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

**Period: 1 July 2021 – 30 June 2022**

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

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

**EPA Licence number: 1126**

**Date of Submission: 31 October 2022**

**Version Number: 1**



Report Submitted by: Advisor Environment - C&L (SA/NSW/NT)

## 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 reporting thresholds:</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>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 18 June 2018 by the South Australian EPA.</p> <p>The Plan is available on the ABC Birkenhead Community Website:<br/> <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 1/7/2021 to 30/06/2022

The table below provides a summary of 1-hr reporting events (stack particulates levels exceeding 100 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   |
|------------|------------|-------------|----------------|------------------------------|--|--|---|
| 03/08/2021 | 14:45      | 15:17       | 32             | 122.2                        | Automatic safety trip on the kiln. 4A mill was also off at the same time   | Kiln and mill remained off until emissions reduced.  | Investigation in progress to determine why the water sprays were not activated. |
| 25/02/2022 | 13:04      | 13:49       | 45             | 103.5                        | Electrical trip on 4A ESP field 6 due to a loose wire reducing effectiveness of ESP.   | Field 6 trip investigated and reset to reduce emissions  | Maintain existing ESP maintenance program                                       |
| 02/03/2022 | 23:36      | 0:33        | 57             | 109                          | 4A ESP field 6 faulty - loose wire, reducing ESP performance   | Kiln shutdown to inspect and repair 4A ESP field 6   | Maintain existing ESP maintenance program                                       |
| 05/03/2022 | 22:49      | 23:28       | 39             | 109.1                        | 4A ESP F extractor screw jammed - hopper above the screw full and re entrainment of dust in process gas to 4A stack  | Industrial Vacuum truck used to clean collected dust from hopper, to try to free jammed extractor screw. | Extractor screw repaired.   |
| 06/03/2022 | 8:19       | 9:27        | 68             | 160.4                        | Vacuum truck operators left access port open after cleaning 4A ESP F extractor screw hopper introducing a flow disturbance in ESP affecting ESP performance.   | Access port closed and vacuum truck operators advised.   | Extractor screw repaired.   |
| 10/03/2022 | 9:59       | 10:53       | 54             | 132                          | Loss of compressed air to the 4A Conditioning Tower sprays due to shutdown of water-cooled air compressors. Compressors shutdown, due to a failure in plant cooling water system due to a loose connection in the systems PLC.   | Kiln was shutdown at 9:52 am to enable the electrical failure to be identified and rectified             | Rare electrical fault and unlikely to reoccur                                   |
| 02/05/2022 | 19:38      | 20:02       | 24             | 105.3                        | 4A ESP F extractor screw jammed - hopper above screw being cleaned by vacuum truck to prevent entrainment of dust in process gas to 4A stack. Vacuum truck operators left access port open after cleaning 4A ESP F extractor screw hopper introducing a flow disturbance in ESP affecting ESP performance. | Access port closed and vacuum truck operators advised.   | Extractor screw repaired.   |
| 19/05/2022 | 11:46      | 12:44       | 58             | 149.9                        | Calcliner tripped due to high exit pressure, resulting in blockage.  | Kiln shut down. Clearing blockages resulted in increased dust emission.                                  | Blockage cleared  |

#### 4B Stack - Summary of 1-hr Reporting Events for the period 1/7/2020 to 30/6/2021

The table below provides a summary of 1-hr reporting events (stack particulates levels exceeding 60 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   |
|------------|------------|-------------|----------------|------------------------------|--|--|---|
| 09/10/2021 | 16:54      | 17:07       | 13             | 66.8                         | 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 | Blockage cleared   | This is a rare event. Maintain existing maintenance /inspection                               |
| 07/11/2021 | 8:15       | 9:10        | 55             | 92.3                         | 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.  | Unable to restart 4B Mill so Calciner turned off to control emissions and valve repaired.  | This failure has not occurred before. Valve repaired - all mechanical working parts replaced. |
| 01/01/2022 | 10:25      | 10:39       | 14             | 70.1                         | Calciner tripped at 8.05 am due to a high positive draft on 4B Mill arising from dust fall back into 4B mill creating a blockage.  | Clearing the blockage and purging the combustion system resulted in two 1 hr reporting events at 10:25 am and 11:58 am. The Calciner combustion system was restarted at 2.33pm | This is a rare event.   |
| 01/01/2022 | 11:58      | 12:50       | 52             | 74.6                         | Calciner tripped at 8.05 am due to a high positive draft on 4B Mill arising from dust fall back into 4B mill creating a blockage.  | Clearing the blockage and purging the combustion system resulted in two 1 hr reporting events at 10:25 am and 11:58 am. The Calciner combustion system was restarted at 2.33pm | This is a rare event.   |
| 12/02/2022 | 11:49      | 13:49       | 100            | 118.2                        | Calciner start up after a false indication of high methane (natural gas) resulted in a safety trip of the Calciner and 4B electrostatic precipitator   | Clearing the blockage and purging the combustion system resulted in 1 hr reporting event   | This is a rare event.   |
| 03/04/2022 | 4:33       | 5:35        | 62             | 65.5                         | Calciner shutdown at 2:30 due to low flow from blending silo   | Calciner shutdown resulted in slight increase in dust emissions  | This is a rare event.   |
| 19/05/2022 | 17:23      | 18:04       | 41             | 72.4                         | Calciner tripped due to high exit pressure, resulting in blockages.  | Kiln shut down. Clearing blockages resulted in increased dust emission.  | Blockage cleared  |

