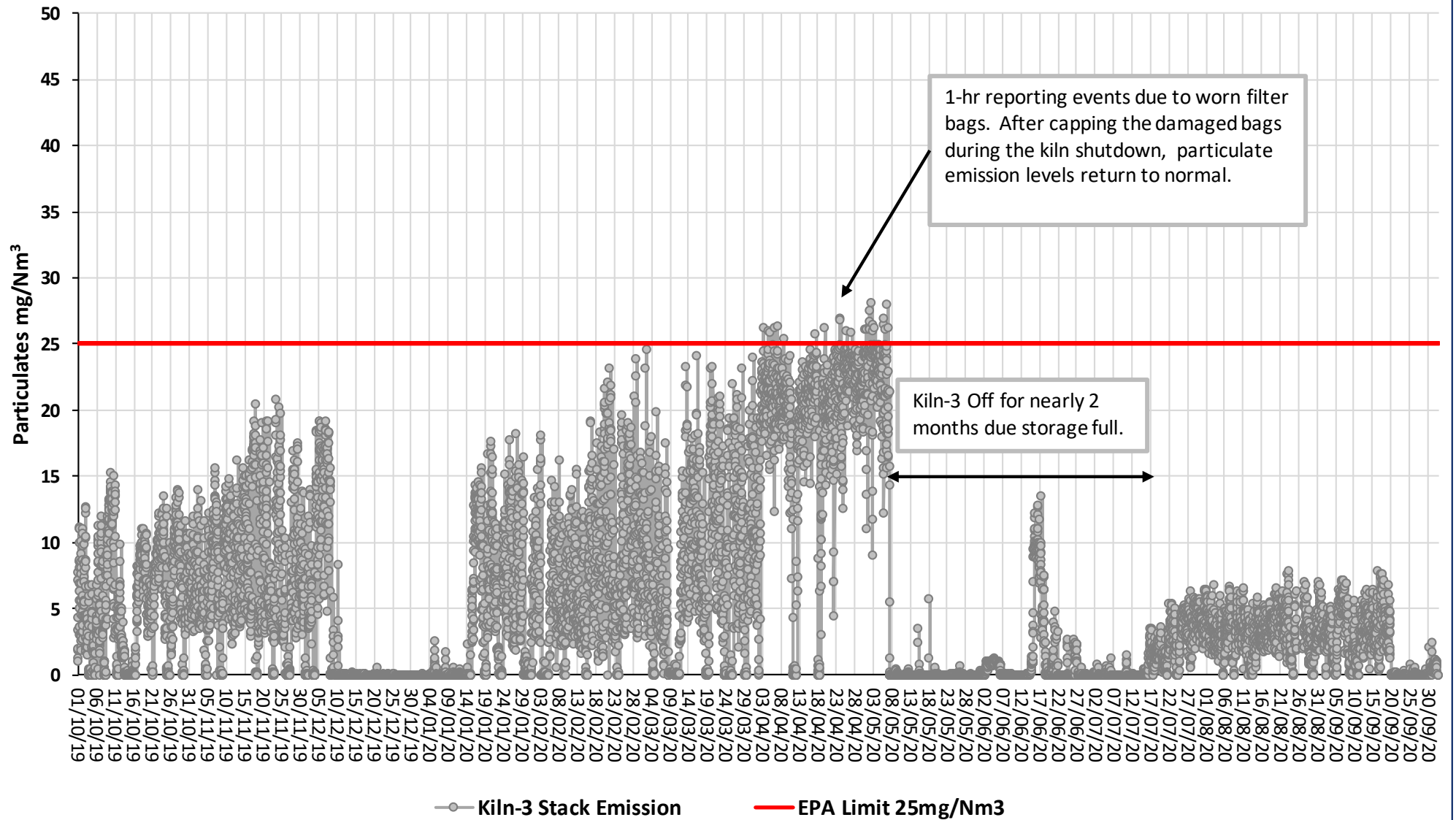
The kiln was shut down on 7 May 2020. A dye test was conducted on the Bag filter to help identify damaged filter bags. Sixteen damaged / worn filter bags were capped. The clean side of the bag filter was also vacuumed to remove an accumulation of dust from previously damaged bags.

The kiln remained shut for an extended period due to a downturn in market demand and was restarted on the 16 July 2020.

Following Kiln 3 start-up, particulate emissions have returned to normal levels.

