

Tata Steel Strip Products UK Port Talbot Steelworks

Quarterly On-site Ambient PM₁₀ Monitoring Report for Quarter 4 2014

			Signed	Dated
Written	Georgina Brooks	Environmental Engineer		27/01/15
Checked	Fiona Abbott	Lead Environmental Engineer		27/01/15
Approved	Richard Leonard	Environment Manager		28/01/15

Initial Circulation

General Circulation

TSSP UK

Glenn Perry

Richard Leonard

Fiona Abbott

Claire Grainger

Georgina Brooks

Natural Resources Wales

Mark Broom

Doug Cowie

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1 Introduction

This report is written to meet commitments made in the response from Tata Steel Strip Products UK (TSSP UK) 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 October to 31st December 2014 (Q4) 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 three breaches of the daily mean PM₁₀ air quality objective in Port Talbot. In addition, one near miss day was recorded on 2nd November (49.7 µg/m³). Near miss days occur when the daily average PM₁₀ concentration is between 45 and 50 µg/m³. A summary of the breach days recorded at the Margam Fire Station monitor (AURN) during Q4 2014 is shown in Table A. This information will be considered when undertaking the analysis outlined above.

Table A – Summary of breach days from 1st October to 31st December 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	19/10/2014	58.4	4.5	24.3	53.9	29.6	16	Yes
2	26/10/2014	69.8	0	24.3	69.8	45.5	14	Yes
3	01/11/2014	61.0	1.3	24.3	59.7	35.4	25.3	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 shows the latest revision of the monitor network as reviewed in March 2014.

Table B shows the monitors deployed during Quarter 4 2014, their data capture and the reasoning for any failure to capture data.

Table B – Summary of TOPAS monitors deployed between 1st October and 31st December (Q4) 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 24/10/14	99.5	PI data used from 24/10/14	10/11/2014	15/12/2014
Centre	88.1	Monitor failed from 28/10/14 to 07/11/14	88.1 (wind direction only)	Monitor failed from 28/10/14 to 07/11/14. Zero data capture for wind speed due to connection issues**	15/08/2014	05/09/2014
Fines Bed	100.0	PI data used from 03/12/14 as the monitor could not be accessed	100.0	PI data used from 03/12/14 as the monitor could not be accessed	25/07/2013	07/11/2013
Harbour	98.8	N/A	98.8 (wind direction only)	Zero data capture for wind speed due to connection issues **	10/12/2013	31/03/2014
Chief Engineers	93.8	PI data used from 01/10/14 - 05/10/14	93.8	PI data used from 01/10/14 - 05/10/14	11/07/2014	21/07/2014
West End	19.2	Delays with installing replacement monitor after 18/10/14 due to PI network	19.2	Delays with installing replacement monitor after 18/10/14 due to PI network	21/10/2013	05/06/2013

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
		failure and access issues		failure and access issues		
Harsco	98.8	N/A	0	No wind vane connected	Calibration record owned by Harsco	16/09/2014
Penrhyn	99.5	N/A	99.5	N/A	10/03/2014	12/09/2014
Harbour Jetty	85.4	Monitor not operating from 18/10/14 to 24/10/14 due to power outage	85.4	Monitor not operating from 18/10/14 to 24/10/14 due to power outage	08/11/2013	18/07/2014
Average	87%					

* 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. A new monitor was installed at the Centre location during Q3, however the problem was not rectified. Therefore, new wind vanes will be installed during Q1 2015.

An average data capture of 87% has been achieved by the TOPAS monitors during Quarter 4 2014. The TOPAS monitor data capture is higher than that achieved during Quarter 3 2014 (76%). The West End monitor recorded the lowest amount of data during the quarter. There was a PI network failure on routine replacement of this monitor and access to the monitor was limited because the site has been taken over by contractors carrying out ground work for the new Power Plant project.