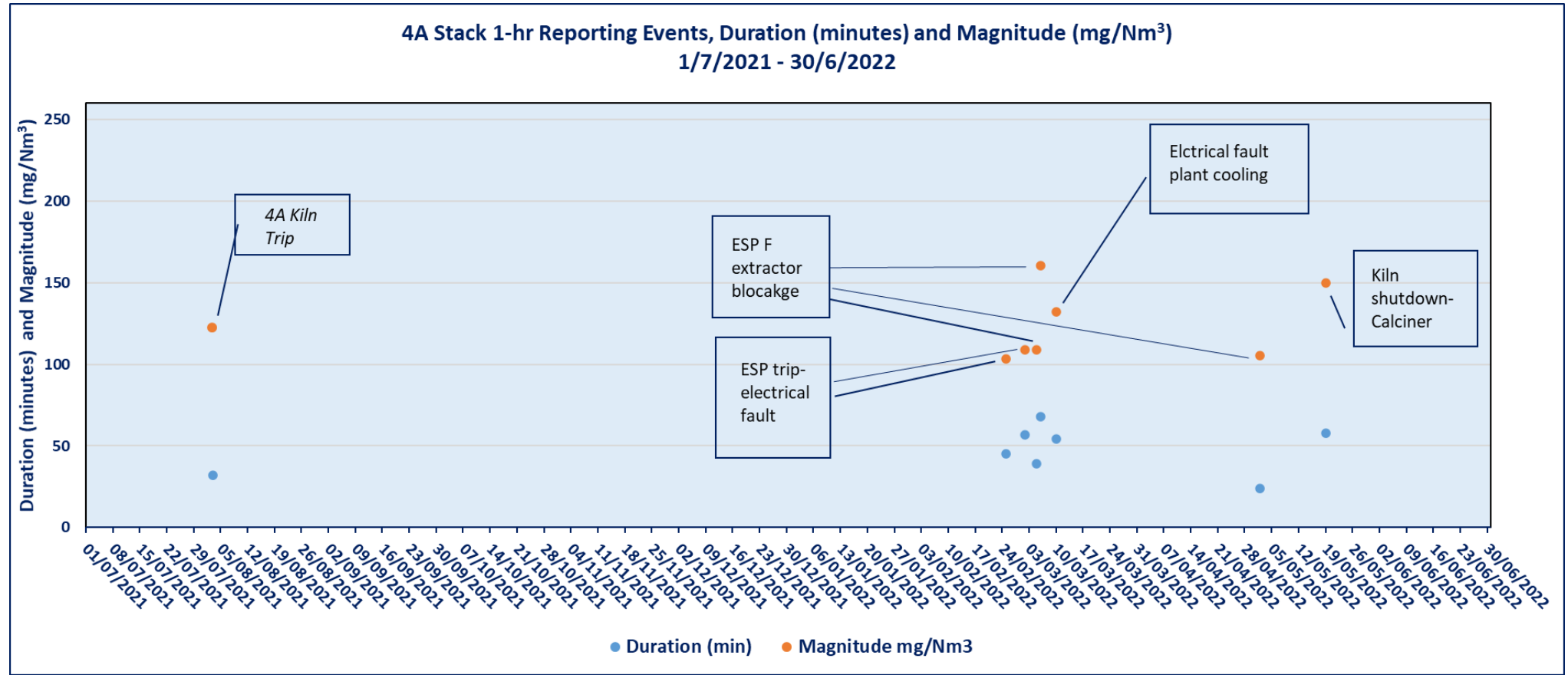
## Stacks 4A and 4B - Number and Cause of 1- hour Reporting Events - 1/7/2020– 30/6/2021

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<br>1/7/2021 to 30/6/2022 |
|-------|--|---|
| 4A    | Automatic safety trip on the kiln. 4A mill was also off at the same time   | 1   |
|       | Calciner tripped due to high exit pressure, resulting in blockage - kiln shutdown to clear blockages creating emissions  | 1   |
|       | 4A ESP field 6 - electrical trip due to a loose wire reducing effectiveness of ESP.  | 2   |
|       | ESP - F extractor screw Jammed - re entrainment of dust in process gas to 4A stack   | 1   |
|       | ESP - F extractor screw Jammed - clearing build-up of dust resulted in- re entrainment of dust in process gas to 4A stack  | 2   |
|       | Loss of compressed air to 4A conditioning tower sprays – due to water cooling system electrical fault tripping water cooled air compressor   | 1   |
|       | <b>Total Number of Reporting Events</b>  | <b>8</b>  |
| 4B    | 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 | 1   |
|       | Calciner tripped due to a high positive draft on 4B Mill arising from dust fall back into 4B mill creating a blockage.   | 3   |
|       | 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.  | 1   |
|       | Calciner shutdown at 2:30 due to low flow from blending silo   | 1   |
|       | Calciner start up after a false indication of high methane (natural gas) resulted in a safety trip of the Calciner and 4B electrostatic precipitator   | 2   |
|       | <b>Total Number of Reporting Events</b>  | <b>7</b>  |