The graph below provides a summary of Kiln 3 stack particulate emissions for the period 1/10/2019 to 30/9/2020

# Kiln-3 Stack - Particulates mg/Nm<sup>3</sup>



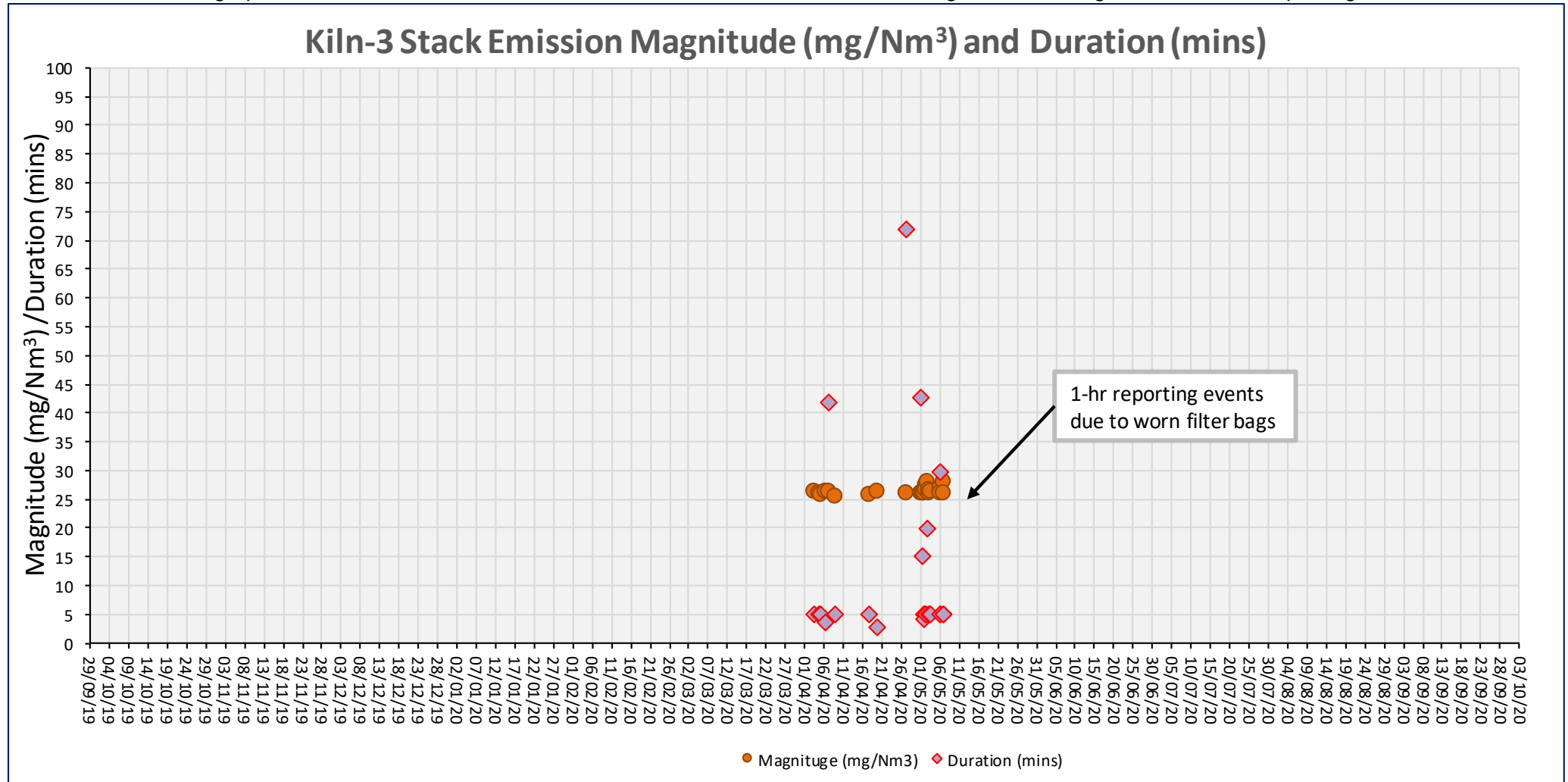
## Trend Analysis of magnitude and duration of 1- hr reporting events between 1/10/2019 – 1/10/2020

**Kiln 1 Stack:** kiln was off for the period 1/10/2019 to 30/09/2020

**Kiln 2 Stack:** No 1- hr Reporting events

**Kiln 3 Stack:** The graph below shows the magnitude and duration of 1-hr reporting events

The graph shows most events were of short duration a few mins and low in magnitude 1 to 3mg/Nm<sup>3</sup> above the reporting event threshold.





