
Neath Port Talbot County Borough Council



Air quality report – 2004

SEVENTH ANNUAL REPORT (2004)

The purpose of this report is to present the results of all pollution monitoring data collected during the calendar year 2004. The data includes results from continuous and non-continuous equipment, some of which is supplied to national pollution monitoring networks. Conclusions are drawn about air quality based upon this information.

EXECUTIVE SUMMARY

Automatic monitoring at the Groeswen Hospital AURN national network site showed that:

- 2004 was a better year with regard to ozone pollution with less exceedences than in 2003.
- The Air Quality Objective for PM₁₀ was breached in 2004. But, there were fewer exceedences than in 2003.
- There were no exceedences of the Air Quality Objective for carbon monoxide in 2004, in contrast with 2003.
- Once again there were no exceedences of the relevant Air Quality Objective levels for nitrogen dioxide or sulphur dioxide.

Deposit gauges showed that:

- The four sites with highest fallout rates are all located in Port Talbot around the steel works. Levels at Ffrwdwyllt House have increased to exceed those at Prince Street. But levels at Prince Street remain at historically low levels. Levels at Eglwys Nunydd have also increased to near those of the other two sites. The 'nuisance limit' was exceeded on 28 days at Prince Street and 34 days at Eglwys Nunydd.
- The annual average decreased at Onllwyn Washery to the lowest ever recorded, which points to increasingly effective management of the site. But coal continues to form the majority component of the fallout.

The nitrogen dioxide diffusion tube survey showed that:

- Monitoring at two lamp posts near the junction at Eastland Road/Victoria Gardens were above the National Air Quality Objective, but
- Annual average concentrations at the frontages of properties in this area were below the National Air Quality Objective. Therefore an Air Quality Management Area is not currently required.

The metals monitoring at Pontardawe shows that:

- The nickel concentration is over three and a half times the EC target value. This will necessitate action by central government if the Target Value of 20 ng/m³ is likely to be exceeded by the Target Date of 31 December 2012. Further options to study the phenomenon are being investigated and central government has been contacted.

Concentrations of volatile organic compounds (VOC's) at Baglan have now decreased largely to background levels since the progressive shut down of the Baglan Bay plant. Consequently, it is recommended that the monitoring be discontinued.

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Grit and dust monitoring

Previous reports have described how deposit gauges have been used to collect atmospheric fallout from a number of locations. The analysis of the collected grit and dust is not confined to the fallout rate, but also includes a sophisticated characterisation of the deposit, using Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Analysis (EDXA). During 2004, sampling of this kind took place at 12 sites in the County Borough.

The report includes results from the following locations:

- Prince Street, Margam, Port Talbot
- Baldwins Crescent, Crymlyn Burrows
- Ffrwdwyllt House, Margam Road, Port Talbot
- Wembley Avenue, Onllwyn
- Eglwys Nunydd Reservoir, Margam, Port Talbot
- Little Warren, Port Talbot.
- Tairgwaith, Amman Valley
- Llygad yr Haul, Glynneath
- Gwaun Cae Gurwen, Amman Valley
- Cil Carne Farm, Bryn, Port Talbot
- Cardonnel Road Skewen
- Parish Road, Cwmgwrach

Once again, the report consists of pie charts and time series graphs for each site for 2004 and the preceding year as a comparison. The pie charts show the average percentage composition of the samples collected during the year, with the average fallout rates of each component in mg/m²/day underneath. The time series show how the fallout rate has changed over the course of the year. The pie charts define the composition of the collected deposit into the following categories:

- Coal – unburned coal.
- Carbonised – partly burnt carbon based material that may be derived from combustion of coal, oil, wood etc.
- Sand – sand and silica based minerals.
- Dirt – mineral material typically found in soil and earth.
- Fly Ash – spherical mineral particles having arisen from combustion.
- Plant/Animal – miscellaneous fragments of insects, plant material etc.
- Calcium Rich – particles with an unusually high calcium content e.g. chalk, cement etc.
- Iron Rich – particles consisting of, or rich in iron.
- Others – anything not falling into the categories above.

Additional information is provided to indicate the annual average and maximum fallout levels, the data capture rate, and the number of days exceeding (or within 10% of) the “nuisance limit” (200 mg/m²/day), which some recognise as relevant for this method of monitoring. However it should be noted that this “limit” is not a statutory limit and the public perception of what constitutes a nuisance might now suggest that a lower “limit” would be appropriate.

The sites are ranked in a table and graphically according to the average fallout rate. A table and graph also shows how annual fallout rates have changed at each location since monitoring began. A map showing the locations of each of the monitoring sites is also shown. Figures 1 to 26

comprise pairs of time series and pie charts for each site. The time series charts show how the fallout rate has varied over the period(s) concerned, whilst the pie charts show the average composition. The tables that accompany the charts highlight any differences that may have occurred over the period. Figure 25 shows the location of each of the deposit gauges. Figure 26 shows the average fallout rate for each site during 2004 in a bar chart, and Table 1 holds the data for this chart. Figure 27 and Table 2 show how fallout rates have varied in the long term. The site at Cwmllynfell was discontinued since all properties in the area had become unoccupied and vandalism of the equipment had become a problem.

Results by site

Baldwins Crescent, Crymlyn Burrows (Figs. 1 & 2)

The “nuisance limit” was not exceeded in 2004 and no samples reached within 10% of 200 mg/m²/day. The maximum fallout rate was 68 mg/m²/day and the average 35 mg/m²/day, the corresponding values for 2003 were 57 and 30 mg/m²/day respectively. There was a 17% increase in fallout rates compared to the previous year, which was mainly due to more fallout from dirt and sand.

Cil Carne Farm, Bryn, Port Talbot (Figs. 3 & 4)

The “nuisance limit” was not exceeded in 2004 and no samples reached within 10% of 200 mg/m²/day. The maximum fallout rate was 68 mg/m²/day and the average 30 mg/m²/day, the corresponding values for 2003 were 43 and 30 mg/m²/day respectively. There was no change in fallout rates compared to the previous year.

Prince Street, Port Talbot (Figs. 5 & 6)

The “nuisance limit” (200 mg/m²/day) was exceeded on 28 days in 2004. There were no exceedences during the previous year, but some 30 days were within 10% of the exceedence level. The maximum fallout rate was 210 mg/m²/day and the average 86 mg/m²/day, the corresponding values for 2003 were 181 and 85 mg/m²/day respectively. The average fallout level was only 1% higher than the previous year.

Ffrwdwyllt House, Margam Road, Port Talbot (Figs. 7 & 8)

The “nuisance limit” was not exceeded during 2004, whilst there were exceedences on 30 days during 2003. The maximum fallout rate was only 143 mg/m²/day and the average 89 mg/m²/day, and the corresponding values for 2003 of 247 and 70 mg/m²/day respectively. There was a 27% increase in fallout rates compared to the previous year, which was mainly due to a big increase in plant and animal fragments. However, there were decreases in iron and coal fallout. The site has now been re-located to a site where there are less trees near the gauge.

Eglwys Nunydd Reservoir, Port Talbot (Figs. 9 & 10)

The “nuisance limit” was exceeded on 34 days during 2004 whilst there were none during 2003. This was due to one very high sample during July, where the fallout rate was 443 mg/m²/day. This has affected the average for the year, which went up to 77 mg/m²/day from 36 mg/m²/day in the previous year, a 110% increase. The July sample was characterised by a higher than normal coal content (48%). There is no reason to regard this sample as suspect.

Gwaun Cae Gurwen (Figs. 11 & 12)

The “nuisance limit” was not exceeded during 2004. The maximum fallout rate was 137 mg/m²/day owing to one higher than normal sample during July/August which was characterised by a higher than normal coal content (50%). This sample affected the average fallout for the year which increased by 74% from 19 mg/m²/day in 2003 to 33 mg/m²/day in 2004.

Tairgwaith (Figs. 13 & 14)

The “nuisance limit” was not exceeded and no samples reached within 10% of 200 mg/m²/day. The maximum fallout rate was 124 mg/m²/day and the average 30 mg/m²/day, the corresponding values for 2003 were 57 and 28 mg/m²/day respectively. There was a 7% increase in fallout rates compared to the previous year. The increase was primarily due to one higher than normal sample during July/August 2004. But this sample was not characterised by higher than normal coal content, rather iron and sand were found to be contributors. However, it should be noted that data capture was slightly lower than normal since two samples were lost. This site has suffered from a degree of interference and vandalism in the past.

Parish Road, Cwmgwrach (Figs. 15 & 16)

The “nuisance limit” was not exceeded and no samples reached within 10% of 200 mg/m²/day. The maximum fallout rate was 54 mg/m²/day and the average 20 mg/m²/day, the corresponding values for 2003 were 86 and 39 mg/m²/day respectively. There was a 49% decrease in fallout rates compared to the previous year, mainly due to decreases in dirt fallout.

Llygad yr Haul, Glynneath (Figs. 17 & 18)

The “nuisance limit” was not exceeded and no samples reached within 10% of 200 mg/m²/day. The average fallout rate at 19 mg/m²/day was low and only very slightly higher than the 18 mg/m²/day figure for 2003.

Wembley Avenue, Onllwyn (Figs. 19 & 20)

The “nuisance limit” was not exceeded and no samples reached within 10% of 200 mg/m²/day. The maximum fallout rate was 83 mg/m²/day and the average 38 mg/m²/day, the corresponding values for 2003 were 148 and 60 mg/m²/day respectively. Average fallout levels in 2004 decreased by some 37%. The annual average is the lowest recorded since monitoring began in 1994 and is due to a large decrease in coal fallout. This is likely to have been due to improvements in dust control at the Onllwyn Washery.

Cardonnel Road, Skewen (Figs. 21 & 22)

The “nuisance limit” was not exceeded and no samples reached within 10% of 200 mg/m²/day. The fallout rate, increased by 52% compared to 2003 levels, the average being 32 mg/m²/day.

Little Warren, Port Talbot (Figs. 23 & 24)

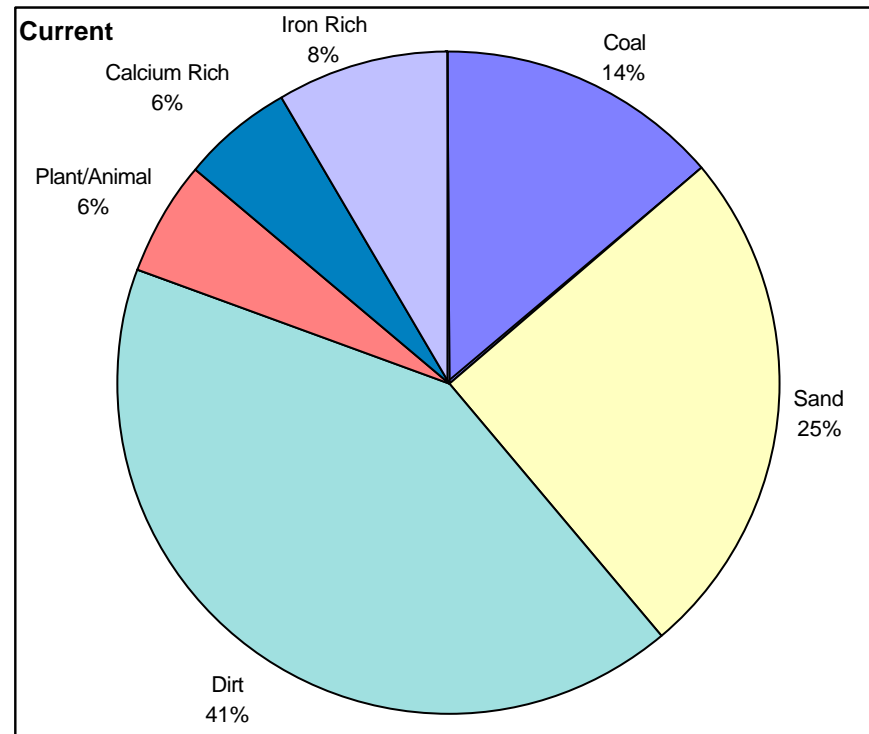
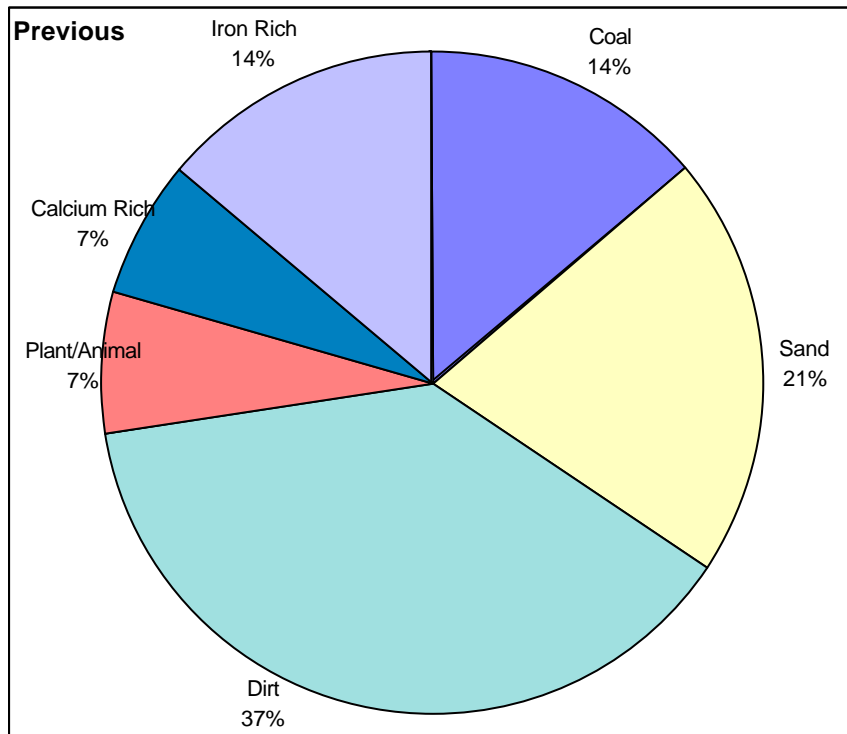
The “nuisance limit” was not exceeded and no samples reached within 10% of 200 mg/m²/day. The maximum fallout rate was 75 mg/m²/day and the average 46 mg/m²/day, the corresponding

values for 2003 were 90 and 50 mg/m²/day respectively. There was an 8% decrease in fallout rates compared to the previous year. The decrease was mainly due to less coal and sand.

Figure 1

Deposit Gauge Analysis Report Jeremy's Oil Distributors, Baldwins Crescent Comparison of Fallout Composition

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03

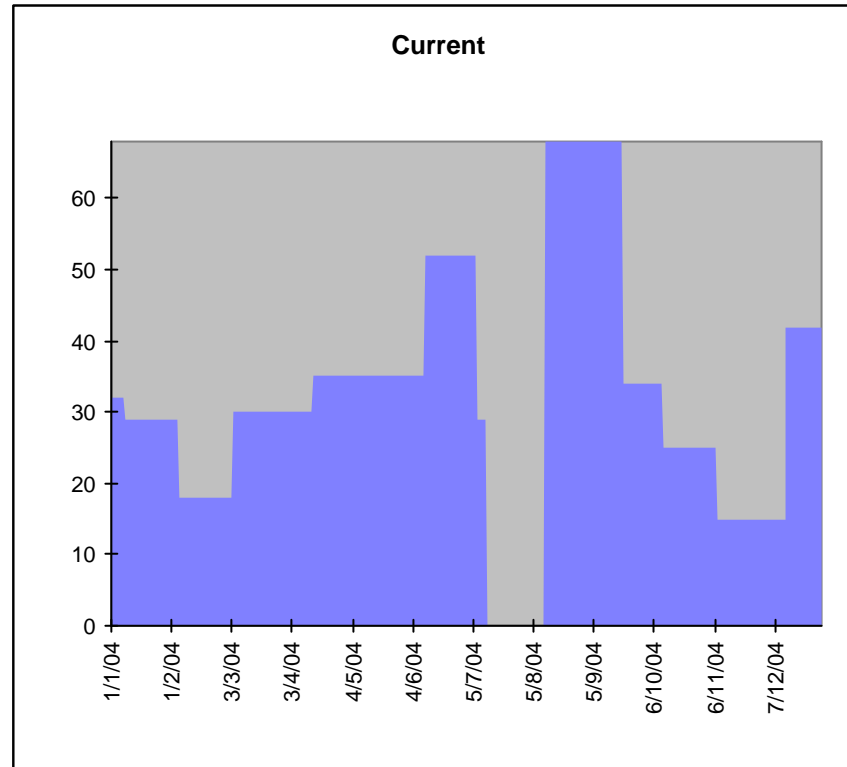
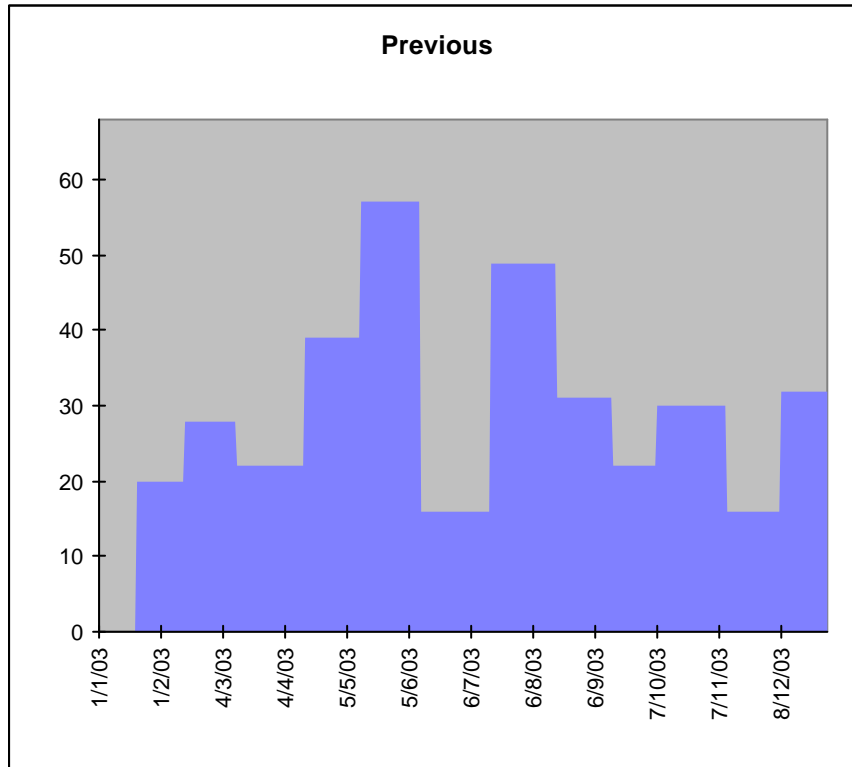


Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/M2/day)	Current	5	0	9	15	0	2	2	3	0
	Previous	4	0	6	11	0	2	2	4	0

Figure 2

Deposit Gauge Analysis Report Jeremy's Oil Distributors, Baldwins Crescent Comparison of Fallout Rate with Time

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



Period	Fallout Level (mg/M2/day)		No. Samples	% Data Capture	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Days within 10% of	Days Exceeding
Current	35	68	11	91.8	0	0
Previous	30	57	12	97.2	0	0
Change	5	Increase		17%		

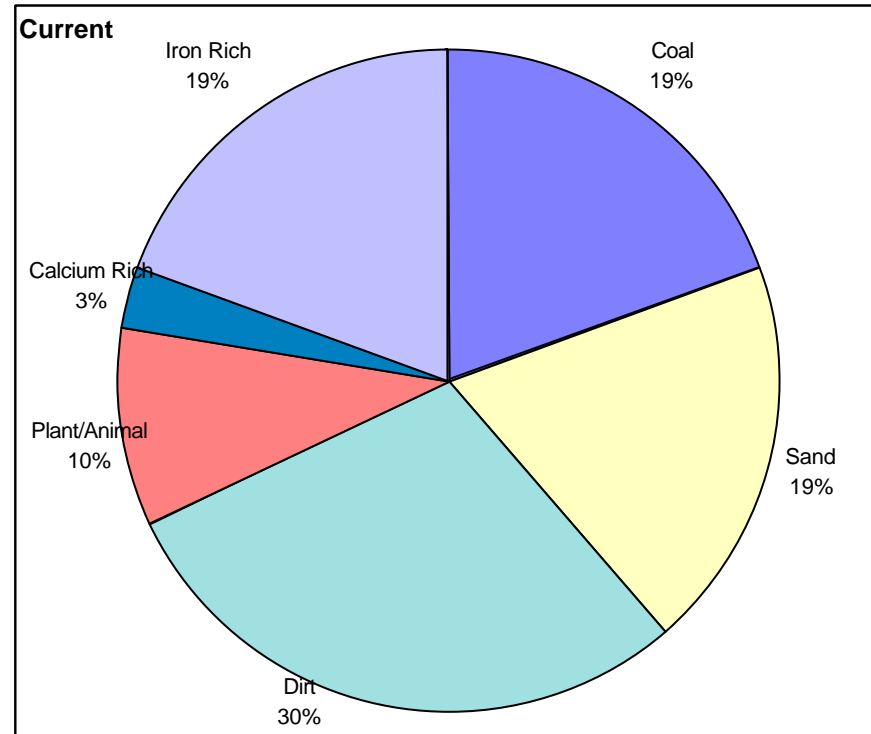
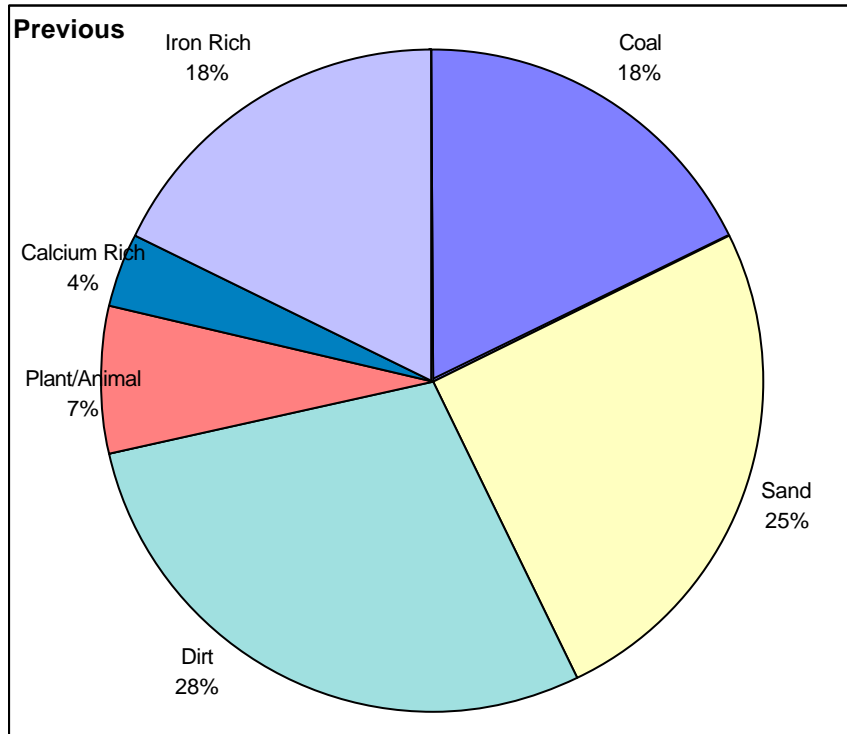
Figure 3

Deposit Gauge Analysis Report

Cil Carne Farm, Port Talbot

Comparison of Fallout Composition

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/M2/day)	Current	6	0	6	9	0	3	1	6	0
	Previous	5	0	7	8	0	2	1	5	0

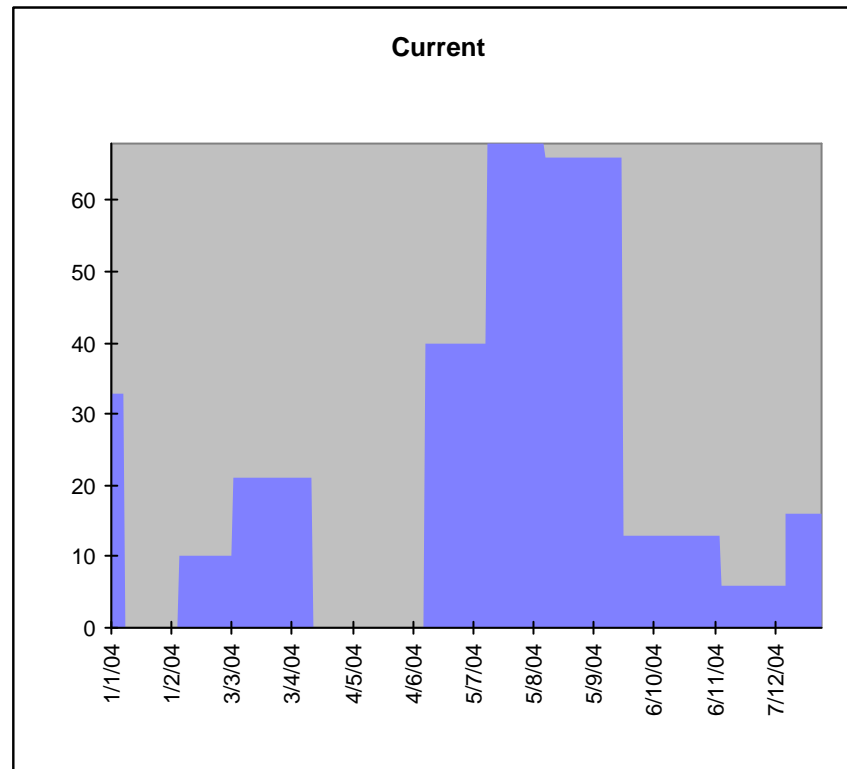
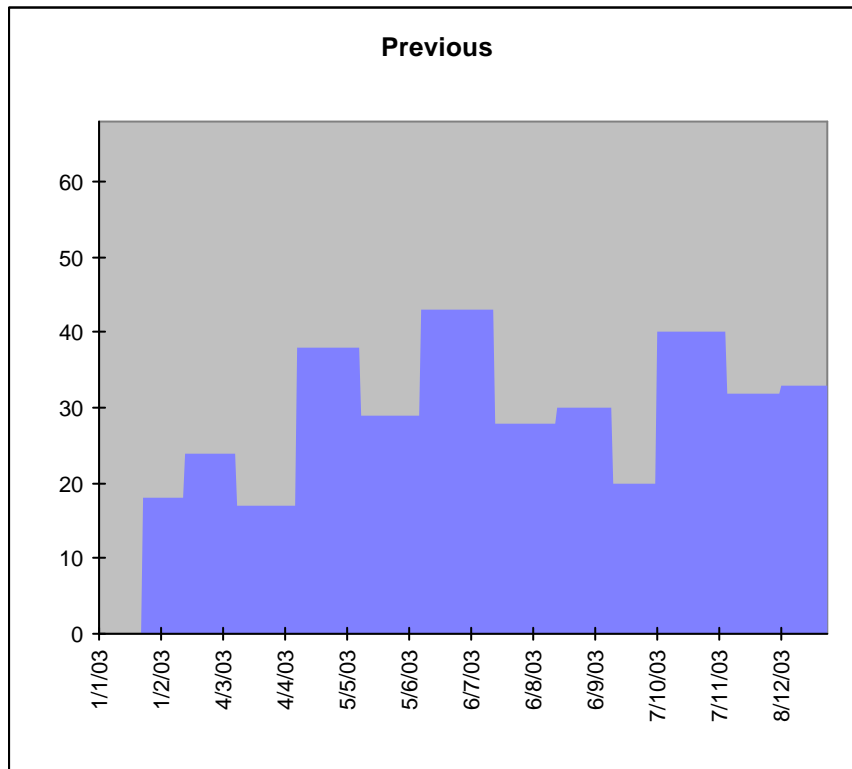
Figure 4

Deposit Gauge Analysis Report

Cil Carne Farm, Port Talbot

Comparison of Fallout Rate with Time

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



Period	Fallout Level (mg/M2/day)		No. Samples	% Data Capture	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Days within 10% of	Days Exceeding
Current	30	68	9	76.7	0	0
Previous	30	43	12	96.3	0	0
Change	0	No change		0%		

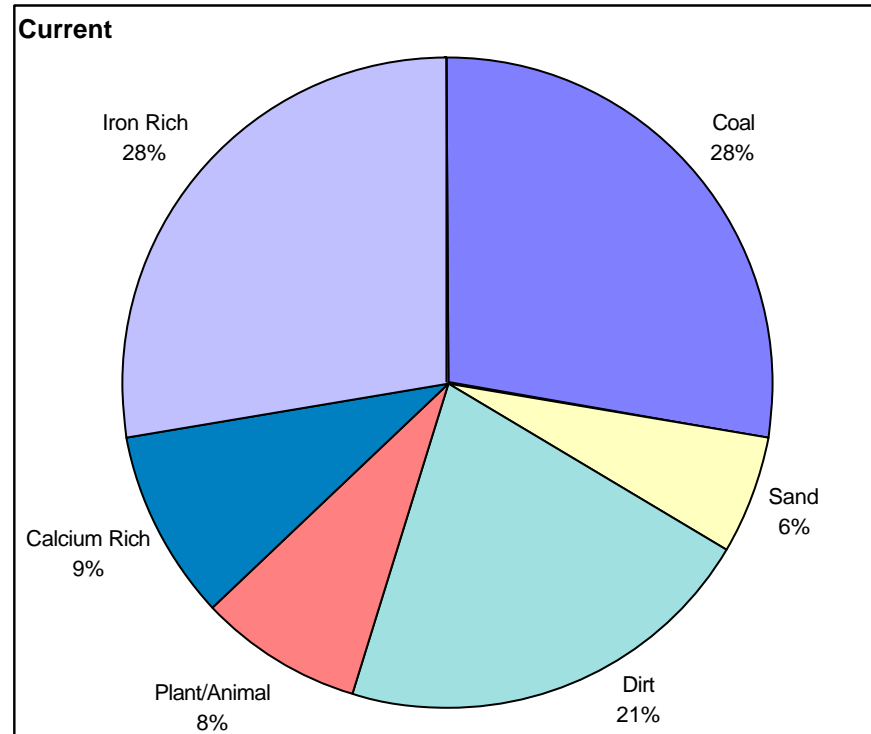
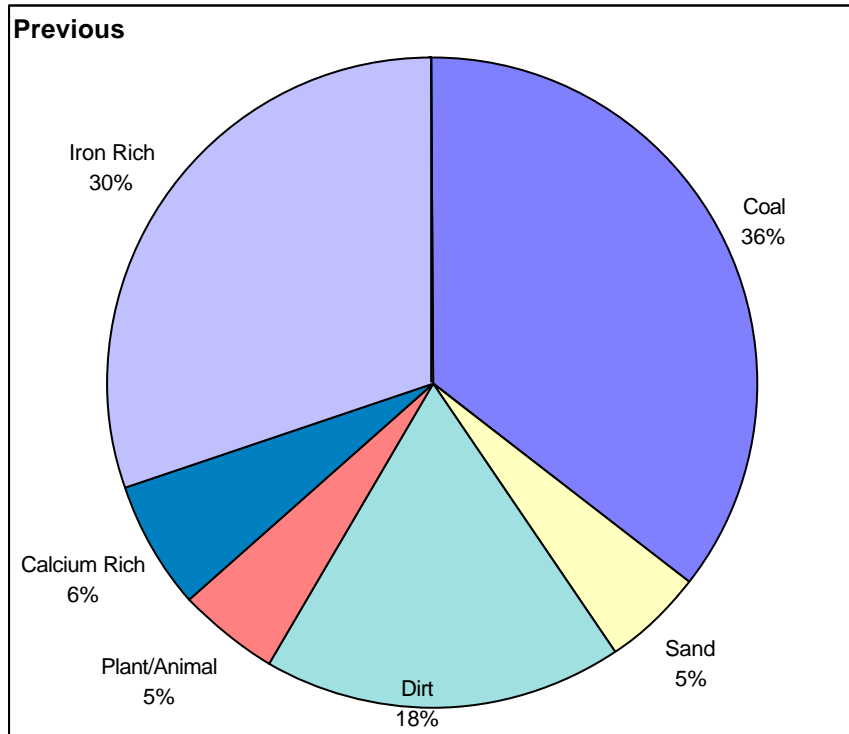
Figure 5

