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Stack Particulate Management Plan

Adelaide Brighton Cement Limited

Licence number: 1126

**Premises Address: Victoria & Elder Roads, Peterhead
(Birkenhead Site)**

June 2018

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Glossary

Term	Definition
$\mu\text{g}/\text{m}^3$	micrograms per cubic metre
mg/m^3	milligrams per cubic metre
μm	micrometre
$^{\circ}\text{C}$	degrees Celsius
m	metre
m^3	cubic metres
m^3/s	cubic metres per second
Nm^3	Gas volume in dry cubic metres at STP dry basis
Nomenclature	Definition
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
Abbreviations	Definition
Air EPP	Environment Protection (Air Quality) Policy 2016
CT	Conditioning Tower
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
PSS	Production Shift Supervisor
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 Stack 4A and Precalciner Stack 4B 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

Combustion and process emissions from the clinker plant are emitted through the Kiln Stack 4A and Precalciner Stack 4B. Opacity monitors installed on both stacks continuously measure the opacity of these stack emissions. A calibration curve is used to convert opacity readings to particulate concentrations expressed as mg/Nm³ (STP- dry basis).

4.0 Plan objectives

The objectives of this plan are to:

- Provide continuous monitoring of stack particulate emissions from Kiln Stack 4A and Precalciner Stack 4B in compliance with the SA EPA "Emission Testing Methodology for Air Pollution Manual version 2" dated August 2012
- Report to the EPA as soon as reasonably practicable, the details of stack particulate events where stack particulate levels exceed the following notifiable reporting thresholds
 - 100mg/Nm³ (1 hour averaging period) on Kiln Stack 4A
 - 60 mg/Nm³ (1 hour averaging period) on Precalciner Stack 4B
- Develop Trigger Action Response Plans (TARP's) to prevent or minimise particulate emissions exceeding the notifiable reporting levels (1 hour averaging periods). These plans are to be based on the following stack particulate emission trigger values:

Stack Particulate Emission Trigger Values		
Averaging period	Kiln Stack 4A mg/Nm ³ (STP dry basis)	Precalciner Stack 4B mg/Nm ³ (STP dry basis)
10 minute	125	90
1 hour	100	60

- ◊ Identification of opportunities to reduce frequency, magnitude and duration of reportable particulate emissions (1-hour averaging period)
- ◊ Provide public access to this plan, quarterly and annual reports of notifiable events

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's EPA Licence No1126, 1/11/2017, condition U-749

Adelaide Brighton Cement's EPA Licence No1126, 1/11/2017, conditions U-718 and U-754

Adelaide Brighton Cement's EPA Licence No1126, 1/11/2017, Schedule Z-1

4.4 STACK PARTICULATE MANAGEMENT PLAN (U - 749)

The Licensee must:

- 4.4.1 *develop and submit a Stack Particulate Management Plan to the satisfaction of the EPA by the date listed below;*
- 4.4.2 *ensure that the Stack Particulate Management Plan includes, but is not limited to:*
 - a *continuous monitoring of particulate emissions from Kiln Stack 4A and Precalciner Stack 4B 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;*
- 4.4.3 *ensure the Stack Particulate Management Plan includes a methodology and framework for the submission of quarterly reports to the EPA on the last day of January, April, July and October of each year, which includes but is not limited to:*
 - a *details of exceedance notifications to the EPA as required by conditions U-718 or U-754, such details to include but not be limited to:*
 - i *the date, time and duration;*
 - ii *the cause;*

- iii the measured particulate concentration;
- iv immediate actions taken to reduce particulate emissions;
- v corrective actions taken to prevent future events of the same kind; and
- vi reporting of particulate concentrations as milligrams per cubic metre at STP, dry basis;

4.4.4 ensure that the Stack Particulate Management Plan includes 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:

- a a trend analysis of notifications and associated details provided under sub paragraph 3 of this condition;
- b a trend comparison of information analysed under sub paragraph 4(a) of this condition with:
 - i community complaints recorded under condition 300-9; and
 - ii the preceding 12 months of stack emission data;
- c identification of any opportunities for improvement in order to decrease the frequency, duration and magnitude of any notified events;

