Tata Steel Strip Products UK
Port Talbot Steelworks
Environmental Improvement

Quarterly On-site Ambient PM_{10} Monitoring Report for Quarter 2 2014

			Signed	Dated
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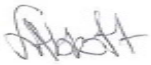
Checked and Approved	Fiona Abbott	Lead Environmental Engineer		31/07/14

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Table of Contents

1 INTRODUCTION 4
2 MONITOR DEPLOYMENT AND DATA CAPTURE 5
3 MONITORED DATA TRENDS 7
4 MONITORED DATA ROSE DIAGRAMS 12
5 CONCLUSIONS 14
APPENDIX A 15

1 Introduction

This report is written to meet commitments made in the response from Tata Steel, Strip Products UK (TSSP UK) business in October 2010 to Improvement Condition 9.8 within Permit BL7108IM/V009. The Improvement Condition states:

"The Operator shall develop a reporting framework for assessing and reporting annually and quarterly the data produced from the on site ambient air quality monitoring network. A copy of the assessment and reporting framework shall be submitted to the Environment Agency at the Reporting Address".

This report will cover the period 1st April to 30th June 2014 (Q2) and will:

- outline monitor deployment and data capture over the course of the monitoring period;
- describe the trends in monitored data with reference to any changes that occurred over the course of the monitoring period; and
- present and interpret rose diagrams for data recorded over the course of the monitoring period.

Conclusions relating to the above points are presented in section 5.

Over the course of the monitoring period there were no breaches of the daily mean PM_{10} air quality objective in Port Talbot, however, two near miss days were recorded. Near miss days occur when the daily average PM_{10} concentration is between 45 and 50 µg/m^3. A summary of the near miss days recorded at the Margam Fire Station monitor (AURN) during Q2 2014 is shown in Table A. This information will be considered when undertaking the analysis outlined above.

Table A – Summary of near miss days from 1st April to 30th June 2014

Count	Near Miss Date	PM10 Daily Mean at AURN	Trans-boundary Influence (based on Narberth) *1	AURN Normal Background*1	Trans-boundary influence removed	Local Influence Above Norm	PM2.5 Fraction (%)	Wind direction towards town from site?*2
1	09/05/14	47.9	5.1	24.3	42.8	18.5	18	Yes
2	10/05/14	48.7	3.5	24.3	45.2	20.9	18	Yes

*1 AURN and Narberth normal background calculated as an average of 2009 to 2013 data (all available data).

*2 Based on the daily mean wind direction recorded at the AURN, Port Talbot.

2 Monitor Deployment and Data Capture

Since the October 2010 response to Improvement Condition 9.8, the locations of monitors in the monitoring network have changed. The current locations of the monitors are illustrated in Figure 1 in Appendix A. Figure 2 in Appendix A illustrates the future on-site monitoring network as planned in January 2013. Figure 3 in Appendix A illustrates the future on-site monitoring network as planned in March 2014.

Table B shows the monitors deployed during Quarter 2 2014, their data capture and the reasoning for any failure to capture data.

Table B – Summary of TOPAS monitors deployed between 1st April and 30th June (Q2) 2014

Monitor	% PM_{10} data capture over entire monitoring period*	Reason for failure to capture PM_{10} data (if <90% data capture)	% Wind data capture over entire monitoring period	Reason for failure to capture wind data (if <90% data capture)	Date of last calibration	Start date of operation
CS&I Admin	99.5	PI data used from 20/06/14	99.5	PI data used from 20/06/14	17/09/2013	18/02/2014
Centre	98.5	N/A	98.5 (wind direction only)	Zero data capture for wind speed due to connection issues **	27/03/2013	24/10/2013
Fines Bed	98.7	N/A	98.7	N/A	25/07/2013	07/11/2013
Harbour	99.3	N/A	99.3 (wind direction only)	Zero data capture for wind speed due to connection issues **	10/12/2013	31/03/2014
Chief Engineers	97.5	N/A	97.5	N/A	03/05/2013	18/07/2013
West End	98.6	N/A	98.6	N/A	05/06/2013	21/10/2013
Harsco	93.2	PI data used from 17/06/14. Monitor out for calibration 25/06/14	0	No wind vane connected.	14/05/2013	02/07/2013
Penrhyn	0	Monitor failed on 09/11/13. No access to replace monitor due	0	Monitor failed on 09/11/13. No access to replace monitor due	12/04/2010	09/01/2013

Monitor	% PM_{10} data capture over entire monitoring period*	Reason for failure to capture PM_{10} data (if <90% data capture)	% Wind data capture over entire monitoring period	Reason for failure to capture wind data (if <90% data capture)	Date of last calibration	Start date of operation
		to road construction.		to road construction.		
Average	85.7%					

* Data downloaded from the monitor when possible, however, PI system data used when access to the monitor is not possible or if the monitor is removed for servicing without a download completed beforehand.

** Several attempts have been made to connect the wind speed on the Centre and Harbour monitors. New wind vanes will be installed during Q3 2014.