Trend Analysis of Magnitude and Duration of 1-hr Reporting Events between 1/07/2021 to 30/6/2022

4A Stack:

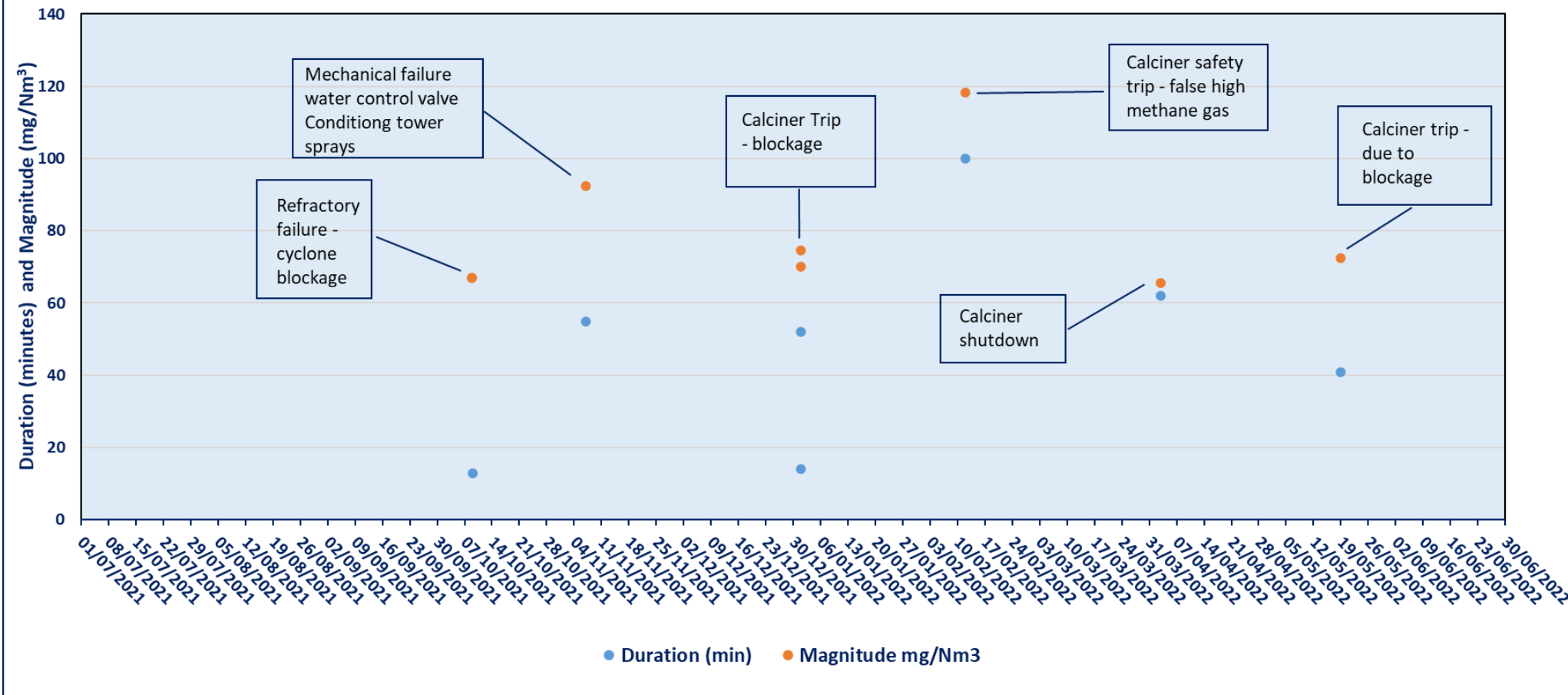


There were 8, 1-hr reporting events for the year.



4B Stack:

4B Stack 1-hr Reporting Events, Duration (minutes) and Magnitude (mg/Nm<sup>3</sup>)  
1/7/2021 - 30/6/2022



There were 7, 1-hr reporting events for the year.