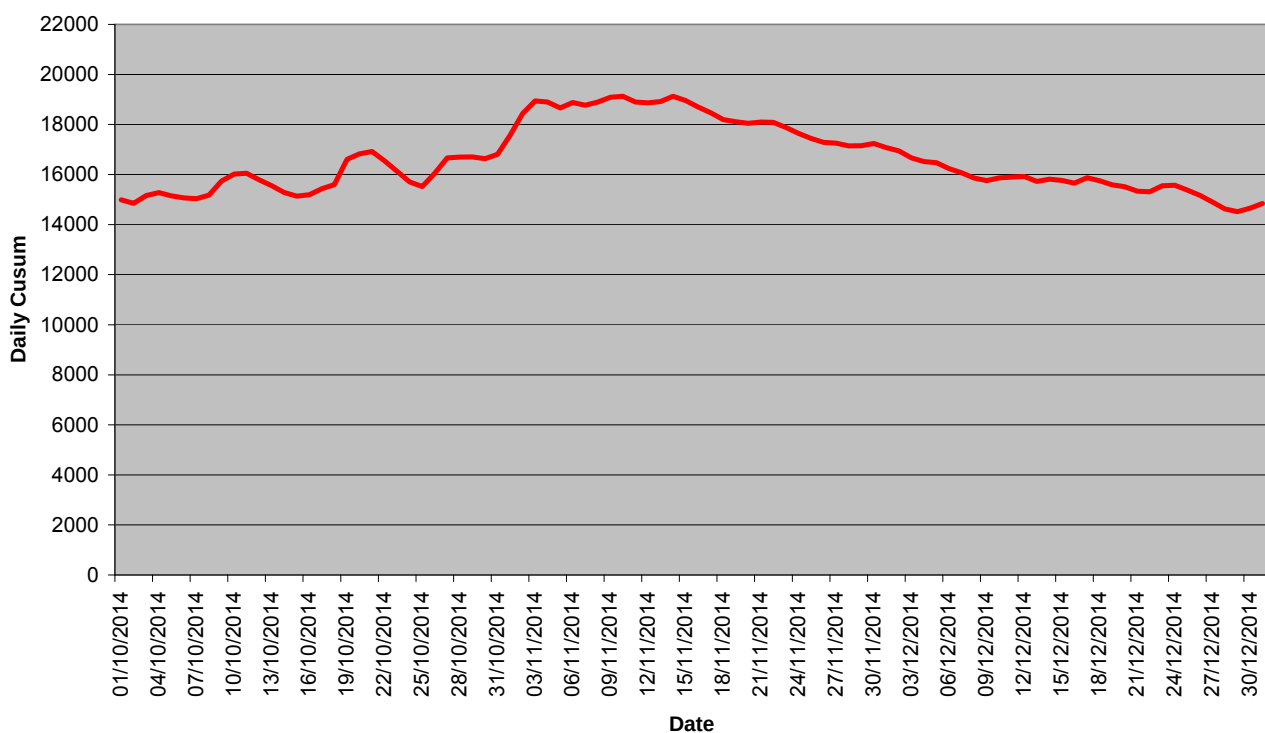
There is an ongoing issue with turnaround time of monitors that are sent away for service and calibration with Turnkey Instruments Ltd. This issue has delayed the replacement of Tata Steel-owned monitors due for calibration during Q4. A new contract is being developed and is expected to become valid in Q1 2015, which is expected to improve turnaround times of the Tata Steel-owned monitors.

The 200 degrees monitor location has been removed from the March 2014 monitoring network plan due to the construction of a new power plant. Therefore, the on-site monitoring network is now complete and any future plans will be issued via the quarterly on-site monitoring reports.