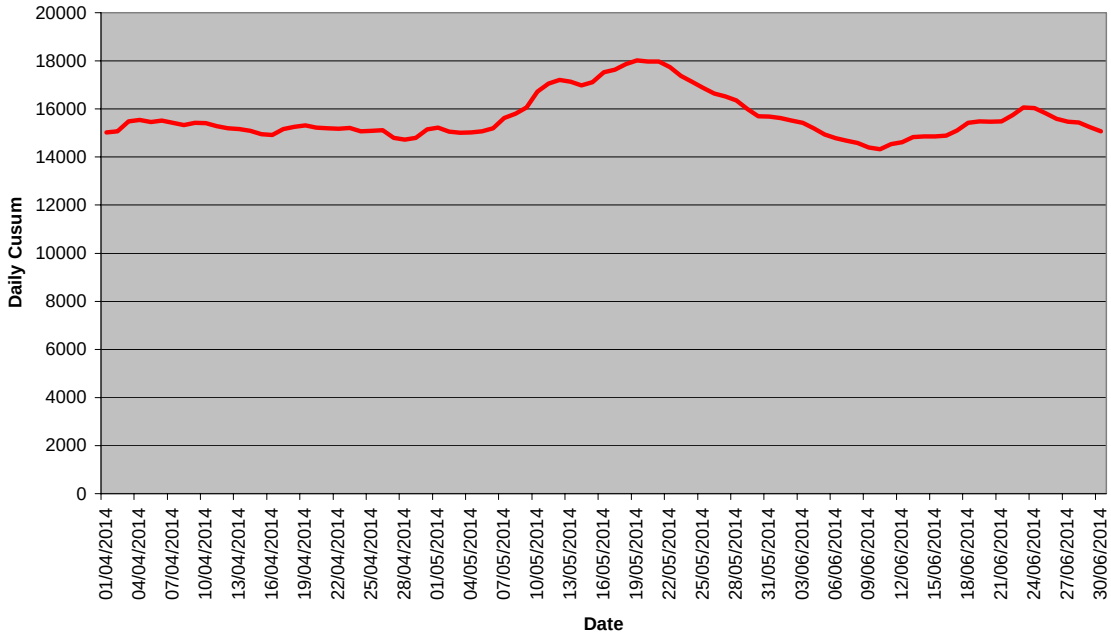
An average data capture of around 86% has been achieved by the TOPAS monitors during Quarter 2 2014. The TOPAS monitor data capture is higher than that achieved during Quarter 1 2014 (69%). One of the reasons for the higher data capture is the removal of the co-located TOPAS monitor (located at the NPTCBC-operated AURN monitor site) from Table B. A review of the monitor network carried out in March 2014 (see Figure 3, Appendix A) concluded that this monitor should be removed from the network.

The review of the monitor network carried out in March 2014 also concluded that the TOPAS monitor replacing a failed TEOM unit at the Beach would be deployed at a new location on the unloader jetty rather than at the original Beach location. The new unloader jetty monitor will be deployed in Q3 2014.

3 Monitored Data Trends

Cusum plots are used to illustrate the trends in PM_{10} concentrations recorded at the Margam Firestation monitor (AURN) and site monitors over the course of the monitoring period. These trends are then analysed against changes that occurred at the Steelworks to determine if the changes impacted ambient PM_{10} concentrations. Monitored PM_{10} concentration data trends for the AURN monitor are presented as a daily cusum plot in Figure A.

