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ANNUAL DUST MANAGEMENT REPORT FOR BIRKENHEAD WORKS

2024 Annual Report and TARP Review

Compliance date: 15/02/2025

EPA Licence 1126: Air Particulate Management Plan (U-1549)

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

62 Elder Road, Birkenhead, SA 5015

Date of Submission: **21 February 2025**

Version Number: **1**

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

Glossary

Term	Definition
µg/m^3	micrograms per cubic metre
mg/m^3	milligrams per cubic metre
µm	micrometre
°C	degrees Celsius
m	metre
m^3	cubic metre
m^3/s	cubic metres per second
Nomenclature	**Definition**
PM_{10}	Particulate matter with a diameter less than 10 micrometres
$PM_{2.5}$	Particulate matter with a diameter less than 2.5 micrometres
24-hour average	Calendar day (midnight to midnight)
Abbreviations	**Definition**
ABC	Adelaide Brighton Cement
Adbri	Adelaide Brighton Cement
Air EPP	South Australian Environment Protection (Air Quality) Policy 2016
APMP	Air Particulate Management Plan
DMP	Dust Management Plan
EPA	Environment Protection Authority
GLPMRP	Ground Level Particulate Monitoring and Reporting Plan
SPMP	Stack Particulate Management Plan
TARP	Trigger Action Response Plan

Purpose	The purpose of the Air Particulate Management Plan (APMP) (formerly Dust Management Plan) is to facilitate the ongoing implementation of dust control measures to minimise offsite dust from the Facility.
Dust Management Plan	This report has been prepared in compliance with the Air Particulate Management Plan, approved 16 October 2023, by SA EPA. The plan is available on the ABC Birkenhead Community website: https:// http://www.birkenheadcommunity.com.au
Background Information	The APMP contains a Trigger Action Response Plan (TARP) to proactively manage fugitive dust emissions. The TARP uses three levels of trigger: • Low (watch and wait) – early warning to increase awareness of potential dust issues • Medium (investigate) – there may be a potential dust issue and investigate • High (escalate) – dust concentrations are higher than normal, and action may be required Triggers and responses have been defined for: • Ambient dust monitoring from on-site monitors • Meteorological parameters (forecasts and observations (e.g., extended dry period with less than 1 mm of rain over 20 days)) • Visual observations Trigger levels and responses are documented in the EPA Approved APMP. All monitoring data, triggers, associated responses and actions are captured in the Dust Management Dashboard and control system, for reporting and analysis. This annual review of the APMP is for the reporting period 1/1/2024 to 31/12/2024.

Reporting Objective	To review the effectiveness of the Trigger Action Response Plan (TARP) contained within the approved Air Particulate Management Plan (APMP) and includes; • Review of all trigger values and frequency of occurrence • A review of the effectiveness of all action and response strategies • Correlation between triggers and measured onsite and offsite dust levels • A review and analysis of community complaints with the exceedance of trigger values and 24-hour exceedance of PM_{10} and $PM_{2.5}$ Air (EPP) criteria • A review and analysis of data collected from licence conditions U-1555 and U-1556 • A trend analysis of data collected • Opportunities for improvement in dust management • Revision of trigger level values as a result of improvements made in dust controls and practices

Particulate Monitor Locations	 Map showing monitoring locations, major infrastructure, sensitive environmental receptors, and north arrow. Monitoring locations are indicated by colour-coded dots on the above map.

Four monitoring locations are located on the Birkenhead Works site, and currently there are two community-based monitoring locations.

Adelaide Brighton Cement has been seeking a replacement location for one of it's long term community monitoring locations (Gunn Street), which was no longer available for use following the sale of the property (not owned by Adbri) in June 2022. After a period of negotiating with the EPA and discussion with City of Port Adelaide Enfield Council, Adbri initiated the application process for installation of a permanent air quality monitor in the preferred location, the NW corner of Naval Reserve, in November 2023.

The application was ultimately not approved in June 2024 and Adbri will continue to work respectfully with both parties to reinstate a long term solution. In the mean time a trailer mounted air quality monitoir has been set up on the corner of Walton Street and Mary Street, Peterhead, until a long-term monitoring station can be established.

In September Adbri installed and commissioned trailer mounted monitoring stations at two locations in the local community. One of these was co-located at the ABC Community Park (Birkenhead), and the other was located on the corner of Walton Street and Mary Street, Peterhead, and is a replacement for the former Gunn Street monitor until a long-term monitoring station can be established.

The trailer mounted monitoring stations have been set up to measure PM2.5, PM10 and TSP particulate sizes using the following equipment:

- Thermo Scientific Model 5028i BAM which consistently measure PM2.5 and PM10.
- Thermo Scientific Model 5014i BAM which consistently measure TSP.
- 10m pump up mast 86000 Wind Speed/Direction Sensor
- Wind speed and direction at each particulate monitor is measured continuously by a RM Young 86000 windspeed and direction sensor, mounted on a 10m pump up mast.

This monitoring arrangement allows for analysis of the new BAM equipment capability and suitability, and to address concerns raised by the EPA with the PM2.5, PM10 and PM2.5/PM10 ratio measured by the DustTrak monitors, that have been in service.

The new BAM's at Community Park and Walton Street commenced operation on the 10 and 11 September, respectively.

Review of Air Particulate Management Plan	**May dust event** In May 2024, there was scheduled maintenance on the clinker shed located near Victoria Road, Birkenhead. During maintenance work the potential for gaps to remain under the eaves of the clinker shed was not adequately identified. This resulted in dust emissions that impacted Adbri's neighbours. This resulted in complaints related to dust impacts to property including vehicles, solar panels, as well as concerns related to health impacts. Adbri took immediate action to identify and fix the source of the dust leakage and has been working with the community ever since to rectify any associated damage or dust impact on property. Since the event, Adbri has: • appointed an expert to assess potential claims. This person has since contacted all registered people, with the majority of solar panels claims assessed and cleaning underway. All car cleaning requests have been actioned • posted regular updates on its community website to keep residents informed, as well as held two community liaison group meetings to update the community and provide opportunities for Adbri, SA EPA and SA Health to answer questions • provided an in-person update to the local council • installed additional CCTV cameras to those already onsite to provide even more early monitoring capability of potential emissions • amended processes and training to more clearly identify and address environmental risks when undertaking works programmes, and • identified dust mitigation projects that are incorporated in the site's Environment Improvement Programme approved in November Adbri held a Community Liaison Group meeting on the 3 June about the dust event • Adbri thanks everyone who attended the June Birkenhead Community Liaison Group meeting. • This meeting provided an opportunity for Adbri to listen to community feedback. Adbri held a Community Liaison Group meeting on the 12 July in response to community concerns about health impacts • Adbri also extends our appreciation to the EPA for arranging for SA Health representatives to attend and present at the meeting. • The representatives addressed health questions raised by the community about the May dust event.

Adbri apologises to the community and is committed to doing better in the future.

Since the May dust event Adbri has continued to call for and listen to community sentiment and developed focus areas and methodology directly related to recent concerns raised by the community.

Based on the feedback, Adbri has developed an Environment Improvement Programme (EIP), that included transparent consultation with the community in its development. The EIP projects are grouped into themes about communication, dust management and monitoring, noise, odour and amenity.

The EIP has been approved by the SA EPA on is available on our birkenhead community website
https://adelaidebrightoncommunity.com.au/sustainability/environmental-improvement-plan/

One of the key learnings from the May dust event, was that the existing monitoring network did not pick up the increase in particulate levels, in particular deposited dust (larger particle size fraction), experienced by the local community.

This has triggered a comprehensive review, of the existing dust monitoring network, the purpose of which is to identify occasions when dust emissions from the site are elevated so that prompt action can be taken to reduce dust emissions to acceptable levels.

Adbri has engaged independent air quality consultants to undertake this review which focusses on the performance of existing onsite and nearby community monitors and how they are used to inform reactive strategies to prevent and mitigate elevated dust emissions from the facility. A component of this review will focus on location and type of monitoring equipment to best identify impacts in the local community.

This review is an important component of the EPA approved EIP, *Project 19 Complete improvements to air particulate monitoring network to measure larger particles across community and improve small particle monitoring and reporting.* This project has mandatory time frames for project milestones which will be reported on as part of the EIP reporting process. This review is currently in progress.

Recommendations from the monitoring network review and the 2024 Annual Review of the TARP undertaken by Katestone documented in the report *"Trigger Action Response Plan Annual Review"* dated February 2025 will inform a revision of the Air Particulate Management Plan including the associated Trigger Action Response Plan, which will be submitted to the SA EPA, for Approval.

TARP Review	Adbri engaged independent air quality consultants Katestone, to undertake a review of the TARP data collected for the period 1 January 2024 to 31 December 2024, who have prepared a report *"Trigger Action Response Plan Annual Review"* dated February 2025, which is included in the appendix of this report.
	
	Katestone have undertaken a detailed analysis of the performance of the Trigger Action Response Plan. The following sections, of the attached report details the following:
	• Overview of the monitoring network (Section 2)
	• Description of ABC's TARP (Section 3)
	• Reporting period data summary (Section 4), including:
	  ○ TARP data collected during the monitoring period (Section 4.1)
	  ○ An analysis of data collected by ABC's other environmental monitoring programs during the reporting period, including:
	  ▪ Ground Level Particulate Monitoring and Reporting Plan (GLPMRP) – required under Licence Condition U-1555 (Section 4.2)
	  ▪ Stack Particulate Management Plan (SPMP) – required under Licence Condition U- 1556 (Section 4.3)
	• Analysis of community complaints alongside TARP data during the reporting period (Section 5)
	• Review of the effectiveness of the TARP during the reporting period (Section 6)
	• Conclusions (Section 7).

Summary of TARP Review, Effectiveness, and Opportunity for Improvement

A summary of the key findings from the report is provided below:

Data capture was greater than 90% at all on-site monitoring sites; however, identification and removal of over two months of invalid data at the Northern Grounds monitor reduced the valid data at this monitor to 78-79% for the reporting period. It is recommended that ABC investigate the Northern Grounds monitor for issues. Possibilities for updating the Dust Management Dashboard to automatically identify periods of regular or extended negative data and issue an alert should also be investigated.

The following table presents a summary of various measures of dust impacts over the 2020 to 2024 calendar years. There were significantly more dust-related complaints from the community in this reporting period than previous years, and there were more exceedances of the South Australian Environment Protection Authority's 24-hour average criterion for PM2.5 than in the previous three years of reporting.

Dust Impact	Count of dust impacts over each calendar year				
	2020	2021	2022	2023	2024
Dust-related complaints	22	37	11	18	201
PM10 exceedances at Community Park	4	0	0	0	0
PM2.5 exceedances at Community Park	22	1	0	0	3

Overall, the Trigger Action Response Plan appears effective in identifying certain conditions that could lead to dust impacts in the community and should in turn, through the actions and responses taken by ABC staff, reduce the likelihood of the facility contributing to these impacts. However, some inadequacies and potential improvements to the monitoring network and Trigger Action Response Plan have been identified.

It would appear that DustTrak monitors under-state PM10 concentrations and may also over-state PM2.5 concentrations. The network would benefit from higher-quality monitoring equipment and the more robust concentration data that these would provide.

- Because alerts are triggered based on absolute concentrations, regional dust events and emissions from off-site sources will be triggering alerts even when the facility is making a minimal contribution to measured concentrations. The Trigger Action Response Plan would benefit from an ability to quantify the facility's contribution to measured concentrations alongside that of other sources, so that action is targeted on those occasions when the facility is making a significant contribution to measured concentrations. However, higher quality monitoring data is a necessity for the implementation of such an automated quantification of source contributions.

- The Trigger Action Response Plan currently focusses triggers on concentrations measured on-site only; community monitors should be incorporated into the Trigger Action Response Plan to ensure that high concentrations event in the community are not missed, as under such events efforts should be made to minimise the site's contribution regardless of its magnitude.
- No alerts were triggered by on-site visual observations during the reporting period. This outcome is considered unrealistic and indicative of improper implementation of the Trigger Action Response Plan amongst site staff. While it is understood that some such events are reported internally, via a separate system, it is recommended that Adelaide Brighton Cement Ltd implements additional training for all site staff to ensure that all such visual observations are reported and recorded in accordance with the Trigger Action Response Plan, and that rationalisation of internal reporting systems is undertaken to ensure that all dust-related activities are recorded in the Trigger Action Response Plan, so that they can be incorporated into Trigger Action Response Plan Reviews

Katestone is undertaking a separate piece of work to review Adelaide Brighton Cement Ltd's monitoring network and make recommendations to improve it, which will include revisions to Trigger Action Response Plan trigger levels and which will address all of the above points. With this work underway but not yet complete, it would be inappropriate to make any significant recommendations for changes in this report.

Opportunities For Improvement in Dust Management	ABC's "Assessment of Options Report"– September 2024 approved by the EPA on 4 October 2024 identifies further opportunities to reduce particulate emissions from the site. The recommended improvement options from this report have been incorporated into an Environment Improvement Programme (EIP) November 2024, approved by the EPA on 15/11/2024. The improvements are now being implemented and reported separately in accordance with the EIP.
Appendix	Katestone Report *"Trigger Action Response Plan Annual Review"* dated February 2025

Trigger Action Response Plan Annual Review

Prepared for:

Adelaide Brighton Cement Ltd

February 2025

Final

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Glossary

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m/s	metres per second
m^3	cubic metres
mg/Nm^3	milligrams per normalised cubic metre
Nomenclature	**Definition**
PM_{10}	particulate matter with a diameter less than 10 micrometres
$PM_{2.5}$	particulate matter with a diameter less than 2.5 micrometres
TSP	Total suspended particulates
Abbreviation	**Definition**
ABC	Adelaide Brighton Cement Ltd
APMP	Air Particulate Management Plan
BAM	Beta Attenuation Monitor
EPA	Environment Protection Authority
GLPMRP	Ground Level Particulate Monitoring and Reporting Plan
SA	South Australia
SPMP	Stack Particulate Management Plan
TARP	Trigger Action Response Plan

EXECUTIVE SUMMARY

Katestone Environmental Australia Pty Ltd was commissioned by Adelaide Brighton Cement Ltd to complete a review of the Trigger Action Response Plan data collected for the period 1 January 2024 to 31 December 2024, inclusive.

Data capture was greater than 90% at all on-site monitoring sites; however, identification and removal of over two months of invalid data at the Northern Grounds monitor reduced the valid data at this monitor to 78-79% for the reporting period. It is recommended that ABC investigate the Northern Grounds monitor for issues. Possibilities for updating the Dust Management Dashboard to automatically identify periods of regular or extended negative data and issue an alert should also be investigated.

The following table presents a summary of various measures of dust impacts over the 2020 to 2024 calendar years. There were significantly more dust-related complaints from the community in this reporting period than previous years, and there were more exceedances of the South Australian Environment Protection Authority's 24-hour average criterion for $PM_{2.5}$ than in the previous three years of reporting.

Dust Impact	Count of dust impacts over each calendar year				
	2020	2021	2022	2023	2024
Dust-related complaints	22	37	11	18	201
PM_{10} exceedances at Community Park	4	0	0	0	0
$PM_{2.5}$ exceedances at Community Park	22	1	0	0	3

Overall, the Trigger Action Response Plan appears effective in identifying certain conditions that could lead to dust impacts in the community and should in turn, through the actions and responses taken by ABC staff, reduce the likelihood of the facility contributing to these impacts. However, some inadequacies and potential improvements to the monitoring network and Trigger Action Response Plan have been identified.

- It would appear that DustTrak monitors under-state PM_{10} concentrations and may also over-state $PM_{2.5}$ concentrations. The network would benefit from higher-quality monitoring equipment and the more robust concentration data that these would provide.
- Because alerts are triggered based on absolute concentrations, regional dust events and emissions from off-site sources will be triggering alerts even when the facility is making a minimal contribution to measured concentrations. The Trigger Action Response Plan would benefit from an ability to quantify the facility's contribution to measured concentrations alongside that of other sources, so that action is targeted on those occasions when the facility is making a significant contribution to measured concentrations. However, higher quality monitoring data is a necessity for the implementation of such an automated quantification of source contributions.
- The Trigger Action Response Plan currently focusses triggers on concentrations measured on-site only; community monitors should be incorporated into the Trigger Action Response Plan to ensure that high concentrations event in the community are not missed, as under such events efforts should be made to minimise the site's contribution regardless of its magnitude.
- No alerts were triggered by on-site visual observations during the reporting period. This outcome is considered unrealistic and indicative of improper implementation of the Trigger Action Response Plan amongst site staff. While it is understood that some such events are reported internally, via a separate system, it is recommended that Adelaide Brighton Cement Ltd implements additional training for all site staff to ensure that all such visual observations are reported and recorded in accordance with the Trigger Action Response Plan, and that rationalisation of internal reporting systems is undertaken to ensure

that all dust-related activities are recorded in the Trigger Action Response Plan so that they can be incorporated into regular Trigger Action Response Plan reviews.

Katestone is undertaking a separate piece of work to review Adelaide Brighton Cement Ltd's monitoring network and make recommendations to improve it, which will include revisions to Trigger Action Response Plan trigger levels and which will address all of the above points. With this work underway but not yet complete, it would be inappropriate to make any significant recommendations for changes in this report.

1. INTRODUCTION

Katestone Environmental Australia Pty Ltd (Katestone) was commissioned by Adelaide Brighton Cement Ltd (ABC) to complete a review of their Trigger Action Response Plan (TARP) data collected for the period 1 January 2024 to 31 December 2024 inclusive (the reporting period).