3 Monitored Data Trends

Cusum plots are used to illustrate the trends in PM₁₀ 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 PM₁₀ concentrations. Monitored PM₁₀ 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 October to 31st December 2014



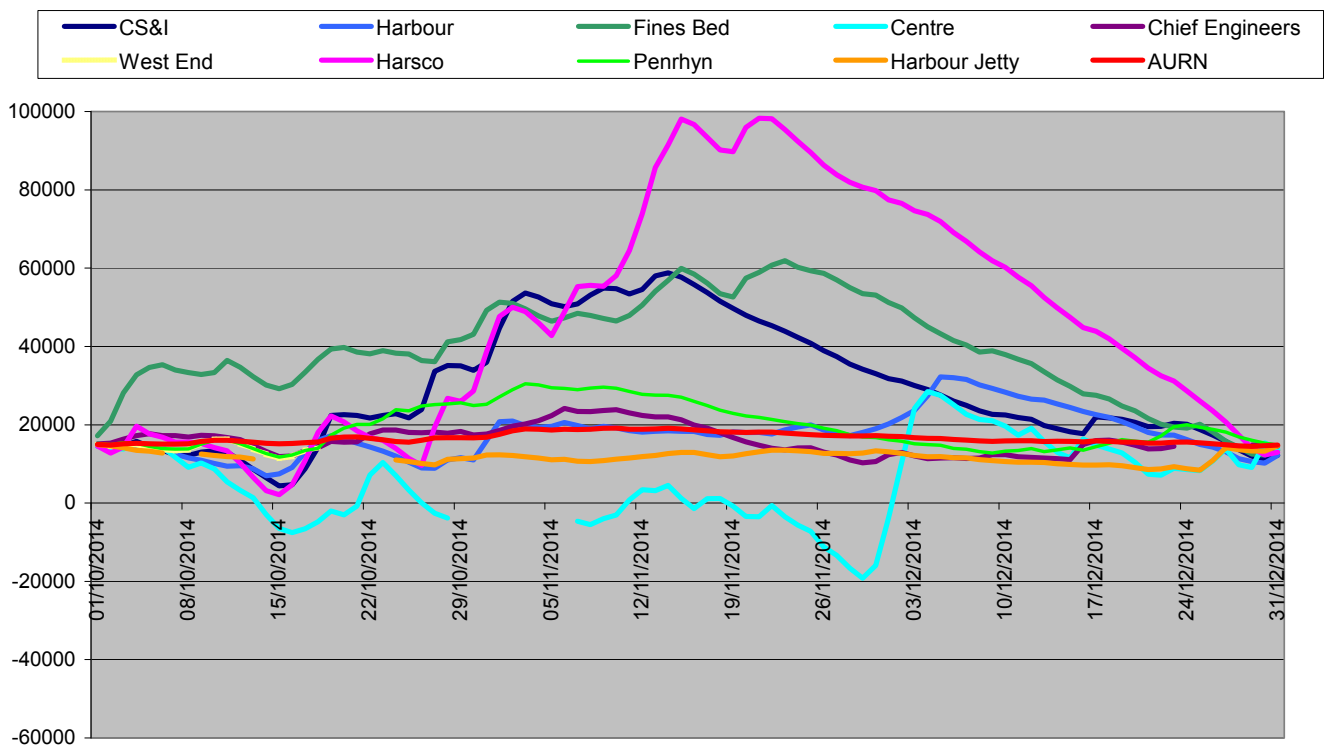
The daily cusum plot for the AURN (Figure A) has been included because comparisons can be made with some of the Steelworks' monitor plots (Figure B) over the monitoring period. However, some of the Steelworks' monitor plots are different to the AURN plot. This indicates that these Steelworks' monitors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

There are a number of peaks and troughs in the AURN cusum plot between 1st and 25th October. The breach day that occurred on 19th October coincides with an increase in the trend during this period. The trend increases between 25th and 27th October, which also coincides with the breach day that was recorded at the AURN on 26th October. The trend stabilises between 28th and 31st October prior to a steeper increase until 3rd November. Once again, this coincides with the breach day recorded on 1st November and the near miss breach day that occurred on 2nd November. The trend is relatively stable between 4th and 14th November and is followed by a general gradual decrease in the trend until the end of the quarter.