Deposit Gauge Analysis Report

24, Prince Street, Port Talbot

Comparison of Fallout Composition

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03

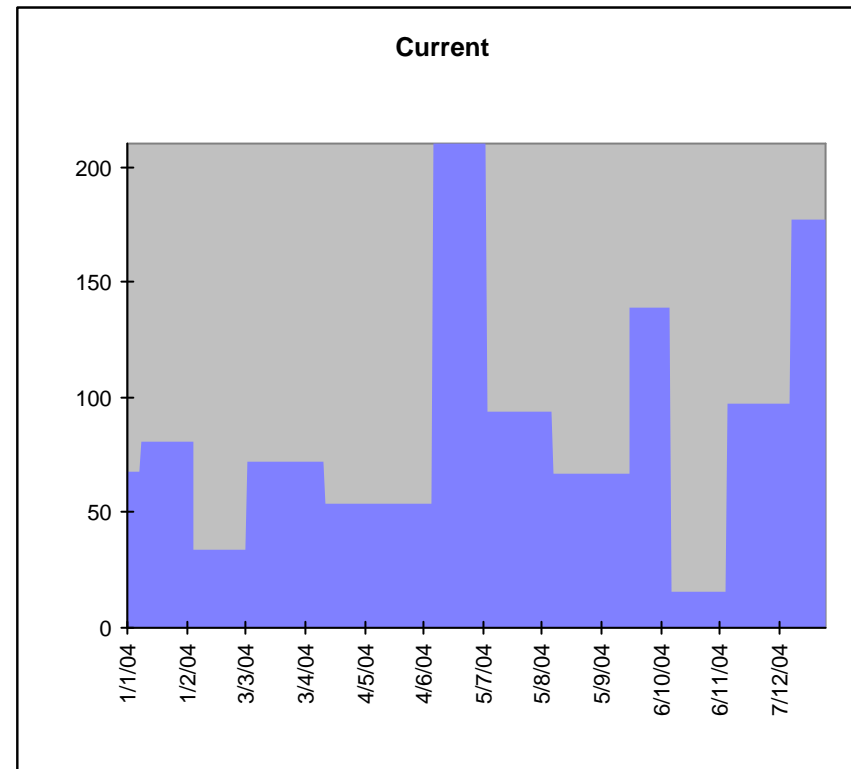
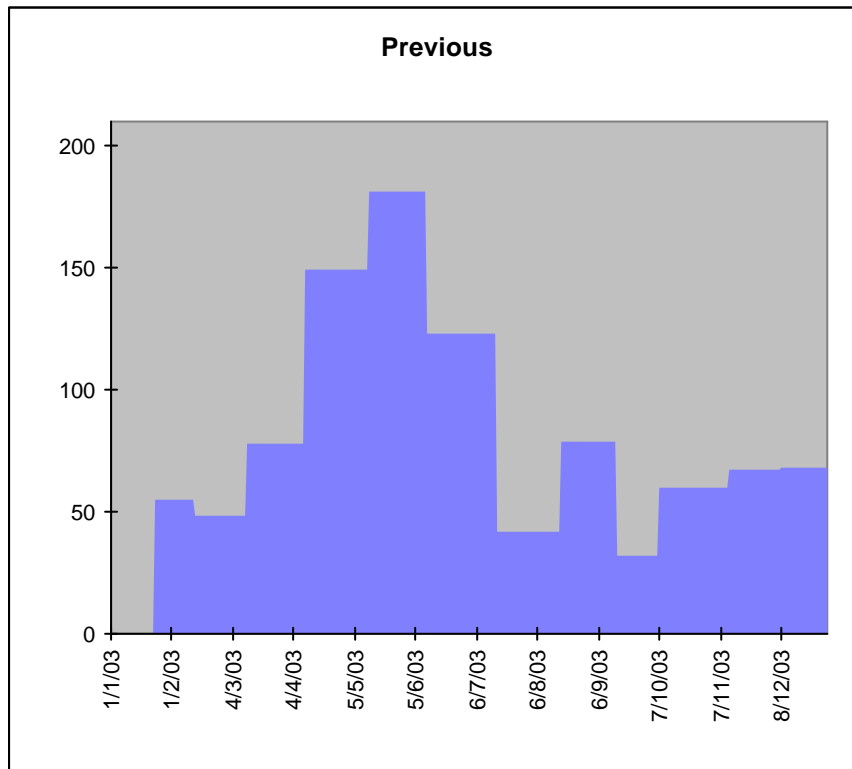


Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m ² /day)	Current	24	0	5	18	0	7	8	24	0
	Previous	28	0	4	14	0	4	5	24	0

Figure 6

Deposit Gauge Analysis Report 24, Prince Street, Port Talbot Comparison of Fallout Rate with Time

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



Period	Fallout Level (mg/M2/day)		No. Samples	% Data Capture	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Days within 10% of	Days Exceeding
Current	86	210	11	100.0	0	28
Previous	85	181	12	96.3	30	0
Change	1	Increase		1%		

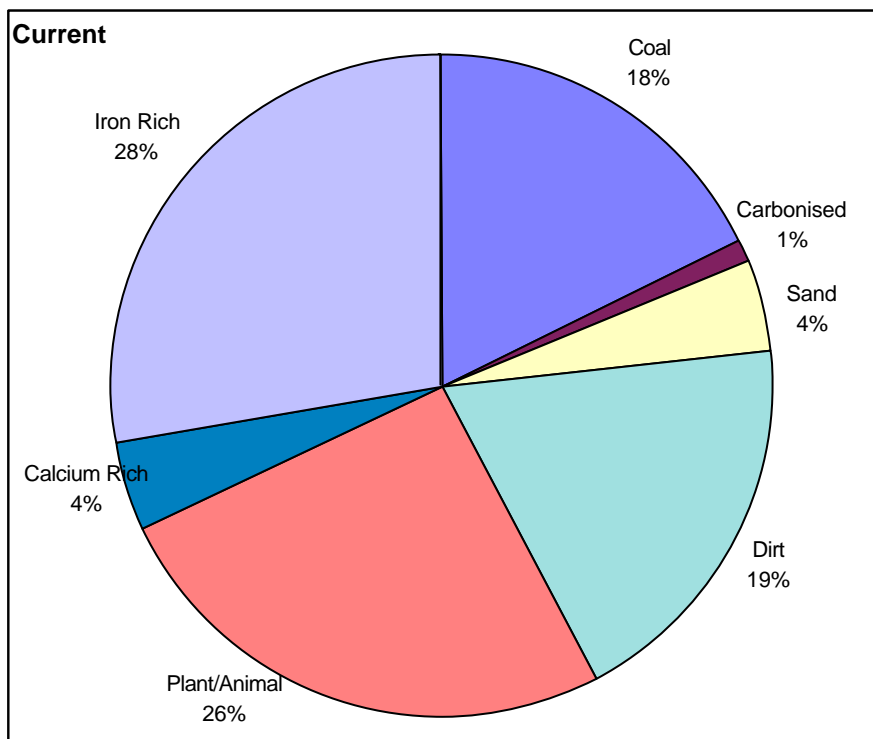
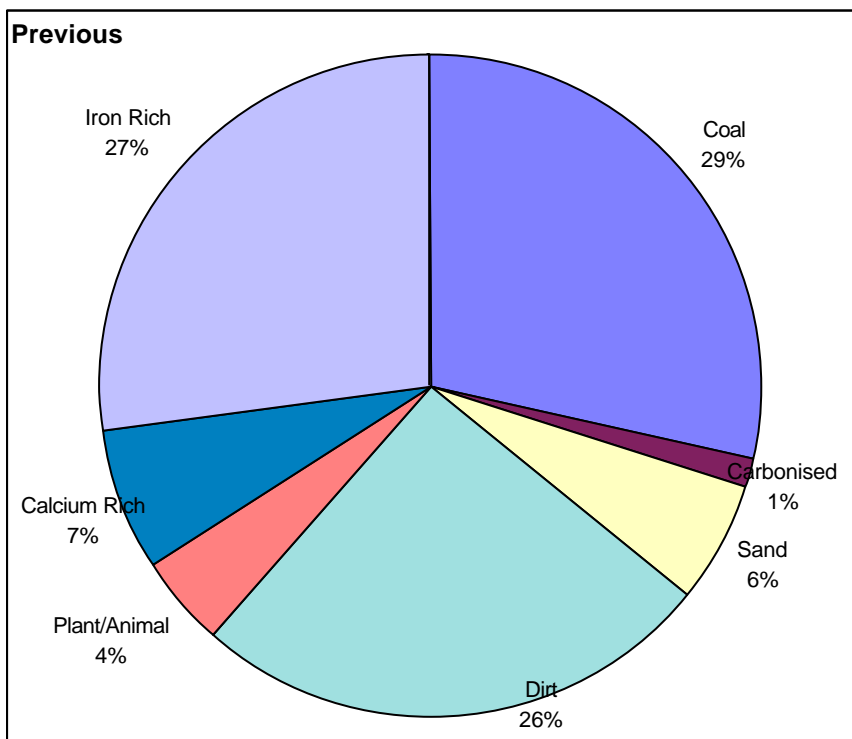
Figure 7

Deposit Gauge Analysis Report

Ffrwdwyllt House, Margam Road, Port Talbot

Comparison of Fallout Composition

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03

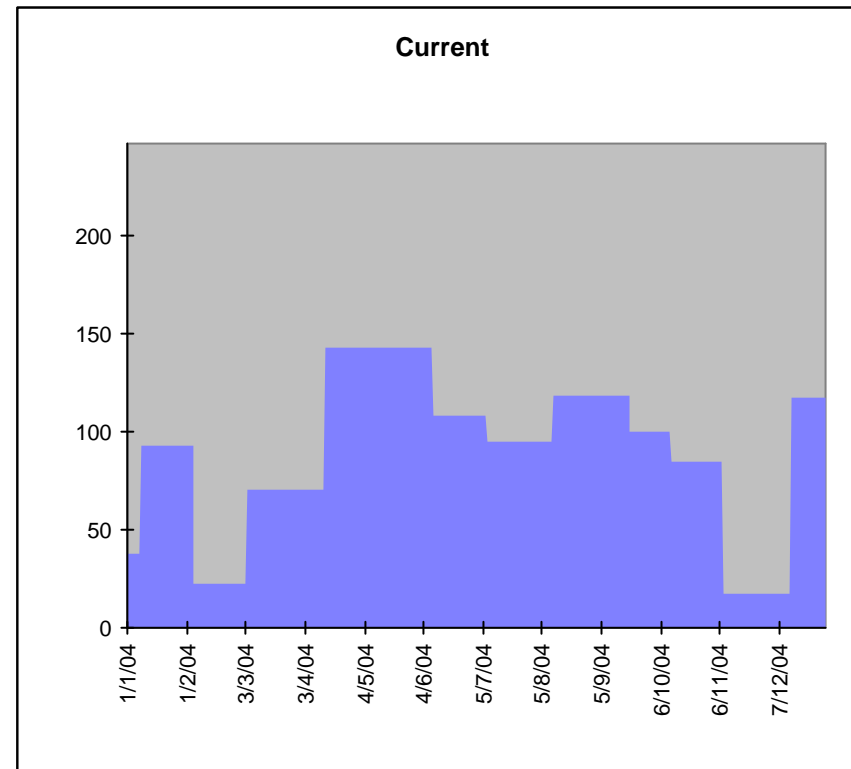
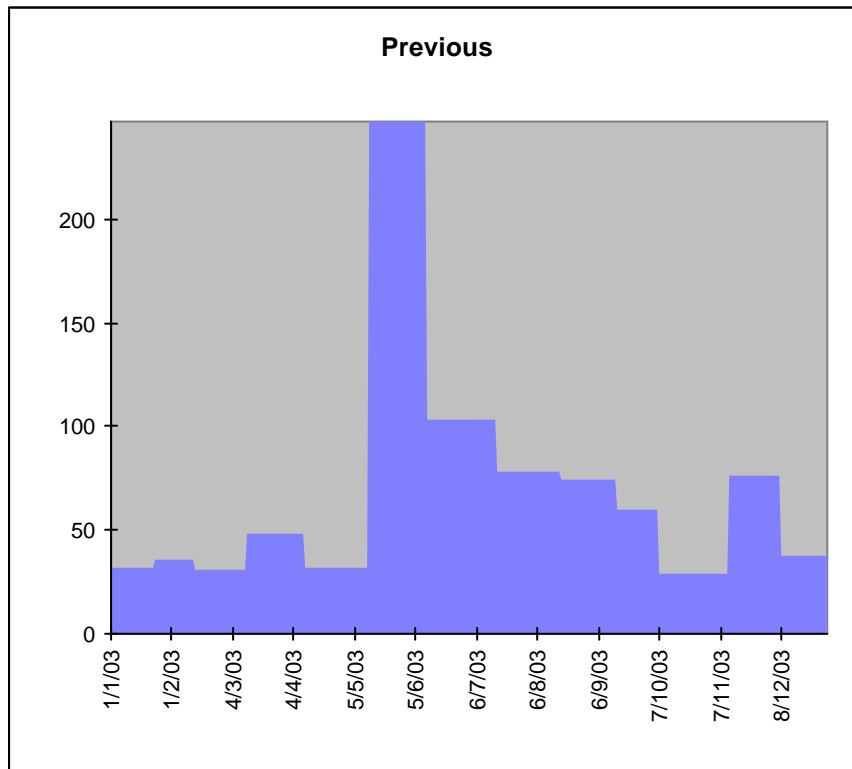


Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	16	1	4	17	0	23	4	25	0
	Previous	20	1	4	18	0	3	5	19	0

Figure 8

Deposit Gauge Analysis Report Ffrwdwyllt House, Margam Road, Port Talbot Comparison of Fallout Rate with Time

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03

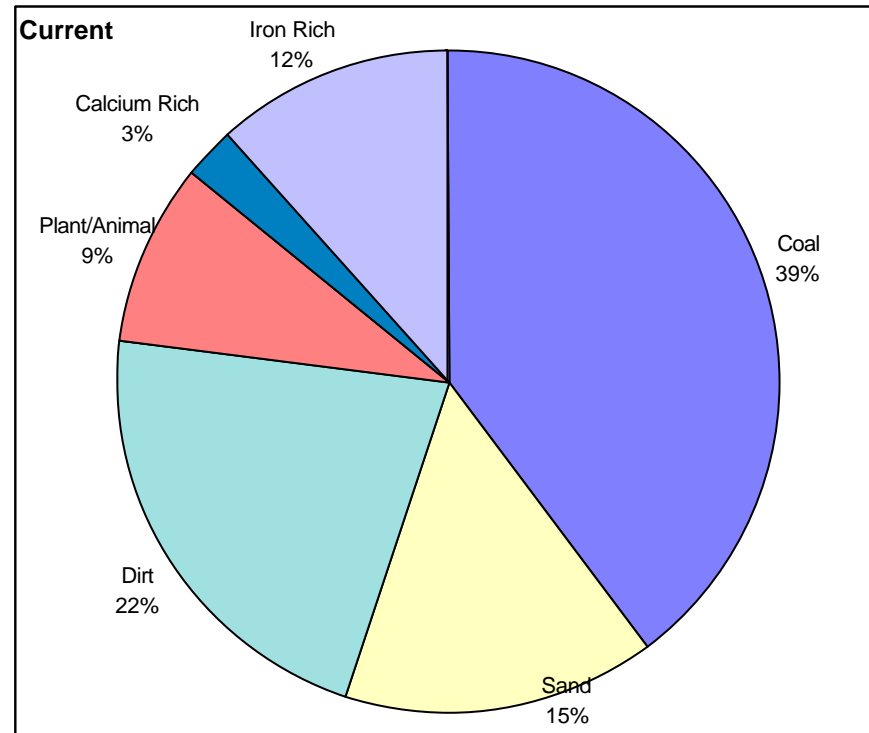
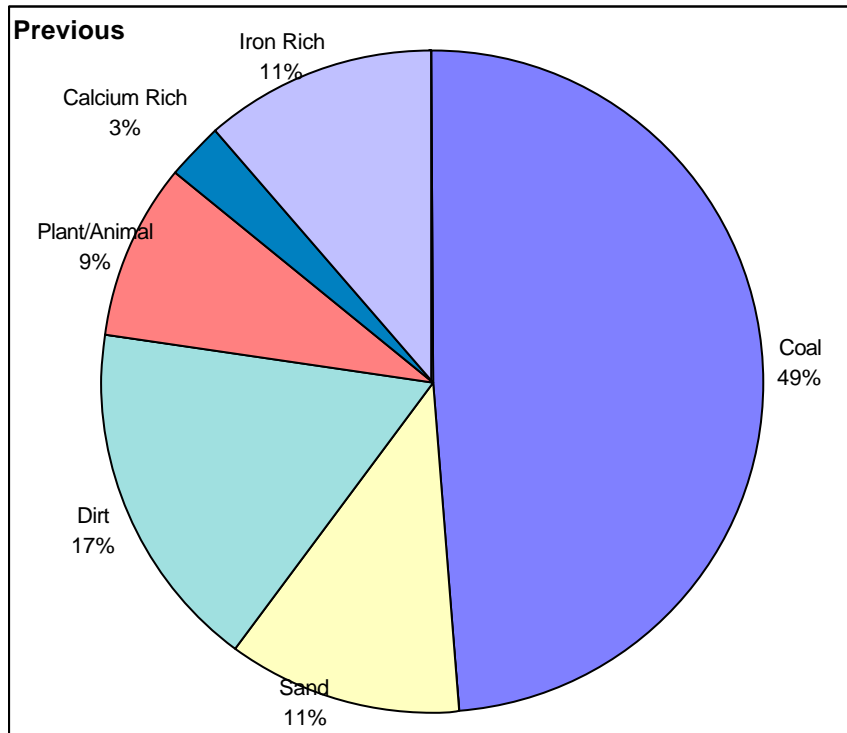


Period	Fallout Level (mg/M2/day)		No. Samples	% Data Capture	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Days within 10% of	Days Exceeding
Current	89	143	11	100.0	0	0
Previous	70	247	12	100.0	0	30
Change	19	Increase		27%		

Figure 9

Deposit Gauge Analysis Report Eglwys Nunydd Reservoir, Port Talbot Comparison of Fallout Composition

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03

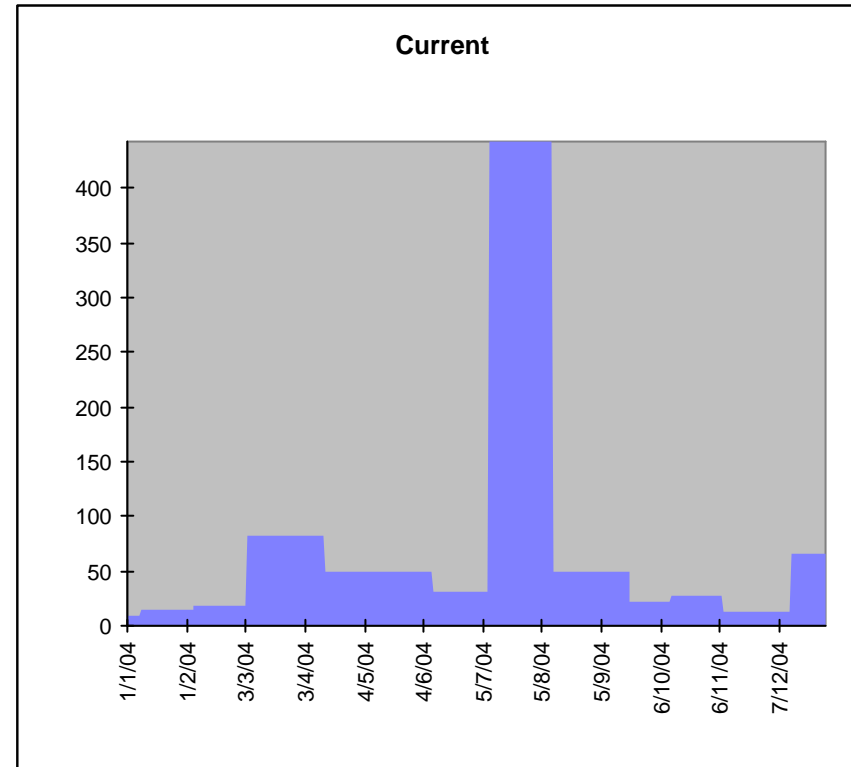
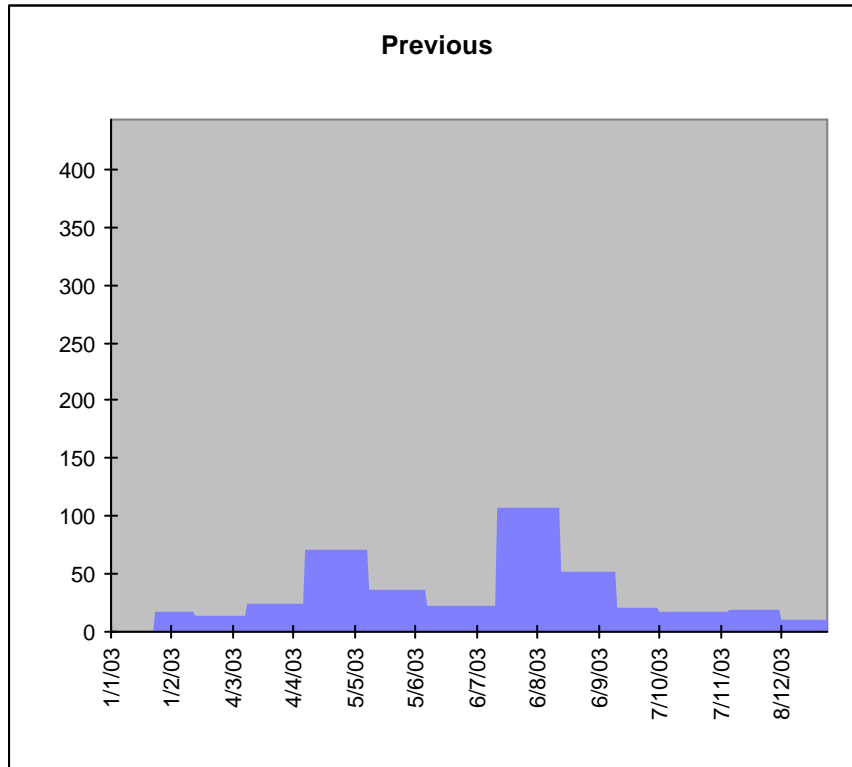


Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	31	0	12	17	0	7	2	9	0
	Previous	17	0	4	6	0	3	1	4	0

Figure 10

Deposit Gauge Analysis Report Eglwys Nunydd Reservoir, Port Talbot Comparison of Fallout Rate with Time

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



Period	Fallout Level (mg/M2/day)		No. Samples	% Data Capture	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Days within 10% of	Days Exceeding
Current	77	443	11	100.0	0	34
Previous	36	107	12	96.3	0	0
Change	41	Increase		114%		

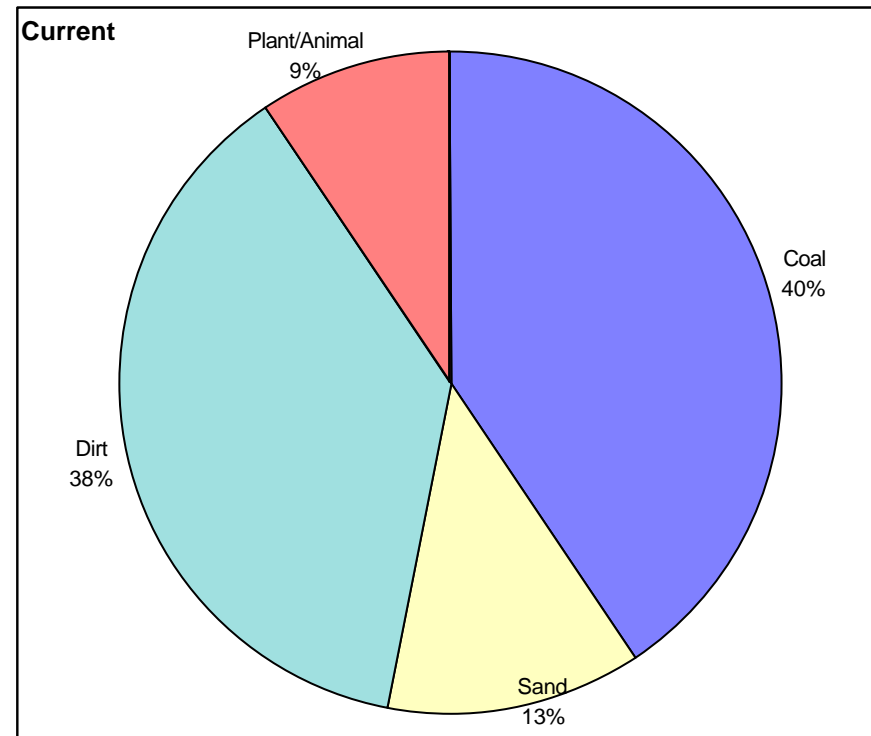
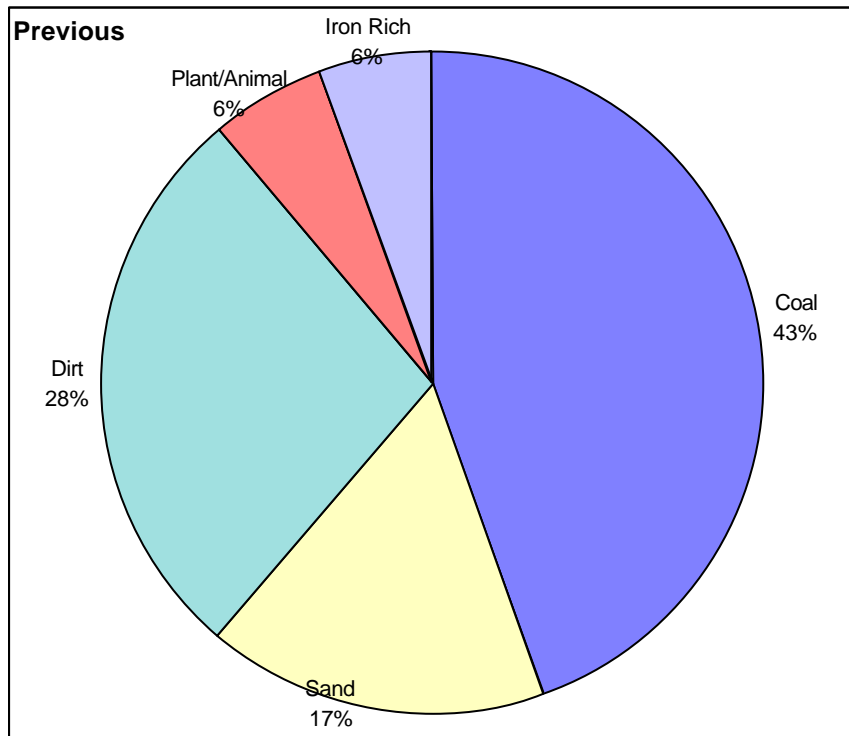
Figure 11

Deposit Gauge Analysis Report

Primary School, Gwaen Cae Gurwen

Comparison of Fallout Composition

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	13	0	4	12	0	3	0	0	0
	Previous	8	0	3	5	0	1	0	1	0

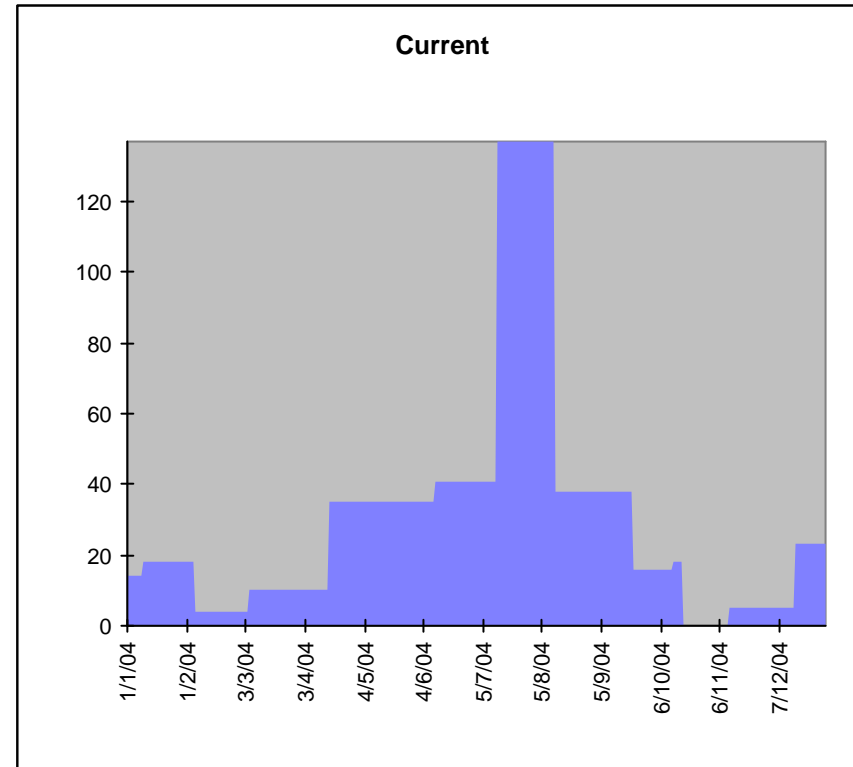
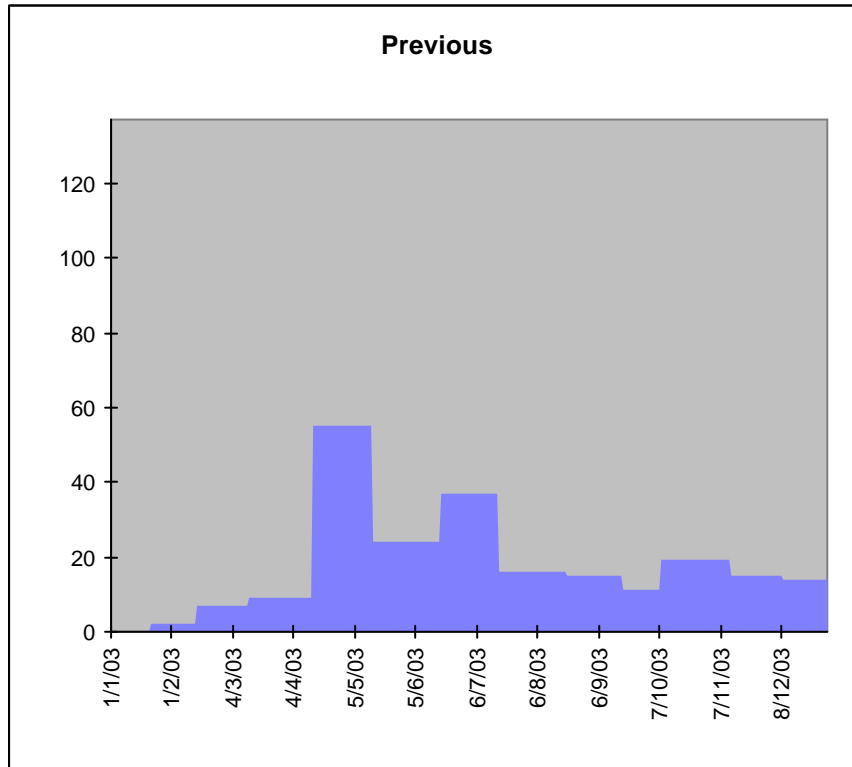
Figure 12

Deposit Gauge Analysis Report

Primary School, Gwaen Cae Gurwen

Comparison of Fallout Rate with Time

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03

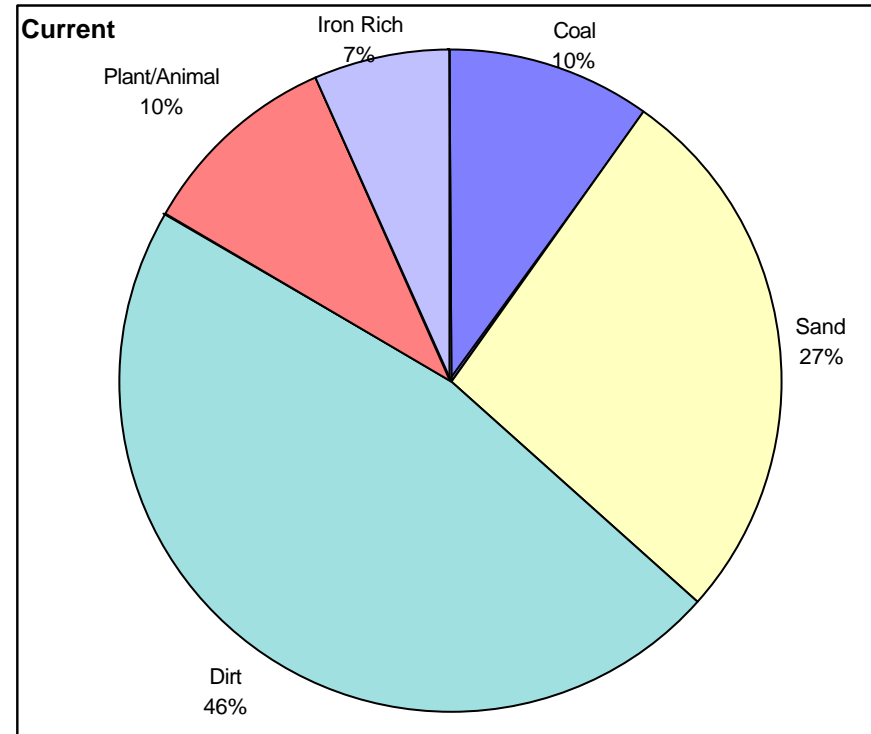
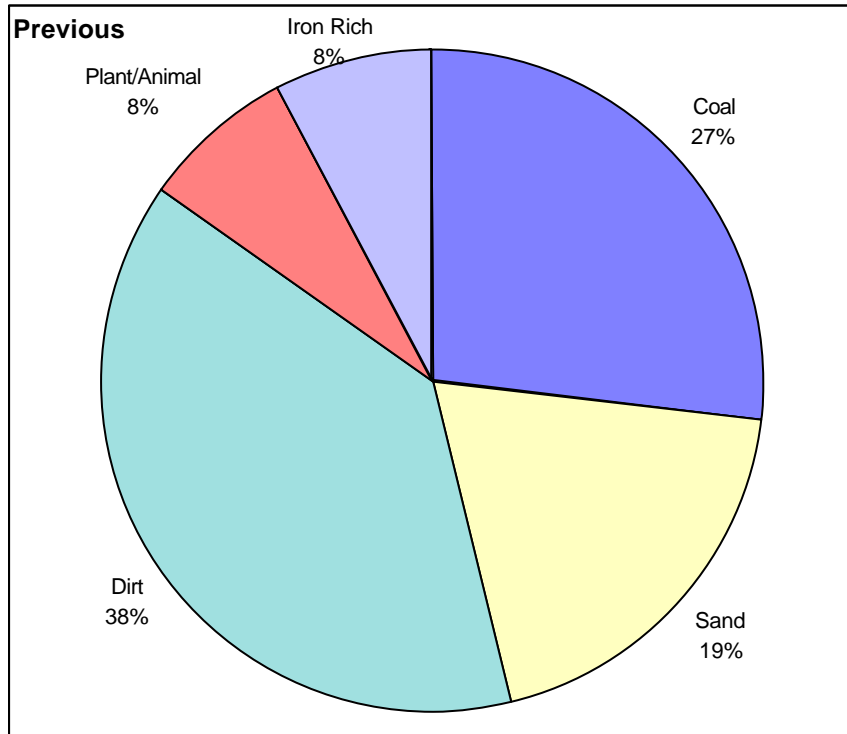


