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*Adelaide Brighton Cement Ltd*

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# Stack Particulate Management Plan

## Annual Stack Particulate Report

**Period: July 2018 – June 2019**

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

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

**EPA Licence number:** **1126**

**Date of Submission:** **31 October 2019**

**Version Number:** **1**



Report Submitted by: 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
$\text{m}$	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:  <a href="http://www.birkenheadcommunity.com.au">http://www.birkenheadcommunity.com.au</a></p>

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## **4A Stack - Summary of 1-hr Reporting events for the period 1/7/2018 to 30/6/2019**

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

Date	Time start	Time finish	Duration (min)	Magnitude mg/Nm <sup>3</sup>	Cause	Immediate Actions Taken	Actions Taken to Prevent a Reoccurrence
12/07/2018	15:17	15:34	17	105.5	Excess build-up within the Bypass process	Checked and cleaned the Bypass system	Regular inspection and cleaning to minimise build-up

## 4B Stack - Summary of 1-hr Reporting events for the period 1/7/2018 to 30/6/2019

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

Date	Time start	Time finish	Duration (min)	Magnitude mg/Nm3	Cause	Immediate Actions Taken	Actions Taken to Prevent a Reoccurrence
12/07/2018	12:17	13:05	48	87	Dislodged baffle plates at the entrance to the Electrostatic Precipitator were found to be the root cause	Turning the 4B Mill back on reduced the emissions to normal levels	This issue has not occurred before. Maintain existing maintenance and inspection program
12/07/2018	22:13	22:42	29	68	Dislodged baffle plates at the entrance to the Electrostatic Precipitator were found to be the root cause	1. Turning the 4B Mill back on reduced the emissions to normal levels  2. Plant turned off the following morning, 13/07/2018 and partially dislodged baffle plates at the entrance to the Electrostatic Precipitator were found and repaired	This issue has not occurred before  Maintain existing maintenance and inspection program
9/08/2018	5:21	5:37	16	68	4B Mill tripped (unforeseen sudden stop causing upset process conditions)	4B Mill re-started	Operate to Process Control Standards
21/11/2018	12:40	2:48	128	132.6	Rare failure of a pump level protection sensor on the 4B Gas Conditioning Tower (GCT) header tank, tripping the pumps providing water to the conditioning tower sprays during a 4B mill stoppage	Immediately isolated the level sensor to allow the pumps to provide water to the conditioning tower sprays.  The level sensor has since been replaced.	Maintain existing maintenance, continuous monitoring of emissions and inspection program
12/12/2018	16:44	17:31	47	63.7	4B mill was turned off and the subsequent failure of the pump on the Gas Conditioning Tower (GCT) spray system to turn on	4B Mill re-started to regain temperature and emission control. In conjunction with turning the mill back on, plant operators immediately attended to and addressed the pump fault.	Maintain existing maintenance, continuous monitoring of emissions and inspection program
19/05/2019	11:44	13:48	124	111.4	The Electrostatic Precipitator (ESP) (emission filtering equipment) efficiency was reduced as a result of water ingress from a cracked plastic casing on an electrical control unit.	The immediate rectification of the damaged control unit.	Replace plastic casings with more robust metal casings.

