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*Adelaide Brighton Cement Ltd*

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# **Stack Particulate Management Plan**

**Adelaide Brighton Cement Limited**

**Licence number: 35**

**Premises Address: Stockwell Road, Angaston 5353  
(Angaston Site)**

**ENVIRONMENT PROTECTION AUTHORITY**

THIS IS THE APPROVED Plan

REFERRED TO IN CONDITION U-854

OF EPA AUTHORISATION NUMBER 35

DELEGATE  DATE 25/10/2019

**August 2019**

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## 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
$\mu\text{m}$	micrometre
$^{\circ}\text{C}$	degrees Celsius
m	metre
$\text{m}^3$	cubic metres
$\text{m}^3/\text{s}$	cubic metres per second
$\text{Nm}^3$	Gas volume in dry cubic metres at STP dry basis
<b>Nomenclature</b>	<b>Definition</b>
$\text{PM}_{10}$	particulate matter with an equivalent aerodynamic of less than 10 micrometres, as passed by a size selective inlet diameter
$\text{PM}_{2.5}$	particulate matter with an equivalent aerodynamic of less than 2.5 micrometres, as passed by a size selective inlet diameter
<b>Abbreviations</b>	<b>Definition</b>
Air EPP	Environment Protection (Air Quality) Policy 2016
CCRO	Central Control Room Operator
SA EPA	South Australian Environment Protection Authority
STP dry basis	Standard Temperature and Pressure (zero degrees Celsius and 101.3 kilo Pascals absolute)
TARP	Trigger Action Response Plan
TSP	Total Suspended Particulates
PO	Plant Operator
PSS	Production Shift Supervisor (includes senior production supervisor day shift)
PCS	Process Control Standards
SCADA	Supervisory Control and Data Acquisition (a control system that uses computers, networked data communications and graphical user interfaces for high-level process supervisory management)
SPMP	Stack Particulate Management Plan

# Stack Particulate Management Plan

## 1.0 Purpose

To provide the framework for the measurement, monitoring and reporting of stack particulate emission concentrations (as TSP), from Kiln 1, Kiln 2 and Kiln 3 and to identify opportunities to decrease the frequency, magnitude and duration of reportable events.

## 2.0 Scope

The Stack Particulate Management Plan (SPMP) addresses

- Objectives of the plan
- Measurement and monitoring of stack particulate emissions
- Calibration and maintenance of particulate monitors
- Reporting methodology
- Public access to reports and this plan

## 3.0 Introduction

Electrostatic Precipitators are used to abate combustion and process particulate emissions from clinker kiln 1 and lime kiln 2. Opacity monitors installed on kiln 1 and kiln 2 stacks continuously measure the opacity of these stack emissions. A calibration curve is used to convert opacity readings to particulate concentrations expressed as  $\text{mg}/\text{Nm}^3$  (STP-dry basis).

A bag filter is used to abate combustion and process particulate emissions from clinker kiln 3. Instrumentation using Probe Electrification technology is used to continuously measure particulate emissions on kiln 3 stack. In bag filter applications, the instrument provides a robust signal proportional to dust emissions, which is used to monitor and detect bag leaks. A calibration curve is used to manually scale the instrument output to convert relative % readings to particulate concentrations expressed as  $\text{mg}/\text{Nm}^3$  (STP-dry basis).

## 4.0 Plan objectives

The objectives of this plan are to:

- Provide continuous monitoring of stack particulate emissions from the lime and clinker kiln stacks in compliance with the SA EPA "Emission Testing Methodology for Air Pollution Manual version 2" dated August 2012
- Develop Trigger Action Response Plans (TARP's) to prevent or minimise particulate emissions exceeding the reporting levels (1 hour averaging periods). These plans are to be based on the following stack particulate emission trigger values:

<i>Stack Particulate Emission Trigger Values</i>			
<i>Averaging period</i>	<i>Kiln Stack 1 <math>\text{mg}/\text{Nm}^3</math> (STP dry basis)</i>	<i>Kiln Stack 2 <math>\text{mg}/\text{Nm}^3</math> (STP dry basis)</i>	<i>Kiln Stack 3 <math>\text{mg}/\text{Nm}^3</math> (STP dry basis)</i>
<i>1 hour</i>	<i>100</i>	<i>100</i>	<i>25</i>