Period	Fallout Level (mg/M2/day)		No. Samples	% Data Capture	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Days within 10% of	Days Exceeding
Current	33	137	11	93.4	0	0
Previous	19	55	12	96.9	0	0
Change	14	Increase		74%		

Figure 13

Deposit Gauge Analysis Report Workingmens Club, Tairgwaith Comparison of Fallout Composition

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	3	0	8	14	0	3	0	2	0
	Previous	7	0	5	10	0	2	0	2	0

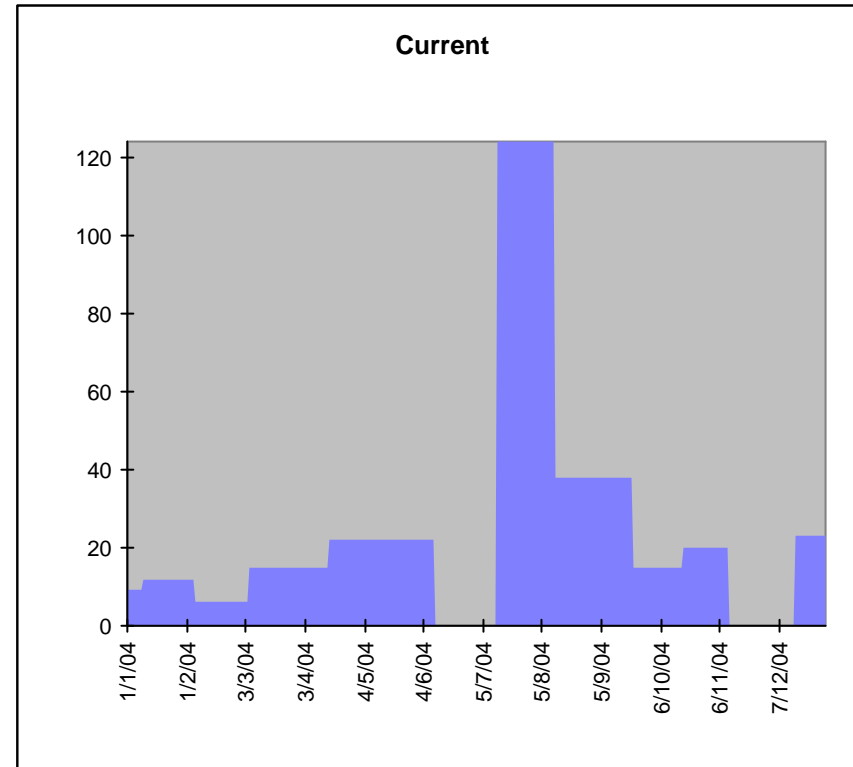
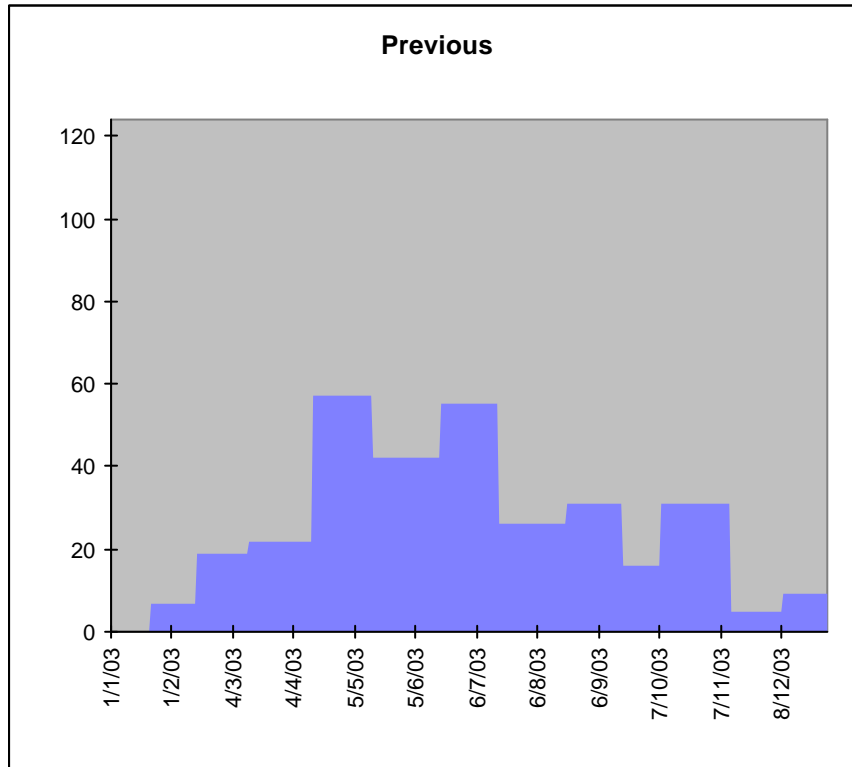
Figure 14

Deposit Gauge Analysis Report

Workingmens Club, Tairgwaith

Comparison of Fallout Rate with Time

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



Period	Fallout Level (mg/M2/day)		No. Samples	% Data Capture	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Days within 10% of	Days Exceeding
Current	30	124	9	81.9	0	0
Previous	28	57	12	96.9	0	0
Change	2	Increase		7%		

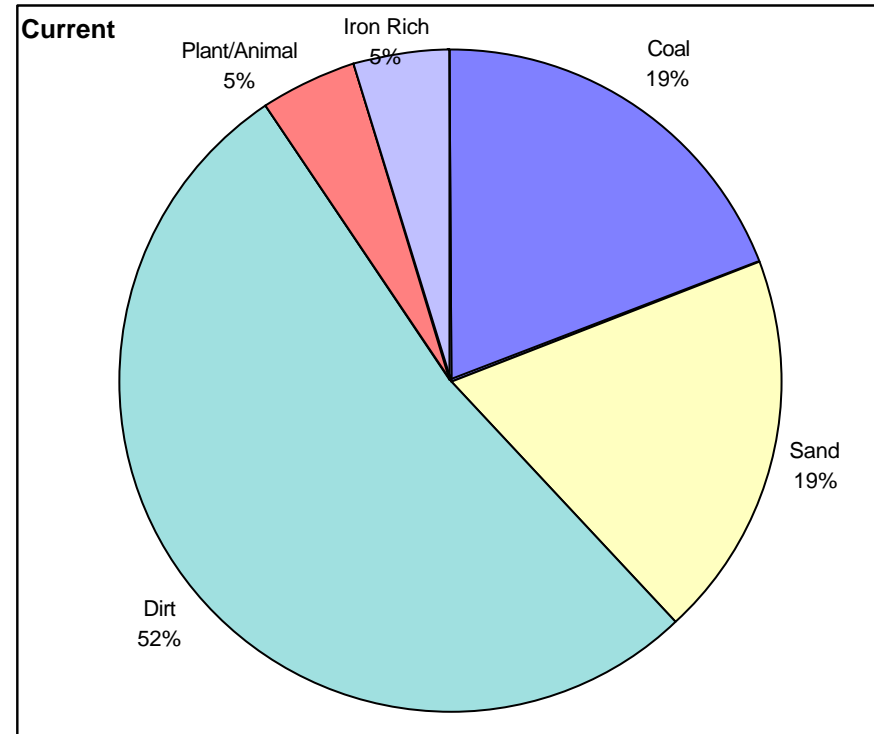
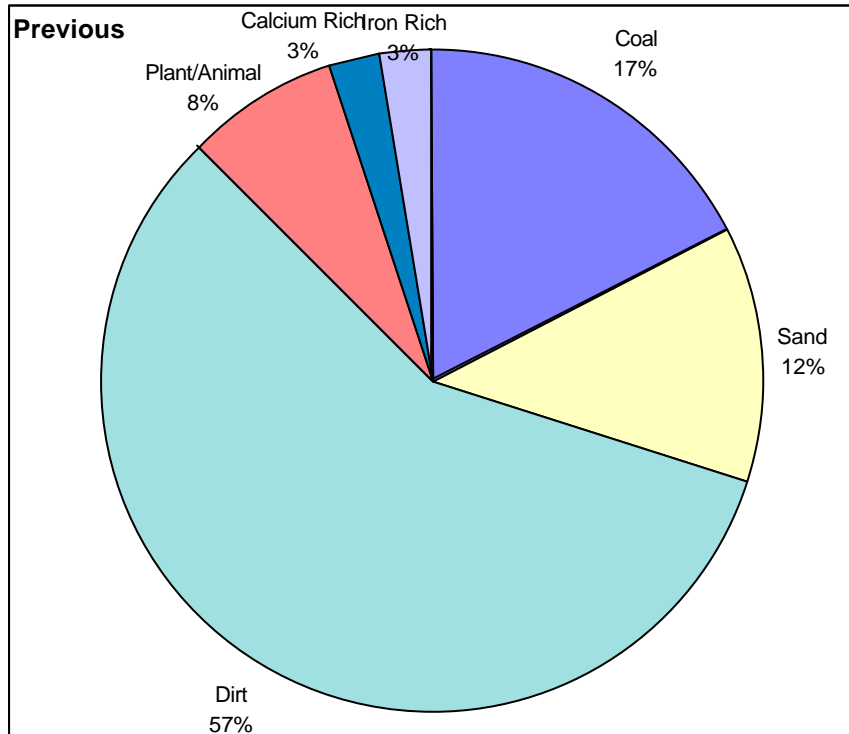
Figure 15

Deposit Gauge Analysis Report

41, Parish Road, Cwmgwrach

Comparison of Fallout Composition

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	4	0	4	11	0	1	0	1	0
	Previous	7	0	5	23	0	3	1	1	0

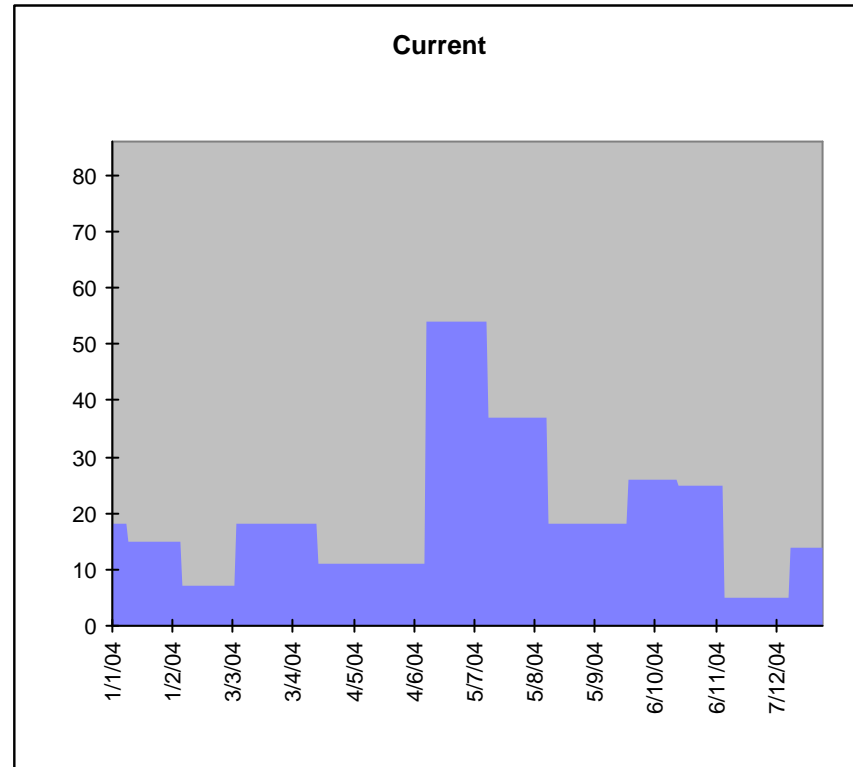
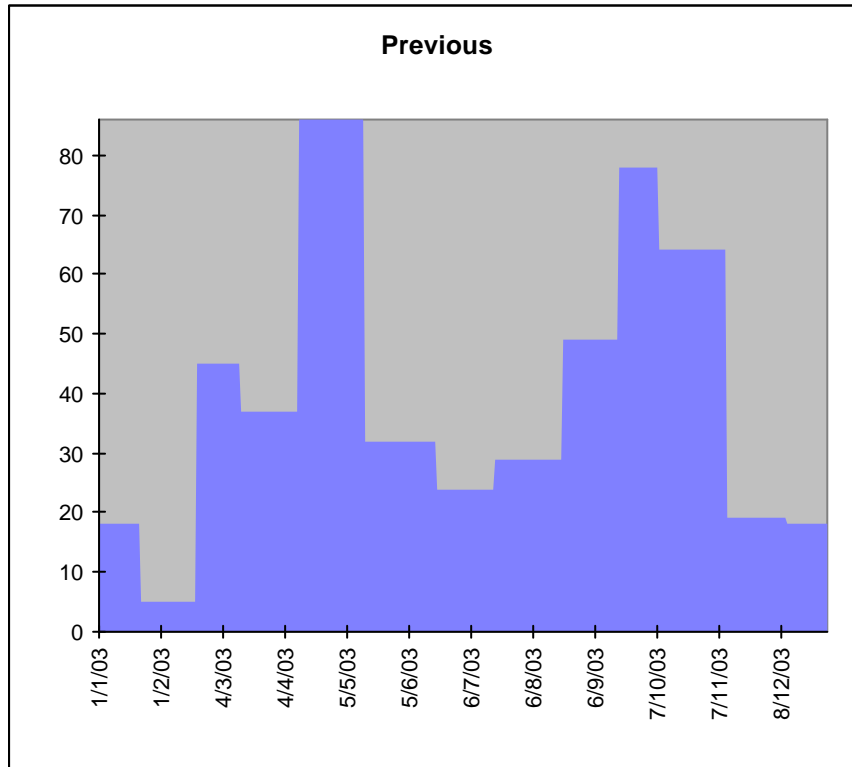
Figure 16

Deposit Gauge Analysis Report

41, Parish Road, Cwmgwrach

Comparison of Fallout Rate with Time

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03

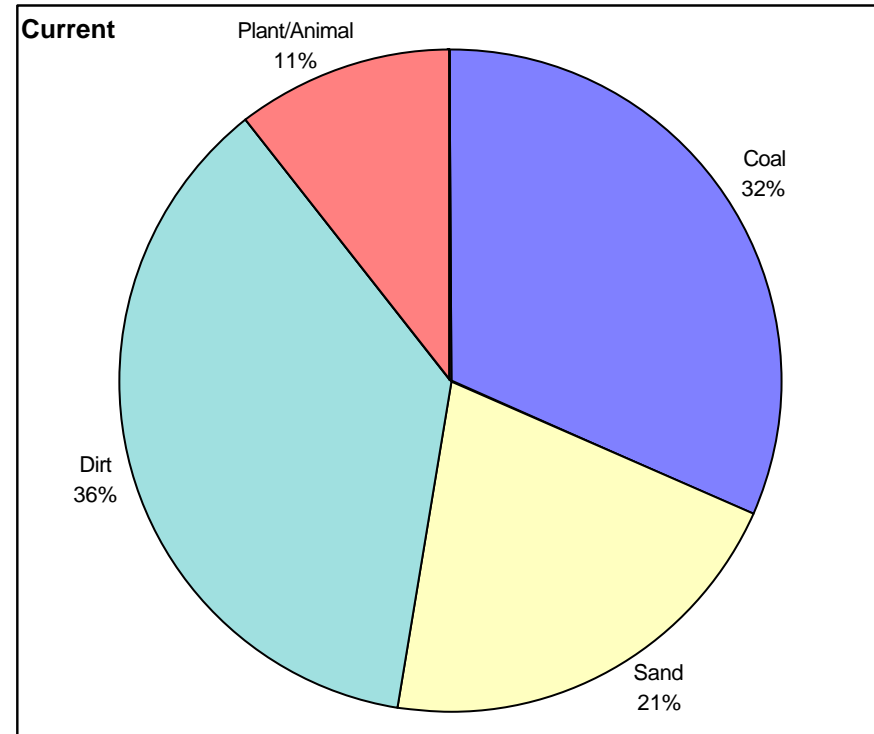
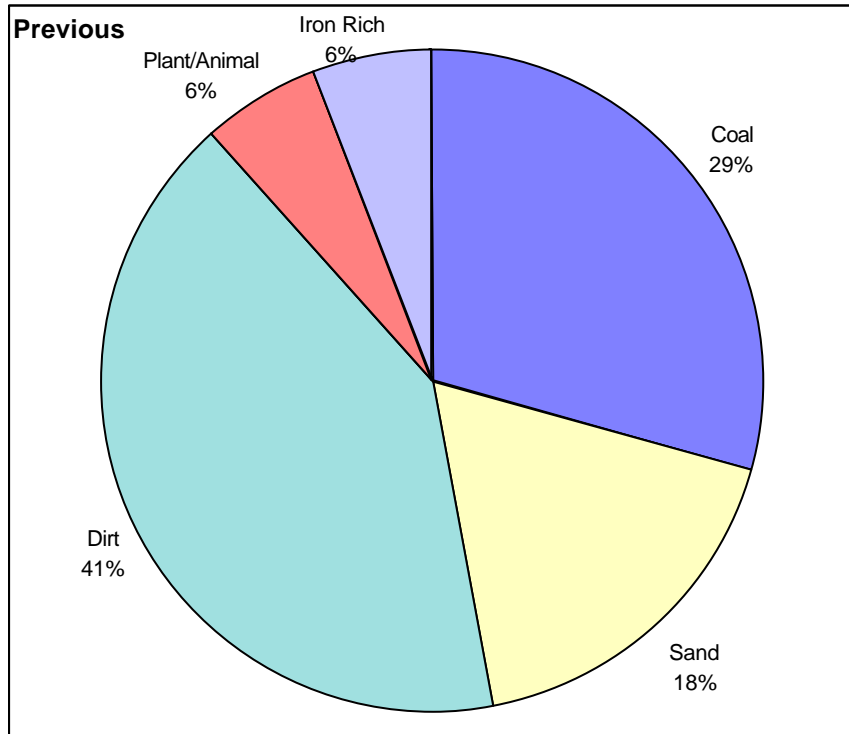


Period	Fallout Level (mg/M2/day)		No. Samples	% Data Capture	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Days within 10% of	Days Exceeding
Current	20	54	11	100.0	0	0
Previous	39	86	12	100.0	0	0
Change	-19	Decrease				-49%

Figure 17

Deposit Gauge Analysis Report 2, Llygad Yr Haul, Glynneath Comparison of Fallout Composition

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03

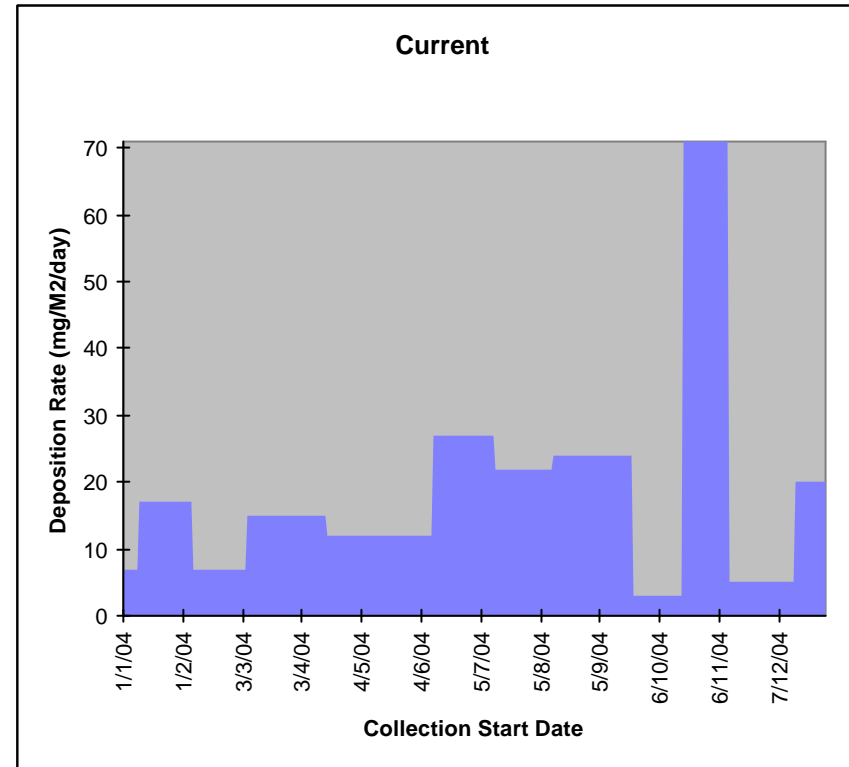
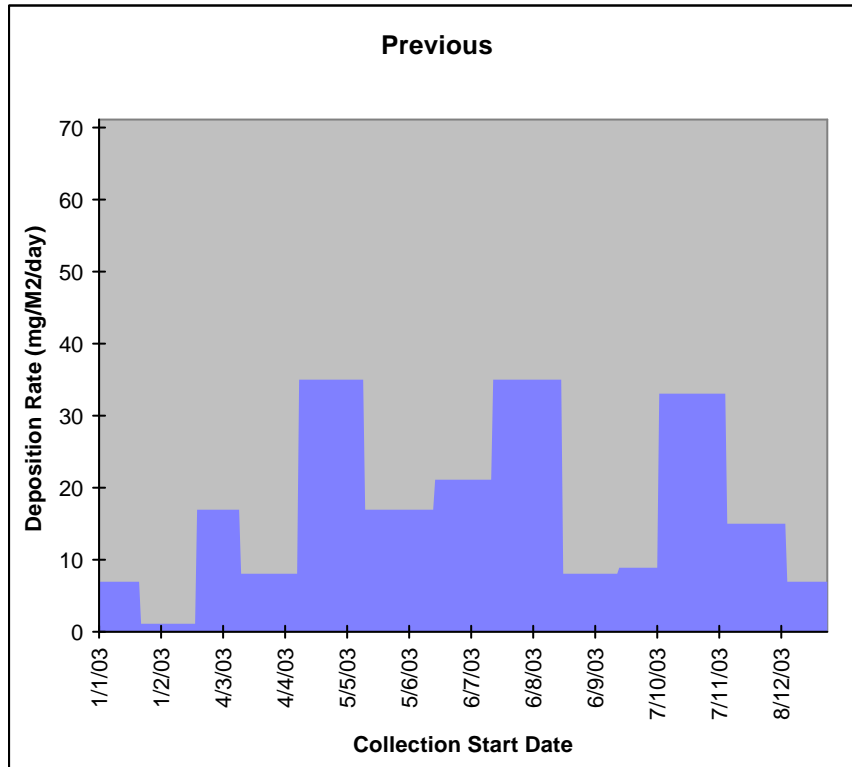


Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	6	0	4	7	0	2	0	0	0
	Previous	5	0	3	7	0	1	0	1	0

Figure 18

Deposit Gauge Analysis Report 2, Llygad Yr Haul, Glynneath Comparison of Fallout Rate with Time

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03

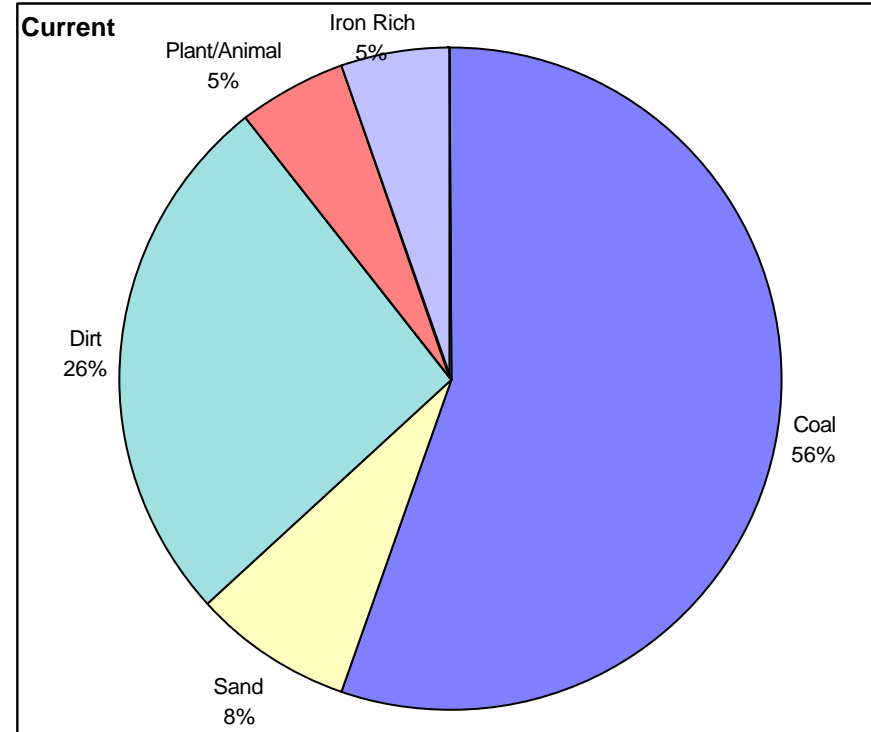
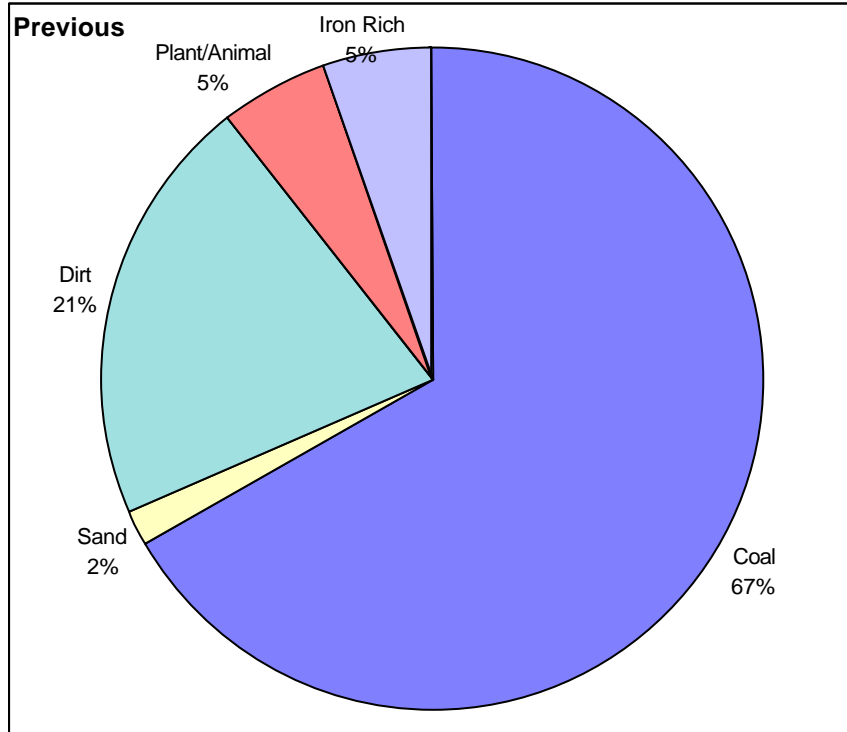


Period	Fallout Level (mg/M2/day)		No. Samples	% Data Capture	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Days within 10% of	Days Exceeding
Current	19	71	11	100.0	0	0
Previous	18	35	12	100.0	0	0
Change	1	Increase		6%		

Figure 19

Deposit Gauge Analysis Report 11, Wembley Avenue, Onllwyn Comparison of Fallout Composition

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	21	0	3	10	0	2	0	2	0
	Previous	38	0	1	12	0	3	0	3	0

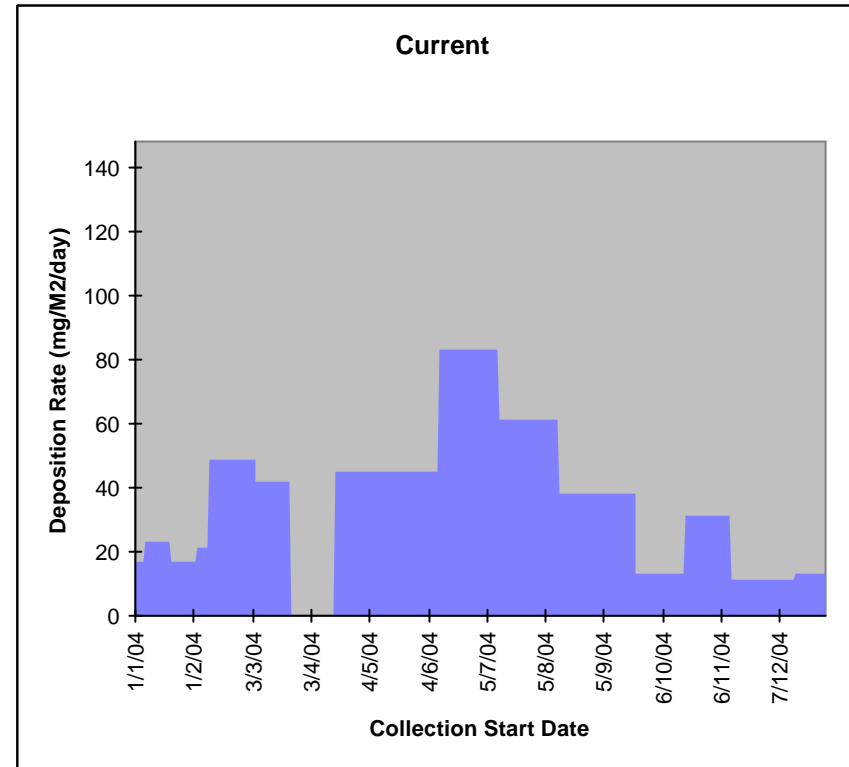
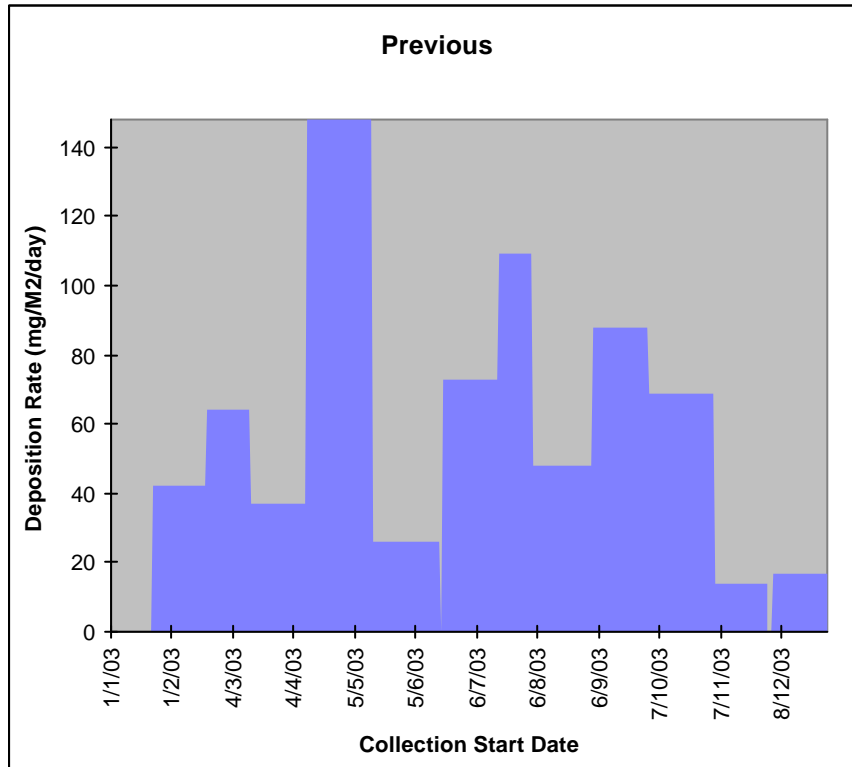
Figure 20

Deposit Gauge Analysis Report

11, Wembley Avenue, Onllwyn

Comparison of Fallout Rate with Time

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



Period	Fallout Level (mg/M2/day)		No. Samples	% Data Capture	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Days within 10% of	Days Exceeding
Current	38	83	13	93.4	0	0
Previous	60	148	12	95.5	0	0
Change	-22	Decrease		-37%		