## Stacks 4A and 4B - Number and Cause of 1- hour Reporting Events - 1/7/2018 – 30/6/2019

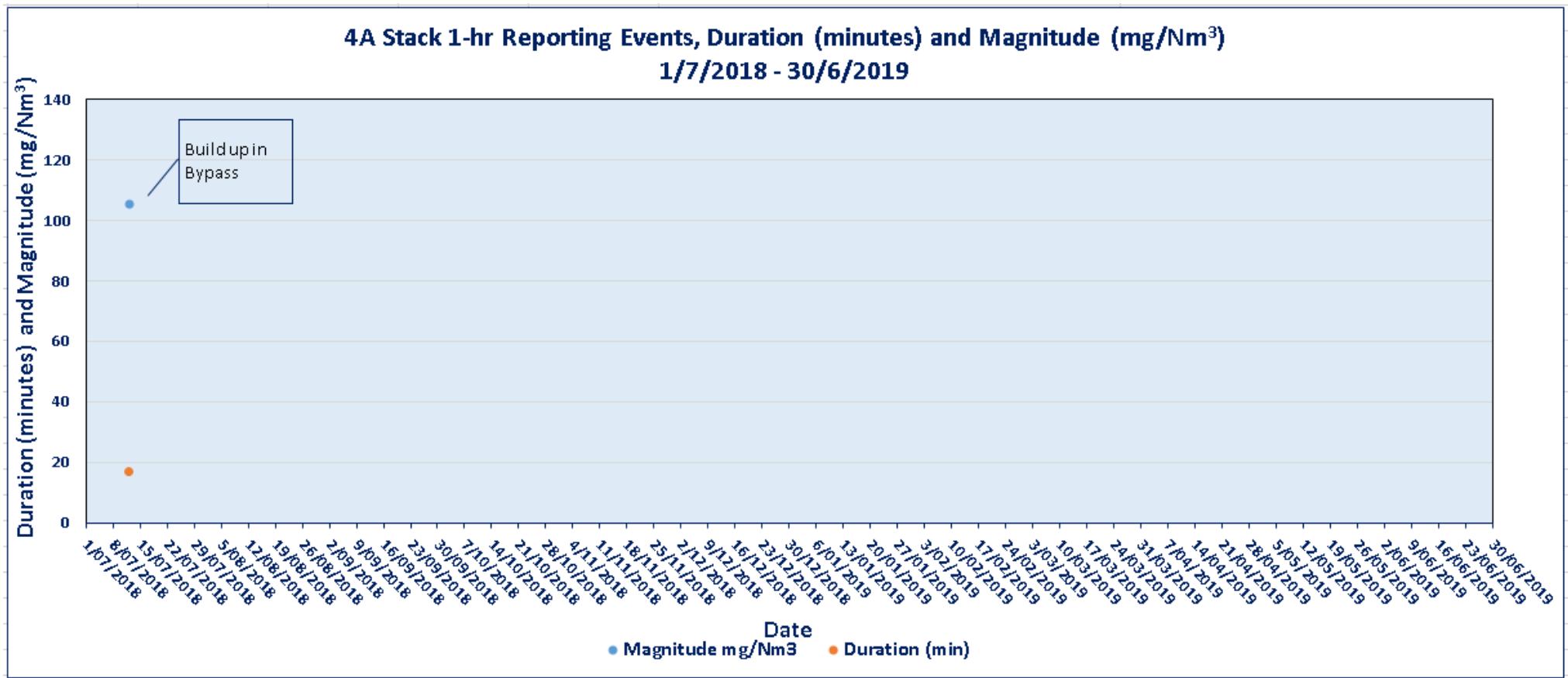
The number of reporting events by cause for each stack is summarised in the table below.

Stack	Cause of 1-hr Reporting Event	Number of 1-hr reporting events current year 1/7/2018 to 30/6/2019
4A	Excess build-up within the Bypass process	1
	Ruptured airline hose to valve that controls water flow to the conditioning tower cooling spray system	0
	<b>Total Number of Reporting Events</b>	<b>1</b>
4B	4B Mill off for extended period	0
	Equipment failure of 4B Elevator drag chain transport system	0
	Dislodged baffle plates at the entrance to the Electrostatic Precipitator were found to be the root cause	2
	4B Mill tripped (unforeseen sudden stop causing upset process conditions)	1
	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	1
	Failure of the pump on the conditioning spray system to turn on, when the 4B Mill was turned off	1
	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.	1
	<b>Total Number of Reporting Events</b>	<b>6</b>

