Neath Port Talbot County Borough Council

Air quality report – 2002

SIXTH ANNUAL REPORT (2002)

The purpose of this report is to present the results of all pollution monitoring data collected during the calendar year 2002. 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

Overall the air quality in Neath and Port Talbot met the National Assembly for Wales Air Quality (Wales) 2000 Regulations Objective Levels. But, the Taibach/Margam Air Quality Management Area remains in effect, since the low number of PM_{10} exceedences could be related to the non-opeartion of the Blast Furnace Number 5 at the Corus works.

The parennial problems of iron-rich nuisance dust in the Taibach and Margam areas, provided a slightly mixed picture in 2002. The Ffrwydwyllt house site has shown welcome improvements, whereas the Prince Street site was marginally worse. This information will be passed to the Environment Agency Wales. The results at Onllwyn washery were disappointing, with an increase of 26% over the previous year. Results at Cwmgwrach, whilst not the highest also showed a significant 64% increase over the previous year.

The nitrogen dioxide diffusion tube survey showed that one site, Victoria Gardens, Neath may be exceeding the annual objective limit for this substance. Further monitoring is therefore required.

Smoke and sulphur dioxide monitoring at Glynneath by 8-port bubbler was discontinued during 2002. This was effected because of the continued low concentrations encountered.

The metals monitoring at Pontardawe continues to show the influence of the nickel smelter at Clydach. The annual mean nickel concentration found in 2002 was 92 ng/m^3, which is over four and a half times the proposed EC target value (20 ng/m^3 annual mean). This is in contrast to some other metals that have shown recent improvements. This information has been brought to the attention of the Environment Agency, which regulates the process.

Monitoring of volatile organic compounds (VOC's) at Baglan has shown a continued reduction in ethene levels.

Contents

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 2002, sampling of this kind took place at 13 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.
- Cwmllynfell, Amman Valley
- 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 2002 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 $mg/m^2/day$ 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 $mg/m^2/day$), 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 27 shows the location of each of the deposit gauges. Figure 28 shows the average fallout rate for each site during 2002 in a bar chart, and Table 1 holds the data for this chart. Figure 29 and Table 2 show how fallout rates have varied in the long term.

Results by site

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

The "nuisance limit" was not exceeded in 2002 and no samples reached within 10% of 200 mg/m2/day. The maximum fallout rate was 71 mg/m2/day and the average 31 mg/m2/day, the corresponding values for 2001 were 98 and 35 mg/m2/day respectively. There was an 11% decrease in fallout rates compared to the previous year. The decrease was primarily due to falling amounts sand and dirt.

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

The "nuisance limit" was not exceeded in 2002 and no samples reached within 10% of 200 mg/m2/day. The maximum fallout rate was 50 mg/m2/day and the average 35 mg/m2/day. Proper comparisons cannot be made with 2001 data since very little data was collected during that year owing to the foot and mouth crisis.

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

The "nuisance limit" was exceeded in two samples during May to July resulting in 66 days where the average fallout rate exceeded 200 mg/m2/day. This compares with 92 days during the previous year. The maximum fallout rate was 251 mg/m2/day. However the average fallout level was 4 % higher than the previous year, the difference being mainly due to more coal fallout. The effect of the nearby steel works continues to be the most significant at this site. This site continues to have the highest fallout rate of all those sampled.

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

The "nuisance limit" was not exceeded during 2002, whereas there were 22 days in 2001. The maximum fallout rate was only 84 mg/m2/day, significantly lower than the figure of 221 mg/m2/day for the previous year. The improvement was mainly due to lower quantities of iron rich material. The site has now shown significant improvements for two years in a row.

Eglwys Nunydd Reservoir, Port Talbot (Figs. 9 & 10)
The "nuisance limit" was exceeded on 54 days during 2002, mainly during the months of April and June. The corresponding figure for 2001 was 35 days. The maximum fallout rate was some 308 mg/m2/day, less than the exceptional figure of 453 mg/m2/day for the previous year. The average fallout level in 2002 was 68 mg/m2/day, a fall 28%. There were substantial decreases in iron rich material and plant and animal fragments, but significantly greater quantities of coal fallout.

Gwaun Cae Gurwen (Figs. 11 & 12)
The "nuisance limit" was not exceeded during 2002 and fallout levels were generally very low. The maximum fallout rate was only 35 mg/m2/day and the average 16 mg/m2/day. The average fallout level in 2002 was 48% less than the corresponding figure for 2001, mainly due to one the high result encountered during that year.

Cwmllynfell (Figs. 13 & 14)
The "nuisance limit" was not exceeded in 2002 and no samples reached within 10% of 200 mg/m2/day. The maximum fallout rate was 58 mg/m2/day and the average 29 mg/m2/day. Proper comparisons cannot be made with 2001 data since very little data was collected during that year owing to the foot and mouth crisis.

Tairgwaith (Figs. 15 & 16)
The "nuisance limit" was not exceeded and no samples reached within 10% of 200 mg/m^2/day. There was a 4% increase in fallout rates compared to the previous year, but the average fallout level was still low at only 24 mg/m^2/day. The maximum fallout rate was just 40 mg/m^2/day.

Parish Road, Cwmgwrach (Figs. 17 & 18)
One sample collected during April/May 2002 showed an uncharacteristically high fallout rate. The annual fallout statistics have therefore been skewed as a result. It is not clear whether the result is a true reflection of fallout levels, or whether the sample was subject to contamination. In the absence of evidence to the contrary it is assumed that the sample was good. The "nuisance limit" was consequently exceeded for a total of 34 days, but no samples reached within 10% of the 200 mg/m^2/day value. The average fallout rate was 46 mg/m^2/day, up 64% on the previous year.

Llygad yr Haul, Glynneath (Figs. 19 & 20)
The "nuisance limit" was not exceeded and no samples reached within 10% of 200 mg/m^2/day. The average fallout rate at 16 mg/m^2/day was low, a reduction of 20% over the previous year.

Wembley Avenue, Onllwyn (Figs. 21 & 22)
The "nuisance limit" was not exceeded exceeded and no samples reached within 10% of 200 mg/m^2/day. But average fallout levels in 2002 increased by 26% to 67 mg/m^2/day. This is the second successive year in which fallout levels have increased. This increase was due almost entirely to coal, which comprised some 65% of the typical sample. This effect is related to the nearby coal washery.

Cardonnel Road, Skewen (Figs. 23 & 24)
The "nuisance limit" was not exceeded and no samples reached within 10% of 200 mg/m^2/day. The fallout rate, at only 18 mg/m^2/day was down by 47% compared to 2001 levels. The change was mainly due to lower levels of coal and dirt.

Little Warren, Port Talbot (Figs. 25 & 26)
The “nuisance limit” was not exceeded and no samples reached within 10% of 200 mg/m2/day. The average fallout rate, at 38 mg/m2/day was 16% lower than that during 2001. The maximum fallout rate was 66 mg/m2/day

Figure 1

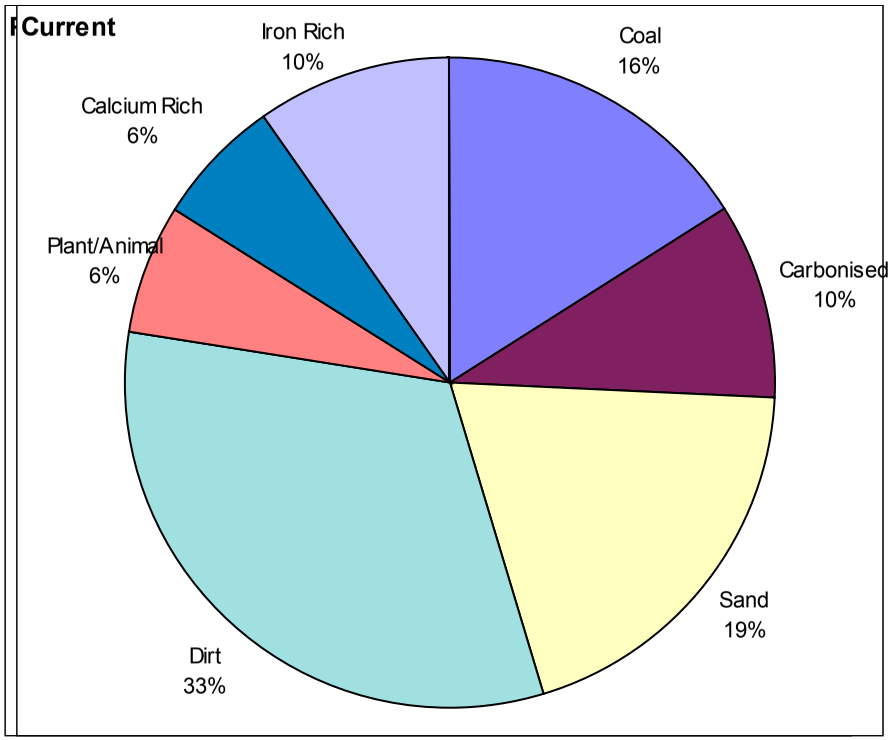
Deposit Gauge Analysis Report

Jeremy's Oil Distributors, Baldwins Crescent

Comparison of Fallout Composition

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01



Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/M2/day)	Current	5	3	6	10	0	2	2	3	0
	Previous	5	2	8	13	0	1	2	4	0

Figure 2

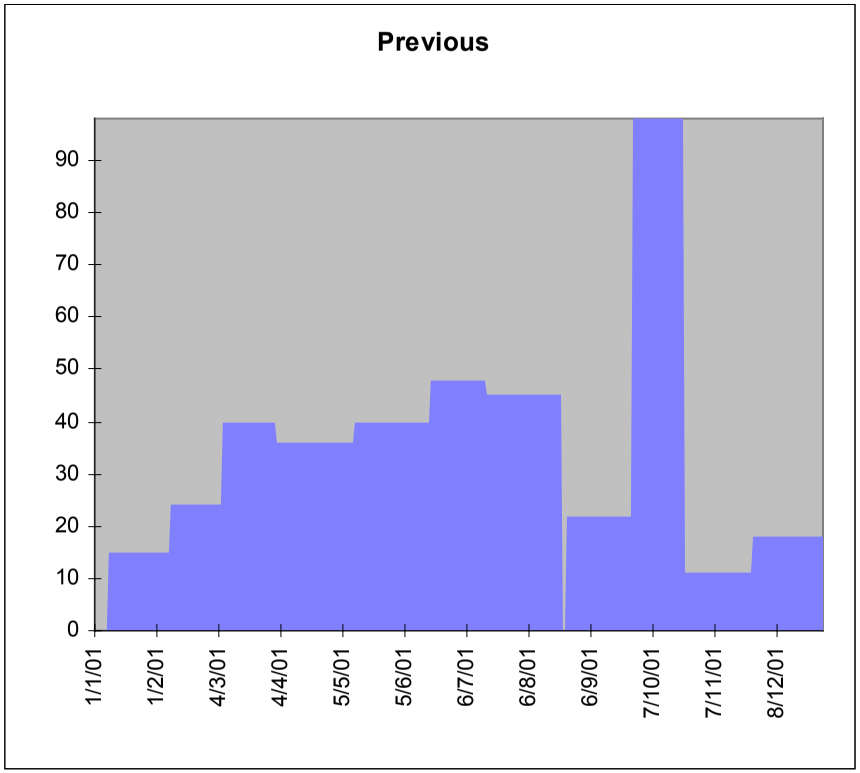
Deposit Gauge Analysis Report

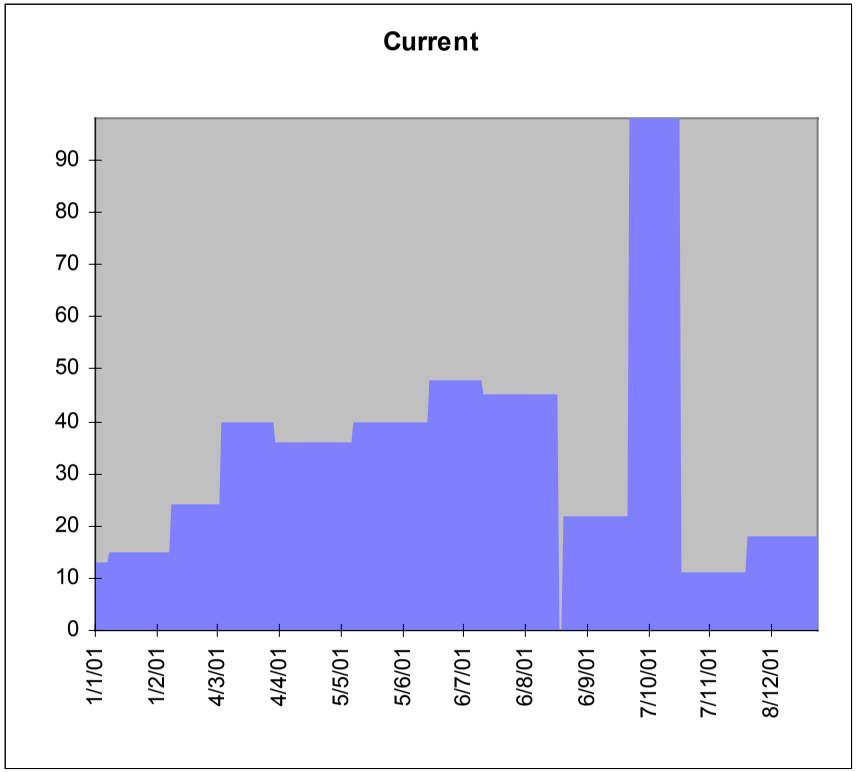
Jeremy's Oil Distributors, Baldwins Crescent

Comparison of Fallout Rate with Time

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	98	11	99.5	0	0
Previous	45	84	12	100.0	0	0
Change	-10	Decrease -22%				

Figure 3

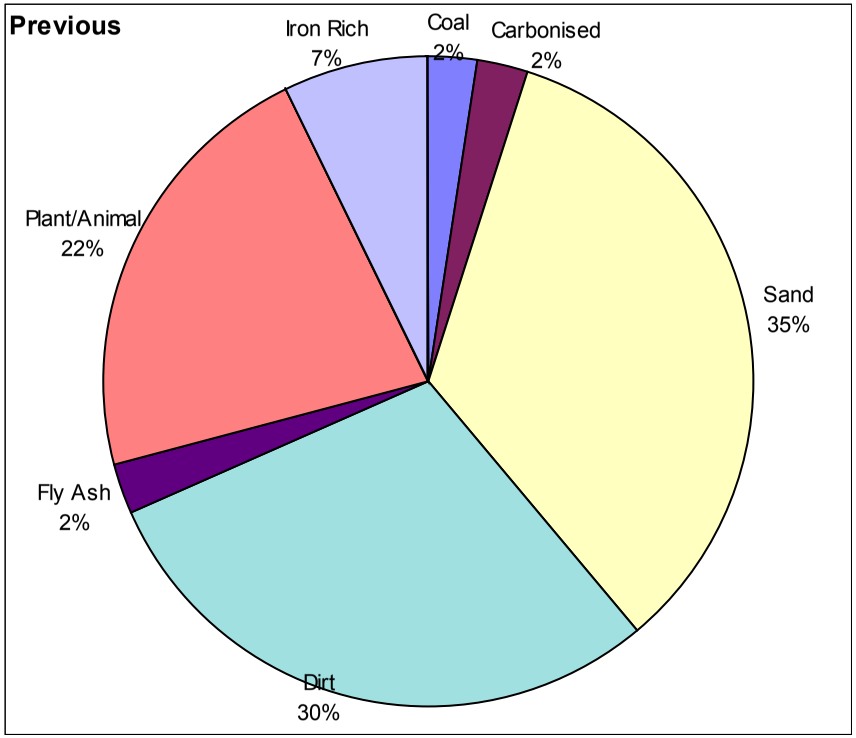
Deposit Gauge Analysis Report

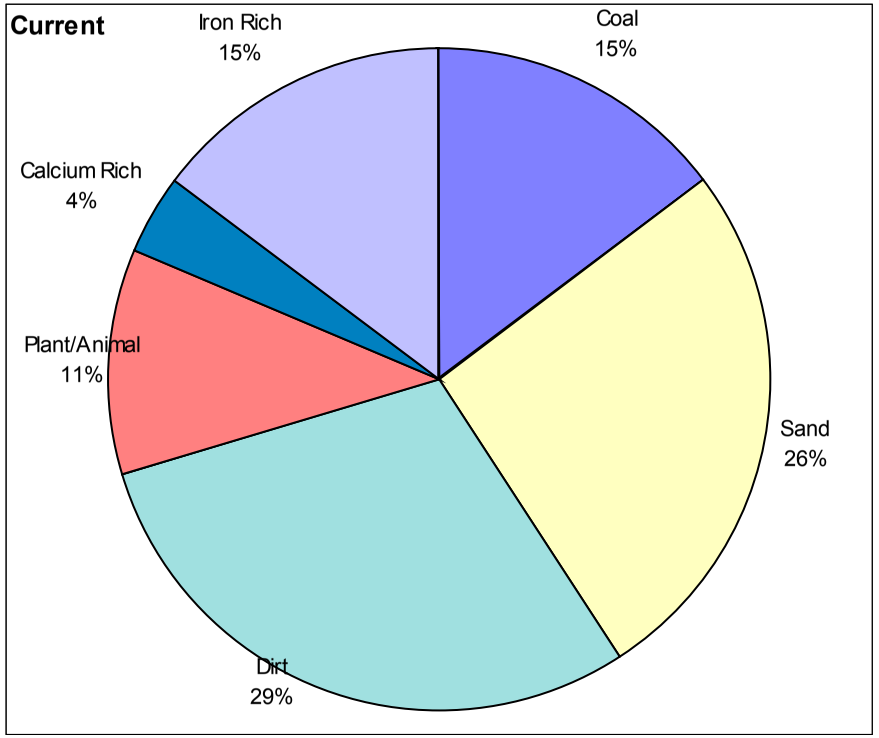
Cil Carne Farm, Port Talbot

Comparison of Fallout Composition

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	7	8	0	3	1	4	0
	Previous	2	2	28	24	2	18	0	6	0