The purpose of this report is to review and evaluate the effectiveness of the TARP ad make any recommendations for improvement. The review has been prepared to satisfy the following annual reporting requirements set out in Condition U-1549 of ABC's licence (licence number 1126):

> *"1.1.4 submit an annual report to the EPA by the 15th day of February of each year, that includes but need not be limited to:*
>
> *a a review of all the trigger values identified in sub paragraph 2(a) of this condition*
>
> *b a review of the effectiveness of all action and response strategies identified in sub paragraph 2(c) of this condition*
>
> *c a trend analysis of data collected*
>
> *d a review and analysis of community complaints received and recorded pursuant to condition U-1553 with the exceedance of trigger values identified in sub paragraph 2(a) of this condition; and*
>
> *e opportunities for improvement in air particulate management*"

Accordingly, this report details the following:

- Overview of the monitoring network (Section 2)
- Description of ABC's TARP (Section 3)
- Reporting period data summary (Section 4), including:
    - TARP data collected during the monitoring period (Section 4.1)
    - An analysis of data collected by ABC's other environmental monitoring programs during the reporting period, including:
        - Ground Level Particulate Monitoring and Reporting Plan (GLPMRP) – required under Licence Condition U-1555 (Section 4.2)
        - Stack Particulate Management Plan (SPMP) – required under Licence Condition U-1556 (Section 4.3)
- Analysis of community complaints alongside TARP data during the reporting period (Section 5)
- Review of the effectiveness of the TARP during the reporting period (Section 6)
- Conclusions (Section 7).

2. MONITORING NETWORK

Figure 1 shows the location and layout of the site, along with the specific locations of the air quality monitors and stacks referenced in this report.

ABC's on-site ambient monitoring network employs the light-scattering DustTrak monitors and, prior to September 2024, ABC only operated DustTrak monitors. Two new off-site BAMs were installed at Community Park and Walton Street in September 2024. The Community Park DustTrak monitor was stolen in September 2024, nine days after the co-located BAM was installed. The Gunn Street DustTrak monitor ceased operating in June 2022 and ABC has been seeking to establish a replacement monitoring location; the new Walton Street BAM effectively provides this replacement monitor.

ABC has separately commissioned Katestone to prepare a review of the monitoring network at the Birkenhead facility and to recommend changes to the monitoring network to improve its robustness in quantifying the impacts of the facility and those of other sources, and changes to the TARP to ensure its effectiveness in triggering prompt action to be taken to minimise the facility's impacts when the facility's contribution is elevated; however, these changes have not yet been implemented and so are not relevant to the 2024 review.

Figure 1 Site layout, stacks and ambient air quality monitors

3. TRIGGER ACTION RESPONSE PLAN

The TARP forms part of ABC's overall Air Particulate Management Plan (APMP) at its Birkenhead Site, which was most recently updated in October 2023.

The APMP defines a range of triggers to assist ABC to meet its dust management obligations by identifying circumstances when:

- Ground-level concentrations at off-site receptors are likely to be elevated due to activities on-site
- Activities on-site are generating dust outside of the normal range.

Three levels of triggers are defined within the current TARP:

1. Low trigger (Watch and wait). This is an early warning level put in place to increase awareness of potential dust issues before they arise.
2. Medium trigger (Investigate). A medium trigger indicates that there may be a potential dust issue and specific investigation is warranted.
3. High trigger (Escalate). A high trigger indicates that dust concentrations are outside of the normal range and that action is warranted.

The TARP has been designed to provide as much warning as possible to allow proactive management of fugitive dust. Therefore, a trigger, particularly a low or medium trigger, does not necessarily indicate the presence of a dust impact.

The triggers and associated responses defined in ABC's APMP are reproduced in the following sections. The trigger levels were unaffected by the October 2023 update; however, the update did include several changes to the actions to be performed in response to these trigger alerts.

3.1 TARP for ambient dust monitoring

Certain responses are implemented when ABC's ambient dust monitoring network measures concentrations of PM_{10} that exceed the trigger values presented in Table 1. The responses that are triggered are presented in Table 2.

Table 1 Trigger values for 1-hour average concentrations of PM_{10}

Parameter	Block 9	North Grounds	East Grounds	South Grounds
Location	On-site	On-site	On-site	On-site
Low	35	20	22	19
Medium	41	27	28	26
High	66	47	48	44

Table 2 Actions and responses for ambient monitoring data triggers

Trigger Level	Action required	Responsibility
Low	• Alert relevant operators that dust levels are elevated therefore heightened awareness to sources of dust may be required.	Shift supervisor
Medium	• Alert relevant operators that dust levels are elevated therefore heightened awareness to sources of dust may be required. • Ensure all routine dust management practices have been implemented. • Visual observations on site to check if there are any significant visible dust emissions in the region of the exceeding monitor.	Shift supervisor
High	• Alert relevant operators that dust levels are elevated therefore heightened awareness to sources of dust may be required. • Ensure all routine dust management practices have been implemented. • Visual observations on site to check if there are any significant visible dust emissions in the region of the exceeding monitor. • Reduce the relevant dust producing activities or reschedule to more suitable meteorological conditions. • If dust mitigation equipment is unavailable, or at fault, investigate temporary alternative management practices.	Shift supervisor

3.2 Trigger values for meteorological parameters

Certain responses are implemented when ABC's meteorological monitoring/forecasting indicates that meteorological parameters correspond to the trigger values presented in Table 3. The responses that are triggered are presented in Table 4. The majority of these meteorological trigger alerts are generated from forecast data, only the trigger alert for an extended dry period is generated from observations.

Table 3 Trigger values for meteorological parameters

Trigger Level	Trigger
Low	Forecast of high temperatures (>30 ºC) and north-easterly winds (0° – 90°)
Low	Forecast of strong winds (> 6 m/s as a 3-hour average) from the facility towards receptor areas (wind direction between 0° and 180°)
Medium	Forecast of strong winds (> 7 m/s as a 3-hour average) from the facility towards receptor areas (wind direction between 0° and 180°)
Medium	Extended dry period indicated by less than 1 mm of rain over a 20-day period
High	Forecast of strong winds (> 8 m/s as a 3-hour average) from the facility towards receptor areas (wind direction between 0° and 180°)

Table 4 Actions and responses for meteorological data triggers

Trigger Level	Action required	Responsibility
Low	• Alert shift employees that dust potential is elevated. • Assess potential for shifting operations to more favourable conditions. • Visual observations of site every 3 hours.	Shift supervisor
Medium	• Alert shift employees that dust potential is elevated. • Assess potential for shifting operations to more favourable conditions. • Ensure all routine dust management practices have been implemented. • Visual observations on site to check if there are any significant visible dust emissions every 3 hours.	Shift supervisor
High	• Alert shift employees that dust potential is elevated. • Assess potential for shifting operations to more favourable conditions. • Ensure water truck is on standby to apply water. • Ensure all routine dust management practices have been implemented. • Visual observations of site every 3 hours. • Review ambient monitoring PM_{10} levels and implement the action response if the high level trigger is activated.	Shift supervisor

3.3 Trigger values for visual observations

Certain responses are triggered if visual observations of dust occur as detailed in Table 5. The responses that are triggered are presented in Table 6.

Table 5 Trigger values for visual observations

Trigger Level	Trigger
Low	General build-up of dust on non-worked areas at the facility, e.g. carparks, alongside buildings etc.
Medium	Visible dust plume generated by facility activity above normal/acceptable levels
High	Visible dust plume crossing the facility boundary

Table 6 Actions and responses for visual observations

Trigger Level	Action required	Responsibility
Low	• Inspect site to determine source of dust. • Check whether routine (baseline) dust management practices have been applied to that source.	Shift supervisor
Medium	• Inspect site to determine source of dust. • Check routine (baseline) dust management practices have been applied to that source. • If relevant, apply water and/or chemical suppressant to source of dust. • If dust mitigation equipment is unavailable, or at fault, investigate temporary alternative management practices. • Repair any faulty dust mitigation equipment.	Shift supervisor
High	• Inspect site to determine source of dust. • Check routine (baseline) dust management practices have been applied to that source. • If relevant, apply water and/or chemical suppressant to source of dust. • If dust mitigation equipment is unavailable, or at fault, investigate temporary alternative management practices. • Repair any faulty dust mitigation equipment. • Minimise activity rate of dust producing activity.	Shift supervisor

3.4 TARP implementation

The TARP is implemented and managed at ABC's Birkenhead facility through a Dust Management Dashboard operated in the Birkenhead Control Room. This includes analysis of monitoring data, logging responses/actions, closing alerts, and raising visual observation alerts.

Live, 1-minute average air quality monitoring data is collected from four on-site monitors (Northern Grounds, Southern Grounds, Eastern Grounds and Block 9). The data are analysed hourly and automatically compared with the site-specific trigger conditions (as detailed in the previous tables) to generate trigger alerts.

As discussed in Section 2, one off-site DustTrak monitor collecting 1-minute average air quality monitoring data operated at Community Park until it was stolen in mid-September 2024. Nine days prior to the theft, two off-site BAMs collecting 5-minuite average air quality monitoring data were installed at Community Park and Walton Street. While there are currently no triggers in the TARP relating to off-site air quality monitoring data, these data are also analysed hourly and available to view on the Dust Management Dashboard.

The Dust Management Dashboard also incorporates meteorological data (forecast and observational), which are updated at 3-hour intervals and analysed daily between 5am-6am and 5pm-6pm. Trigger alerts are generated if meteorological data (observations and forecast) satisfy the relevant trigger level criteria (as detailed in the previous tables).

Staff in the Birkenhead Control Room are notified of any new or escalated alerts.

ABC has separately commissioned Katestone to prepare a review of the monitoring network at the Birkenhead facility and to recommend changes to the monitoring network to improve its robustness in quantifying the impacts of the facility, and changes to the TARP to ensure its effectiveness in triggering prompt action to be taken to minimise the facility's impacts when the facility's contribution is elevated. This work is ongoing and incomplete, and so has not yet been implemented.

4. REPORTING PERIOD DATA SUMMARY

4.1 TARP

4.1.1 Alerts

TARP alerts triggered during the reporting period are summarised in Table 7 and Table 8 (percentages may not sum to 100% due to rounding). Alerts generated over consecutive hours at a particular monitor are recorded as a single alert of the highest level during the alert period. As set out in Table 3, the only meteorological alert triggered by observational data is an alert for an extended dry period.

The data show that:

- A total of 798 alerts were recorded, including 426 low level alerts (53%), 289 medium level alerts (36%) and 83 high level alerts (10%)
- Low-, medium- and high-level alerts occurred with decreasing frequency at all particulate monitoring sites; however, high level meteorological alerts triggered by forecast meteorology occurred with slightly higher frequency than medium-level meteorological alerts triggered by forecast meteorology
- The sites which generated the most alerts were Northern Grounds (290), Eastern Grounds (256) and Southern grounds (138), followed by Block 9 (68), Meteorology – forecast (43) and Meteorology – observations (3)
- No alerts were triggered by on-site visual observations during the reporting period. Alerts should be triggered by the "general build-up of dust on non-worked areas at the facility, e.g. carparks, alongside buildings etc.", "visible dust plume generated by facility activity above normal/acceptable levels" and "visible dust plume crossing the facility boundary". Such events are known to occur at the facility and therefore this outcome is considered unrealistic and indicative of improper implementation of the TARP amongst site staff. However, it is understood that some such events are reported internally, via a separate system. It is recommended that ABC implements additional training for all site staff to ensure that all such visual observations are reported and recorded in accordance with the TARP, and that rationalisation of internal reporting systems is undertaken to ensure that all dust-related activities are recorded in the TARP so that they can be incorporated into TARP reviews.

Table 7 Number of alerts during the reporting period

Site	Trigger level			Total (% of all alerts)
	Low	Medium	High	
Southern Grounds	81	50	7	138 (17%)
Eastern Grounds	138	95	23	256 (32%)
Block 9	34	29	5	68 (9%)
Northern Grounds	145	105	40	290 (36%)
Meteorology – forecast	28	7	8	43 (5%)
Meteorology – observations	-	3	-	3 (0.4%)
Onsite visual observations	0	0	0	0 (0%)
All sites	**426**	**289**	**83**	**798**

Table 8 Frequency of alerts during the reporting period

Site	Trigger level		
	Low	Medium	High
Southern Grounds	59%	36%	5%
Eastern Grounds	54%	37%	9%
Block 9	50%	43%	7%
Northern Grounds	50%	36%	14%
Meteorology – forecast	65%	16%	19%
Meteorology – observations	-	100%	-
Onsite visual observations	-	-	-
All sites	**53%**	**36%**	**10%**

4.1.2 Actions

Actions recorded in response to TARP triggers during the reporting period are summarised in Table 9 and Table 10 (note that percentages may not sum to 100% due to rounding). These actions include but are not limited to alerting operators, checking for dust emissions, checking dust controls are in place and working, implementing temporary mitigation, reducing activity rates and rescheduling activities.

The data show that:

- A total of 2,165 actions were taken, including 606 actions against low level alerts (28%), 1,104 actions against medium level alerts (51%) and 455 actions against high level alerts (21%)
- The most actions were triggered by alerts at Northern Grounds (759) and Eastern Grounds (573), followed by Southern Grounds (381), Meteorology – observations (164), Meteorology – forecast (163) and Block 9 (125)

Table 9 Number of actions taken during the reporting period

Site	Trigger level			Total (% of all actions)
	Low	Medium	High	
Southern Grounds	110	216	55	381 (18%)
Eastern Grounds	196	273	104	573 (26%)
Block 9	40	74	11	125 (6%)
Northern Grounds	184	346	229	759 (35%)
Meteorology – forecast	76	31	56	163 (8%)
Meteorology – observations	-	164	-	164 (8%)
Onsite visual observations	-	-	-	0 (0%)
All sites	**606**	**1,104**	**455**	**2,165**

Table 10 Frequency of actions taken during the reporting period

Site	Trigger level		
	Low	Medium	High
Southern Grounds	29%	57%	14%
Eastern Grounds	34%	48%	18%

Site	Trigger level		
	Low	Medium	High
Block 9	32%	59%	9%
Northern Grounds	24%	46%	30%
Meteorology – forecast	47%	19%	34%
Meteorology – observations	-	100%	-
Onsite visual observations	-	-	-
All sites	**28%**	**51%**	**21%**

4.1.3 TARP Implementation Summary

Table 11 summarises the TARP alerts triggered and actions taken during the reporting period. On average, approximately 3 separate actions were performed for every trigger, the same as in the 2023 reporting period. However, this average may be skewed slightly by the large number of actions triggered by just three meteorological observation alerts, which relate to three periods of extended dry weather in Adelaide, during which operators were notified a total of 1,883 times to remind them of the increased risk and need for action (noting that these 1,883 individual notifications are grouped into 164 distinct alerts).

Table 11 Summary of TARP implementation during the reporting period

Site	Alerts	Actions	Average Actions/Alert
Southern Grounds	138	381	2.8
Eastern Grounds	256	573	2.2
Block 9	68	125	1.8
Northern Grounds	290	759	2.6
Meteorology – forecast	43	163	3.8
Meteorology – observations	3	164	54.7
Onsite visual observations	0	0	-
All sites	**798**	**2,165**	**2.7**

4.2 Ground Level Particulate Monitoring and Reporting Plan

PM_{10} and $PM_{2.5}$ data collected during the reporting period in accordance with the Ground Leven Particulate Monitoring and Reporting Plan (GLPMRP) are summarised in Table 12. Timeseries of 24-hour average particulate concentrations are presented for the off-site monitors in Figure 2 and Figure 3, and for the on-site monitors in Figure 4 and Figure 5.

ABC has historically targeted at least 90% availability of data and automated alerts are implemented for loss of data availability to ensure that instrument faults are rectified promptly. Data availability at each site over the reporting period is shown in the 'data capture' column of Table 12. All on-site monitoring sites achieved the 90% data availability threshold for the reporting period. As the BAMs were not installed until September 2024, and the Community Park DustTrak was stolen in September 2024, none of these monitors achieved the 90% data availability threshold for the reporting period. However, for the periods that these monitors were in operation, the 90% data availability threshold was met.

In preparing this review, Katestone conducts some basic quality assurance of the monitoring dataset which involves filtering out data which are identified as invalid. While at most sites this cleaning resulted in minimal data loss, as shown in the 'valid data' column of Table 12, data from the Northern Grounds monitor covering 20% of the reporting

period was identified as invalid and removed. This is primarily due to a step change in recorded particulate concentrations at the Northern Grounds monitor on 29 October 2024. This change resulted in large numbers of negative particulate concentration measurements over the remainder of the reporting period, during which time the concentrations did not consistently follow the same trends as the other monitoring sites, which generally showed similar patterns. As such, all data collected at Northern Grounds from 5 am on 29 October 2024 to the end of the reporting period were considered invalid. ABC should investigate the Northern Grounds monitor for issues. Possibilities for updating the Dust Management Dashboard to automatically identify periods of regular or extended negative data and issue an alert should also be investigated.

Figure 2 and Figure 3 show that while the concentrations of $PM_{2.5}$ recorded by the off-site $PM_{2.5}$ BAM were broadly comparable to those recorded by the Community Park DustTrak, the PM_{10} BAM recorded significantly higher concentrations of PM_{10} than were previously recorded by the DustTrak monitor. No such step change can be seen in the off-site $PM_{2.5}$ data or on-site particulate monitoring data. Furthermore, BAMs are Australian Standard monitors and therefore are generally considered to be more reliable than the non-Australian Standard DustTrak monitors. Based on these observations, it is considered likely that the Community Park DustTrak monitor under-reported concentrations of PM_{10} over the reporting period. Trends in the offsite PM_{10} monitoring data will therefore be considered within each monitor type, without comparison between the two.

