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# Stack Particulate Management Plan Annual Stack Particulate Report

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COMPLIANCE DATE: 31/10/24 – Annual Report 2024 (July 2023-June 2024)

EPA Licence 1126: Stack Particulate Management Plan (U - 1556)

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

**62 Elder Road, Birkenhead, SA 5015**

**EPA Licence number: 1126**

**Date of Submission: 31 October 2024**

**Version Number: 1**



Report Submitted by: Business Partner - Environment

## 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

<b>Monitoring Objective</b>	<p>All stack particulate emissions events for the reporting period where levels have exceeded the following reporting thresholds:</p> <p>Before 1/11/2022:</p> <ul style="list-style-type: none"> <li>• 100mg/Nm<sup>3</sup> (1 hour averaging period) on Kiln Stack 4A)</li> <li>• 60 mg/Nm<sup>3</sup> (1 hour averaging period) on Precalciner Stack 4B)</li> </ul> <p>After 1 /11/2022:</p> <ul style="list-style-type: none"> <li>• 80mg/Nm<sup>3</sup> (1 hour averaging period) on Kiln Stack 4A)</li> <li>• 50 mg/Nm<sup>3</sup> (1 hour averaging period) on Precalciner Stack 4B)</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 Stack 4A and Precalciner Stack 4B</li> <li>• A trend analysis of magnitude and duration of 1-hour notifications on a time series graph for each stack</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 year</li> <li>• Identification of opportunities for improvement to decrease the frequency, duration and magnitude of 1-hour reporting events</li> </ul>
<b>Monitoring Plan</b>	<p>This monitoring report has been prepared in line with the objectives of the Stack Particulate Management Plan approved on 12 September 2023 by the South Australian EPA.</p> <p>The Plan is available on the ABC Birkenhead Community Website:  <a href="http://www.birkenheadcommunity.com.au">http://www.birkenheadcommunity.com.au</a></p>

#### 4A Stack - Summary of 1-hr Reporting Events for the period 1/7/2023 to 30/06/2024

The table below provides a summary of 1-hr reporting events:

- before 1/11/2022, where stack particulates levels exceeded 100 mg/Nm<sup>3</sup> (1 hour averaging period) and
- after 1/11/2022, where stack particulates levels exceeded 80 mg/Nm<sup>3</sup> (1 hour averaging period)

Date	Time start	Time finish	Duration (min)	Magnitude mg/Nm <sup>3</sup>	Cause	Immediate Actions Taken	Actions Taken to Prevent a Reoccurrence
30/08/2023	20:57	21:12	15	83	<p>Kiln had been off for 13 hours, following a cyclone blockage.</p> <p>Blockage cleaning activities resulted in particulate emissions.</p> <p>Seized feed flap was identified as likely root cause of blockage.</p>	<p>During cleaning activities, 4A preheater &amp; main fan dampers are kept to minimum, to try and curb dust emissions. Fan dampers must be kept open to provide suction to keep cleaning crews safe from heat and dust.</p> <p>Clearing a cyclone blockage often results in surges of material being released into the kiln, which can cause emission spikes.</p> <p>Cleaning crews cannot always control the magnitude of the surges being released.</p> <p>Control room operators communicated with cleaning crews via radio to advise of emission issues in order to stop the task if required.</p> <p>Seized feed flap removed</p>	<p>Feed flap design to reduce chance of seizing in closed position is being investigated for implementation in 2024 kiln shutdown</p> <p>Review procedure for clearing blockages &amp; ensure adequate instructions for monitoring and controlling emissions are clear and present.</p>
28/05/2024	20:46	21:01	15	84.8	<p>There was insufficient compressed air availability to the 4A Gas Conditioning Tower water sprays, to effectively cool the gas stream during a 4A Mill trip event, which resulted in increased 4A ESP temperatures, reducing ESP performance, resulting in an increase in particulate emissions.</p> <p>It was identified that when the 4A Gas Conditioning Tower water sprays demanded more water and more atomising air with Raw Mill 4A off, the compressor system failed to meet the compressed air demand, only recruiting 2 out of the systems 4 compressors resulting in low air pressure.</p> <p>Further investigation found that a contract maintenance company had worked on the compressor system in the days prior. This work included disabling 2 out of 4 compressors, however, they believe all were returned to service. This has been the most likely cause identified.</p>	<p>Shift fitter drained excess water out of air receiver #2 and also from both inlet filters, also checked 4A sprays and whole system for air leaks, and put D silo compressors in manual to boost air pressure until 4A mill turned back on bringing particulate levels under control.</p>	<p>Critical SCADA alarm created to highlight to operators when less than 3 compressors available, has been implemented.</p> <p>Improved signage at compressors highlighting minimum of 3 compressors must be available at all times. To be installed</p>