The data shows that most reporting events are equipment related

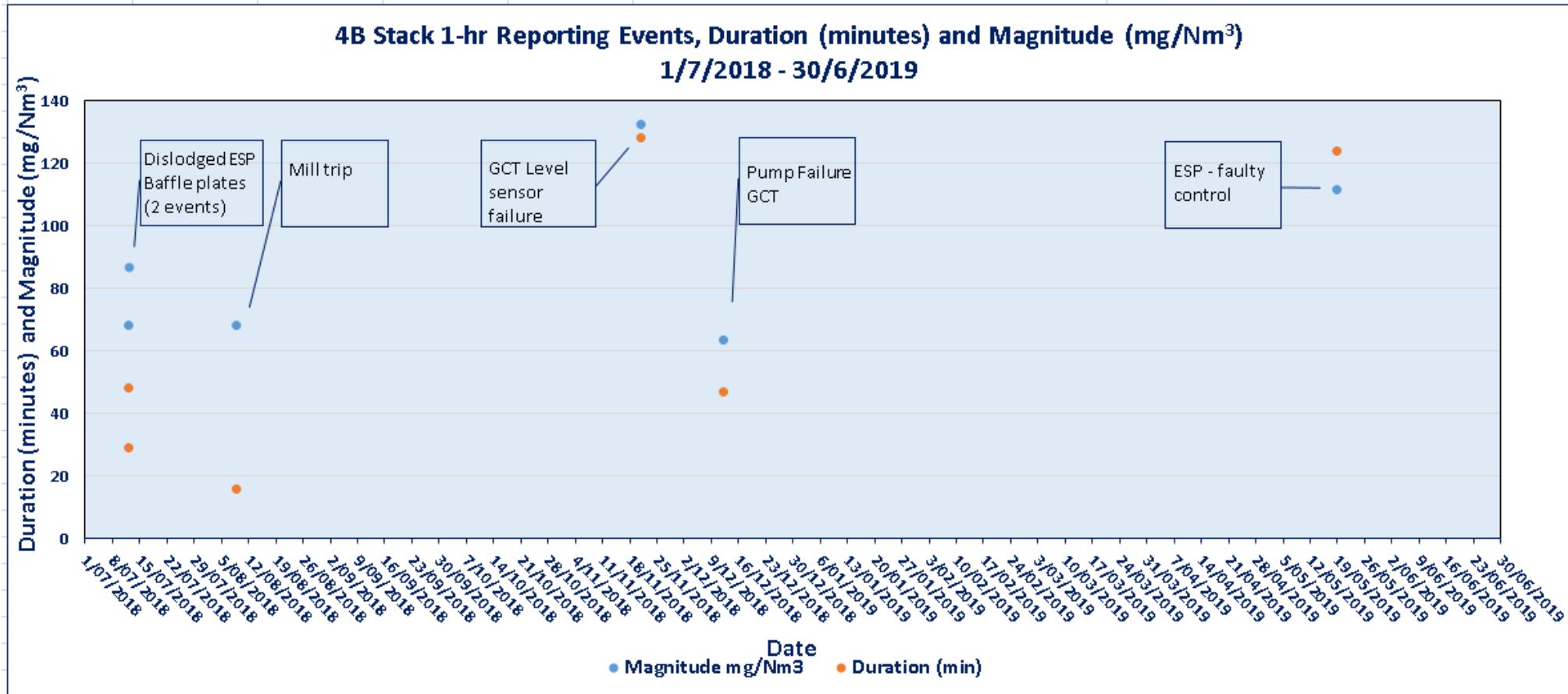
## Trend Analysis of magnitude and duration of 1-hr reporting events between 1/7/2018 to 30/6/2019

### 4A Stack:



There was only one, 1-hr Reporting event for the year.

## 4B Stack:



Most 1-hr reporting events have a different root cause.

