

Tata Steel Strip Products UK Port Talbot Steelworks

Quarterly On-site Ambient PM₁₀ Monitoring Report for Quarter 2 2015

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1 Introduction

These reports are written to assess and report the data produced quarterly from the on-site ambient air quality monitoring network. This report will cover the period 1st April to 30th June 2015 (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 nine breaches of the daily mean PM₁₀ air quality objective in Port Talbot. One of these breaches, however, was attributed to the influence of trans-boundary pollution (10th April). In addition, seven near miss days were recorded on 9th April, 12th April, 21st April, 25th April, 12th May, 28th May and 2nd June. Near miss days occur when the daily average PM₁₀ concentration is between 45 and 50µg/m³. A summary of the breach days recorded at the Margam Fire Station monitor (AURN) during Q2 2015 is shown in Table A. This information will be considered when undertaking the analysis outlined above.

Table A – Summary of breach days from 1st April to 30th June 2015

Count	Breach 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	06/04/2015	51.5	0	24.3	51.5	27.2	60	Yes
2	10/04/2015	52.8	31.6	24.3	21.2	0	62	Yes
3	24/04/2015	59.8	5.0	24.3	54.8	30.5	30	Yes
4	03/05/2015	98.5	0	24.3	98.5	74.2	15	Yes
5	05/05/2015	87.3	0.3	24.3	87.0	62.7	18	Yes
6	06/05/2015	93.3	0	24.3	93.3	69	14	Yes
7	11/05/2015	73.2	4.1	24.3	69.1	44.8	20	Yes
8	01/06/2015	61.6	0	24.3	61.6	37.3	23	Yes
9	06/06/2015	53.3	0.5	24.3	52.8	28.5	11	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

The current locations of the monitors are illustrated in Figure 1 in Appendix A. Figure 2 in Appendix A shows the latest revision of the planned monitor network as reviewed in March 2014.

Table B shows the monitors deployed during Quarter 2 2015, 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) 2015

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	99.9	PI data used 22/05/15 onwards	99.9	PI data used 22/05/15 onwards	10/11/2014	15/12/2014
Centre	99.9	N/A	9.4% (Wind direction only)	Zero data capture for wind speed due to connection issues** No wind direction data available after 09/04/15	15/08/2014	05/09/2014
Fines Bed	99.3	N/A	99.3	N/A	10/11/2014	02/02/2015
Chief Engineers	98.9	N/A	98.9	N/A	11/07/2014	21/07/2014
West End	0	Monitor failed – see comments below	0	Monitor failed – see comments below	04/10/2014	22/10/2014
Harsco	98.9	N/A	0	No wind vane connected	Calibration record owned by Harsco	16/09/2014
Penrhyn	58.0	Monitor deployed on 07/05/15	58.0	Monitor deployed on 07/05/15	04/05/2015	07/05/2015
Harbour	21.3	Monitor deployed on 11/06/15	21.3	Monitor deployed on 11/06/15	11/06/15	26/05/16
Average	73%					

* 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 monitor. A new wind vane was installed on 9th April 2015, however there are still connection issues. If these issues cannot be rectified in Q3, alternative wind vane options will be sought.