EIFs (Environmental Incident Forms) were issued on 2nd November for emissions from the BOS Plant entering the Casters. The times of some of these emissions correlate with elevated PM₁₀ concentrations at the AURN monitor (for the hours ending 17:00, 18:00 and 19:00). Therefore, these emissions cannot be discounted from contributing to the elevated PM₁₀ concentrations recorded at the AURN monitor on 2nd November.

Monitored PM₁₀ concentration data trends for the Centre, Harsco, CS&I, Penrhyn, West End, Chief Engineers, Fines Bed, Harbour and Harbour Jetty monitors are presented as daily cusum plots in Figure B.

Figure B – Daily cusums for the Centre, Harsco, CS&I, Penrhyn, West End, Chief Engineers, Fines Bed, Harbour and Harbour Jetty TOPAS monitors from 1st October to 31st December 2014



The cusum trend for the Centre monitor commences with a general decrease until 16th October and is followed by a general increase until 19th October, which coincides with the breach day that occurred on 19th October. This is prior to a decrease in the trend until 28th October, which does not coincide with the breach day recorded at the AURN on 26th October. The Centre monitor was not operating between the 28th October and 7th November, therefore it is not possible to determine whether the trend would correlate with the 1st November breach day or the near miss day (2nd November). The cusum trend increases between the 7th and 12th November, and then predominantly decreases before a final steep increase from the 29th November to 4th December. Similarities can be seen between the Centre monitor cusum trend and the AURN monitor cusum trend during October. However significant differences can be seen between the two trends in November and December with increases being seen on the Centre monitor cusum trend but not on the AURN trend. The Centre monitor is located in fairly close proximity to the Ironmaking (Blast Furnaces, Raw Materials Handling (RMH) and Granulated Coal

Injection (GCI) Plant) area of the site, the Sinter Plant and the Burdening stockyards. A high number of the EIFs issued by Ironmaking area during Q4 were for casthouse emissions from Blast Furnaces 4 and 5. An investigation was carried out into the relationship between the cusum trend for the Centre monitor and the number of EIFs issued per day. No relationship was found as a greater number of EIFs were issued on days when the cusum trend for the Centre monitor was decreasing compared to days when the trend was increasing. There were no changes to processes in close proximity to the Centre monitor during the quarter that could explain increases in the trend, which were not mirrored by the AURN trend in November and December.

The cusum trend for the Harsco monitor commences with a small a variation until the plot increases steeply until 19th October, which coincides with the breach day that occurred on 19th October. The trend then decreases until 26th October, which does not coincide with the breach day that was recorded at the AURN monitor on 26th October. This decrease is prior to a steep general increase until 2nd November, which coincides with the 1st November breach day and the near miss breach day (2nd November). The cusum trend generally increases steeply between the 5th and 15th November followed by one final small increase from the 19th to 21st November. The cusum trend then steadily decreases until the end of the quarter. Similarities can be seen on the Harsco and Centre monitor trends in October and December and as the monitors are located in close proximity to each other, it is likely that that the two monitors were impacted by similar sources during the Q4 monitoring period. As was also the case with the Centre monitor, no correlation could be found between EIFs for casthouse emissions and increases on the Harsco monitor cusum trend. The Harsco monitor is also located in very close proximity to the Sinter Plant. During a period in November, when increases can be seen in the Harsco trend but not the AURN trend, an EIF was issued by the Sinter Plant for elevated sinter temperatures. Immediate actions were taken, including checking that the foam dust suppression system was fully functional and diverting sinter away from the Blast Furnace stockhouses to the sinter stockpile.

The CS&I monitor cusum trend initially decreases between 1st and 15th October, which is followed by a series of peaks and troughs on a generally increasing trend until 14th November. This is prior to a reasonably steep decrease until 16th December, an increase until 17th December and a final decrease until the end of the quarter. The three breach days and the near miss day coincide with increases on the cusum trend. The trend for the CS&I monitor is very similar to that of the AURN monitor; therefore, it is possible that the two monitors were impacted by similar sources. The CS&I monitor trend is also fairly similar to that of the Harsco monitor throughout October and during the first week of November. The CS&I monitor is located in close proximity to the Ironmaking area of the site. However, once again, a higher number of EIFs for casthouse emissions were issued on days when the cusum trend for the CS&I monitor was decreasing compared to days when the trend was increasing. The CS&I monitor is also located in close proximity to the Power Plant, however, there were no significant changes to processes within close proximity to the CS&I monitor that could explain the variation in the trend during the quarter.