Figure 4

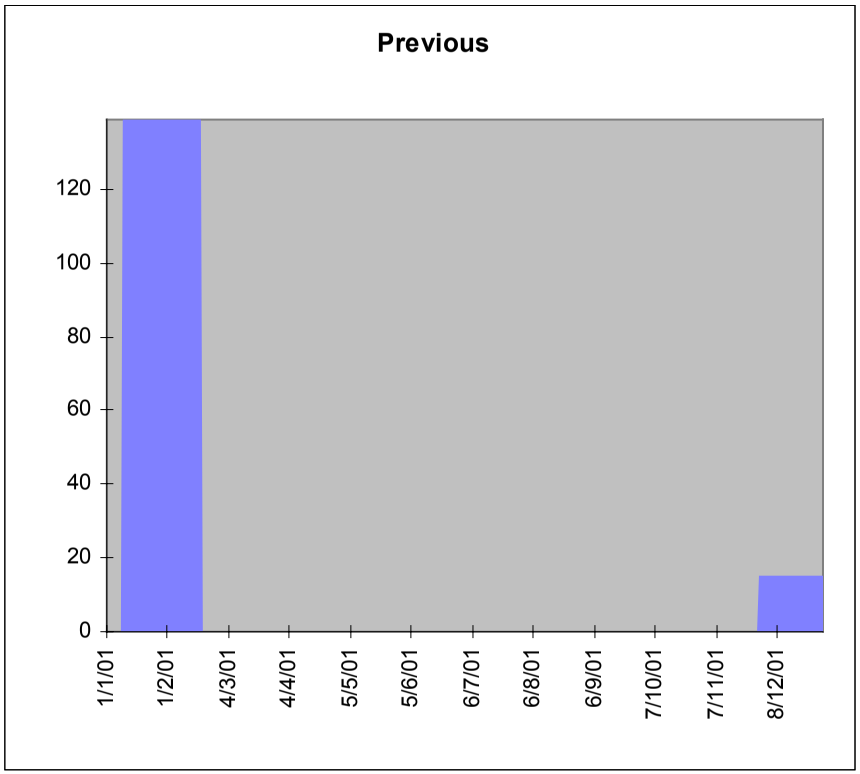
Deposit Gauge Analysis Report

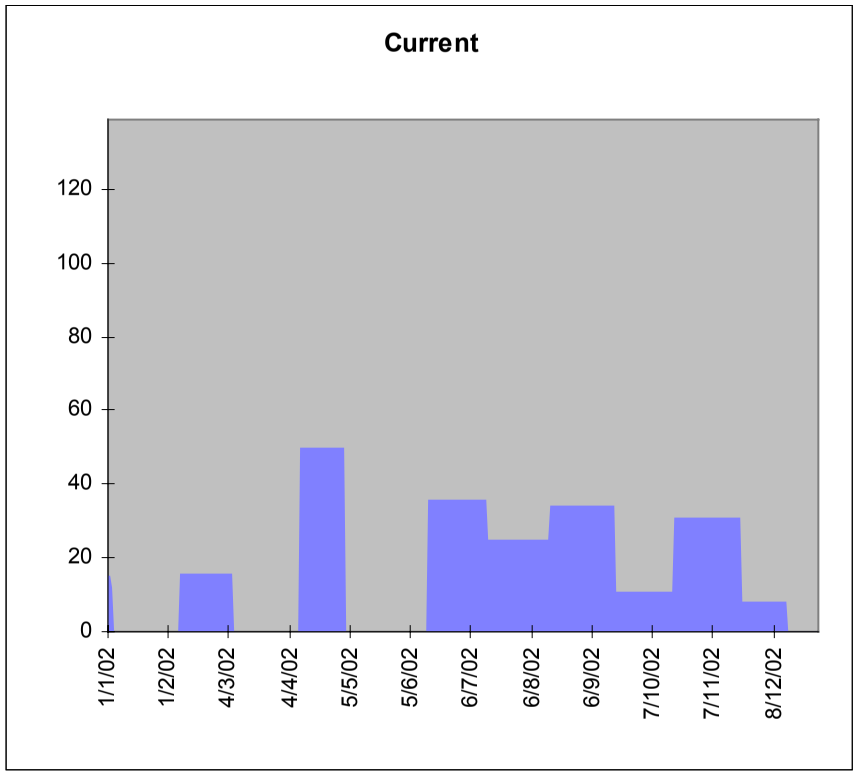
Cil Carne Farm, Port Talbot

Comparison of Fallout Rate with Time

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	26	50	9	65.7	0	0
Previous	83	139	2	20.5	0	0
Change	-57	Decrease -69%				

Figure 5

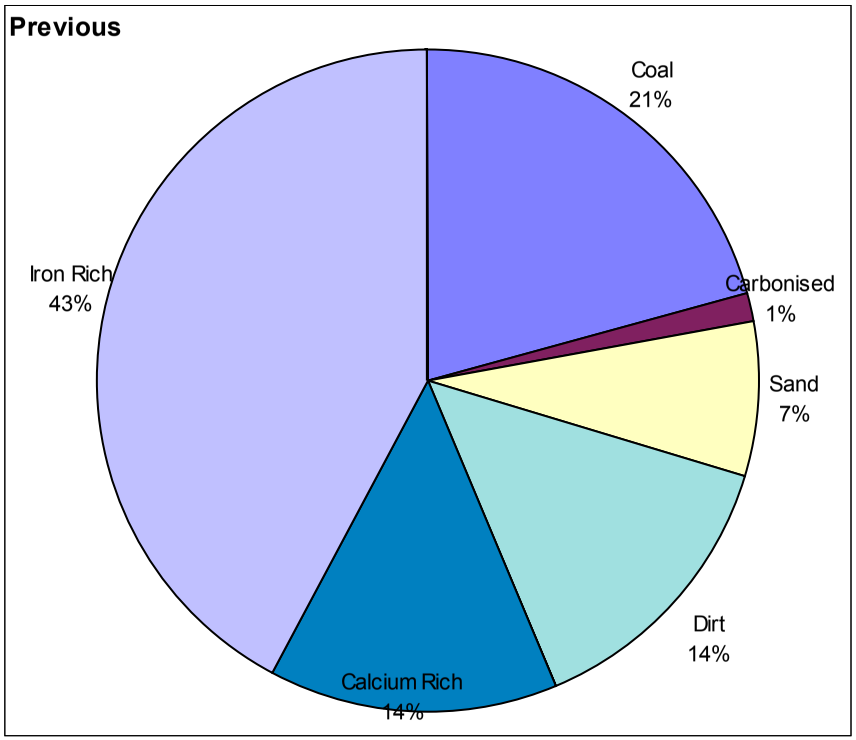
Deposit Gauge Analysis Report

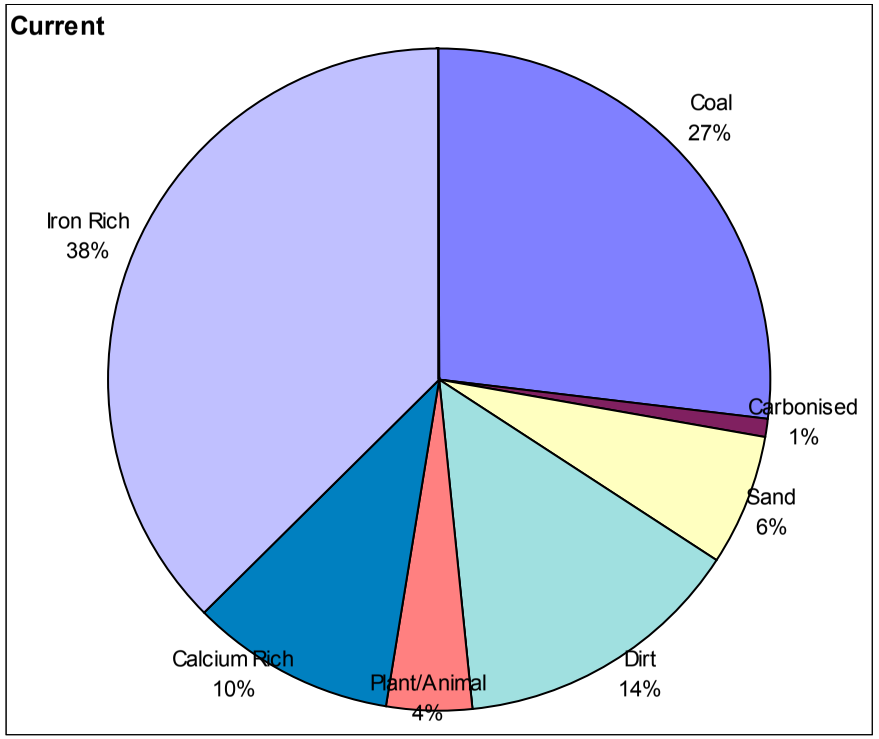
24, Prince Street, Port Talbot

Comparison of Fallout Composition

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	38	1	9	20	0	6	14	53	0
	Previous	28	2	10	19	0	0	19	57	0

Figure 6

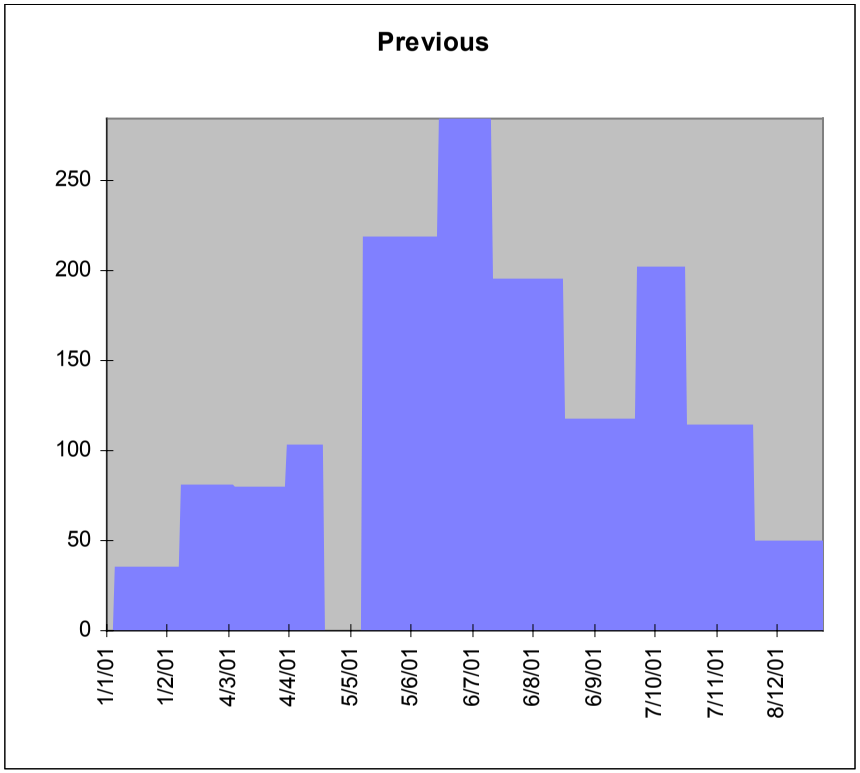
Deposit Gauge Analysis Report

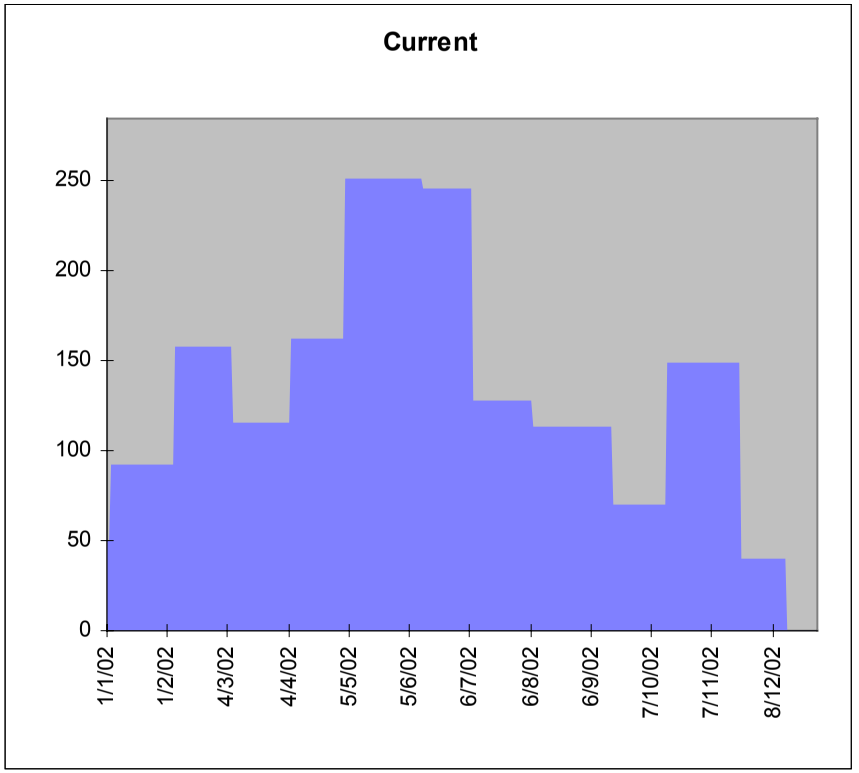
24, Prince Street, Port Talbot

Comparison of Fallout Rate with Time

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	141	251	11	95.6	0	66
Previous	135	284	11	94.7	37	92
Change	6	Increase 4%				

Figure 7

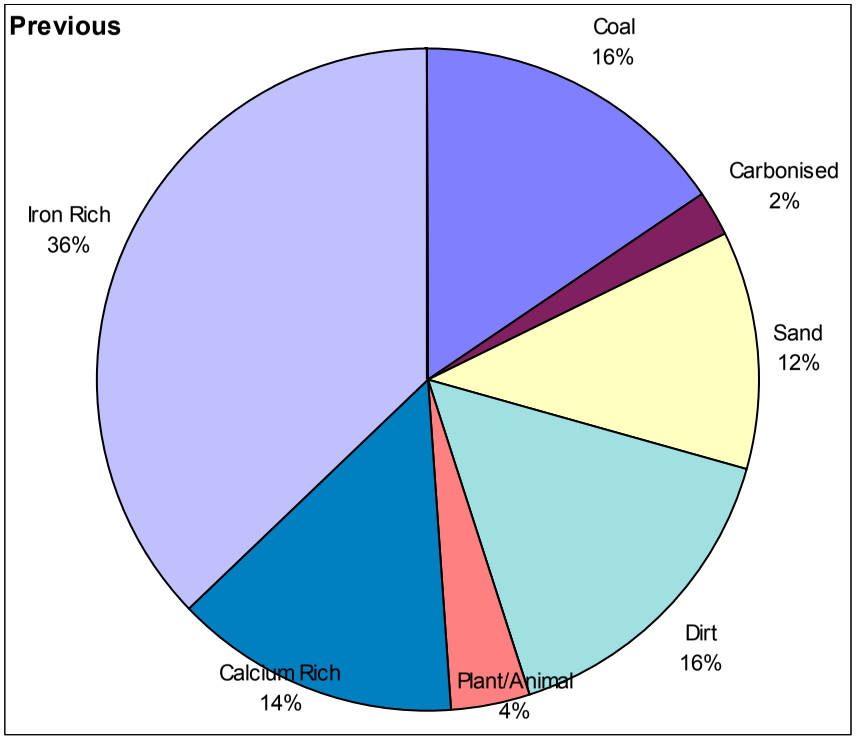
Deposit Gauge Analysis Report

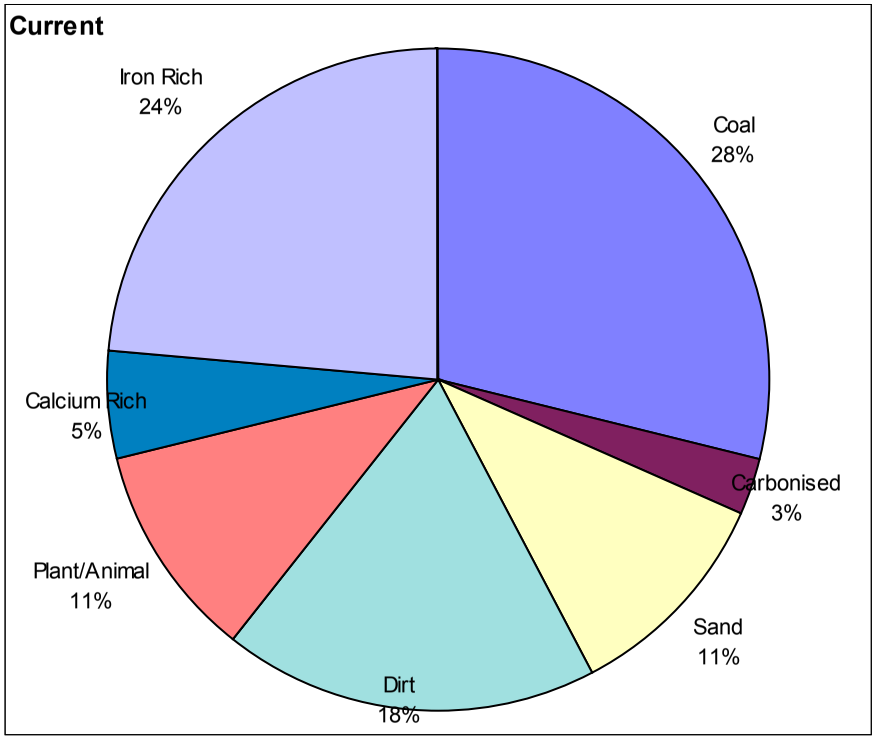
Ffrwdwyllt House, Margam Road, Port Talbot

Comparison of Fallout Composition

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	11	1	4	7	0	4	2	9	0
	Previous	8	1	6	8	0	2	7	19	0