#### 4B Stack - Summary of 1-hr Reporting Events for the period 1/7/2023 to 30/6/2024

The table below provides a summary of 1-hr reporting events:

- before 1/11/2022, where stack particulates levels exceeded 60 mg/Nm<sup>3</sup> (1 hour averaging period)) and
- after 1/11/2022, where stack particulates levels exceeded 50 mg/Nm<sup>3</sup> (1 hour averaging period))

Date	Time start	Time finish	Duration (min)	Magnitude mg/Nm <sup>3</sup>	Cause	Immediate Actions Taken	Actions Taken to Prevent a Reoccurrence
02/09/2023	16:42	17:48	66	100.9	4B conditioning tower water sprays air pressure regulator bulb failed resulting in malfunction of the spray system, increasing 4B ESP operating temperature and increase in particulate emissions.	4B Raw Mill could not be restarted due to metal detector fault. Fitter replaced air pressure regulator	Implement progressive replacement of site air regulator plastic bulbs with more durable option, starting with units exposed to the elements.
13/03/2024	12:19	12:57	38	54.3	4B ESP performance was being degraded, when 4B raw mill was stopped ("Pit – Stop") for a clean out and maintenance which impacted ESP performance resulting in increased particulate emissions.	Restarting 4B Raw Mill reduced particulate emissions.	The usual plant-operating conditions likely to cause a change in ESP performance were checked including: <ul style="list-style-type: none"> <li>• ESP fields and controls</li> <li>• Conditioning towers and water sprays</li> <li>• Flow rates and Temperatures</li> <li>• Temperatures and combustion process were not affected.</li> </ul> <p>Investigations so far have not identified a cause for the reduction in ESP performance.</p>
18/03/2024	2:28	3:12	44	60.7	4B ESP performance was being degraded, when 4B raw mill was stopped ("Pit – Stop") for a clean out and maintenance which impacted ESP performance resulting in increased particulate emissions.	Restarting 4B Raw Mill reduced particulate emissions.	The usual plant-operating conditions likely to cause a change in ESP performance were checked including: <ul style="list-style-type: none"> <li>• ESP fields and controls</li> <li>• Conditioning towers and water sprays</li> <li>• Flow rates and Temperatures</li> <li>• Temperatures and combustion process were not affected.</li> </ul> <p>Investigations so far have not identified a cause for the reduction in ESP performance.</p>

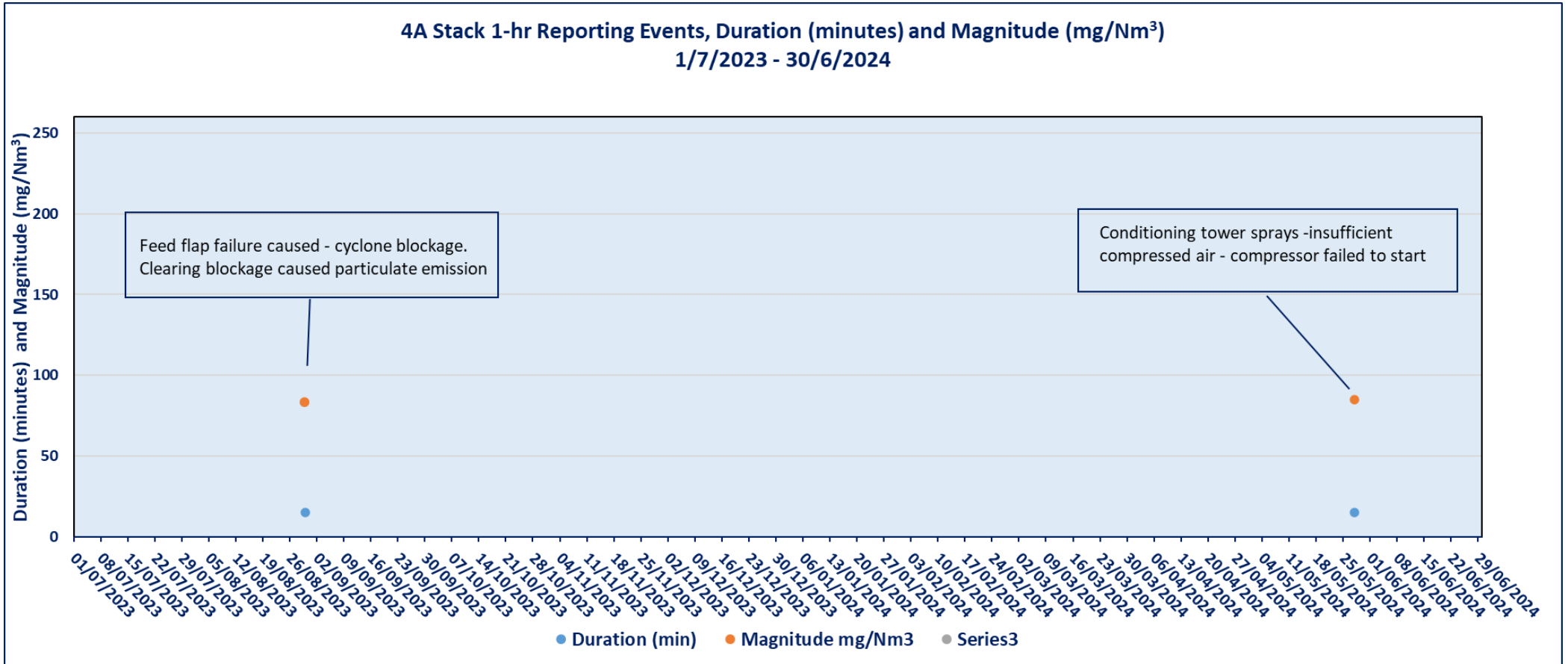
### Stacks 4A and 4B - Number and Cause of 1- hour Reporting Events - 1/7/2023– 30/6/2024