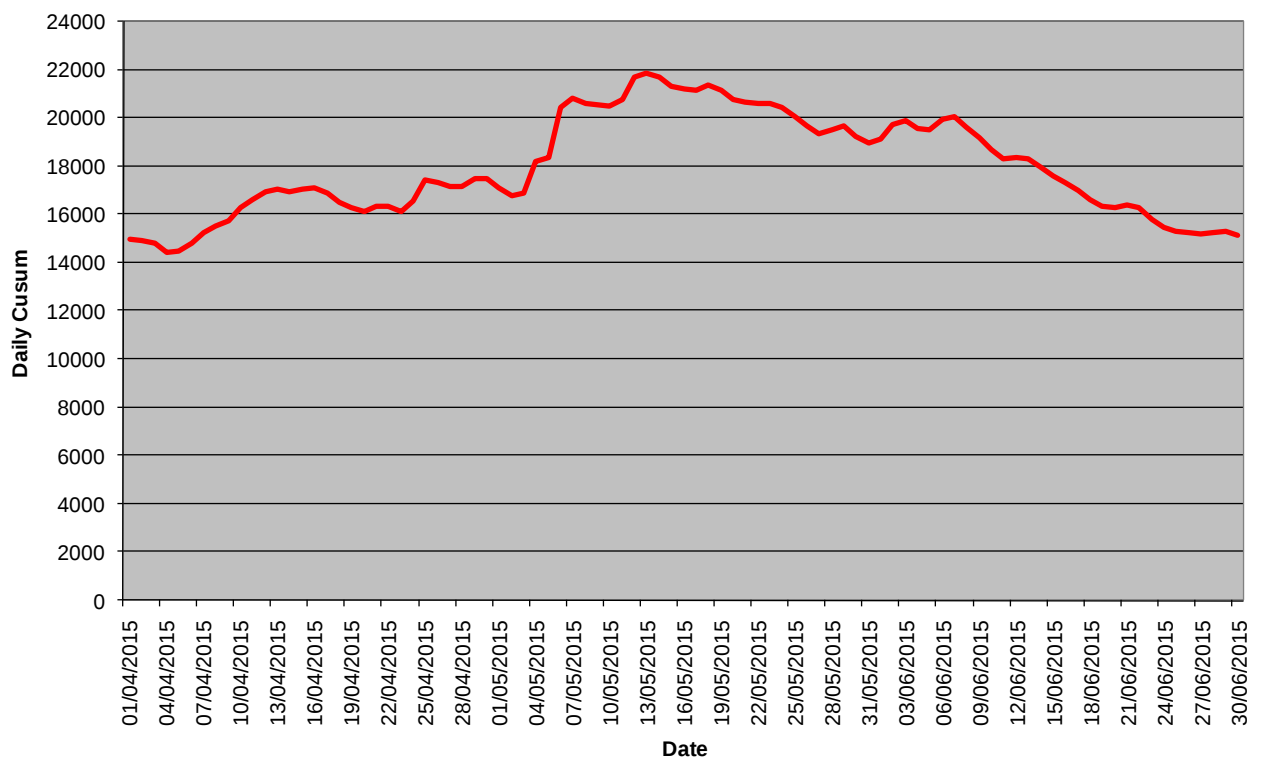
An average data capture of 73% has been achieved by the TOPAS monitors during Quarter 2 2015. The TOPAS monitor data capture is higher than that achieved during Quarter 1 2015 (67%). The main reason for the higher data capture was the return of the Penrhyn monitor to the network. The failed monitor at the West End location requires replacement. However, due to delays with the initiation of a service contract with a new supplier, the contract did not start until March 2015. As a result, there were no replacement monitors available during Q2.

Only 8 of the 9 monitors in the planned network (see Figures 1 and 2, appendix A) were deployed during Q2. This is because the Harbour Jetty monitor was out of calibration according to its calibration date; although the Harbour Jetty monitor was operating within a year of its start dates of operation (see Table C below). As a result of a corrective action from an external ISO14001 audit we are no longer able to operate monitors outside of the annual calibration period, despite monitors being deployed for less than a year. In addition, due to delays with the initiation of a service contract with a new supplier, the contract did not start until March 2015. Consequently, the monitor will not be re-instated until replacement monitors become available. We aim to increase the monitor network back to the planned 9 monitors by the end of Q3 2015.