- Provide an annual report to the EPA that includes;
  - details of stack particulate events where particulate levels exceed the following reporting thresholds
    - 100mg/Nm<sup>3</sup> (1 hour averaging period) on Kiln 1 and Kiln 2 stacks
    - 25 mg/Nm<sup>3</sup> (1 hour averaging period) on kiln 3 stack.
  - Identification of opportunities to reduce frequency, magnitude and duration of reportable particulate emissions (1-hour averaging period)
- Provide public access to this plan and annual reports

## 5.0 Applicable legislative requirements and guidance

*South Australian Environment Protection Act 1993*

*South Australian Environment Protection Regulations 2009*

*South Australian Environment Protection (Air Quality) Policy 2016 (Air EPP)*

*South Australian Environment Protection Authority document "Emission Testing Methodology for Air Pollution Manual version 2" dated August 2012*

*Adelaide Brighton Cement Ltd EPA Licence No 35, condition U-854*

*Adelaide Brighton Cement Ltd EPA Licence No 35, conditions U-853 and U-852*

*Adelaide Brighton Cement Ltd EPA Licence No 35, Schedule Z-1*

### STACK PARTICULATE MANAGEMENT PLAN (U – 854)

*The Licensee must:*

1. *develop and submit a Stack Particulate Management Plan to the satisfaction of the EPA by the date listed below;*
2. *ensure that the Stack Particulate Management Plan includes, but is not limited to:*
  - a *continuous monitoring of particulate emissions from Kiln Stacks 1,2 and 3 in accordance with the EPA document entitled "Emission Testing Methodology for Air Pollution Manual Version 2" dated August 2012;*
  - b *how the continuous monitors will be calibrated in accordance with Appendix B of the EPA document entitled "Emission Testing Methodology for Air Pollution Manual Version 2" dated August 2012;*
  - c *what actions will be taken when stack particulate emission trigger values listed in Schedule Z-1 are exceeded;*
  - d *a methodology and framework for annual reporting to the EPA on the last day of October of each year, which includes but is not limited to:*
    - i. *for each exceedance of the stack particulate emission trigger values listed in Schedule Z-1;*
      - *the date, time and duration;*
      - *the cause;*
      - *the measured particulate concentration as milligrams per/cubic metre at STP, dry basis;*
      - *immediate actions taken to reduce particulate emissions;*
      - *corrective actions taken to prevent future events of the same kind;*
    - ii. *a trend analysis of exceedance events and associated details provided under sub-paragraph 2 of this condition for Kiln Stacks 1, 2 and 3 with;*

- A. *community complaints recorded under condition S-1; and*
- B. *the preceding 1,3 and 5 years of stack emission data;*
- C. *the identification of any opportunities for improvement in order to decrease the frequency, duration and magnitude of future exceedance events, based on the trend analysis;*
- iii. *a methodology and framework for providing access to the Stack Particulate Management Plan (or any revised plan approved by the EPA in writing) and to annual reporting.*
- 3. *implement the Stack Particulate Management Plan approved in writing by the EPA (or any revised plan approved in writing by the EPA).*

**NOTES**

The Licensee must ensure that any exceedance event that results in environmental harm as defined under Sections 79 and 80 of the Environment Protection Act 1993 is notified pursuant to Section 83 of the Environment Protection Act 1993.

*Compliance Date: 30/08/2019*

**PARTICULATE EMISSIONS - KILN STACK 3 (U - 853)**

*The Licensee must:*

- 1. *take all reasonable and practicable measures to prevent particulate emissions (as TSP) from Kiln Stack 3 exceeding 25 milligrams per cubic metre at STP, dry basis, based on a 1hour average;*
- 2. *where particulate emissions exceed the limit specified under sub-paragraph 1 of this condition, take immediate action to reduce particulate emissions to below that limit.*

**NOTES**

The Licensee must ensure that any exceedance event that results in environmental harm as defined under Sections 79 and 80 of the Environment Protection Act 1993 is notified pursuant to Section 83 of the Environment Protection Act 1993.

**PARTICULATE EMISSIONS - KILN STACKS 1 & 2 (U - 852)**

*The Licensee must:*

- 1. *take all reasonable and practicable measures to prevent particulate emissions (as TSP) from Kiln Stacks 1 and 2 exceeding a limit of 100 milligrams per cubic metre at STP, dry basis, based on a 1-hour average;*
- 2. *where particulate emissions exceed the limit specified under sub paragraph 1 of this condition, take immediate action to reduce particulate emissions to below that limit.*

**NOTES**

The Licensee must ensure that any exceedance event that results in environmental harm as defined under Sections 79 and 80 of the Environment Protection Act 1993 is notified pursuant to Section 83 of the Environment Protection Act 1993.