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

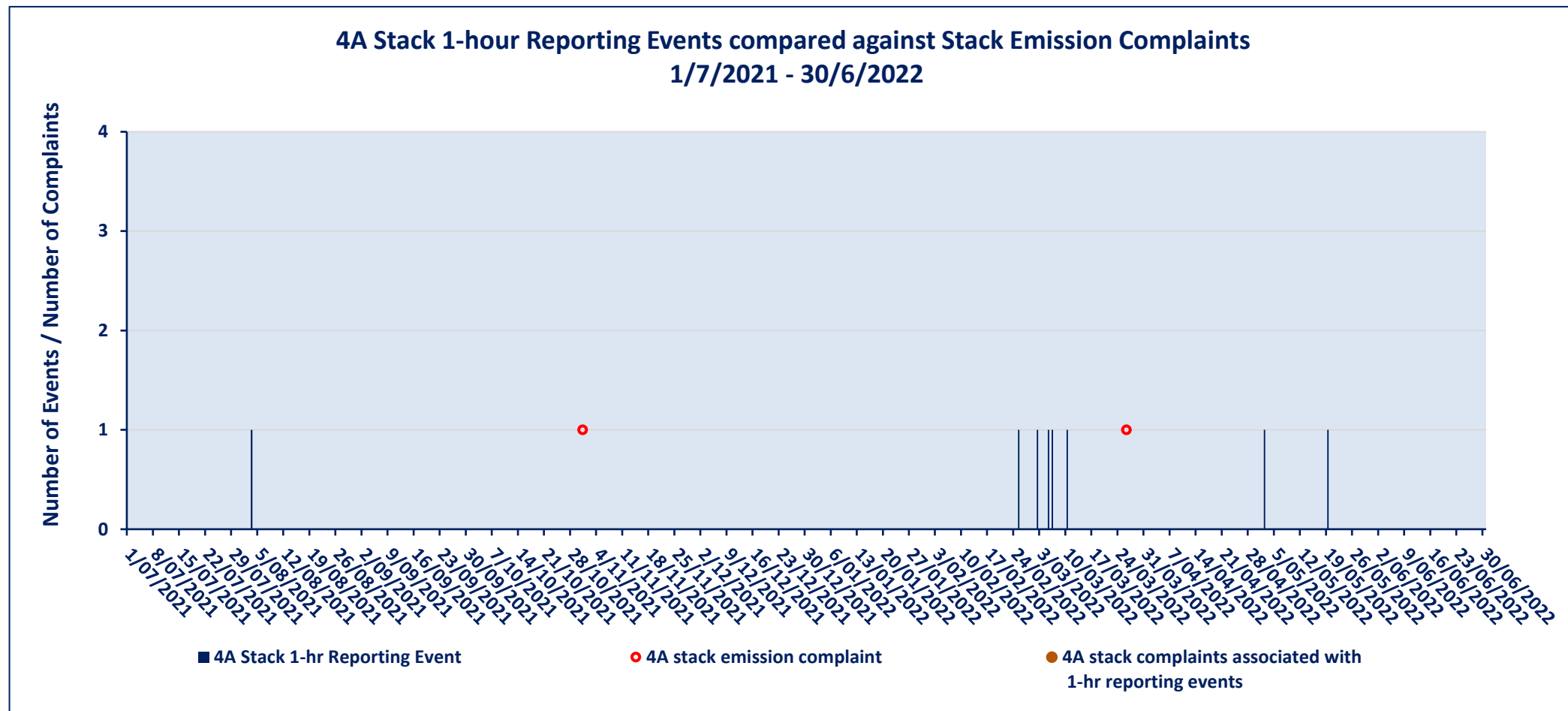
The table below captures community complaints by type and stack 1-hr reporting events for the period 1/7/2021 to 30/06/2022