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

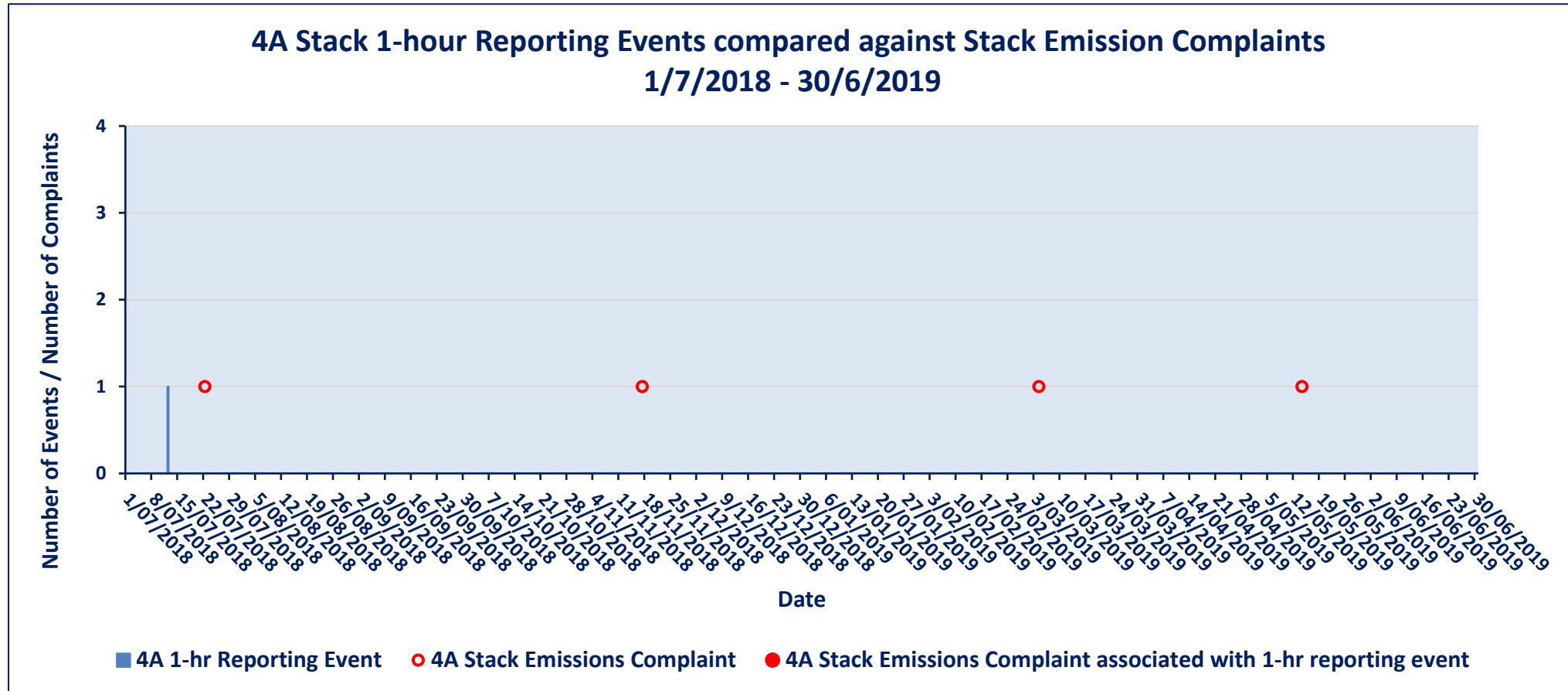
The table below captures community complaints by type and stack 1-hr reporting events for the period 1/7/2018 to 30/06/2019