Stack Particulate Emission Trigger Values			
Averaging period	Kiln Stack 1 mg/Nm <sup>3</sup> (STP dry basis)	Kiln Stack 2 mg/Nm <sup>3</sup> (STP dry basis)	Kiln Stack 3 mg/Nm <sup>3</sup> (STP dry basis)
1 hour	100	100	25

## 6.0 Responsibilities

The organisational chart presented in Figure 1 shows personnel with roles that have been assigned in the Stack Particulate Management Plan.

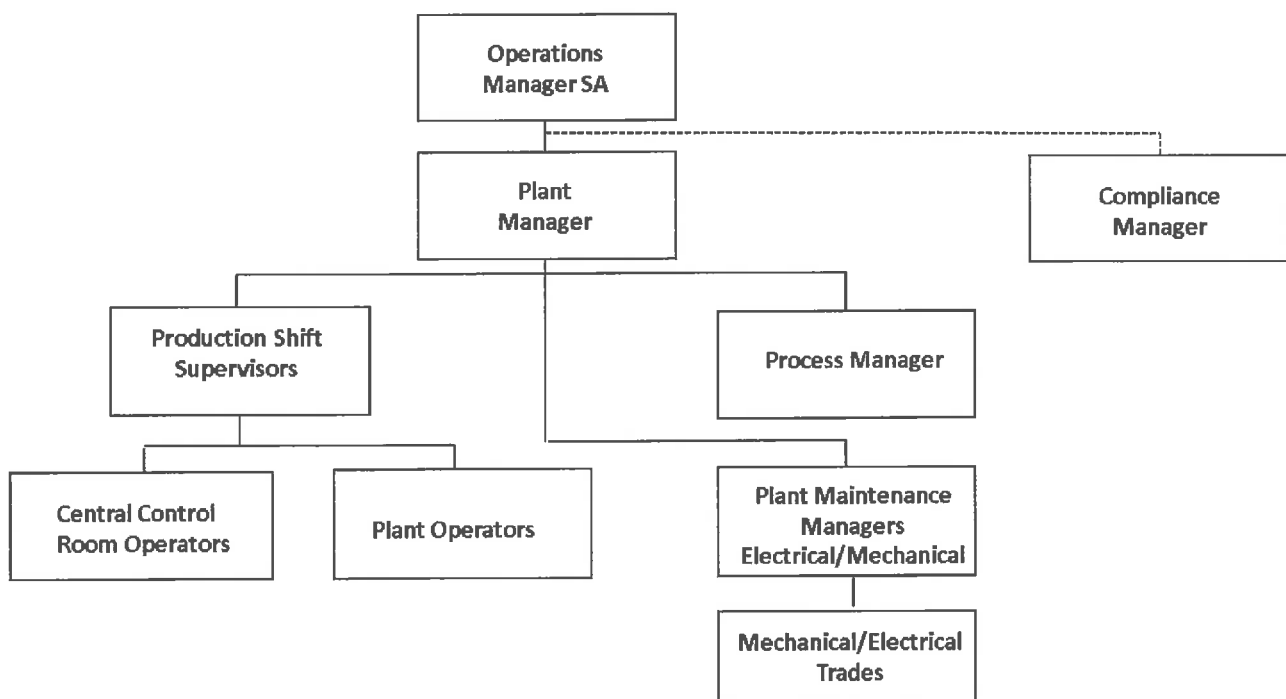


Figure 1: Organisation chart showing positions at the facility with responsibilities under the SPMP

Table 1, General Responsibilities, details the responsibilities that apply in relation to this Stack Particulate Management Plan.