| Date       | Time  | 4A Stack 1-hr Reporting Event | 4B Stack 1-hr Reporting Event | 4A stack emission complaint | 4B stack emission complaint | 4A stack complaints associated with 1-hr reporting events | 4B stack complaints associated with 1-hr reporting events | Dust Complaint |
|------------|-------|-------------------------------|-------------------------------|-----------------------------|-----------------------------|---|---|----------------|
| 19/07/2021 | 00:08 |                               |                               |                             | 1                           |   |   |                |
| 03/08/2021 | 14:45 | 1                             |                               |                             |                             |   |   |                |
| 8/08/2021  | 12:43 |                               |                               |                             |                             |   |   | 1              |
| 9/08/2021  | 13:48 |                               |                               |                             |                             |   |   | 1              |
| 22/08/2021 | 10:30 |                               |                               |                             |                             |   |   | 1              |
| 24/08/2021 | 13:28 |                               |                               |                             |                             |   |   | 1              |
| 1/09/2021  | 10:00 |                               |                               |                             |                             |   |   | 1              |
| 8/09/2021  | 14:30 |                               |                               |                             |                             |   |   | 1              |
| 10/09/2021 | 09:21 |                               |                               |                             | 1                           |   |   |                |
| 13/09/2021 | 10:00 |                               |                               |                             |                             |   |   | 2              |
| 13/09/2021 | 08:00 |                               |                               |                             |                             |   |   |                |
| 16/09/2021 | 08:06 |                               |                               |                             |                             |   |   | 1              |
| 17/09/2021 | 10:28 |                               |                               |                             |                             |   |   | 1              |
| 09/10/2021 | 16:54 |                               | 1                             |                             |                             |   |   |                |
| 19/10/2021 | 05:30 |                               |                               |                             |                             |   |   | 8              |
| 19/10/2021 | 05:30 |                               |                               |                             |                             |   |   |                |
| 19/10/2021 | 05:30 |                               |                               |                             |                             |   |   |                |
| 19/10/2021 | 05:30 |                               |                               |                             |                             |   |   |                |
| 19/10/2021 | 05:30 |                               |                               |                             |                             |   |   |                |
| 19/10/2021 | 05:30 |                               |                               |                             |                             |   |   |                |
| 19/10/2021 | 05:30 |                               |                               |                             |                             |   |   |                |
| 31/10/2021 | 14:30 |                               |                               | 1                           |                             |   |   |                |
| 1/11/2021  | 17:30 |                               |                               |                             |                             |   |   | 1              |
| 4/11/2021  | 10:50 |                               |                               |                             |                             | 1   |   |                |
| 07/11/2021 | 8:15  |                               | 1                             |                             |                             |   |   |                |
| 12/11/2021 | 15:00 |                               |                               |                             |                             |   |   | 1              |
| 29/11/2021 | 10:00 |                               |                               |                             |                             |   |   | 1              |
| 10/12/2021 | 11:14 |                               |                               |                             |                             |   |   | 1              |
| 1/01/2022  | 08:05 |                               |                               |                             |                             | 1   |   |                |
| 01/01/2022 | 10:25 |                               | 2                             |                             |                             |   |   |                |
| 01/01/2022 | 11:58 |                               |                               |                             |                             |   |   |                |
| 8/01/2022  | 15:18 |                               |                               |                             |                             |   |   | 1              |
| 3/02/2022  | 18:00 |                               |                               |                             |                             |   |   | 1              |
| 12/02/2022 | 11:49 |                               | 1                             |                             |                             |   |   |                |
| 25/02/2022 | 13:04 | 1                             |                               |                             |                             |   |   |                |
| 02/03/2022 | 23:36 | 1                             |                               |                             |                             |   |   |                |
| 05/03/2022 | 22:49 | 1                             |                               |                             |                             |   |   |                |
| 06/03/2022 | 8:19  | 1                             |                               |                             |                             |   |   |                |
| 10/03/2022 | 09:30 |                               |                               |                             |                             | 1   |   |                |
| 10/03/2022 | 9:59  | 1                             |                               |                             |                             |   |   |                |
| 23/03/2022 | 15:58 |                               |                               |                             |                             |   |   | 1              |
| 26/03/2022 | 10:10 |                               |                               | 1                           |                             |   |   |                |
| 03/04/2022 | 4:33  |                               | 1                             |                             |                             |   |   |                |
| 02/05/2022 | 19:38 | 1                             |                               |                             |                             |   |   |                |
| 18/05/2022 | 16:15 |                               |                               |                             |                             |   |   | 1              |
| 19/05/2022 | 11:46 | 1                             |                               |                             |                             |   |   |                |
| 19/05/2022 | 17:23 |                               | 1                             |                             |                             |   |   |                |
| 22/05/2022 | 01:43 |                               |                               |                             |                             | 1   |   |                |
| 23/05/2022 | 15:45 |                               |                               |                             |                             |   |   | 1              |

| Legend                     |
|----------------------------|
| Stack 1-hr reporting event |
| Stack emissions complaint  |
| Dust complaint             |

The above data is plotted on the following time series graphs for each stack.