4.4.5 ensure that the Stack Particulate Management Plan includes a methodology and framework for providing public access to the Stack Particulate Management Plan (or any revised plan approved by the EPA) and to quarterly and annual reporting;

4.4.6 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: 28-Feb-2018

1.4 PARTICULATE EMISSIONS - KILN STACK 4A (U - 718)

The Licensee must:

- 1.4.1 take all reasonable and practicable measures to prevent particulate emissions (as TSP) from Kiln Stack 4A exceeding a limit of 100 milligrams per cubic metre at STP, dry basis, based on a 1 hour average;
- 1.4.2 where particulate emissions exceed the limit specified under sub paragraph 1 of this condition, take all reasonable and practicable immediate action to reduce particulate emissions to below that limit;

- 1.4.3 provide notification to the EPA as soon as reasonably practicable of any exceedance of the limit specified under sub paragraph 1 of this condition and include the reason(s) for the exceedance, and the corrective actions implemented to reduce particulate emissions to below that limit.

1.5 PARTICULATE EMISSIONS - PRECALCINER STACK 4B (U - 754)

The Licensee must:

- 1.5.1 take all reasonable and practicable measures to prevent particulate emissions (as TSP) from Precalciner Stack 4B exceeding a limit of 60 milligrams per cubic metre at STP, dry basis, based on a 1 hour average;
- 1.5.2 where particulate emissions exceed the limit specified under sub paragraph 1 of this condition, take all reasonable and practicable immediate action to reduce particulate emissions to below that limit;
- 1.5.3 provide notification to the EPA as soon as reasonably practicable of any exceedance of the limit specified under sub paragraph 1 of this condition and include the reason(s) for the exceedance, and the corrective actions implemented to reduce particulate emissions to below that limit.

Adelaide Brighton Cement Ltd – EPA Environmental Authorisation 1126 -Schedule Z-1

Stack Particulate Emission Trigger Values		
Averaging period	Kiln Stack 4A mg/Nm ³ (STP dry basis)	Precalciner Stack 4B mg/Nm ³ (STP dry basis)
10 minute	125	90
1 hour	100	60