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

Stack	Cause of 1-hr Reporting Event	Number of 1-hr reporting events current year 1/7/2023 - 30/6/2024
4A	Feed Flap failure caused cyclone blockage -	1
	Loss of compressed air to 4A conditioning tower sprays – compressor failed to start	1
	<b>Total Number of Reporting Events</b>	<b>2</b>
4B	Erratic ESP Performance - unknown cause	2
	4B Conditioning tower sprays - loss of water due to compressed air regulator failure	1
	<b>Total Number of Reporting Events</b>	<b>3</b>

Trend Analysis of Magnitude and Duration of 1-hr Reporting Events between 1/07/2023 to 30/6/2024

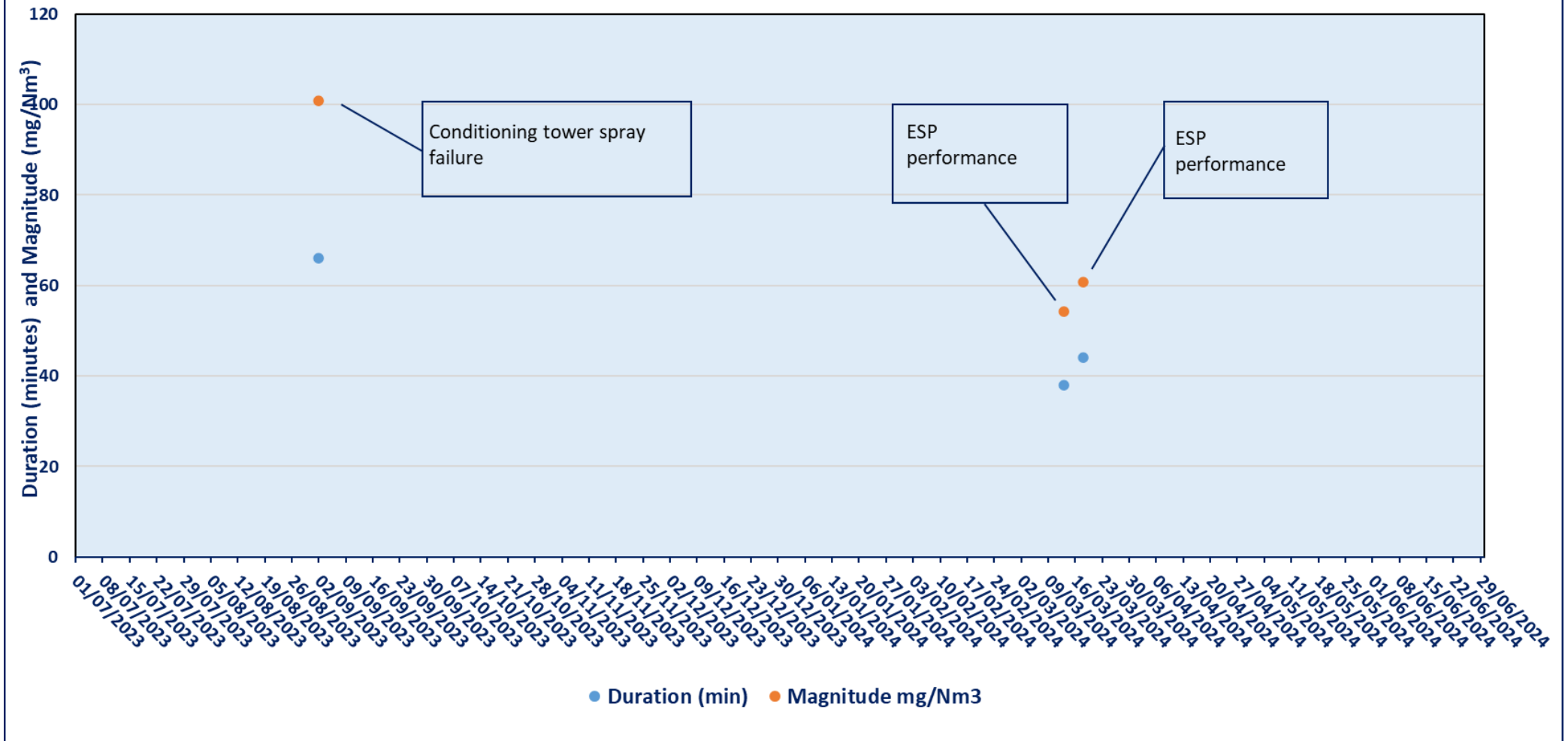
4A Stack:



There were 2, 1-hr reporting events for the year.

4B Stack:

4B Stack 1-hr Reporting Events, Duration (minutes) and Magnitude (mg/Nm<sup>3</sup>)  
1/7/2023 - 30/6/2024



There were 3, 1-hr reporting events for the year.



### Trend Analysis of Community Complaints by Type against 1-hr Reporting Events

The table below captures community complaints by type and stack 1-hr reporting events for the period 1/7/2023 to 30/06/2024.

Date	Finish Time	4A Stack Emissions 1-hr Reporting Event	4B Stack Emissions 1-hr Reporting Event	4A Stack Emissions Complaint	4B Stack Emissions Complaint	Emissions Complaint associated with 1-hr reporting event	Emissions Complaint Associated with 1-hr reporting event	Dust complaint	Ambient Air 24- hr PM <sub>10</sub> and PM <sub>2.5</sub> Exceedance Report	Ambient Air 24- hr PM <sub>2.5</sub> Exceedance Report	Odour
30/08/2023	21:12	1									
02/09/2023	17:48		1								
05/09/2023	19:55										1
11/09/2023	11:01							1			
13/09/2023	12:56							1			
13/09/2023	16:00							1			
15/09/2023	13:35							1			
10/10/2023	10:23							1			
17/10/2023	16.:12							1			
18/10/2023	21:11										1
24/10/2023	16:12							1			
15/11/2023	17:30							2			
18/11/2023	9:47							1			
21/12/2023	0:16							1			
17/02/2024	9:02										1
28/02/2024	12:29							1			
07/03/2024	18:30							1			
11/03/2024	21:15										1
17/03/2024	13:47							1			
30/03/2024	08:14										1
13/03/2024	12:57		1								
18/03/2024	2:28		1								
09/04/2024	16:00							1			
29/04/2024	16:33							1			
10/05/2024	24:00									1	
12/05/2024	24:00									1	
28/05/2024	21:01	1									
30/06/2024	24:00										