Figure A – Daily cusum for the AURN monitor from 1st April to 30th June 2014

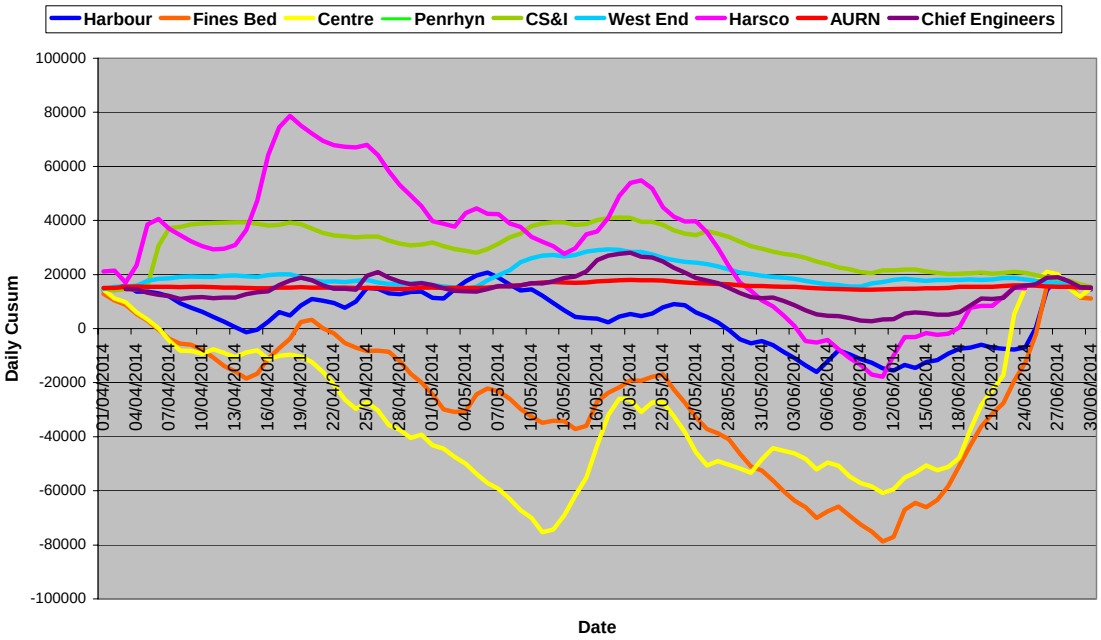


The daily cusum plot for the AURN (Figure A) has been included because comparisons can be made with some of the Steelworks' monitor plots (Figure B) over the monitoring period. However, some of the Steelworks' monitor plots are different the AURN plot. This indicates that these Steelworks' monitors are being impacted by different sources to the AURN monitor, which are possibly in the vicinity of the monitors.

The AURN cusum plot is fairly constant between 1st April and 5th May. The plot then increases relatively steeply until 12th May, which coincides with the two near miss days recorded at the AURN on 9th and 10th May. There is then a slight decrease in the cusum plot until 15th May followed by another increase until 20th May. The plot then decreases steeply until 10th June followed by a gradual increase until 24th June prior to a final decrease until the end of the quarter.

Monitored PM_{10} concentration data trends for the Harsco, Centre, CS&I, Fines Bed, Chief Engineers, West End and Harbour monitors are presented as daily cusum plots in Figure B.

Figure B – Daily cusums for the Harsco, Centre, CS&I, Fines Bed, Chief Engineers, West End and Harbour TOPAS monitors from 1st April to 30th June 2014



After a small decrease between 2nd and 3rd April, the trend for the Harsco monitor increases steeply until 6th April. This is followed by a gradual decrease in the trend until 12th April, again followed by a steep increase until 18th April. The cusum plot then generally decreases until 13th May except for two small peaks on 25th April and 5th May. The general decrease does not coincide with the two near miss days recorded at the AURN monitor on 9th May and 10th May. The plot once again steeply increases until 20th May, followed by a steep decrease until 11th June. This is prior to a gradual increase in the trend until the monitor was removed for calibration on 25th June. No breach or near miss days were recorded during the increases observed in the cusum trend between 3rd and 6th April, 13th and 18th April, 13th and 20th May or 11th and 25th June.

The Harsco monitor is located in fairly close proximity to the Blast Furnaces, Ironmaking Raw Materials Handling (RMH) area, Sinter Plant and the Burdening Stockyards. With regard to the increase in the cusum plot between 3rd and 6th April, Environment Incident Forms (EIFs) were issued for emissions from the casthouse roof on Blast Furnace No.4 (BF4) on the 5th April. With regard to the period between 13th and 18th April, further EIFs were issued for casthouse fume from BF4 & BF5. In addition, an EIF was issued in relation to ferrous stockhouse emissions and EIFs were issued for dust emissions from the GCI Plant. In relation to the burdening area during this period, an EIF was issued for stockyard dust lift-off and for dust lift-off from sinter reclaiming activities.

With regard to the period 13th to 20th May, several EIFs were issued in relation to casthouse emissions, dust emissions from the GCI plant, bleeder valve releases, and also BF5 Ferrous Stockhouse emissions. In relation to the Burdening area during the period 13th to 20th May, an EIF was issued in relation to a fugitive emission from the mixed carbon-ravelling screen and a notification was sent regarding the Sinter Plant dedust fan not being operational as a result of a failure of the 1074 chain conveyor. With regard to the period from 11th to 25th June, several EIFs were issued for casthouse fume from BF4 and BF5. In addition, there were two bleeder valve releases on BF4, one on 12th June and another on 21st June. EIFs were also issued for dust emissions from the

GCI Plant and another was issued for ferrous stockhouse emissions. A further EIF was issued for a small amount of black smoke visible from BF5 stove stack.

Although no near miss or breach days were recorded at the AURN during these periods, the incidents listed above may help to explain the small general increases seen in the AURN cusum plot for the periods between 6th and 20th May and between 10th and 24th June. In all cases, immediate actions were taken to mitigate emissions and there is a work stream in place to address the casthouse fume emissions.

The Centre monitor cusum trend decreases steeply until 8th April and is followed by a series of shallow peaks and troughs until 19th April. The trend then decreases steeply once again until 11th May, which does not coincide with the two near miss days recorded at the AURN monitor on 9th and 10th April. The plot then increases sharply until 19th May followed by a small decrease and then a small increase until 22nd May. The plot decreases steeply until 26th May prior to a series of small peaks and troughs, which are followed by a steep increase in the trend between 17th June and 27th June. The trend decreases slightly for the final time until 29th June and then increases until the end of the quarter.