**Table 1: General Responsibilities**

<p>Plant Maintenance Manager (Electrical)</p>	<p>Responsibility and authority to ensure</p> <ul style="list-style-type: none"> <li>• Maintenance of stack particulate monitoring equipment</li> <li>• Calibration of stack particulate monitoring equipment</li> <li>• Maintenance of calibration and service records</li> <li>• Maintenance staff have relevant skills/training to maintain monitoring equipment</li> </ul>
<p>Central Control Room Operators (CCRO) Plant Operators (PO)</p>	<p>Responsible for minimisation of stack particulate emissions This includes:</p> <ul style="list-style-type: none"> <li>• Responding to, investigating plant and stack particulate emission alarms</li> <li>• Initiating action to minimise stack particulate emissions</li> <li>• TARP reporting and recording</li> </ul>
<p>Production Shift Supervisors (PSS) Process Manager</p>	<p>Responsible for minimisation of stack particulate emissions This includes:</p> <ul style="list-style-type: none"> <li>• Responding to, investigating plant and stack particulate emission alarms</li> <li>• Initiating action to minimise stack particulate emissions</li> <li>• Ensuring TARP reporting and recording</li> </ul>
<p>Process Manager</p>	<p>Responsible for:</p> <ul style="list-style-type: none"> <li>• Maintaining and Developing Process Control Standards for clinker and lime plant operation</li> <li>• Investigating the cause of reportable stack emission reporting events</li> <li>• Identification of opportunities to reduce stack emissions</li> <li>• Preparation of reportable emission event reports</li> </ul>
<p>Plant Manager</p>	<p>Responsible for:</p> <ul style="list-style-type: none"> <li>• Implementation of this Stack Particulate Management Plan</li> </ul>
<p>Compliance Manager</p>	<p>Responsible for:</p> <ul style="list-style-type: none"> <li>• Scheduling/conducting stack particulate emission testing for calibration of stack particulate monitoring equipment</li> <li>• Annual reporting requirements of this plan</li> </ul>
<p>Operations Manager</p>	<p>Responsible for:</p> <ul style="list-style-type: none"> <li>• Ensuring compliance with this Stack Particulate Management Plan</li> <li>• Ensuring employees are aware of the site EPA licence conditions and reporting requirements relating to this plan</li> <li>• Provision of resources to reasonably and practically implement this plan</li> </ul>



## 7.0 Monitoring

Continuous particulate monitoring will be undertaken in accordance with the SA EPA document entitled "Emission Testing Methodology for Air Pollution Manual Version 2" dated August 2012.

Continuous particulate monitoring details are as follows;

- A PCME View 580 continuous particulate monitor utilising PCME's *Dynamic Opacity*<sup>TM</sup> (Ratiometric Opacity) measurement technology is installed in accordance with the manufacturer's recommendations on Kiln stacks 1 and 2.
- A PCME Leak Alert 73 continuous particulate monitor utilising PCME's *Electrodynamic*<sup>TM</sup> Probe Electrification technology is installed in accordance with the manufacturer's recommendations on Kiln stack 3
- Particulate data from the monitors is automatically captured, monitored, trended and alarmed in the plant SCADA system. Time stamped monitored data is stored in the plant SCADA system for five years.
- Measured particulate data is averaged over a 1-hour averaging period and alarms are set to alert operators when particulate measurements exceed the threshold trigger values contained in Schedule Z 1.

## 8.0 Trigger Action Response Plans (TARP's)

The SCADA system manages the plants operating control systems, process parameter data, trends and alarms and allows operators to view multiple process parameters at the same time.

There are many combinations of plant operating conditions that can result in process conditions that change the level of particulates from the Kiln Stacks. Process Control Standards (PCS) are developed and maintained to identify the most suitable operating ranges for process variables for different parts of the process.

Alarms are set on one-hour particulate emissions trends to alert operators to take early action to reduce particulate emissions before reaching the 1-hour reporting threshold.

Flow charts have been prepared to help operators identify the correct TARP in response to 1-hour triggers, for different plant operating conditions.

When a trigger is activated the following details will be recorded in a database:

- Date, time and duration
- Measured particulate concentration mg/Nm<sup>3</sup> (STP-dry)
- Immediate actions taken to reduce particulate emissions