Date	Time	4A 1-hr Reporting Event	4B 1- hr Reporting Event	4A Stack Emissions Complaint	4B Stack Emissions Complaint	4A Stack Emissions Complaint associated with a 1-hr reporting event	4B Stack Emissions Complaint Associated with a 1-hr reporting event	Dust complaint
4/07/2018	16:11							1
10/07/2018	13:54							1
12/07/2018	13:05		1					
12/07/2018	15:34	1						
12/07/2018	22:42		1					
22/07/2018	10:30			1				
27/07/2018	10:50							1
8/08/2018	10:10							1
9/08/2018	5:37		1					
25/08/2018	23:59							1
27/08/2018	15:30							1
29/10/2018	18:30							1
30/10/2018	09:59							1
12/11/2018	20:00							1
13/11/2018	11:09							1
17/11/2018	21:00			1				
21/11/2018	2:48		1					
12/12/2018	17:30		1					
16/12/2018	12:12							1
8/01/2019	15:30							1
19/01/2019	10:11							1
7/02/2019	12:15							1
4/03/2019	21:15			1				
6/03/2019	14:23							1
20/03/2019	09:30			1				
25/03/2019	11:55							1
4/04/2019	15:10							1
11/04/2019	10:00							1
11/04/2019	13:01							1
29/04/2019	12:30							1
13/05/2019	06:00							1
14/05/2019	08:57							1
14/05/2019	12:00							1
14/05/2019	0:00			1	1			
17/05/2019	09:30							1
19/05/2019	13:38		1					
24/05/2019	06:23							1
11/06/2019	11:38							1
24/06/2019	16:20							1

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

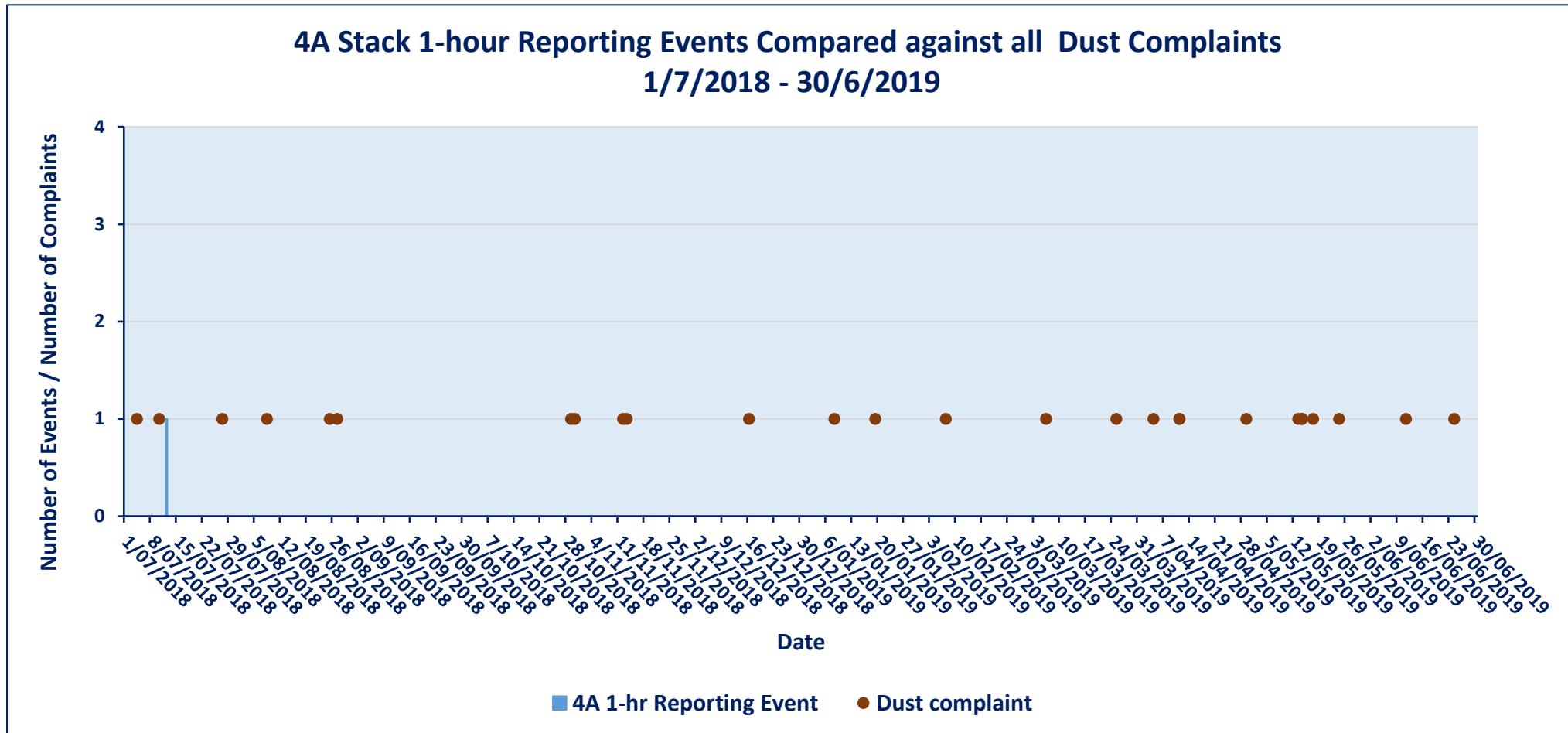
The above data is plotted on the following time series graphs for each stack.