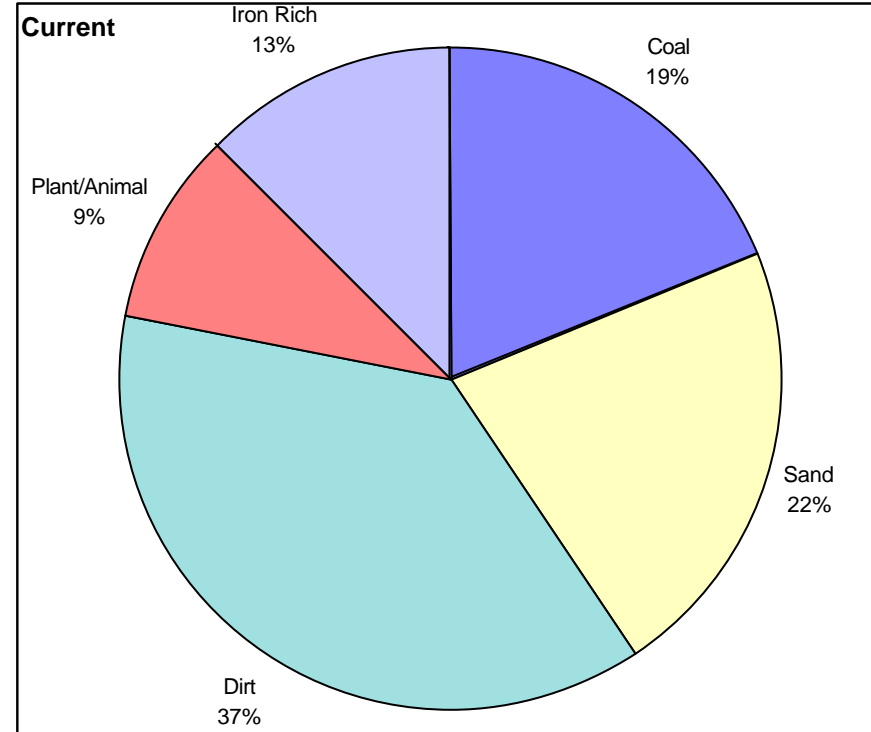
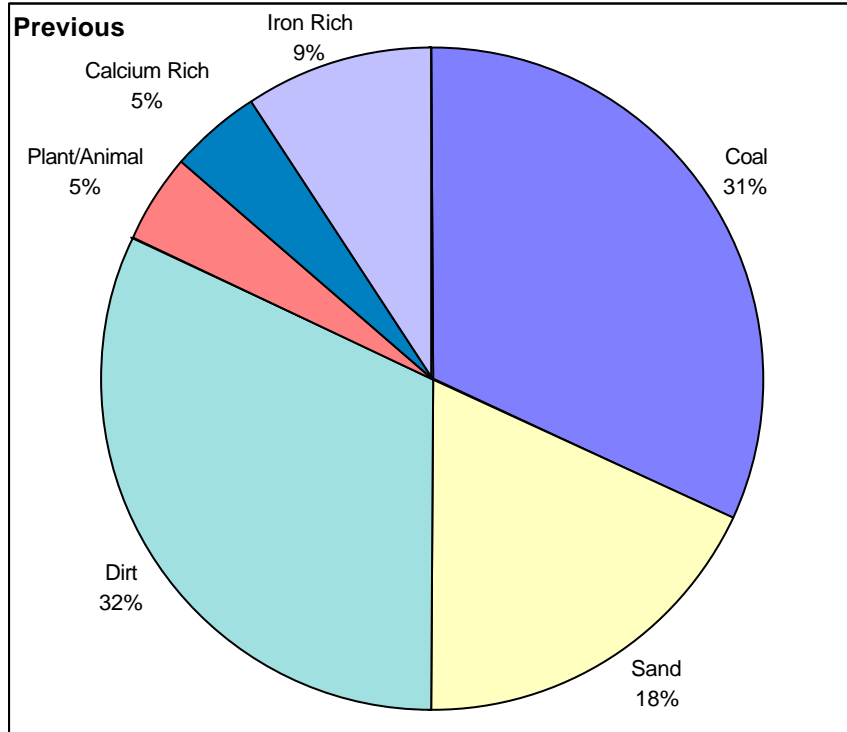
Figure 21

Deposit Gauge Analysis Report

Cardonnel Road, Skewen

Comparison of Fallout Composition

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	6	0	7	12	0	3	0	4	0
	Previous	7	0	4	7	0	1	1	2	0

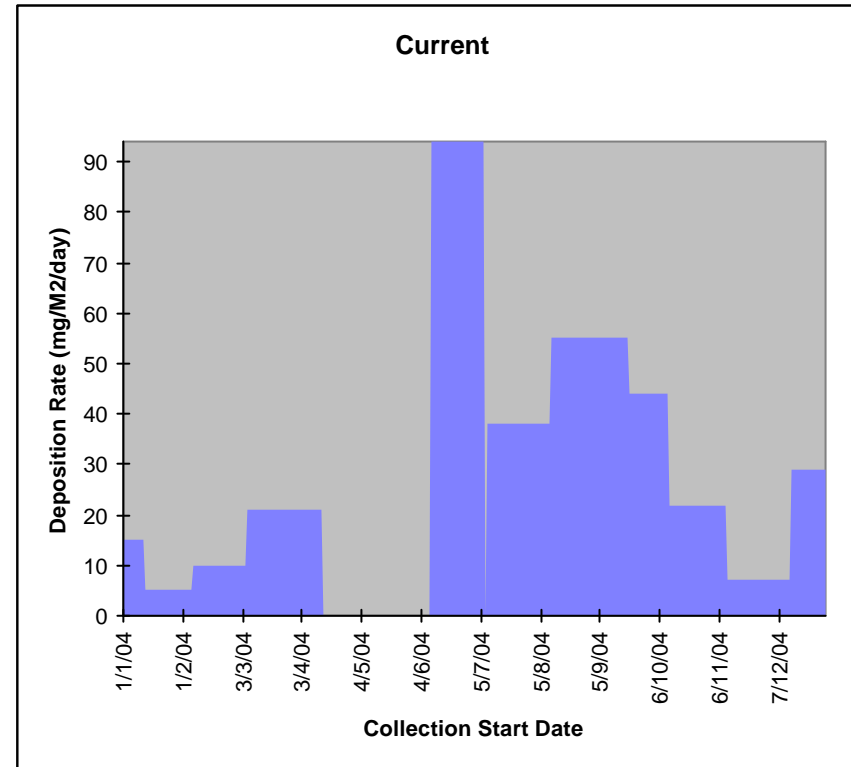
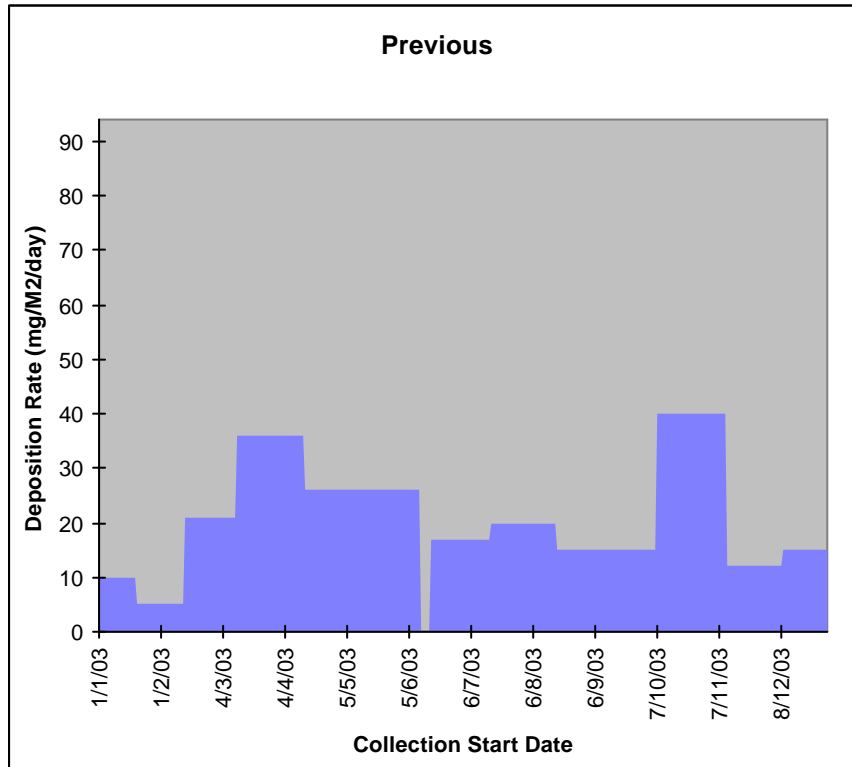
Figure 22

Deposit Gauge Analysis Report

Cardonnel Road, Skewen

Comparison of Fallout Rate with Time

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



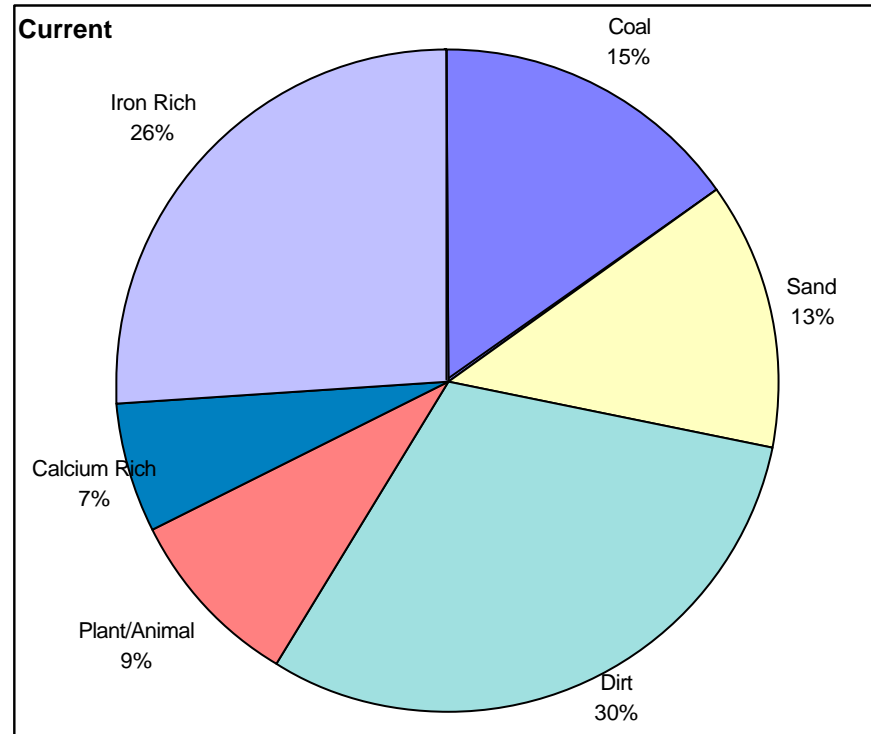
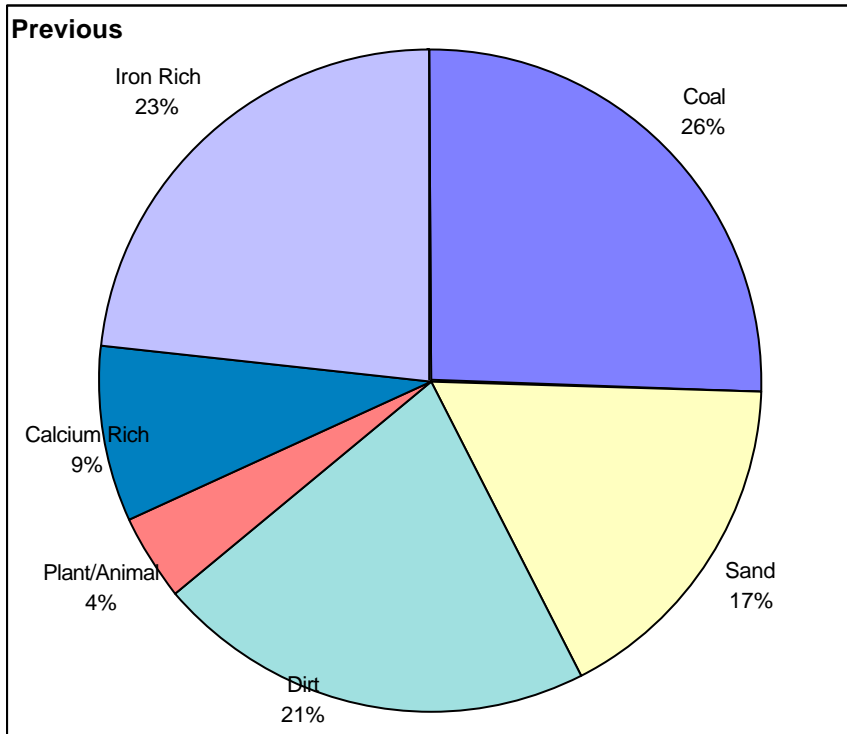
Period	Fallout Level (mg/M2/day)		No. Samples	% Data Capture	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Days within 10% of	Days Exceeding
Current	32	94	10	84.4	0	0
Previous	21	40	12	98.6	0	0
Change	11	Increase		52%		

Figure 23

Deposit Gauge Analysis Report Little Warren, Port Talbot

Comparison of Fallout Composition

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/M2/day)	Current	7	0	6	14	0	4	3	12	0
	Previous	12	0	8	10	0	2	4	11	0

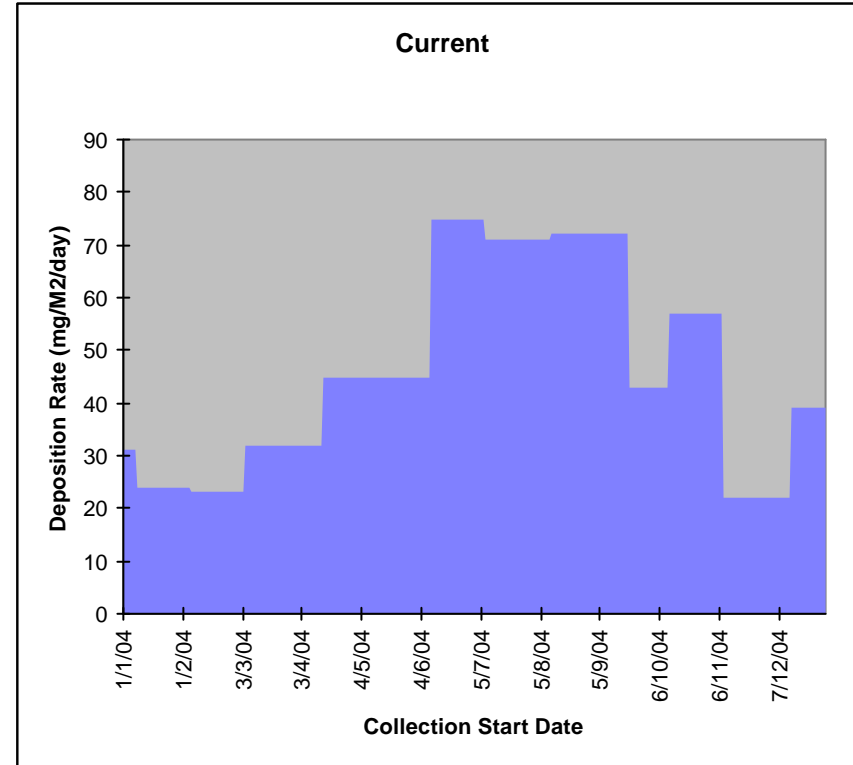
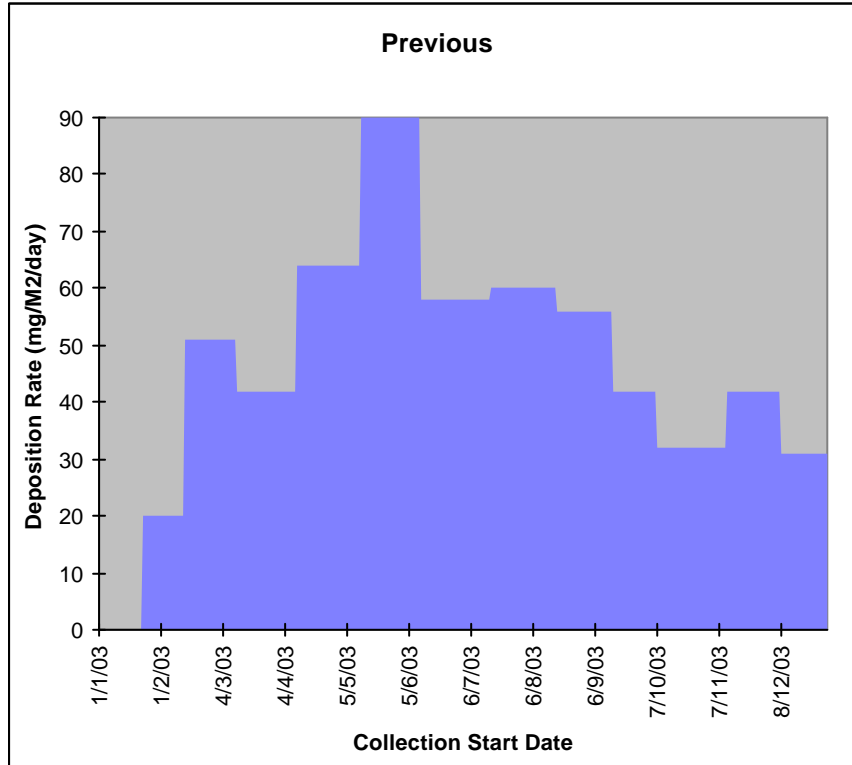
Figure 24

Deposit Gauge Analysis Report

Little Warren, Port Talbot

Comparison of Fallout Rate with Time

Current Period = 01-Jan-04 to 31-Dec-04
 Previous Period = 01-Jan-03 to 31-Dec-03



Period	Fallout Level (mg/M2/day)		No. Samples	% Data Capture	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Days within 10% of	Days Exceeding
Current	46	75	11	100.0	0	0
Previous	50	90	12	96.3	0	0
Change	-4	Decrease		-8%		

Figure 25 Deposit gauge locations

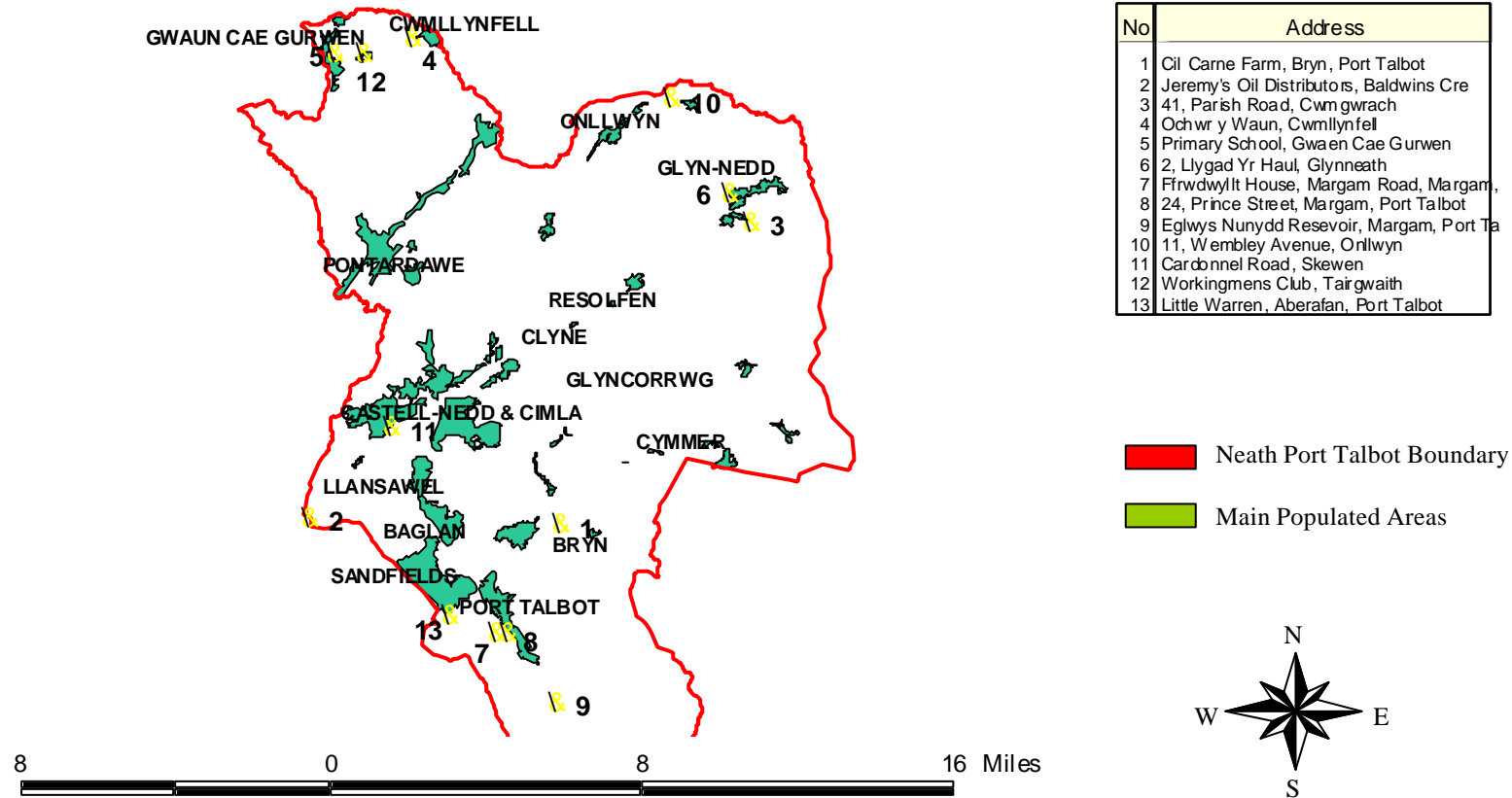


Figure 26 Comparison of average fallout rates, 2004.

Comparison of average fallout rates for current period

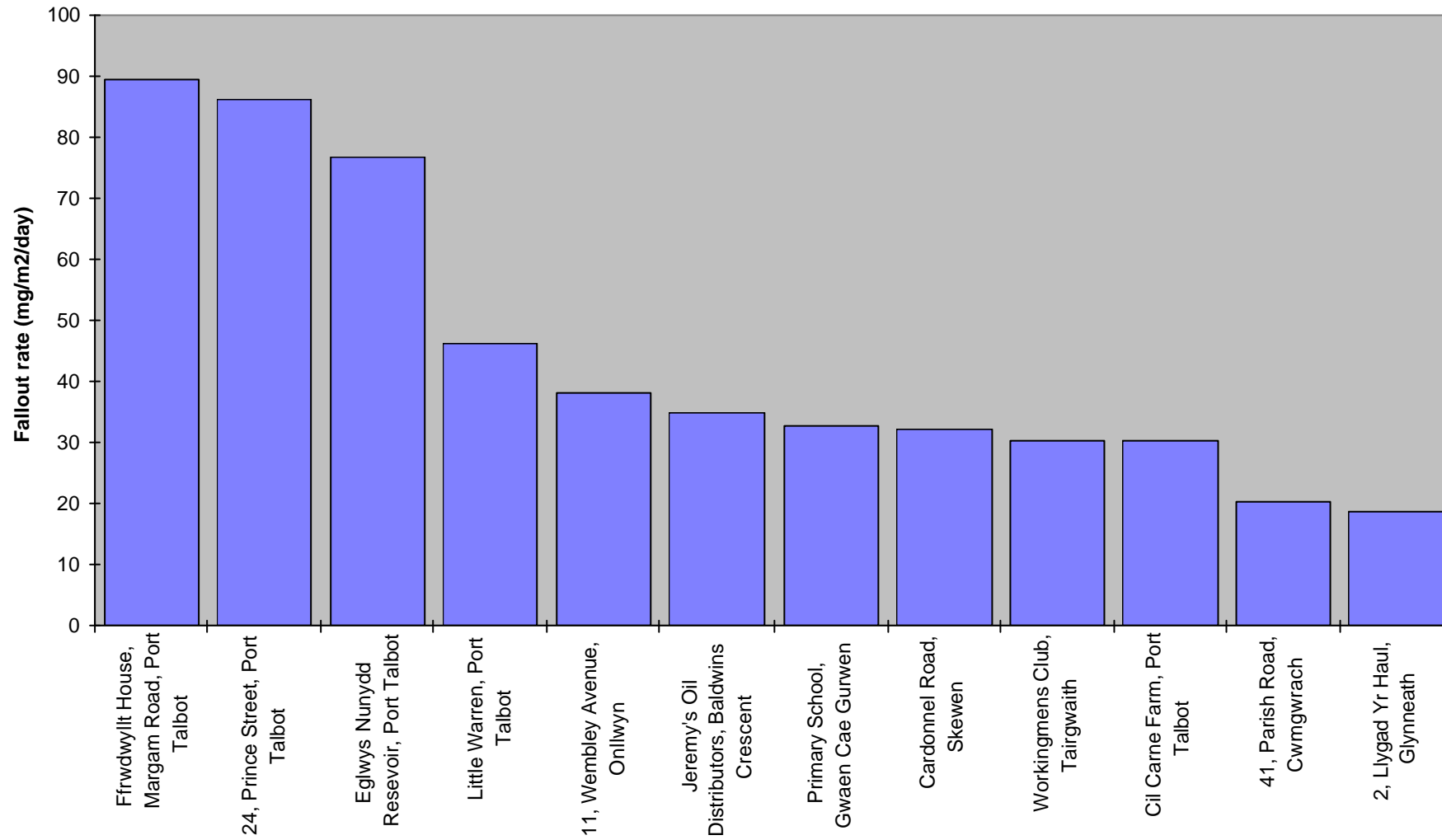


Table 1 Sites ranked by average fallout level (mg/m²/day), 2004.

Site Name	Fallout Level (mg/M ² /day)		200 mg/M ² /day 'Nuisance Limit'	
	Average	Maximum	Days within 10% of	Days Exceeding
Ffrwdwyllt House, Margam Road, Port Talbot	89	143	0	0
24, Prince Street, Port Talbot	86	210	0	28
Eglwys Nunydd Reservoir, Port Talbot	77	443	0	34
Little Warren, Port Talbot	46	75	0	0
11, Wembley Avenue, Onllwyn	38	83	0	0
Jeremy's Oil Distributors, Baldwins Crescent	35	68	0	0
Primary School, Gwaen Cae Gurwen	33	137	0	0
Cardonnel Road, Skewen	32	94	0	0
Workingmens Club, Tairgwaith	30	124	0	0
Cil Carne Farm, Port Talbot	30	68	0	0
41, Parish Road, Cwmgwrach	20	54	0	0
2, Llygad Yr Haul, Glynneath	19	71	0	0

Figure 27 Long term deposition rates.

Long term deposition rates

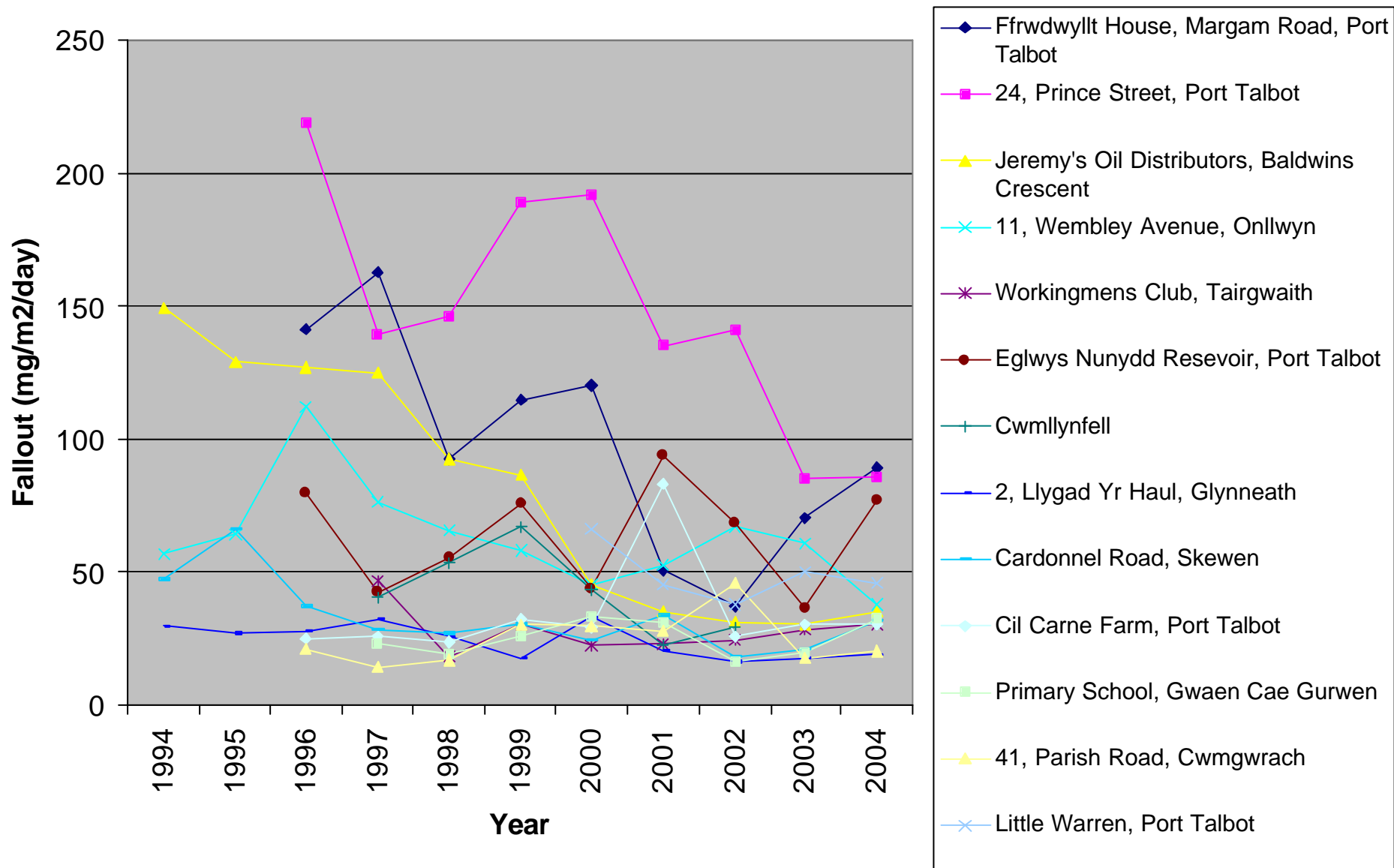


Table 2 Long term deposition rates

Site Name	Fallout rate (mg/m ² /day)											
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Ffrwdwyllt House, Margam Road, Port Talbot				141	163	92	115	120	51	37	70	89
24, Prince Street, Port Talbot				219	139	146	189	192	135	141	85	86
Jeremy's Oil Distributors, Baldwins Crescent	121	149	129	127	125	93	86	45	35	31	30	35
11, Wembley Avenue, Onllwyn	54	57	64	112	76	66	58	45	53	67	60	38
Workingmens Club, Tairgwaith					47	18	30	22	23	24	28	30
Eglwys Nunydd Reservoir, Port Talbot				80	42	55	76	44	94	68	36	77
Cwmllynfell					41	53	67	43	22	29		
2, Llygad Yr Haul, Glynneath	37	30	27	28	32	26	18	33	20	16	18	19
Cardonnel Road, Skewen	48	47	66	37	28	27	30	24	34	18	21	32
Cil Carne Farm, Port Talbot				25	26	24	32	29	83	26	30	30
Primary School, Gwaen Cae Gurwen					23	19	26	33	31	16	19	33
41, Parish Road, Cwmgwrach				21	14	17	31	30	28	46	18	20
Little Warren, Port Talbot								66	45	38	50	46

Nitrogen dioxide - diffusion tubes

Neath Port Talbot County Borough is one of approximately 300 local authorities that contribute to the UK Nitrogen Dioxide Survey. The survey is co-ordinated by AEA Technology, which is also responsible for quality control/assurance, interpretation and dissemination of data. There are three categories of site i.e. kerbside, intermediate and urban background. Individual authorities normally have four tubes, two of which are of the urban background type. Following the merger to the unitary Authority, the County Borough has inherited the monitoring commitments of the previous Borough Councils (7 tubes). AEA Technology disseminates annual reports, both in written and electronic form. These and other reports can be obtained via the Internet at the following address: <http://www.airquality.co.uk/>.

Pollutant information

Nitrogen dioxide is one of a number of nitrogen oxides that are formed during high temperature combustion processes from the oxidation of nitrogen in the air or fuel. Road traffic is the main source, being the cause of approximately 50% of all European emissions. Concentrations tend therefore to be highest in urban environments with high traffic levels and in the vicinity of large industrial sources.

Nitrogen dioxide is a respiratory irritant and also plays a part in production of another atmospheric pollutant, Ozone. Nitrogen oxides persist in the atmosphere for only about one day before they are oxidised to nitric acid. Nitrogen oxides therefore play a part in the production of acid rain.

Results

In previous years, results have shown that concentrations at Victoria Gardens have tended to increase. This rise in levels has approached toward the National Air Quality objective for NO₂. Consequently, some additional diffusion tubes were put out at locations in the vicinity of the junction at Easland Road and Victoria Gardens. One tube was placed on a lamp standard at the junction and two were placed on downpipes on the frontages of properties either side of the lights. The two tubes on house frontages are necessary in order to properly assess a potential breach of the National Air Quality Standard (NAQS) in accordance with the guidelines for Local Air Quality Management (LAQM). A further two tubes were set up at properties near to Groeswen Hospital, since results at this site had also shown a tendency to increase. However, these last two tubes were set up in August and so there is insufficient data to report for 2004.