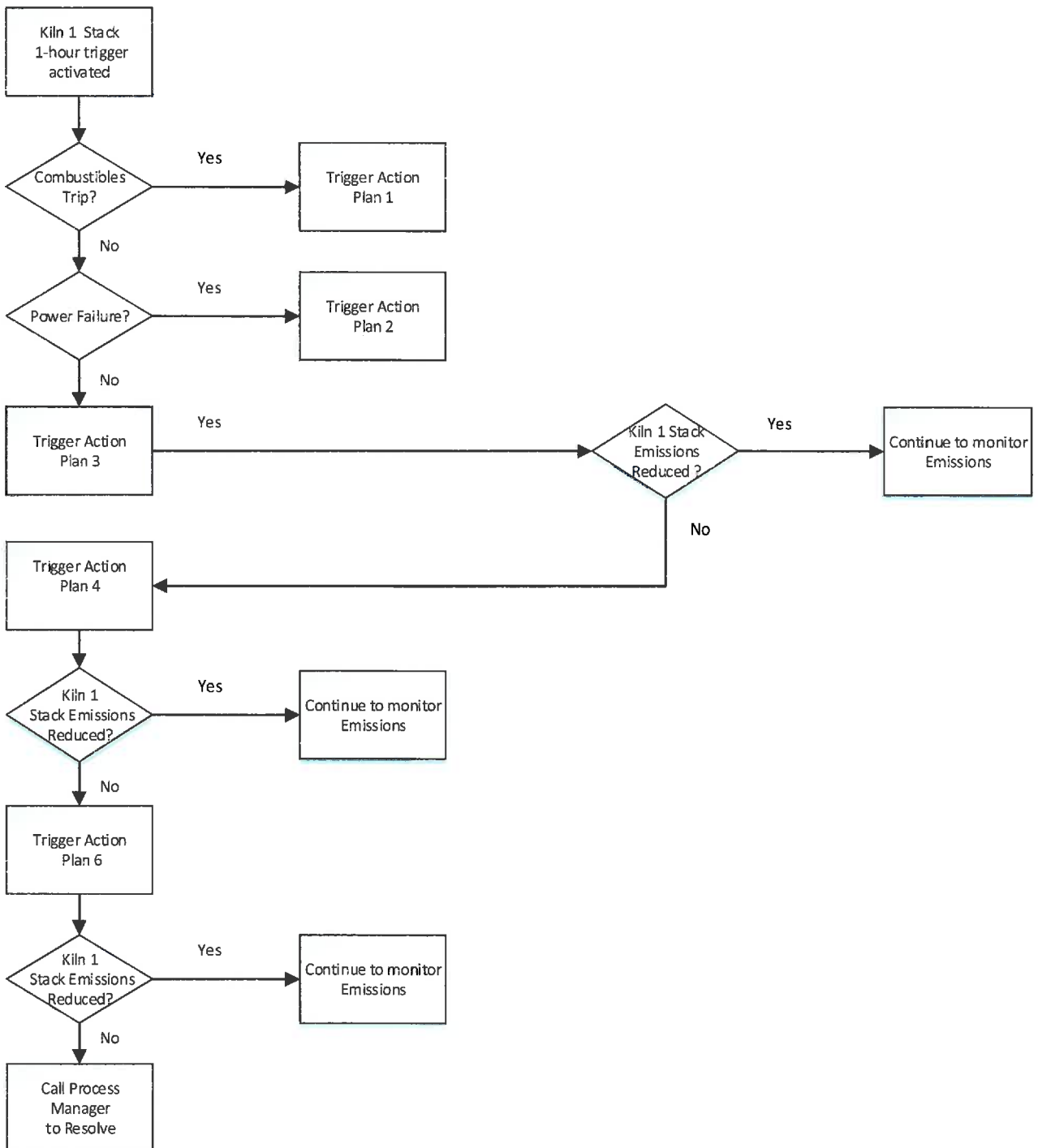
Plant operating data will be automatically recorded in the database and control room operators will record the trigger action plan and corresponding actions implemented in response to the activated trigger. Following approval of this plan, the system to be developed by a third party is expected to take twelve weeks to implement.

For all 1-hour reporting events, an investigation to identify the cause and corrective action taken to reduce future recurrences will be undertaken by the Process Manager and/or relevant technical staff. The event will be reported to the EPA as part of the annual reporting process.