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 April to 30th June 2015

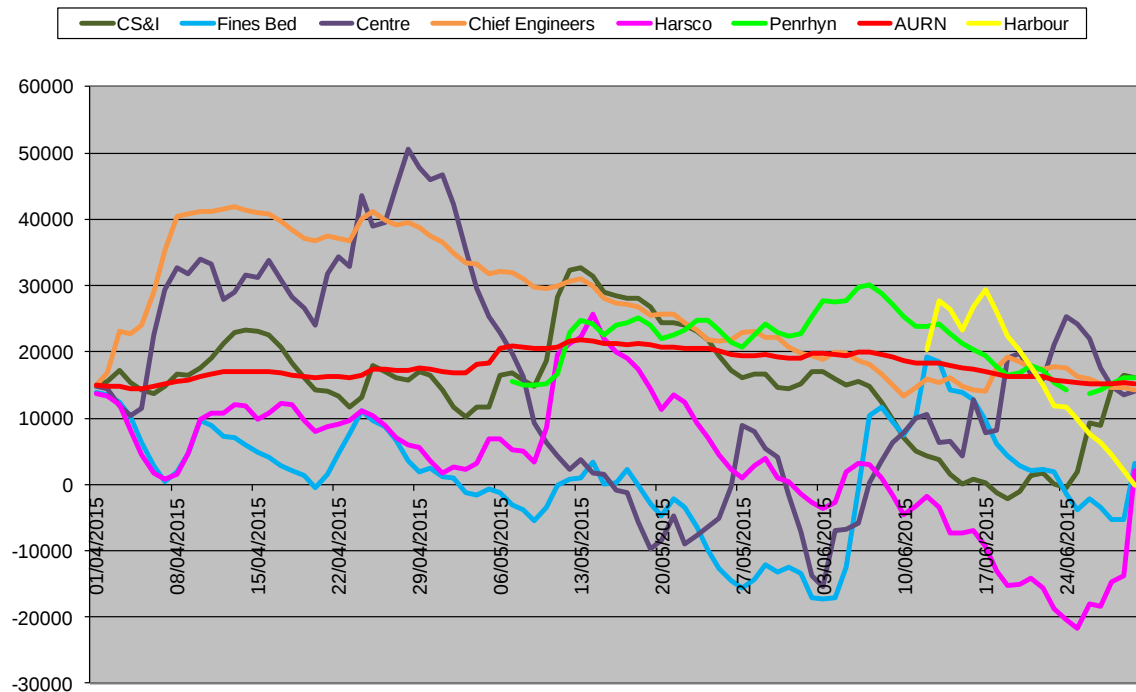


The daily cusum plot for the AURN (Figure A) has been included because comparisons can be made with some of the Steelworks' monitor plots (Figure B) over the monitoring period. However, some of the Steelworks' monitor plots are different to the AURN plot. This indicates that these Steelworks' monitors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

The cusum plot for the AURN monitor is relatively stable between 1st and 4th April, followed by an increase until 13th April, coinciding with two breach days. The trend is then stable until 23rd April, followed by an increase until 25th April, coinciding with the breach day that occurred on 24th April. The trend is stable once again until 2nd May, followed by increases in the trend until 7th May and between 10th and 13th May which coincide with a further four breach days. The trend then decreases until the end of the quarter except for two increases between 31st May and 3rd June and 5th and 7th June which coincide with the final two breach days of the quarter.

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

Figure B – Daily cusums for the Centre, Harsco, CS&I, Penrhyn, Chief Engineers, Fines Bed and Harbour TOPAS monitors from 1st April to 30th June 2015



The cusum trend for the Centre monitor increases from the start of the quarter until 8th April, coinciding with one breach day recorded at the AURN. This is followed by a relatively stable period until 1st May with increases in the trend coinciding with both breach days recorded at the AURN during this period. This is prior to a steep decrease in the trend until 19th May, which does not coincide with the four breach days recorded at the AURN during this period. This is followed by a general increase in the trend until 24th June, except for a significant decrease between 27th May and 3rd June, which does not coincide with the breach day recorded at the AURN on 1st June. The breach day that was recorded on 6th June coincides with a slight increase on the Centre monitor cusum trend. Finally the trend decreases from 24th June until the end of the quarter.