Despite the Harsco monitor and the Centre monitor being located in reasonably close proximity to each other, the cusum trends do not at first appear to be very similar. However, similarities can be seen in that both monitor cusum trends show steep increases in May and June. Therefore, it is likely that the incidents potentially affecting the Harsco monitor may have also corresponded with increases in the cusum trend for the Centre monitor.

The CS&I monitor is located in reasonably close proximity to both the Harsco and Centre monitors. The CS&I cusum trend is very stable until 5th April but then increases very steeply until 7th April. The trend is fairly stable again until 19th April but is followed by a gradual decrease until 5th May. The trend generally and gradually increases again until 18th May, which coincides with the two near miss days recorded at the AURN on 9th and 10th May. This increase is followed by a steeper general decrease until 10th June and a more gradual decrease until the end of the quarter.

As the CS&I monitor cusum trend shows increases at similar times as those for the Harsco and Centre monitors, it is likely that the incidents potentially affecting these monitors also affected the CS&I monitor at times when increases were not seen in the AURN cusum plot. However, the CS&I monitor cusum trend started to increase on May 5th, which was just prior to the increases in the Harsco (May 13th) and Centre (May 11th) monitor trends. During the period from 5th to 13th May, several EIFs were issued for incidents that likely impacted on the monitor causing the increases seen on the cusum trend including; BF4 casthouse emissions, ferrous stockhouse emissions and dust emissions from the GCI plant. It may be possible that the incidents during this period impacted on the AURN monitor during the near miss days that occurred on 9th and 10th May. In all cases, immediate actions were taken to mitigate emissions.

The trend for the West End monitor is relatively stable until 5th May and is followed by a gradual increase until 17th May. This increase coincides with the two near miss days recorded at the AURN monitor on 9th and 10th May. This is followed by a general, very gradual decrease until the end of the quarter with a very slight increase in the trend between 10th and 13th June. The West End monitor is located in close proximity to the CS&I monitor, and the trend for both of these monitors began to increase on 5th May. Therefore, it is likely that the sources affecting the CS&I monitor at this time, were also affecting the West End monitor. The West End monitor also follows a very similar trend

to the AURN monitor, this is likely due to the fact that these two monitors are located in close proximity to each other and were likely impacted by the same sources.

The cusum trend for the Fines Bed monitor decreases until 14th April and is followed by an increase until 20th April. Then trend then generally decreases until 3rd May, prior to a small increase until 6th May and another general decrease until 14th May. The trend increases again, but at a more gradual rate, until 22nd May and is followed by a steep decrease until 5th June. There are a series of small peaks and troughs until 15th June, followed by a very steep increase in the trend until 27th June. The trend then decreases gradually until the end of the quarter.

The cusum trend for the Fines Bed monitor is very similar to that of the Harsco monitor. As the two monitors are located in reasonably close proximity to each other, it is likely that the sources affecting the Harsco monitor were also affecting the Fines Bed monitor.

The Chief Engineers monitor cusum trend is fairly stable compared to the trends for some of the other monitors. The trend is reasonably constant until 16th April and is followed by a series of small peaks and troughs until 3rd May. The trend then increases gradually until 16th May, which coincides with the two near miss days recorded at the AURN on 9th and 10th May. The cusum trend levels out until 21st May and then decreases at a steeper rate until 10th June. The trend gradually increases until 27th June and then decreases until the end of the quarter. The Chief Engineers monitor cusum trend is very similar to the AURN trend with both trends showing increases during similar periods in May and June. The AURN monitor trend also shows very slight increases with correspond to the peaks seen in the Chief Engineers monitor trend between 16th April and 3rd May. Therefore, it is possible that the sources affecting the Chief Engineers monitor during Q2 were also affecting the AURN monitor.

The Chief Engineers monitor is located in close proximity to the Steel & Slab area of the site. EIFs were issued from the Steel & Slab area on 9th and 10th May for incidents that might have affected the AURN monitor on these near miss days. Several EIFs were issued for dust from the BOS Plant entering the casters and an EIF was issued regarding the tripping of sec vent fans. Fans 5 and 6 were restarted and shortly after fan 4 restarted. Blowing commenced following the restart of the fans. Further, on 10th May, an EIF was issued for a slop from Converter 1 as a result of high silicon levels in the hot metal. All vent fans were operational at the time. The Chief Engineers monitor is also located in close proximity to the plating pits. However, no EIFs were issued for emissions from plating on either 9th or 10th May.

The cusum trend for the Harbour monitor decreases from the start of the quarter until 14th April and is followed by a generally increasing trend until 6th May. The cusum trend then decreases until 9th May, levels out until 10th May and then continues to decrease until 17th May. The interruption in the decreasing trend between 9th and 10th May coincides with the two near miss days recorded at the AURN monitor. The trend steadily increases until 23rd May and is followed by a steep decrease until 5th June and a series of small peaks and troughs until 24th June. The trend then increases very steeply until 27th June and then decreases until the end of the quarter.