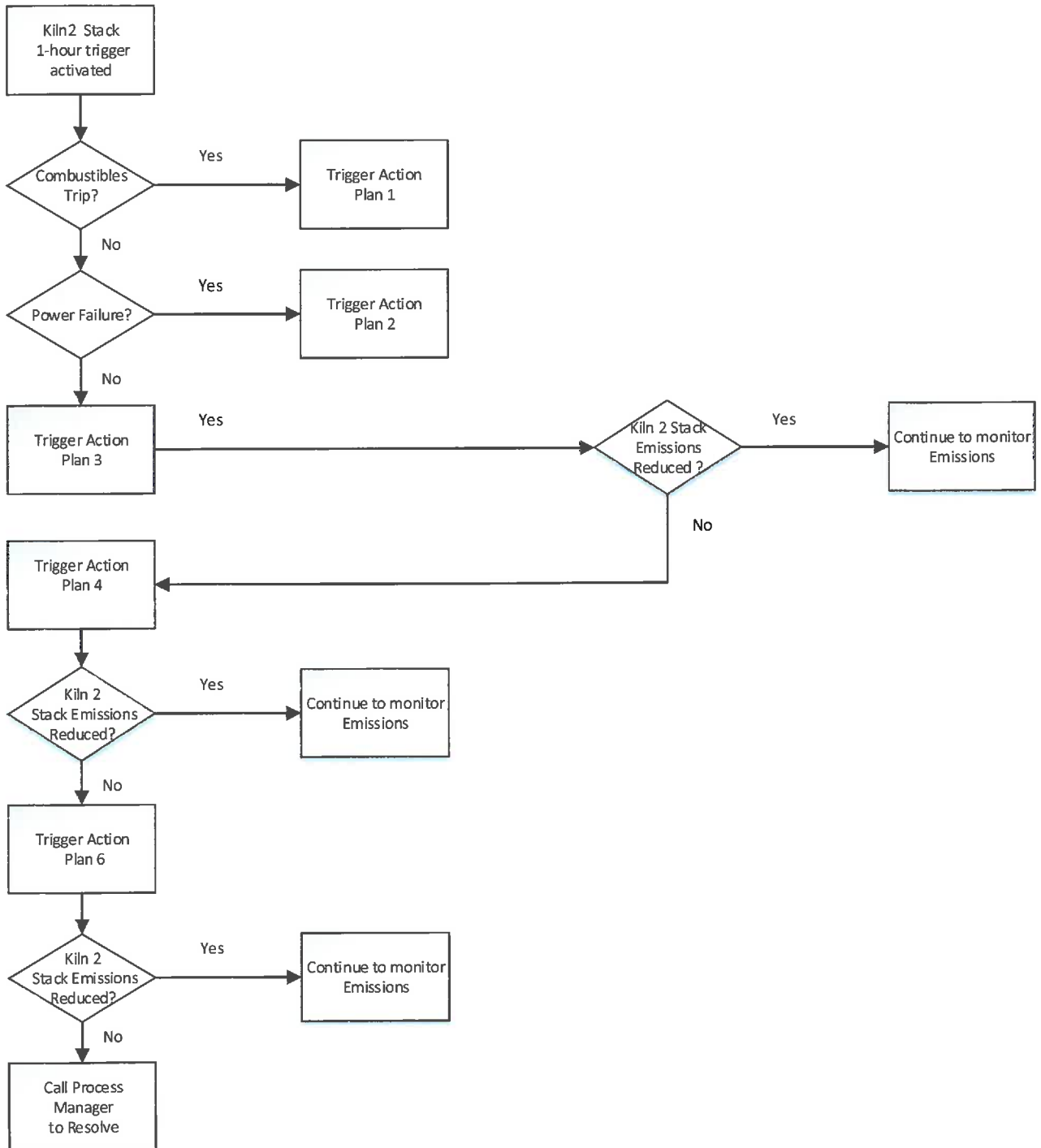
Flow charts and trigger action plans are detailed below.