#### 4A Stack:



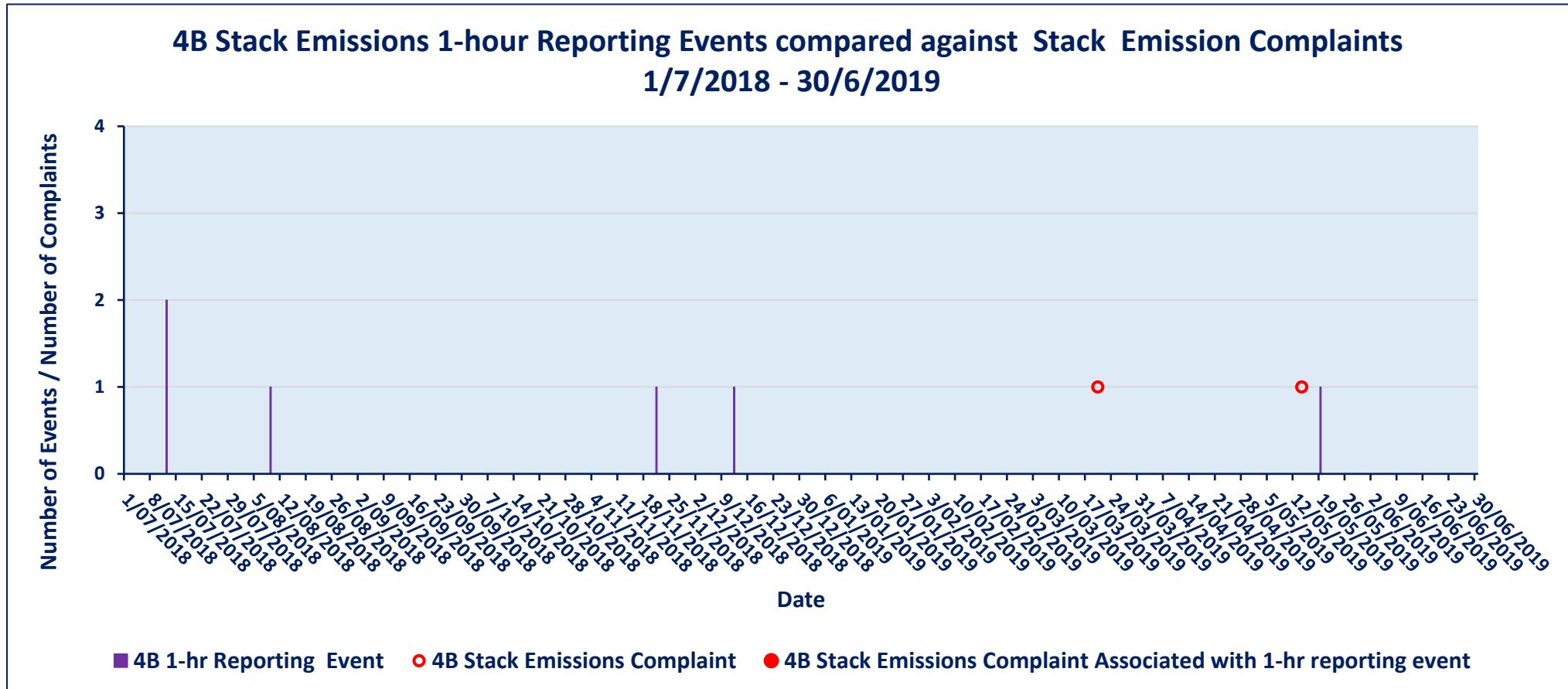
Stack emission complaints did not coincide with 4A stack 1-hr reporting events.