Figure 8

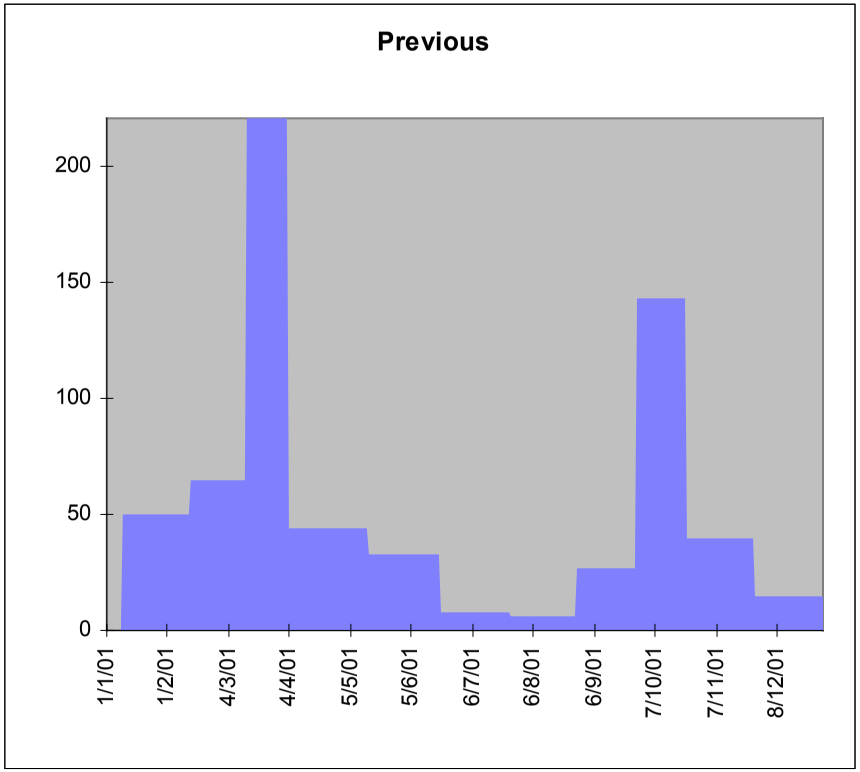
Deposit Gauge Analysis Report

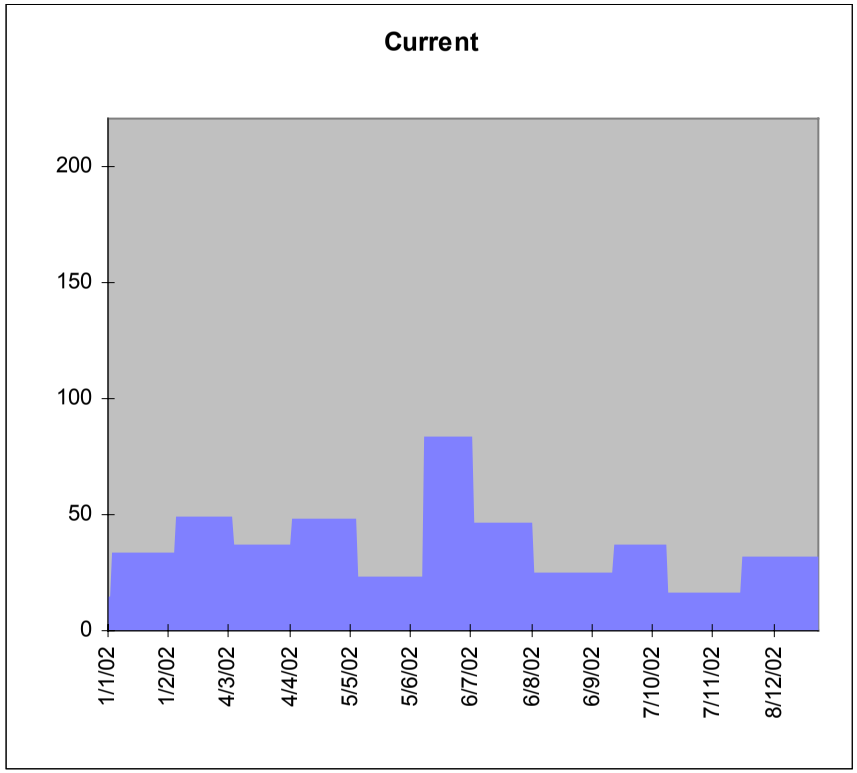
Ffrwdwyllt House, Margam Road, Port Talbot

Comparison of Fallout Rate with Time

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	37	84	12	100.0	0	0
Previous	51	221	11	100.0	0	22
Change	-14	Decrease -27%				

Figure 9

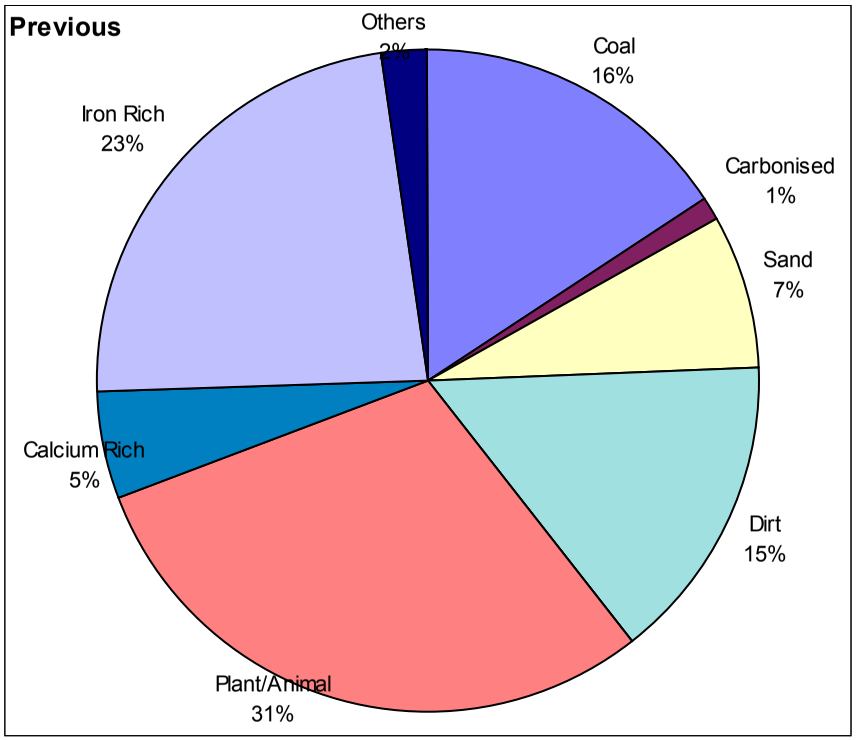
Deposit Gauge Analysis Report

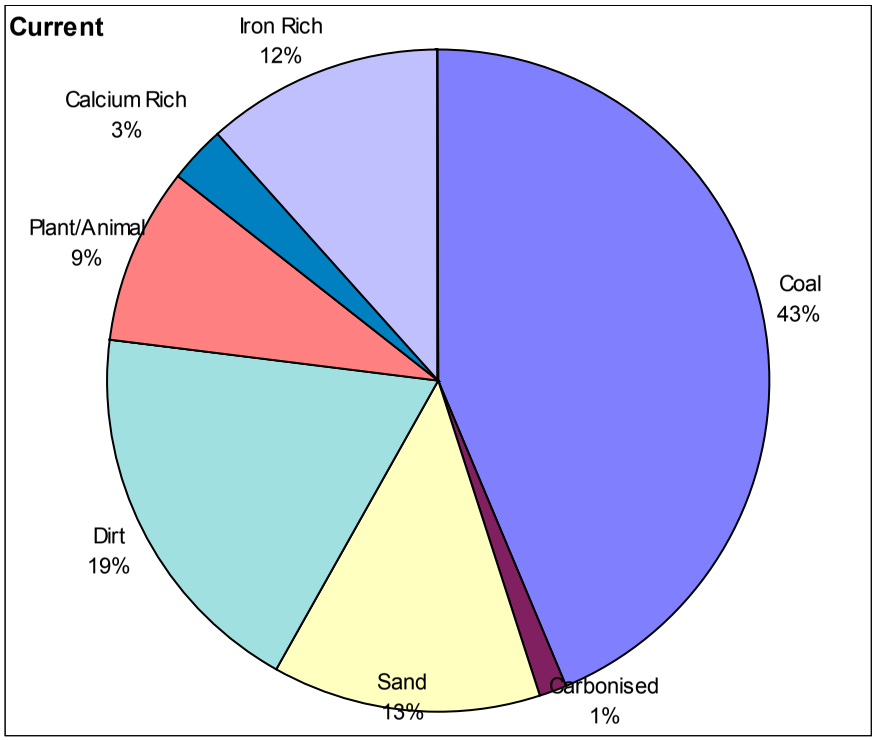
Eglwys Nunydd Resevoir, Port Talbot

Comparison of Fallout Composition

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	30	1	9	13	0	6	2	8	0
	Previous	15	1	7	14	0	28	5	22	2

Figure 10

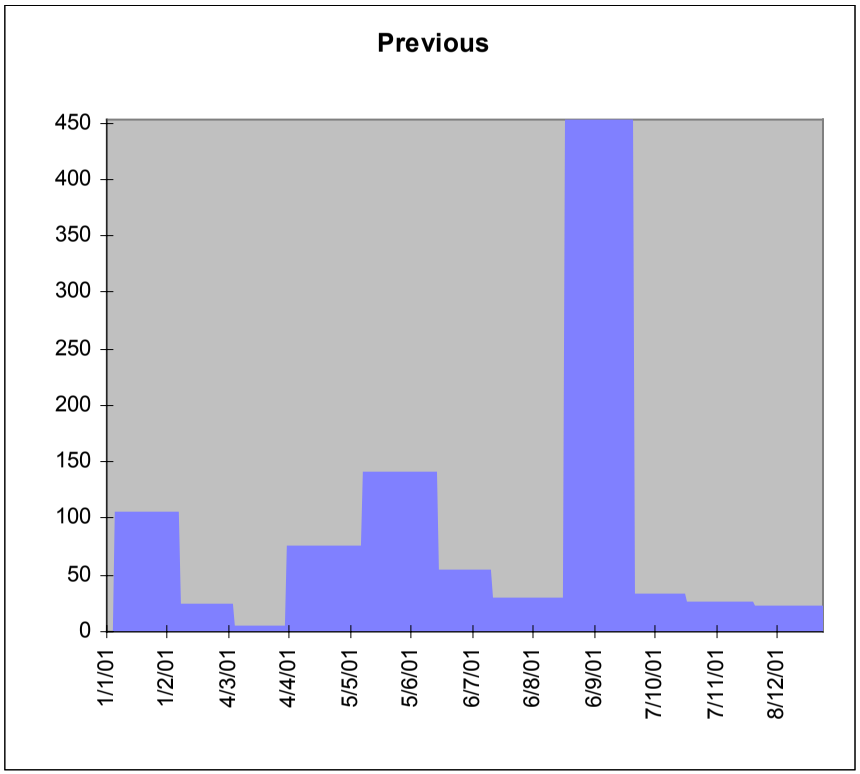
Deposit Gauge Analysis Report

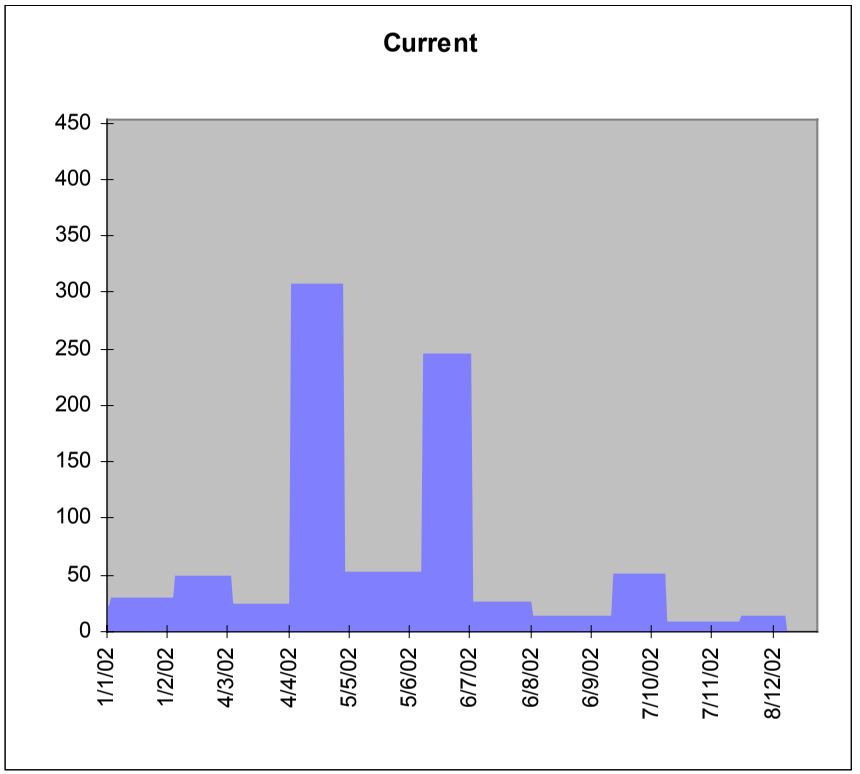
Eglwys Nunydd Resevoir, Port Talbot

Comparison of Fallout Rate with Time

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	68	308	11	95.6	0	54
Previous	94	453	11	100.0	0	35
Change	-26	Decrease -28%				

Figure 11

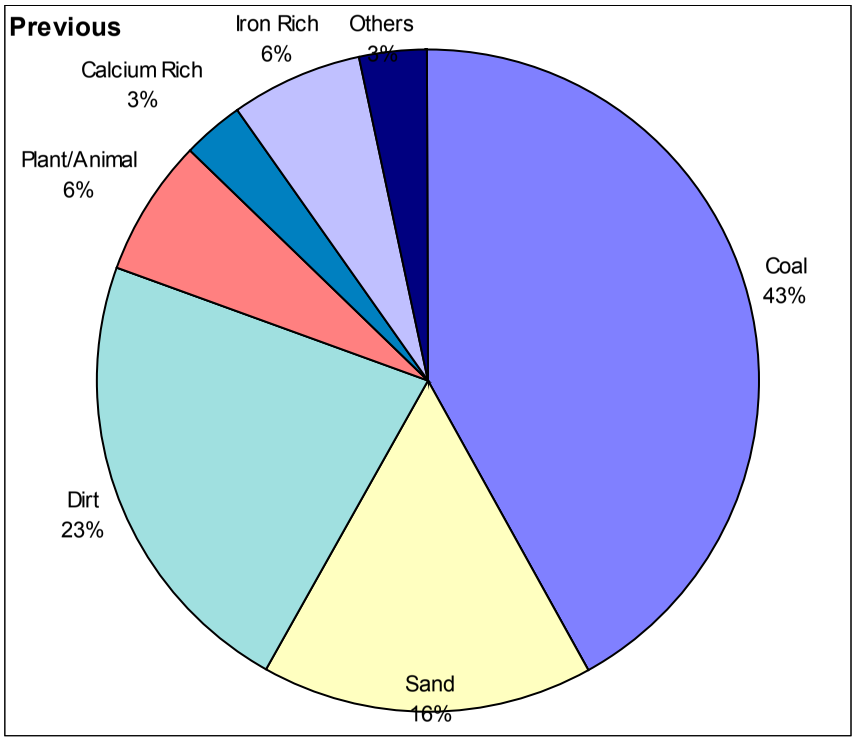
Deposit Gauge Analysis Report

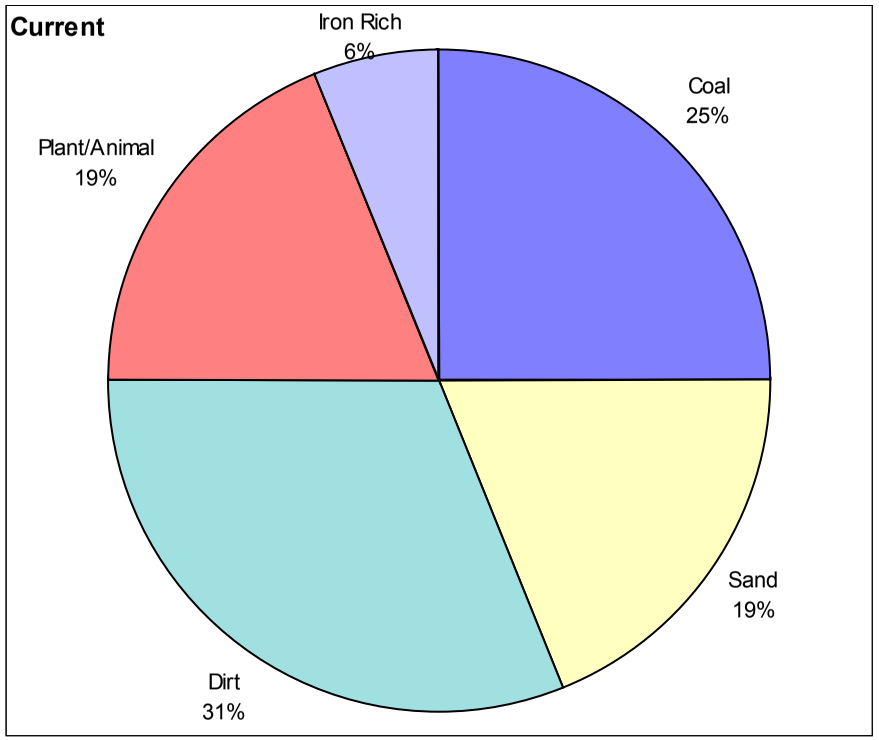
Primary School, Gwaen Cae Gurwen

Comparison of Fallout Composition

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	3	5	0	3	0	1	0
	Previous	13	0	5	7	0	2	1	2	1