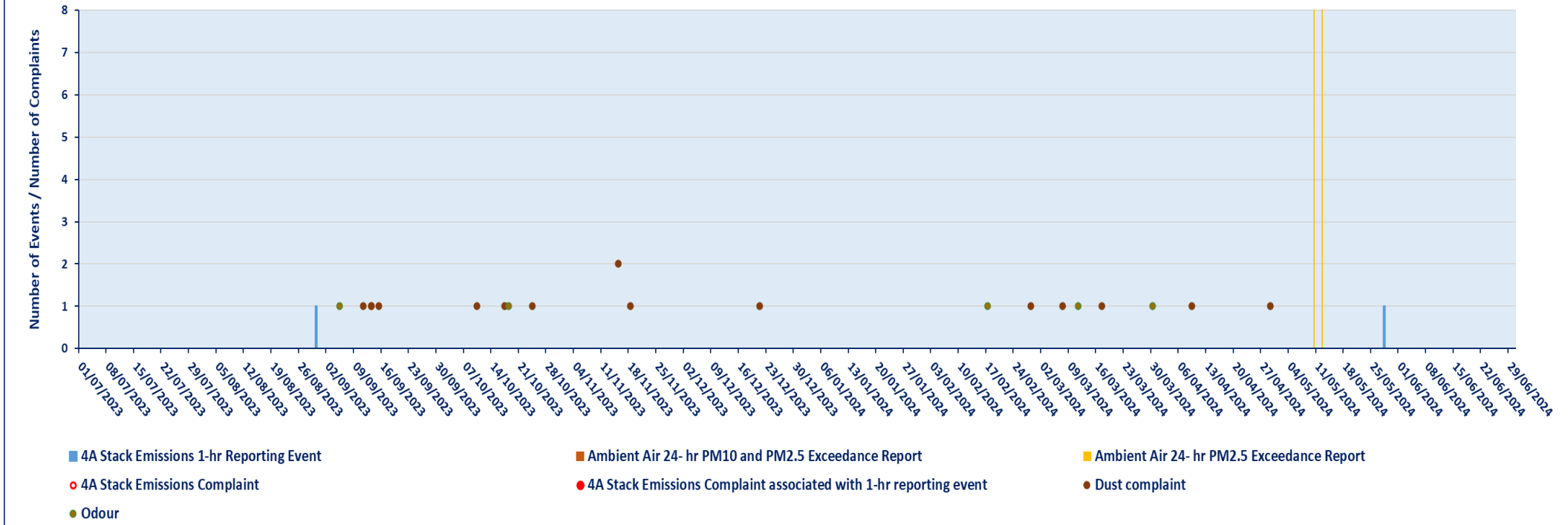
Legend
4A Stack 1-hr reporting event
4B Stack 1-hr reporting event
4A Stack Emissions complaint
4B Stack Emissions complaint
Ambient Air 24-hr PM <sub>2.5</sub> exceedance
Ambient Air 24-hr PM <sub>10</sub> & PM <sub>2.5</sub> exceedance
Dust complaint

Dust Complaints arising from the May 2024 event is not included in this table.

The above data is plotted on the following time series graph for each stack as follows:

4A Stack:

4A Stack Emission Complaints and Dust Complaints and Odour Complaints Compared against  
4A Stack Emissions 1-hour Reporting Events and Ambient 24 hr PM<sub>10</sub> and PM<sub>2.5</sub> Exceedance Reports  
1/7/2023 - 30/06/2024



Dust Complaints arising from the May 2024 event is not included in this graph.

Comments:

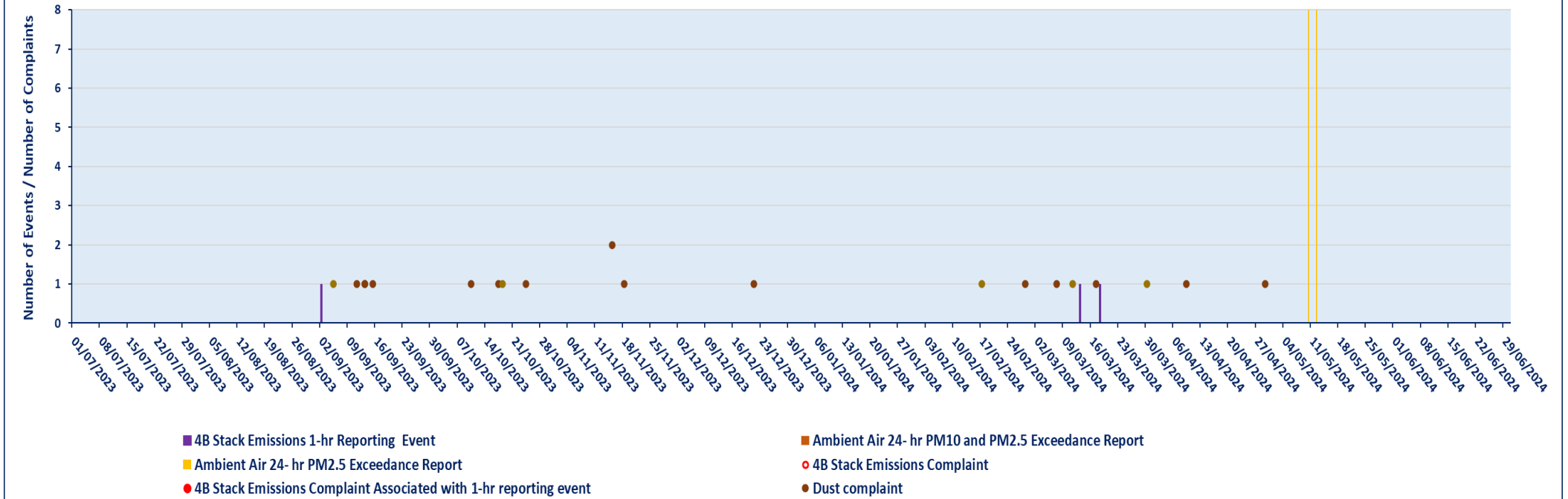
Stack emission complaints did not coincide with 4A stack 1-hr reporting events.