#### 4A Stack:



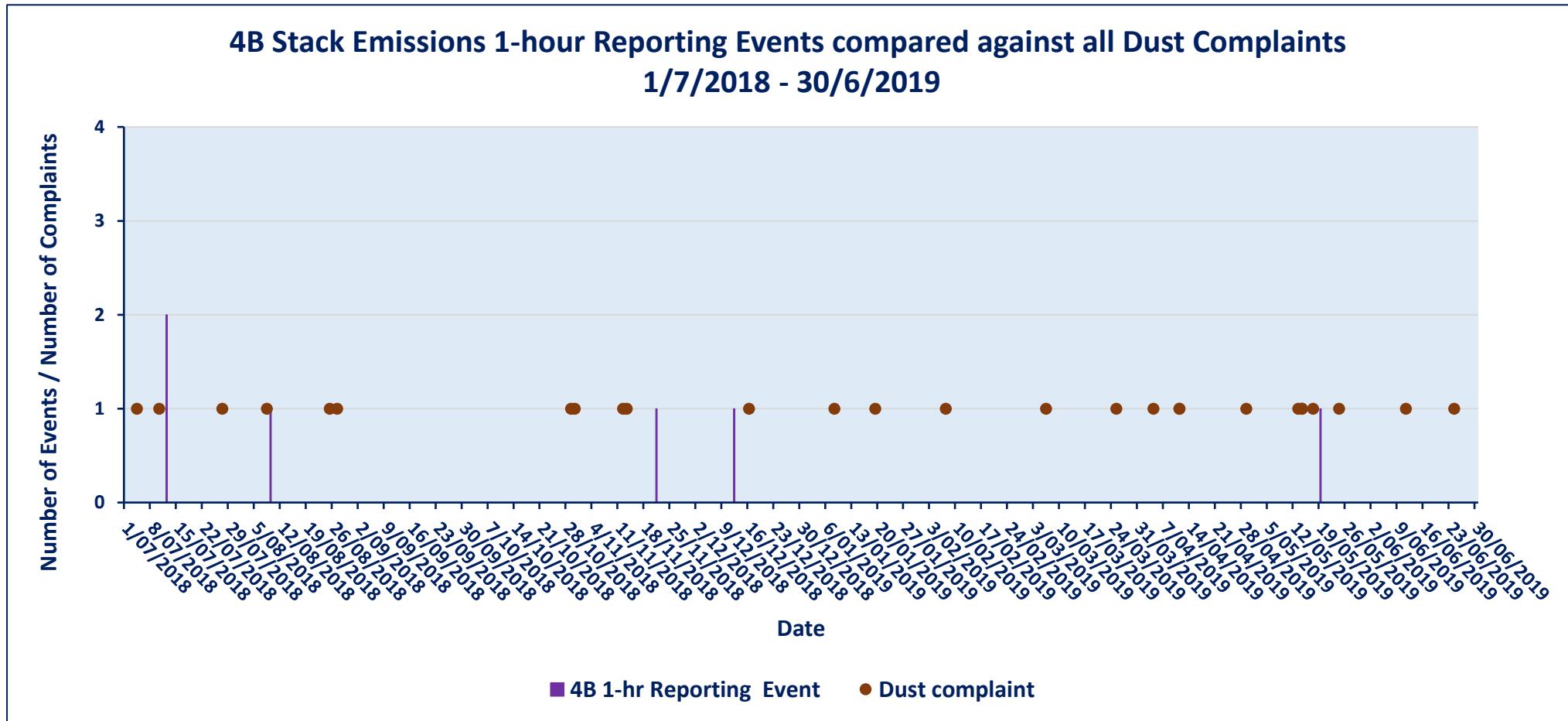
Dust complaints did not coincide with 4A stack 1-hr reporting events, indicating dust complaints are not related to stack emissions.

