# An Initial Assessment of the Short-Term Impact of the Explosion and Subsequent Shut-Down of Blast Furnace Five on the $PM_{10}$ concentrations around the Port Talbot Steel Works.

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## Background

On 8th November 2001 between 17.00 and 17.30 GMT an explosion occurred at furnace 5 of the Corus steelworks at Port Talbot in South Wales. The purpose of this report is to provide a summary of the impact of this event on automatically monitored $PM_{10}$ concentrations nearby.

The impact that the sintering plant has had on previous measured concentrations has been notable. The monitoring station used in the area is very close to the steelworks (less than a mile to the east). The prevailing south westerly winds is known to transport $PM_{10}$ emissions from the furnaces towards the monitoring station. This has resulted in occasions of exceptionally high levels of $PM_{10}$ recorded that are not representative of the ambient air in the region. Persistent south westerly winds resulting in successively high hourly means can impact the calculated 24 hour running mean on which Defra's health bandings are based, resulting in levels rising into a higher index.

## Results

The analysis below examines concentrations in the time period before the explosion (from 1st August to 8th November 2001) and after the shutdown of the furnace to the present (8th November 2001 to 14th January 2002). Table 1 shows averages for the entire period (1st August to 8th November and 8th November to 14th January and then compares them with the corresponding periods for previous years. Table 2 provides the similar averages using the same data sets but uses only the top ten percentiles of each data set, thereby removing the influence of any background $PM_{10}$ levels. These averages should consequently represent the influence of the furnace on $PM_{10}$ levels adequately.

**Table 1 – hourly and 24 hourly averages for periods before explosion compared with after and corresponding figures for other years.**

| | 2001-2002 | | 1998-1999 | | 1999-2000 | | 2000-2001 | |
|---|---|---|---|---|---|---|---|---|
| **Time period** | **Hourly** | **24hr run avg** | **Hourly** | **24hr run avg** | **Hourly** | **24hr run avg** | **Hourly** | **24hr run avg** |
| **August 1st to November 8th.** | 23.17 | 23.24 | 23.75 | 23.72 | 23.38 | 23.60 | 22.80 | 22.73 |
| **November 8th to January 14th.** | 15.66 | 15.50 | 22.11 | 21.80 | 22.99 | 23.05 | 22.21 | 22.24 |

**Table 2 - hourly and 24 hourly averages for periods before explosion compared with after and corresponding figures for other years using the 90th percentile.**

| | 2001-2002 | | 1998-1999 | | 1999-2000 | | 2000-2001 | |
|---|---|---|---|---|---|---|---|---|
| **Time period** | **Hourly** | **24hr run avg** | **Hourly** | **24hr run avg** | **Hourly** | **24hr run avg** | **Hourly** | **24hr run avg** |
| **August 1st to November 8th.** | 71.5 | 50.8 | 66.7 | 47.3 | 68.3 | 54.6 | 73.4 | 51.8 |
| **November 8th to January 14th.** | 35.7 | 26.5 | 58.2 | 42.3 | 68.4 | 50.6 | 71.3 | 53.0 |

As can be seen in both Tables 1 and 2 and in Chart 1, there is a marked difference in $PM_{10}$ concentration after the shutdown of the damaged blast furnace. This reduction is most