Raw data has previously been presented, in the same manner as is shown on the Internet for the national network. But, it is considered appropriate for some data to be presented as 'bias adjusted' as is necessary when calculating levels as part of the LAQM procedure. Bias adjustment is the process of multiplying the raw data by a factor in order to make it equivalent to the response obtained from expensive continuous analysers, such as operates at Groeswen Hospital. Several councils and AEA Technology run 'co-location' studies where several diffusion tubes are sited with a continuous analyser and the results compared. An overall factor can be generated for the type of diffusion tube concerned, based upon the average difference between the diffusion tube and automatic analyser. The relevant factor for the type of diffusion tube used by this Authority in 2004 was 0.89.

Table 3 shows the bias adjusted results for 2004, together with summary averages for the year as a whole. The individual results are shown graphically in Figure 29, whilst Figure 30 shows the annual averages for each site. The locations of the sites are shown in the attached map (Figure 28).

These studies commenced in 1994 and the changes in annual averages that have occurred at each location are again reviewed. These results are shown graphically in Figure 31. The data shown in this graph are not bias adjusted in order to allow comparison with historical data. Co-location studies have only been operating over the last few years. Examination of this graph shows that results at most locations decreased in 2004, the exception being Victoria Gardens.

The Victoria Gardens location continues to produce the highest results. There is an EC Directive Limit and Guide values that pertain to nitrogen dioxide concentrations. However, the Directive is based upon the measurement of hourly nitrogen dioxide levels, not monthly averages. Surrogate statistics are available which are based upon the annual average of the monthly diffusion tube samples. The corresponding surrogate statistic for the limit is $91.5 \mu\text{g}/\text{m}^3$ and $53.5 \mu\text{g}/\text{m}^3$ for the guide value. No local sites have ever come close to breaching the limit or guide values during 2004. The National Air Quality objective for NO_2 is $40 \mu\text{g}/\text{m}^3$ as an annual average, to be achieved by 2005. The existing Victoria Gardens site ($43.9 \mu\text{g}/\text{m}^3$) and the new site at the junction of Eastland Road/Victoria Gardens ($43.0 \mu\text{g}/\text{m}^3$) sites have exceeded this figure. However, the tubes on the frontages of properties at Eastland Road ($38.2 \mu\text{g}/\text{m}^3$) and Victoria Gardens ($33.0 \mu\text{g}/\text{m}^3$) were both below the objective. Therefore there is currently no need for an Air Quality Management Area in the vicinity of the junction at Eastland Road/ Victoria Gardens. However, the NO_2 concentration at Eastland Road is still relatively close to the National Air Quality objective and studies will need to continue in order to monitor developments.

Figure 28 Nitrogen dioxide diffusion tube locations

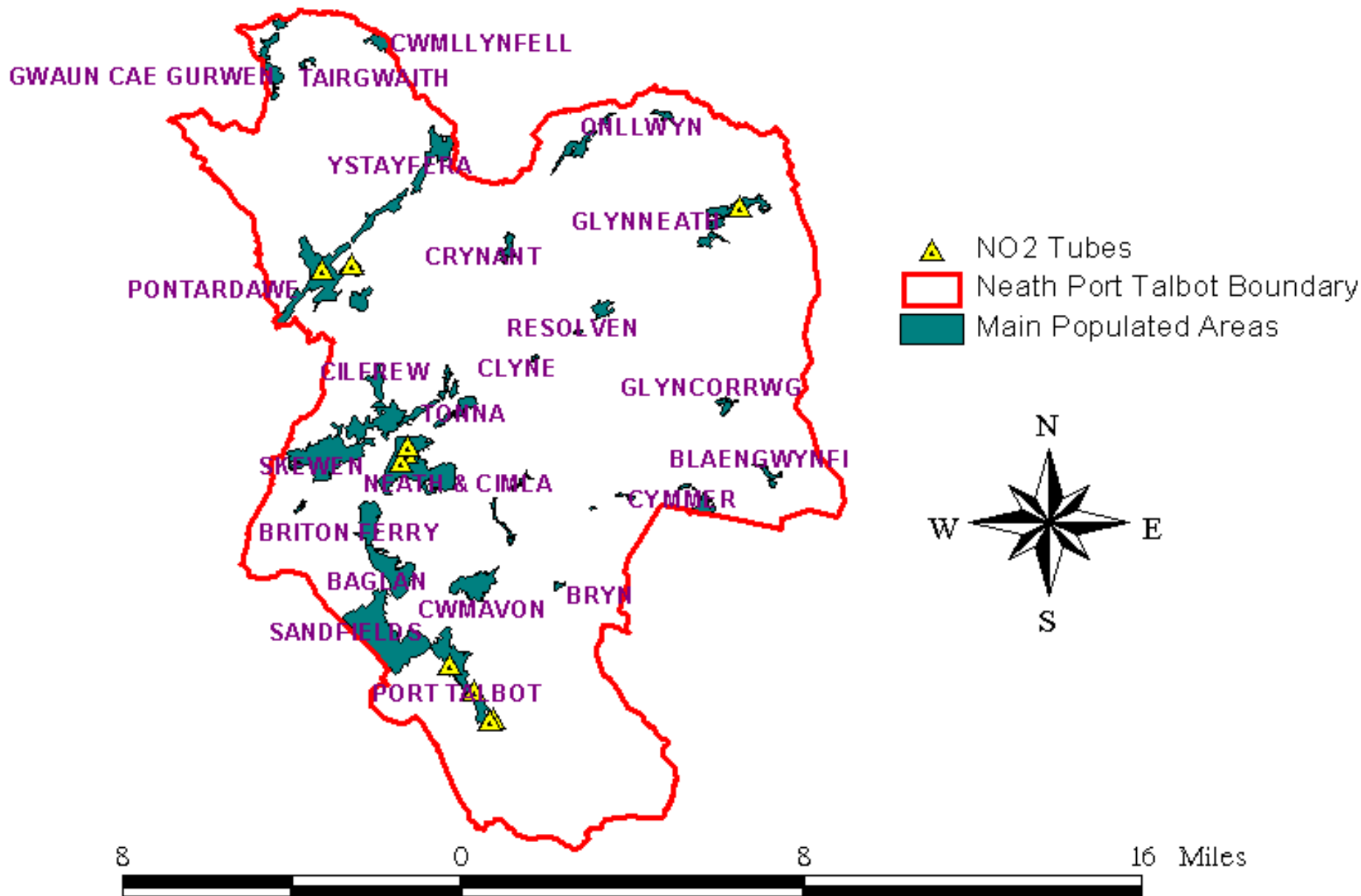


Table 3 Bias Adjusted Nitrogen Dioxide Diffusion Tube Results (mg/m³) – 2004

Site	Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Neath Civic Centre	UB	27.5	26.2	26.9	19.4	15.5	13.1	12.2	9.9	25.7	27.9	38.9	30.8	22.8
Cwmnedd Primary School, Glynneath	UB	17.0	21.2	17.7	10.0	9.3	6.5			13.3	17.7	17.2	18.5	14.8
Groeswen Hospital, Margam	K	50.1	37.4	39.6	23.6	38.2	21.8	21.8	28.0			56.4	41.1	35.8
Rice Street, Taibach	UB	28.2	26.3	19.7	18.7	17.0	12.2	9.7	12.7	11.4	21.9	30.9	24.5	19.4
College Green, Margam	UB	20.6	17.5	20.9			12.2	11.7	8.8		17.5	30.3		17.4
High St., Pontardawe	K	27.4	39.1	28.9	24.1	26.9	17.0	18.0	23.8	23.6	32.0	33.3	33.5	27.3
Victoria Gardens, Neath	K	65.4	54.1	52.2	31.8	36.2	32.8	25.7	34.8	41.6	48.4	56.8	47.3	43.9
Victoria Gardens Junction				51.8	35.5	38.6	32.0	27.0	47.6	45.7		65.6		43.0
8 Victoria Gardens				42.2	30.1	34.3	19.0	24.1	28.6	32.0	38.4	47.9		33.0
28 Eastland Road				38.2	33.7	42.7	30.8	21.1	31.8	36.5		52.4	56.9	38.2

Key:

UB – Urban background location

K – Kerbside location

Conversion factor: 1ppb = 1.91 µg/m³

Table 4 Nitrogen dioxide annual averages (mg/m³) – 1994 to 2004

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Neath Civic Centre	17.7	17.8	12.4	11.6	11.7	10.2	8.7	12.0	15	14.6	25.6
Cwmnedd Primary School, Glynneath	13.0	13.7	9.0	7.7	7.8	6.2	6.3	9.8	7.1	9.8	16.7
Groeswen hospital, Margam	16.6	17.3	14.9	11.9	13.6	8.4	9.9	13.9	19.6	22.7	40.2
Rice Street, Taibach	15.5	17.5	11.6	9.9	10.6	10.0	8.7	11.6	12.3	13.0	21.9
College Green, Margam	10.7	11.6	11.9	10.0	9.4	7.6	7.7	10.1	10.5	10.9	19.6
High St., Pontardawe	15.9	11.9	11.2	19.7	12.8	10.3	10.7	12.8	19.1	19.7	30.7
Victoria Gardens, Neath	28.3	28.3	20.1	20.6	20.7	17.1	17.0	20.6	23.7	25.3	49.4

The information in this table is raw data as featured on the national network. It is not subject to a bias adjustment factor.

Conversion factor: 1ppb = 1.91 µg/m³

Figure 29 Bias adjusted monthly nitrogen dioxide diffusion tube results (mg/m^3) – 2004

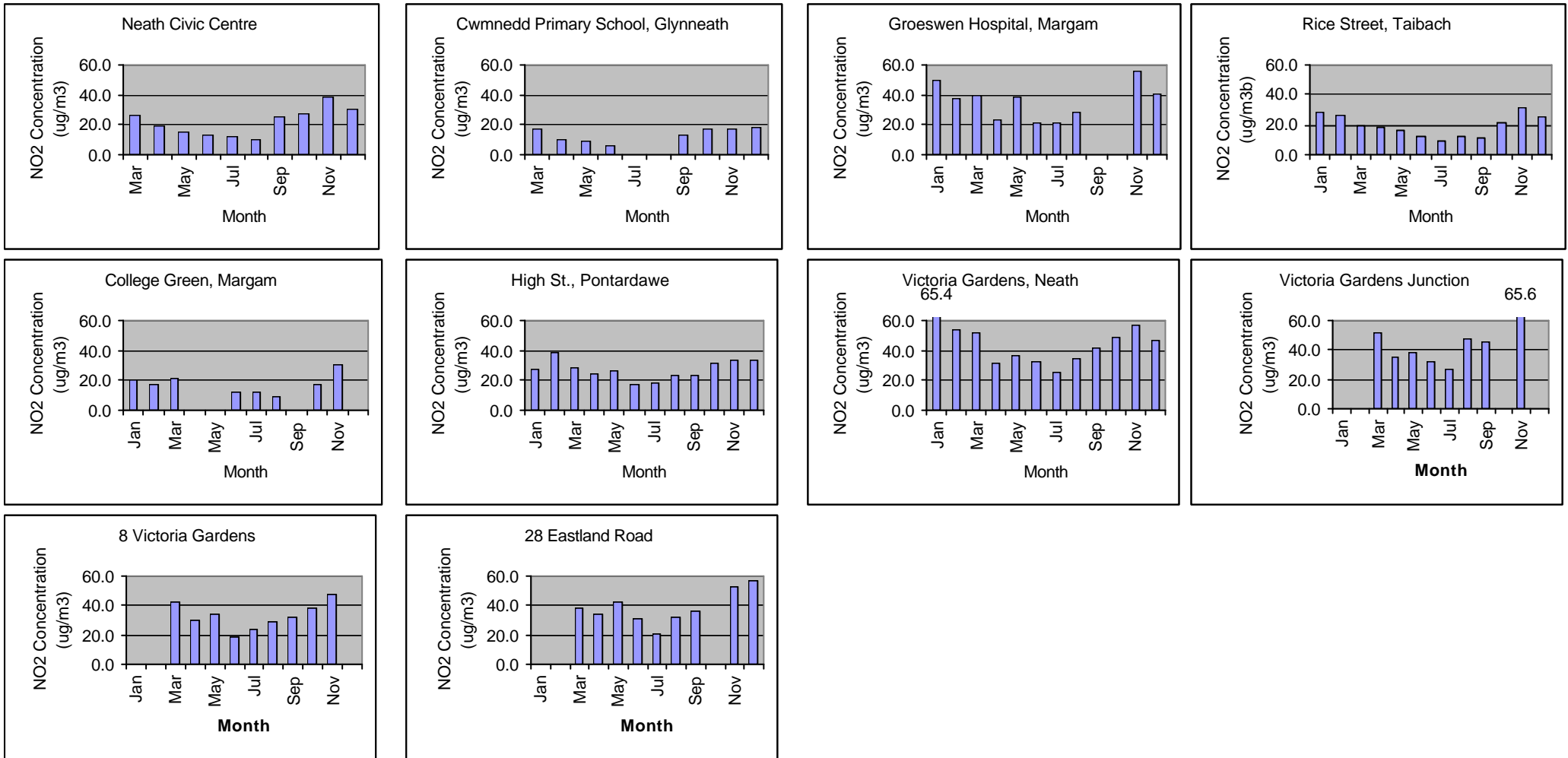


Figure 30 Bias adjusted nitrogen dioxide annual averages – 2004

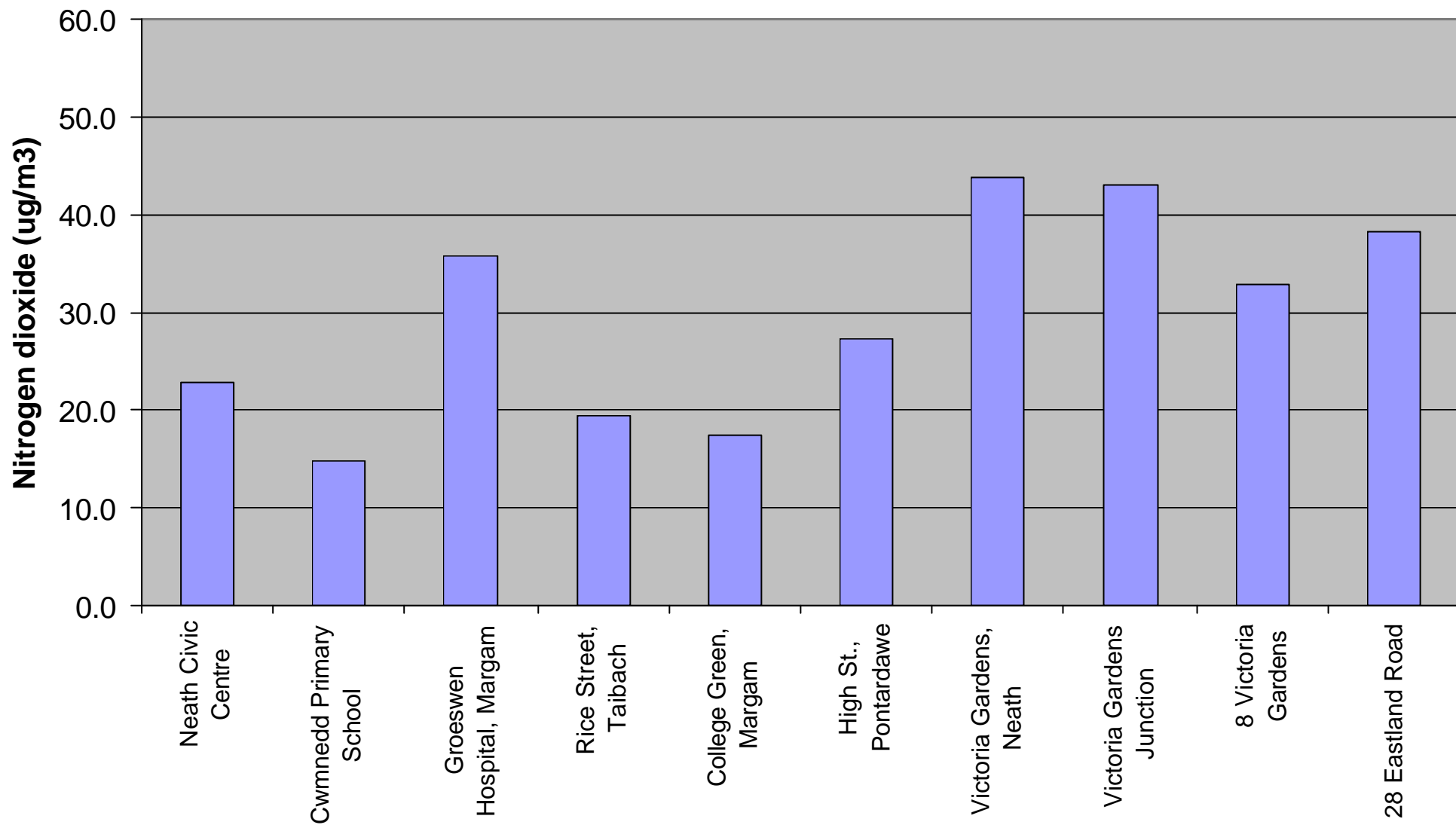
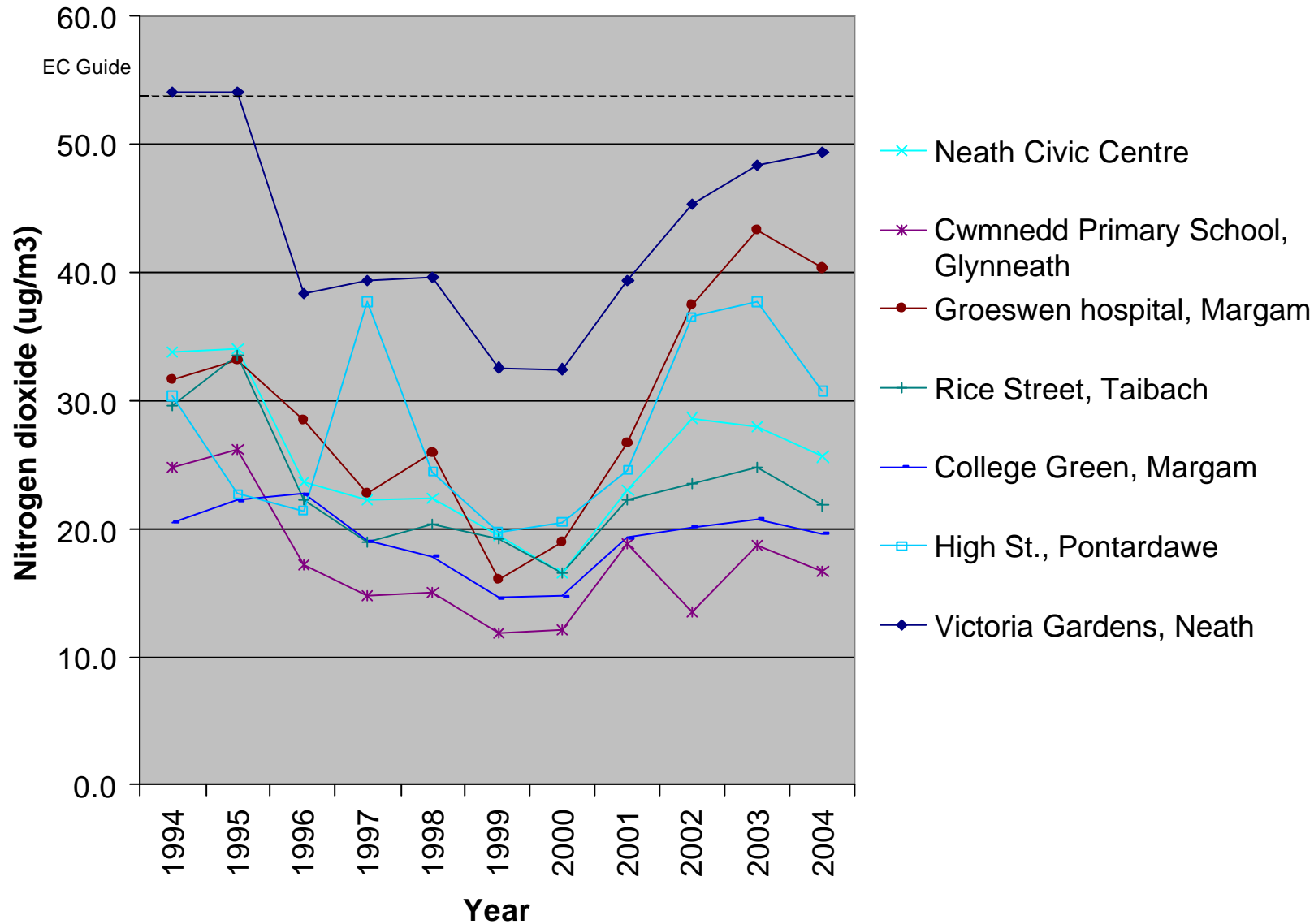


Figure 31 Annual nitrogen dioxide summary graph 2004



Key: EC Guide – Surrogate EC Guide Level

Metals monitoring at Pontardawe

Monitoring of the concentrations of 13 airborne metals has been carried out continuously in the Pontardawe area since 1972. Pumps continuously sample ambient air and particles are collected on filters that are analysed by AEA Technology. Until 1997, this work was carried out at Trebanos Sewage Works. Following a programme of construction at the site, monitoring was re-located to Pontardawe Leisure Centre. The objectives are to establish whether the Nickel works at Clydach has any significant impact upon metal concentrations in the area. The new site is approximately 4km downwind of the Nickel works, as compared to the Trebanos site, which was about 2km from the works.

Monitoring was carried out in respect of the following metals:

- Lead (Pb)
- Nickel (Ni)
- Zinc (Zn)
- Arsenic (As)
- Cadmium (Cd)
- Chromium (Cr)
- Copper (Cu)
- Iron (Fe)
- Cobalt (Co)
- Selenium (Se)
- Antimony (Sb)
- Cerium (Ce)
- Scandium (Sc)

There have been a number of developments concerning air quality guidelines for metals over the past few years. In December 2004 the European Union published a Directive relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons (PAH), (EC, 2004). The Directive set target values for arsenic, cadmium, nickel and benzo[a]pyrene (a PAH) for the total content in the PM₁₀ fraction averaged over a calendar year. The target values from the Directive are shown below:

Nickel	20 ng/m³
Arsenic	6 ng/m³
Cadmium	5 ng/m³

It should be noted that the Directive requires measurement of air concentrations for Directive compliance to be made using valid PM₁₀ monitoring methods. The polypropylene ducts used to hold the filters do not conform exactly to a PM₁₀ inlet specification and consideration will therefore need to be given to additional or different monitoring in the future.

Results

The annual mean nickel concentration found in 2004 was 76 ng/m³, which is over three and a half times the EC target value (20 ng/m³ annual mean). This is 79% more than the amount measured in 2003, but is less than the 2002 figure. This information has been passed to the Environment Agency, which has responsibility for regulating the INCO nickel works.

The annual mean concentrations of arsenic and cadmium have been found to be 0.7 ng/m³ and 0.15 ng/m³ respectively. These concentrations represent between 11% and ~3% of the proposed target values. The concentrations for both substances have not changed significantly since 2003.

The annual mean air concentration of lead at the Pontardawe site was found to be 8.8 ng/m³, which represents ~2% of the present air quality limit value (500 ng/m³ to be met by 2005) and less than 4% of the UK's air quality objective (250 ng/ m³) for 2008. This shows that it is very unlikely that any of the present air quality limit values or objectives for lead will be exceeded in the vicinity of the Pontardawe monitoring site. There was a slight decrease on the 2003 average concentration.

From assessment of the measured concentrations at the Trebanos and Pontardawe sites between 1990 and 2004 it is clear that the majority of the metals show a reduction in concentration. The metals that show concentration reductions are shown below (percentage reductions/year are shown in brackets):

- Arsenic (average decrease of 10%/year)
- Antimony (average decrease of 5%/year)
- Cadmium (average decrease of 16%/year)
- Cerium (average decrease of 3%/year)
- Cobalt (average decrease of 3%/year)
- Copper (average decrease of 12%/year)
- Iron (average decrease of 2%/year)
- Lead (average decrease of 14%/year)
- Selenium (average decrease of 12%/year)

The metals showing an increase are (percentage increases/year are shown in brackets):

- Chromium (average increase of 10%/year)
- Nickel (average increase of 5%/year)
- Scandium (average increase of 5%/year)

The long-term trends in pollution levels are shown graphically in figures 32 to 36 inclusive.

Conclusions

The introduction of the EC Directive has implications for the monitoring method to be used in future. The current method allows direct comparison with historical data set, but it does not comply with the specification laid down by the Directive.

The nickel concentration now and in recent years suggests that the Target Value of 20 ng/m³ is likely to be exceeded by the Target Date of 31 December 2012, unless matters change. The Directive places certain responsibilities for such matters as monitoring, reporting, public information etc on member states, that is, central government. The Authority is aware of monitoring having been carried out by central government in the Glais area, near the works using a PM₁₀ method. This also apparently showed that the average nickel concentration for 2004, at 34 ng/m³ was greater than the Target Value. The Authority is in discussion with the Environment Agency, INCO and the City and County of Swansea with regard to enhanced studies to investigate the phenomenon, its source and the extent to which current emissions or historic ones contribute to present measured levels. Contact has been made with central Government on this issue.

Table 5 Threshold Limit Values and Environmental Air Guidelines.

Element	Current or proposed Air Quality Limit Values (ng/m³)	Environmental Assessment Levels (EALs) (ng m⁻³)	Comment	Annual Mean Air Concentration in 2004 (ng m⁻³) (2 significant figures)	Annual Mean Concentration as a % of Air Quality Limit Values, proposed Target Values or EALs
Arsenic (As)	6		Target value	0.66	11 %
Cadmium (Cd)	5		Target value	0.15	3 %
Cobalt (Co)		200##	Cobalt and its compounds as Co	1.2	0.6 %
Chromium (Cr)		100##	Cr VI compounds	7.1	7.1 %
Copper (Cu)		10000##	Dust, fume and mists	3.9	0.039 %
Iron (Fe)		10000##	Iron salts as Fe	227	2.3 %
Nickel (Ni)	20		Target value	76	380 %
Lead (Pb)	(500)** (250)***		Inorganic compounds	8.8 8.8	1.8 % 3.5 %
Antimony (Sb)		5000##	Except antimony trisulphide and antimony trioxide	1.1	0.022 %
Selenium (Se)		1000##	Not including hydrogen selenimide	0.38	0.038 %

Notes:

1. # Air Quality Target Values from EC (2004), Directive 2004/107/EC (annual mean air concentration).
2. ## IPPC Environmental Assessment and Appraisal of BAT: IPPC H1 Environment Agency Version 6 July 2003.
3. ** EU Daughter Directive (1999) limit value and DEFRA air quality objective to be met by 2005 (annual mean air concentration).
4. *** DEFRA air quality objective for Pb in the UK to be met by 2008 (annual mean air concentration).

Figure 32

Mean Annual Concentrations of Cerium and Scandium in Air
at Trebanos (1972-1996) and Pontardawe (1997-2004)

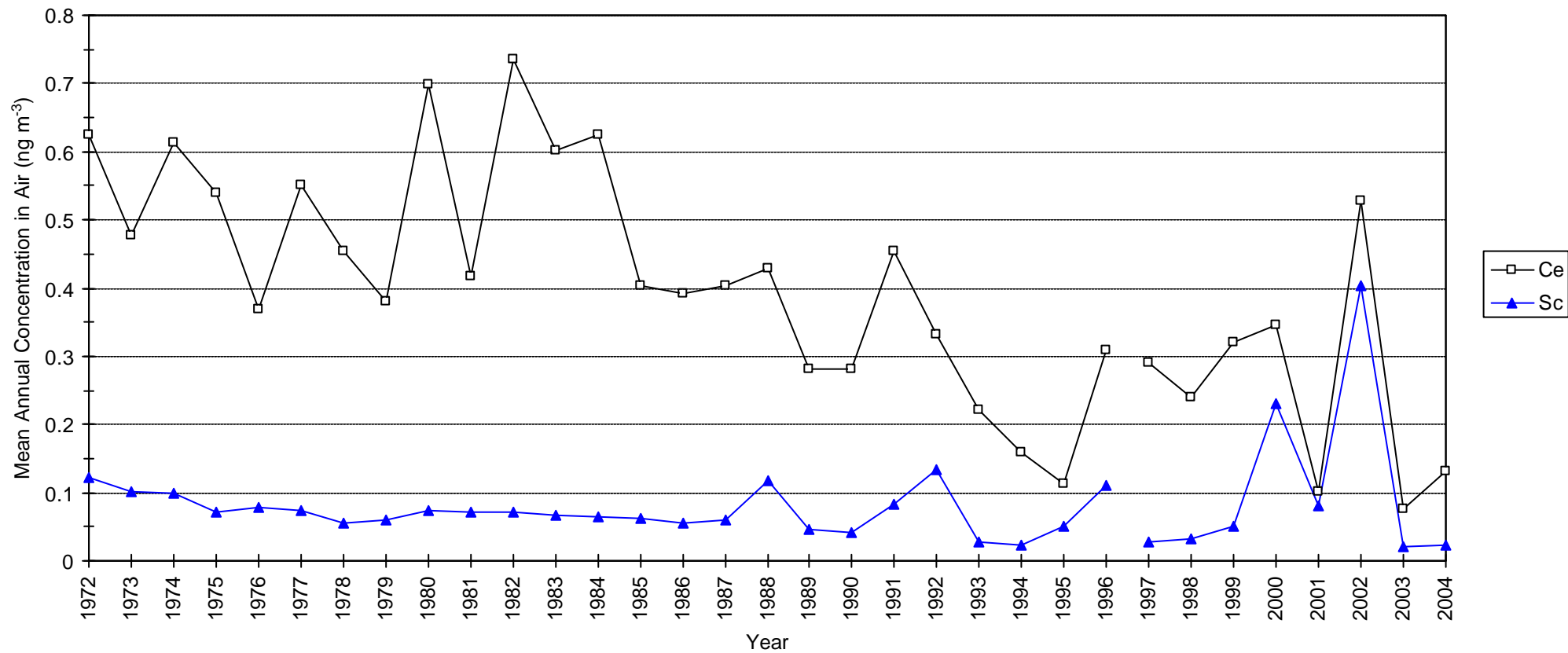


Figure 33

Annual Mean Concentrations of Antimony, Cobalt and Selenium in Air at Trebanos (1972-1996) and at Pontardawe (1997-2004)

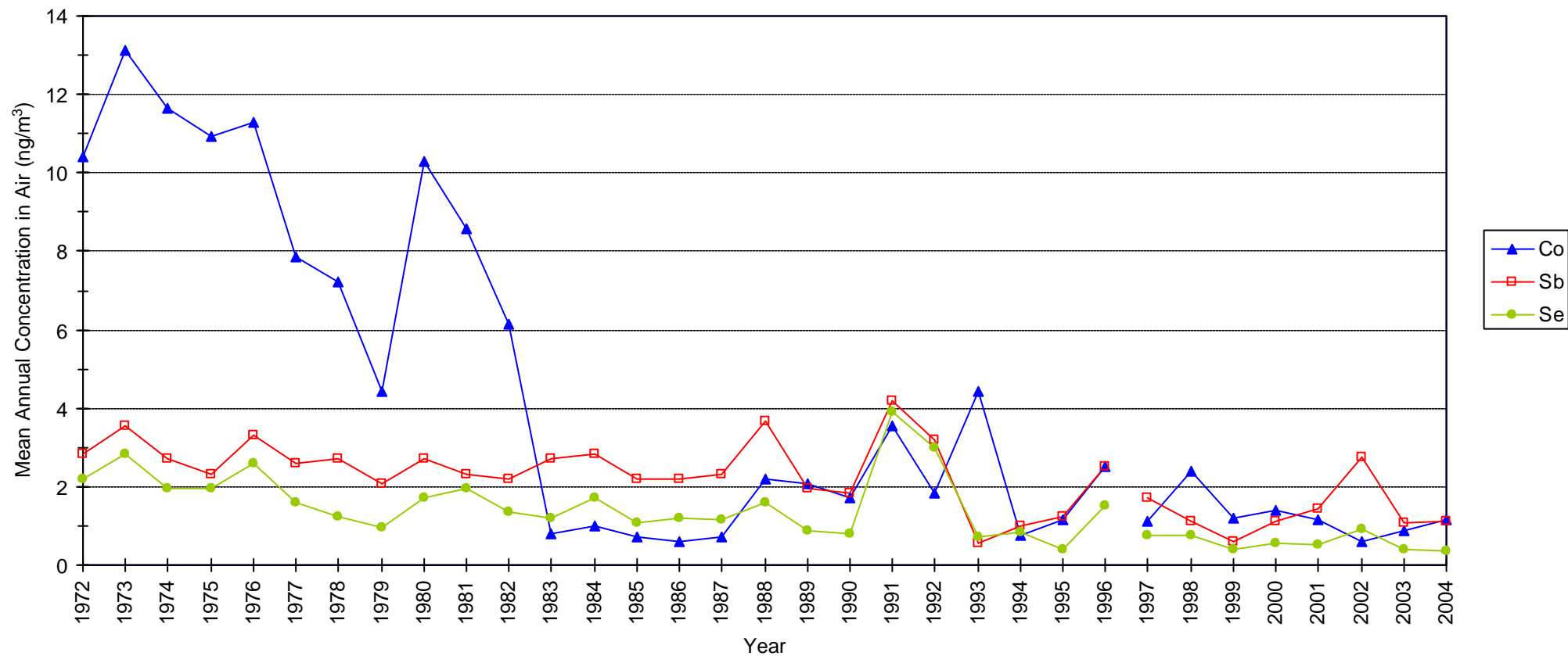


Figure 34

Annual Mean Concentrations of Arsenic, Cadmium, Chromium and Copper in Air at Trebanos (1972-1996) and at Pontardawe (1997-2004)