Concentrations measured at the off-site monitoring locations (Community Park and Walton Street) are compared with the South Australian Environmental Protection Authority (EPA) 24-hour average criteria for PM_{10} (50 µg/m^3) and $PM_{2.5}$ (25 µg/m^3):

- While no exceedances of the PM_{10} criterion were recorded at either site during the reporting period, three exceedances of the $PM_{2.5}$ criterion were recorded at Community Park (10 May 2024 (26.8 µg/m^3), 12 May 2024 (29.6 µg/m^3) and 10 August 2024 (26.4 µg/m^3)). This differs from the previous two reporting periods (calendar years 2022 and 2023), during which no exceedances of either criterion were recorded.
- At the time of the exceedances the BAMs were not yet operational; therefore, the exceedances were recorded by the indicative DustTrak monitor, and no data for Walton Street were available.
- The exceedances occurred within a period of elevated particulate concentrations at Community Park from May to August 2024. Figure 4 and Figure 5 indicate that the on-site monitors recorded a similar pattern in particulate concentrations at this time, with peaks in the 24-hour average concentrations of particulates at all monitors frequently aligning over this period. All on-site monitors recorded elevated 24-hour average concentrations of particulates on the exceedance days.
- Off-site concentrations of particulates were also elevated on 6 April 2024, although neither EPA criterion was exceeded at Community Park. 24-hour average concentrations of particulates at all on-site monitors were similarly elevated on this day. Additionally, concentrations of particulates recorded by both on-site and off-site monitors followed similar trends throughout April 2024.
- While the on-site monitors recorded elevated 24-hour average concentrations of particulates in mid- to late-December 2024, concentrations at the off-site monitors showed no such increase.

ABC commissioned Katestone to conduct a review into particulate concentrations in the vicinity of the facility in January to May 2024, and in particular to review the exceedances of the EPA's 24-hour average criterion for $PM_{2.5}$ on 10 and 12 May 2024 at Community Park (Katestone deliverable no. D23123-3). The key outcomes of this review are as follows:

- There were significant changes in the concentrations of particulates measured at air quality monitoring sites across the Adelaide region in May 2024, including increases in the 24-hour average concentrations.
- It is considered likely that multiple sources of particulate emissions contributed to the rise in particulate concentrations in May 2024, and that these sources include both local sources (such as the facility) and regional sources of particulates.

- The estimated contribution of the facility to the 24-hour average concentration of $PM_{2.5}$ at Community Park on 10 May 2024 was small (around 1.1 µg/m^3), and without this contribution the exceedance of the EPA's 24-hour average criterion for $PM_{2.5}$ at Community Park would likely still have occurred on this date.
- The estimated contribution of the facility to the 24-hour average concentration of $PM_{2.5}$ at Community Park on 12 May 2024 was more significant at around 4.9 µg/m^3. Without this contribution, exceedance of the criterion for $PM_{2.5}$ would likely not have occurred, although compliance would have been marginal.

It is also understood that sources of visible dust emissions in the form of holes/gaps in the clinker shed walls facing Victoria Road were observed during this time, which were subsequently rectified.

Table 12 Summary of GLPMRP data collected during the reporting period

Location	Site	Avg period	Size	Concentration (µg/m³)					Valid data[1]	Data capture[2]
				Max	Min	Mean	99th %ile	95th %ile		
Off-site	Community Park (DustTrak)	1-hour	PM_{10}	121.4	-3.6	9.5	41.6	25.4	98%	98%
			$PM_{2.5}$	83.2	-3.7	8.7	39.8	23.1	98%	98%
		24-hour	PM_{10}	30.3	1.2	9.5	26.2	19.5	98%	98%
			$PM_{2.5}$	29.6	0.9	8.7	25.4	18.5	98%	98%
	Community Park (BAM)	1-hour	PM_{10}	87.3	-3.9	22.4	57.7	43.7	98%	99%
			$PM_{2.5}$	35.9	-18.4	6.4	24.1	18.1	98%	99%
		24-hour	PM_{10}	43.2	6.3	22.3	41.7	34.9	99%	99%
			$PM_{2.5}$	13.3	2.2	6.4	11.1	9.2	98%	99%
	Walton Street (BAM)	1-hour	PM_{10}	69.4	-0.5	19.9	49.9	37.8	98%	98%
			$PM_{2.5}$	22.1	-10.4	5.4	16.4	12.7	98%	98%
		24-hour	PM_{10}	37.7	5.5	19.8	36.5	30.3	98%	98%
			$PM_{2.5}$	12.4	1.2	5.4	11.2	8.1	98%	98%
On-site	Southern Grounds	1-hour	PM_{10}	77.5	-8.5	7.9	30.6	19.4	99%	99%
			$PM_{2.5}$	77.3	-8.7	7.1	28.7	17.5	99%	99%
		24-hour	PM_{10}	24.1	1.4	7.9	20.9	14.9	99%	99%
			$PM_{2.5}$	23.1	1.3	7.1	20.5	13.9	99%	99%
	Eastern Grounds	1-hour	PM_{10}	425.4	-4.9	11.4	40.7	25.2	97%	100%
			$PM_{2.5}$	262.4	-5.0	9.1	33.1	20.3	97%	100%
		24-hour	PM_{10}	34.6	3.1	11.4	26.8	20.2	97%	99%
			$PM_{2.5}$	26.6	2.2	9.0	22.4	16.8	97%	99%
	Northern Grounds	1-hour	PM_{10}	157.7	-9.9	11.4	51.6	29.5	79%	99%
			$PM_{2.5}$	88.6	-10.0	8.5	34.4	21.2	79%	99%
		24-hour	PM_{10}	32.1	2.4	11.5	28.2	22.2	78%	98%
			$PM_{2.5}$	24.2	1.4	8.5	22.8	15.7	78%	98%
	Block 9	1-hour	PM_{10}	182.3	-3.1	8.4	42.5	22.4	99%	100%
			$PM_{2.5}$	117.9	-4.8	6.8	31.0	17.5	99%	100%
		24-hour	PM_{10}	30.4	1.7	8.4	25.4	17.1	99%	99%
			$PM_{2.5}$	24.8	1.4	6.8	20.0	13.4	99%	99%

Table note:

[1] Percentage of data available after validation for the period over which the monitor was physically in place.

[2] Percentage of data available prior to validation for the period over which the monitor was physically in place.

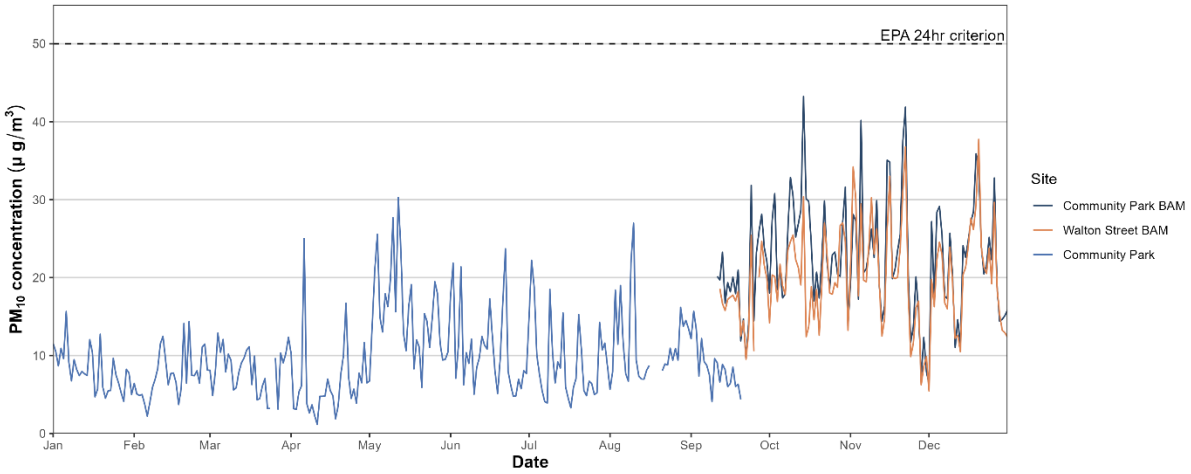

Figure 2 24-hour average concentrations of PM_{10} measured off-site during the reporting period

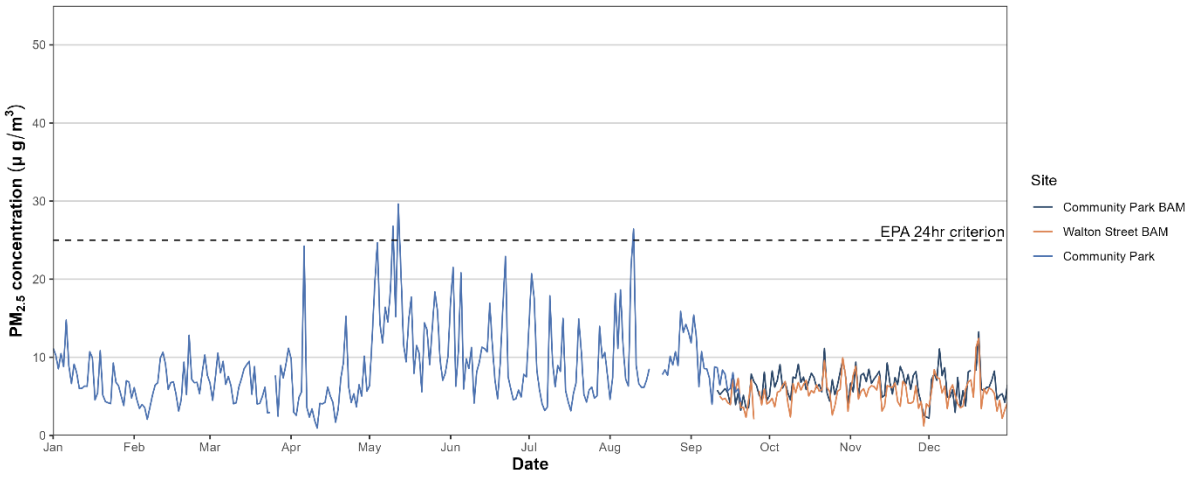

Figure 3 24-hour average concentrations of $PM_{2.5}$ measured off-site during the reporting period

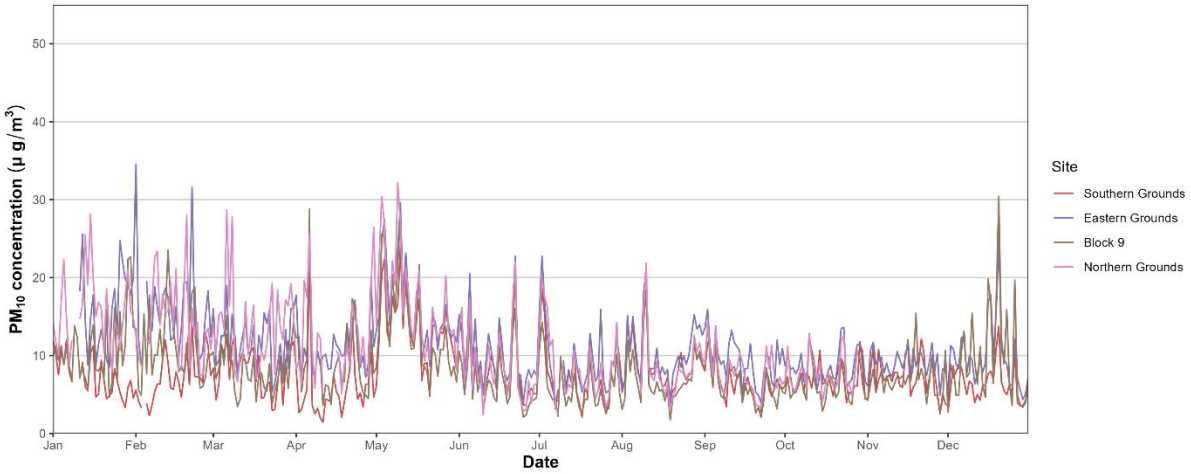

Figure 4 24-hour average concentrations of PM_{10} measured on-site during the reporting period

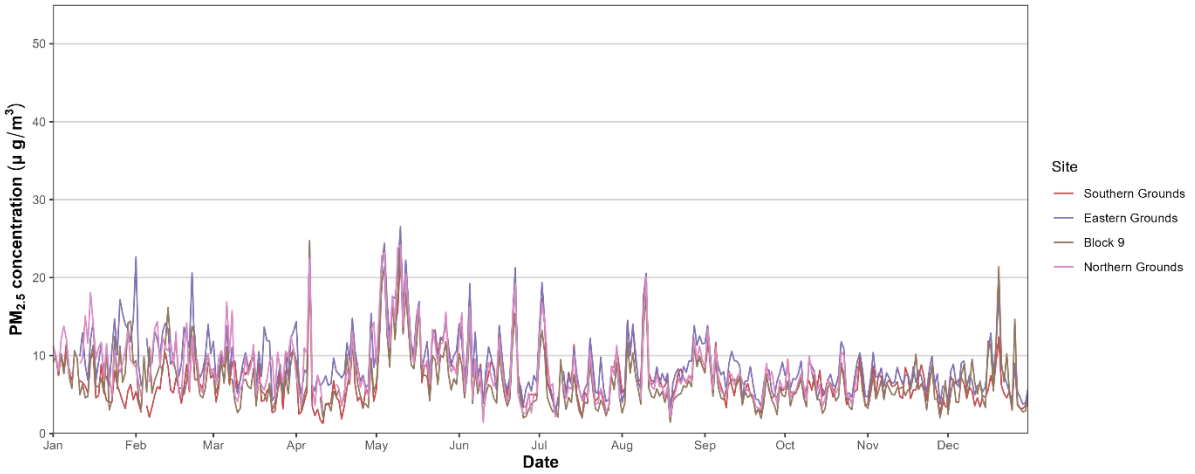

Figure 5 24-hour average concentrations of $PM_{2.5}$ measured on-site during the reporting period

4.3 Stack Particulate Management Plan

The data collected from sampling equipment within kiln Stack 4A and pre-calciner Stack 4B during the reporting period in accordance with the Stack Particulate Management Plan (SPMP) are summarised in Table 13. This equipment measures concentrations of total suspended particulates (TSP). Time series of 1-hour rolling average and 24-hour average in-stack concentrations are presented in Figure 6 and Figure 7, respectively.

The SPMP data show the following:

- Data capture for both stacks was at least 99% for the reporting period.
- The annual average TSP concentration in Stack 4A (11.2 mg/Nm^3) was considerably higher than in Stack 4B (1.9 mg/Nm^3) and both the maximum 1-hour rolling average and maximum 24-hour average concentrations of TSP were recorded at Stack 4A. This is the same as the previous reporting period (calendar year 2023).
- Maximum 1-hour rolling average and annual mean concentrations of TSP were lower at both stacks during the reporting period than in the previous reporting period, whereas maximum 24-hour average concentrations of TSP were higher at both stacks during the reporting period than in the previous reporting period.
- Figure 6 and Figure 7 indicate the following about in-stack concentrations of particulates in Stack 4A:
    - Recorded concentrations flatlined in January and February 2024 due to the plant shutdown, but were elevated in the days prior to the shutdown, particularly on 2 January 2024.
    - After the shutdown, 24-hour average concentrations appear to gradually increase into April, with a number of relatively large spikes in April and May. Concentrations then appear to decrease through late May and June 2024 except for a large spike on 24 June 2024 (the highest 24-hour average concentration of in-stack particulates recorded during the reporting period). 24-hour average concentrations above 20 mg/Nm^3 occurred on 2 January 2024, 28 February 2024, 10 March 2024, 9, 21, 24-26 and 30 April 2024, 1, 3, 5, 6, 11, 13, 14, and 26-28 May 2024 and 24 June 2024.
    - 24-hour average in-stack concentrations above 20 mg/Nm^3 also occurred on 13 and 25 August 2024, on 1 and 21-23 September 2024 and on 6 December 2024.
- Figure 6 and Figure 7 indicate the following about in-stack concentrations of particulates in Stack 4B:
    - Recorded concentrations flatlined in January and February 2024 due to the plant shutdown.

- After the shutdown, relatively elevated concentrations occurred throughout March 2024 (peaking on 13 March 2024) with all of 5, 10, 12-15, 17 and 18 March 2024 recording 24-hour average concentrations of over 5 mg/Nm^3.
- Relatively elevated 24-hour average concentrations of particulates also occurred on 17 April 2024, 17 and 18 July 2024, 4 and 29 September 2024, and 13, 14, and 16 November 2024, and concentrations outside of these days were relatively low.

Comparison between the SPMP and GLPMRP data shows the following:

- The two exceedances of the EPA's 24-hour average $PM_{2.5}$ criterion at Community Park on 10 and 12 May 2024 occurred during a period of elevated concentrations at Stack 4A and low concentrations at Stack 4B. On 10 and 12 May the 24-hour average concentrations in Stack 4A were 11.4 mg/Nm^3 and 15.1 mg/Nm^3, respectively, but concentrations exceeded 20 mg/Nm^3 on 3, 5, 6, 11, 13 and 14 May.
- While some elevated in-stack concentrations of particulates were recorded at Stack 4A around the exceedance of the EPA's 24-hour average $PM_{2.5}$ criterion at Community Park on 10 August 2024 (24-hour average concentration peak of 25.0 mg/Nm^3 on 13 August), the 24-hour average concentration on 10 August 2024 was only 3.77 mg/Nm^3. in-stack concentrations of particulates at Stack 4B were low.
- Elevated concentrations of particulates were observed at all on-site and off-site monitors on 6 April 2024. The 24-hour average in-stack concentration of particulates in Stack 4A on this day was 12.1 mg/Nm^3, which is slightly above average but not particularly elevated. In-stack concentrations of particulates at Stack 4B were low at this time.
- The highest valid 24-hour average in-stack concentration of particulates occurred on 24 June 2024 at Stack 4A; on-site and off-site concentrations of particulates on this day and in the following days were low.

