

Moderate to Very High Particulate Matter (PM₁₀) Episode 26th–28th February 2013 –Aberdeen Region

On the 26th, 27th and 28th February 2013 provisional air quality monitoring data from sites throughout the Aberdeen region and measured elevated concentrations of particulate Matter (PM₁₀).

PM₁₀ concentrations measured across the majority of Scotland were generally in the Low to Moderate air pollution band (index 2 – 4). However at the busy roadside sites Aberdeen Market Street, Aberdeen Union Street and Aberdeen Wellington Road concentrations of PM₁₀ respectively reached air pollution banding Moderate (index 6) to Very High (index 10). Figures 2 below illustrates the elevated concentrations as seen on a recent Scottish Air Quality Bulletin distributed via the Air Quality in Scotland website.

Figure 1 describes the boundaries between index points for each pollutant. Further information on air pollution banding and the health impacts associated can be found on the Scottish Air Quality website

(www.scottishairquality.co.uk).

Figure 1: Boundaries between index points for each Pollutant

Band	Index	Ozone	Nitrogen Dioxide	Sulphur Dioxide	PM2.5 Particles	PM10 Particles
		Running 8 hourly mean µg/m ³	hourly mean µg/m ³	15 minute mean µg/m ³	24 hour running mean µg/m ³	24 hour running mean µg/m ³ (Grav. Equiv.)
Low	1	0-33	0-66	0-88	0-11	0-16
	2	34-65	67-133	89-176	12-23	17-33
	3	66-99	134-199	177-265	24-34	34-49
Moderate	4	100-120	200-267	266-354	35-41	50-58
	5	121-140	268-334	355-442	42-46	59-66
	6	141-159	335-399	443-531	47-52	67-74
High	7	160-187	400-467	532-708	53-58	75-83
	8	188-213	468-534	709-886	59-64	84-91
	9	214-239	535-599	887-1063	65-69	92-99
Very High	10	240 or more	600 or more	1064 or more	70 or more	100 or more

Figure 2: Scottish Air Pollution Bulletin issued during 27th and 28th February 2013

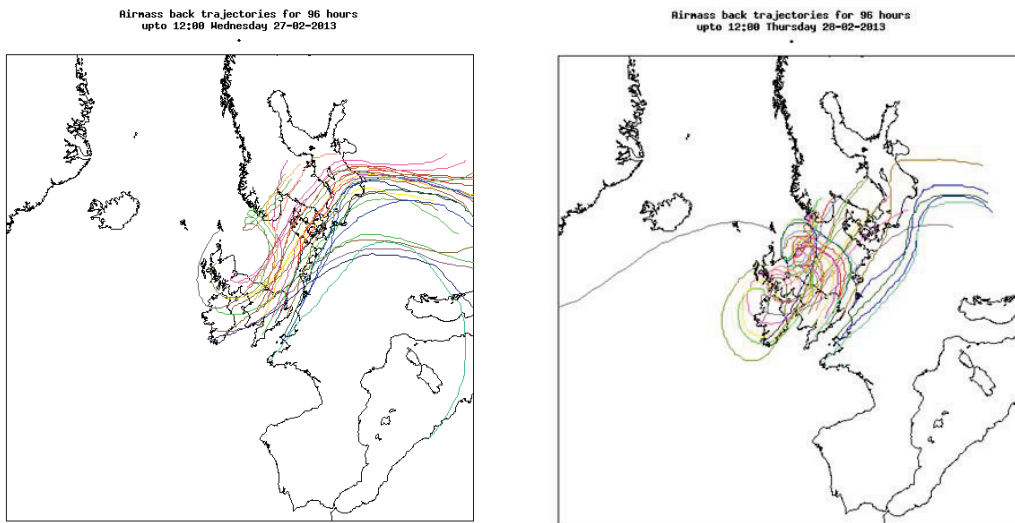
Aberdeen City					
SITE	8 Hourly Mean Ozone (µg/m ³)	Hourly Mean Nitrogen dioxide (µg/m ³)	max 15min mean Sulphur dioxide (µg/m ³)	24Hour Mean PM _{2.5} Particles (µg/m ³)	24Hour mean PM ₁₀ Particles (µg/m ³ Grav Equiv)
Aberdeen Anderson Dr	N/M	149 (Low 3)	N/M	N/M	38 (Low 3)
Aberdeen Errol Place	46 (Low 2)	80 (Low 2)	N/M	21 (Low 2)	32 (Low 2)
Aberdeen King Street	N/M	130 (Low 2)	N/M	N/M	47 (Low 3)
Aberdeen	N/M	153 (Low 3)	N/M	N/M	68 (Moderate 6)

Market Street 2					
Aberdeen Union Street Roadside	N/M	143 (Low 3)	N/M	N/M	75 (High 7)
Aberdeen Wellington Road	N/M	N/A	N/M	N/M	112 (Very High 10)
City of Glasgow					
Glasgow Byres Road	N/M	254 (Moderate 4)	N/M	N/M	29 (Low 2)
Glasgow Dumbarton Road	N/M	241 (Moderate 4)	N/M	N/M	27 (Low 2)
Glasgow Kerbside	N/M	135 (Low 3)	N/M	35 (Moderate 4)	41 (Low 3)
Dundee City					
Dundee Lochee Road	N/M	245 (Moderate 4)	N/M	N/M	32 (Low 2)
Stirling					
Stirling Craig's Roundabout	N/M	212 (Moderate 4)	N/M	N/M	38 (Low 3)
West Lothian					
SITE	8 Hourly Mean Ozone ($\mu\text{g m}^{-3}$)	Hourly Mean Nitrogen dioxide ($\mu\text{g m}^{-3}$)	max 15min mean Sulphur dioxide ($\mu\text{g m}^{-3}$)	24Hour Mean $\text{PM}_{2.5}$ Particles ($\mu\text{g m}^{-3}$)	24Hour mean PM_{10} Particles ($\mu\text{g m}^{-3}$ Grav Equiv)
West Lothian Newton	N/M	113 (Low 2)	N/M	N/M	52 (Moderate 4)

A number of factors contributed to the occurrence of this episode, including weather conditions and the emission source.

Weather conditions over the 26th to the 28th February, and leading up to this time, was dominated by a high pressure system, air masses were sourced from the Scandinavia. Air masses from this direction (illustrated in Figure 3 below) normally bring in clean air however over this period there was recirculation over North East Scotland. The High pressure system created cold, dry and static conditions with pockets of freezing mist and fog experienced in many regions of the country. There were very low wind speeds recorded in the North East region over this period which created poor dispersion conditions. These poor pollution dispersion conditions caused pollutant emissions including Particulate Matter to re-circulate and stagnate close to their source. This in turn caused pollution levels to increase over a relatively short period of time.

Figure 3: 4 day Air Mass Back trajectories for the 27th and 28th February 2013



These prevailing weather conditions affected the majority of Scotland, however, it was only in the Aberdeen region that concentrations of PM₁₀ reached High and Very High pollution levels. This was most likely due to both the volume of traffic and vicinity to busy roads and the working harbour.

Sources of this pollution event are therefore most likely to be a combination of localised traffic, industrial processes and domestic fuel burning. Looking at the available air mass trajectories, Saharan Dust models, and other global events (i.e. forest fires) there is no evidence of any trans-boundary particulate matter being associated with this event.

Figure 4 below plots PM₁₀ concentrations at a number of sites across North East Scotland shows how levels become elevated over the 26th to 28th February period

Figure 4: Plot of Elevated PM10 concentrations across North East Scottish sites