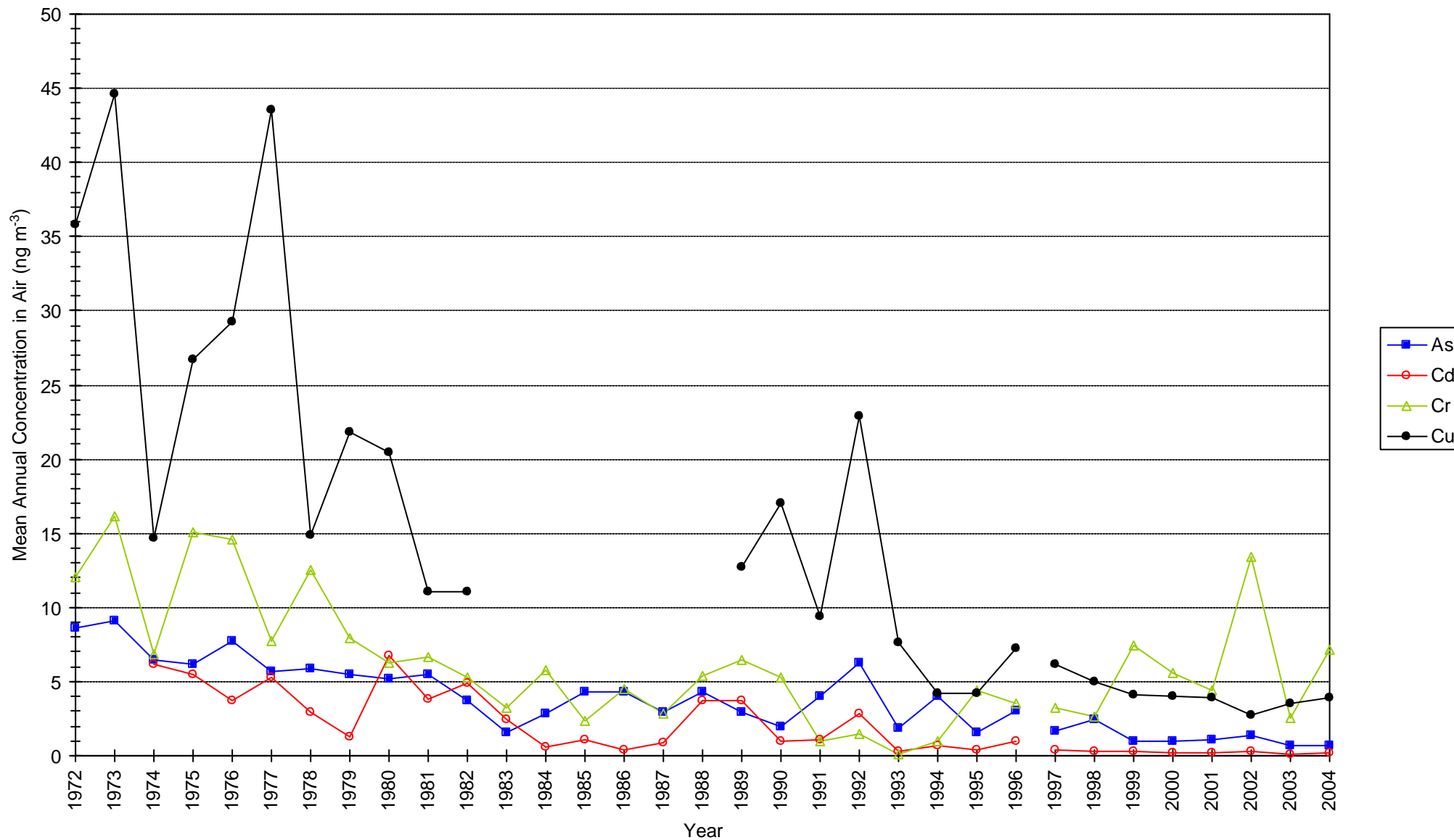


Figure 35

Annual Mean Concentrations of Iron in Air
at Trebanos (1972-1996) and at Pontardawe (1997-2004)

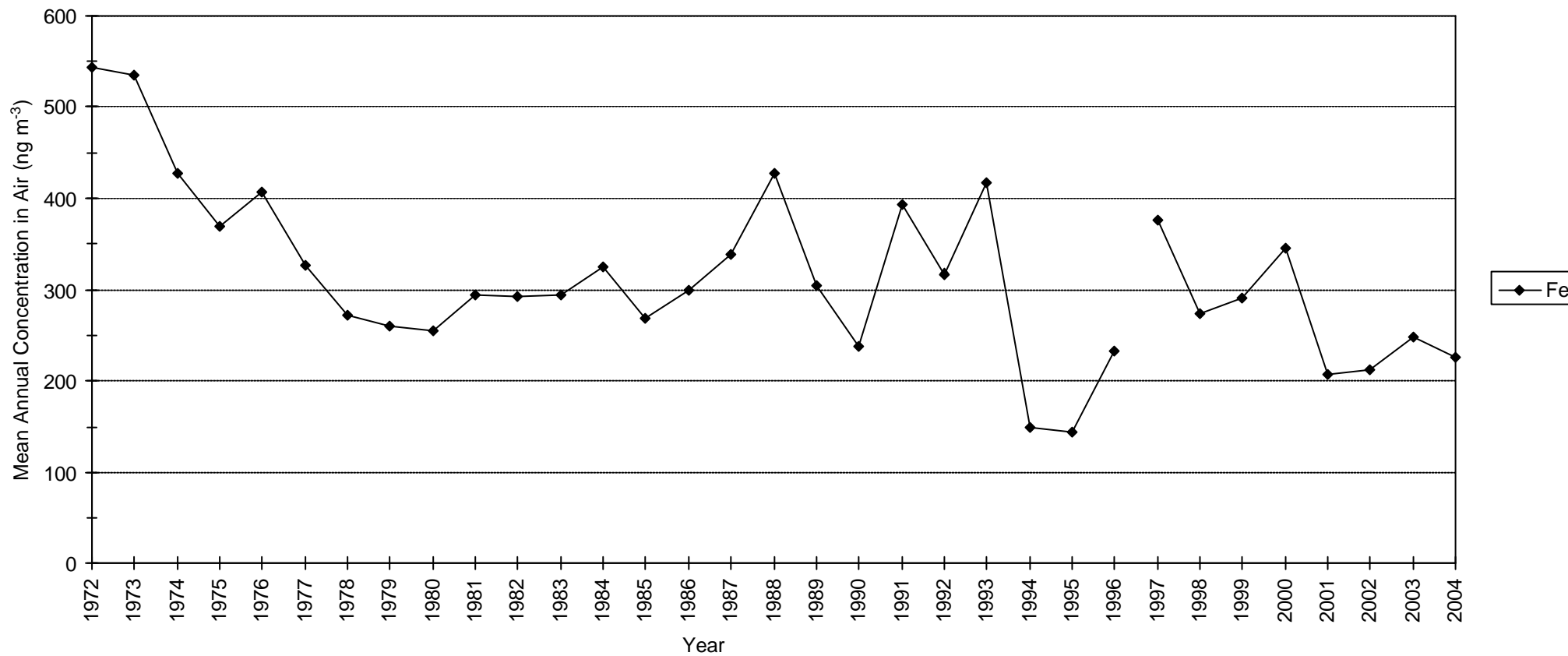
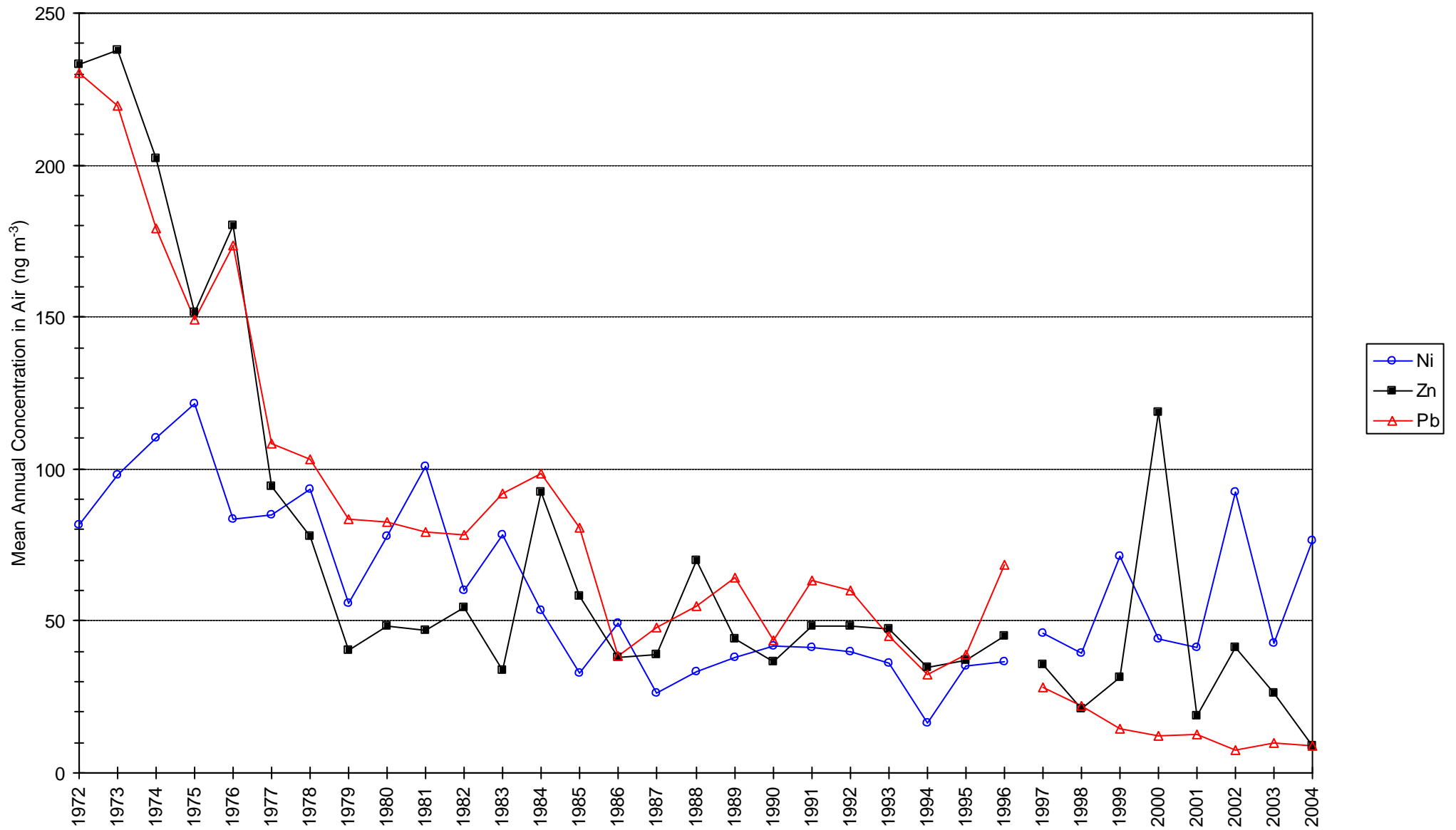


Figure 36

**Annual Mean Concentrations of Lead, Nickel and Zinc in Air
at Trebanos (1972-1996) and at Pontardawe (1997-2004)**



Particles and inorganics

Groeswen Hospital, Port Talbot

This monitoring station has been in operation since early January 1997. Measurements of specific pollutants and meteorological parameters are made continuously, producing an average value for every 15 minutes in the day. The National Environmental Technology Centre (NETCEN) and their contractors (Stanger Science and Environment) collect the data. The data is then subjected to a rigorous quality assurance procedure, prior to dissemination via the Internet and Ceefax. The site is initially contacted via modem and the data collected at regular intervals. Data is automatically scaled in accordance with the latest calibrations (where appropriate) and subjected to an initial inspection prior to dissemination within one hour of receipt. Subsequently, data remains in this format until a final ratification is carried out, by NETCEN, normally in three-month blocks. Some care should therefore be exercised when relying upon statistics not yet subject to final ratification. All data for 2004 has now been fully ratified and can therefore be reported with confidence. Data is collected in respect of PM₁₀ particulates, oxides of nitrogen (NO_x), sulphur dioxide (SO₂) and ozone (O₃). Also, carbon monoxide (CO) measurements have been taking place since mid May 1998. The carbon monoxide data is not currently part of the national network, but it is hoped that it will be adopted at some point in the future. In addition, this authority can also retrieve wind speed and direction data from the site, which is collected via sensors located on top of a 10-metre mast, attached to the cabin. The location of the analyser is shown in Figure 51.

Pollutants monitored

PM₁₀

PM₁₀ describes the fraction of airborne particulate matter that is less than 10 microns in size. Fine particles are of the greatest concern since they are capable of being easily transported over long distances on currents of air. Also, fine particles may be drawn into the respiratory air-ways where they may adversely affect health. Recently, the attention of scientists has been drawn towards studying the PM_{2.5} fraction and even smaller particles that can penetrate the very deepest parts of the lung.

PM₁₀ and other particulate matter may vary considerably in chemical and physical composition. Particles (and other forms of pollution) may be described as 'primary' or 'secondary' according to their source. Secondary pollution arises as a result of the chemical reaction (or interaction) of pollutants in the atmosphere. Examples of secondary pollution include acid rain, ozone and significant quantities of sulphate particles. On the other hand, primary pollutants arise directly from the polluting source. The principal sources of 'primary' polluting particles are combustion processes e.g. traffic and industry.

Sulphur Dioxide (SO₂)

Sulphur dioxide is a corrosive acid gas that combines with water vapour in the atmosphere to produce acid rain. SO₂ in ambient air is capable of causing harm to human health and the environment. It is associated with asthma and

chronic bronchitis, and has been known to damage vegetation, soils, watercourses and building materials.

Sulphur dioxide is mainly formed as a result of the combustion of fossil fuels in power stations. Some areas, which rely heavily upon the use of coal for domestic heating may suffer localised pollution as a consequence.

Nitrogen Dioxide (NO₂)

Nitrogen dioxide is one of a number of nitrogen oxides that are formed during high temperature combustion processes from the oxidation of nitrogen in the air or fuel. Road traffic is the main source, being the cause of approximately 50% of all European emissions. Concentrations tend therefore to be highest in urban environments with high traffic levels and in the vicinity of large industrial sources.

Nitrogen dioxide is a respiratory irritant and also plays a part in production of another atmospheric pollutant, Ozone. Nitrogen oxides persist in the atmosphere for only about one day before they are oxidised to nitric acid. Nitrogen oxides therefore play a part in the production of acid rain.

Ozone (O₃)

Ozone is a highly reactive chemical which, when present in the lower atmosphere at high concentrations, can irritate the eyes and air passages, causing breathing difficulties. Ozone is a so-called secondary pollutant since it is produced indirectly by the reaction between hydrocarbons, NO₂ and sunlight. Ozone tends to be lower in urban areas because high levels of NO are produced by vehicles and this helps to break down ozone to oxygen and NO₂. The highest ozone therefore tends to occur in rural areas and during the summer months when the sun shines the longest. The ozone forming reactions are complex and have a time lag associated with them which can mean that ozone levels are greatest downwind of the location where the pollution is produced. It is recognised that low level ozone formation is an international problem and that exceedences of the National Air Quality Standard would still occur, even if all sources of hydrocarbons were eliminated in this country.

Carbon monoxide (CO)

Carbon monoxide (CO) is a toxic gas, which is emitted into the atmosphere as a result of combustion processes, and is also formed by the oxidation of hydrocarbons and other organic compounds. In European urban areas, CO is produced almost entirely (90%) from road traffic emissions. In some areas, localised industrial sources may be significant. Carbon monoxide at levels found in ambient air may reduce the oxygen-carrying capacity of the blood. It survives in the atmosphere for a period of approximately 1 month but is eventually oxidised to carbon dioxide.

Results and analysis

Appendix 1 shows the UK air quality standards and bandings. Table 13 shows the objectives of the UK National Air Quality Strategy, whereas Table 15 shows the air quality bands. The results for each of the pollutants should be read in the context of these tables.

Meteorological data

Figure 37 shows the average proportion of the time in percent that the wind blows from any of the 16 specified compass points. The average wind speed for these directions are also shown.

Nitrogen dioxide (NO₂)

The results are summarised in Table 6. Figure 38 shows time series graphs of NO₂ concentration for each month expressed as hourly averages. Some data was lost in September-October and to a lesser extent in April due to equipment failures.

Limits and objectives

The National Air Quality Objective for nitrogen dioxide is defined in two ways. The first method of assessment is based upon exceedence of 200µg/m³ as an hourly average, with 18 exceedences being allowed per year, to be achieved by 31st December 2005. The second method specifies an annual average of 40µg/m³ as the limit. The maximum hourly value was 96 µg/m³ and the annual average was 21 µg/m³. Therefore, no exceedences of the Air Quality Objective level occurred. No exceedences of the World Health Organisation (WHO) guideline (hourly average > 210 µg/m³) occurred. Air pollution levels were “low” at all times. The EU Directive (98 percentile > 199.8 µg/m³) was not breached.

There is now also a limit for the protection of vegetation and ecosystems that applies to all oxides of nitrogen (30.6 µg/m³), not just nitrogen dioxide. As the annual concentration was 21 µg/m³, this limit was also not exceeded. In any event, this limit does not apply in the vicinity of major industrial sources, motorways etc as is the case at Margam.

Directional analysis

Average nitrogen dioxide levels have been analysed by wind direction (Figure 39). Levels were highest from a generally northerly and easterly direction, the maximum being 28 µg/m³ from the north.

Summary

There were no exceedences of the Air Quality objective levels for NO₂ during 2004, as was the case in previous years.

Sulphur dioxide (SO₂)

The results are summarised in Table 8. Figure 40 shows the time series graphs for SO₂ concentration for each month expressed as 15 minute averages.

Limits and objectives

The Air Quality objective level, 266µg/m³ as a 15-minute average, was not breached during 2004, therefore the Air Quality Objective, which is based upon the 99.9 percentile of all 15-minute average values, was not breached either. The maximum 15-minute average was 210 µg/m³. The maximum daily average was 32 µg/m³ and neither the Air Quality Objective (daily average 125µg/m³ not to be exceeded more than 3 times per year) or the EU Directive (daily average >125 µg/m³) were breached. The Air Quality Objective also has an hourly averaged limit, which is 350µg/m³, not to be breached more than 24 times a year, which was not breached. The maximum hourly average was 154 µg/m³. The WHO guideline (hourly average > 324.5 µg/m³) was not breached. Air pollution was low throughout the year.

Directional analysis

SO₂ levels (Figure 42, Table 7) were generally greatest from the south-western quadrant, peaking at 21 µg/m³ in the west-south-west.

Summary

No breaches of any Air Quality Objective levels arose during 2004.

Ozone (O₃)

The results are summarised in Table 9. Figure 43 shows the time series graphs for O₃ concentration for each month expressed as 8 hourly running averages.

Limits and objectives

The Air Quality recommended objective for ozone is 100 µg/m³, measured as a rolling 8hour average. This was breached on a total of 83 occasions on a total of 12 days. This is a significant improvement on the figures for 2003, where there were 397 exceedences on 47 days. All exceedences occurred between the months of April and September. No statutory Air Quality Objective level for Ozone has been set, owing to the potential for trans-boundary sources. Air pollution was low apart from 153 hours of 'moderate' pollution.

Directional analysis

O₃ levels were not particularly direction dependent (see figure 44), but were slightly biased to the south and west.

Summary

In 2004 there were 83 breaches of the Air quality strategy recommended objective for Ozone, an improvement on 2003, which was an unusually poor year.

PM₁₀

The results are summarised in Table 10. Figure 45 shows the time series graphs for PM₁₀ concentration for each month expressed as 24hour running averages.

Limits and objectives

The average concentration was 24 µg/m³, which was the same as during the previous year. The hourly maximum was 198 µg/m³. The Air Quality Objective level is 50 µg/m³ as a gravimetric daily average to be breached no more than 35 occasions in a year. Since gravimetric methods typically produce higher values than TEOM's, a factor must be applied to the TEOM data for equivalence. The current recommended factor is TEOM X 1.3, although work is ongoing to establish a more accurate factor for Port Talbot. Using this method, there were 38 days in 2004 where the daily averages exceeded 50 µg/m³. This is a little less than the corresponding number of exceedences in 2003, i.e. 43. Consequently the Air Quality Objective Level, which is to be achieved by 31st December 2004, was breached. Air pollution was 'high' for 28 hours, 'moderate' for 344 hours and 'low' 8089 hours.

Directional analysis

Figure 46 shows that PM₁₀ levels were once again highest from the west south-west (55 µg/m³).

Summary

The Air Quality Objective level was breached again during 2004, although there was improvement over 2003.

Carbon monoxide (CO)

The results are summarised in Table 11. Figure 47 shows the time series graphs for CO concentration for each month expressed as 8 hourly running averages.

Limits and objectives

The Air Quality Objective level 10 mg/m³ expressed as an 8hour rolling average not was exceeded. The maximum 8-hour average was 3.9 mg/m³. The World Health Organisation has set two guidelines for CO. One guideline is identical to the Air Quality Objective, and was therefore not exceeded. The second guideline equates to 29 mg/m³ as an hourly average and was not exceeded since the maximum hourly average was 10.6 mg/m³.

Directional analysis

Figure 48 shows that average CO concentrations showed a pronounced bias towards the south westerly direction 6.05 mg/m³.

Summary

There were no breaches of the Air Quality Objective level or World Health Organisation guidelines during 2004. This contrasts with 2003 where an emission associated with the starting of Blast Furnace 5 caused an exceedence. An approach has been made to Government in order to have the carbon monoxide analyser incorporated onto the AURN national network. If approved, this will bring additional quality assurance benefits to those currently applied by the Council in-house.

Summary

In 2004 there were 83 exceedences of the Air Quality Strategy recommended objective on 47 days.

The Air Quality Objective for PM₁₀ was breached again in 2004, but the 38 occasions on which exceeded were less than the previous year.

There were no breaches of the Air Quality Objective level for carbon monoxide, nitrogen dioxide or sulphur dioxide.

There were fewer exceedences of air quality objectives during 2004 than the previous year, which was a relatively poor one nationally.

Table 6 Nitrogen dioxide summary statistics 2004

Statistic	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Number Very High	0	0	0	0	0	0	0	0	0	0	0	0	0
Number High	0	0	0	0	0	0	0	0	0	0	0	0	0
Number Moderate	0	0	0	0	0	0	0	0	0	0	0	0	0
Number Low	742	669	583	525	742	715	740	738	61	388	718	724	7369
Max 15-min mean ($\mu\text{g}/\text{m}^3$)	109	94	111	82	111	73	75	63	78	73	86	105	111
Max hourly mean ($\mu\text{g}/\text{m}^3$)	80	88	92	77	88	55	63	52	75	63	80	96	96
Max running 8-hour mean ($\mu\text{g}/\text{m}^3$)	51	67	56	58	56	43	38	33	47	48	59	76	76
Max running 24-hour mean ($\mu\text{g}/\text{m}^3$)	39	48	48	43	40	26	33	25	39	32	45	58	58
Max daily mean ($\mu\text{g}/\text{m}^3$)	35	48	42	41	39	24	28	25	36	29	43	57	57
Average ($\mu\text{g}/\text{m}^3$)	25	26	23	20	22	15	15	16	32	18	25	25	21
Data Capture (%)	99.7	99.6	78.4	72.9	99.7	99.3	99.5	99.2	8.5	52.2	99.7	97.3	83.9
Annual mean > 40 $\mu\text{g}/\text{m}^3$	-	-	-	-	-	-	-	-	-	-	-	-	0
Hourly mean > 200 $\mu\text{g}/\text{m}^3$	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual mean nitrogen oxides >30 $\mu\text{g}/\text{m}^3$	-	-	-	-	-	-	-	-	-	-	-	-	0

Conversion factor: 1ppb = 1.91 $\mu\text{g}/\text{m}^3$

Table 7 Average PM₁₀, NO₂, SO₂, O₃ and CO levels by direction 2004

Direction	PM₁₀ (ug/m³)	NO₂ (ug/m³)	SO₂ (ug/m³)	O₃ (ug/m³)	CO (ug/m³)
N	12	28	3	41	1.09
NNE	13	27	3	41	0.38
NE	16	25	3	47	0.41
ENE	16	26	3	47	0.37
E	16	27	5	48	0.25
ESE	17	27	4	49	0.42
SE	21	24	4	54	0.68
SSE	25	22	5	55	0.73
S	36	19	7	60	1.31
SSW	35	15	6	66	1.81
SW	41	14	15	67	6.05
WSW	55	16	21	62	4.26
W	30	13	8	64	2.12
WNW	17	18	2	55	1.20
NW	13	24	2	48	1.07
NNW	12	26	2	44	0.89

Table 8 Sulphur dioxide summary statistics 2004

Statistic	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Number Very High	0	0	0	0	0	0	0	0	0	0	0	0	0
Number High	0	0	0	0	0	0	0	0	0	0	0	0	0
Number Moderate	0	0	0	0	0	0	0	0	0	0	0	0	0
Number Low	2909	2619	2347	2806	2902	2789	2903	2898	2629	2846	2815	2882	33439
Max 15-min mean ($\mu\text{g}/\text{m}^3$)	154	128	130	112	122	165	210	117	114	101	88	90	210
Max hourly mean ($\mu\text{g}/\text{m}^3$)	93	85	93	104	69	101	154	75	61	64	53	69	154
Max running 8-hour mean ($\mu\text{g}/\text{m}^3$)	33	23	43	35	35	48	63	33	21	41	18	39	63
Max running 24-hour mean ($\mu\text{g}/\text{m}^3$)	19	18	34	19	21	20	36	22	17	20	13	22	36
Max daily mean ($\mu\text{g}/\text{m}^3$)	15	15	24	19	16	19	32	16	12	18	13	22	32
Average ($\mu\text{g}/\text{m}^3$)	6	5	6	5	7	7	7	5	5	4	4	8	6
Data Capture (%)	99.7	99.6	80.6	99.6	99.7	99.2	99.5	99.5	93.3	97.6	99.7	99.2	97.2
15-min mean > 266 ($\mu\text{g}/\text{m}^3$)	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly mean > 350 ($\mu\text{g}/\text{m}^3$)	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily mean > 125 ($\mu\text{g}/\text{m}^3$)	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual mean > 20 ($\mu\text{g}/\text{m}^3$)	-	-	-	-	-	-	-	-	-	-	-	-	-

Conversion factor: 1ppb = 2.66 $\mu\text{g}/\text{m}^3$

Table 9 Ozone summary statistics 2004

Statistic	Month												Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Number Very High	0	0	0	0	0	0	0	0	0	0	0	0	0
Number High	0	0	0	0	0	0	0	0	0	0	0	0	0
Number Moderate	0	0	0	28	49	20	4	38	14	0	0	0	153
Number Low ($\mu\text{g}/\text{m}^3$)	744	672	609	691	695	700	740	706	669	730	720	741	8441
Max 15-min mean ($\mu\text{g}/\text{m}^3$)	90	92	102	134	138	134	130	148	118	84	82	94	148
Max hourly mean ($\mu\text{g}/\text{m}^3$)	86	90	96	132	136	128	126	146	116	82	80	92	146
Max running 8-hour mean ($\mu\text{g}/\text{m}^3$)	81	85	89	118	122	110	95	132	108	79	79	89	132
Max running 24-hour mean ($\mu\text{g}/\text{m}^3$)	78	79	86	98	88	103	78	119	86	75	77	81	119
Max daily mean ($\mu\text{g}/\text{m}^3$)	75	77	85	83	84	87	74	107	77	74	75	80	107
Average ($\mu\text{g}/\text{m}^3$)	50	50	60	64	59	54	50	57	53	52	43	44	53
Data Capture (%)	99.7	99.7	80.6	99.3	99.9	99.4	99.5	99.6	94.0	97.8	99.7	97.3	97.2
Running 8-hour mean > 100 ($\mu\text{g}/\text{m}^3$) – exceedences (No. days)	0 (0)	0 (0)	0 (0)	11 (2)	19 (4)	14 (2)	0 (0)	33 (2)	6 (2)	0 (0)	0 (0)	0 (0)	83 (12)

Conversion factor: 1ppb = $2 \mu\text{g}/\text{m}^3$

Table 10 PM₁₀ summary statistics 2004

Statistic	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Number Very High	0	0	0	0	0	0	0	0	0	0	0	0	0
Number High	0	14	1	0	11	0	2	0	0	0	0	0	28
Number Moderate	26	53	47	15	87	20	61	0	0	23	12	0	344
Number Low	718	605	523	690	646	688	621	744	688	690	708	744	8089
Max 15-min mean (µg/m ³)	264	193	316	183	307	210	247	137	186	190	329	111	329
Max hourly mean (µg/m ³)	198	149	141	145	136	158	156	96	145	150	189	79	198
Max running 8-hour mean (µg/m ³)	122	101	93	109	118	118	126	62	93	783	111	57	126
Max running 24-hour mean (µg/m ³)	62	90	75	67	84	66	75	43	48	56	54	45	90
Max daily mean (µg/m ³)	61	68	54	53	80	63	73	40	43	53	53	43	80
Average (µg/m ³)	23	24	26	23	33	28	25	21	24	21	16	22	24
Data Capture (%)	99.1	99.6	79.7	96.7	100	97.4	92.6	99.6	93.3	97.4	99.7	98.5	96.1
Daily mean > 50 (gravimetric)	3	3	5	3	9	3	4	1	1	4	1	1	38
Annual mean > 40 (gravimetric)	-	-	-	-	-	-	-	-	-	-	-	-	0

Note: All concentrations expressed in µg/m³.