#### 4B Stack:



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

#### 4B Stack:



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 previous year 1/11/2017 to 30/6/2018	Number of 1-hr reporting events current year 1/7/2018 to 30/6/2019
4A	Excess build-up within the Bypass process	Process related	5	1
	Ruptured airline hose to valve that controls water flow to the conditioning tower cooling spray system	Equipment related	1	0
	<b>Total Number of Reporting Events</b>		<b>6</b>	<b>1</b>
4B	4B Mill off for extended period	Process related	7	0
	Equipment failure of 4B Elevator drag chain transport system	Equipment related	1	0
	Dislodged baffle plates at the entrance to the Electrostatic Precipitator were found to be the root cause	Equipment related	0	2
	4B Mill tripped (unforeseen sudden stop causing upset process conditions)	Process related	0	1
	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
	Failure of the pump on the conditioning spray system to turn on, when the 4B Mill was turned off	Equipment related	0	1
	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
	<b>Total Number of Reporting Events</b>		<b>8</b>	<b>6</b>

The data shows there has been a reduction in 1-hr reporting events, particularly process related events, since the introduction of the stack Trigger Action Reporting Plans (TARP)'s in July 2018.

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## **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 these improvement opportunities have been implemented.

<b>Stack</b>	<b>Improvement Opportunities - Identified and Implemented</b>
4A	An increase in quench air fan speed and lower bypass conditioning tower temperatures have assisted in reducing build up in the bypass system.
	Alarm settings have been fine-tuned to provide earlier indication of conditions that could result in increased stack particulate emissions.
4B	Alarm settings have been fine-tuned to provide earlier indication of conditions that could result in increased stack particulate emissions.
	During the 2019 shutdown, pipework on the gas conditioning tower spray system header tank was altered to allow a faulty level sensor to be changed with minimal disruption to process and stack emissions
	External 4B ESP electrical control boxes were reviewed and water proofing improved where necessary by replacing old plastic covers with metal covers, reducing the risk of water ingress and potential for stack emissions resulting from water ingress.

## **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 Reporting Plans (TARP's). The purpose of the stack TARP's are 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 following table details the number of 10-minute triggers that were activated for each stack for the reporting period 1/7/2018 to 30/6/2019.

### **TARP trigger events for the period 1/7/2018 to 30/6/2019**

Stack	Number of 10 minute trigger events	Number of 1-hr Reporting events
4A	9	1
4B	27	6

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 table shows the relative split between process and equipment related 1-hr reporting events, for the current and previous reporting years.

### **1-hr reporting events by type for each stack for the current year (1/7/2018 to 30/6/2019) and previous year**

Stack	Type of 1-hr Reporting Event	Number of 1-hr reporting events previous year 1/11/2017 to 30/6/2018	Number of 1-hr reporting events current year 1/7/2018 to 30/6/2019
4A	Process related	5	1
	Equipment related	1	0
	<b>Total Number of Reporting Events</b>	<b>6</b>	<b>1</b>
4B	Process related	7	0
	Equipment related	1	6
	<b>Total Number of Reporting Events</b>	<b>8</b>	<b>6</b>

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The data in the table above shows that the introduction of the stack TARP's in July 2018, have been effective in reducing 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 however do provide the plant with the early warning needed to start trouble shooting for equipment related issues.

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 existing TARP's 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 TARP's, continue to be monitored for further improvement over the next 12 months.
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