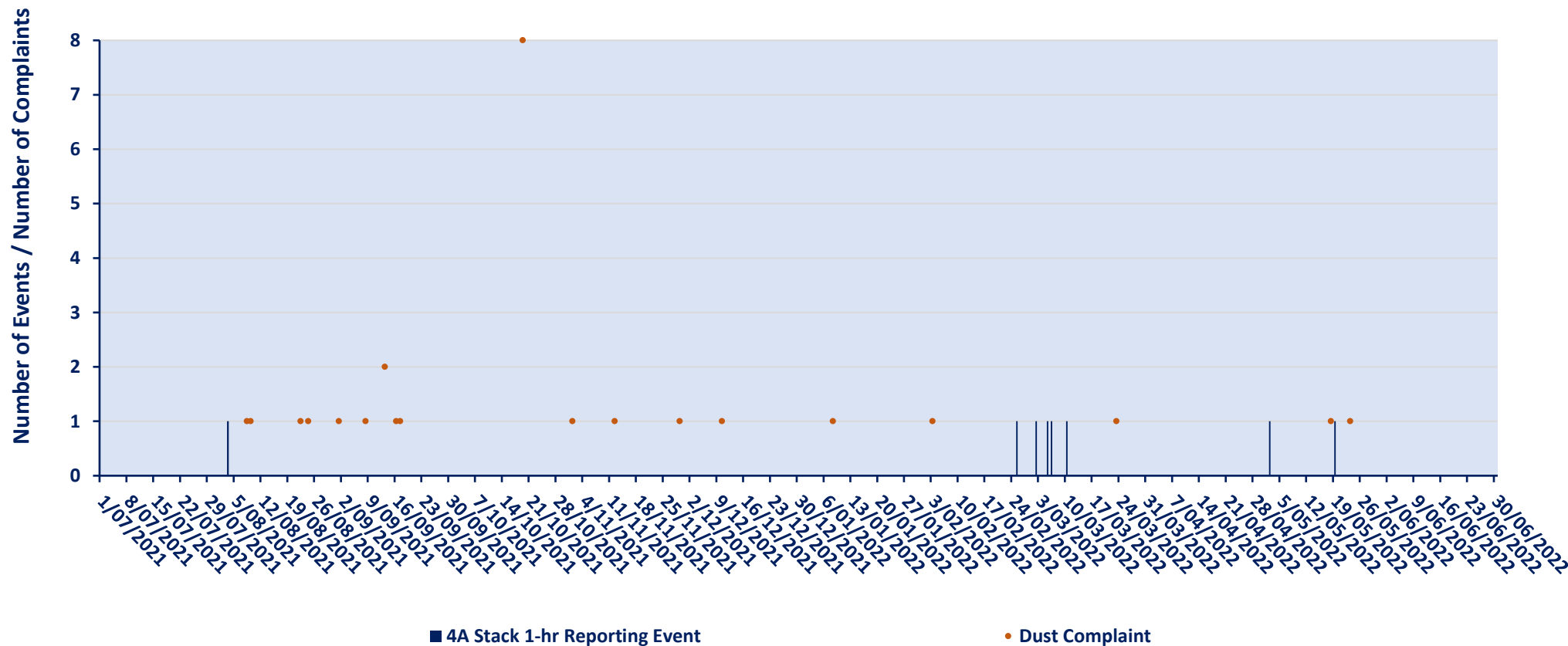
**4A Stack:**



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

4A Stack:

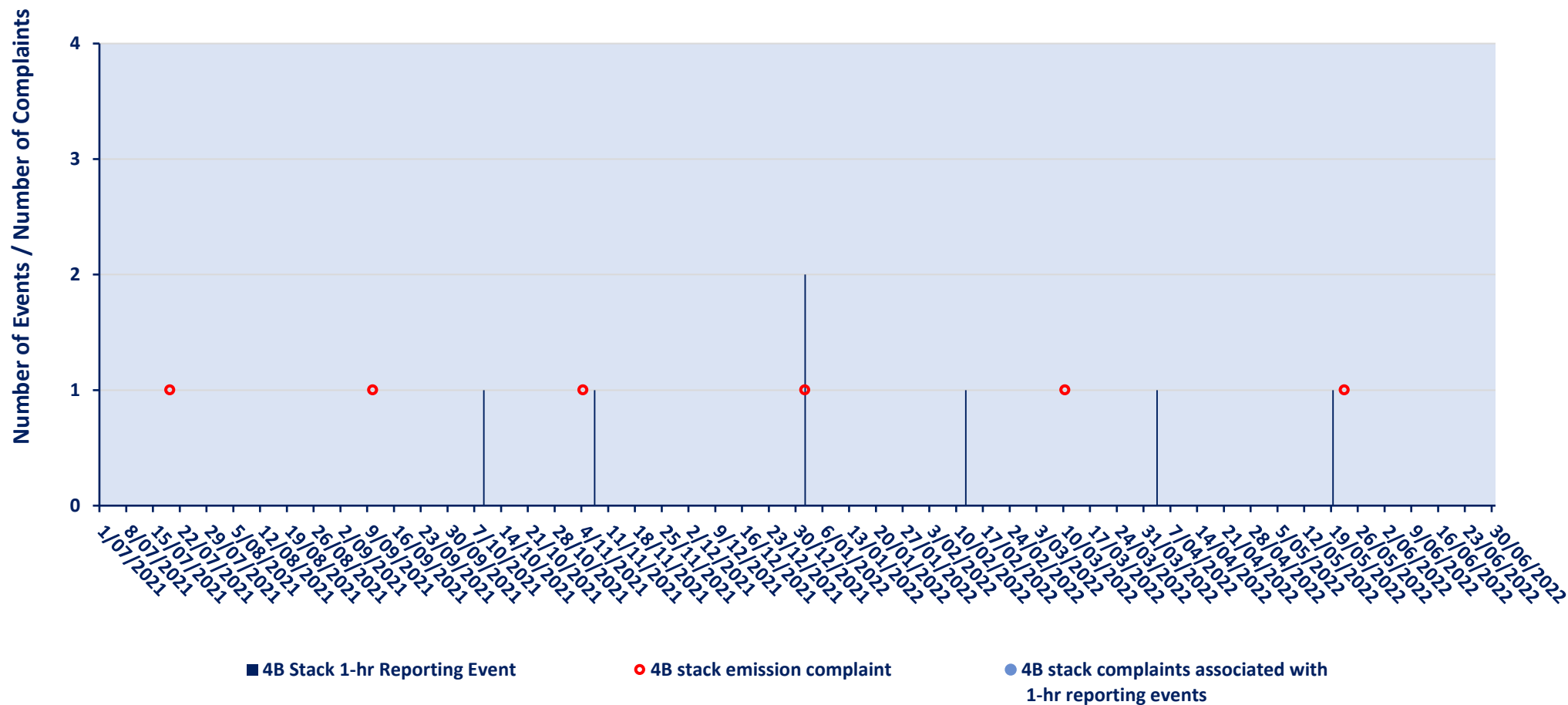
4A Stack 1-hour Reporting Events compared against All Dust Complaints  
1/7/2021 - 30/6/2022