Table 11 Carbon monoxide summary statistics 2004

Statistic	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Number Very High	0	0	0	0	0	0	0	0	0	0	0	0	0
Number High	0	0	0	0	0	0	0	0	0	0	0	0	0
Number Moderate	0	0	0	0	0	0	0	0	0	0	0	0	0
Number Low	701	595	713	598	469	638	736	673	694	715	701	736	8019
Max 15-min mean (mg/m ³)	4.1	3.0	4.5	5.3	6.5	9.0	13.1	5.4	6.3	4.8	3.3	5.1	13.1
Max hourly mean (mg/m ³)	3.8	3.1	3.7	3.6	7.1	4.1	10.6	5.6	4.4	4.4	2.7	4.4	10.6
Max running 8-hour mean (mg/m ³)	2.4	1.9	2.8	1.6	3.1	2.2	2.7	2.4	2.6	3.9	1.4	1.9	3.9
Average (mg/m ³)	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.5	0.4	0.7	0.3	0.5	0.5
Data Capture (%)	96.0	99.7	87.5	99.6	96.4	99.9	99.6	99.6	97.4	94.5	99.7	99.3	97.4
Exceedences of 10 (mg/m ³) maximum daily running 8-hour mean (exceedence days)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Exceedences of WHO guideline – hourly mean >25 (mg/m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0