6.0 Responsibilities

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

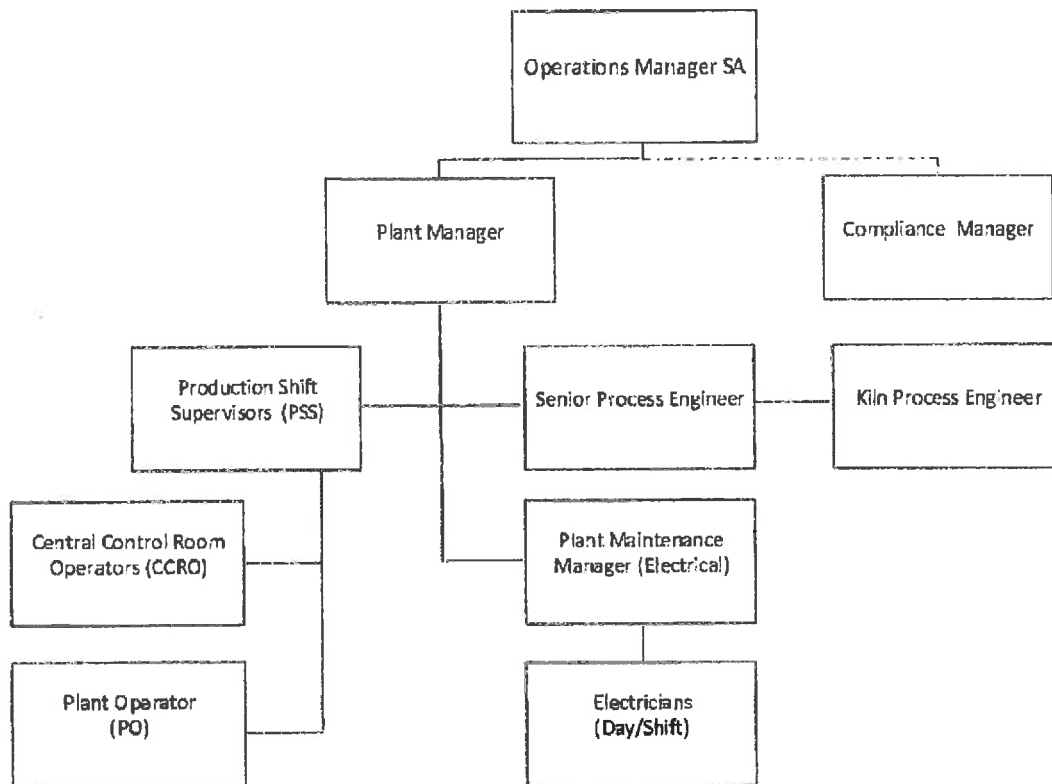


Figure 1: Organisation chart showing positions at the Facility with responsibilities under the SPMP

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

Table 1: General Responsibilities

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

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 Durag D-R 290 Dust and Opacity monitor is installed in accordance with the manufacturers recommendations on Kiln Stack 4A and Precalciner Stack 4B.
- Opacity and particulate data from the monitors are 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 10-minute and 1-hour averaging periods and alarms are set to alert operators when particulate measurements exceed the threshold trigger values contained in Schedule Z 1 as follows:

Stack Particulate Emission Trigger Values		
Averaging period	Kiln Stack 4A mg/Nm ³ (STP dry basis)	Precalciner Stack 4B mg/Nm ³ (STP dry basis)
10 minute	125	90
1 hour	100	60

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 amount of particulates from the Kiln Stack 4A and Precalciner Stack 4B. Process Control Standards (PCS) are developed and maintained to identify the most suitable operating ranges for process variables for different parts of the process.

The purpose of a trigger action response plan (TARP) is to take early action to prevent or minimise particulate emissions reaching the 1-hour reporting threshold. Early action is initiated when particulate emissions reach the 10-minute average trigger.

Flow charts have been prepared to help operators identify the correct TARP in response to 10-minute and 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/Nm³ (STP-dry)
- Immediate actions taken to reduce particulate emissions