Table 13 Summary of SPMP data collected during the reporting period

Stack	Avg period	Concentration (mg/Nm^3)					Data capture
		Max	Min	Mean	99th %ile	95th %ile	
4A	1-hour	84.7	0.0	11.2	42.4	27.2	100%
	24-hour	35.1	0.0	11.2	27.4	23.4	100%
4B	1-hour	61.8	0.0	1.9	16.6	7.2	100%
	24-hour	22.5	0.0	1.9	8.8	4.6	99%

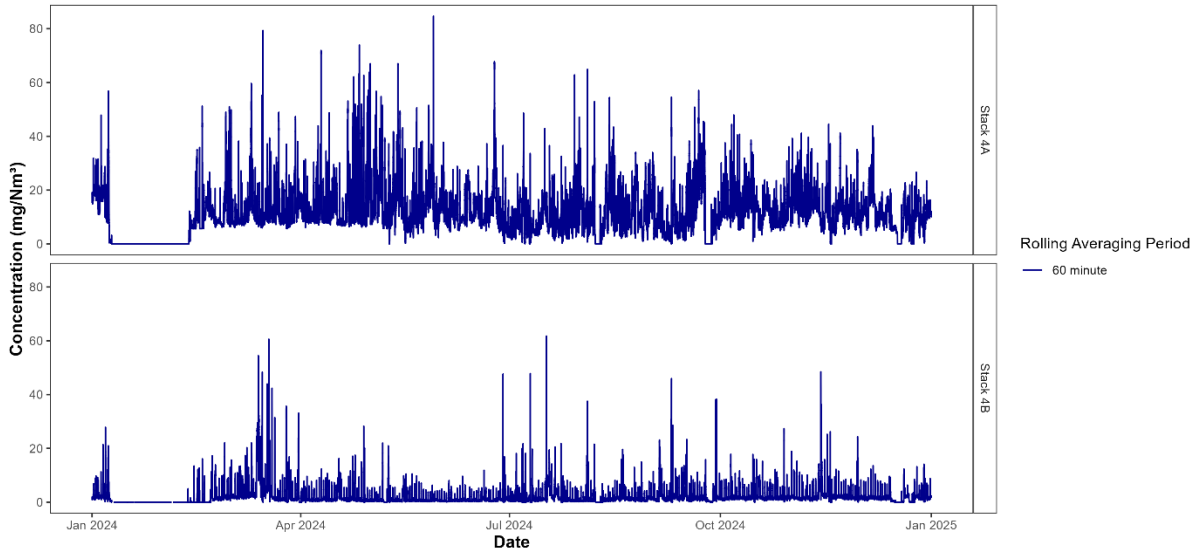

Figure 6 **Rolling 1-hour average in-stack TSP concentrations (mg/Nm^3) measured at Stacks 4A and 4B during the reporting period**

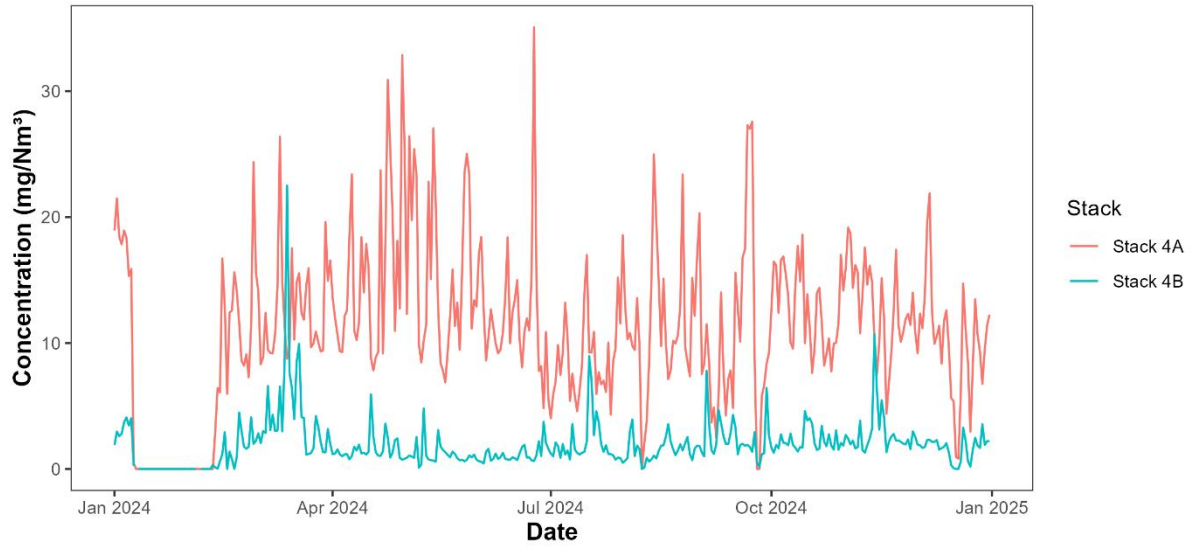

Figure 7 **24-hour average in-stack TSP concentrations (mg/Nm^3) measured at Stacks 4A and 4B during the reporting period**

4.4 Meteorology

Forecast and observed meteorological data were sourced from the Meteomatics data service over the reporting period. A time series of hourly average meteorological observations for the reporting period is presented in Figure 8. Meteorological data is also collected at each of the dust monitoring locations. The distribution of wind speed and wind direction measured at each monitor is presented as wind roses in Figure 9. The two BAM monitoring stations are served by 10m wind masts that can be expected to record high quality data, although they only operated from September 2024; it is unsurprising, therefore, that the wind roses for these two sites look very similar. Wind instruments at the other sites are relatively poorly sited and will produce comparatively unreliable data, although their measurements would be expected to look different due to having operated for the whole year.

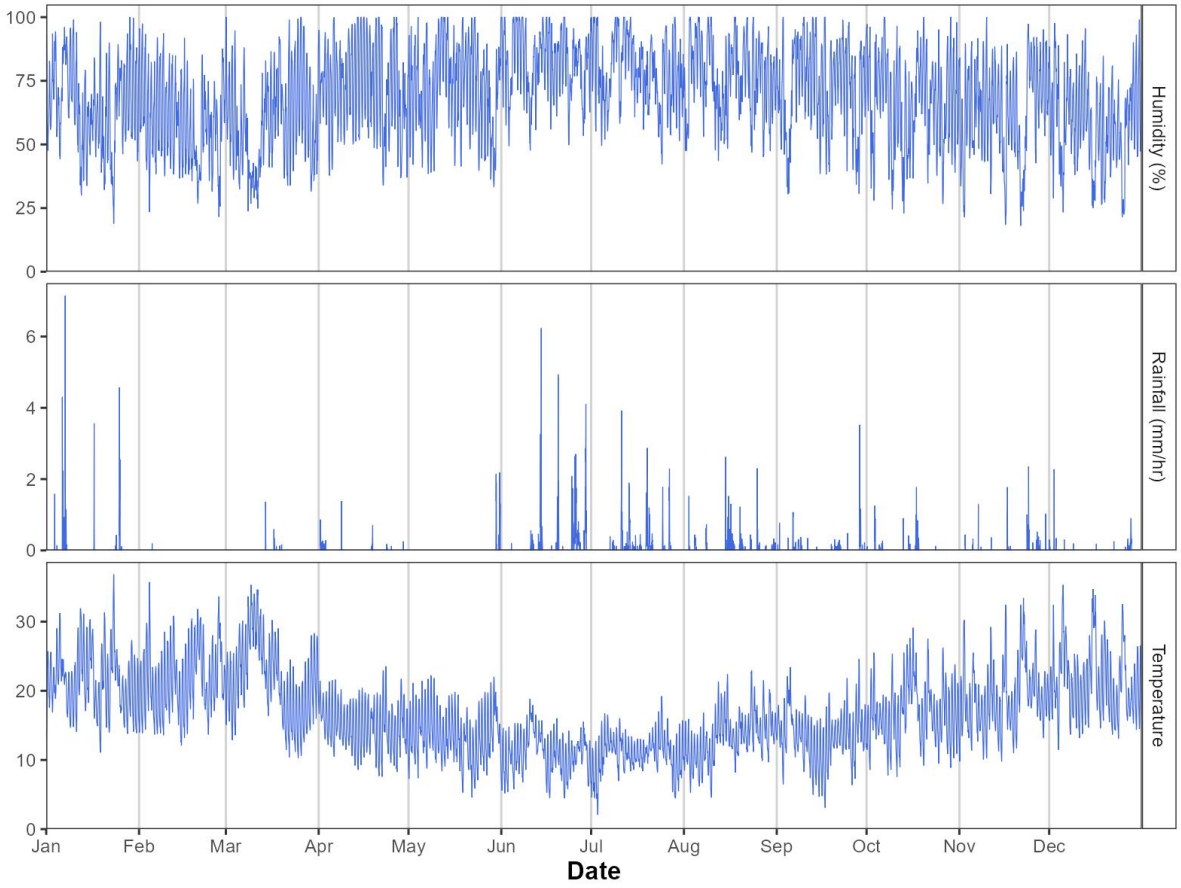

Figure 8 **Meteorological observations for Birkenhead during the reporting period**

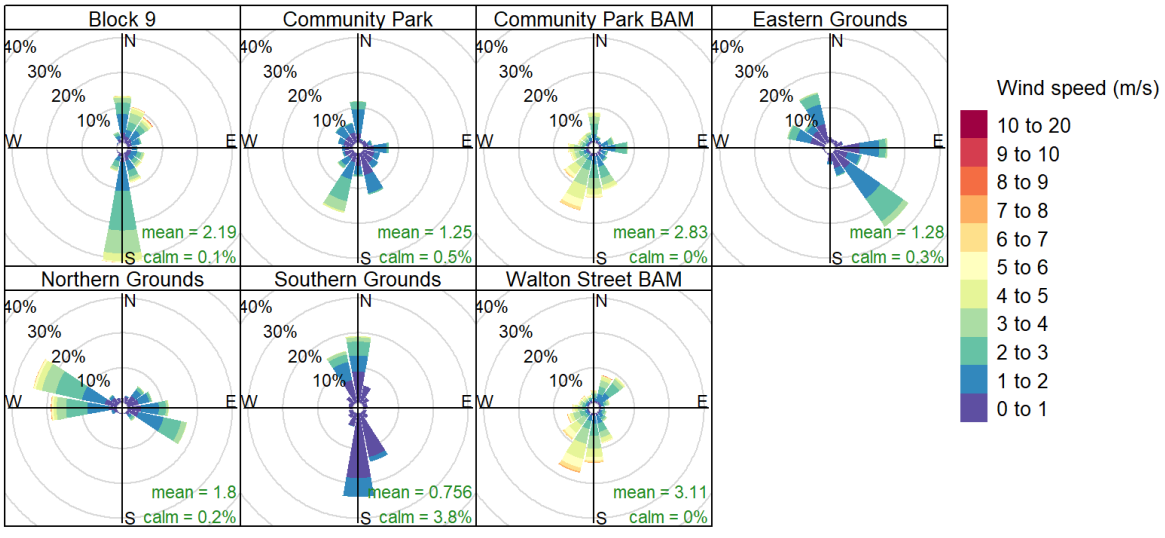

Figure 9 **Distribution of wind speed and direction measured at ABC monitoring sites during the reporting period**

4.5 EPA Monitoring

The closest EPA monitoring site to ABC's Birkenhead facility is Le Fevre 1 (see Figure 1). The 24-hour average concentrations of PM_{10} and $PM_{2.5}$ measured at Le Fevre 1 during the reporting period are shown in Figure 10 and Figure 11, respectively. Concentrations of PM_{10} and $PM_{2.5}$ measured at other monitors within the EPA network (Adelaide CBD, Elizabeth, Le Fevre 2 (North Haven), Netley, Christies, Port Pirie Oliver St, Whyalla Walls St and Whyalla Schulz Reserve) are also shown in the figures as grey lines to provide the context of regional dust levels.

The Netley air monitoring station was decommissioned on 2 June 2024. The EPA intends to establish a new monitoring station in the western suburbs of Adelaide once a suitable location has been identified.

The data show that:

- 24-hour average concentrations of PM_{10} at Le Fevre 1 exceeded the EPA criterion of 50 µg/m^3 on 29 May 2024
- 24-hour average concentrations of $PM_{2.5}$ at Le Fevre 1 did not exceed the EPA of criterion of 25 µg/m^3 during the reporting period.

Figure 12 presents a pollution rose and proportion contribution rose of hourly average concentrations of PM_{10} recorded at Le Fevre 1 on 29 May 2024. Winds at Le Fevre 1 on this day were from between the northwest through east-northeast and primarily from the northeast. The greatest contribution to the mean PM_{10} concentration on this day was under winds from the northeast (the direction of ABC's Birkenhead facility).

All other EPA monitors recorded a spike in 24-hour average concentrations of PM_{10} on 29 May 2024, including those monitors which are located far from the facility, such as Whyalla Walls St and Port Pirie Oliver St. Some of the other EPA monitors recorded exceedances of the EPA criterion for PM_{10} around 29 May 2024:

- Christies recorded its only exceedance of the EPA criterion for PM_{10} on 29 May 2024
- Elizabeth recorded its only exceedances of the EPA criterion for PM_{10} on 29 and 30 May 2024
- Whyalla Walls St recorded 16 exceedances of the EPA criterion for PM_{10} during the reporting period, one of which was on 29 May 2024

The Adelaide CBD, Le Fevre 2, Netley and Whyalla Schulz Reserve monitoring stations recorded no exceedances of the EPA criterion for PM_{10} during the reporting period. While Port Pirie Oliver St recorded four exceedances of the EPA criterion for PM_{10} during the reporting period, none of these were in May or June 2024. None of the EPA monitors recorded exceedances of the EPA criterion for $PM_{2.5}$ during the reporting period.

Christies, Elizabeth, and Whyalla Walls St are located to the south, northeast and northwest of ABC's Birkenhead facility, respectively. They are all located further from the facility than any of the Adelaide CBD, Le Fevre 2 or Netley monitors, which did not record exceedances around 29 May 2024.

Comparison with the GLPMRP and SPMP data around 29 May 2024 shows the following:

- 24-hour average in-stack concentrations of particulates at Stack 4A were elevated in the days prior to the exceedance (26-28 May 2024) but were not particularly elevated on 29 May 2024, being 11.1 mg/Nm^3.
- While 24-hour average concentrations of particulates at all the on-site monitors in ABC's dust monitoring network were relatively elevated throughout May to August 2024, concentrations of particulates at the on-site monitors were not particularly elevated on 29 May 2024, ranging between 7.4 µg/m^3 and 13.0 µg/m^3 for PM_{10} and between 5.6 µg/m^3 and 8.9 µg/m^3 for $PM_{2.5}$.
- While 24-hour average concentrations of particulates at Community Park were elevated throughout May to August 2024, they were not particularly elevated on 29 May 2024, being 9.4 µg/m^3 for PM_{10} and 7.0 µg/m^3 for $PM_{2.5}$.

While the pollution rose and proportion contribution rose indicate that the source of particulates responsible for the elevated concentration of PM_{10} at Le Fevre 1 on 29 May 2024 was to the northeast (the direction of ABC's Birkenhead facility), the pattern of similarly elevated concentrations across all EPA monitors indicates a regional dust event.

EPA monitoring data from the Community Park exceedance days indicates the following:

- 24-hour average concentrations of $PM_{2.5}$ at all EPA monitors were relatively elevated on 10 May 2024, ranging between 10.2 and 15.3 µg/m^3. Netley recorded the highest 24-hour average concentration of $PM_{2.5}$ and Le Fevre 1 recorded the second highest at 12.8 µg/m^3.
- 24-hour average concentrations of $PM_{2.5}$ at all EPA monitors were relatively elevated on 12 May 2024, ranging between 9.1 and 13.2 µg/m^3. Netley recorded the highest 24-hour average concentration of $PM_{2.5}$ and Le Fevre 1 recorded the second highest at 12.6 µg/m^3.
- 24-hour average concentrations of $PM_{2.5}$ at all EPA monitors were relatively elevated on 10 August 2024, ranging between 7.3 and 14.9 µg/m^3. Le Fevre 1 recorded the highest 24-hour average concentration of $PM_{2.5}$ (14.9 µg/m^3) and Le Fevre 2 recorded the second highest at 12.6 µg/m^3. The measurement at Le Fevre 1 on this day was the highest 24-hour concentration measured at this site in 2024.
- 24-hour average concentrations of PM_{10} at all EPA monitors except Whyalla Walls St were relatively elevated on 10 May 2024, ranging between 19.1 and 48.0 µg/m^3. Port Pirie Oliver St recorded the highest 24-hour average concentration of PM_{10} by a significant margin, with Netley recording the second highest at 32.4 µg/m^3 and Le Fevre 1 recording the third highest at 31.6 µg/m^3.
- 24-hour average concentrations of PM_{10} were somewhat elevated at Le Fevre 1 and Le Fevre 2 on 12 May 2024, but not approaching an exceedance, and concentrations were not elevated at any other EPA sites. Le Fevre 2 recorded the highest 24-hour average concentration of PM_{10} at 19.4 µg/m^3 and Le Fevre 1 recorded the second highest at 17.7 µg/m^3.
- 24-hour average concentrations of PM_{10} were relatively elevated at Le Fevre 1, Le Fevre 2, Adelaide CBD and Christies on 10 August 2024, but were not elevated at the other EPA sites. Le Fevre 1 recorded the highest 24-hour average concentration of PM_{10} at 28.8 µg/m^3 and Adelaide CBD recorded the second highest at 21.4 µg/m^3.

This analysis supports the conclusions in Katestone's investigative report (Katestone deliverable no. D23123-3) that:

- the exceedance of the EPA's 24-hour average criterion for $PM_{2.5}$ at Community Park on 10 May 2024 was likely the result of particulate emissions from sources other than the facility
- that while $PM_{2.5}$ concentrations on 12 May 2024 were regionally elevated, emissions from ABC's Birkenhead facility likely contributed to the exceedance of the EPA's 24-hour average criterion for $PM_{2.5}$ at Community Park on this day.