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

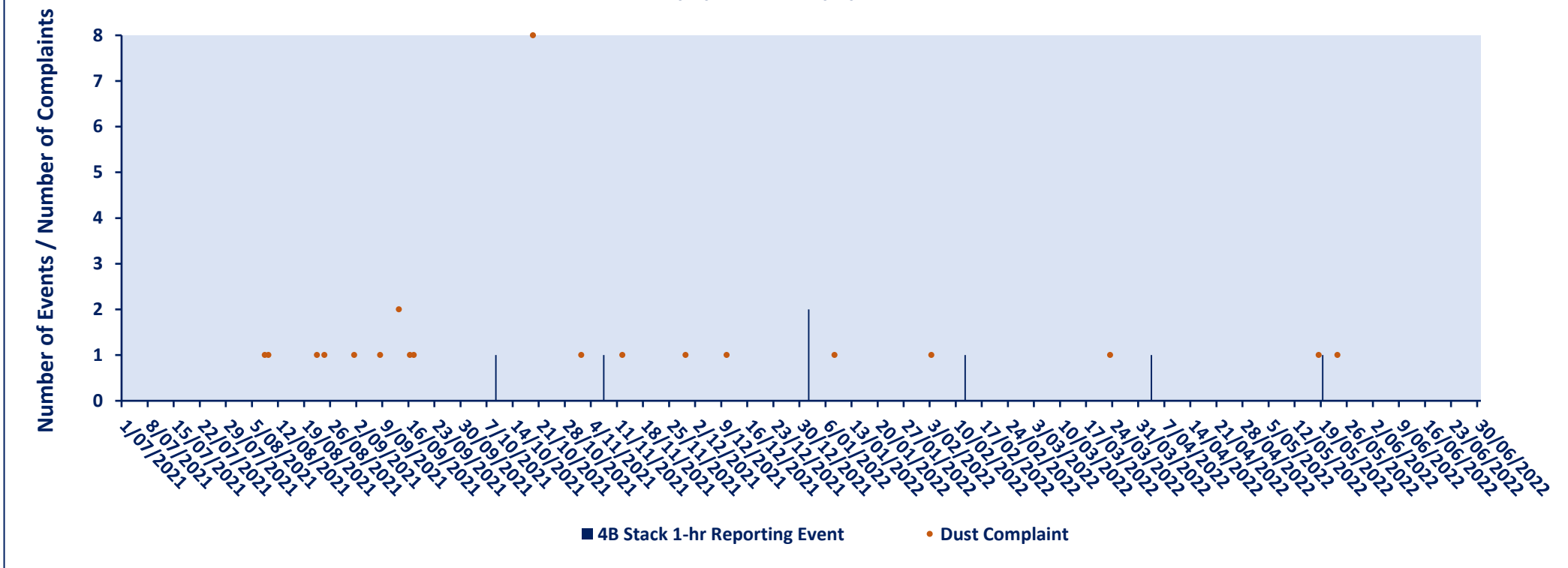
4B Stack:

4B Stack 1-hour Reporting Events compared against Stack Emission Complaints  
1/7/2021 - 30/6/2022



One stack emission complaint preceded a 4B stack 1-hr reporting events by 2 hrs 20 mins.  
All other stack emission complaints did not coincide with a 4B stack 1-hr reporting event

4B Stack 1-hour Reporting Events compared against All Dust Complaints Complaints  
1/7/2021 - 30/6/2022



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

## 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 1/7/2020 - 30/6/2021 | Number of 1-hr reporting events 1/7/2021 - 30/6/2022 |
|-------|--|------------------------------|--|--|
| 4A    | Excess build-up within the Bypass process  | Process related              | 1  | 0  |
|       | 4A ESP field 6 - electrical trip due to a loose wire reducing effectiveness of ESP.  | Equipment related            | 0  | 2  |
|       | Automatic safety trip on the kiln in response to a failure of the inlet temperature sensor on the Bypass ESP.  | Equipment related            | 1  | 0  |
|       | Automatic safety trip on the kiln. 4A mill was also off at the same time   | Process related              | 0  | 1  |
|       | ESP - F extractor screw Jammed - re entrainment of dust in process gas to 4A stack   | Equipment related            | 0  | 1  |
|       | ESP - F extractor screw Jammed - clearing blockage - re entrainment of dust in process gas to 4A stack   | Process related              | 0  | 2  |
|       | Calciner tripped due to high exit pressure, resulting in blockage - kiln shutdown to clear blockage  | Process related              | 0  | 1  |
|       | 4A conditioning tower spray pump failed  | Equipment related            | 1  | 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  | 1  |
|       | <b>Total Number of Reporting Events</b>  |                              |  | <b>3</b>   |
| 4B    | 4B Mill off for extended period  | Process related              | 4  | 0  |
|       | 4B Mill tripped (unforeseen sudden stop causing upset process conditions)  | Process related              | 1  | 0  |
|       | Kiln and Calciner trip- Emergency stop activated in response to a Kiln shell hot spot  | Equipment related            | 1  | 0  |
|       | Short term electrical instability in 4B ESP fields on start-up of the calciner following a kiln trip.  | Process related              | 1  | 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  | 1  |
|       | 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  | 1  |
|       | 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  | 3  |
|       | 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  | 1  |
|       | Calciner shutdown due to low flow from blending silo   | Process related              | 0  | 1  |
|       | <b>Total Number of Reporting Events</b>  |                              |  | <b>7</b>   |

The data above shows similar 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 requires any further action.