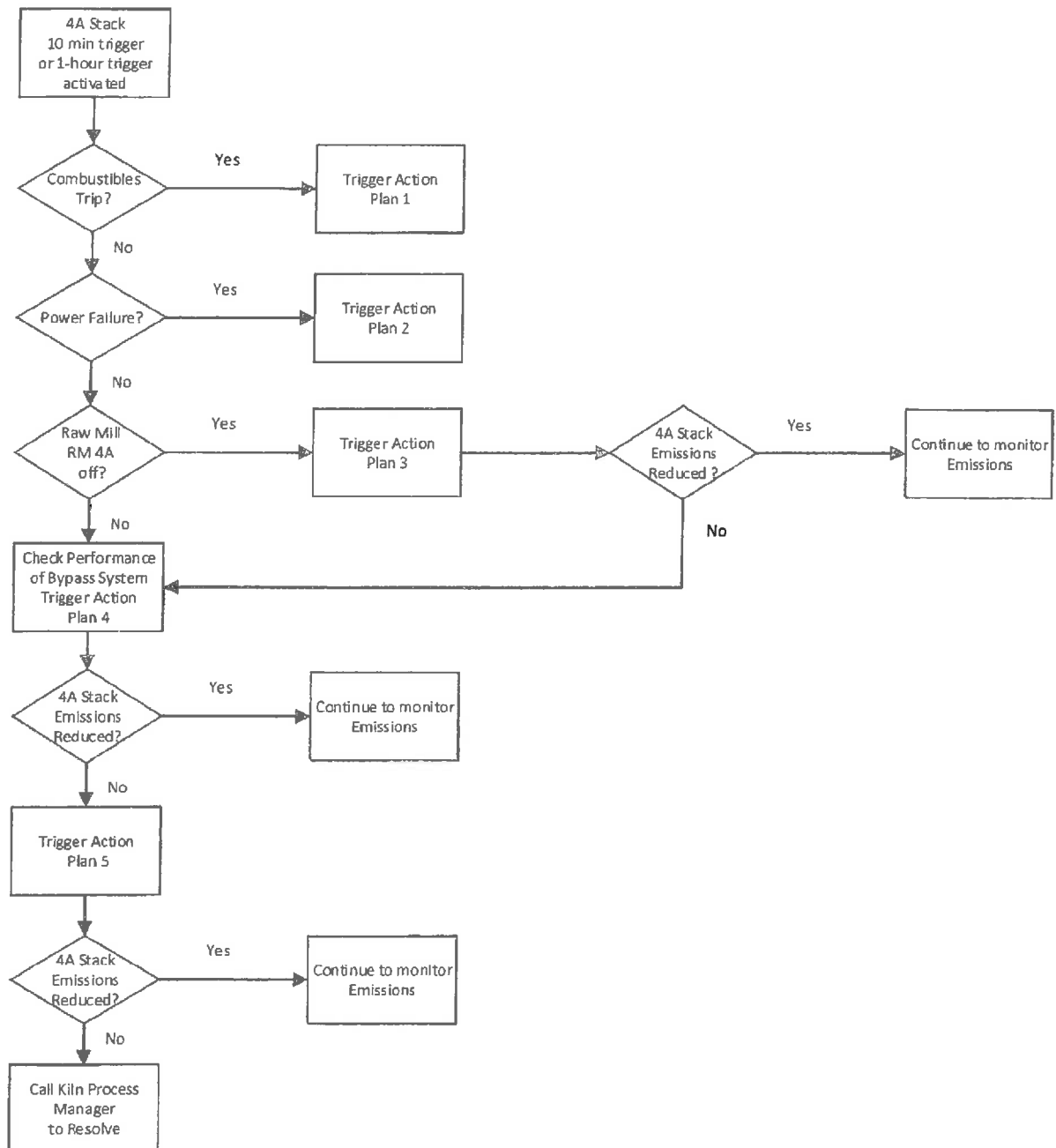
Plant operating data will be automatically recorded in the database and control room operators will record the trigger action plan and actions implemented in response to the activated trigger. Following approval of this plan, the system to be developed by a third party is expected to take six weeks to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

For all 1-hour reporting events an investigation to identify the cause will be undertaken by the Kiln Process Manager and/or relevant technical staff. The event will be reported to the EPA as soon as reasonably practicable.

Flow charts and trigger action plans are detailed below.