The Harbour monitor is located in close proximity to the Burdening stockyards and the Jetty. No breach or near miss days were recorded at the AURN monitor during the periods; 14th April to 6th May, 17th to 23rd May or 5th to 27th June, when general increases can be seen in the cusum trend for the Harbour monitor. During the period 14th April to 6th May, an EIF was issued for a visible plume whilst discharging cargo and water dust suppression was activated to reduce emissions. A further EIF was issued after a hole

was found in the Number 3 unloader hopper. Operational modifications were made to reduce the amount of dust lift-off from the hopper. Finally, two EIFs were issued for dust lift-off from roads and in order to reduce emissions, a bowser was deployed to wet the area. No EIFs were issued in the periods 17th to 23rd May or 5th to 27th June, which could explain the increases in the cusum trend.

There were no significant changes to processes within close proximity to the on-site monitors that can explain the increases in trends during the quarter.

4 Monitored Data Rose Diagrams

Rose diagrams for data from all of the Tata owned monitors (and one monitor owned by Harsco) are presented as Figures 4 and 5 in Appendix A. The rose diagrams illustrate the predominant wind directions that impact each monitor with PM_{10}. If wind data is not available from a monitor (see Table B), then data has been substituted from the Margam AURN monitor wind vane. Also, wind data from the AURN monitor was used for the West End monitor because the data was inconsistent with wind vanes on other monitors. Maintenance was carried out on the West End wind vane during Q2 but the issue could not be resolved. Therefore, the wind vane will be replaced during Q3 2014. Potential sources of PM_{10} that may impact the site monitors are discussed below. The potential sources discussed are not necessarily the same as those that impact the monitors located in the town.

Table E - Summary of potential sources impacting the TOPAS monitors between 1st April and 30th June 2014

Monitor	Predominant Wind directions impacting the monitor	Potential sources in close proximity to the monitor	Potential sources further away from the monitor
CS&I Admin	SE to S (150° to 180°)	Blast Furnaces, Lafarge Tarmac Slag Pools and Slag Granulation Plant.	Steel & Slab (S&S), Harsco Briquetting and Metal Recovery (MR) Plants, Slab Yards, Coke Ovens and other off-site sources.
Centre	NNW to NE (350° to 60°) and WSW to NW (260° to 320°)	Granulated Coal Injection Plant (GCI), Raw Materials Handling (RMH), Blast Furnaces, Lafarge Tarmac's Slag Pools and the Sinter Plant.	Powers Plant, Primary Stockyards, Fines Bed, Reverts Stockyard, Harbour, other offsite sources and the coast.
Fines Bed	NNE to E (10° to 90°), SE (120° and 150°), SSE to S (170° to 180°) SW (220°) and WSW to NNW (260° to 350°)	Fines Bed, Reverts Stockyard, Primary Stockyard, Hanson's Slag Plant and the Sinter Plant.	Lafarge Tarmac's Slag Granulation Plant and Slag Handling Plant, Power Plant, RMH, GCI, Blast Furnaces, Harbour, Harsco's MR Plant, Rolling Mills, Slab Yards, Coke Ovens, Docks, the coast and other off-site sources.
Harbour	N to NE (0° to 60°)	Reverts Stockyard, Fines Bed and the Primary Stockyard.	Hanson's Slag Plant, Docks and other off-site sources.
West End	SE (130°), SSE to S (150° to 180°), SW to WNW (210° to 290°) and NNW (330°)	Power Plant, Lafarge Tarmac Slag Pools and Slag Granulation Plant, Blast Furnaces, RMH, GCI and the Sinter Plant.	Harsco's Briquetting and MR Plants, the Rolling Mills, S&S, Slab Yards, Coke Ovens, Lafarge Tarmac's Slag Handling Plant, Primary Stockyards, Fines Bed, Reverts Stockyard, Harbour, Docks, the Coast, Margam, Taibach and Aberavon residential areas and other off-site sources.
Harsco	NNE (20°) and S (180°)	Sinter Plant and the Docks.	Lafarge Tarmac's Slag

			Handling Plant, Harsco's Metal Recovery (MR) Plant, other off-site sources and the coast.
Chief Engineers	NE (70°), SE to SW (140° to 240°), WNW (290°) and NNW to N (330° to 0°)	Lafarge Tarmac's Slag Pools and Slag Granulation Plant, Blast Furnaces, RMH, GCI, Sinter Plant, S&S, Harsco's MR and Briquetting Plants.	Power Plant, Coke Ovens, Rolling Mills, Slab Yards Primary Stockyards, Reverts Stockyard, Fines Bed, other off-site sources and the coast.

In summary, the site monitors were impacted by PM_{10} from a wide range of wind directions and therefore were not predominantly impacted by any one potential source. Tata will use the above information presented above to further the understanding of potential sources that may have an impact on off-site receptors and to develop a targeted improvement programme.