### Stack Particulate Management Plan / TARP Review:

The Stack Particulate Management Plan (SPMP), approved on the 18 June 2018, 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 1/7/2021 to 30/6/2022.

#### 10 minute TARP trigger events for the period 1/7/2021 to 30/6/2022

| Stack | Number of 10-minute trigger events | Number of 1-hr Reporting events |
|-------|------------------------------------|---------------------------------|
| 4A    | 60                                 | 8                               |
| 4B    | 52                                 | 7                               |

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 |
|-------|------------------------------|---|--|--|--|--|
| 4A    | Process related              | 5   | 1  | 3  | 1  | 4  |
|       | Equipment related            | 1   | 0  | 0  | 2  | 4  |
|       | <b>Total</b>                 | <b>6</b>  | <b>1</b>   | <b>3</b>   | <b>3</b>   | <b>8</b>   |
| 4B    | Process related              | 7   | 1  | 4  | 6  | 4  |
|       | Equipment related            | 1   | 5  | 2  | 1  | 3  |
|       | <b>Total</b>                 | <b>8</b>  | <b>6</b>   | <b>6</b>   | <b>7</b>   | <b>7</b>   |



## 4A Stack

| Stack | Cause of 1-hr Reporting Event  | 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 current year 1/7/2020 - 30/6/2021 | Number of 1-hr reporting events current year 1/7/2021 - 30/6/2022 |
|-------|--|------------------------------|---|--|--|---|---|
| 4A    | Excess build-up within the Bypass process  | Process related              | 5   | 1  | 2  | 1   | 0   |
|       | Ruptured airline hose to valve that controls water flow to the conditioning tower cooling spray system                                     | Equipment related            | 1   | 0  | 0  | 0   | 0   |
|       | Erratic ESP Performance - unknown cause  | Process related              | 0   | 0  | 1  | 0   | 0   |
|       | 4A ESP field 6 - electrical trip due to a loose wire reducing effectiveness of ESP.  | Equipment related            | 0   | 0  | 0  | 0   | 2   |
|       | 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   |
|       | Automatic safety trip on the kiln. 4A mill was also off at the same time   | Process related              | 0   | 0  | 0  | 0   | 1   |
|       | ESP - F extractor screw Jammed - re entrainment of dust in process gas to 4A stack   | Equipment related            | 0   | 0  | 0  | 0   | 1   |
|       | 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   |
|       | Calcliner tripped due to high exit pressure, resulting in blockage - kiln shutdown to clear blockages creating emissions                   | Process related              | 0   | 0  | 0  | 0   | 1   |
|       | 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   |
|       | 4A conditioning tower spray pump failed  | Equipment related            | 0   | 0  | 0  | 1   | 0   |
|       | <b>Total Number of Reporting Events</b>  |                              |   | <b>6</b>   | <b>1</b>   | <b>3</b>  | <b>3</b>  |

## 4B Stack

| Stack                                   | Cause of 1-hr Reporting Event   | Type of 1-hr Reporting Event | Number of 1-hr reporting events<br>1/11/2017 - 30/6/2018 | Number of 1-hr reporting events<br>1/7/2018 - 30/6/2019 | Number of 1-hr reporting events<br>1/7/2019 - 30/6/2020 | Number of 1-hr reporting events<br>1/7/2020 - 30/6/2021 | Number of 1-hr reporting events<br>1/7/2021 - 30/6/2022 |
|---|---|------------------------------|--|---|---|---|---|
| 4B                                      | 4B Mill off for extended period   | Process related              | 7  | 0   | 2   | 4   | 0   |
|   | Equipment failure of 4B Elevator drag chain transport system  | Equipment related            | 1  | 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   |
|   | 4B Mill tripped (unforeseen sudden stop causing upset process conditions)   | Process related              | 0  | 1   | 0   | 1   | 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   |
|   | 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   |
|   | 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   |
|   | 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   |
|   | 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   |
|   | 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   |
| Erratic ESP Performance - unknown cause | Process related   | 0                            | 0  | 1   | 0   | 0   |   |

| Stack | Cause of 1-hr Reporting Event  | Type of 1-hr Reporting Event | Number of 1-hr reporting events<br>1/11/2017 - 30/6/2018 | Number of 1-hr reporting events<br>1/7/2018 - 30/6/2019 | Number of 1-hr reporting events<br>1/7/2019 - 30/6/2020 | Number of 1-hr reporting events<br>1/7/2020 - 30/6/2021 | Number of 1-hr reporting events<br>1/7/2021 - 30/6/2022 |
|-------|--|------------------------------|--|---|---|---|---|
| 4B    | Kiln and Calciner trip- Emergency stop activated in response to a Kiln shell hot spot  | Equipment related            | 0  | 0   | 0   | 1   | 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   |
|       | 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   |
|       | 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   |
|       | 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   |
|       | 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   |
|       | Calciner shutdown at 2:30 due to low flow from blending silo   | Process related              | 0  | 0   | 0   | 0   | 1   |
|       | <b>Total Number of Reporting Events</b>  |                              | <b>8</b>   | <b>6</b>  | <b>6</b>  | <b>7</b>  | <b>7</b>  |

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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 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.
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