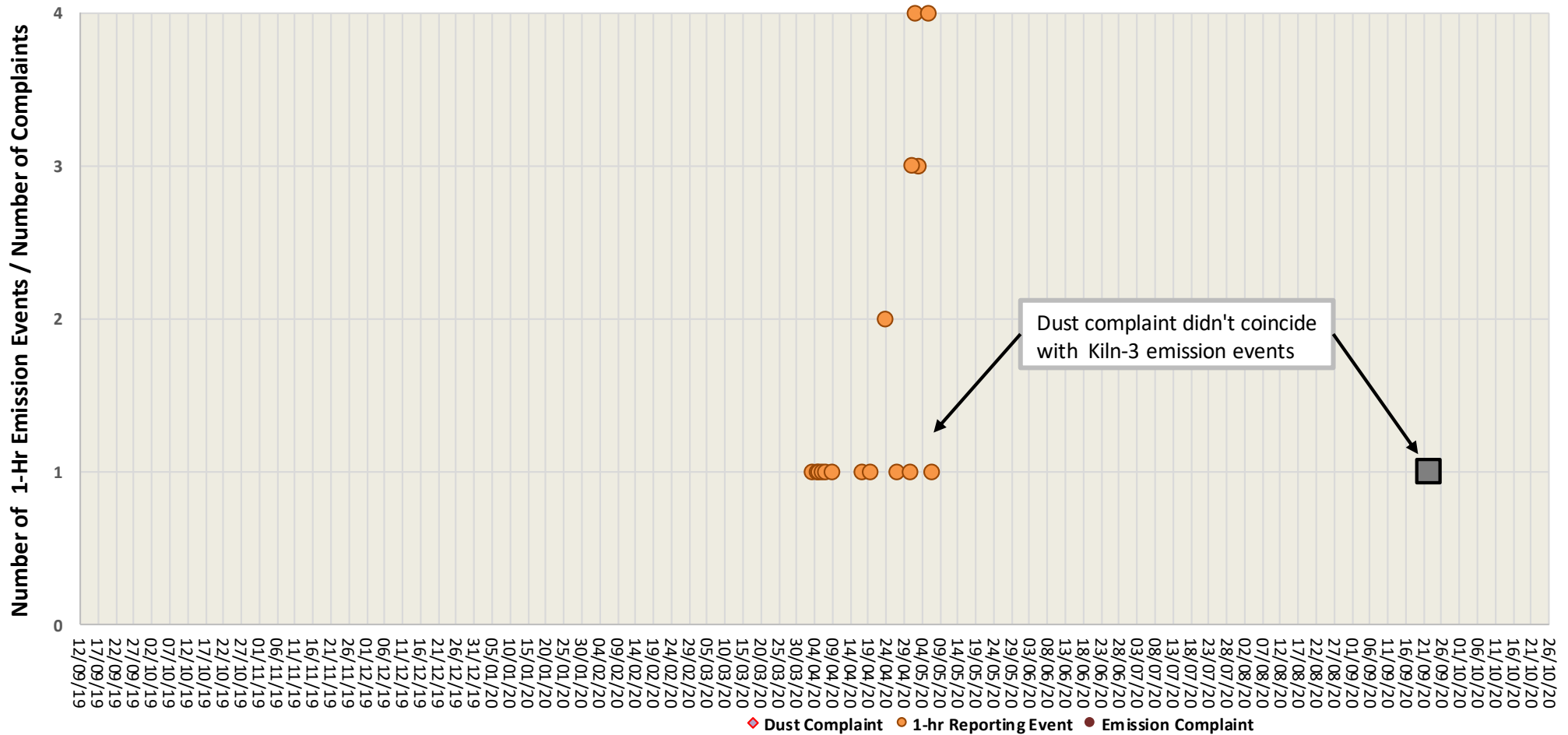
## Trend analysis of community complaints by type against 1-hr reporting events

The table below captures community complaint by type and stack 1-hr reporting events for the period 1/10/2019 to 30/09/2020