Figure 12

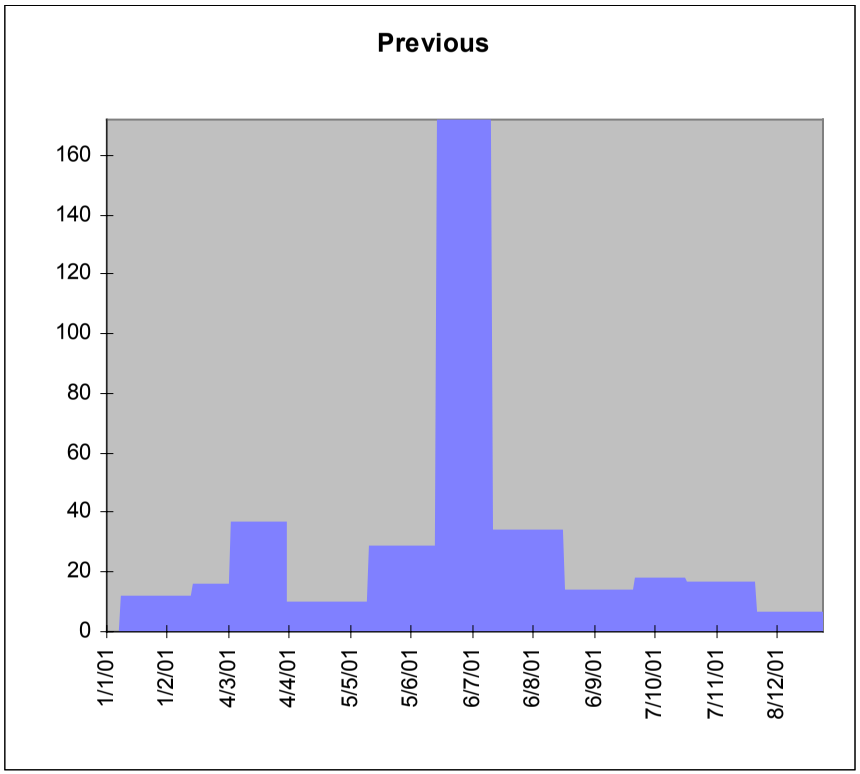
Deposit Gauge Analysis Report

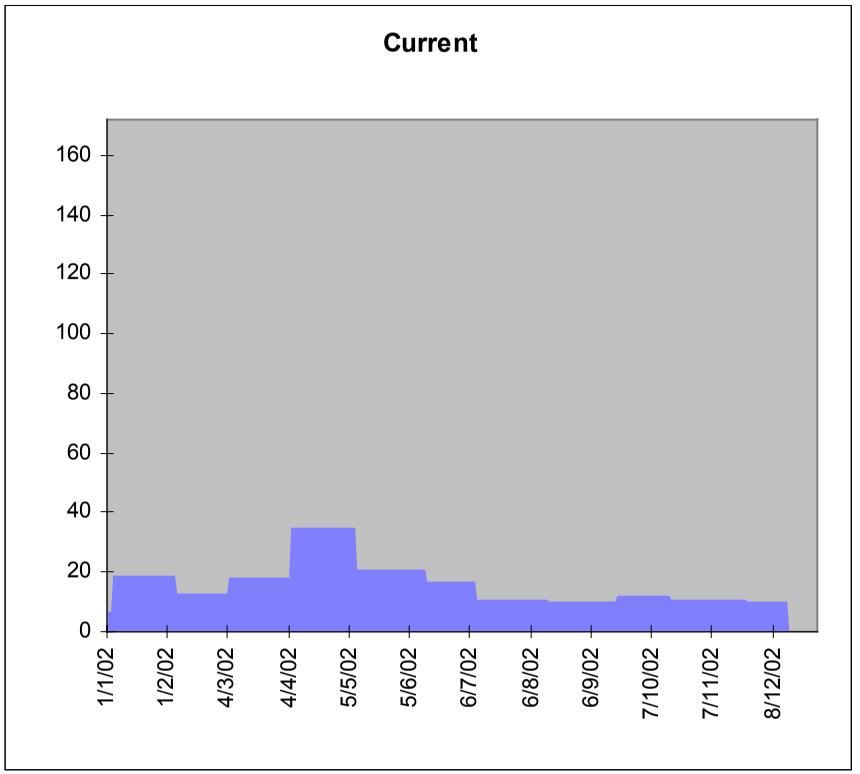
Primary School, Gwaen Cae Gurwen

Comparison of Fallout Rate with Time

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	16	35	11	95.9	0	0
Previous	31	172	11	100.0	0	0
Change	-15	Decrease -48%				

Figure 13

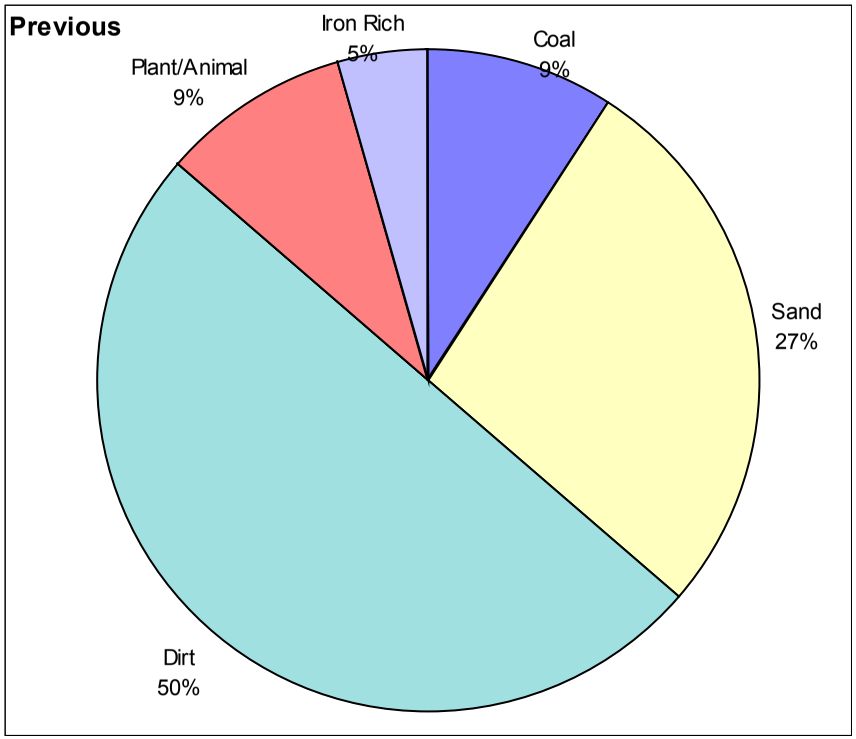
Deposit Gauge Analysis Report

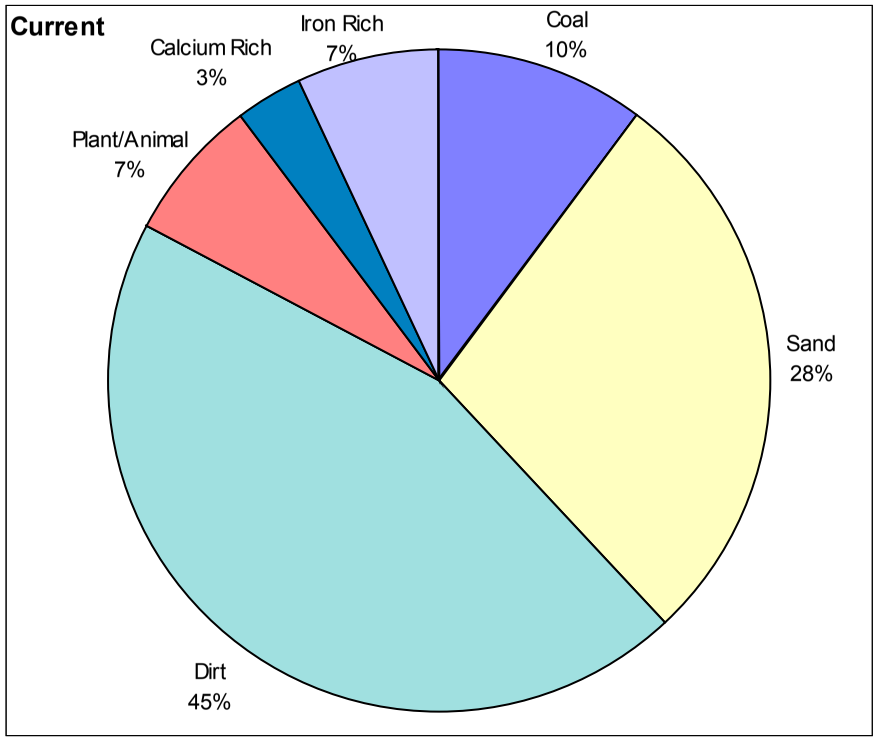
Cwmllynfell

Comparison of Fallout Composition

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	13	0	2	1	2	0
	Previous	2	0	6	11	0	2	0	1	0

Figure 14

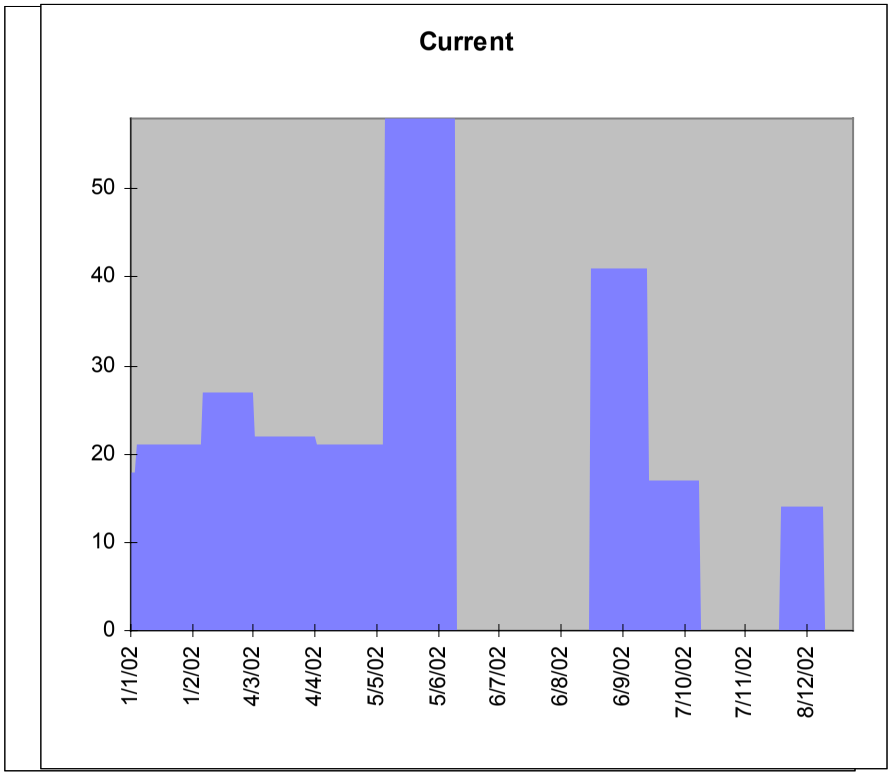
Deposit Gauge Analysis Report

Cwmllynfell

Comparison of Fallout Rate with Time

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01



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	29	58	8	65.9	0	0
Previous	22	25	3	23.1	0	0
Change	7	Increase 32%				

Figure 15

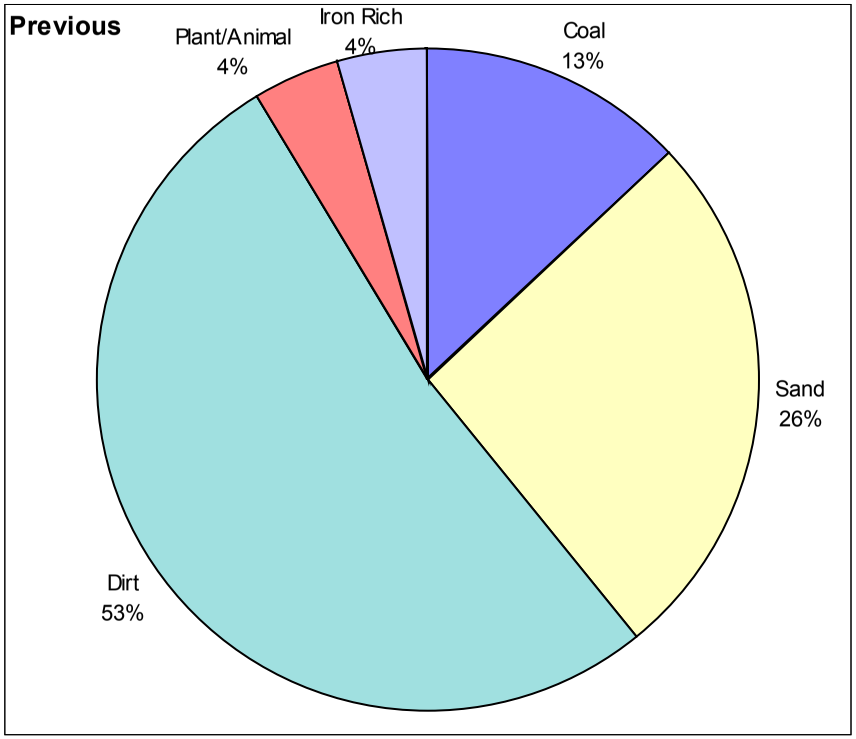
Deposit Gauge Analysis Report

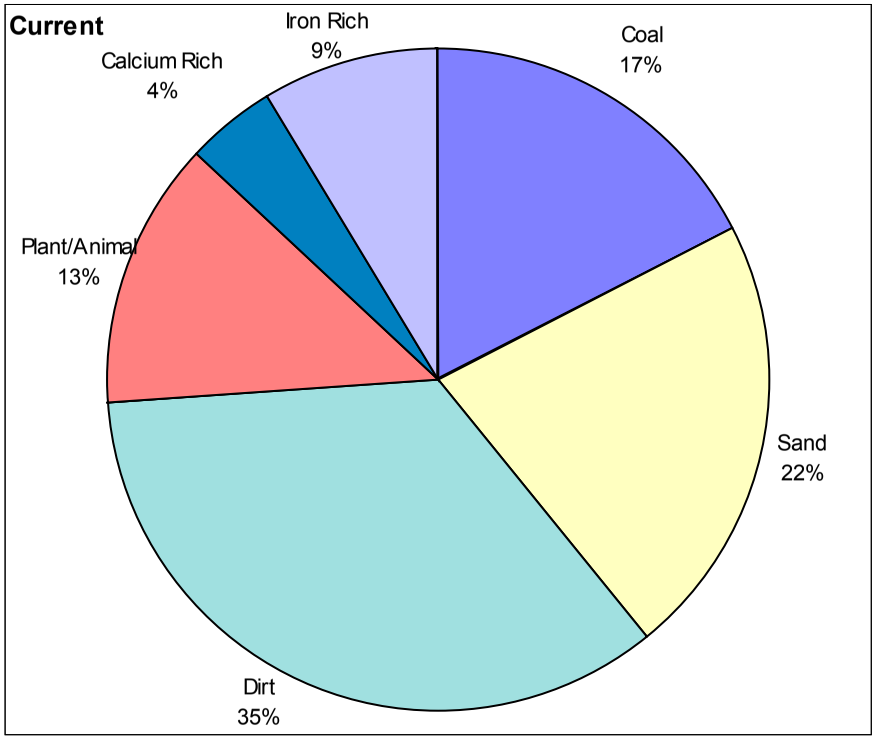
Workingmens Club, Tairgwaith

Comparison of Fallout Composition

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	5	8	0	3	1	2	0
	Previous	3	0	6	12	0	1	0	1	0

Figure 16

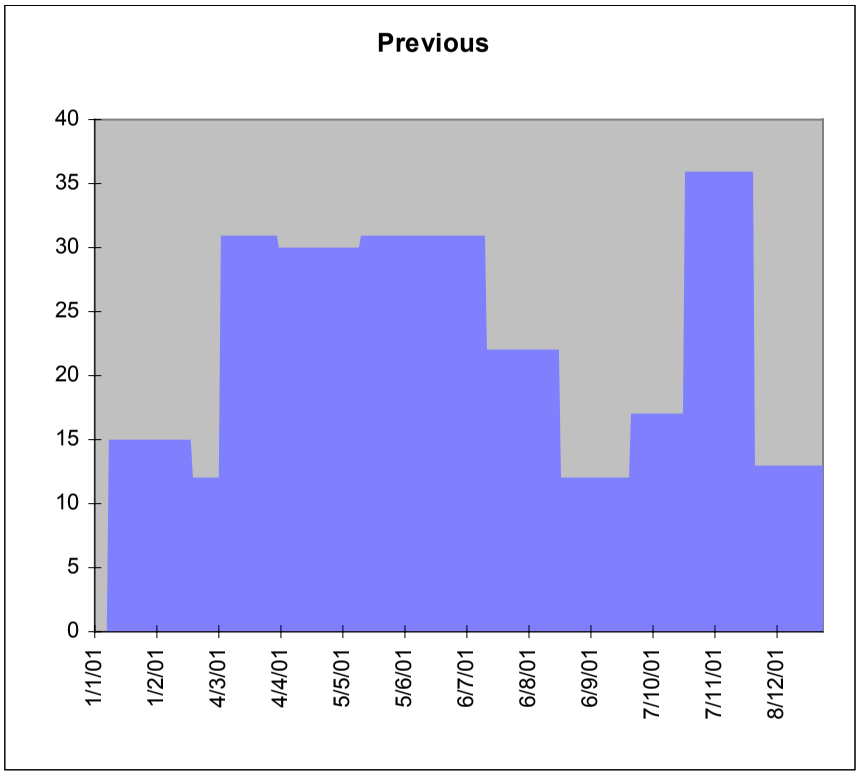
Deposit Gauge Analysis Report

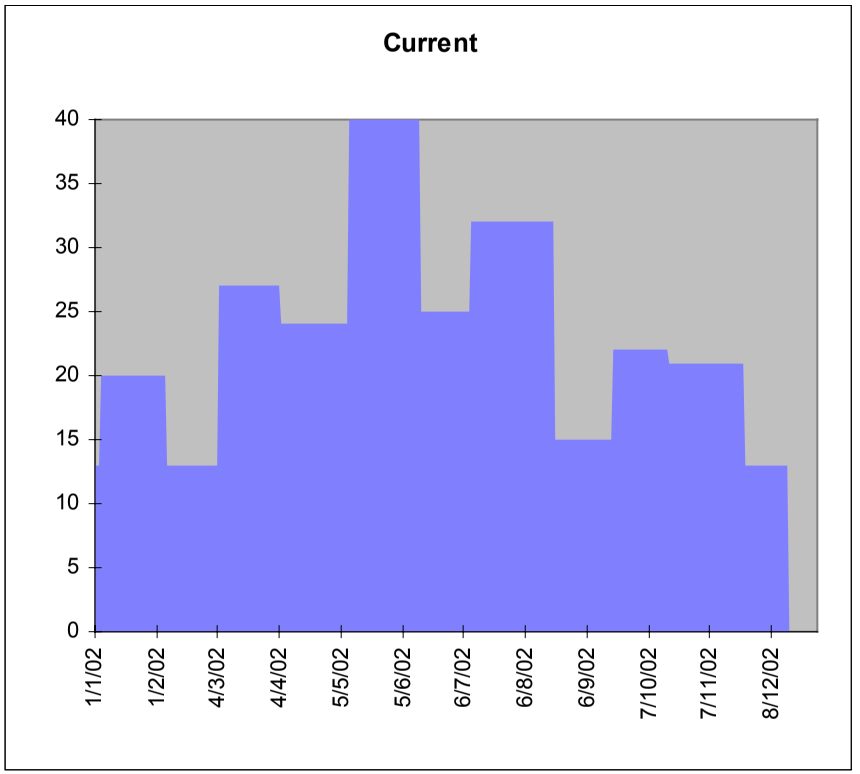
Workingmens Club, Tairgwaith

Comparison of Fallout Rate with Time

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	24	40	11	95.9	0	0
Previous	23	36	11	100.0	0	0
Change	1	Increase 4%				