Dust complaints did not coincide with 4A stack 1-hr reporting events, indicating dust complaints are not related to stack emissions.

Odour complaints did not coincide with 4A stack 1-hr reporting events.

4B Stack:

4B Stack Emission Complaints and Dust Complaints and Odour Complaints Compared against  
4B Stack Emissions 1-hour Reporting Events and Ambient 24 hr PM<sub>10</sub> and PM<sub>2.5</sub> Exceedance Reports  
1/7/2022 - 30/06/2023



Dust Complaints arising from the May 2024 event is not included in this graph.

Comments:

Stack emission complaints did not coincide with 4B stack 1-hr reporting events.

Dust complaints did not coincide with 4B stack 1-hr reporting events, indicating dust complaints are not related to stack emissions.

Odour complaints did not coincide with 4B stack 1-hr reporting events.

### Stacks 4A and 4B - Comparison of current and previous year, 1-hr reporting events - by cause and number

The table below details the number and cause of 1-hr reporting events for both stacks, for the current and previous reporting year.

Stack	Cause of 1-hr Reporting Event	Type of 1-hr Reporting Event	Number of 1-hr reporting events current year	Number of 1-hr reporting events current year
			1/7/2022 - 30/6/2023	1/7/2023 - 30/6/2024
4A	Erratic ESP Performance - unknown cause	Process related	1	0
	Electrical fault tripped power supply to 4A conditioning tower sprays	Equipment related	1	0
	Faulty thermocouple - 4A conditioning tower sprays control erratic	Equipment related	1	0
	4A conditioning tower sprays did not deliver sufficient water for effective cooling	Equipment related	1	0
	Feed Flap failure caused cyclone blockage -	Equipment related	0	1
	Loss of compressed air to 4A conditioning tower sprays – due to compressor failed to start	Equipment related	0	1
	<b>Total Number of Reporting Events</b>		<b>4</b>	<b>2</b>
4B	Erratic ESP Performance - unknown cause	Process related	1	2
	Mechanical failure of the water supply control valve for the 4B Conditioning Tower spray system, which resulted in a loss of water flow to the sprays. Valve failure occurred when 4B Raw Mill was off, which is when high water flow through the sprays is required to cool and condition the process gases to maintain effective ESP performance.	Equipment related	1	0
	Calciner start up after a false indication of high methane (natural gas) resulted in a safety trip of the Calciner and 4B electrostatic precipitator	Equipment related	1	0
	Calciner safety trip triggered by carbon monoxide sensor, unstable conditions for a period following start up.	Process related	3	0
	4B Conditioning tower sprays not started by operator following kiln trip caused by kiln main drive cooling fan failure	Equipment related	1	0
	4B ESP - too hot on start up - insufficient cold air bleed on start up	Process related	1	0
	4B Conditioning tower sprays - loss of water due to compressed air regulator failure	Equipment related	0	1
	Combustion trip due to electrical component failure in combustion gas analyser.	Equipment related	1	0
	<b>Total Number of Reporting Events</b>		<b>9</b>	<b>3</b>

The data above shows a reduction in levels in 1-hr reporting events between the two reporting years.

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

Actions taken to prevent recurrence of 1-hr reporting events has been documented for each reporting event.

Equipment related failures are one off events and don't suggest an underlying condition that that requires any further action.

### Stack Particulate Management Plan / TARP Review:

The Stack Particulate Management Plan (SPMP), approved on the 13 September 2023, incorporates the use of stack particulate emissions Trigger Action Response Plans (TARP's). The purpose of the stack TARP's is to enable early action to be taken to prevent or minimise the number of occasions where stack emissions reach the 1-hr reporting threshold. The plant initiates early action when particulate emissions reach the 10-minute trigger threshold.

The table below details the number of 10-minute triggers that were activated for each stack for the reporting period 1/7/2022 to 30/6/2023.

#### 10 minute TARP trigger events for the period 1/7/2023 to 30/6/2024

Stack	Number of 10-minute trigger events	Number of 1-hr Reporting events
4A	9	2
4B	19	3

The data in the table shows the current 10-minute triggers are providing sufficient early warning needed to reduce the number of 1-hr reporting events.

The following tables summarises the 1-hr reporting events by type for 4A and 4B stacks since the TARP was implemented in 2018.