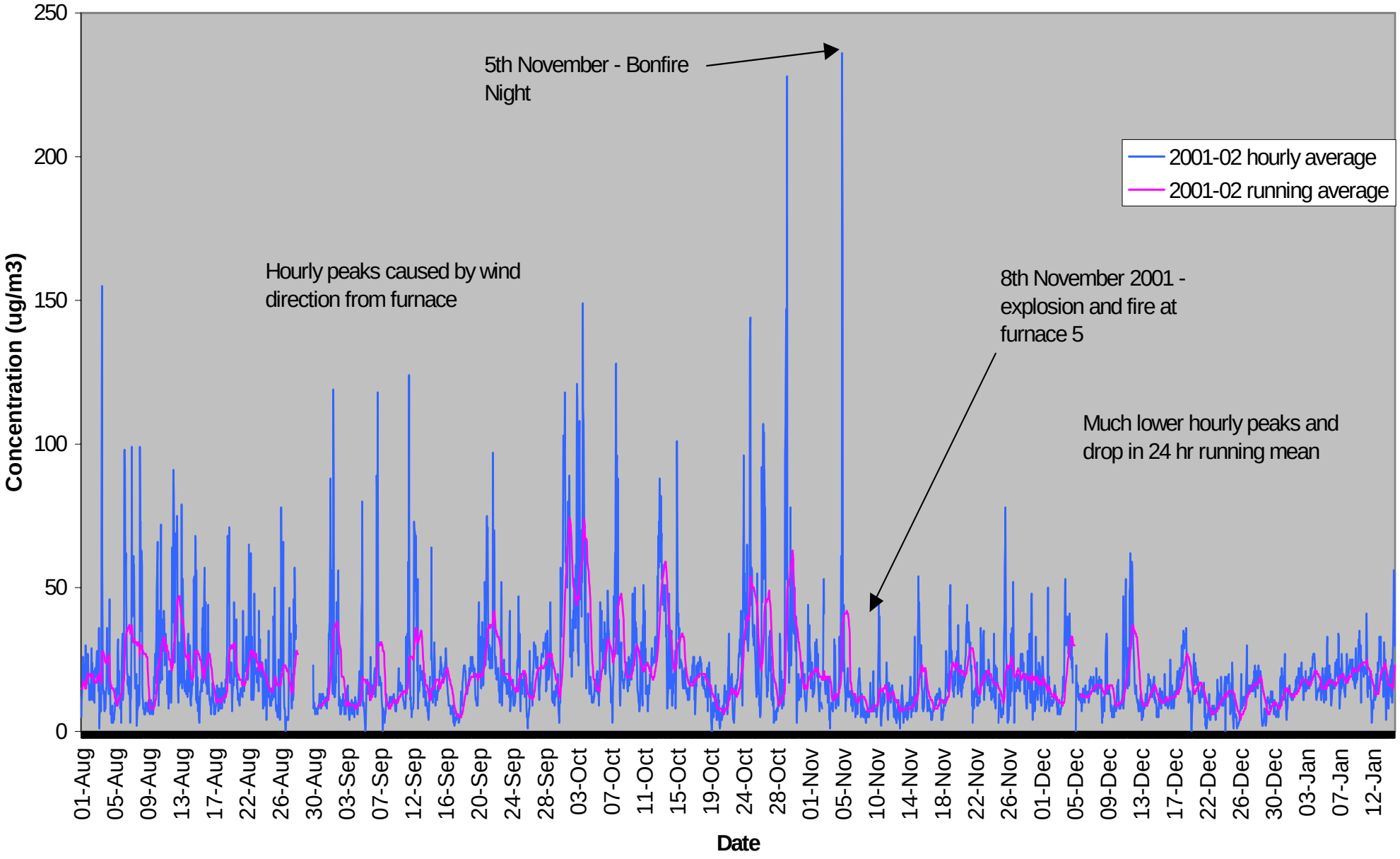
notable in the hourly averages in which the highest peaks are particularly conspicuous. The 24 hour running mean values have removed the extreme values though Table 2 (using the 90$^{th}$ percentile) shows that this has still halved after the explosion. Data for the previous years (Charts 2 and 3) show that both hourly and 24 hourly average emissions were very similar before and after 8$^{th}$ November. Consequently, it can be assumed that the pattern shown for the 2001-2002 period is a genuine result of the furnace removal rather than a seasonal weather influence.

Interestingly, the direct influence of the explosion and fire on $PM_{10}$ levels is not apparent in Chart 1, which shows several high hourly peaks in the days preceding the explosion (possibly the result of local emissions associated with Bonfire Night celebrations compounding emissions from the steelworks) but very low levels on the 8$^{th}$ and 9$^{th}$ November 2001. This may be the result of a change in wind direction, taking pollution away from the monitoring station at the time.