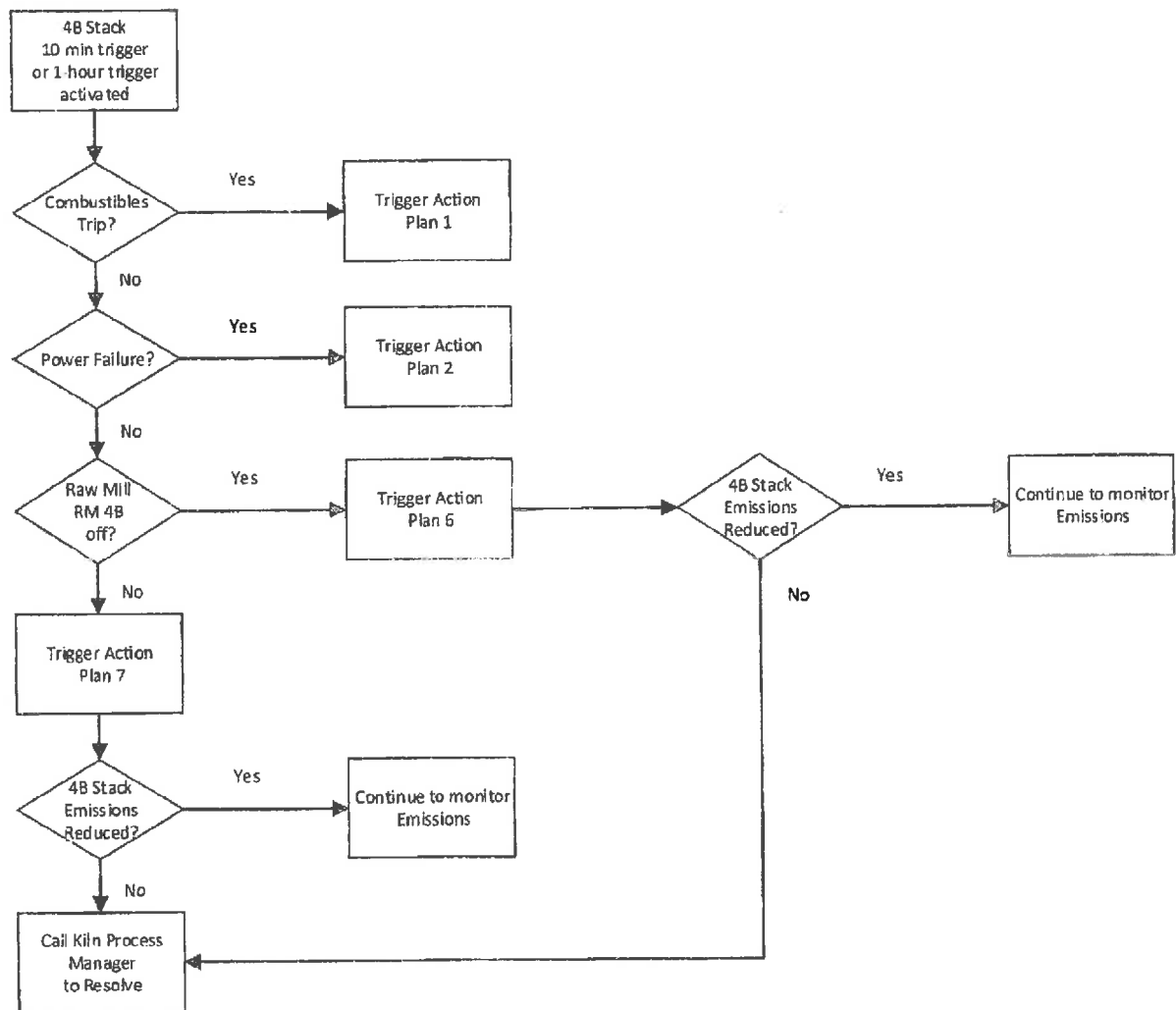
4A Stack Particulate - Trigger Action Response Plan Flow Chart

For 10 minute (average) and 1-hour (average) Triggers



4B Stack Particulate - Trigger Action Response Plan Flow Chart

For 10 minute and 1-hour (average) Triggers



Trigger Action Plans		
Plan	Action Details	Responsibility
Trigger Action Plan 1	Purge Kiln/Precalciner	CCRO
	Restart /Check ESP operation	CCRO
	Reduce draft	CCRO
	Restart plant	CCRO
Trigger Action Plan 2	When power returns	CCRO
	Purge Kiln/Precalciner	CCRO
	Restart /check ESP operation	CCRO
	Restart plant	CCRO
Trigger Action Plan 3	Check 4A MCT sprays are controlling to Raw Mill 4A PCS set point for mill off	CCRO
	Check 4A preheater draft is controlling to 4A Preheater PCS set point	CCRO
	Check the 4A MCT sprays are atomising effectively	PO
	Adjust sprays (number operating and or replace if required)	CCRO / Production Supervisor
	Lower 4A MCT outlet temperature set point by 10C to a minimum of 125C	CCRO
	Check 4A ESP fields are optimised and operating correctly	Electrician
	Check 4A Rappers are operating correctly	PO
	Check clinker cooler bag filter is operating correctly	CCRO
Trigger Action Plan 4	Check plant is operating to Bypass PCS and adjust operating parameters if required	CCRO
	Lower Bypass CT outlet temperature set point by 10C to a minimum of 130C	CCRO
	Check the Bypass CT sprays are atomising effectively	CCRO/PO
	Adjust sprays (number operating and or replace if required)	PO
	Check quench air fan is operating correctly	CCRO
	Monitor pressure of Bypass CT inlet	CCRO
	Seek approval from Production Supervisor to reduce bypass fan speed by 10% if emissions have not reduced	CCRO / Production Supervisor
	Check and clean Poppet Valve if required	CCRO/PO
	Seek approval from Production Supervisor to check and clean bypass CT target plates	CCRO / Production Supervisor
	Check Bypass ESP fields are optimised	Electrician
	Check Bypass ESP Rappers are operating correctly	PO
	Check double flap dampers on Bypass ESP extractors are operating correctly (false air ingress check)	PO