Figure 17

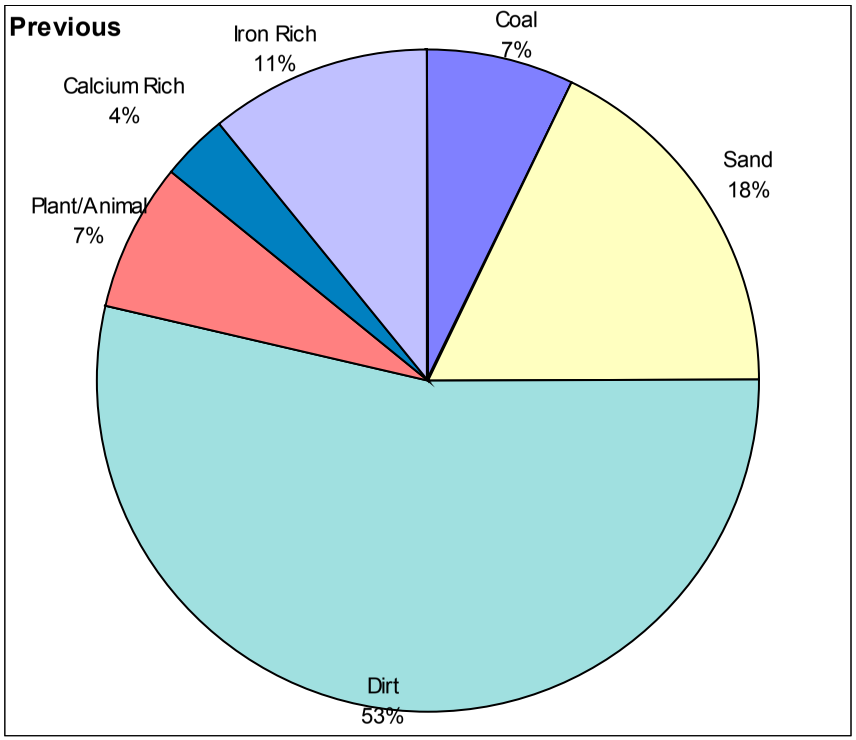
Deposit Gauge Analysis Report

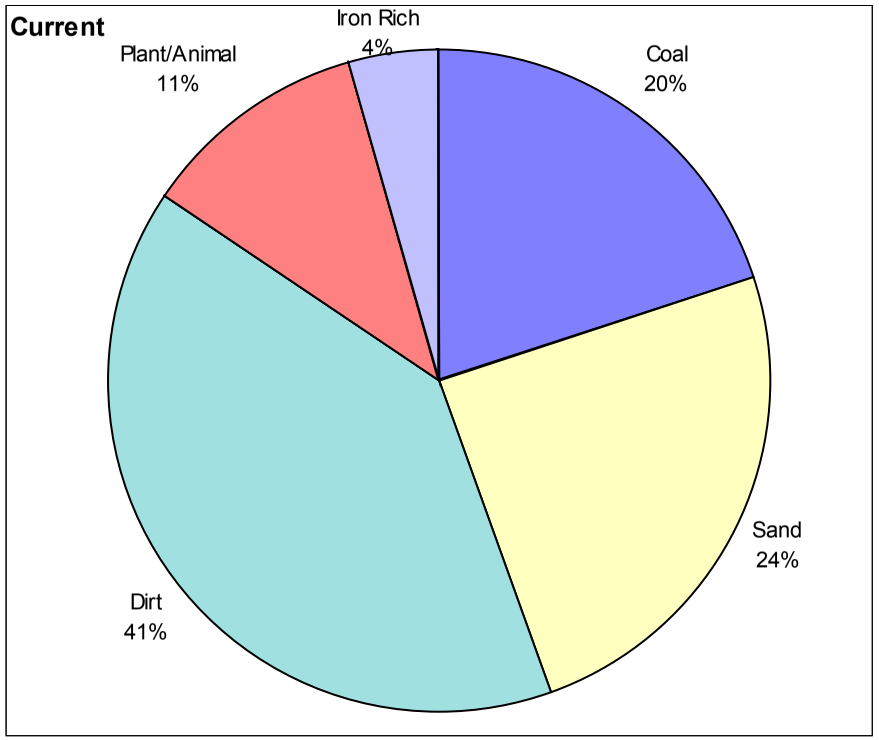
41, Parish Road, Cwmgwrach

Comparison of Fallout Composition

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	9	0	11	18	0	5	0	2	0
	Previous	2	0	5	15	0	2	1	3	0

Figure 18

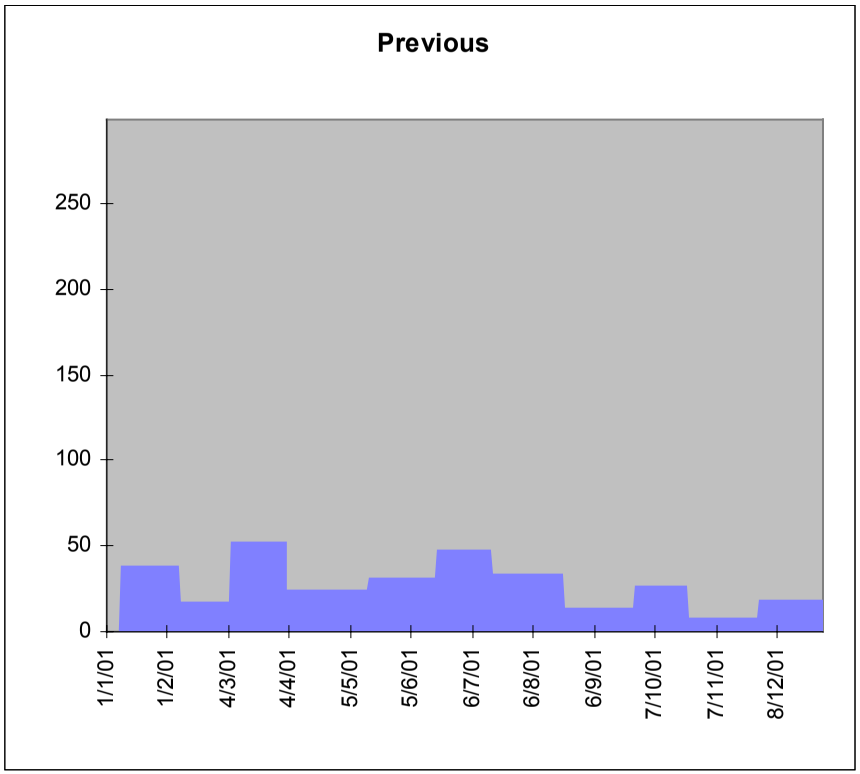
Deposit Gauge Analysis Report

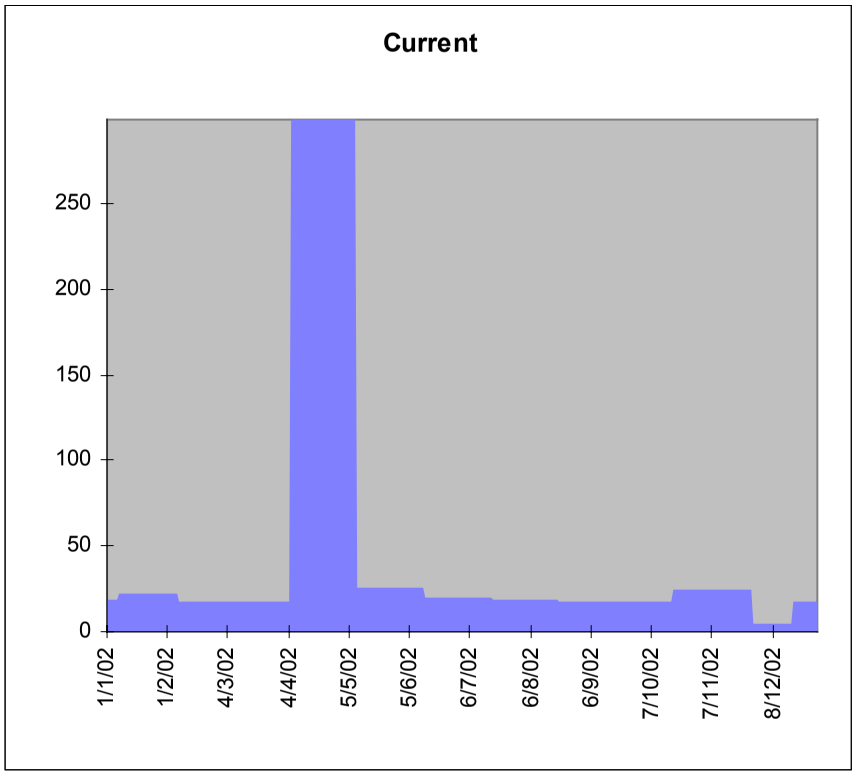
41, Parish Road, Cwmgwrach

Comparison of Fallout Rate with Time

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	299	12	100.0	0	34
Previous	28	52	11	100.0	0	0
Change	18	Increase 64%				

Figure 19

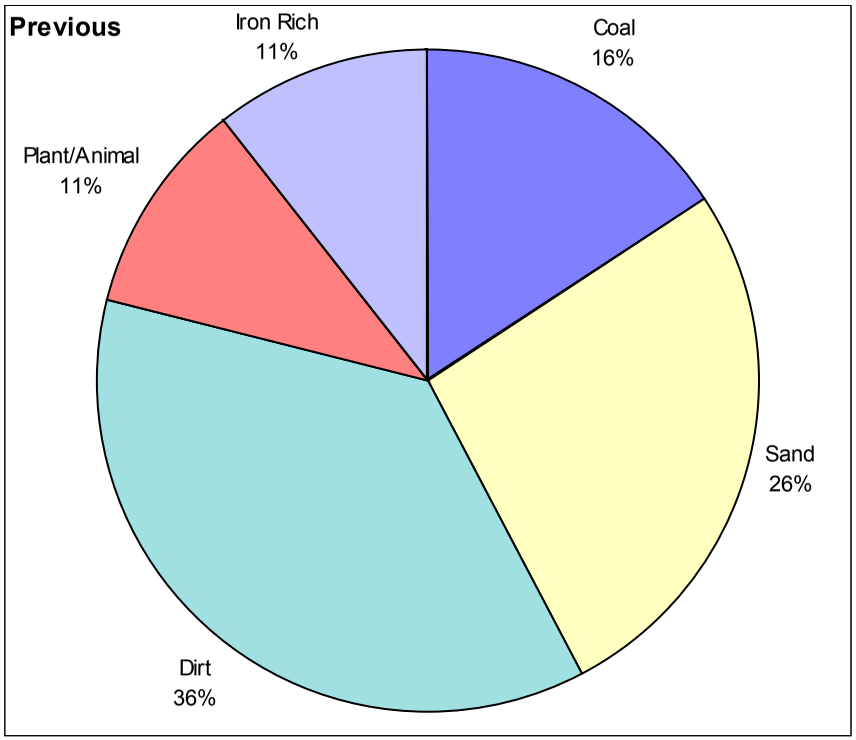
Deposit Gauge Analysis Report

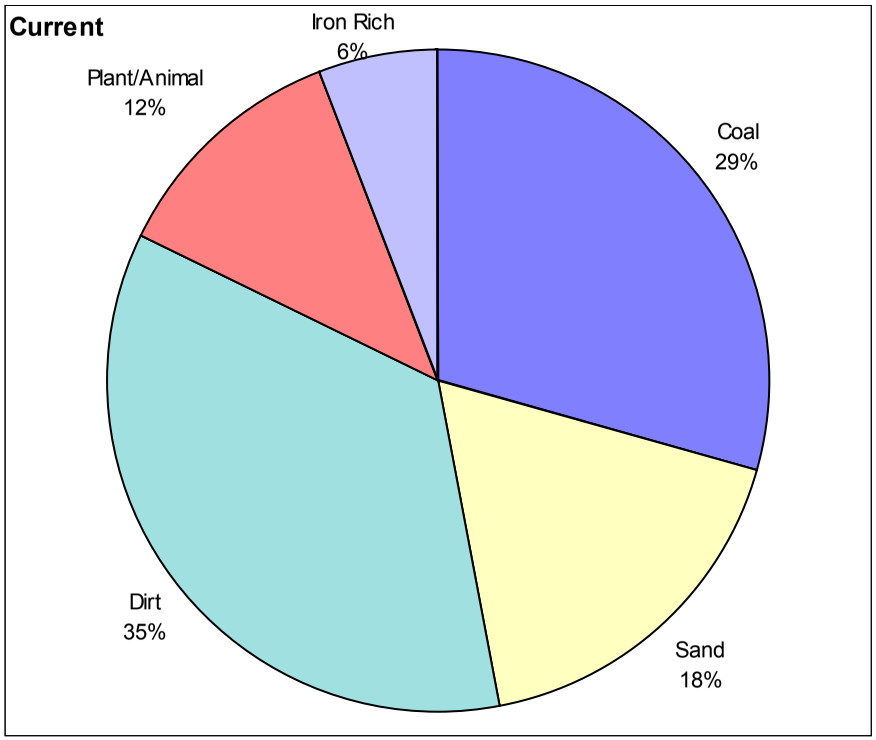
2, Llygad Yr Haul, Glynneath

Comparison of Fallout Composition

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	3	6	0	2	0	1	0
	Previous	3	0	5	7	0	2	0	2	0

Figure 20

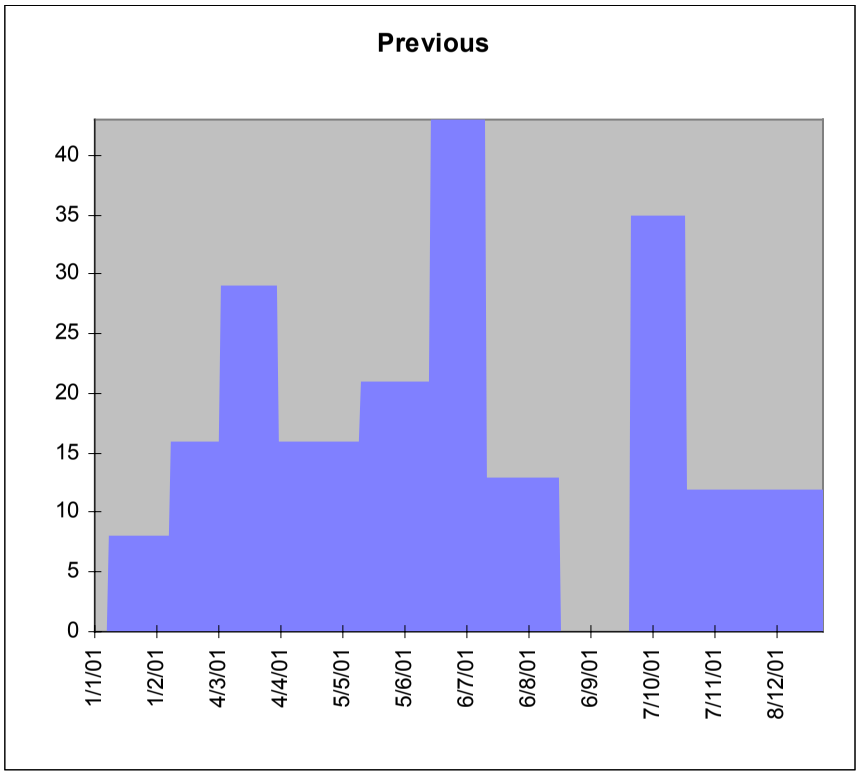
Deposit Gauge Analysis Report

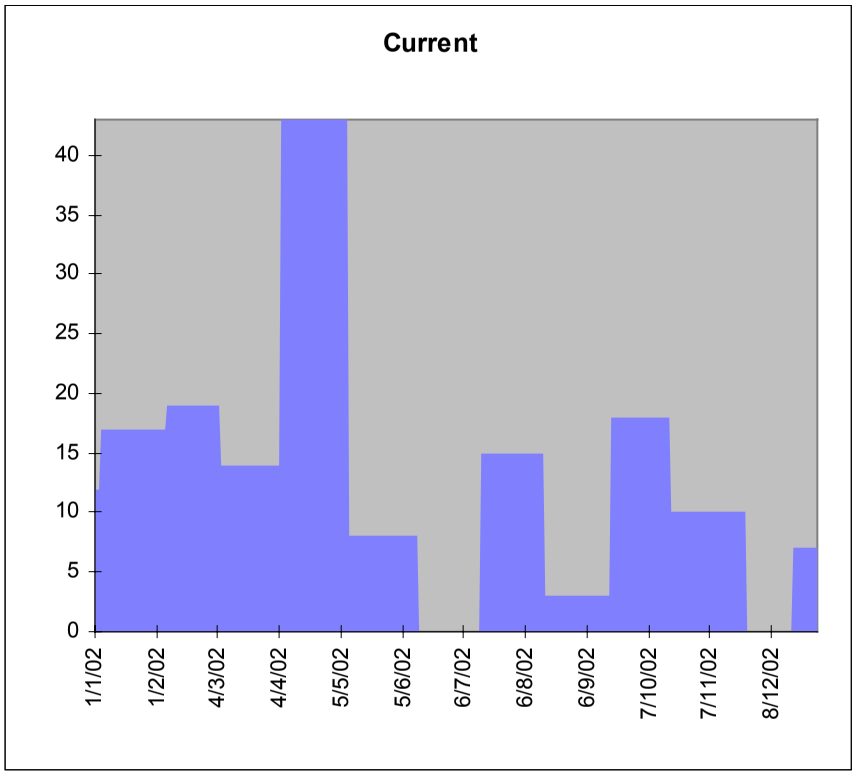
2, Llygad Yr Haul, Glynneath

Comparison of Fallout Rate with Time

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	16	43	10	84.9	0	0
Previous	20	43	10	90.2	0	0
Change	-4	Decrease -20%				