Similarities can be seen between the Centre monitor cusum trend and the AURN monitor cusum trend during April. However there are differences between the two trends during the first half of May, when increases are seen on the AURN monitor cusum trend but not on the Centre trend. There are also differences between the trends from the middle of May until the end of the quarter when the AURN trend is generally decreasing and increases are seen on the Centre monitor 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. The majority of the EIFs (Environmental Incident Forms) issued by the Ironmaking area during Q2 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 for casthouse emissions per day. No relationship was found as a greater number EIFs were issued on days when the cusum trend for the Centre monitor was decreasing compared to days when the trend was increasing. Further, no relationship could be found between increases on the Centre monitor cusum trend and EIFs issued for emissions from the GCI Plant or ferrous stockhouse emissions. No Blast Furnace bleeder openings occurred during Q2. No EIFs were issued from the Burdening area at times when increases can be seen on the Centre monitor trend but not on the AURN trend between the middle of May and the end of the quarter. 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.

The cusum trend for the Harsco monitor commences with a decrease until 7th April, followed by an increase until 11th April, coinciding with the 10th April breach day but not the breach on 6th April. The breach on 10th April was attributed to the influence of trans-boundary pollution. This is prior to a stable period, with slight increases in the trend coinciding with the 24th April and 5th May breach days but not coinciding with the breach days recorded on 3rd and 6th May. This is followed by a steep increase in the trend until 14th May, coinciding with 11th May breach day, and a general decrease in the trend until 25th June. A slight increase coincides with the 6th June breach day but not the breach recorded at the AURN on 1st June. Finally, the trend increases steeply until the end of the quarter.

The Harsco monitor trend is fairly similar to that of the AURN monitor, with increases and decreases in the trends being seen at similar times throughout the quarter. However, a steep increase is can be seen during the final days of the quarter which is not mirrored by the AURN trend. The Harsco monitor is located within reasonably close proximity to the Centre monitor. As was also the case with the Centre monitor, no relationship could be found between EIFs issued in the Iron Making area and increases on the Harsco monitor cusum trend during the quarter. The Harsco monitor is also located in very close proximity to the Sinter Plant and in close proximity to the Burdening Stockyards. An EIF was generated for the Burdening area regarding dust lift-off from the movement of material in the stockyards on 25th June which may have impacted the Harsco monitor but not the AURN at this time. However, the trend for the Harsco monitor continued to increase after this operation ceased. There were no changes to processes in close proximity to the Harsco monitor that could explain increase seen on the Harsco monitor cusum trend at the end of June.

The CS&I monitor cusum trend is fairly stable between 1st April and 9th May, with small increases in the trend coinciding with the breach days recorded on 10th April, 24th April and 6th May, but not the other three breaches during the period. Following this, the trend increases steeply until 13th May (coinciding with 11th May breach day) prior to a gradual decrease until 24th June. Slight increases during this period coincide with the remaining two breaches at the AURN during Q2. Finally, the trend increases until the end of the quarter. The trend for the CS&I monitor is reasonably similar to that of the AURN monitor, although the trend for the CS&I monitor was not increasing at the time of a number of the recorded breach days at the AURN. In addition, the CS&I trend was increasing during the final days of June when decreases can be seen on the AURN trend. The CS&I monitor trend is similar to that of the Harsco monitor throughout the quarter. The CS&I monitor is also located in close proximity to the Ironmaking area of the site. However, no relationship could be found between EIFs issued in the area and increases on the CS&I monitor cusum trend during the quarter. 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 increases and decreases in the trend during the quarter.

The Penrhyn monitor commenced operation on 7th May and the cusum trend begins with a stable period until 10th May, an increase until 13th May (coinciding with the 11th May breach day) and another stable period until 31st May. This is followed by an increase until 7th June, which coincides with the final two breach days of the quarter. The trend then decreases steadily until the end of the quarter. The Penrhyn monitor follows a similar trend to the AURN monitor during May and June. There were no changes to site processes within close proximity to the Penrhyn monitor during Q2.