#### Table 1-hr Reporting Events by type since implementation of the Stack Particulate TARP

Stack	Type of 1-hr Reporting Event	Number of 1-hr reporting events 1/11/2017 - 30/6/2018	Number of 1-hr reporting events 1/7/2018 - 30/6/2019	Number of 1-hr reporting events 1/7/2019 - 30/6/2020	Number of 1-hr reporting events 1/7/2020 - 30/6/2021	Number of 1-hr reporting events 1/7/2021 - 30/6/2022	Number of 1-hr reporting events 1/7/2022 - 30/6/2023	Number of 1-hr reporting events 1/7/2023 - 30/6/2024
4A	Process related	5	1	3	1	4	1	0
	Equipment related	1			2	4	3	2
	<b>Total</b>	<b>6</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>8</b>	<b>4</b>	<b>2</b>
4B	Process related	7	1	4	6	4	4	2
	Equipment related	1	5	2	1	3	5	1
	<b>Total</b>	<b>8</b>	<b>6</b>	<b>6</b>	<b>7</b>	<b>7</b>	<b>9</b>	<b>3</b>

## 4A and 4B Stack – Number of 1-hr Reporting Events per reporting year by type

Stack	Cause of 1-hr Reporting Event	Type of Event	1/11/2017 30/6/2018	1/7/2018 30/6/2019	1/7/2019 30/6/2020	1/7/2020 30/6/2021	1/7/2021 30/6/2022	1/7/2022 30/6/2023	1/7/2023 30/6/2024
4A	Excess build-up within the Bypass process	Process related	5	1	2	1	0	0	0
	Ruptured airline hose to valve that controls water flow to the conditioning tower cooling spray system	Equipment related	1	0	0	0	0	0	0
	Erratic ESP Performance - unknown cause	Process related	0	0	1	0	0	1	0
	4A ESP field 6 - electrical trip due to a loose wire reducing effectiveness of ESP.	Equipment related	0	0	0	0	2	0	0
	Automatic safety trip on the kiln, in response to a failure of the inlet temperature sensor on the Bypass ESP.	Equipment related	0	0	0	1	0	0	0
	Automatic safety trip on the kiln. 4A mill was also off at the same time	Process related	0	0	0	0	1	0	0
	ESP - F extractor screw Jammed - re entrainment of dust in process gas to 4A stack	Equipment related	0	0	0	0	1	0	0
	ESP - F extractor screw Jammed - clearing build-up of dust resulted in re entrainment of dust in process gas to 4A stack	Process related	0	0	0	0	2	0	0
	Calciner tripped due to high exit pressure, resulting in blockage - kiln shutdown to clear blockages creating emissions	Process related	0	0	0	0	1	0	0
	Loss of compressed air to 4A conditioning tower sprays – due to water cooling system electrical fault tripping water cooled air compressor	Equipment related	0	0	0	0	1	0	0
	Electrical fault tripped power supply to 4A conditioning tower sprays	Equipment related	0	0	0	0	0	1	0
	Faulty thermocouple - 4A conditioning tower sprays control erratic	Equipment related	0	0	0	0	0	1	0
	4A conditioning tower sprays did not deliver sufficient water for effective cooling	Equipment related	0	0	0	0	0	1	0
	Feed Flap failure caused cyclone blockage -	Equipment related	0	0	0	0	0	0	1
	Loss of compressed air to 4A conditioning tower sprays – due to compressor failed to start	Equipment related	0	0	0	0	0	0	1
	4A conditioning tower spray pump failed	Equipment related	0	0	0	1	0	0	0
<b>Total Number of Reporting Events</b>			<b>6</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>8</b>	<b>4</b>	<b>2</b>