Figure 21

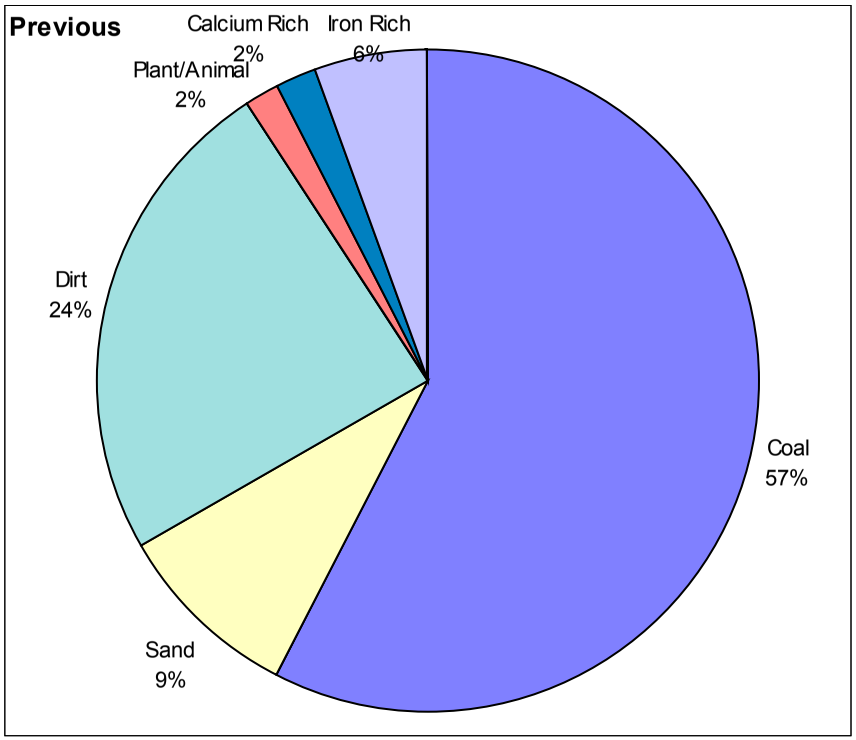
Deposit Gauge Analysis Report

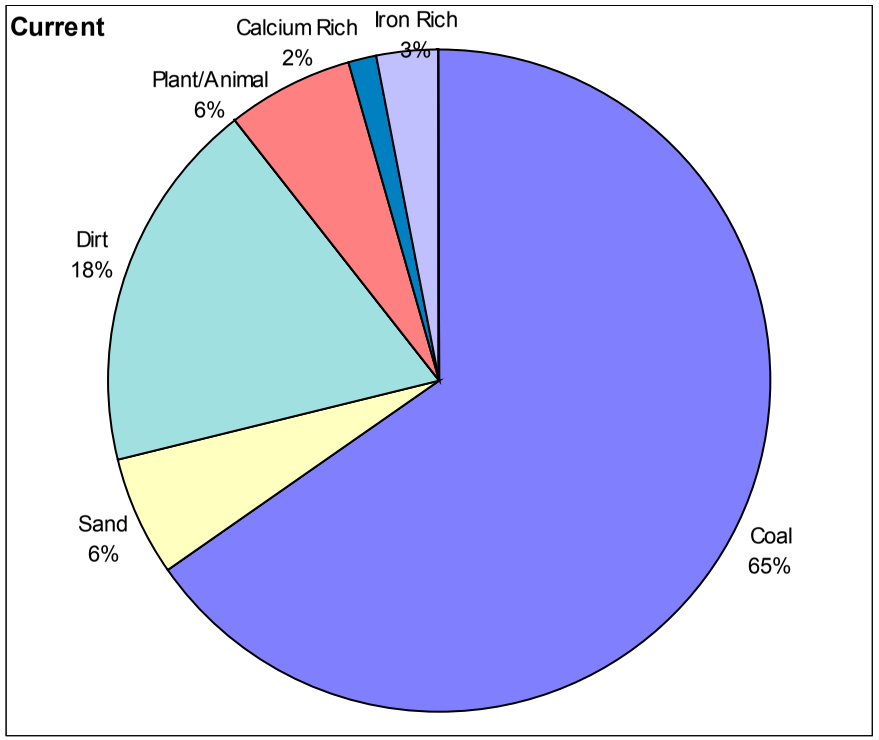
11, Wembley Avenue, Onllwyn

Comparison of Fallout Composition

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	43	0	4	12	0	4	1	2	0
	Previous	31	0	5	13	0	1	1	3	0

Figure 22

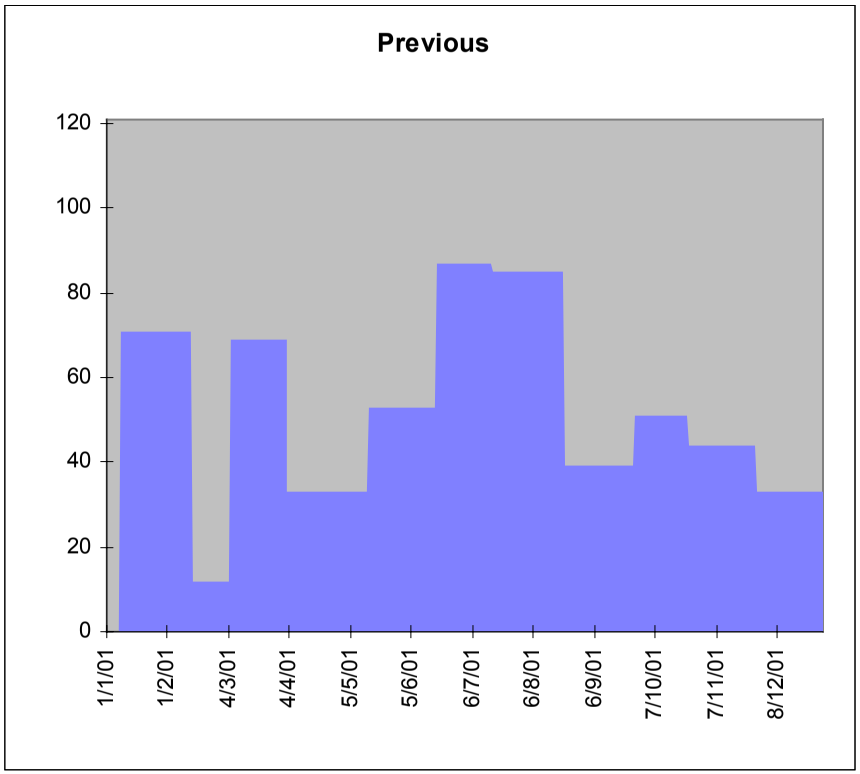
Deposit Gauge Analysis Report

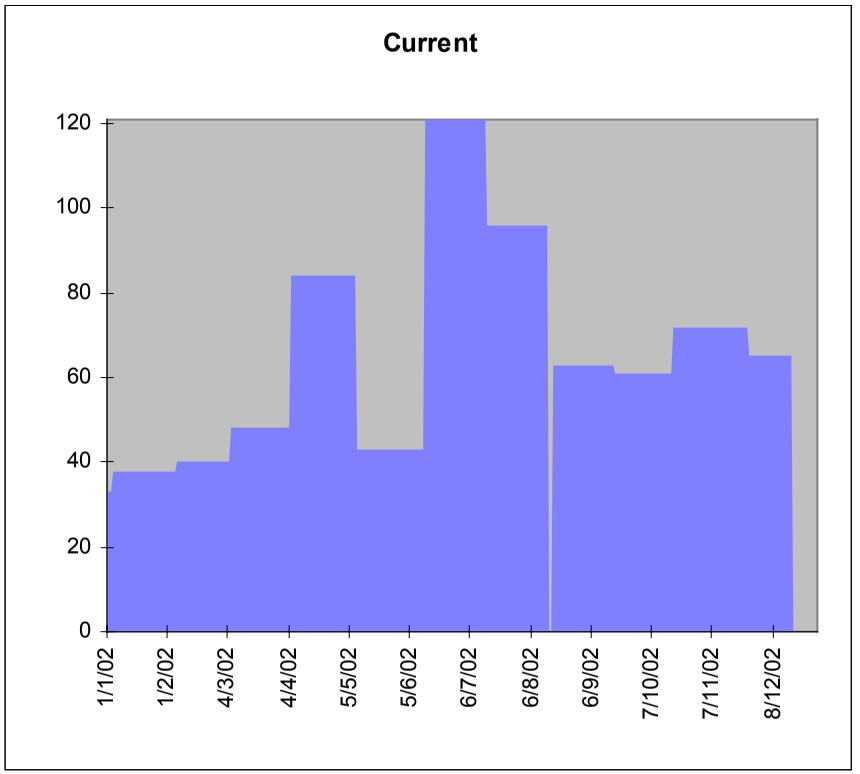
11, Wembley Avenue, Onllwyn

Comparison of Fallout Rate with Time

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	67	121	11	95.9	0	0
Previous	53	87	11	100.0	0	0
Change	14	Increase 26%				

Figure 23

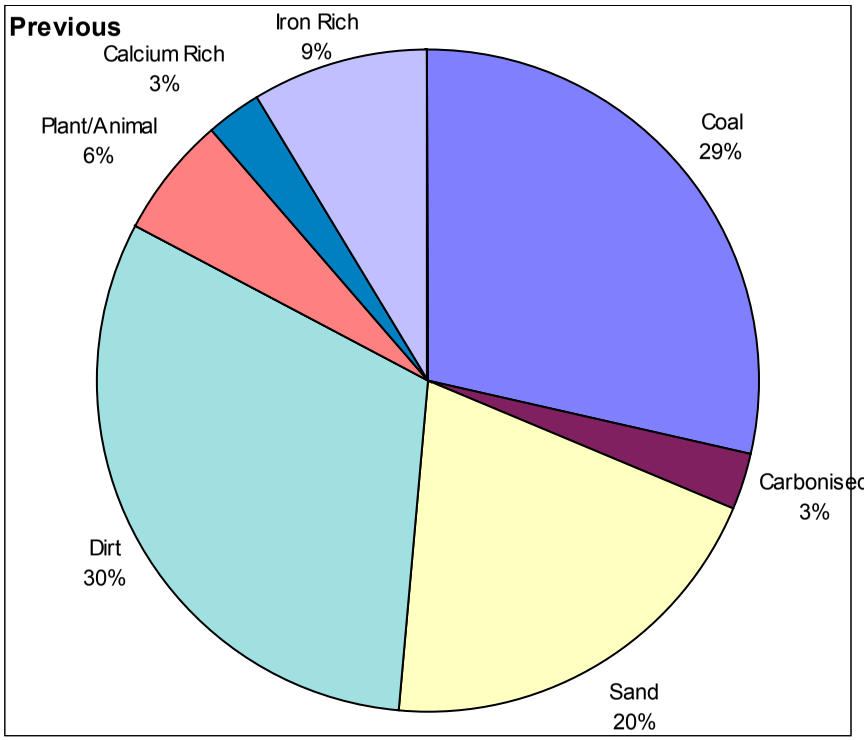
Deposit Gauge Analysis Report

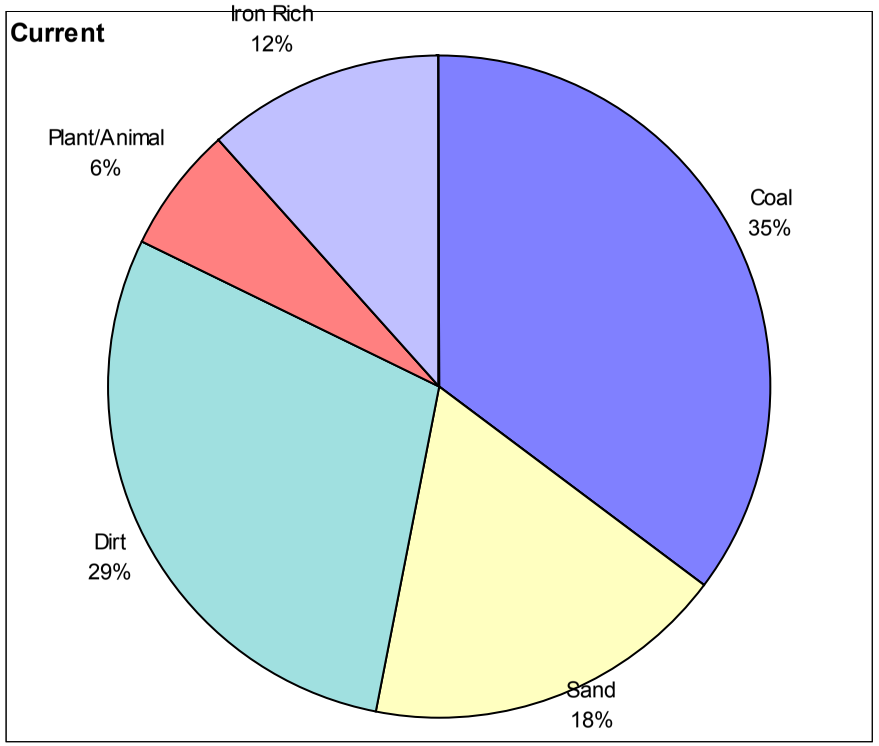
Cardonnel Road, Skewen

Comparison of Fallout Composition

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	3	5	0	1	0	2	0
	Previous	10	1	7	11	0	2	1	3	0

Figure 24

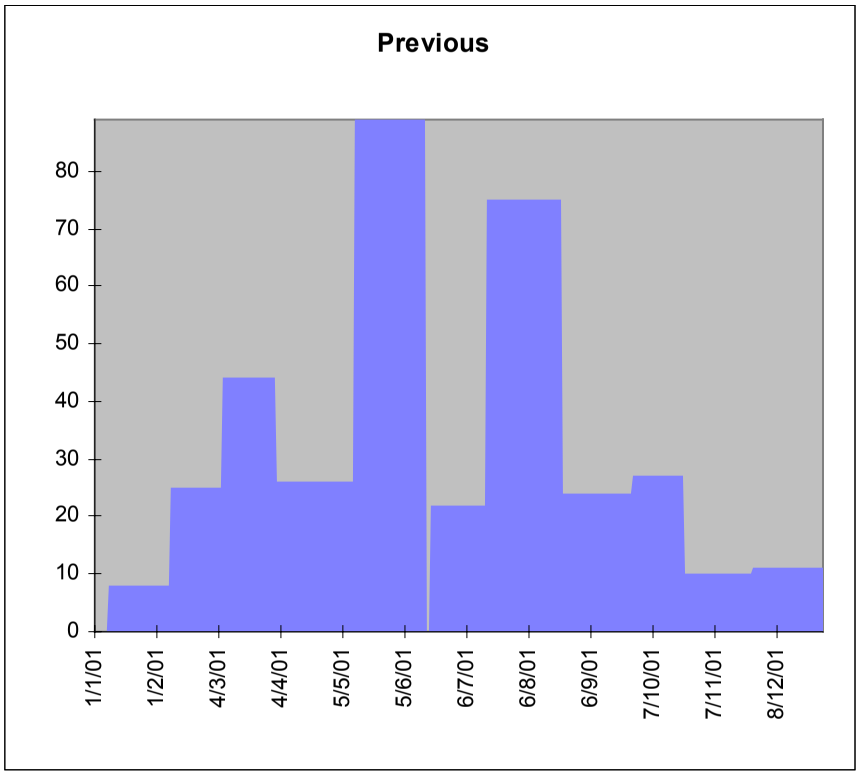
Deposit Gauge Analysis Report

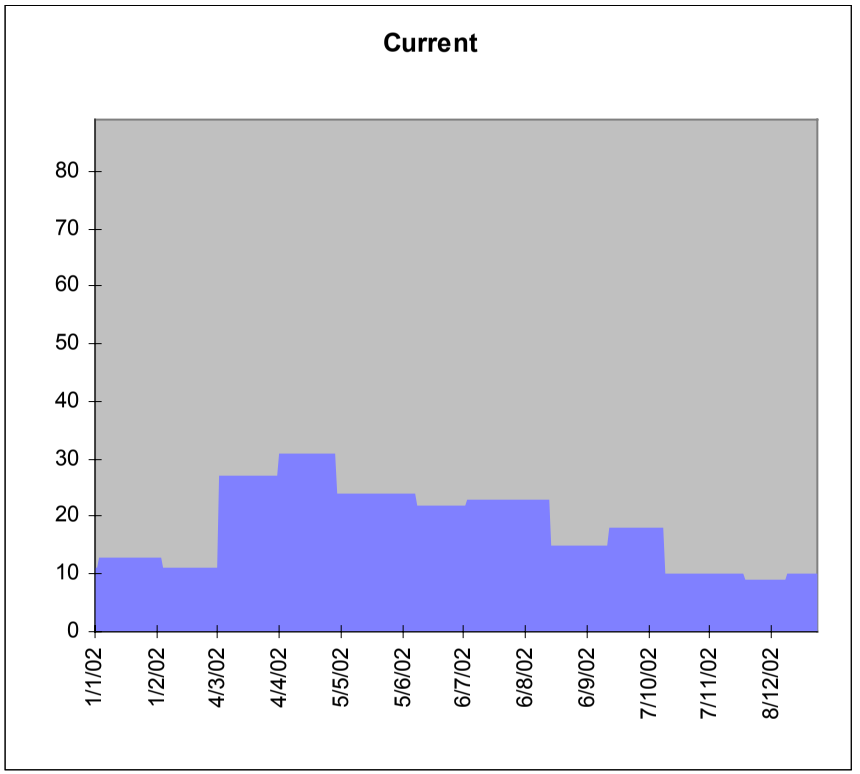
Cardonnel Road, Skewen

Comparison of Fallout Rate with Time

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





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	18	31	12	100.0	0	0
Previous	34	89	11	99.4	0	0
Change	-16	Decrease -47%				