The cusum trend for the Chief Engineers monitor increases steeply until 8th April, followed by a stable period in the trend ending on 25th April. The trend then gradually decreases until the end

of the quarter. Increases in the Chief Engineers monitor cusum trend coincide with all three of the breaches in April and very slight increases coincide with the breaches recorded on 6th and 11th May. However, the remaining four breaches recorded in May and June did not coincide with increases on the cusum trend. The Chief Engineers monitor trend is similar to the trend for the AURN monitor during April; however during May and June, increases can be seen on the AURN monitor trend but not on the trend for the Chief Engineers monitor. The Chief Engineers monitor is located in close proximity to the Steel & Slab area of the site and also Harsco's Metal Recovery (MR) Plant. No relationship could be found between EIFs issued for BOS Plant converter slopping emissions and increases on the Chief Engineers monitor cusum trend during the quarter. There were no significant changes to processes taking place within close proximity to the Chief Engineers monitor during the quarter.

The cusum trend for the Fines Bed monitor decreases from the start of the quarter until 7th April, followed by an increase until 11th April, coinciding with 10th April trans-boundary breach day but not the breach recorded on 6th April. This is prior to a decrease in the trend until 20th April and an increase ceasing on 24th April to coincide with the breach on this day. A gradual decrease in the trend follows until 9th May, before a stable period in the trend until 21st May. Slight increases in the trend coincide with the breaches recorded on 5th and 11th May but not the breaches recorded on 3rd and 6th May. This was also the case with the Harsco monitor cusum trend. The Harsco and Fines Bed monitors are located in close proximity to each other. The trend generally decreases until 3rd June, followed by a steep increase until 12th June, therefore coinciding with 6th June breach day but not the breach recorded on 1st June. Finally, the trend decreases until 30th June and then increases until the end of the quarter. The Fines Bed monitor follows a fairly similar trend to the Harsco monitor cusum trend with increases and decreases seen at similar times during the quarter. The Fines Bed monitor, like the Harsco 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 account for the increases and decreases seen on the Fines Bed monitor cusum trend during Q2.

The Harbour monitor commenced operation on 11th June and, therefore, was not operating at the time of the breach days recorded at the AURN monitor during Q2. The cusum trend increases until 13th June, followed by a decrease until 15th June and a further increase until 17th June. The trend then decreases until the end of the quarter. The trend for the Harbour monitor is similar to that of the AURN during June except for two increases on the Harbour trend which are not mirrored by the AURN trend. The Harbour monitor is located within close proximity to the Burdening Stockyards and Harbour, but there were no changes to processes or EIFs issued in these areas that could explain the increases seen on the Harbour monitor trend which were not mirrored on the AURN trend.

The West End monitor was not operating throughout the monitoring period.

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 D), 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 D - Summary of potential sources impacting the TOPAS monitors between 1st April and 30th June 2015