The cusum trend for the Penrhyn monitor is relatively stable between 1st and 15th October, which is followed by a gradual increase until 4th November. This coincides with the three breach days and one near miss day. The trend then decreases very gradually until 9th December, prior to a slight increase until 24th December. The trend then decreases once again until the end of the quarter. The Penrhyn monitor follows a similar trend to AURN monitor cusum trend; however increases are seen on the Penrhyn trend, which are not mirrored by the AURN trend in December. There were no changes to site processes during that time, however, preliminary excavation work on the Andrew Scott

Ltd. site was taking place in the area during the quarter, which may possibly have impacted upon the Penrhyn monitor but not the AURN monitor.

The West End monitor cusum trend follows an almost identical plot to the Penrhyn cusum trend, until the West End monitor stopped operating on 18th October. As these monitors are located in very close proximity to each other, it is likely that the sources affecting the Penrhyn monitor at this time, were also affecting the West End monitor.

The cusum trend for the Chief Engineers monitor is stable between 1st and 15th October, followed by an increase until 23rd October, which coincides with the breach day that occurred on 19th October. The trend is stable between 23rd and 30th October and, therefore, did not increase to coincide with the breach day recorded on 26th October. The trend increases again until 6th November, inline with the breach day and near miss breach day on 1st and 2nd November respectively, prior to a gradual decrease until 29th November. The trend increases slightly until 2nd December and levels out until 15th December. The trend increases for the final time until 18th December and is stable until the 24th December when the monitor ceased operation. The Chief Engineers monitor trend is similar to the trend for the AURN monitor, showing increases and decreases at similar times throughout the quarter. Therefore, it is possible that the two monitors were impacted by similar sources during the quarter. The Chief Engineers monitor is located in close proximity to the Steel & Slab area of the site and also Harsco's MR Plant. However, there were no significant changes to processes or unusual operations taking place within close proximity to the Chief Engineers monitor that could explain the increases or decreases in the trend during the quarter.

The cusum trend for the Fines Bed monitor increases between 1st and 6th October, followed by a predominantly increasing series of peaks and troughs until 23rd November. This is prior to a steady decrease until the end of the quarter. The breach days that occurred on 19th October and 1st November and the near miss breach day coincides with increases in the trend, whereas the breach day that occurred on 26th October coincides with a decrease in the trend. The Fines Bed monitor follows a similar trend to the AURN monitor cusum trend for Q4. The Fines Bed monitor is located in close proximity to the burdening stockyards and the Sinter Plant. However, there were no significant changes to the processes within these areas of the site that could have possibly impacted upon the Fines Bed monitor when increases were seen on the Fines Bed monitor cusum trend in November but not in the AURN monitor trend.

The cusum trend for the Harbour monitor decreases steadily between 1st October and 14th October, followed by a steeper increase until 19th October – coinciding with the breach day that occurred on 19th October. This is prior to a decrease in the cusum trend until 26th October, which does not coincide with the 26th October breach day. This is followed by a slight increase until 28th October and the trend levelling out until 30th October. The trend once again increases until 2nd November, which coincides with the breach day that was recorded on 1st November and the near miss breach day on 2nd November. The trend levels out between 3rd November and 30th November, prior to a relatively steep increase until 5th December. The cusum trend then steadily decreases until the end of the quarter. The Harbour monitor is located in close proximity to the burdening stockyards and the harbour unloader jetty. The Harbour monitor cusum trend also follows a similar trend to the cusum for the AURN monitor. However, there were no significant changes to the processes within this area of the site that could explain the increases seen in the Harbour monitor cusum trend in early December, which are not mirrored by the AURN monitor cusum trend.