Figure 25

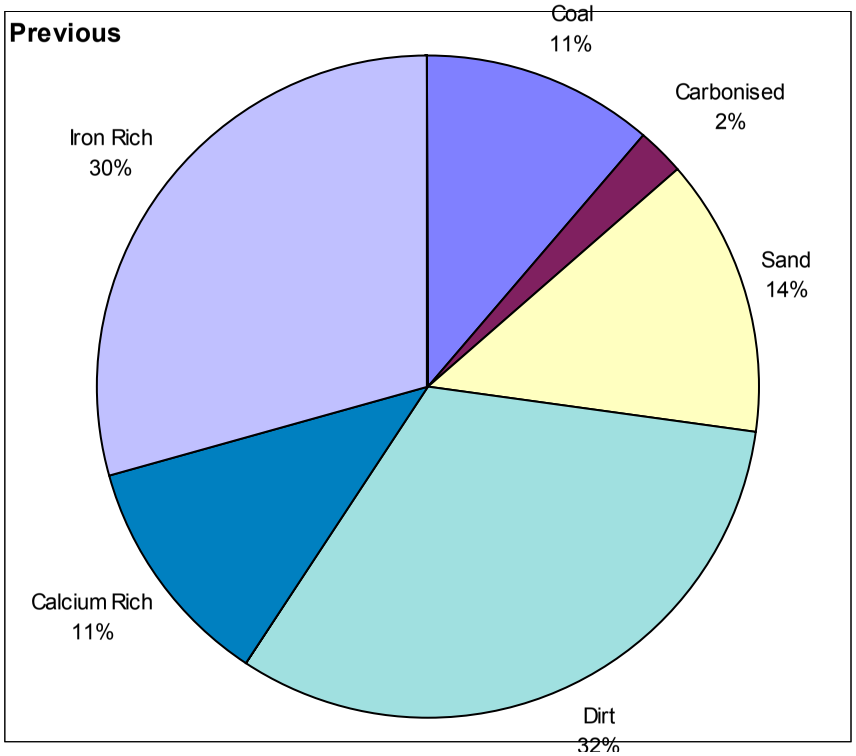
Deposit Gauge Analysis Report

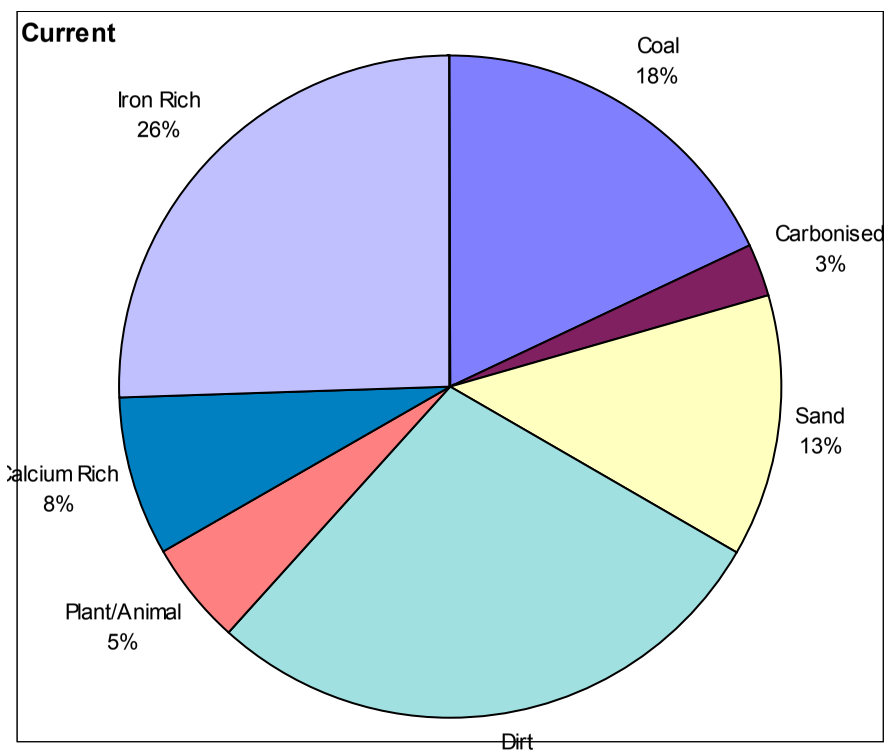
Little Warren, Port Talbot

Comparison of Fallout Composition

Current Period = 01-Jan-02 to 31-Dec-02

Previous Period = 01-Jan-01 to 31-Dec-01





Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/M2/day)	Current	7	1	5	11	0	2	3	10	0
	Previous	5	1	6	14	0	0	5	13	0

Figure 26

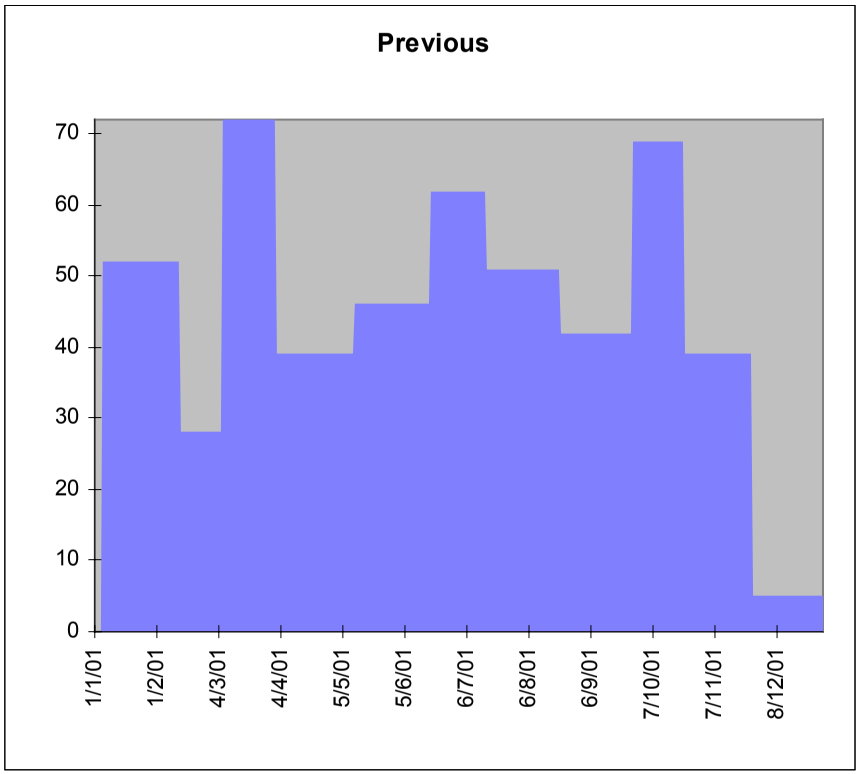
Deposit Gauge Analysis Report

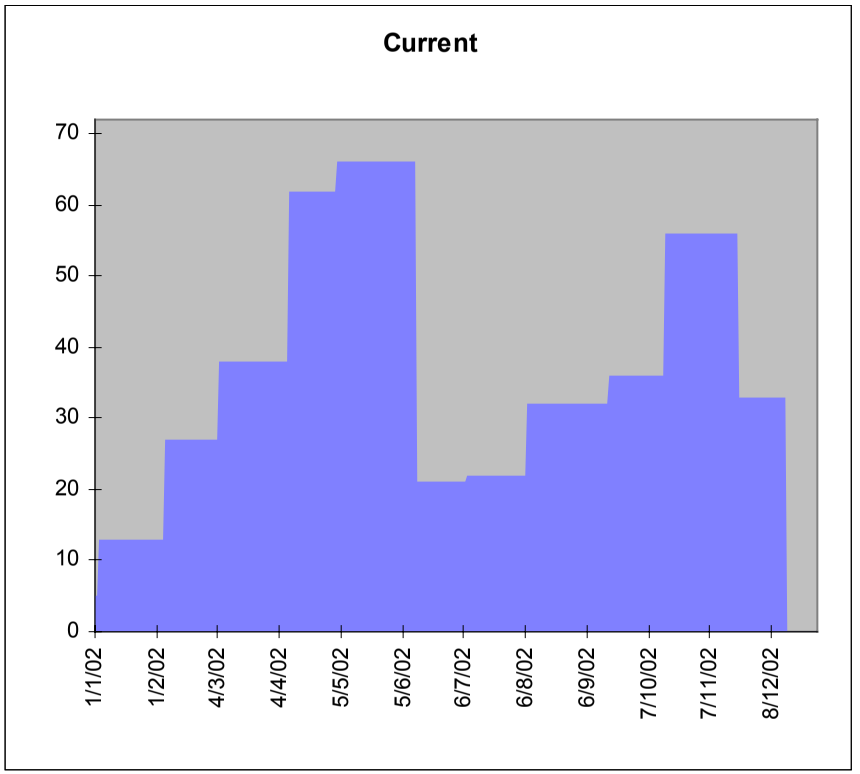
Little Warren, Port Talbot

Comparison of Fallout Rate with Time

Current Period = 01-Jan-02 to 31-Dec-02

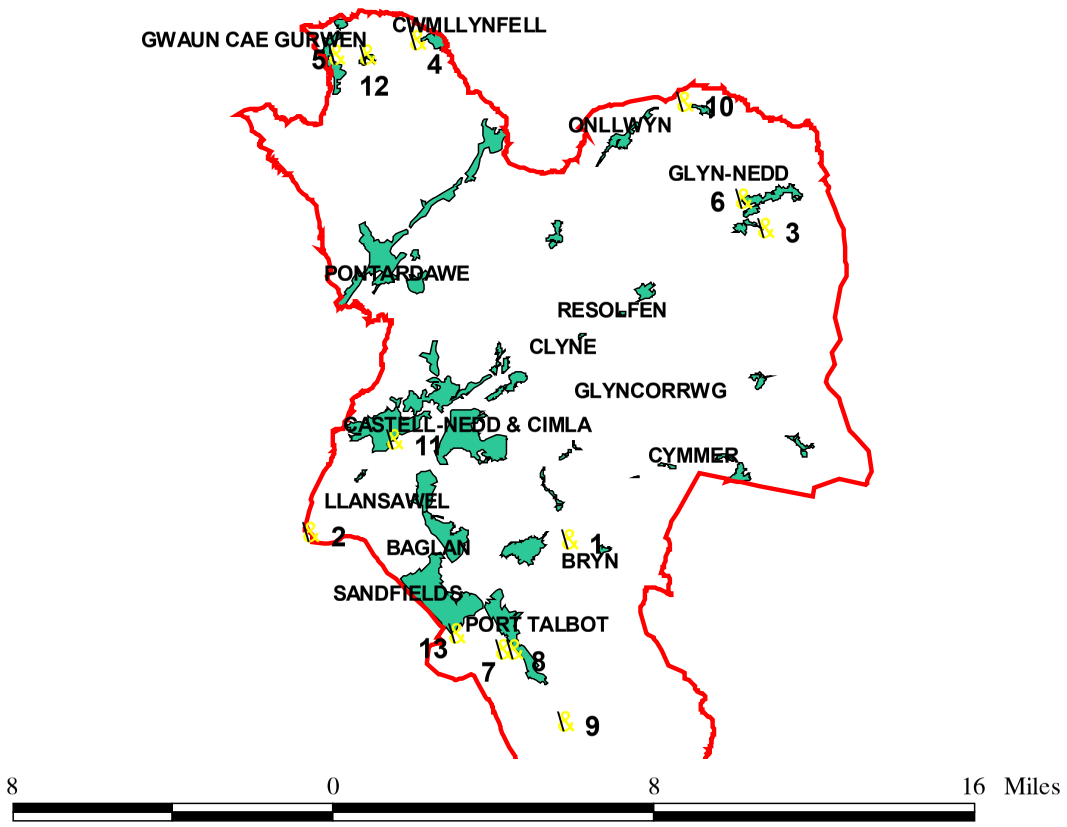
Previous Period = 01-Jan-01 to 31-Dec-01





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	66	11	95.6	0	0
Previous	45	72	11	100.0	0	0
Change	-7	Decrease -16%				

Figure 27 Deposit gauge locations



No	Address
1	Cil Carne Farm, Bryn, Port Talbot
2	Jeremy's Oil Distributors, Baldwins Cre
3	41, Parish Road, Cwmgwrach
4	Ochwr y Waun, Cwmllynfell
5	Primary School, Gwaen Cae Gurwen
6	2, Llygad Yr Haul, Glynneath
7	Ffrwdwyllt House, Margam Road, Margam,
8	24, Prince Street, Margam, Port Talbot
9	Eglwys Nunydd Resevoir, Margam, Port Ta
10	11, Wembley Avenue, Onllwyn
11	Cardonnel Road, Skewen
12	Workingmens Club, Tairgwaith
13	Little Warren, Aberafan, Port Talbot

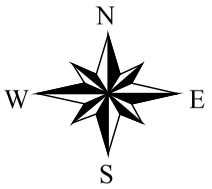


Figure 28 Comparison of average fallout rates, 2002.

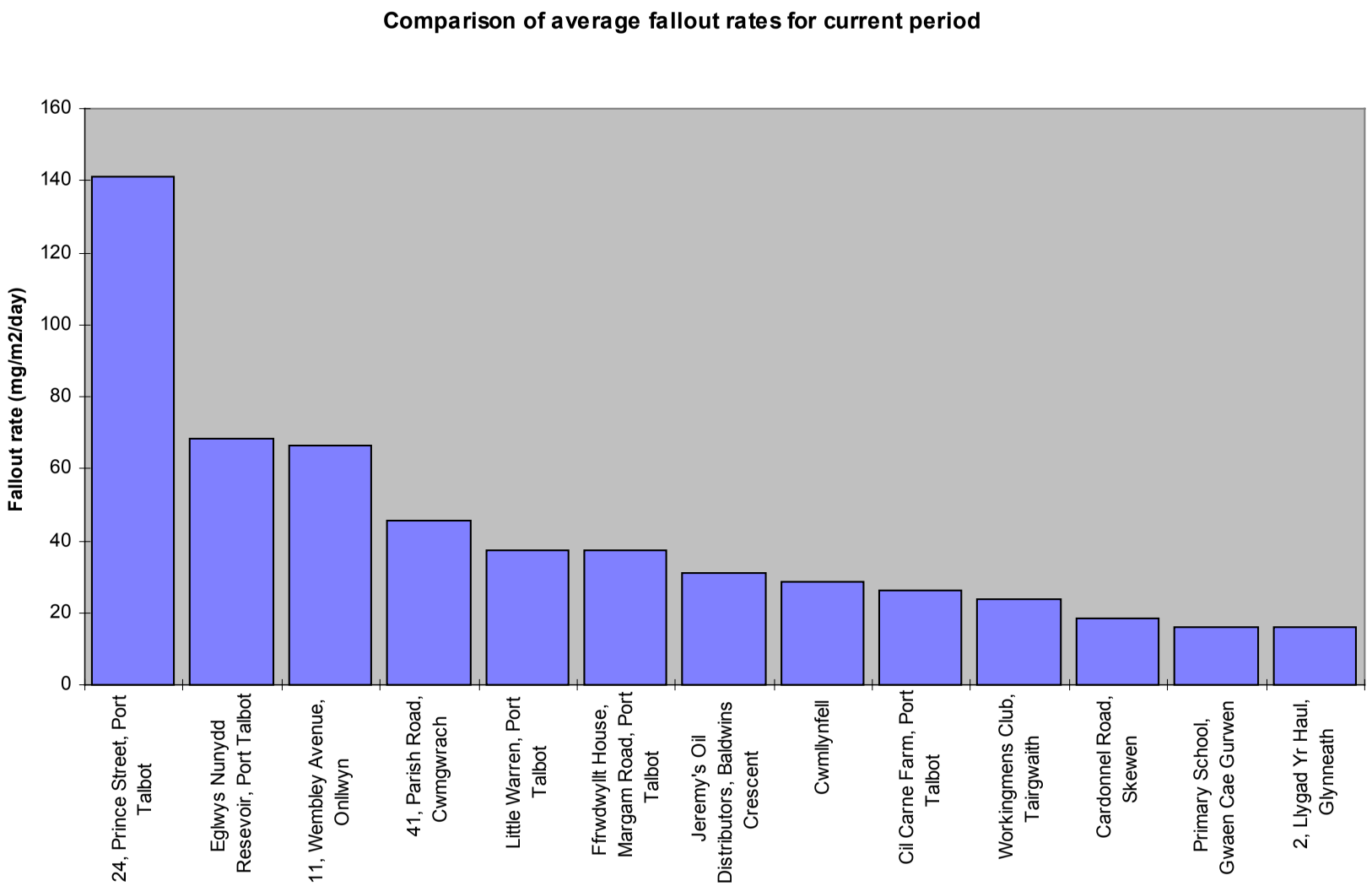


Table 1 Sites ranked by average fallout level (mg/m2/day), 2002.

Site Name	Fallout Level (mg/M2/day)		200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum	Days within 10% of	Days Exceeding
24, Prince Street, Port Talbot	141	251	0	66
Eglwys Nunydd Resevoir, Port Talbot	68	308	0	54
11, Wembley Avenue, Onllwyn	67	121	0	0
41, Parish Road, Cwmgwrach	46	299	0	34
Little Warren, Port Talbot	38	66	0	0
Ffrwdwyllt House, Margam Road, Port Talbot	46	84	0	0
Jeremy's Oil Distributors, Baldwins Crescent	31	71	0	0
Cwmllynfell	33	58	0	0
Cil Carne Farm, Port Talbot	26	50	0	0
Workingmens Club, Tairgwaith	24	40	0	0
Cardonnel Road, Skewen	24	31	0	0
Primary School, Gwaen Cae Gurwen	16	35	0	0
2, Llygad Yr Haul, Glynneath	16	43	0	0

Figure 29 Long term deposition rates.