# Kiln 1 Stack Particulate - Trigger Action Response Plan Flow Chart

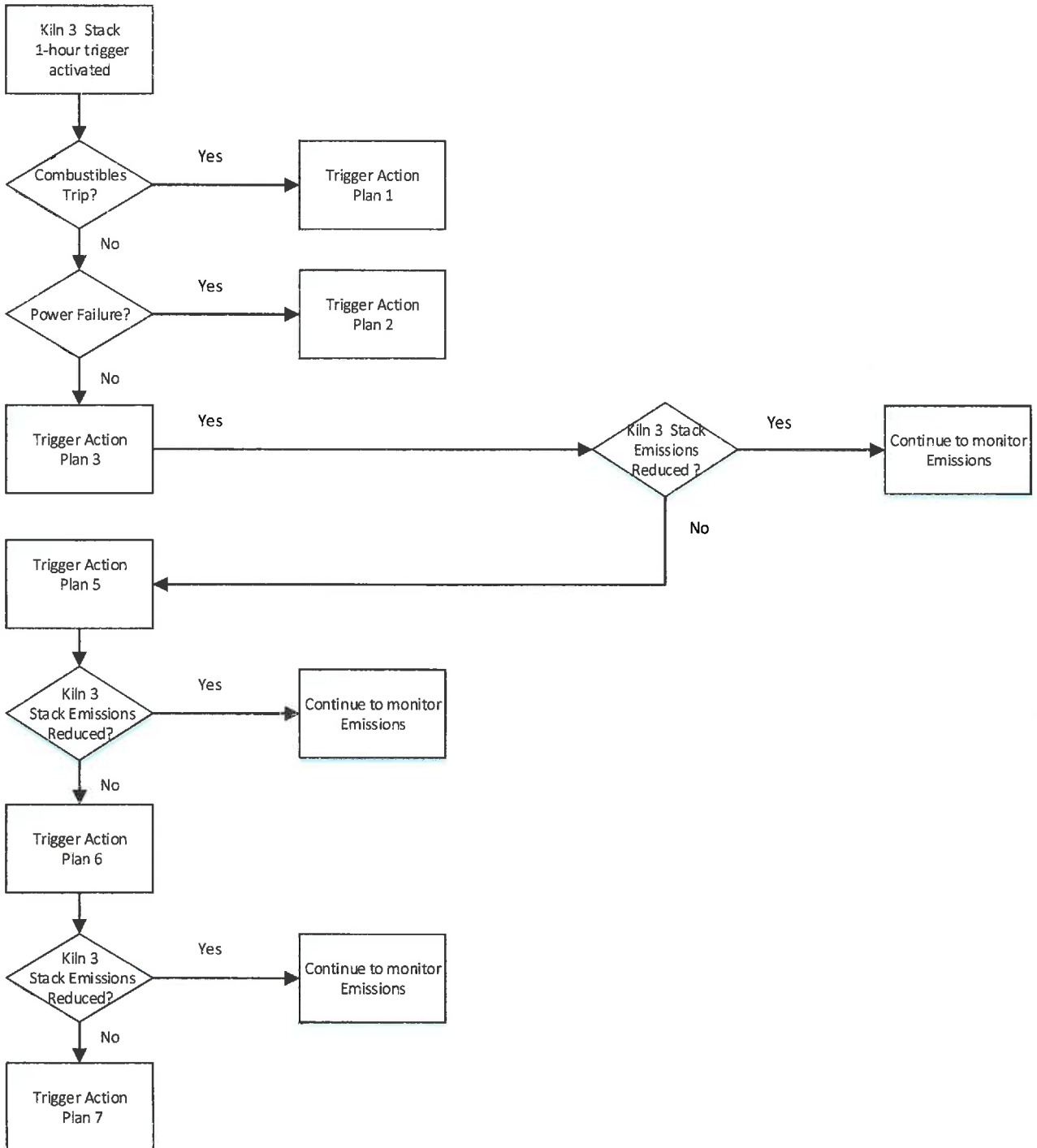
## For 1-hour (average) Trigger



## Kiln 2 Stack Particulate - Trigger Action Response Plan Flow Chart For 1-hour (average) Trigger



## Kiln 3 Stack Particulate - Trigger Action Response Plan Flow Chart For 1-hour (average) Trigger



<b>Trigger Action Plans</b>		
<b>Plan</b>	<b>Action Details</b>	<b>Responsibility</b>
<b>Trigger Action Plan 1</b>	Purge Kiln	CCRO
	Restart plant	CCRO
<b>Trigger Action Plan 2</b>	When power returns	CCRO
	Purge Kiln	CCRO
	Restart plant	CCRO
<b>Trigger Action Plan 3</b>	Check particulate emissions monitor operating correctly	CCRO
	Check kiln operating to PCS	CCRO
<b>Trigger Action Plan 4</b>	Check ESP Rappers are operating correctly	PO
	Check ESP transport system operating correctly (hopper screw and rotary sluice)	PO
	Check ESP fields are optimised	Electrician
<b>Trigger Action Plan 5</b>	Isolate purge air to broken bags	CCRO
<b>Trigger Action Plan 6</b>	Reduce kiln feed rate, gas and exhaust fan	Production shift supervisor / CCRO
<b>Trigger Action Plan 7</b>	Shut down Kiln 3 and repair / blank broken bags	Production shift supervisor Process Manager