5 Conclusions

- During Q2 2014 there were no breach days recorded at the AURN monitor. However, two near miss days were recorded on 9th May and 10th May. Near miss days occur when the daily average PM_{10} concentration is between 45 and 50 µg/m^3.

- The TOPAS monitors achieved an average data capture of 86% during Q2 2014. The data capture for the TOPAS monitors was higher than that achieved during Q1 2014 (69%).

- The daily cusum plot for the AURN (Figure A) has been included because comparisons can be made with some of the Steelworks' monitor plots over the monitoring period.

- The Harsco and Centre monitor cusum trends are very different to the AURN trend. This indicates that these monitors are being impacted by different sources to the AURN monitor, which are possibly in the vicinity of the monitors.

- Around forty EIFs were issued from the Ironmaking and Burdening area that could possibly explain some of the increases in the Harsco and Centre monitor trends that did not mirror the AURN during Q2.

- Site monitors were impacted by PM_{10} from a wide range of wind directions and therefore were not predominantly impacted by any one potential source.

Appendix A

Figure 1 Locations of Tata Steel Monitors* Operating during Quarter 2 2014
*with the exception monitor no.7 which is owned by Harsco

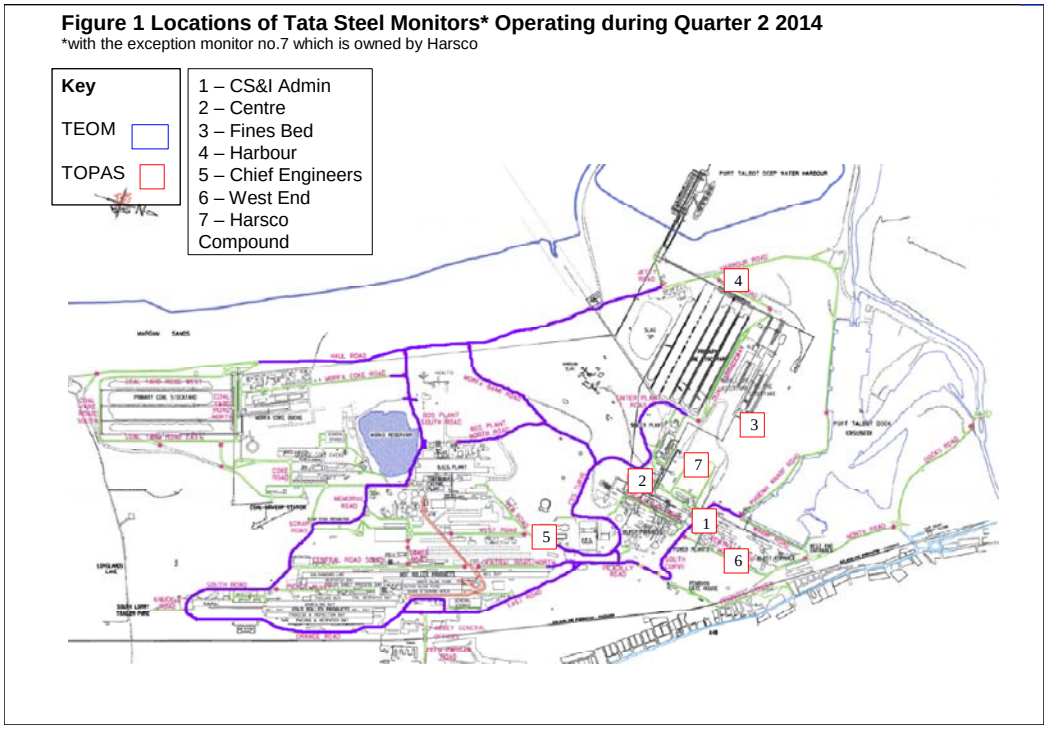


Figure 2 Future On Site Monitoring Network (Tata Steel Monitors*) as Planned in January 2013
*with the exception monitor no.10 which is owned by Harsco