The Harbour Jetty monitor cusum trend is very stable throughout the quarter except for one increase between 25th and 27th December. The monitor was not operating during the breach day that occurred on 19th October and the trend was decreasing slightly during the breach day recorded on 26th October. However, a slight increase in the trend coincided with the breach day recorded on 1st November and a very slight decrease in the trend coincided with the near miss breach day on 2nd November. The increase seen in the trend between 25th and 27th December is not mirrored by the AURN monitor trend. There were no changes to processes within close proximity to the Harbour Jetty monitor that could explain this increase in the cusum trend.

4 Monitored Data Rose Diagrams

Rose diagrams for data from all of the Tata Steel-owned monitors (and one monitor owned by Harsco) are presented in Figures 3 and 4 in Appendix A. The rose diagrams illustrate the predominant wind directions that impact each monitor with PM₁₀. If wind data is not available from a monitor (see Table B), then data has been substituted from the Margam AURN monitor wind vane. Potential sources of PM₁₀ 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 October and 31st December 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 SSE (140° to 170°)	Blast Furnaces, Lafarge Tarmac Slag Pools and Slag Granulation Plant.	Harsco Briquetting Plant, Slab Yards, Rolling Mills, Darlow Lloyds HAA Slag Screening Site (HAA) and other off-site sources.
Centre	NNE (10°), NE to ENE (60° to 70°), SSE (160°) and NW (320°)	Granulated Coal Injection Plant (GCI), Raw Materials Handling (RMH), Blast Furnaces, Lafarge Tarmac's Slag Pools and the Sinter Plant.	Steel & Slab (S&S), the Docks, Harbour Way (PDR), M4 motorway and other off-site sources.
Fines Bed	NE (20° to 60°), SW (230°), W to NNW (270° to 350°)	Fines Bed, Reverts Stockyard, Primary Stockyard, Civil and Marine's Slag Plant and the Docks.	Harbour, Aberavon residential area, Harbour Way, M4 motorway, the coast and other off-site sources.
Harbour	N to NE (0° to 60°)	Reverts Stockyard, Fines Bed and the Primary Stockyard.	Civil and Marine's Slag Plant, Docks, Aberavon residential area and other off-site sources.
West End	S to WNW (180° to 300°)	Power Plant, Lafarge Tarmac Slag Pools and Slag Granulation Plant, Blast Furnaces, RMH and GCI.	The Docks, Civil and Marine's Slag Plant, Sinter Plant, Fines Bed, Reverts Stockyard, Primary Stockyard, Harbour, Lafarge Tarmac's Slag Handling Plant, Harsco's Metal Recovery (MR) and Briquetting Plants, S&S, Coke Ovens, the Coast and other off-site sources.
Harsco	NE (30°), E to SSE (90° to 170°) and SSW (200°)	RMH, GCI, Sinter Plant, Blast Furnaces, Lafarge Tarmac's Slag Pools, Slag Granulation and Slag Handling Plants.	Harsco's MR and Briquetting Plants, S&S, Slab Yards, Coke Ovens, HAA, Rolling Mills, Margam and Taibach residential areas, Harbour Way, M4 motorway, the coast and other off-site sources.

Chief Engineers	SSW (190° to 200°), SW (230°) and NNW (340° to 350°)	Lafarge Tarmac's Slag Pools and Slag Granulation Plant, Blast Furnaces, S&S, Harsco's MR and Briquetting Plants.	Power Plant, Coke Ovens, Harbour Way, M4 motorway, the coast and other off-site sources.
Penrhyn	NNE to ESE (10° to 210°), SW (210°), WSW to W (260° to 270°) and NNW (350°)	Margam and Taibach residential areas, Harbour Way, M4 motorway, Lafarge Tarmac's Slag Pools and Slag Granulation Plant, the Blast Furnaces, RMH and GCI.	Harsco's MR Plant, Sinter Plant, Primary Stockyards, Harbour, Harbour Way, M4 motorway, the coast and other off-site sources.
Harbour Jetty	WNW to NNW (280° to 340°)	Aberavon residential area and the coast.	N/A