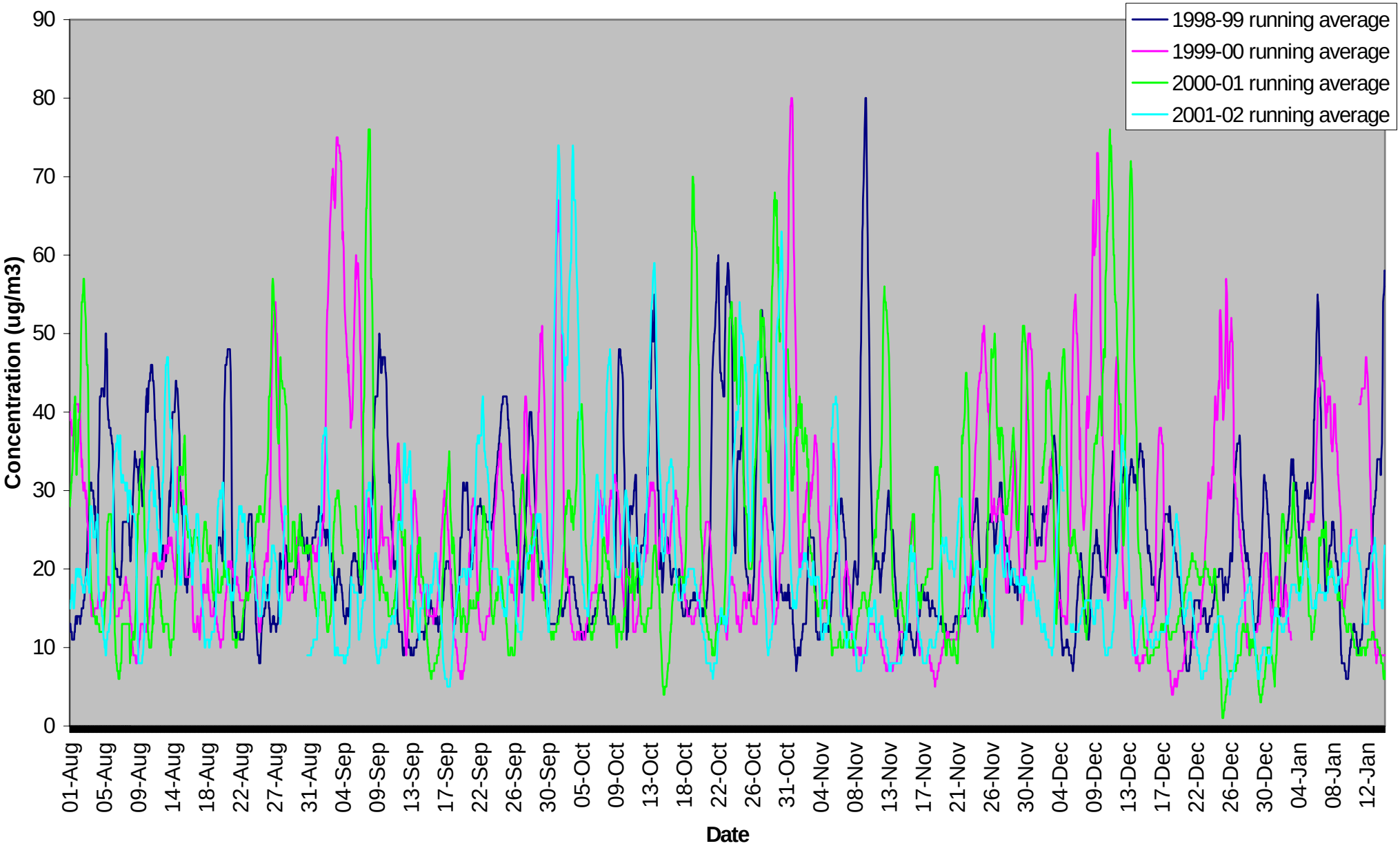
**Summary**

Elevated $PM_{10}$ levels resulting from the explosion and fire at Furnace 5 were not registered in the data from the Port Talbot monitoring station. After the date of the explosion and following the shutdown of one of the two furnaces near the monitoring site there have been significant reductions in the $PM_{10}$ levels recorded, both hourly and 24 hourly averages. This suggests that the influence of the steelworks in producing localised elevated levels has been significantly reduced. Hourly levels are expected to remain lower with fewer spikes. The 24 hour running mean dropped accordingly, after the loss of the furnace and fewer breaches of the 'MODERATE' band are expected in the immediate future.

## Chart 1 - Port Talbot PM10 concentrations, 1st August 2001 to 14th January 2002



## Chart 2 - comparable 24hr running averages by year from August 1st to Jan 14th, 1998-2001



## Chart 3 - comparable hourly concentrations from 1st August to 14th January, 1998-2001