It is furthermore considered likely that the exceedance of the EPA's 24-hour average criterion for $PM_{2.5}$ at Community Park on 10 August 2024 was a result of a regional dust episode, although some contribution from emissions from the facility cannot be ruled out.

However, there is some doubt as to the accuracy of all of these high $PM_{2.5}$ measurements, as it is possible that the indicative DustTrak monitors were over-stating actual $PM_{2.5}$ concentrations. The EPA monitor at Le Fevre 1 never measured a 24-hour concentration above 14.9 µg/m^3.

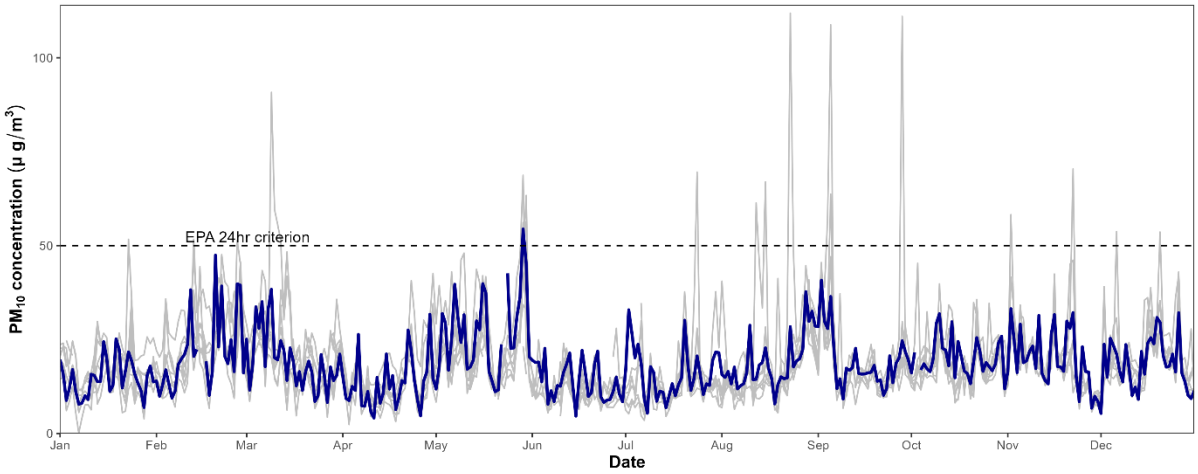

Figure 10 **24-hour average concentrations of PM_{10} recorded at Le Fevre 1 (blue) and other EPA monitoring sites (grey) during the reporting period**

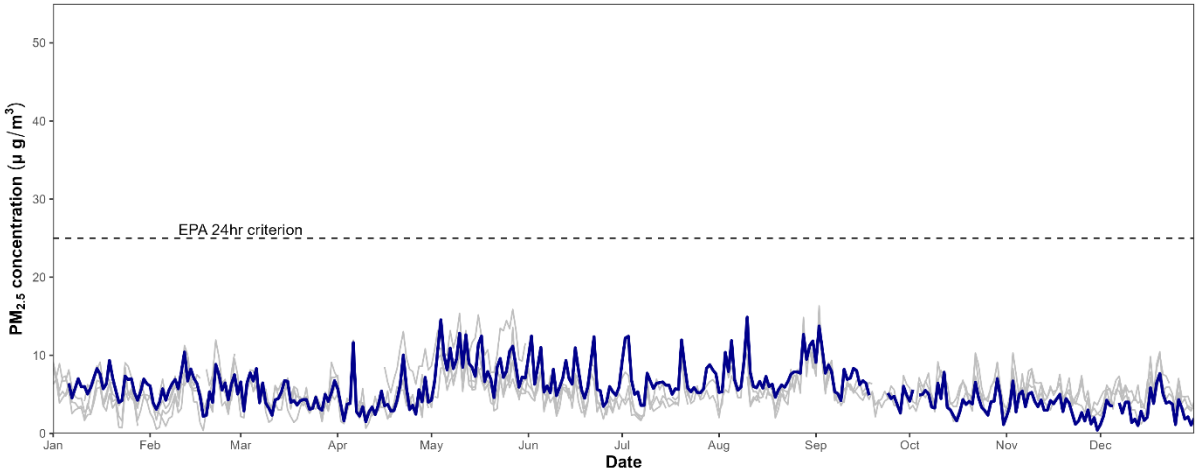

Figure 11 **24-hour average concentrations of $PM_{2.5}$ recorded at Le Fevre 1 (blue) and other EPA monitoring sites (grey) during the reporting period**

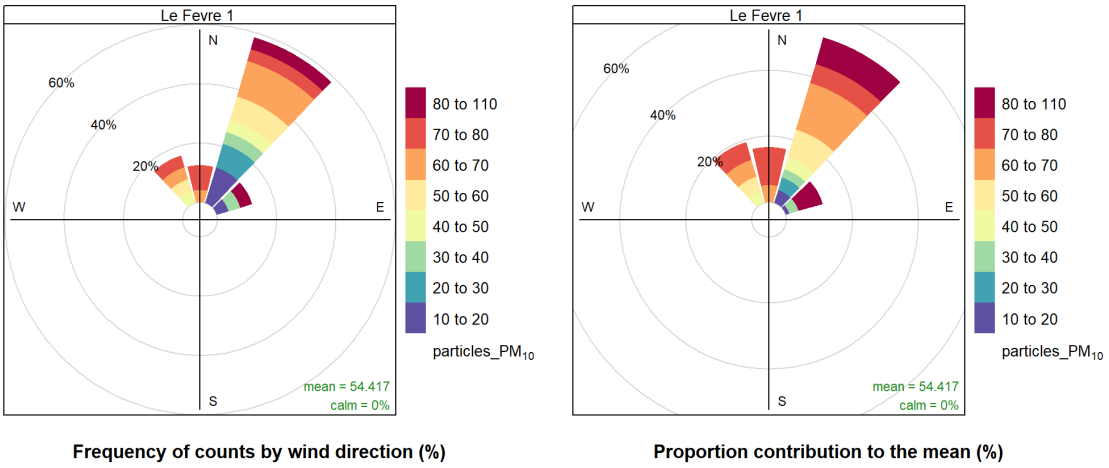

Figure 12 **Pollution rose (left) and proportion contribution rose (right) of concentrations of PM_{10} recorded at Le Fevre 1 on 29 May 2024**

5. COMPLAINTS

There were 201 complaints relating to dust made during the reporting period, significantly more than the previous five years of reporting, during which ABC received between 11 and 47 complaints relating to dust annually. The number of complaints on a single day can be an indicator of the significance of the dust impacts at that time – Table 14 summarises the days on which multiple complaints were received.

62% of all complaints were received in May, and a further 19% and 6% were received in June and July, respectively. 29% of all complaints were received on three days in May: 13 May 2024 (36 complaints), 17 May 2024 (12 complaints) and 24 May 2024 (11 complaints). The only days with multiple dust-related complaints which were not during May to July were on 5 September 2024 and 15 October 2024 (3 complaints received on each day).

Table 14 Summary of days with multiple dust-related complaints

Date	Number of complaints	Date	Number of complaints
13/05/2024	36	19/05/2024	3
17/05/2024	12	26/05/2024	3
24/05/2024	11	3/06/2024	3
21/05/2024	9	12/06/2024	3
16/05/2024	8	18/06/2024	3
20/05/2024	8	5/09/2024	3
14/05/2024	6	15/10/2024	3
14/06/2024	6	22/05/2024	2
18/05/2024	5	25/05/2024	2
27/05/2024	5	2/06/2024	2
11/06/2024	5	6/06/2024	2
15/05/2024	4	10/06/2024	2
23/05/2024	4	17/06/2024	2
28/05/2024	4	19/06/2024	2
5/06/2024	4	23/07/2024	2

As discussed in Section 4, particulate concentrations at ABC's Community Park monitor were relatively elevated throughout May to August 2024, and particularly in May 2024. ABC's Community Park monitor recorded exceedances of the EPA's 24-hour average criterion for $PM_{2.5}$ on 10 and 12 May 2024, and the exceedance on 12 May 2024 was considered likely to be primarily the result of emissions from the facility. All of ABC's on-site dust monitoring stations recorded elevated concentrations of particulates on these days. It is considered likely that particulate emissions from ABC's Birkenhead facility contributed to the high numbers of dust-related complaints in May 2024.

In addition to the above, analysis of the exceedance at Community Park on 10 May 2024 and data from the EPA's monitoring network indicates that a regional dust event affecting the wider Adelaide region also took place in May 2024. Particularly, the exceedance of the EPA's 24-hour average criterion for PM_{10} at Le Fevre 1 on 29 May 2024 was the result of a regional dust event. It is considered likely that regional dust impacts contributed to the high numbers of dust-related complaints in May 2024.

ABC's Community Park monitor recorded a third exceedance of the EPA's 24-hour average criterion for $PM_{2.5}$ on 10 August 2024 and a single dust-related complaint was received on this day. No other dust complaints were received in the week following this exceedance.

It should be noted that dust complaints often relate to a gradual build-up of dust, so the day of the complaint does not necessarily relate to the day of the dust emissions that led to the complaint. This is acknowledged as a limitation to some of the analysis presented above. The following analysis qualitatively investigates the relationship between ambient concentrations of PM_{10} and the frequency of dust complaints in the following days.

A timeseries of 24-hour average concentrations of PM_{10} at ABC's off-site dust monitors is shown in Figure 13, with the dust complaint dates indicated by vertical lines. Figure 14 shows the same timeseries with the number of dust complaints received each week indicated by a frequency histogram. Figure 15 and Figure 16 show timeseries of 24-hour average concentrations of PM_{10} at ABC's on-site dust monitors overlaid with the same complaints information. It is important to highlight that the indicative DustTrak monitor at Community Park was almost certainly under-stating PM_{10} concentrations during its period of operation from January to September of 2024.

These figures illustrate the high concentration of complaints in May and, to a lesser extent, June and July. They furthermore illustrate how suddenly the number of dust complaints increased in the week beginning 12 May 2024. As no dust complaints were received on 12 May 2024, this indicates that the day with the highest number of dust-related complaints (13 May 2024) occurred after over four months during which only seven complaints were received, on seven different days. This pattern is potentially consistent with a significant dust deposition event the night of 12 to 13 May 2024, but was likely also influenced by the steady rise in particulate concentrations through April and early May.

In the days prior to the increase in complaints, on- and off-site concentrations of PM_{10} were significantly elevated, suggesting a primarily regional contribution to the dust deposition event and resulting dust-related complaints at this time. Off-site concentrations of PM_{10} remained elevated through to the beginning of August, whereas on-site concentrations were comparable to levels recorded earlier in the year. This suggests that sources other than the facility contributed to elevated dust deposition levels and resulting dust-related complaints over May to July.

One pattern that is visible in these plots is the tendency for complaints to be received after a sudden drop in ambient off-site concentrations of PM_{10} (see 13 May 2024 and the complaints in early September 2024). This could theoretically be indicative of meteorological conditions conducive to deposition of airborne particulate matter, such that the ambient concentration of airborne particulates is decreased as deposition increases.

ABC commissioned Katestone to investigate whether meteorological conditions may have contributed to the high numbers of dust-related complaints over the period from 13 to 18 May 2024 (Katestone deliverable no. D23123-2). The key outcomes of this work were as follows:

- Wind conditions around the facility were unfavourable for dispersion of dust emissions throughout May 2024, and in particular wind speeds were lower than in previous months.
- Condensation of the plumes from Stack 4A and Stack 4B likely occurred overnight and in the morning from 13-18 May 2024, coincident with low wind speeds.
- Despite these unfavourable conditions, there were no obvious features in the meteorological conditions that would (on their own) explain the elevated deposition reported in the community from 13 May 2024, since the same unfavourable conditions occurred throughout January to May 2024 without triggering an increase in community complaints.

Overall, it is considered likely that while the meteorological conditions were not the cause of the elevated concentration of particulates in the community, the unfavourable meteorological conditions were instrumental in enabling the deposition of airborne particulates and subsequent increase in dust-related complaints.

Complaints may also reflect extended periods of low levels of dust accumulating over time, rather than short-lived events of elevated concentrations. Under this scenario, dust impacts may be due to a cumulative combination of broader dust sources, as measured by the EPA monitoring network (Figure 10 and Figure 11), in combination with on-site operations or other local sources. Given the lack of elevated concentrations at the EPA monitors in June to August compared to those observed at Community Park, it would seem likely that local sources of dust contributed to complaints during this time.

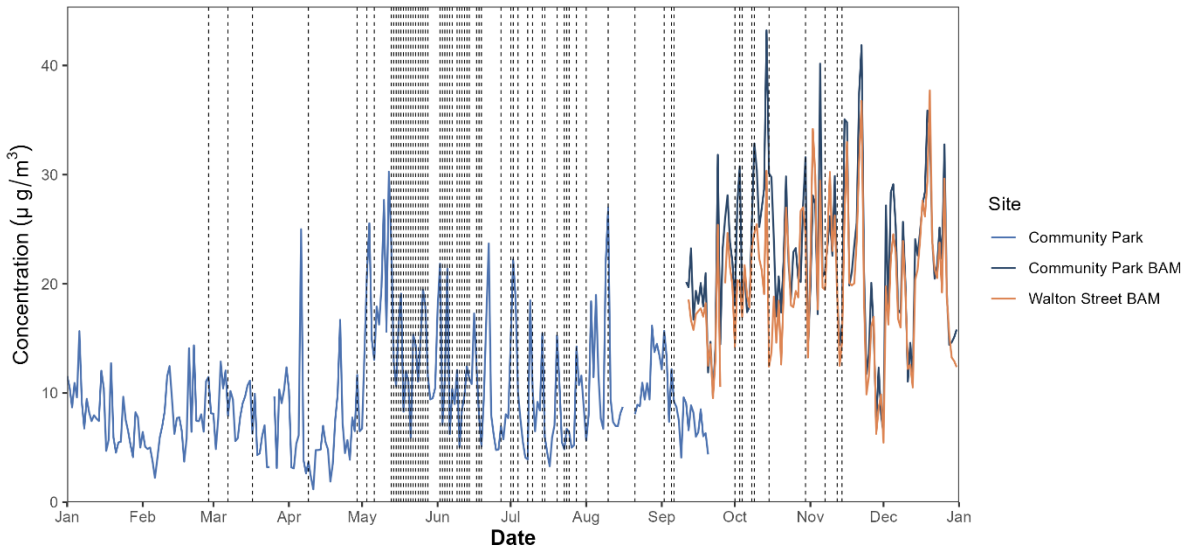

Figure 13 **Days with dust complaints reported (vertical dashed lines) and corresponding 24-hour average concentrations of PM_{10} (µg/m^3) at the off-site monitoring stations**

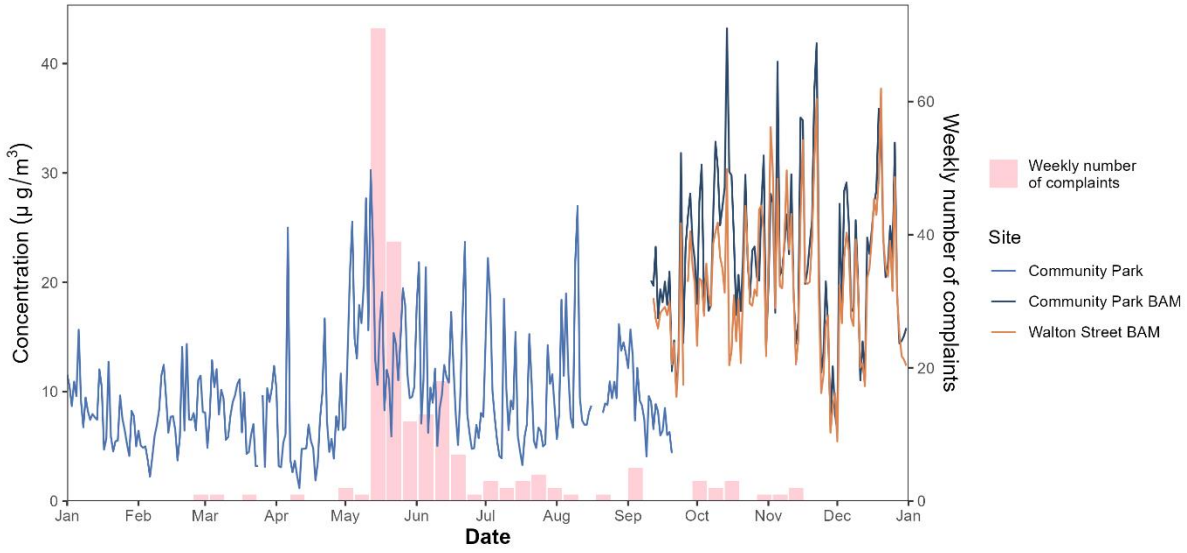

Figure 14 **Weekly number of dust complaints reported (histogram) and corresponding 24-hour average concentrations of PM_{10} (µg/m^3) at the off-site monitoring stations**