In summary, the site monitors were impacted by PM₁₀ from a wide range of wind directions and therefore were not predominantly impacted by any one potential source. Tata will use the 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 Q4 2014 there were three breach days recorded at the AURN monitor. In addition, one near miss day was recorded. Near miss days occur when the daily average PM₁₀ concentration is between 45 and 50 µg/m³.
- The TOPAS monitors achieved an average data capture of 87% during Q4 2014. The data capture for the TOPAS monitors was higher than that achieved during Q3 2014 (76%).
- The daily cusum plot for the AURN (Figure A) has been included because comparisons can be made with all of the Steelworks' monitor plots over the monitoring period.
- There are similarities between all of the on-site monitors trends and the trend for the AURN monitor during Quarter 4, with most trends coinciding with the breach days occurring on 19th October, 1st November and the near miss breach day that occurred on 2nd November. However, only the trends for the CS&I and Penrhyn monitors increased to coincide with the breach day recorded on 26th October. The CS&I monitor and the Penrhyn monitors are located within close proximity to the AURN monitor.
- Site monitors were impacted by PM₁₀ 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 4 2014

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

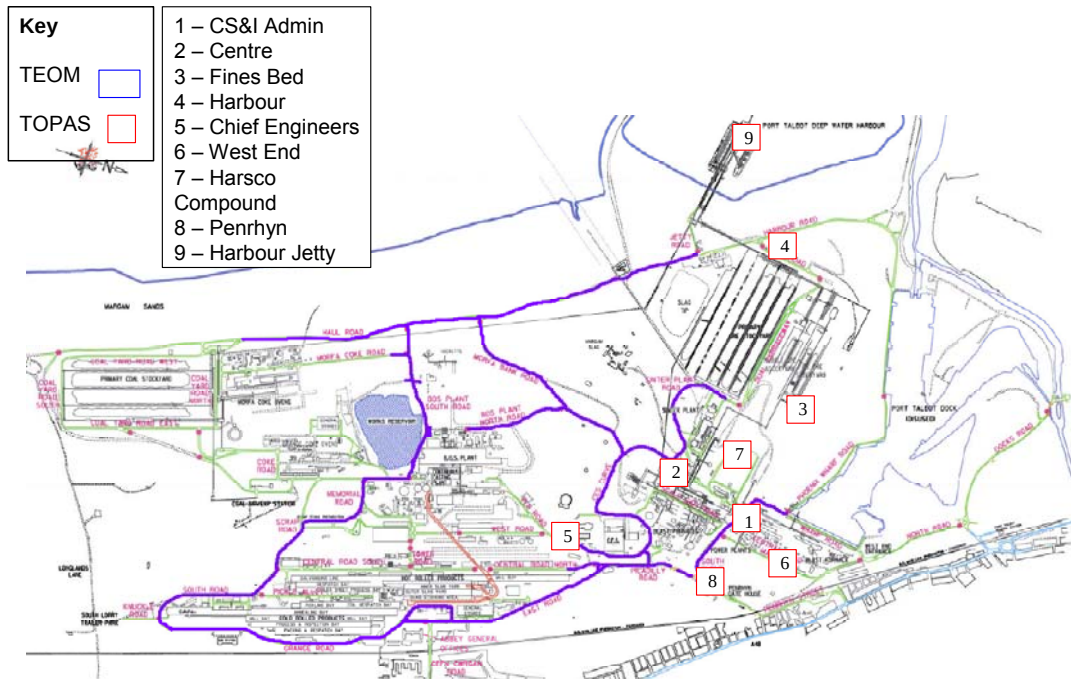


Figure 2 Future On Site Monitoring Network (Tata Steel Monitors*) as Planned in March 2014

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