Date	Time	Kiln-1 Stack 1-hr Reporting Event	Kiln-2 Stack 1-hr Reporting Event	Kiln-3 Stack 1-hr Reporting Event	Dust Complaint	Kiln -1 Stack Emission Complaint	Kiln – 2 Stack Emission Complaint	Kiln – 3 Stack Emission Complaint
3/04/2020	10:32:50			1				
4/04/2020	17:57:40			1				
5/04/2020	4:52:40			1				
6/04/2020	7:58:40			1				
7/04/2020	4:35:40			1				
8/04/2020	22:37:40			1				
17/04/2020	12:17:10			1				
19/04/2020	22:59:10			1				
24/04/2020	3:31:50			1				
24/04/2020	2:36:50			1				
25/04/2020	20:04:50			1				
27/04/2020	6:44:40			1				
30/04/2020	22:23:50			1				
1/05/2020	22:51:30			1				
1/05/2020	22:46:30			1				
1/05/2020	7:51:30			1				
2/05/2020	13:51:30			1				
2/05/2020	5:21:30			1				
2/05/2020	3:16:30			1				
2/05/2020	1:56:30			1				
2/05/2020	1:06:30			1				
3/05/2020	10:41:20			1				
3/05/2020	4:31:20			1				
3/05/2020	3:51:20			1				
6/05/2020	22:36:20			1				
6/05/2020	5:46:20			1				
6/05/2020	1:26:10			1				
6/05/2020	0:56:10			1				
7/05/2020	0:46:20			1				
22/09/2020	16:00:00				1			

# Kiln 3 Stack

## Emission Events and Community Complaints



The graph shows that:

- There were no complaints about stack emissions.
- Kiln stack 1-hr reporting events did not result in community complaints.
- Community dust complaints did not coincide with stack 1-hr reporting events, indicating dust complaints are not related to stack emissions

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## Kiln Stacks 1, 2 & 3 - Number and Cause of 1- hour Reporting Events - 1/10/2019 – 30/09/2020

The number of reporting events by cause for each stack is summarised in the table below.

Stack	Cause of 1-hr Reporting Event	Type of 1-hr Reporting Event	Number of 1-hr reporting events current year October 2019-2020
Kiln-1	None (Not running)	Process Related	0
	None (Not running)	Equipment Related	0
	Total Number of Events		0
Kiln-2	None	Process Related	0
	None	Equipment Related	0
	Total Number of Events		0
Kiln-3	None	Process Related	0
	Damaged filter bags	Equipment Related	29
	Total Number of Events		29

The data in the table above shows that 1-hr reporting events, are related to equipment issues rather than process issues.

## Identification of opportunities to reduce the frequency, duration and magnitude of 1-hr reporting events

The table below details the opportunities to reduce the frequency, duration and magnitude of 1-hr reporting events, that have been identified.

All of the improvement opportunities have been implemented, except for the project to replace all the filter bags in Kiln-3 which is scheduled for the April 2021 Shutdown.

Stack	Improvement Opportunities Identified and Implemented	Improvement Opportunities to be Implemented
Kiln-2	Q14 exhaust fan and electrostatic precipitator inspection and cleaning are scheduled for extended kiln shutdowns to minimise the potential for particulate emissions on start up.	
	Alarm settings have been fine-tuned to give operators early warning of conditions that could result in a 1-hr reporting event for stack particulate emission.	
Kiln-3	Bag filter, inspections, capping or replacement of worn/damaged filter bags and air side cleaning are scheduled for extended kiln shutdown maintenance periods.	CAPEX to replace all filter bags in Kiln-3 has been approved for the next major plant shutdown, scheduled for April 2021.
	Alarm settings have been fine-tuned to give operators early warning of conditions that could result in 1-hr reporting event for stack particulate emission	

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## **Stack Particulate Management Plan / TARP Review:**

The Stack Particulate Management Plan (SPMP), approved on 25 October 2019, incorporates the use of stack particulate emissions Trigger Action Reporting Plans (TARP's).

1-hr reporting events have been related to equipment performance due to worn and damaged filter bags on kiln 3. This was rectified during kiln 3 shutdown in May/June 2020.

Preventive cleaning and maintenance of the Bag filter and electrostatic precipitator, during kiln shutdown periods, has been the most effective way to minimise 1-hr reporting events.

The current Trigger Action Reporting Plans have been effective in improving operation response times to process conditions that have the potential for stack emissions to reach 1-hr reporting levels.

There have been no identified improvements required in the existing TARP's.

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## **Summary:**

- The current Trigger Action Reporting Plans have been effective in improving operation response times to process conditions that have the potential for stack emissions to reach 1-hr reporting levels.
- Opportunities to reduce the frequency, number and magnitude of 1-hr reporting events have been identified and implemented.
- It is recommended that the performance of the existing TARP's be monitored over the next 12 months.