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 SW (140° to 200°)	Blast Furnaces, Granulated Coal Injection (GCI) Plant, Raw Materials Handling (RMH) Lafarge Tarmac's Slag Pools and Slag Granulation Plant.	Steel & Slab (S&S), Harsco's Metal Recovery (MR) Plant, Slab Yards, Darlow Lloyds HAA Site (HAA), Coke Ovens, Rolling Mills, the coast and other off-site sources.
Centre	NNW to NNE (350° to 10°), SE (140°) and SW (210°)	GCI Plant, RMH and Lafarge Tarmac's Slag Granulation Plant.	Hanson's Slag Plant, Lafarge Tarmac's Slag Handling Plant, Steel & Slab, HAA, Docks, Aberavon town and residential area, the coast and other off-site sources.
Fines Bed	NNE (10° to 30°), ENE, (70°), SSW (190°), SW (210° to 220°), WNW (280°) and NW (300° to 320°)	Fines Bed, Reverts Stockyard, Primary Stockyard and Hanson's Slag Plant.	Power Plant, Harbour, Docks, Aberavon town and residential area, the coast and other off-site sources.
Harsco	N (0°), ENE to SSE (80° to 170°) and WSW (260°)	Sinter Plant, RMH, GCI Plant, Blast Furnaces, Lafarge Tarmac's Slag Pools, Slag Granulation Plant, Power Plant, Primary Stockyard and Hanson's Slag Plant.	Harsco's MR Plant, S&S, Slab Yards, HAA, Rolling Mills, Coke Ovens, Docks, M4, Harbour Way, Margam, Taibach and Aberavon residential areas, the coast and other off-site sources.
Chief Engineers	SW (210° to 230°)	Harsco's MR Plant and S&S.	The coast and other off-site sources.
Penrhyn	N (0°), SSE (160°) and NW (300° to 320°)	Power Plant, Hanson's Slag Plant, Taibach residential area, Harbour Way, M4 and the hills.	Slab Yards, Docks, Aberavon residential area and other off-site sources.
Harbour	NW to NE (300° to 30°) and ENE (60° to 80°)	Reverts Stockyard, Fines Bed and the Docks	Hanson's Slag Plant, Aberavon residential area and town, M4, Harbour Way, coast and other off-site sources.

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 Steel 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 Q2 2015 there were nine breach days recorded at the AURN monitor. One of these breaches, however, was attributed to the influence of trans-boundary pollution (10th April).
- In addition, seven near miss days were recorded during the quarter. Near miss days occur when the daily average PM₁₀ concentration is between 45 and 50µg/m³.
- The TOPAS monitors achieved an average data capture of 73% during Q2 2015. The data capture for the TOPAS monitors was higher than that achieved during Q1 2015 (67%).
- 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 monitor trends and the trend for the AURN monitor during Quarter 2, with most trends increasing to coincide with the breach days that occurred during the quarter.
- 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 Q2 2015

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

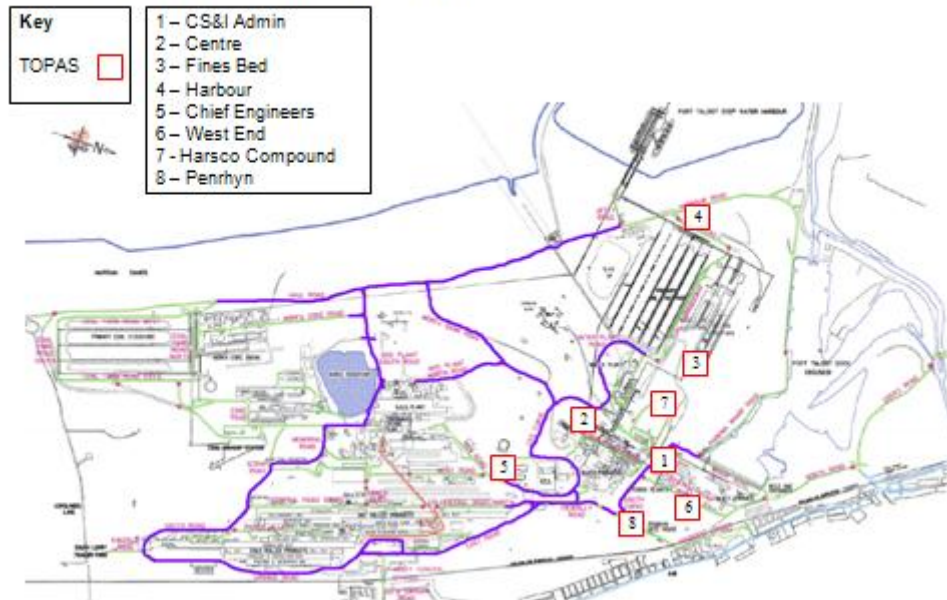


Figure 2 On Site Monitoring Network (Tata Steel Monitors*) as Planned in March 2014

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