Stack	Cause of 1-hr Reporting Event	Type of Event	1/11/2017 30/6/2018	1/7/2018 30/6/2019	1/7/2019 30/6/2020	1/7/2020 30/6/2021	1/7/2021 30/6/2022	1/7/2022 30/6/2023	1/7/2023 30/6/2024
4B	4B Mill off for extended period	Process related	7	0	2	4	0	0	0
	Equipment failure of 4B Elevator drag chain transport system	Equipment related	1	0	0	0	0	0	0
	Dislodged baffle plates at the entrance to the Electrostatic Precipitator were found to be the root cause	Equipment related	0	2	0	0	0	0	0
	4B Mill tripped (unforeseen sudden stop causing upset process conditions)	Process related	0	1	0	1	0	0	0
	Rare failure of a pump level protection sensor on the 4B conditioning tower header tank, tripping the pumps providing water to the conditioning tower sprays during a 4B mill stoppage	Equipment related	0	1	0	0	0	0	0
	Failure of the pump on the conditioning spray system to turn on, when the 4B Mill was turned off	Equipment related	0	1	0	0	0	0	0
	The 4B Electrostatic Precipitator (emission filtering equipment) efficiency was reduced as a result of water ingress from a cracked plastic casing on an electrical control unit.	Equipment related	0	1	0	0	0	0	0
	VVF drive fault occurred on 4B Raw feed conveyor during 4B mill start up sequence, preventing 4B conditioning tower sprays to come on.	Equipment related	0	0	1	0	0	0	0
	The event occurred after the calciner tripped on high exit pressure. The increase in particulate emissions occurred as a result of increased flow required to safely perform fault finding and remove a metal pole, that was found lodged in the dust flap below 4B cyclone.	Process related	0	0	1	0	0	0	0
	The event occurred as a result of an electrical fault on 4B ESP field 3, which resulted in loss of that field, with resulting increase in particulate emission. The root cause of the problem was a failed cartridge fuse switch and associated cabling on the ESP switchboard.	Equipment related	0	0	1	0	0	0	0

Stack	Cause of 1-hr Reporting Event	Type of Event	1/11/2017 30/6/2018	1/7/2018 30/6/2019	1/7/2019 30/6/2020	1/7/2020 30/6/2021	1/7/2021 30/6/2022	1/7/2022 30/6/2023	1/7/2023 30/6/2024
4B	Erratic ESP Performance - unknown cause	Process related	0	0	1	0	0	1	2
	Kiln and Calciner trip- Emergency stop activated in response to a Kiln shell hot spot	Equipment related	0	0	0	1	0	0	0
	Short term electrical instability in 4B ESP fields on start-up of the calciner following a kiln trip.	Process related	0	0	0	1	0	0	0
	A section of refractory lining spalled off the 3B Cyclone in the Calciner preheater, tripping the Calciner combustion system. For safety reasons, the blockage consisting of refractory and raw meal at 600C is cleared under negative pressure, using high pressure water lances to break up the refractory. The process of clearing the blockage creates variations in draft and particulate emission levels which are difficult to manage	Equipment related	0	0	0	0	1	0	0
	Mechanical failure of the water supply control valve for the 4B Conditioning Tower spray system, which resulted in a loss of water flow to the sprays. Valve failure occurred when 4B Raw Mill was off, which is when high water flow through the sprays is required to cool and condition the process gases to maintain effective ESP performance.	Equipment related	0	0	0	0	1	1	0
	Calciner tripped due to a high positive draft on 4B Mill arising from dust fall back into 4B mill creating a blockage.	Process related	0	0	0	0	3	0	0
	Calciner start up after a false indication of high methane (natural gas) resulted in a safety trip of the Calciner and 4B electrostatic precipitator	Equipment related	0	0	0	0	1	1	0
	Calciner safety trip triggered by carbon monoxide sensor, unstable conditions for a period following start up.	Process related	0	0	0	0	0	3	0
	4B Conditioning tower sprays not started by operator following kiln trip caused by kiln main drive cooling fan failure	Equipment related	0	0	0	0	0	1	0
	4B ESP too hot on start-up - insufficient cold air bleed on start up	Process related	0	0	0	0	0	1	0
	4B Conditioning tower sprays - loss of water due to compressed air regulator failure	Equipment related	0	0	0	0	0	0	1
	Combustion trip due to electrical component failure in combustion gas analyser.	Equipment related	0	0	0	0	0	1	0
	Calciner shutdown at 2:30 due to low flow from blending silo	Process related	0	0	0	0	1	0	0
	<b>Total Number of Reporting Events</b>			<b>8</b>	<b>6</b>	<b>6</b>	<b>7</b>	<b>7</b>	<b>9</b>



The data in the above tables shows that there are a number of process and equipment related conditions that give rise to 1-hr reporting events.

The data also shows that since the introduction of stack TARPs in July 2018, there has been a reduction in the number of process-related 1-hr reporting events.

Equipment performance related events that result in a 1-hr reporting event, are often unique in nature and require the plant to remain operational long enough to be able to determine the root cause of the problem, so that corrective action can be taken.

The current 10-minute triggers provide the plant with the early warning needed to start trouble shooting for equipment and process related issues.

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

There have been no identified improvements required in the existing TARPs.

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**Summary:**

- The existing TARPs have been effective, in reducing the number of 1-hr reporting events.
  - 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 TARPs continue to be monitored for improvement over the next 12 months.
-