Trigger Action Plans		
Plan	Action Details	Responsibility
Trigger Action Plan 5	Check plant is operating to 4A Raw Mill PCS and adjust plant parameters if required	CCRO
	Check adequate water flow rate to Raw Mill 4A sprays	CCRO/PO
	Seek Production Supervisor permission to increase feed rate to reduce Raw Mill 4A outlet temperature or reduce outlet temp with water	CCRO
	Check 4A ESP fields are operating correctly	Electrician
	Check 4A ESP Rappers are operating correctly	PO
	Check 4A ESP F extractor slide is closed (False air ingress check)	PO
	Check exit draught is operating to 4A Preheater PCS	CCRO
	Check clinker cooler bag filter is operating correctly	CCRO
Trigger Action Plan 6	Check 4B CT sprays are controlling to Raw Mill 4B PCS set point for mill off	CCRO
	Check 4B Calciner draft is controlling to 4B Calciner PCS set point	CCRO
	Lower 4B CT outlet temperature set point by 10C to a minimum of 150C	CCRO
	Check the 4B CT sprays are atomising effectively	PO
	Adjust sprays (number operating and or replace if required)	CCRO / Production Supervisor
	Check 4B ESP fields are optimised and operating correctly	Electrician
	Check 4B ESP Rappers are operating correctly	PO
Trigger Action Plan 7	Check plant is operating to 4B Raw Mill PCS and adjust plant parameters if required	CCRO
	Check adequate water flow rate to Raw Mill 4B sprays	CCRO/PO
	Seek Production Supervisor permission to increase feed rate to reduce Raw Mill 4B outlet temperature	CCRO
	Check 4B ESP fields are optimised	Electrician
	Check 4B Rappers are operating correctly	PO
	Check for false air ingress on ESP	PO

9.0 Maintenance and Calibration of Opacity 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 Durag D-R 290 Dust and Opacity monitor recommend that parallel measurements are performed with the opacity monitor and an acceptable reference method and a statistical approach is used to establish the correlation between opacity and particulate concentration.
- A calibration curve to correlate particulate emissions expressed as mg/Nm³ (STP dry basis) with opacity 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

- A number of service and performance checks are performed on a regular basis in accordance with the operation and service manuals for the opacity monitors. These performance checks include:
 - An automated daily, zero and dirty window check and automatic adjustment
 - A monthly, zero, dirty window and span check.
 - A monthly linearity check, which consists of manually inserting a series of filters into the unit and confirming the monitors' opacity readings.
- 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 Quarterly reporting

All stack particulate emissions events for the reporting quarter, where levels have exceeded the reporting thresholds:

- 100mg/Nm³ (1 hour averaging period) on Kiln Stack 4A
- 60 mg/Nm³ (1 hour averaging period) on Precalciner Stack 4B

will be reported in a table format providing the following details:

- date, time and duration
- the measured particulate concentration mg/Nm³ (STP-dry)
- immediate actions taken to reduce particulate emissions
- cause and corrective actions taken to prevent future reoccurrence

Reports will be submitted to the EPA by the last day of January, April, July and October of each year

10.2 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 Stack 4A and Precalciner Stack 4B
- A trend analysis of magnitude and duration of 1-hour notifications on a time series graph for each stack
- 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 year
- Identification of opportunities for improvement to decrease the frequency, duration and magnitude of 1-hour reporting events

10.3 Public access to reports and Stack Particulate Management Plan

- Following acceptance of the quarterly and annual reports by the EPA, reports will be made available on the ABC Community Web Site.
- A copy of the current version of this Plan, as approved by the EPA, will be made available on the ABC Community Web Site.

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