## 9.0 Maintenance and Calibration of Particulate Monitors

### Calibration

Continuous emissions monitoring will be undertaken in accordance with Appendix B of the EPA document entitled "Emission Testing Methodology for Air Pollution Manual Version 2" dated August 2012. Appendix B of the Emission Testing Methodology for Air Pollution Manual Version 2 states *"measurements must be made, and equipment operated, in accordance with requirements outlined in the manufacturers manual, relevant test methods and with procedures in this methodology as applicable."*

- The manufacturers of the PCME View 580 and Leak Alert 73 recommend that parallel measurements are performed with the monitor and an acceptable reference method and a statistical approach is used to establish the correlation between instrument readings (opacity or relative %) and particulate concentration.
- A calibration curve to correlate particulate emissions expressed as mg/Nm<sup>3</sup> (STP dry basis) with instrument readings from the monitor will be established using the following standards and test methods:
  - AS 4323.2 - 1995 "Stationary source emissions Method 2: Determination of total particulate matter—Isokinetic manual sampling — Gravimetric method" (recommended SA EPA test method for total solid particulates)
  - BS EN 14181:2014 "Stationary source emissions – Quality assurance of automated measuring systems". (This method is preferred by ABC as the recommended SA EPA test method – ISO 10155: 1995 'Stationary source emissions – Automated monitoring of mass concentrations of particles – performance characteristics, test methods and specifications', requires particulate testing at elevated levels which will necessitate "turning off" particulate abatement controls to generate higher particulate loads and the potential for community complaints).
- Independent NATA accredited specialists will perform the calibration under typical plant operating loads.
- Calibration records are maintained on site for seven years.

### Routine Service and Performance Checks

Both the PCME View 580 and PCME Leak Alert 73 are reliable instruments requiring quarterly instrument checks to ensure lens and probe respectively, are free of excessive particulate build up. In addition to these quarterly checks the instruments have additional alarms to alert the need for maintenance.

The PCME View 580 has the following features

- Purge air supplied to keep the lens free of dust build up
- An automatic light check to provide an alarm should light levels fall to below 10% transmission, indicating the need to clean optical surfaces.
- Automatic electronic zero and span checks are done every 4 hours to provide increased assurance that the instrument is measuring correctly

The PCME Leak Alert 73 has the following features

- Purge air supplied to keep the probe free of dust build up
- Automatic insulator contamination detection
- Electronic zero and reference drift detection (manually initiated)

- Competent maintenance staff perform these checks in accordance with the service and operations manuals.
- Maintenance and performance records are held on site.

## 10.0 Reporting methodology

All reports will clearly identify the EPA licence number, name and address where the licence activity is conducted, name and contact details of the person submitting the report.

### 10.1 Annual reporting

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:

- A table detailing the number and cause of reporting events for Kiln Stacks 1,2 and 3
  - date, time and duration
  - the measured particulate concentration mg/Nm<sup>3</sup> (STP-dry)
  - immediate actions taken to reduce particulate emissions
  - cause and corrective actions taken to prevent future reoccurrence
- A trend analysis of magnitude and duration of 1-hour notifications on a time series graph for each stack for the current year
- A trend analysis of community complaints by type against 1-hour reporting events by cause on a time series graph for each stack
- 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;

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

- Identification of opportunities for improvement to decrease the frequency, duration and magnitude of 1-hour reporting events

### 10.2 Public access to reports and Stack Particulate Management Plan

- Following submission to the EPA, the annual report, will be made available on the ABC Community Web Site within seven days.
- A copy of the current version of this Plan, as approved by the EPA, will be made available on the ABC Community Web Site within seven days.

## 11.0 Plan review

An annual review of the plan will be undertaken at the time of preparing the annual report and will include:

- A review of the effectiveness of TARP's
- Identified opportunities for improvement in TARP's

A review of the plan will be triggered where a process change requires a modification to actions within the TARP.

## 12.0 Plan Submission

Submitted by:

Name

Position

Authorised on behalf of

**ADELAIDE BRIGHTON CEMENT LTD.**

Signed: .....

Dated: ...../...../.....

## 13.0 Plan Approval

Approved by:

.....

**DELEGATE OF THE ENVIRONMENT PROTECTION AUTHORITY**

Signed: .....

Dated: ...../...../.....