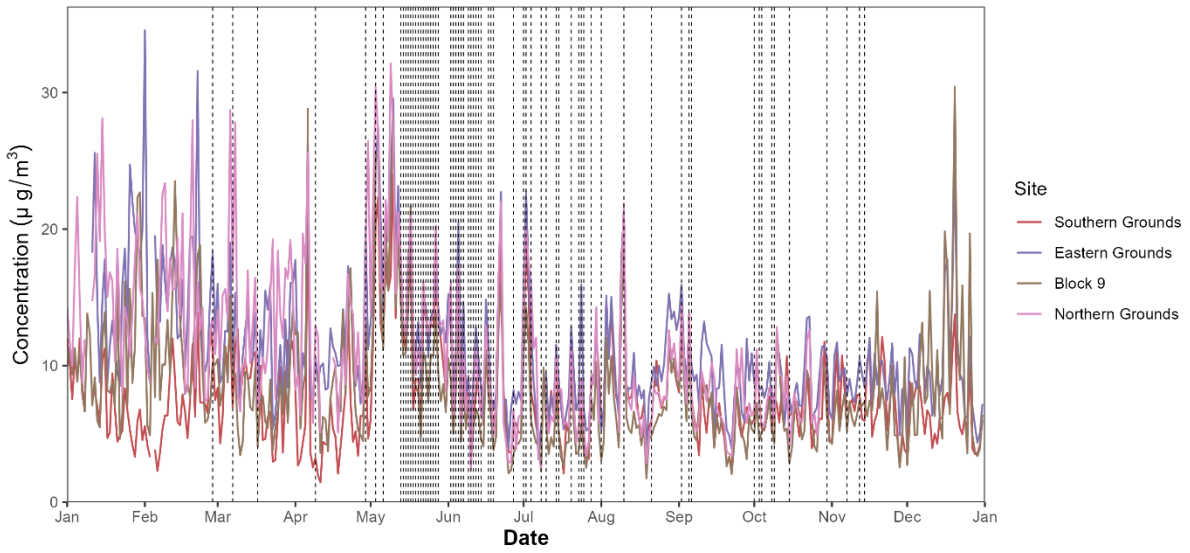

Figure 15 **Days with dust complaints reported (vertical dashed lines) and corresponding 24-hour average concentrations of PM_{10} (µg/m^3) at the on-site monitoring stations**

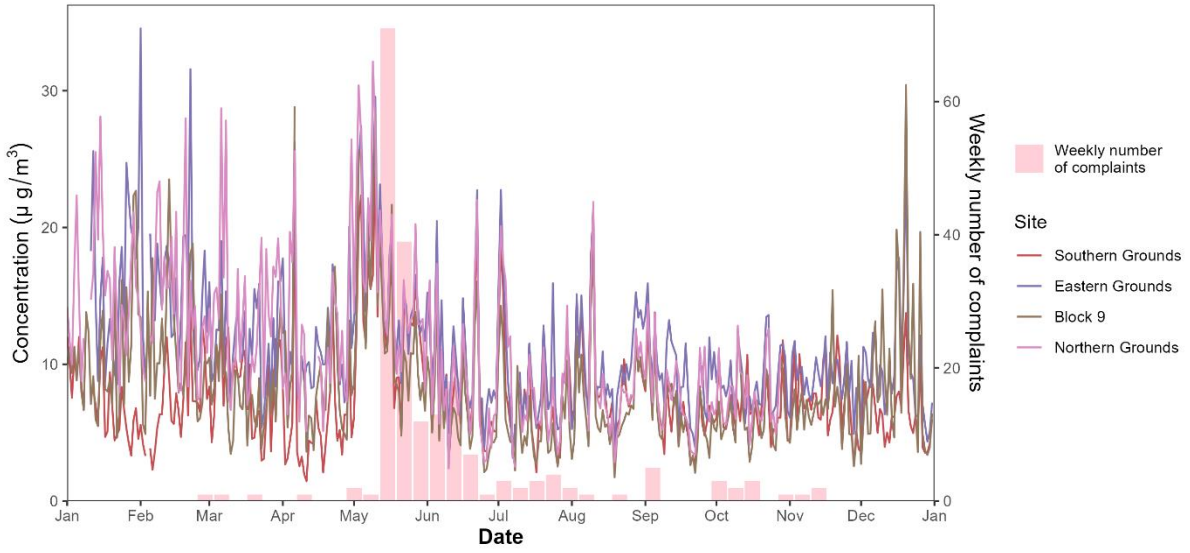

Figure 16 **Weekly number of dust complaints reported (histogram) and corresponding 24-hour average concentrations of PM_{10} (µg/m^3) at the on-site monitoring stations**

6. TARP EFFECTIVENESS

As discussed in Section 4.1, there were 798 alerts triggered during the reporting period of 366 days, comprised of:

- 426 low level alerts
- 289 medium level alerts
- 83 high level alerts

It is important to acknowledge that alerts are not necessarily triggered as a result of emissions from the facility; they can be triggered by a variety of factors including meteorological forecasts and regional dust episodes (because alerts are triggered based an absolute concentration, not the facility contribution). Similarly, dust impacts in the community may not necessarily be a result of emissions from the facility, but rather the result of particulate emissions from other sources. Also, because alerts are triggered based on on-site measured concentrations only, they may miss off-site impacts on occasion, such as when measured concentrations at community monitors are elevated but those on-site are not. Potential improvements to the TARP to address these points are discussed further in Section 7.

The majority of alerts (68%) were triggered by measured concentrations at the Northern Grounds and Eastern Grounds monitors, with a further 26% being triggered by measured concentrations at the Southern Grounds and Block 9 monitors. 6% of all alerts were triggered by forecast and observed meteorology. There were no alerts triggered by visual dust observations.

In response to the 798 alerts, ABC undertook 2,165 actions, or, on average, approximately 3 actions per alert. This is the same approximate number of actions per trigger as the previous reporting period (calendar year 2023).

The following sections evaluate the effectiveness of the TARP through analysis of the dust impacts experienced by the community during the reporting period.

6.1 Frequency of dust impacts

One metric of TARP effectiveness is a lack of dust impacts on the nearby community potentially attributable to emissions from the facility. Figure 17 plots measured TSP concentrations in kiln Stack 4A and pre-calciner Stack 4B against measured concentrations at ABC's dust monitors to determine if there is a relationship between the two and therefore whether the stack emissions appear to influence ambient concentrations in the community and at the facility. Linear regression was used to describe the relationships between in-stack and ambient concentrations of particulates; the resulting lines of best fit and equations are shown in Figure 17. The R^2 value in each plot is a measure of the quality of the fit, with 1 being a perfect linear relationship and 0 being no relationship.

The figure shows that:

- There is a distinct difference between the scatter plots of concentrations measured at the DustTrak monitors and the scatter plots of concentrations measured at the BAMs
- The highest PM_{10} levels recorded at the Community Park DustTrak (and the on-site DustTrak monitors) did not coincide with high in-stack TSP concentrations
- The highest in-stack TSP levels did not coincide with high particulate concentrations at the Community Park DustTrak (or the on-site DustTrak monitors)
- The relationship between TSP concentrations in Stack 4B and ambient PM_{10} concentrations is negative for all monitors
- The relationship between TSP concentrations in Stack 4A and ambient PM_{10} concentrations is positive only for the Southern Grounds DustTrak, Community Park DustTrak, Community Park BAM and Walton Street BAM monitoring sites.

- While all of the relationships are weak (with R^2 not exceeding 0.0089), the strongest relationships between in-stack concentrations of TSP and ambient PM_{10} concentrations are between Stack 4A and the Southern Grounds and Community Park DustTrak monitors, which recorded R^2 values of 0.0089 and 0.0075, respectively.

The lack of strong positive relationships between in-stack particulate concentrations and ambient concentrations of PM_{10} suggests that the stack emissions have little influence on measured particulate concentrations in the community. However, there is some evidence of a weak relationship between in-stack particulate concentrations at Stack 4A and ambient PM_{10} concentrations at Southern Grounds, Community Park and Walton Street, and this analysis does not consider meteorological conditions which may affect the transport of particulates from the stacks to the monitors. It is therefore possible that in-stack concentrations of particulates have a minor influence on particulate concentrations in the community.

Dust-related complaints and off-site ambient monitoring of particulates have also been analysed as indicators of possible dust impacts.

The GLPMRP data for the off-site monitors presented in Section 4.2 show that there were three exceedances of the EPA's 24-hour average criterion for $PM_{2.5}$ at Community Park and no exceedances of the EPA's 24-hour average criterion for PM_{10} It was concluded that emissions from the facility contributed to at least one of the three exceedances, but that other sources (potentially regional) also contributed. The EPA monitoring data in Section 4.5 show that there was a single exceedance of the EPA's 24-hour average criterion for PM_{10} at Le Fevre 1 which was determined to be attributable to a regional dust event and not emissions from the facility.

As discussed in Section 5, there were significantly more dust-related complaints in 2024 than in any of the previous five years. Analysis of ambient monitoring data found that emissions from the facility likely contributed to these complaints, but that sources other than the facility also likely contributed.

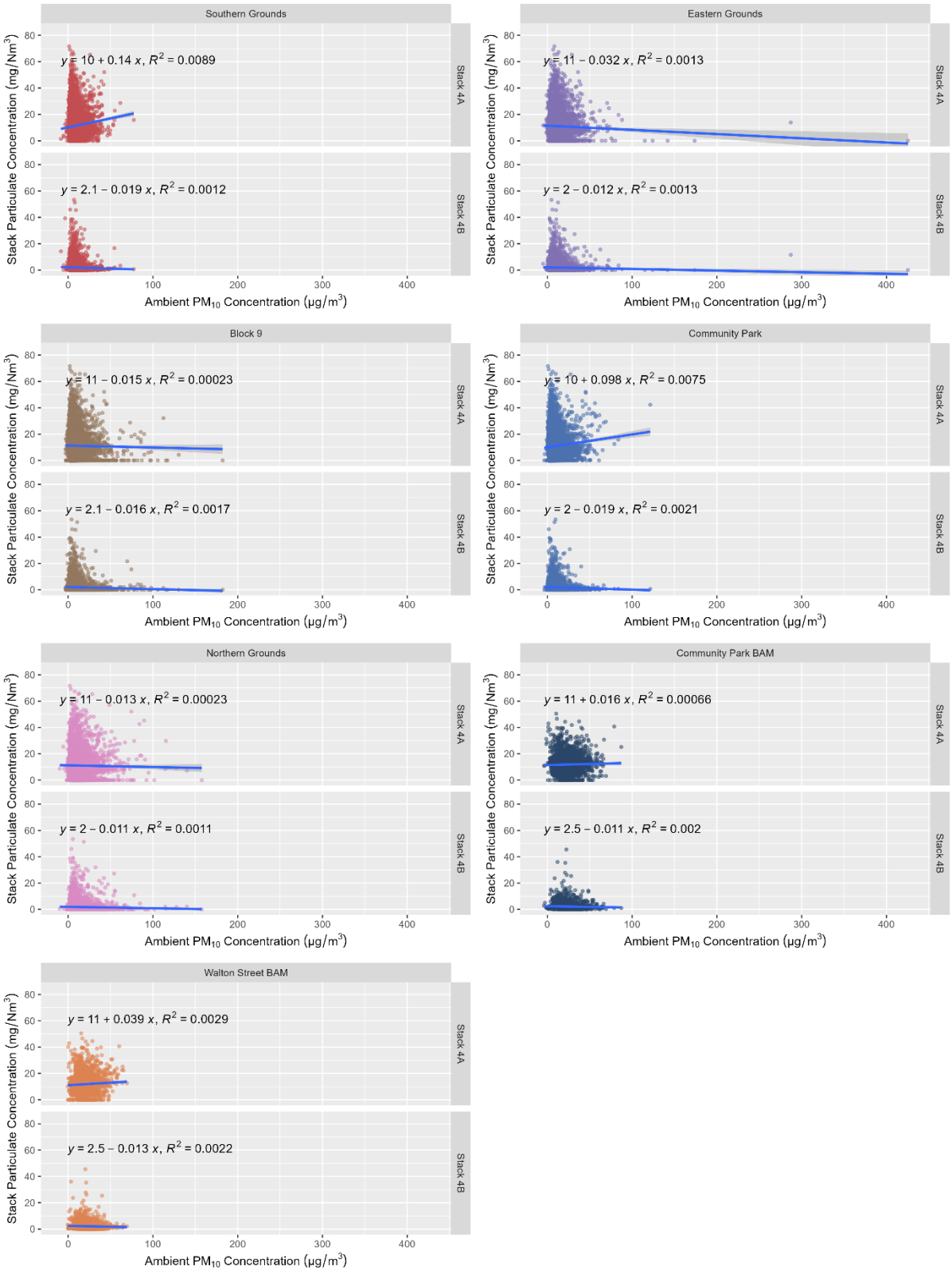

Figure 17 **Scatter plot of 1-hour average in-stack TSP concentration (mg/Nm^3) measured at Stacks 4A and 4B compared to 1-hour average ambient measurements at all on-site and off-site ABC monitors for the reporting period**

6.2 Coverage of dust impacts by alerts

It was determined in previous sections that emissions from the facility likely contributed to elevated ambient particulate concentrations, dust deposition rates and dust-related complaints in the community. Another metric of TARP effectiveness is, therefore, whether dust impacts in the community are predictable based on trigger alerts at the facility.

The relationship between daily trigger alert numbers (the coloured boxes) and complaints (dashed lines) is investigated in Figure 18. The high numbers of complaints in May were associated with large numbers of medium- and low-level alerts; however, in June the number of alerts was noticeably lower despite complaints being received on most days, and no complaints were received following a day with 10 low-level alerts in late June. Similarly, in late July complaints were received on several consecutive days during which at most one alert of each level was triggered, and in mid-November several complaints were received during a period in which a single medium-level alert was triggered. This suggests that the triggers are effective in identifying certain conditions that could lead to dust complaints but are missing certain other conditions which also could lead to dust complaints.

As has been mentioned previously, the trigger level exceedances and/or complaints could relate to regional dust episodes or other factors, and do not necessarily indicate that the facility is the source of the dust emissions that have led to the complaints. However, even if the alerts were triggered by off-site emissions, the actions the alerts trigger should minimise the potential for the facility to further contribute to the already elevated ambient dust concentrations in the community. Similarly, it may be that the complaints received during periods where no or few alerts were triggered were primarily the result of off-site sources of particulates which did not impact on-site particulate concentrations enough to trigger an alert.

Figure 19 provides the 1-hour average concentration of PM_{10} at ABC's off-site monitoring stations during the reporting period along with high trigger alerts identified by grey vertical markers. Figure 19 shows that several of the highest hourly average PM_{10} concentrations at Community Park and many of the highest hourly average PM_{10} concentrations at Walton Street were not covered by high trigger alerts. While some periods of elevated PM_{10} concentrations at Community Park were covered by high alerts, this indicates that the current triggers are not effectively identifying certain conditions that could lead to elevated concentrations of particulates at the off-site monitors. As discussed above, this may be indicative of sources other than the facility contributing to ambient PM_{10} concentrations in the community but not triggering any alerts, which is reasonable.

The frequency of high trigger alerts by week of the year is shown in Figure 20. Here it is clear that the most high-level alerts were triggered in the first four months of the year, when concentrations of PM_{10} in the community were relatively low, as well as at the start of May, when ambient concentrations in the community were elevated. This may be indicative of the TARP effectively controlling particulate emissions from the facility in January to April such that off-site dust impacts were mitigated, but that the actions taken at the start of May were insufficient to avoid dust impacts in the community such as the exceedances of the EPA's 24-hour average criterion for $PM_{2.5}$ and the large number of dust-related complaints received at this time. However, this could also be indicative of sources other than the facility contributing to off-site dust impacts.

Overall, the TARP appears effective in identifying certain conditions that could lead to dust impacts in the community and should in turn, through the actions and responses taken by ABC staff, reduce the likelihood of the facility contributing to these impacts. However, some inadequacies and potential improvements to the monitoring network and TARP have been identified:

- It would appear that DustTrak monitors under-state PM_{10} concentrations, and may also over-state $PM_{2.5}$ concentrations. The network would benefit from higher quality monitoring equipment and the more robust concentration data that these would provide.
- Because alerts are triggered based on absolute concentrations, regional dust events and emissions from off-site sources will be triggering alerts even when the facility is making a minimal contribution to measured concentrations. The TARP would benefit from an ability to quantify the facility's contribution to measured

concentrations alongside that of other sources, so that action is targeted on those occasions when the facility is making a significant contribution to measured concentrations. However, higher quality monitoring data is a necessity for the implementation of such an automated quantification of source contributions.

- The TARP currently focusses triggers on concentrations measured on-site only; community monitors should be incorporated into the TARP to ensure that high concentrations events in the community are not missed, as under such events efforts should be made to minimise the site's contribution regardless of its magnitude.

Katestone is undertaking a separate piece of work to review ABC's monitoring network and make recommendations to improve it, which will include revisions to TARP trigger levels and which will address all of the above points. With this work underway, it would be inappropriate to make any significant recommendations for changes in this report.