Conversion factor: 1ppm = 1.16 mg/m³

Figure 37 Wind speed and direction: 2004

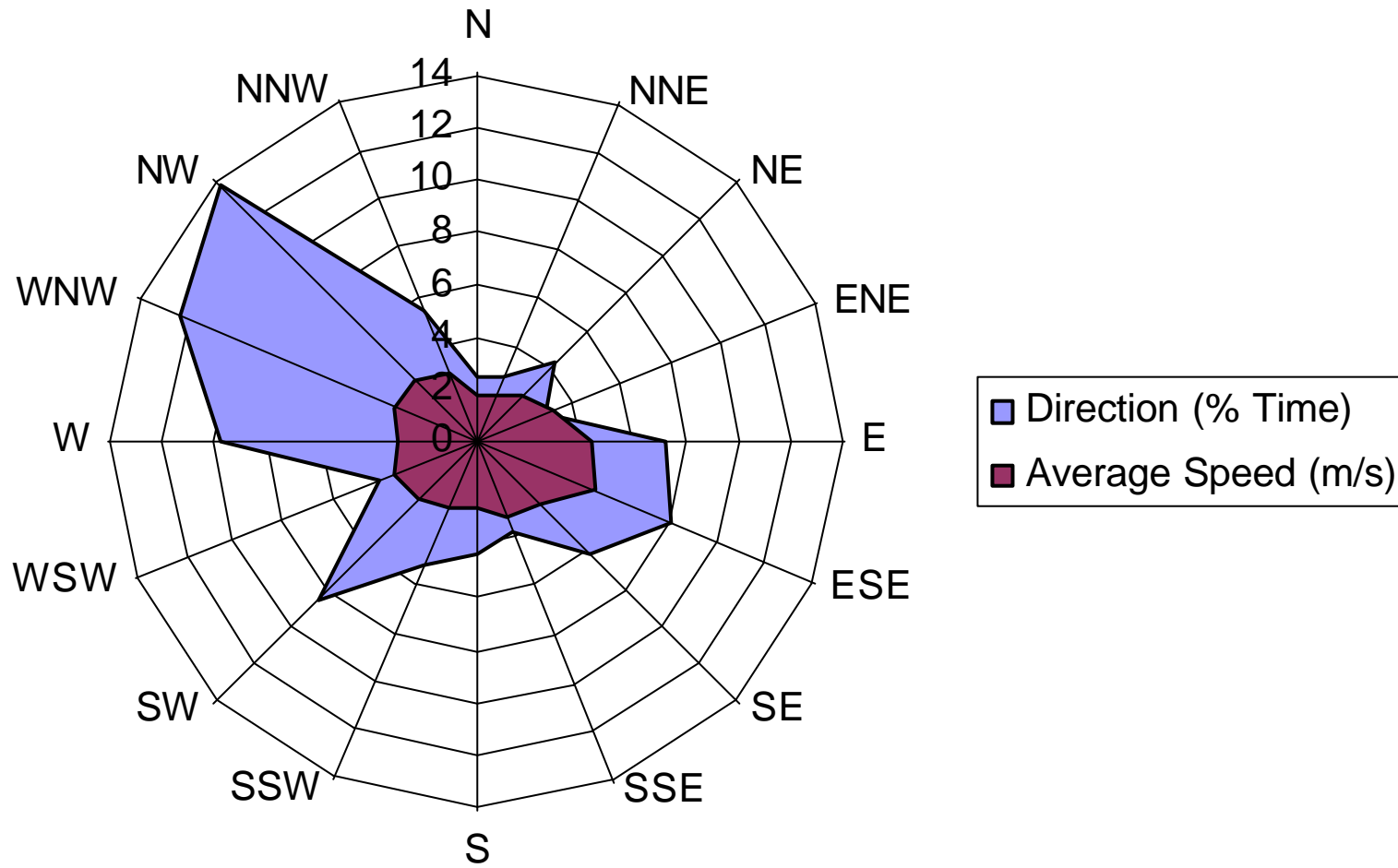


Figure 38 Nitrogen dioxide results – 2004 - hourly averages

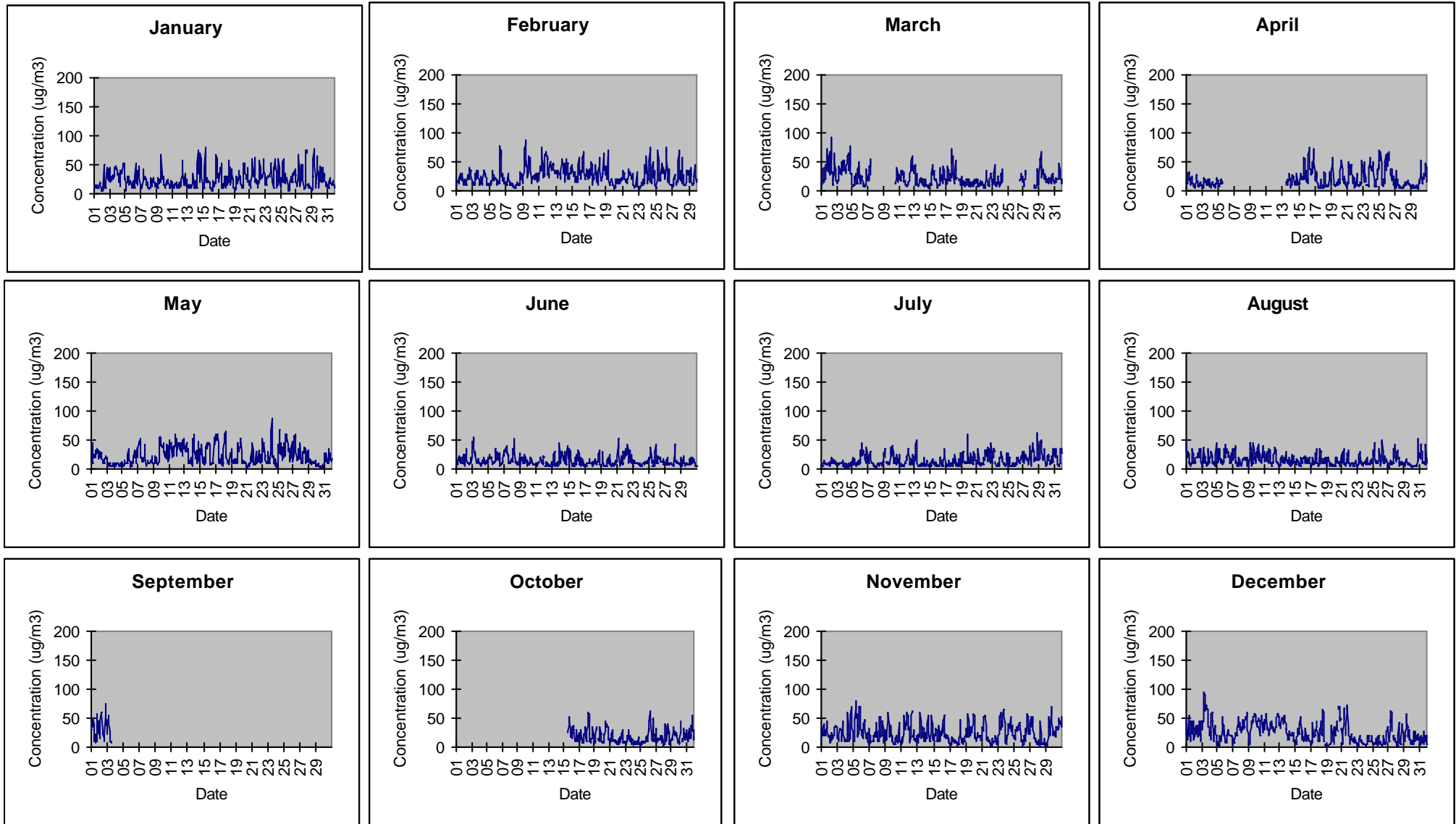


Figure 39 Average nitrogen dioxide levels by wind direction in 2004

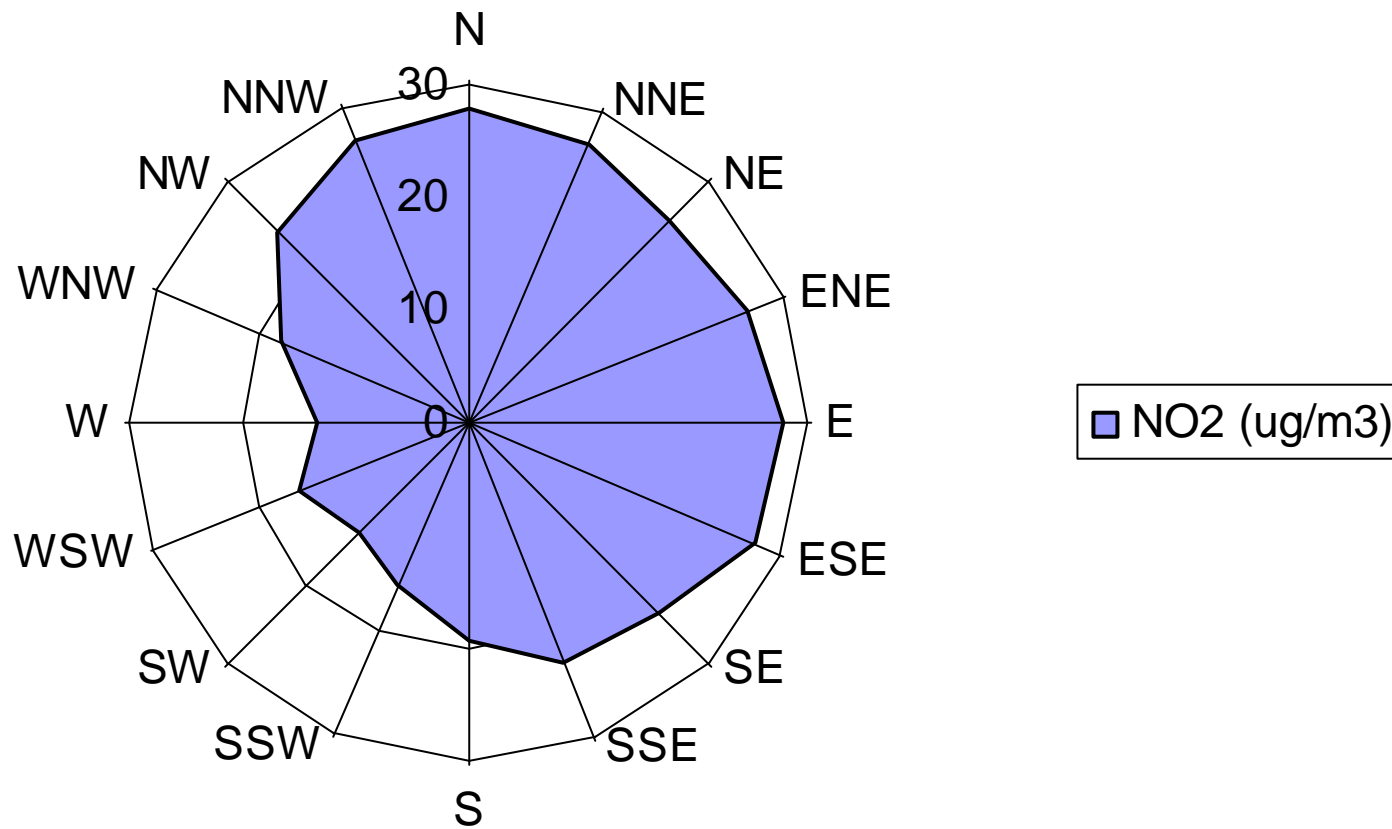


Figure 40 Sulphur dioxide results – 2004 – 15minute averages

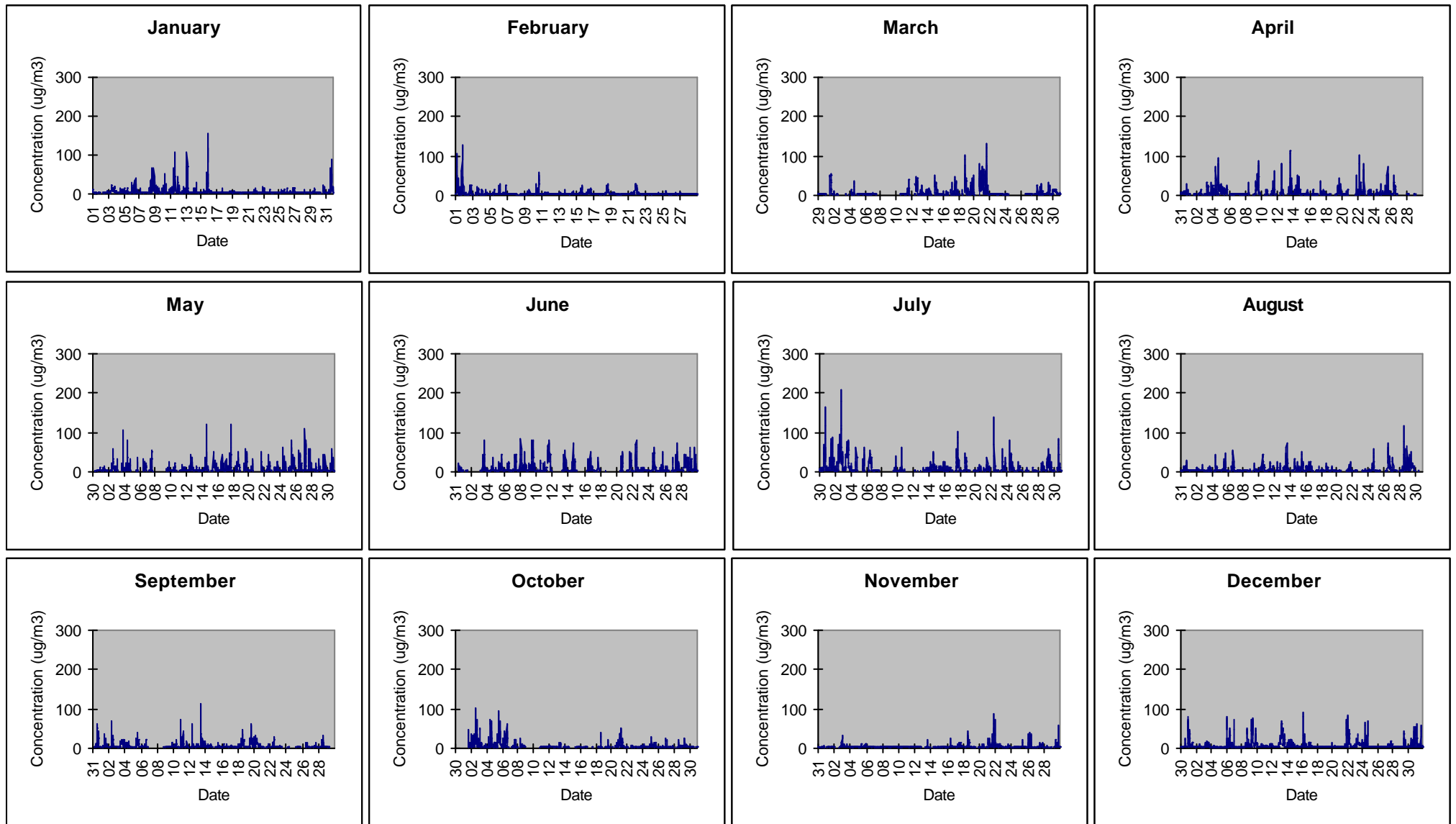


Figure 42 Average sulphur dioxide levels by wind direction in 2004

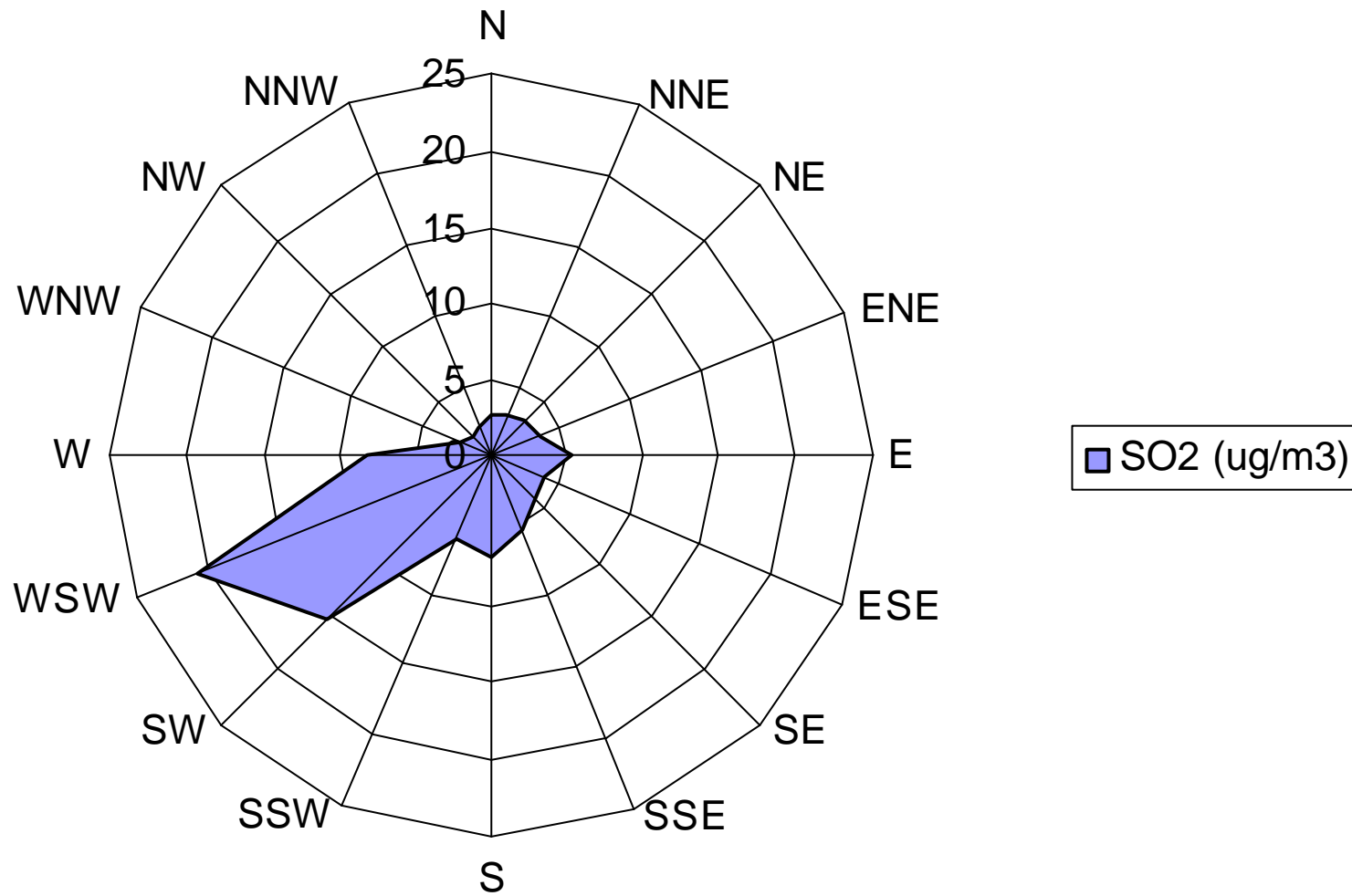


Figure 43 Ozone results – 2004 – 8hour running averages

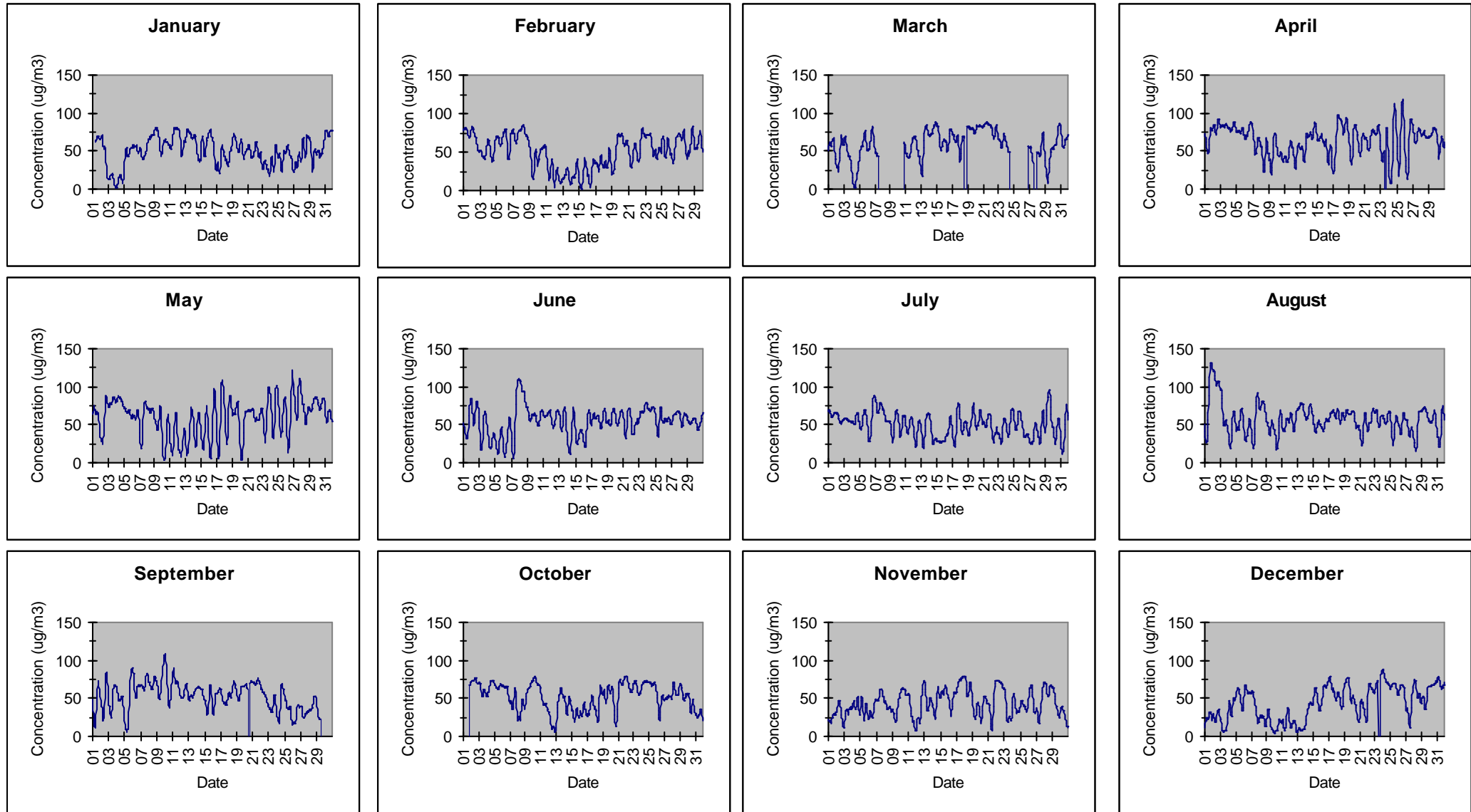


Figure 44 Average ozone levels by wind direction in 2004

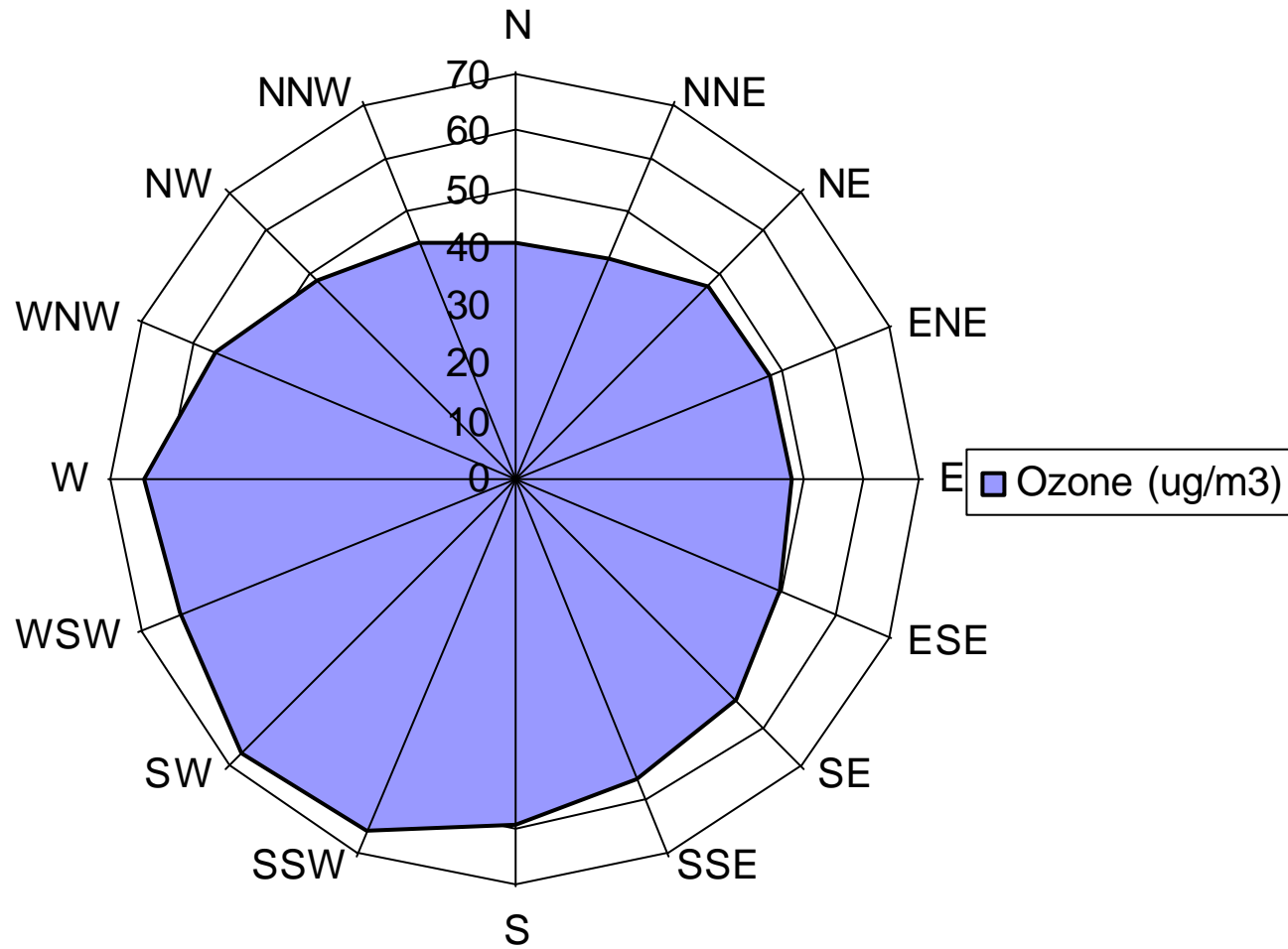


Figure 45 PM₁₀ results – 2004 - 24hour running averages

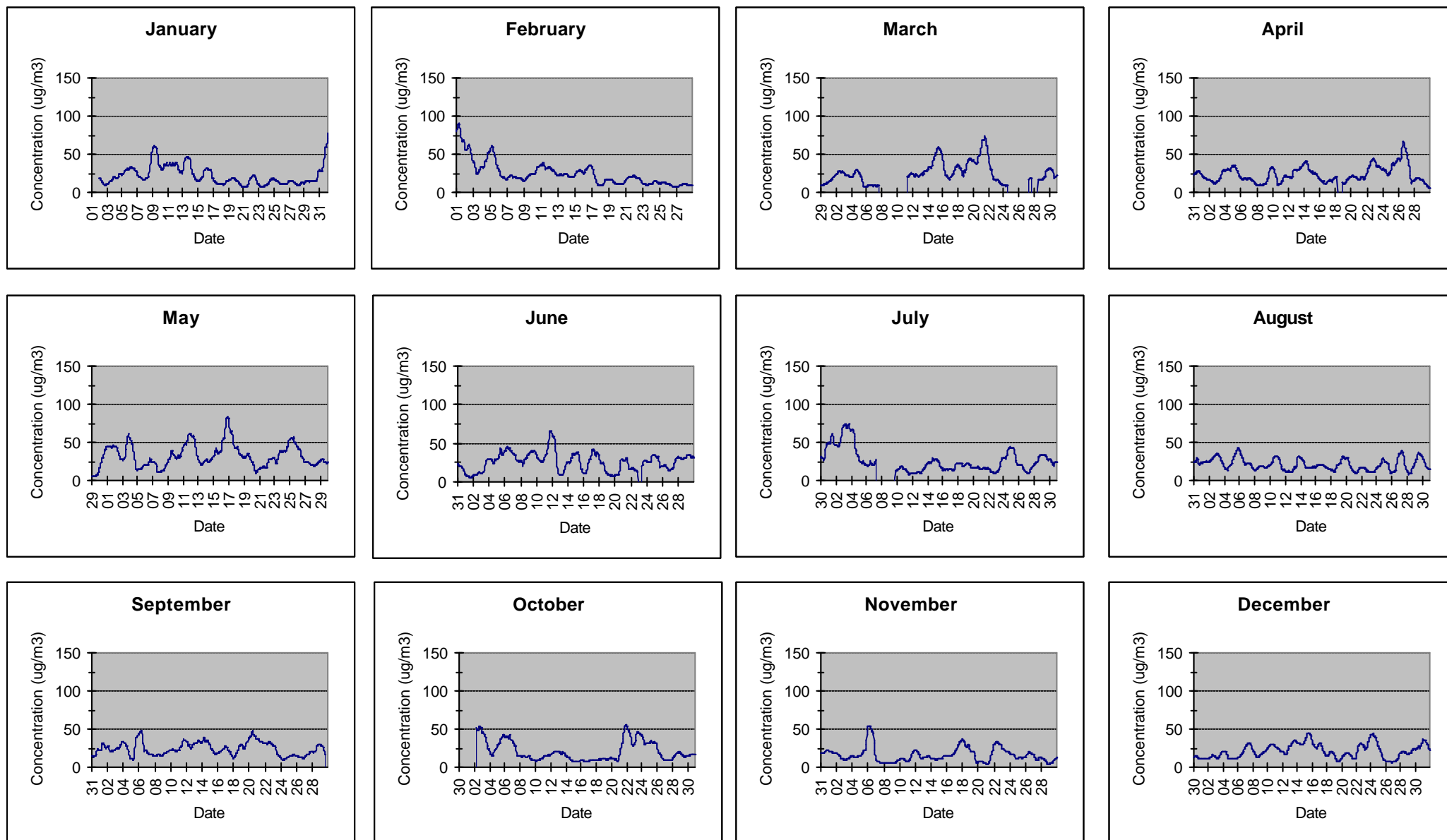


Figure 46 PM₁₀ particulate levels by wind direction in 2004

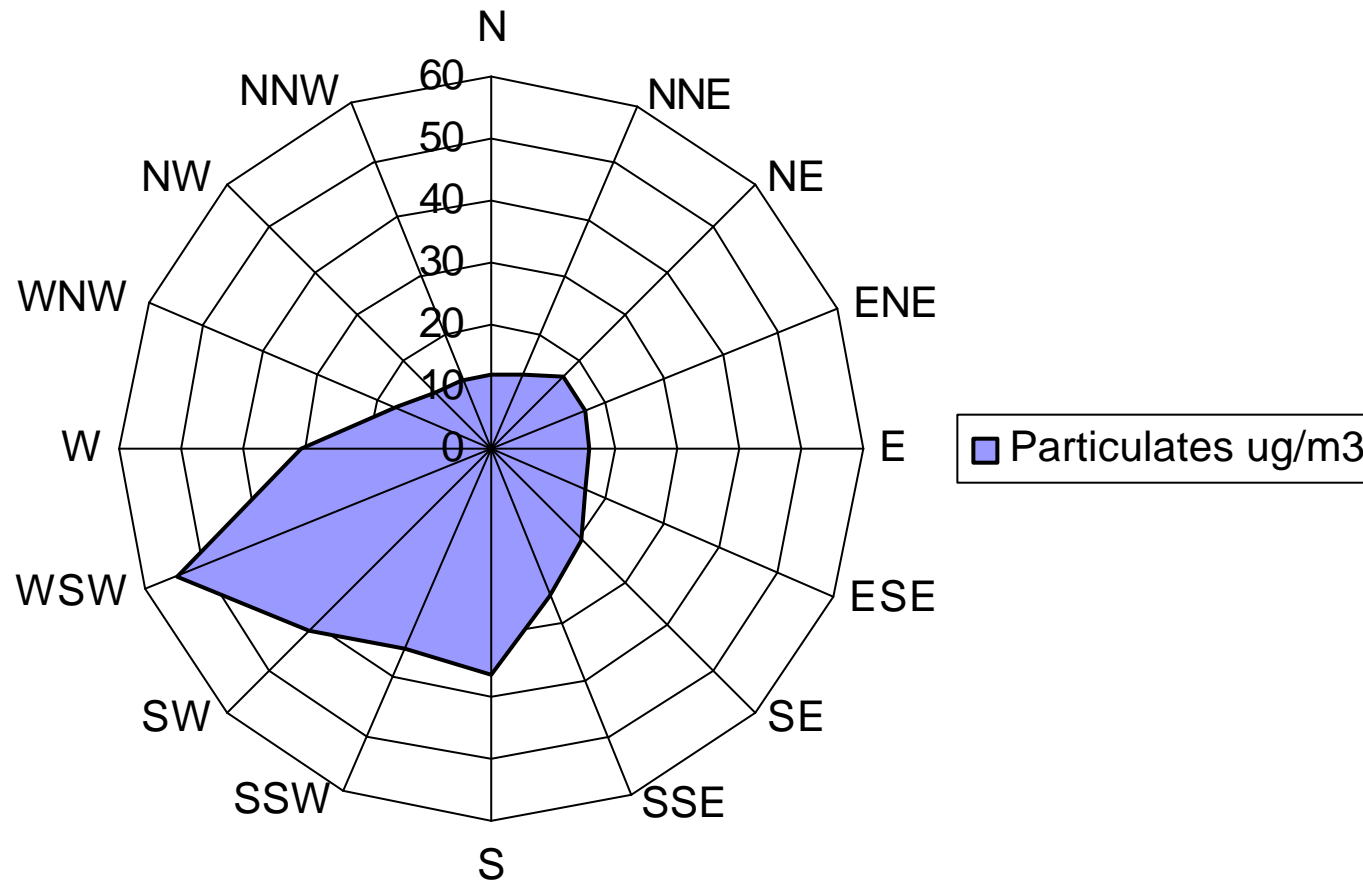


Figure 47 CO results – 2004 - 8hour running averages

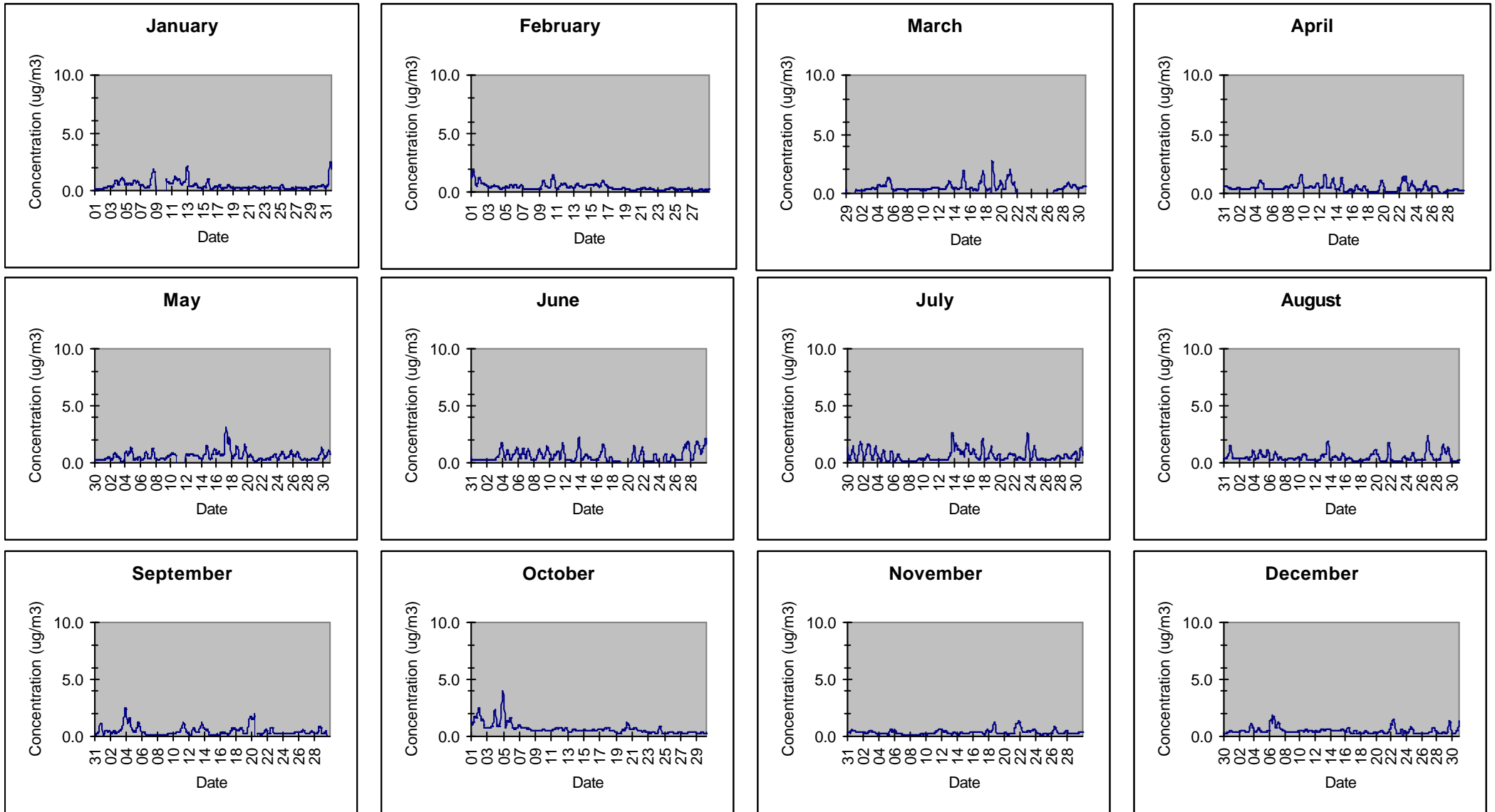
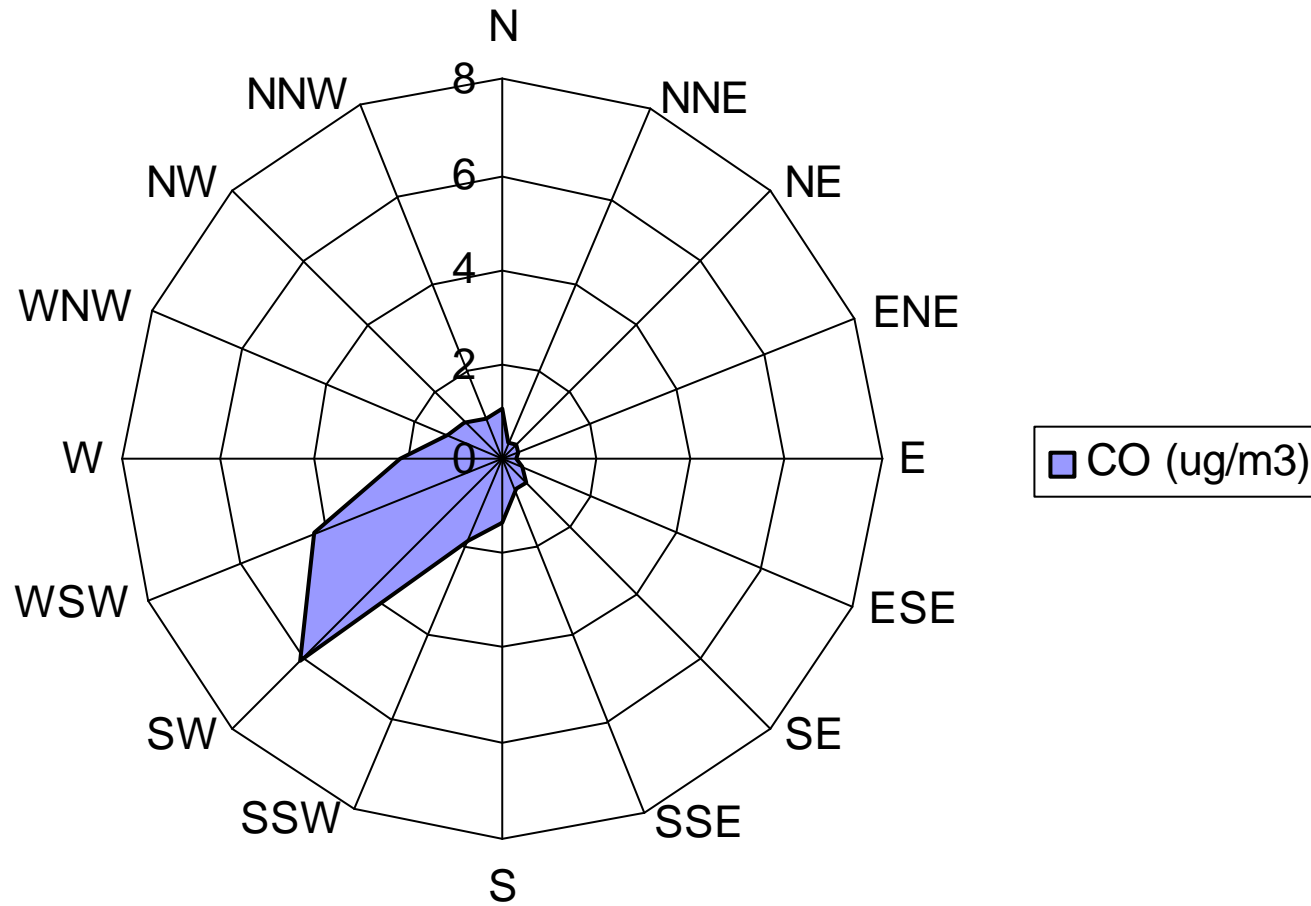


Figure 48 CO levels by wind direction in 2004



Organics –Ozone Precursor System

Baglan, Port Talbot

Introduction

The monitoring station has been in operation since November 1996. Neath Port Talbot and Swansea Authorities were successful in obtaining funding from the Department of the Environment (now Department of the Environment, Transport and the Regions) to pilot the government's proposals for Local Authority air quality management under the Environment Act. Part of this award was used to provide the Monitoring Unit. The total cost of setting up the unit was approximately £50,000. In April 1998, the system was incorporated onto the Authority's Monnet database, which allows remote data collection and quality assurance. The data is checked on a daily basis and is collected and disseminated to the Authority's World Wide Web Internet site on an hourly basis. The location of the analyser is shown in Figure 51.

Pollutants monitored

The ozone precursor analyser is so called because it allows measurement of volatile organic compounds (VOC's), substances that have a role in the formation of another pollutant, Ozone. Ozone in turn is of concern since it can cause harm to plants and people when present at low altitude and in high concentrations. VOC is an acronym, which stands for Volatile Organic Compounds. These are a range of mainly synthetic, carbon based substances which are capable of becoming a vapour at relatively low temperatures. These substances are primarily man-made, but Methane also arises naturally from the putrefaction of organic materials and as a result of the process of digestion in animals. Some VOC's are recognised as being potentially harmful to health, whereas others are harmful to the environment. The government has introduced National Air Quality Objectives (1997), which are health based environmental aims, for Benzene and 1,3-Butadiene, to be achieved by 31st December 2003. These measurements do not currently contribute to the National Hydrocarbon Network.

The following volatile organic compounds are analysed:

- 1,3-butadiene
- 1-butene
- 3 methyl pentane
- Benzene
- Ethane
- Ethene
- Ethyl benzene
- Ethyne
- Propane
- Propene
- Toluene
- Cis 2-Butene

- Cis 2-pentene
- Iso-butane
- Iso-pentane
- m+p-xylene
- o-xylene
- N-Butane
- N-heptane
- N-hexane
- N-pentane
- Trans 2 butene
- Trans 2 pentene

Apart from benzene and 1,3-butadiene, there are no environmental standards that apply for these pollutants and adverse health effects are unlikely to arise at ambient concentrations.

Benzene

Benzene is a chemical consisting of six atoms of carbon and hydrogen, arranged in a ring structure. Benzene in the atmosphere arises primarily as a result of the combustion of petroleum based fuels. It is also present in cigarette smoke. Benzene harms animals by causing damage to the genetic make-up of cells. Substances that cause this type of damage are of particular concern, since there is no method currently available which enables a risk free exposure level to be determined. Long term exposure to benzene is associated with types of leukaemia. The National Air Quality Objective level is 5 parts per billion (ppb) or $16.3 \mu\text{g}/\text{m}^3$, measured as a running annual average.

1,3-butadiene

1,3-Butadiene is a chemical consisting of four carbon and six hydrogen atoms. Only trace amounts are normally present in the atmosphere, which arise mainly from the combustion of petroleum (and other fossil fuels) and as a result of accidental fires. Like Benzene, 1,3-Butadiene is genotoxic and is associated with leukaemia's and lymphomas. The National Air Quality Objective level is 1 ppb or $2.25 \mu\text{g}/\text{m}^3$ measured as an annual running average.

Results and analysis

The results for 2004 at Baglan and the National Hydrocarbon Network site at Cardiff are summarised and compared in Table 15 below. The Cardiff site has been used previously for comparison since it is the nearest such site where similar measurements are carried out. However, the number of substances analysed at the Cardiff site has now decreased to six.

Table 12 VOC results at Baglan and Cardiff - 2004

VOC Species	Average (ppb)		Max (ppb)	
	Baglan	Cardiff	Baglan	Cardiff
1,3-butadiene	0.02	0.05	0.53	16.42
1-butene	0.05	ND	42.49	ND
3-methyl pentane	0.02	ND	0.37	ND
Benzene	0.06	0.26	8.99	4.02
Ethane	0.69	ND	18.09	ND
Ethene	0.05	ND	0.75	ND
Ethyl benzene	0.07	0.12	6.52	5.42
Ethyne	0.09	ND	3.71	ND
Propane	0.03	ND	0.43	ND
Propene	0.25	ND	165.13	ND
Toluene	0.26	0.88	7.88	24.24
cis 2-butene	0.09	ND	1.33	ND
cis 2-pentene	0.02	ND	0.25	ND
iso-pentane	0.26	ND	7.34	ND
Isobutane	0.43	ND	15.59	ND
m-xylene	0.18	0.34	5.97	14.64
o-xylene	0.93	0.22	36.40	11.22
n-butane	0.05	ND	1.16	ND
n-heptane	0.06	ND	32.84	ND
n-hexane	0.02	ND	0.29	ND
n-pentane	0.08	ND	6.38	ND
trans 2-butene	0.03	ND	0.52	ND
trans 2-pentene	0.02	ND	0.32	ND

The information is represented graphically in Figures 49 (averages) and 50 (maxima).

The average annual concentration of benzene at 0.06ppb is only just over 1% of the National Air Quality objective level and is less than a quarter of that measured in Cardiff during the same period. The 1,3-butadiene concentrations were barely measurable, being near the detection limit of the equipment.

There are no National Air Quality objectives for the other substances measured. But the Environment Agency has developed a series of Environmental Assessment Levels (EALs) for the protection of human health. However, not all of the substances listed above have an EAL. But, in those cases where an EAL is provided, the concentrations are well below their respective EALs. Average concentrations of ethane (ethylene) and propene

(propylene), which arose from Baglan Bay works, have now reduced substantially owing to the shutdown of the corresponding parts of the works. These reductions in voc concentrations are shown graphically in Figure 52. Historically, the most noticeable reductions have been for ethane, ethane, propane and propene. The reduction in measured levels to around background concentrations raises a question as to the future need to monitor these substances. It is recommended that this monitoring should be discontinued.

Figure 49 VOC Average concentrations – 2004

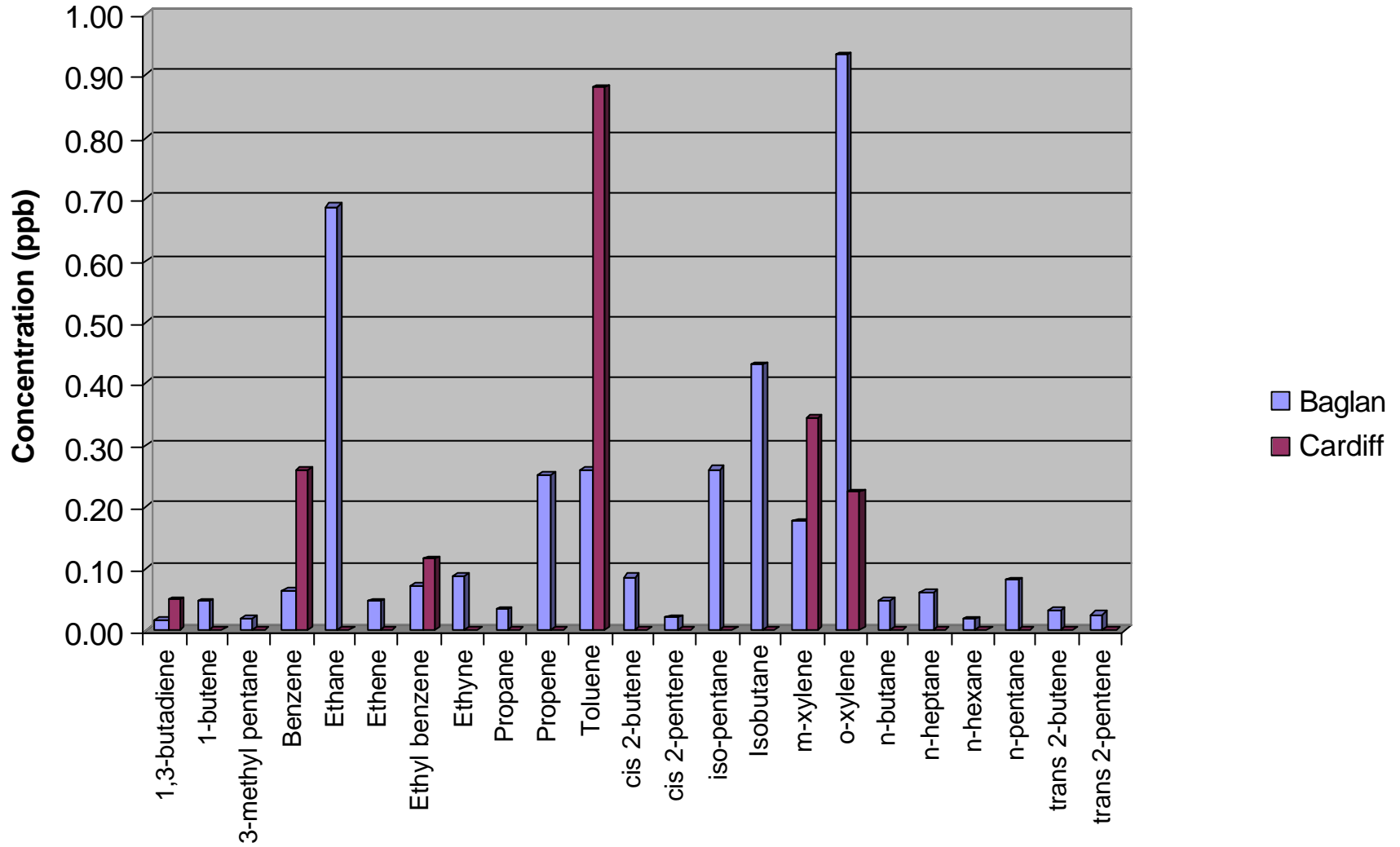


Figure 50 VOC maximum concentrations – 2004

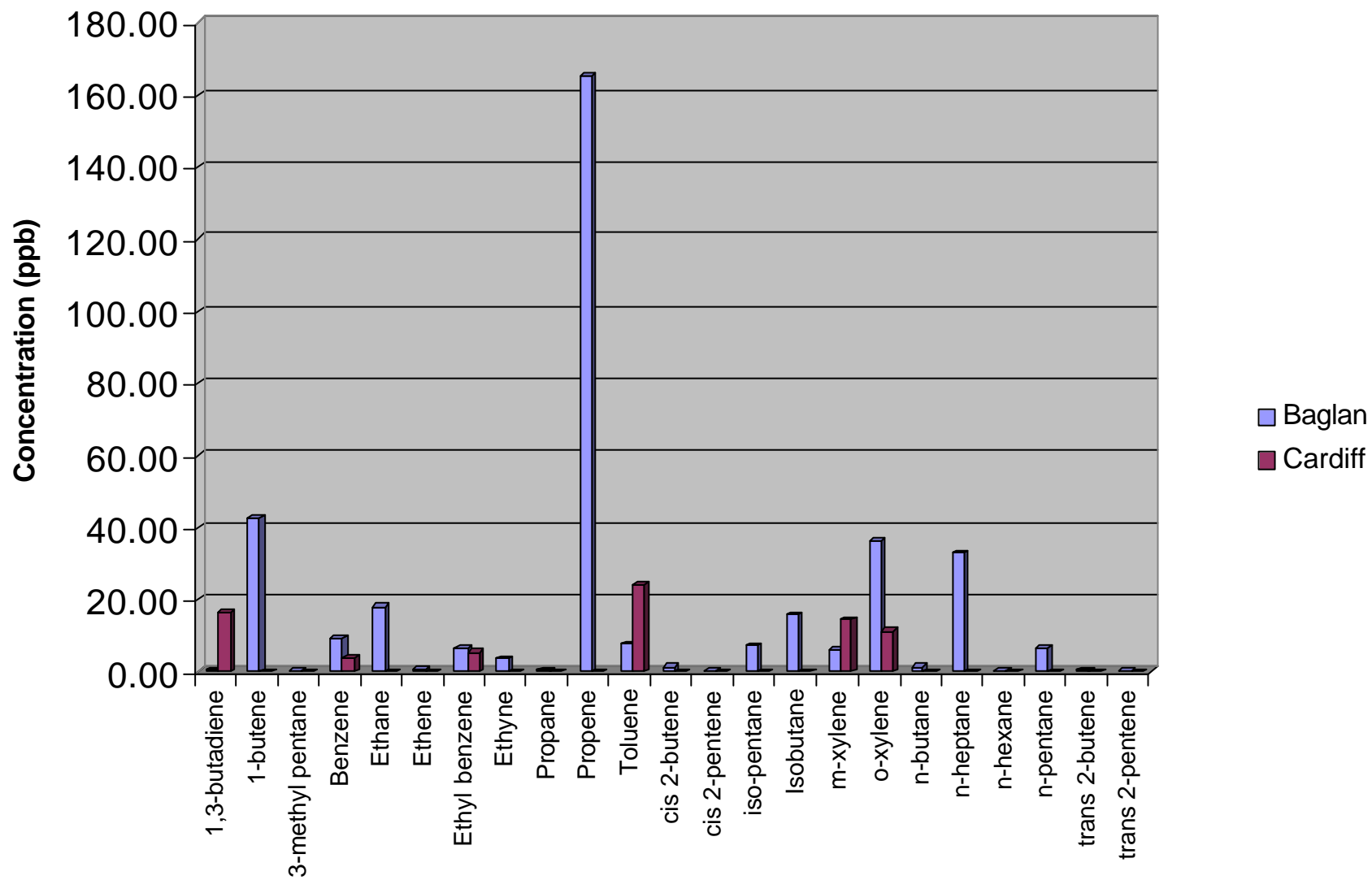


Figure 51 Continuous analyser locations

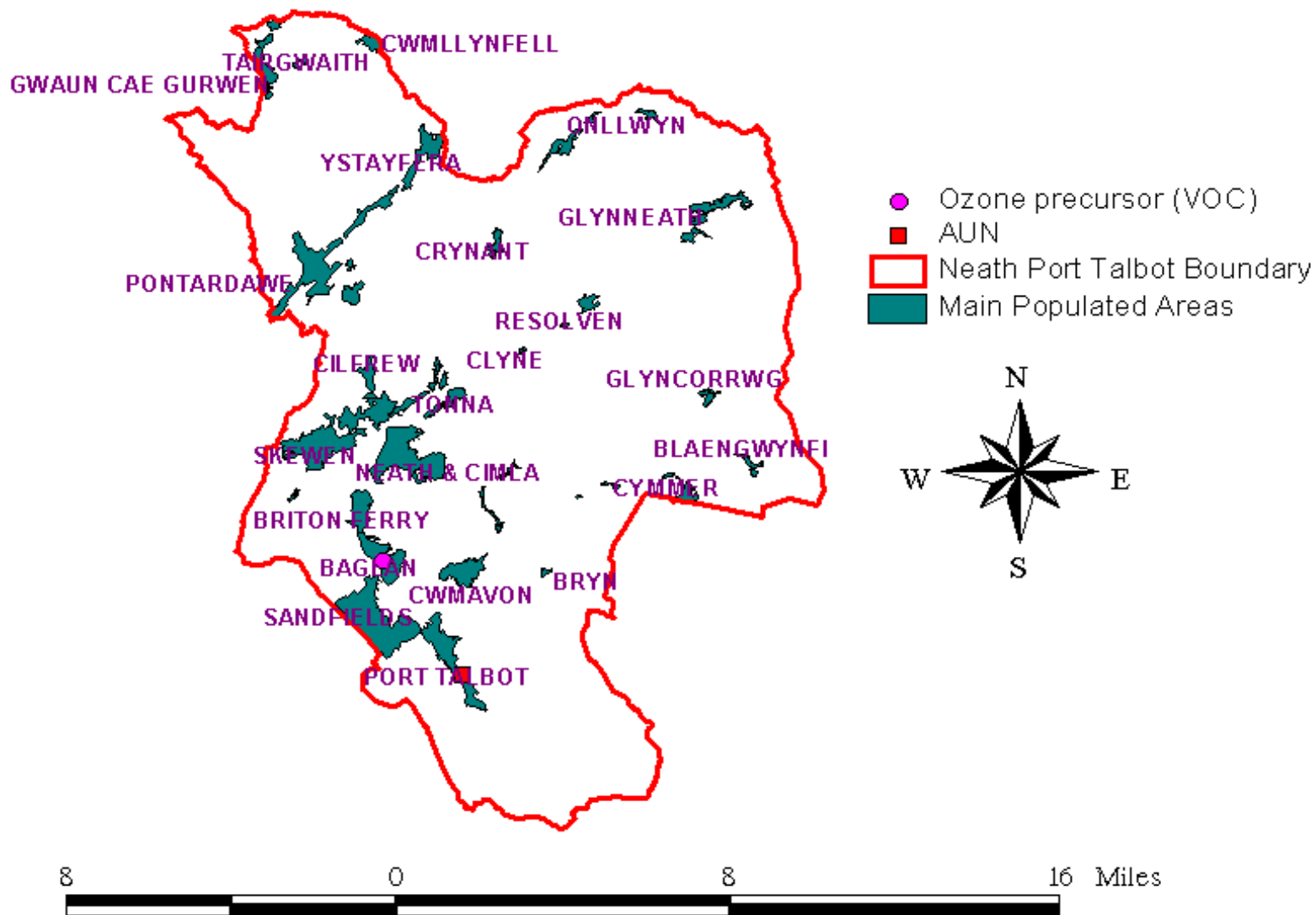
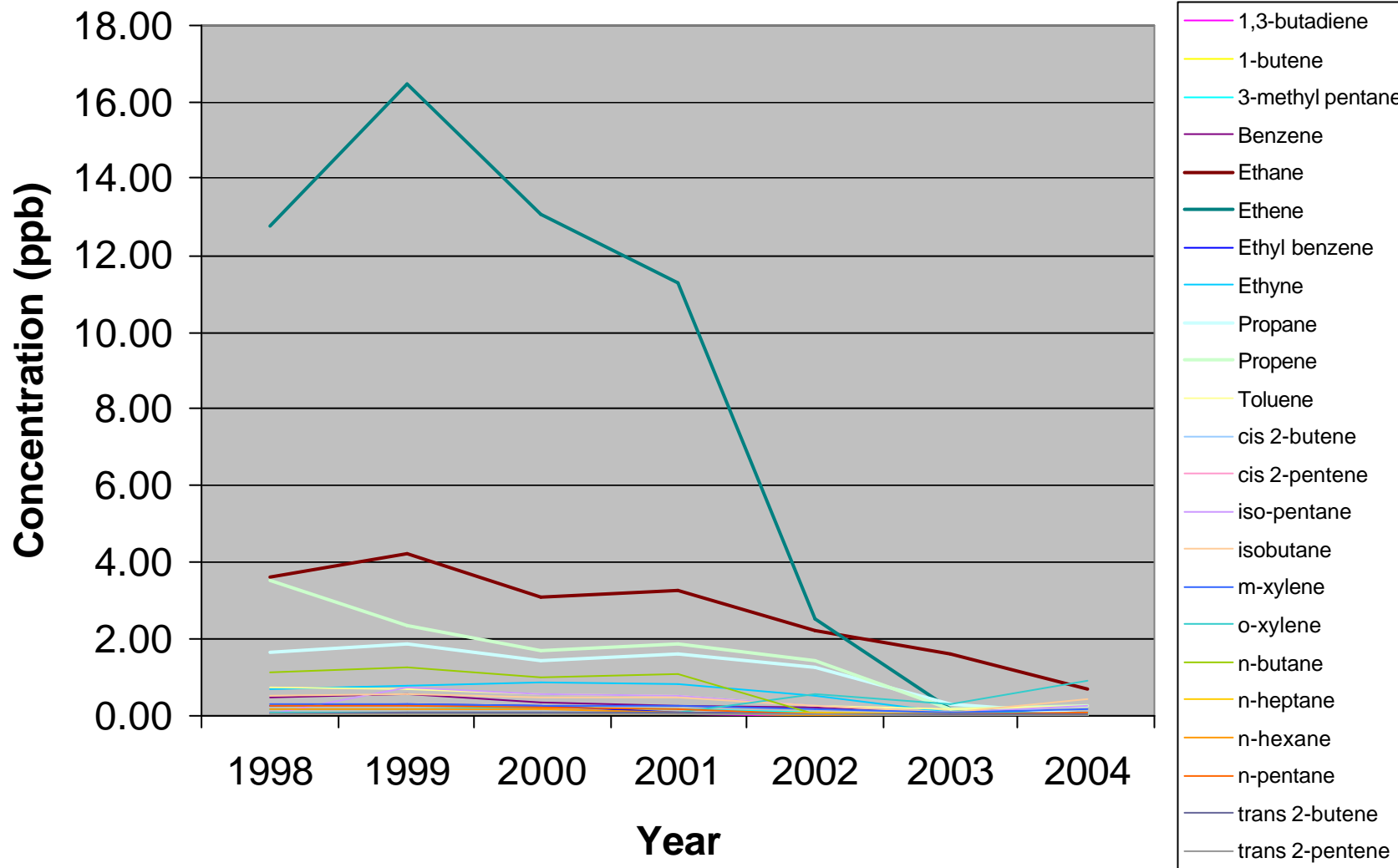


Figure 52 VOC maximum concentrations – 2004



APPENDIX 1

AIR QUALITY STANDARDS AND BANDINGS

Table 13 Summary of objectives

Pollutant	Objective	Measured as	To be achieved by
Benzene	16.25 µg/m ³ (5 ppb)	Running Annual Mean	31 December 2003
1,3-Butadiene	2.25 µg/m ³ (1 ppb)	Running Annual Mean	31 December 2003
Carbon monoxide	10 mg/m ³ (8.6 ppm)	Running 8 Hour Mean	31 December 2003
Lead	0.5 µg/m ³	Annual Mean	31 December 2004
	0.25 µg/m ³	Annual Mean	31 December 2008
Nitrogen dioxide*	200 µg/m ³ (105 ppb) Not to be exceeded more than 18 times per year	1 Hour Mean	31 December 2005
	40 µg/m ³ (21 ppb)	Annual Mean	31 December 2005
Nitrogen Oxides**	(V) 30 µg/m ³ (16 ppb)	Annual Mean	31 December 2000
Ozone	100 µg/m ³	Running 8 hour Mean Daily maximum of running 8 hr mean not to be exceeded more than 10 times per year	31 December 2005
Particles (PM10)	50 µg/m ³ Not to be exceeded more than 35 times per year	24 Hour Mean	31 December 2004
	40 µg/m ³	Annual Mean	31 December 2004

Quality Objectives - Continued

Sulphur dioxide	266 $\mu\text{g}/\text{m}^3$ (100 ppb) Not to be exceeded more than 35 times per year	15 Minute Mean	31 December 2005
	350 $\mu\text{g}/\text{m}^3$ (132 ppb) Not to be exceeded more than 24 times per year	1 Hour Mean	31 December 2004
	125 $\mu\text{g}/\text{m}^3$ (47 ppb) Not to be exceeded more than 3 times per year	24 Hour Mean	31 December 2004
	(V) 20 $\mu\text{g}/\text{m}^3$ (8 ppb)	Annual Mean	31 December 2000
	(V) 20 $\mu\text{g}/\text{m}^3$ (8 ppb)	Winter Mean (01 October - 31 March)	31 December 2000
<p>Notes: $\mu\text{g}/\text{m}^3$ - micrograms per cubic metre mg/m^3 - milligrams per cubic metre ppb - parts per billion ppm - parts per million * The objectives for nitrogen dioxide are provisional ** Assuming NO_x is taken as NO_2 (V) These standards are adopted for the protection of vegetation and ecosystems. All of the remainder are for the protection of human health.</p>			

Table 14 UK Air quality banding levels

Band	Index	Ozone		Nitrogen Dioxide		Sulphur Dioxide		Carbon Monoxide		PM10 Particles
		8 hourly or hourly mean*		hourly mean		15 minute mean		8 hour mean		24 hour mean
		μgm^{-3}	ppb	μgm^{-3}	ppb	μgm^{-3}	ppb	mgm^{-3}	ppb	μgm^{-3}
Low										
	1	0-32	0-16	0-95	0-49	0-88	0-32	0-3.8	0.0-3.2	0-16
	2	33-66	17-32	96-190	50-99	89-176	33-66	3.9-7.6	3.3-6.6	17-32
	3	67-99	33-49	191-286	100-149	177-265	67-99	7.7-11.5	6.7-9.9	33-49
Moderate										
	4	100-126	50-62	287-381	150-199	266-354	100-132	11.6-13.4	10.0-11.5	50-57
	5	127-152	63-76	382-476	200-249	355-442	133-166	13.5-15.4	11.6-13.2	58-66
	6	153-179	77-89	478-572	250-299	443-531	167-199	15.5-17.3	13.3-14.9	67-74
High										
	7	180-239	90-119	573-635	300-332	532-708	200-266	17.4-19.2	15.0-16.5	75-82
	8	240-299	120-149	363-700	333-366	709-886	267-332	19.3-21.2	16.6-18.2	83-91
	9	300-359	150-179	701-763	367-399	887-1063	333-399	21.3-23.1	18.3-19.9	92-99
Very High										
	10	360 or more	180 or more	764 or more	400 or more	1064 or more	400 or more	23.2 or more	20 or more	100 or more

* For ozone, the maximum of the 8 hourly and hourly mean is used to calculate the index value.

Source <http://www.aeat.co.uk/netcen/airqual/welcome.html>

Table 15 UK Air quality banding levels

Banding	Index	Health Descriptor
Low	1	Effects are unlikely to be noticed even by individuals who know they are sensitive to air pollutants
	2	
	3	
Moderate	4	Mild effects, unlikely to require action, may be noticed amongst sensitive individuals.
	5	
	6	
High	7	Significant effects may be noticed by sensitive individuals and action to avoid or reduce these effects may be needed (e.g. reducing exposure by spending less time in polluted areas outdoors). Asthmatics will find that their 'reliever' inhaler is likely to reverse the effects on the lung.
	8	
	9	
Very High	10	The effects on sensitive individuals described for 'High' levels of pollution may worsen.

Source <http://www.aeat.co.uk/netcen/airqual/welcome.html>