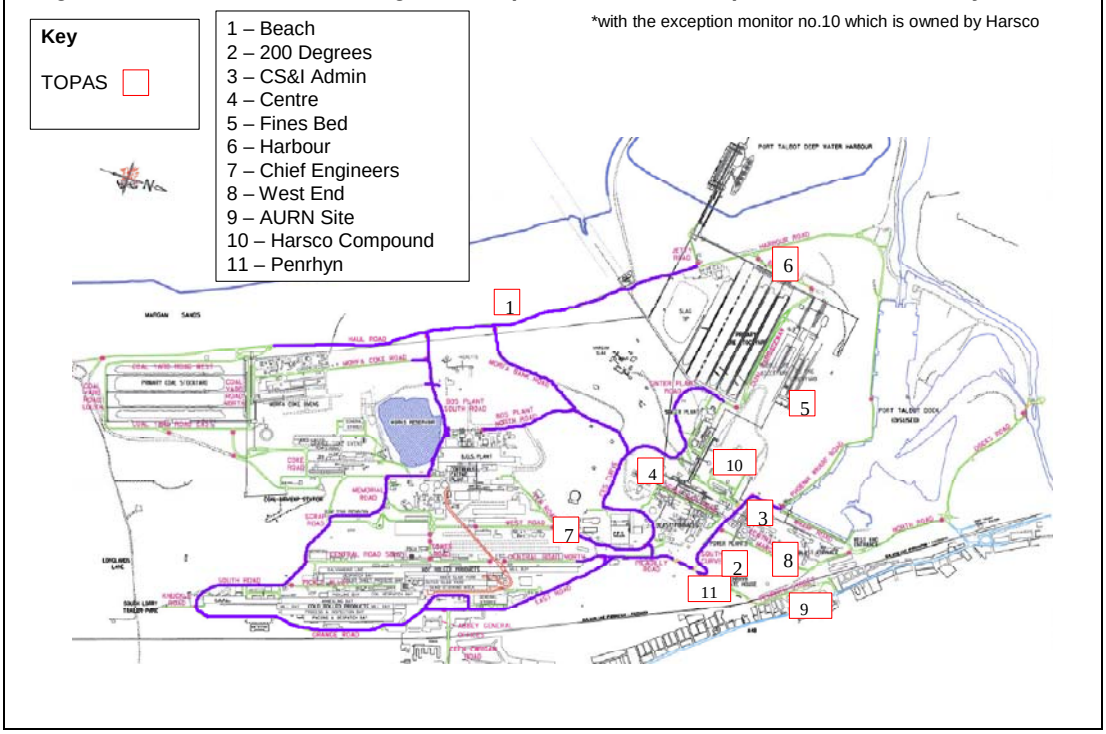


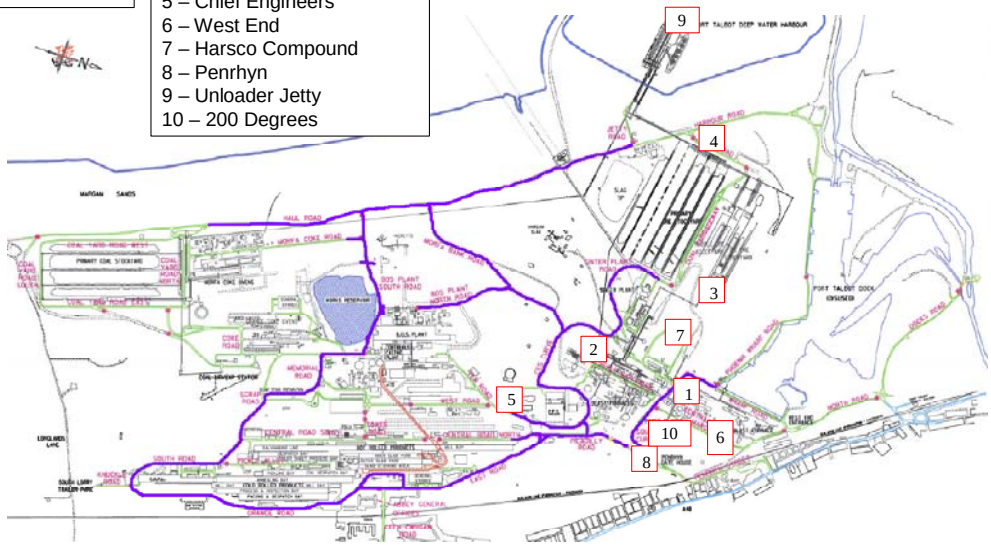
Figure 3 Future On Site Monitoring Network (Tata Steel Monitors*) as Planned in March 2014