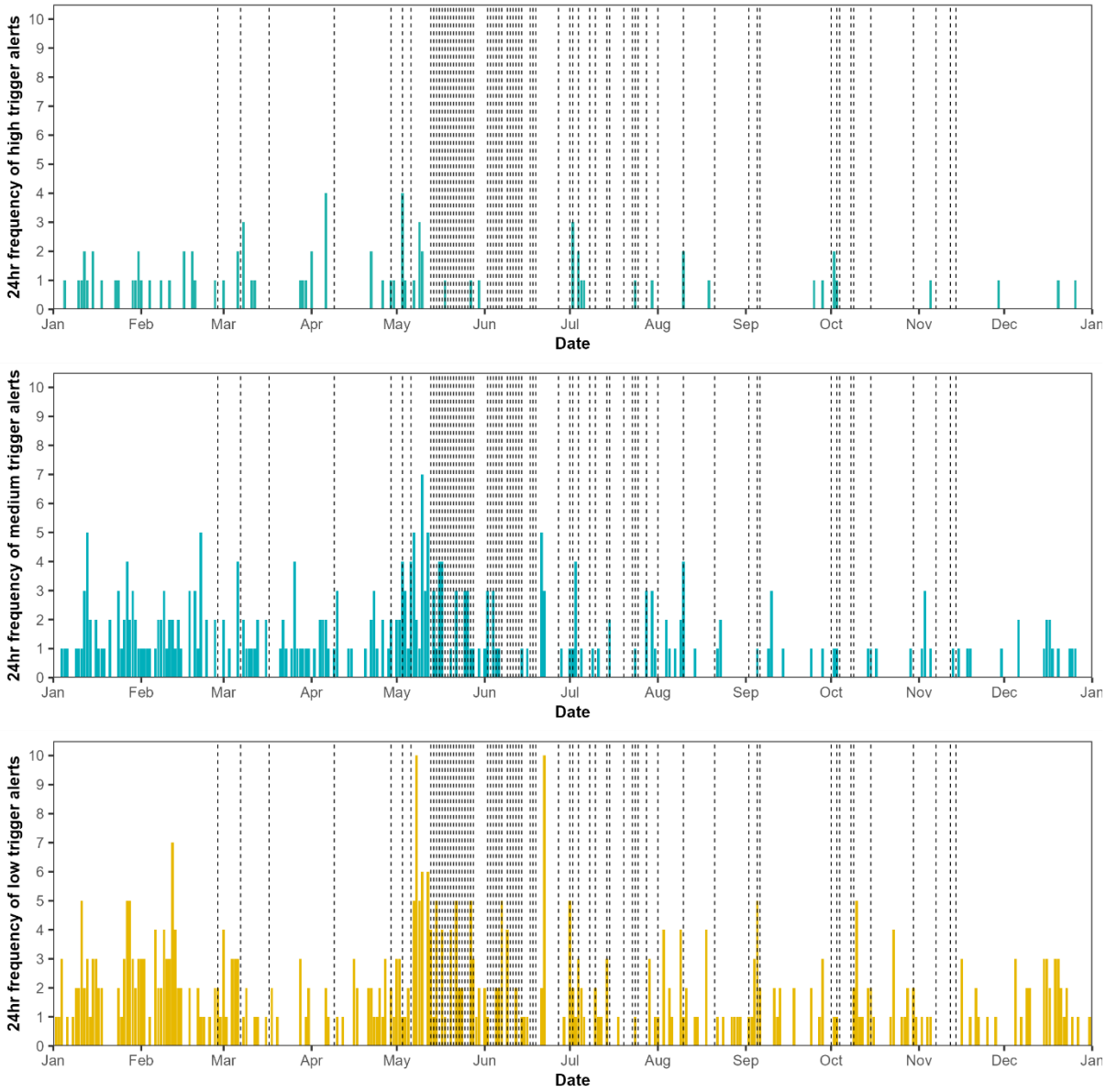

Figure 18 Trigger alerts and complaints during the reporting period

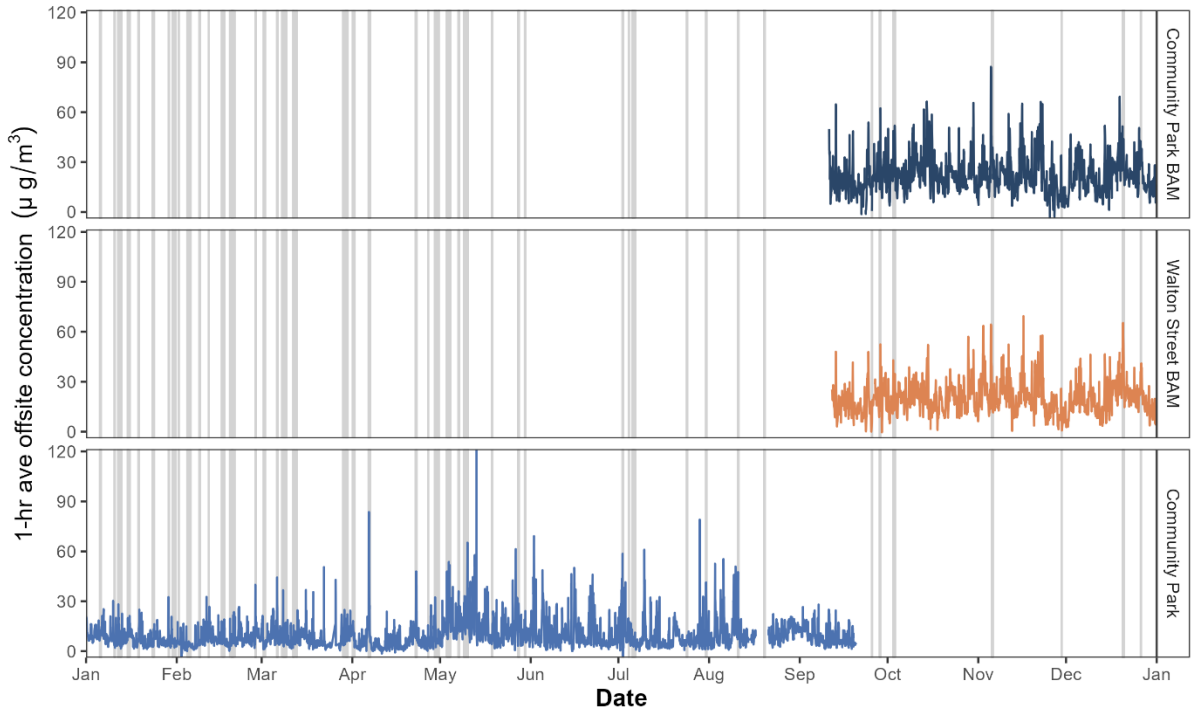

Figure 19 **1-hour average concentration of PM_{10} (µg/m^3) at the off-site monitoring stations with periods of 'high' triggers marked in grey**

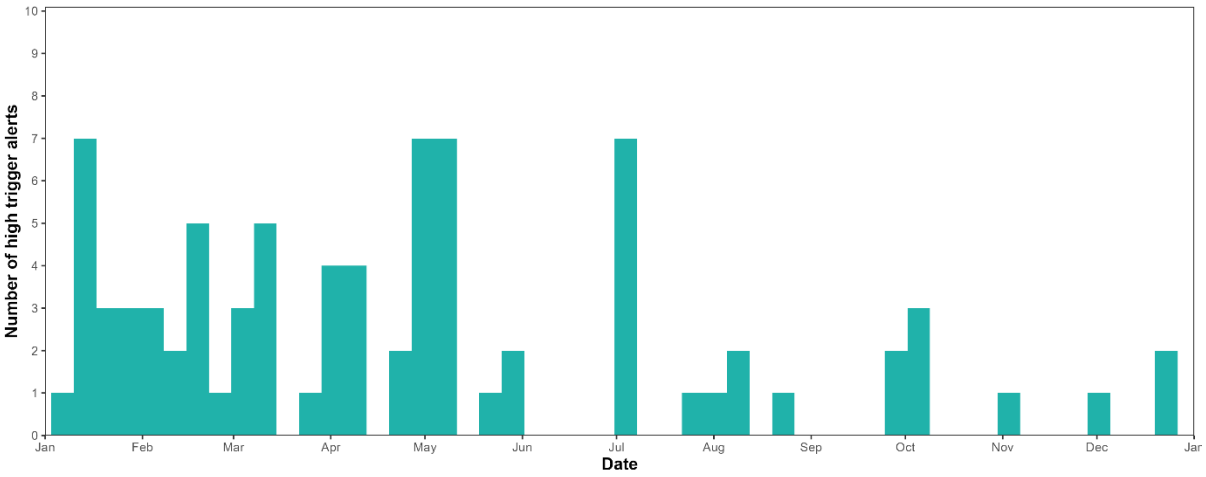

Figure 20 **Frequency of high trigger alerts during the reporting period**

6.3 Effects of actions on dust impacts

A third metric of TARP effectiveness is how dust impacts in the nearby community are affected when an action is performed in response to a trigger alert at the facility. To examine these effects, Figure 21 to Figure 25 show boxplots of the mean concentration of PM_{10} at ABC's off-site dust monitors 3-6 hours before an alert is triggered, 0-3 hours before an alert is triggered, 0-3 hours after an alert is triggered, and 3-6 hours after an alert is triggered. Each figure corresponds to a particular source of alerts and is split into low, medium, and high alert levels. Due to the lack of data at the BAMs and the small number of triggers in the second half of the year, the figures for these monitors are affected by few data points being available. For this reason, the focus of this analysis will be on the figures for the Community Park DustTrak monitor.

No figure is included for the alerts triggered by meteorological observations (indicating a 20-day period with less than 1 mm of rain) since these alerts are associated with a more gradual increase in dust risk which likely would not be visible within 6 hours of the alert being triggered. Furthermore, these alerts indicate an increased risk of dust emissions in general, not that ambient concentrations are currently elevated (unlike the concentration-based alerts), nor that a specific upcoming 3-hour period has an elevated risk of dust impacts (unlike the meteorological forecast-based alerts). Therefore, it is possible that no change in actual ambient concentrations of PM_{10} in the 6 hours following an alert triggered by meteorological observations would occur, regardless of the action taken by operators.

For the concentration-based alerts, which are triggered when measured concentrations of PM_{10} or $PM_{2.5}$ at a particular site exceed certain thresholds, effective response actions would be expected to be associated with increasing concentrations over the 6 hours before the alert was triggered and decreasing concentrations over the 6 hours after the alert was triggered. Note that the concentration-based alerts do not consider wind speed or direction and so the expected trend is affected by the location of the alerting site relative to the off-site monitors and the facility. The alerting site and the off-site monitors would need to be experiencing elevated dust at the same time for this trend to be expected.

A trend suggesting effective response actions is observed for all alert levels from Southern Grounds (Figure 21), low- and medium level alerts from Eastern Grounds (Figure 22), medium-level alerts from Block 9 (Figure 23), al all alert levels from Northern Grounds (Figure 24). There is also some evidence of concentrations decreasing over the six hours after a high-level alert from Eastern Grounds, although the increase in concentrations in the 6 hours prior to an alert is less clear.

That the expected trend was visible for all alert levels from the Northern Grounds and Southern Grounds monitors is as expected. The Northern Grounds and Southern Grounds monitors would likely be affected at the same time as Community Park under calm conditions with low dispersion of fugitive dust. The Southern Grounds monitor would additionally be expected to be affected at the same time as Community Park as this monitor is downwind of the facility under similar wind conditions to the Community Park monitor.

The Eastern Grounds monitor is on the opposite side of the facility from Community Park and so would not be expected to be affected by particulate emissions from the facility under the same wind conditions as Community Park. However, under calm conditions with low dispersion of fugitive dust emissions from the facility may affect both the Eastern Grounds and Community Park monitors. High-level alerts at the Eastern Grounds monitor would most likely be triggered when winds transport emissions from the facility to the monitor, and therefore away from Community Park, potentially explaining the lack of the expected trend under high-level alerts from Eastern Grounds. Furthermore, emissions from sources to the east of the facility (which are more distant from Eastern Grounds than the facility and so may be more likely to trigger a low- or medium-level alert) would be expected to affect both the Eastern Grounds and Community Park monitors under the same wind conditions.

The Block 9 monitor is located on the northeastern boundary of the facility and so is never downwind of the facility at the same time as the Community Park monitor. It is, therefore, expected that measured concentrations at the Community Park monitor would have little dependence on actions taken in response to alerts from Block 9. Similar to the Eastern Grounds and Northern Grounds monitors, the Block 9 monitor would potentially be affected at the same time as the Community Park monitor under calm conditions with low dispersion of fugitive dust. The effective response trend for medium alerts at Block 9 may be a result of this. Given the evidence of the effectiveness of the actions taken in response to trigger alerts of all levels from the other sites, it is reasonable to assume that actions taken in response to trigger alerts from Block 9 are likely to be similarly effective at managing fugitive dust emissions from the facility.

For the meteorological forecast-based alerts, which inform ABC staff of dust risk before elevated concentrations have the opportunity to occur, an effective response action would be associated with minimal change in the concentrations measured off-site. Figure 25 does indeed show little obvious dependence of measured PM_{10} concentrations at Community Park on alerts based on forecast meteorology. In the TARP review for the previous reporting period, a similar tend to the concentration-based alerts was visible in the boxplot for high-level alerts based on forecast meteorology; it was recommended to review this trend in subsequent years. Such a trend is not

visible in the boxplot for high-level alerts based on forecast meteorology for this reporting period, indicating that the trend observed last year was potentially anomalous.

It should be noted that the presence of the expected trends in the boxplots indicates that the actions taken in response to alerts are effective at reducing the effect of particulate emissions from the facility on ambient concentrations of particulates in the community, not that the actions are effective at completely mitigating any dust impacts.

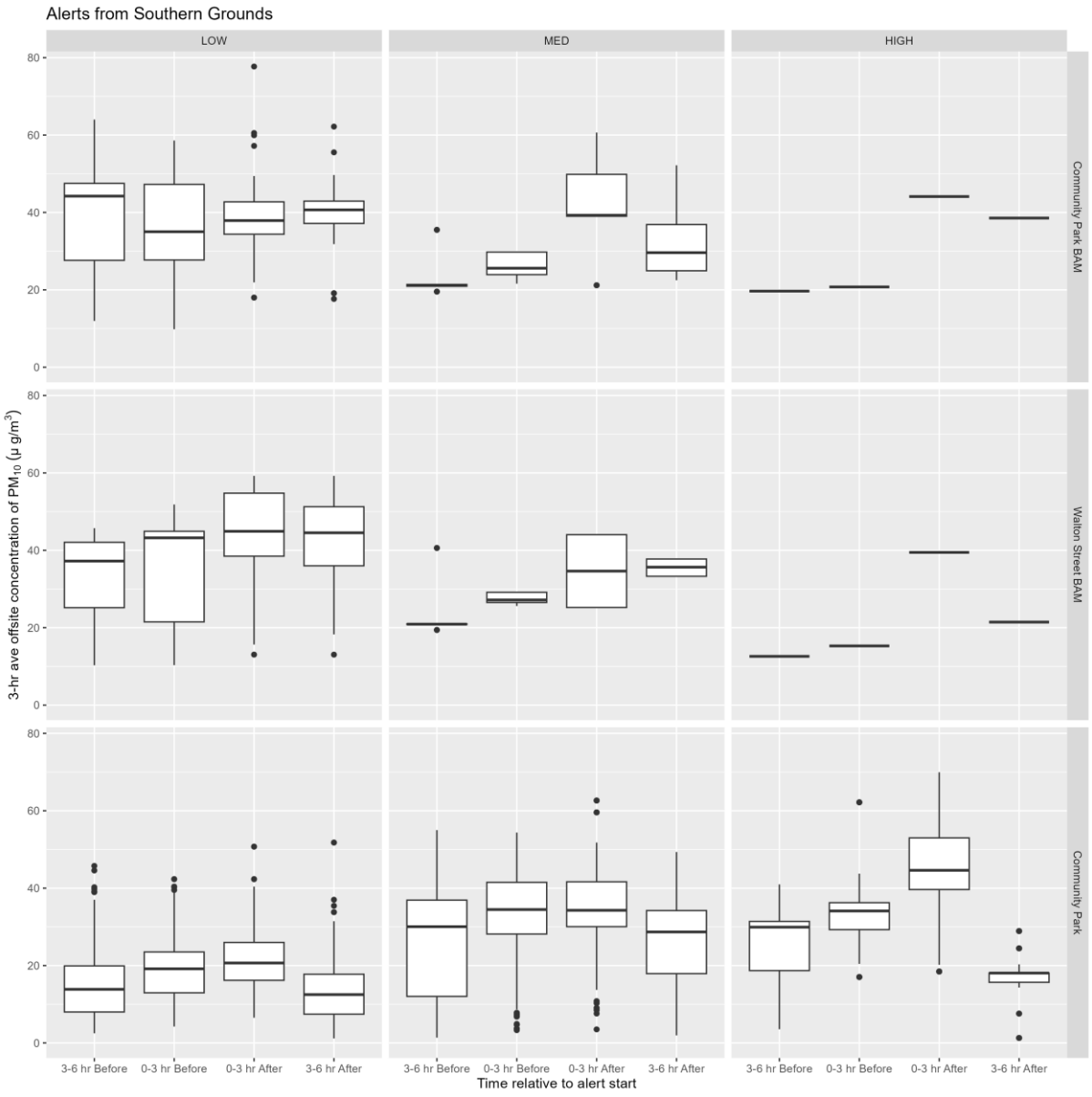

Figure 21 Boxplots of 3-hr average concentrations of PM_{10} at off-site monitoring stations within 6 hours of a trigger alert from the Southern Grounds monitor

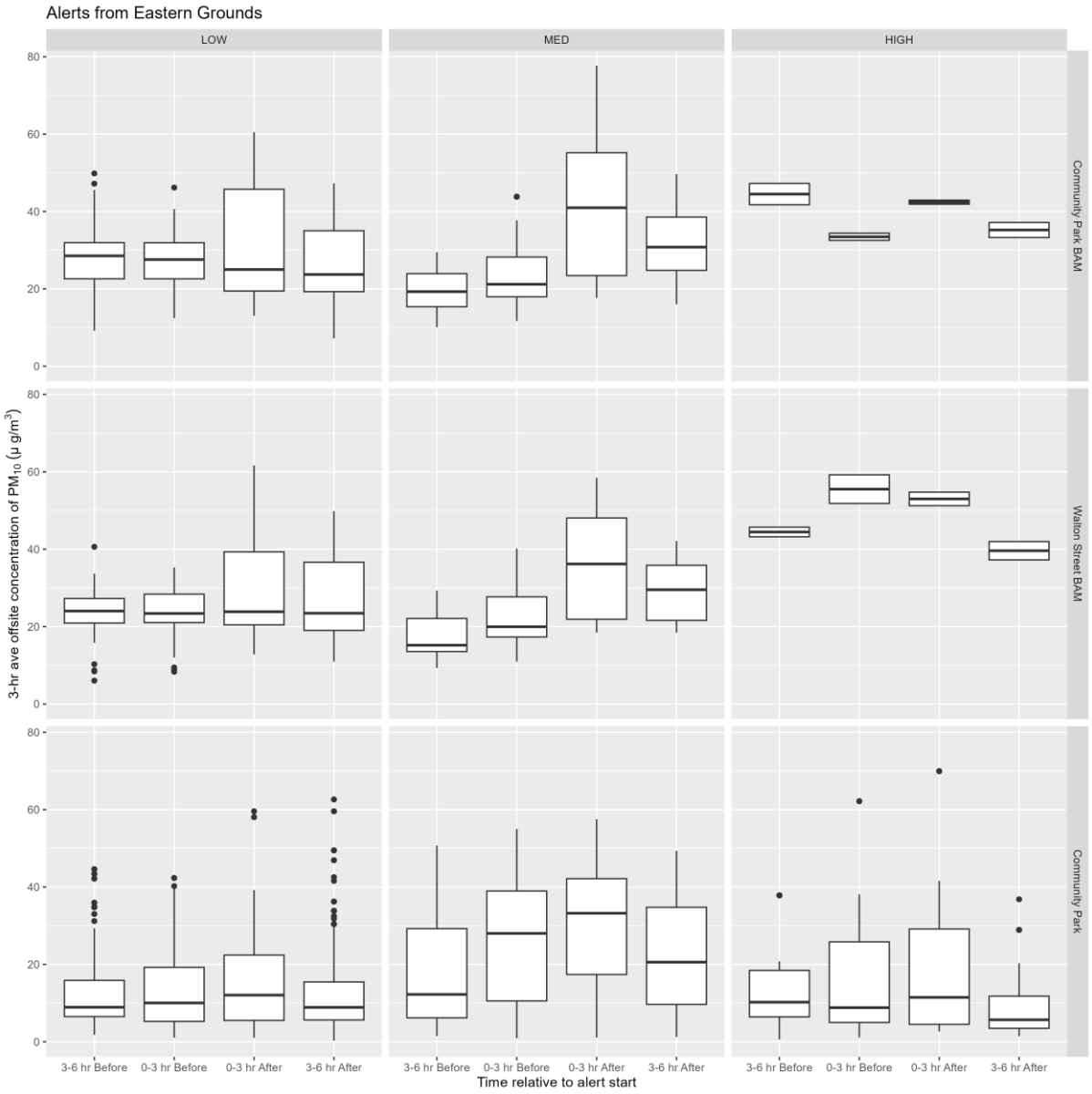

Figure 22 Boxplots of 3-hr average concentrations of PM_{10} at off-site monitoring stations within 6 hours of a trigger alert from the Eastern Grounds monitor

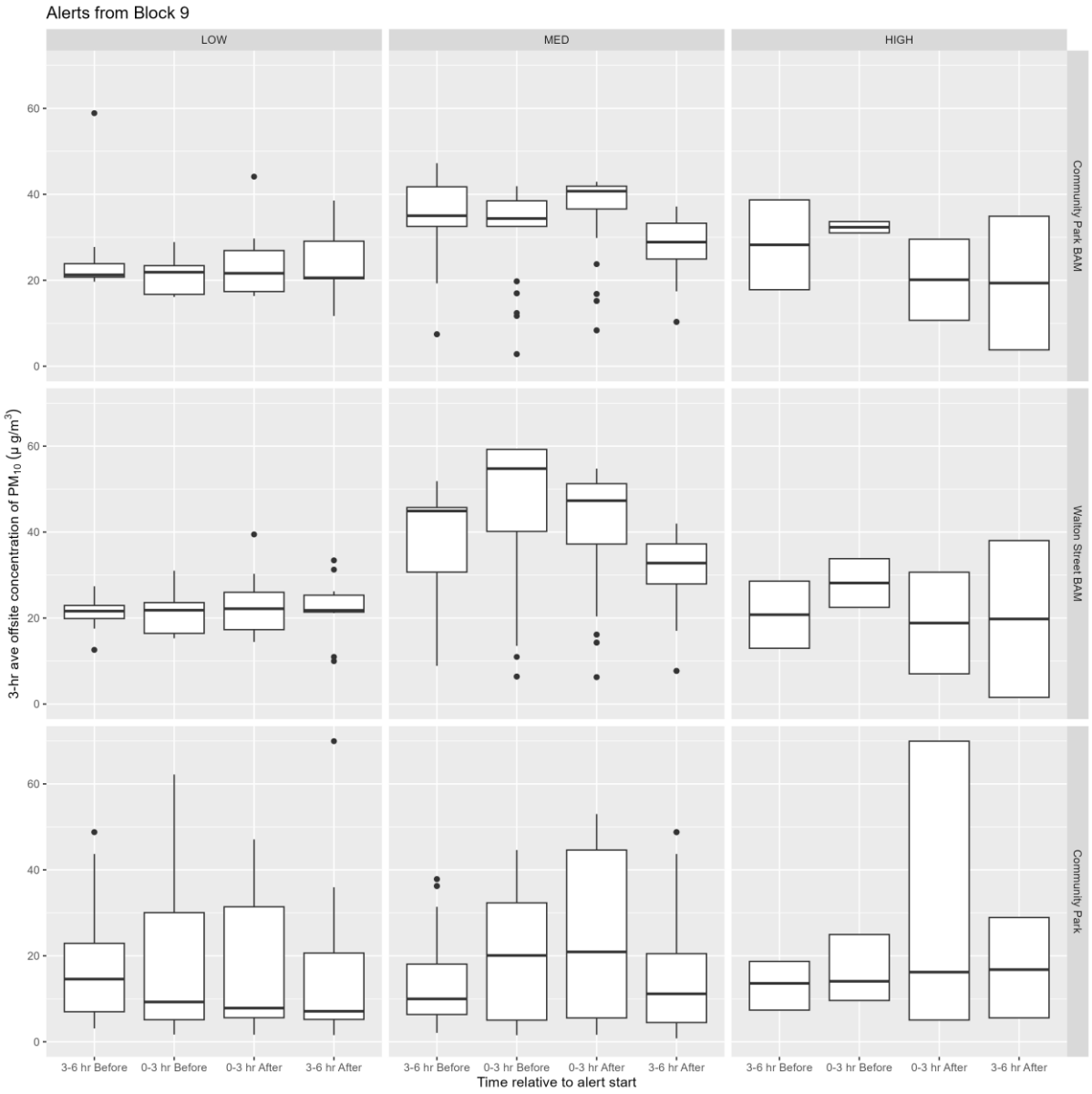

Figure 23 Boxplots of 3-hr average concentrations of PM_{10} at off-site monitoring stations within 6 hours of a trigger alert from the Block 9 monitor

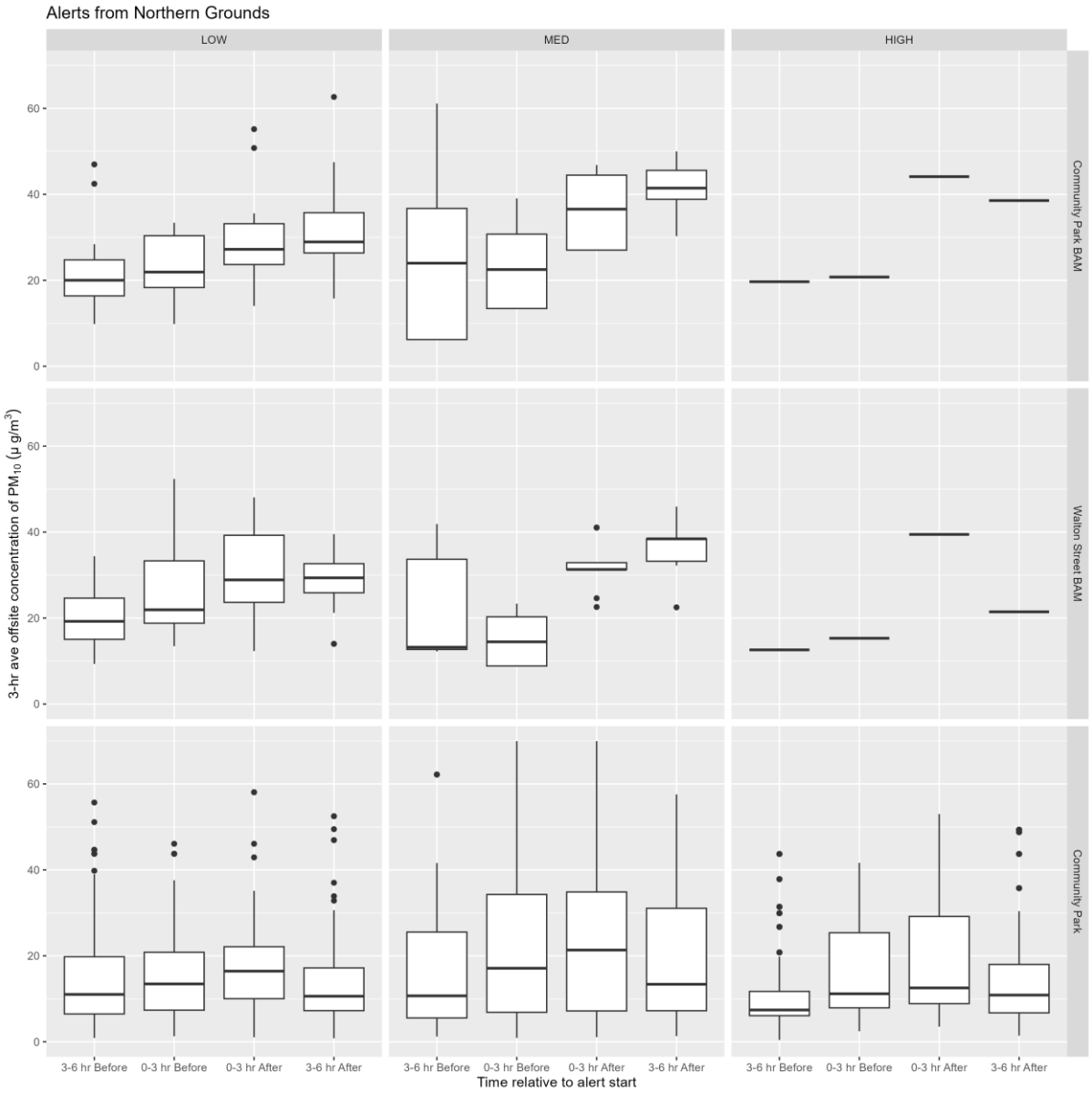

Figure 24 Boxplots of 3-hr average concentrations of PM_{10} at off-site monitoring stations within 6 hours of a trigger alert from the Northern Grounds monitor

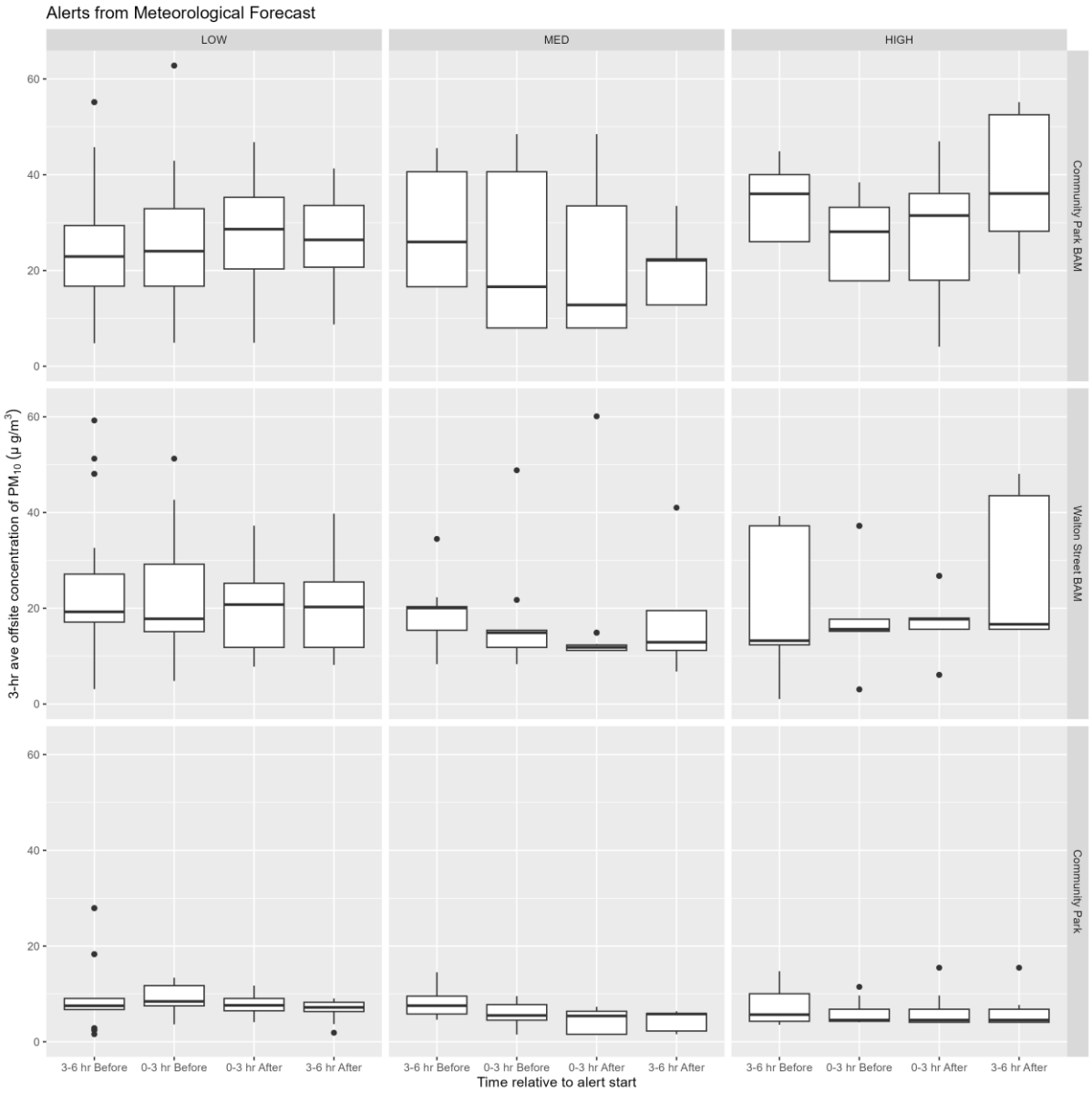

Figure 25 Boxplots of 3-hr average concentrations of PM_{10} at off-site monitoring stations within 6 hours of a Meteorology Forecast trigger alert

7. CONCLUSIONS

Katestone was commissioned by ABC to complete a review of the TARP data collected for the period 1 January 2024 to 31 December 2024, inclusive.

Data capture was greater than 90% at all on-site monitoring sites; however, identification and removal of over two months of invalid data at the Northern Grounds monitor reduced the valid data at this monitor to 78-79% for the reporting period. It is recommended that ABC investigate the Northern Grounds monitor for issues. Possibilities for updating the Dust Management Dashboard to automatically identify periods of extended or regular negative data and issue an alert should also be investigated.

Table 15 presents the frequency of various measures of dust impacts over the 2020 to 2024 reporting periods. There were significantly more dust-related complaints from the community in this reporting period than previous years, and there were more exceedances of the EPA's 24-hour average criterion for $PM_{2.5}$ than in the previous three years of reporting.

Table 15 Comparison of community impacts between the 2020-2024 reporting periods

Dust Impact	Count of dust impacts over each calendar year				
	2020	2021	2022	2023	2024
Dust-related complaints	22	37	11	18	201
PM_{10} exceedances at Community Park	4	0	0	0	0
$PM_{2.5}$ exceedances at Community Park	22	1	0	0	3

Overall, the TARP appears effective in identifying certain conditions that could lead to dust impacts in the community and should in turn, through the actions and responses taken by ABC staff, reduce the likelihood of the facility contributing to these impacts. However, some inadequacies and potential improvements to the monitoring network and TARP have been identified:

- It would appear that DustTrak monitors under-state PM_{10} concentrations, and may also over-state $PM_{2.5}$ concentrations. The network would benefit from higher-quality monitoring equipment and the more robust concentration data that these would provide.
- Because alerts are triggered based on absolute concentrations, regional dust events and emissions from off-site sources will be triggering alerts even when the facility is making a minimal contribution to measured concentrations. The TARP would benefit from an ability to quantify the facility's contribution to measured concentrations alongside that of other sources, so that action is targeted on those occasions when the facility is making a significant contribution to measured concentrations. However, higher quality monitoring data is a necessity for the implementation of such an automated quantification of source contributions.
- The TARP currently focusses triggers on concentrations measured on-site only; community monitors should be incorporated into the TARP to ensure that high concentrations events in the community are not missed, as under such events efforts should be made to minimise the site's contribution regardless of its magnitude.
- No alerts were triggered by on-site visual observations during the reporting period. Alerts should be triggered by the "general build-up of dust on non-worked areas at the facility, e.g. carparks, alongside buildings etc.", "visible dust plume generated by facility activity above normal/acceptable levels" and "visible dust plume crossing the facility boundary". Such events are known to occur at the facility and therefore this outcome is considered unrealistic and indicative of improper implementation of the TARP amongst site staff. However, it is understood that some such events are reported internally, via a separate system. It is recommended that ABC implements additional training for all site staff to ensure that all such visual observations are reported and recorded in accordance with the TARP, and that rationalisation of

internal reporting systems is undertaken to ensure that all dust-related activities are recorded in the TARP so that they can be incorporated into TARP reviews.

Katestone is undertaking a separate piece of work to review ABC's monitoring network and make recommendations to improve it, which will include revisions to TARP trigger levels and which will address all of the above points. With this work underway but not yet complete, it would be inappropriate to make any significant recommendations for changes in this report.