*with the exception monitor no.7 which is owned by Harsco

Key

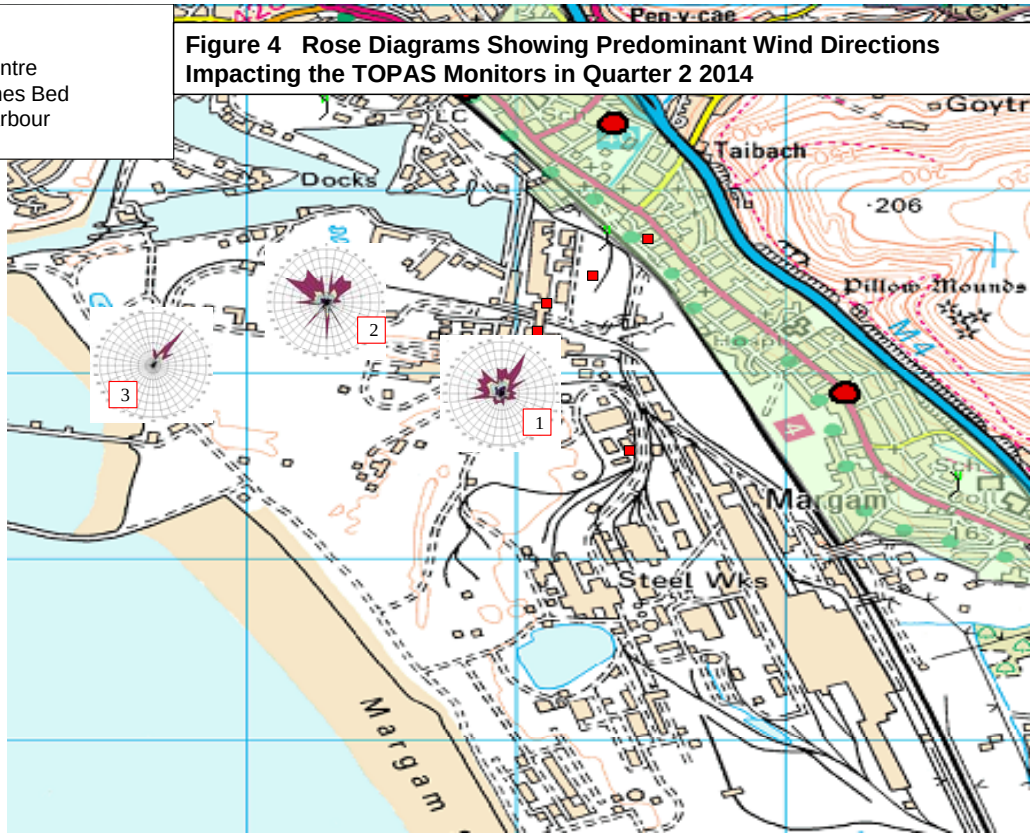
TOPAS

1 – CS&I Admin
2 – Centre
3 – Fines Bed
4 – Harbour
5 – Chief Engineers
6 – West End
7 – Harsco Compound
8 – Penrhyn
9 – Unloader Jetty
10 – 200 Degrees



Key
1 – Centre
2 – Fines Bed
3 – Harbour

Figure 4 Rose Diagrams Showing Predominant Wind Directions Impacting the TOPAS Monitors in Quarter 2 2014



Key
4 – CS&I Admin
5 – Chief Engineers
6 – West End
7 – Harsco Compound

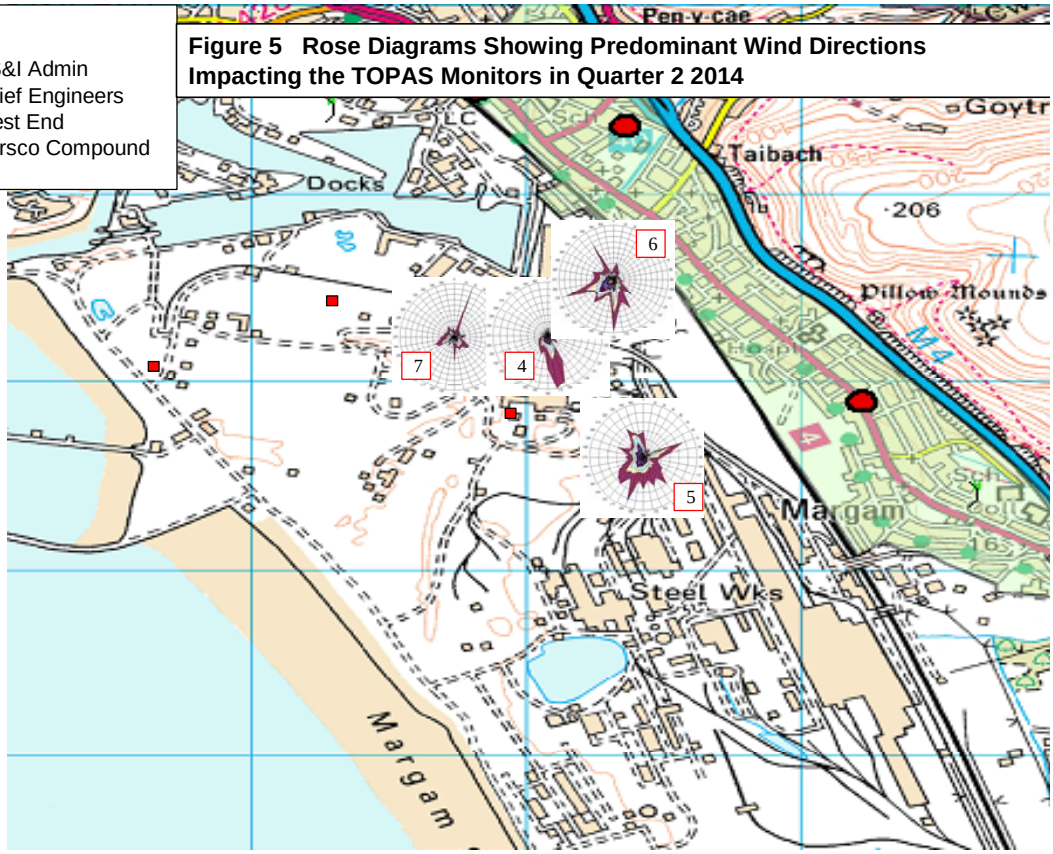


Figure 5 Rose Diagrams Showing Predominant Wind Directions Impacting the TOPAS Monitors in Quarter 2 2014