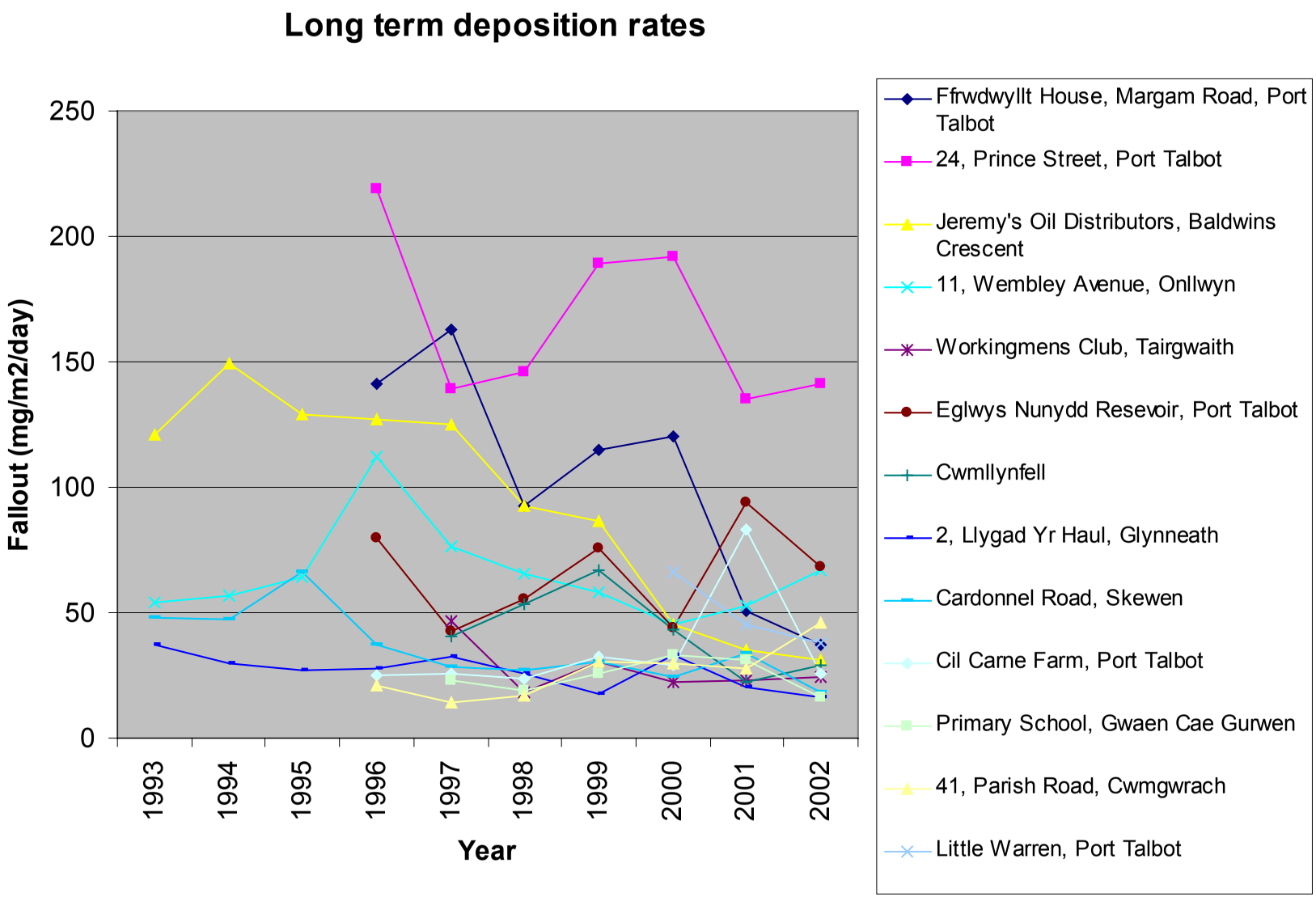


Table 2 Long term deposition rates

Site Name	Fallout rate (mg/m2/day)									
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Ffrwdwyllt House, Margam Road, Port Talbot				141	163	92	115	120	51	37
24, Prince Street, Port Talbot				219	139	146	189	192	135	141
Jeremy's Oil Distributors, Baldwins Crescent	121	149	129	127	125	93	86	45	35	31
11, Wembley Avenue, Onllwyn	54	57	64	112	76	66	58	45	53	67
Workingmens Club, Tairgwaith					47	18	30	22	23	24
Eglwys Nunydd Resevoir, Port Talbot				80	42	55	76	44	94	68
Cwmllynfell					41	53	67	43	22	29
2, Llygad Yr Haul, Glynneath	37	30	27	28	32	26	18	33	20	16
Cardonnel Road, Skewen	48	47	66	37	28	27	30	24	34	18
Cil Carne Farm, Port Talbot				25	26	24	32	29	83	26
Primary School, Gwaen Cae Gurwen					23	19	26	33	31	16
41, Parish Road, Cwmgwrach				21	14	17	31	30	28	46
Little Warren, Port Talbot								66	45	38

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. The most recent of the annual reports that have been subject to final ratification is the 2001 report. This and other reports can be obtained via the Internet at the following address: http://www.airquality.co.uk/archive/reports/reports.php?action=category&section_id=13. Alternatively, the printed reports are available to view via Peter Hollingsworth (Principal Officer, Environment), Neath Civic Centre. This report summarises the data for 2002, obtained from the ten locations in the County Borough where nitrogen dioxide tubes are located.

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

Table 3 shows the results for 2002, together with summary averages for the year as a whole. The individual results are shown graphically in Figure 31, whilst Figure 32 shows the annual averages for each site. The locations of the sites are shown in the attached map (Figure 30).

These studies have been on going since 1994 the changes in annual averages that have occurred at each location are again reviewed. These results are shown graphically in Figure 33.

Monitoring was discontinued at three sites during 2002, following changes to the requirements of the national network. All sites classed as “Intermediate” were stopped. The locations concerned were Godrergraig, London Road in Neath and Margam Road in Port Talbot. The results at most locations appeared to increase during 2002, continuing the trend for the 2001 dataset.

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 48ppb and 28ppb for the guide value. No local sites have ever come close to breaching the limit or guide values during 2002. The National Air Quality objective for NO_2 is 21 ppb (40$\mu g/m^3$) as an annual average, to be achieved by 2005. The Victoria Gardens site at 23.7 ppb (45.3 $\mu g/m^3$) has marginally exceeded

this figure. Further monitoring of this site is therefore necessary to determine compliance with the UK standard.

Figure 30 Nitrogen dioxide diffusion tube locations

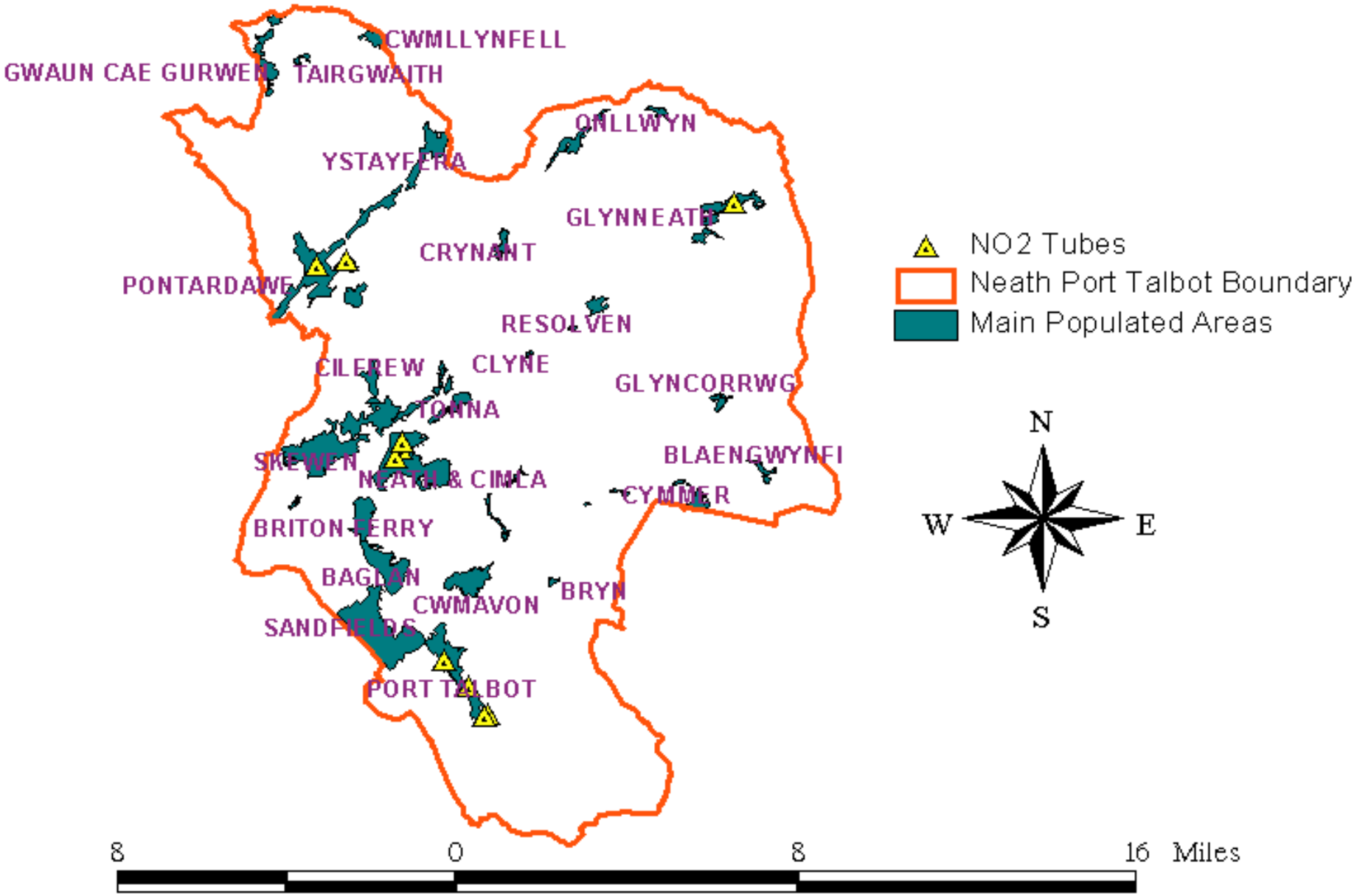


Table 3 Nitrogen Dioxide Diffusion Tube Results (ppb) – 2002

Site	Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Neath Civic Centre	UB	21.8	14.2	18.3	13	9.3	15.5	9.3	9.6	15.4	17.7	18.9	17.1	15.0
London Road, Neath	I	17.3	20.9	20.6	19.9	12.1	17.7							
Cwmnedd Primary School, Glynneath	UB	12.6	7	10.1	7.4	5.6	3.5		6.3	9.4	2.8	13.4	0.0	7.1
Groeswen Hospital, Margam	K	17.7	14.8	17.8			15.4	17.5	16.3	20.9	24.4	28.4	22.5	19.6
Rice Street, Taibach	UB	16.9	13.1	15	9.9	9.5	6.8	8.5	8.7	12.9	13.7	17.7	14.5	12.3
Margam Road, Margam	I	16.7	12.4	15.4	11.3	9.8	7.1							
College Green, Margam	UB		12.4	11.7	9.1	7	6.4	8.1	9	13.2	13.7	12	13.2	10.5
High St., Pontardawe	K	21.2	17.7	21.5	16.9			14.7		19	18.1	22.3	20.7	19.1
Godrergraig, Pontardawe	I	11.9	6.9	10	6.7	5.2	2.5							
Victoria Gardens, Neath	K	30.1			16	18.4	26.1	18	18.9	26.8	28	28	26.8	23.7

Key:
UB – Urban background location
I – Intermediate location
K – Kerbside location
ND – No data

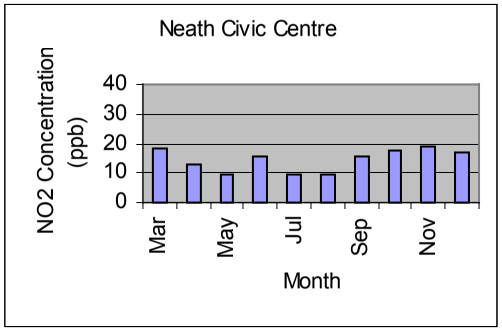
Conversion factor: 1ppb = 1.91 $\mu g/m^3$

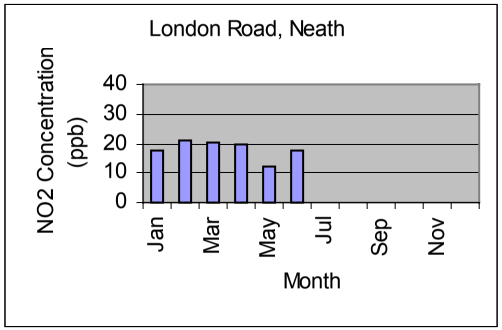
Table 4 Nitrogen dioxide annual averages (ppb) – 1994 - 2002

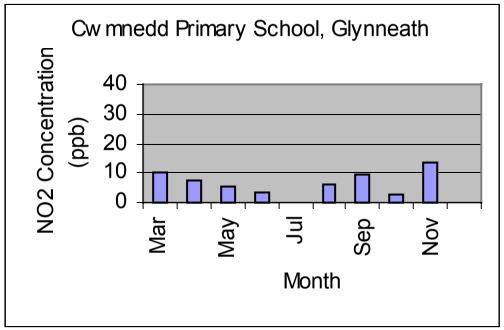
Year	1994	1995	1996	1997	1998	1999	2000	2001	2002
Neath Civic Centre	17.7	17.8	12.4	11.6	11.7	10.2	8.7	8.8	15
London Road, Neath	24.1	23.8	18.5	14.5	15.4	16.0	12.5	13.0	
Cwmnedd Primary School, Glynneath	13.0	13.7	9.0	7.7	7.8	6.2	6.3	6.2	7.1
Groeswen hospital, Margam	16.6	17.3	14.9	11.9	13.6	8.4	9.9	11.4	19.6
Rice Stree, Taibach	15.5	17.5	11.6	9.9	10.6	10.0	8.7	8.6	12.3
Margam Road, Margam	12.7	14.0	8.0	10.9	11.2	9.4	9.2	8.5	
College Green, Margam	10.7	11.6	11.9	10.0	9.4	7.6	7.7	7.4	10.5
High St., Pontardawe	15.9	11.9	11.2	19.7	12.8	10.3	10.7	11.2	19.1
Godrergraig, Pontardawe	ND	ND	ND	ND	7.3	6.3	5.9	5.4	
Victoria Gardens, Neath	28.3	28.3	20.1	20.6	20.7	17.1	17.0	15.8	23.7

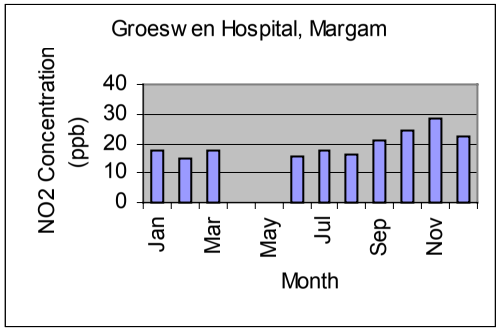
Conversion factor: 1ppb = 1.91 $\mu g/m^3$

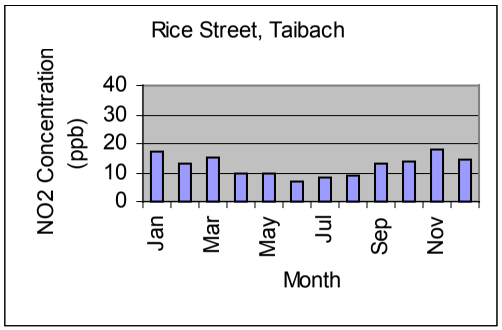
Figure 31 Monthly nitrogen dioxide diffusion tube results (ppb) – 2002

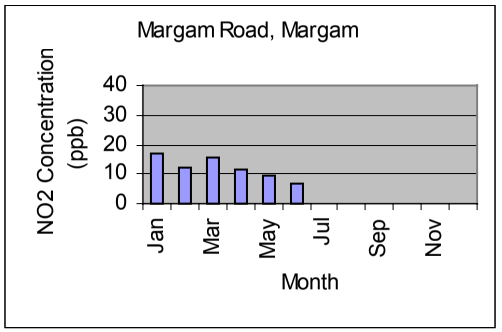


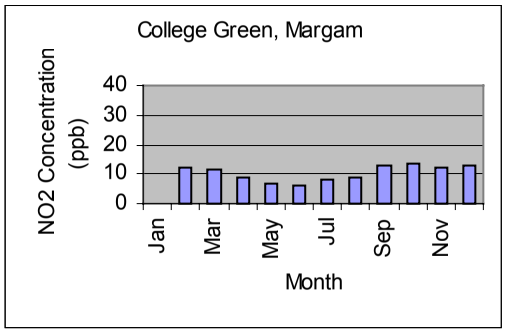


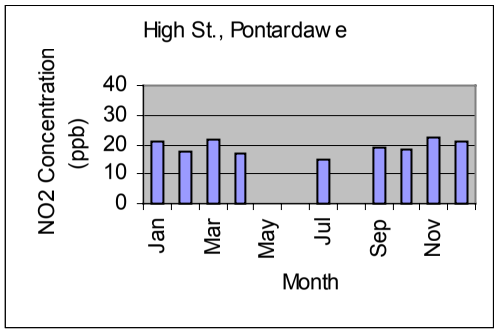


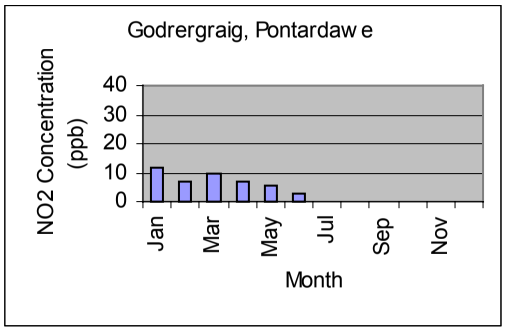












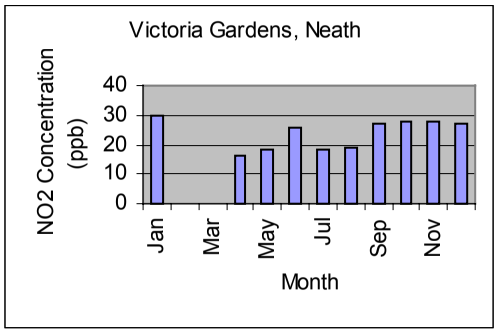


Figure 32 Nitrogen dioxide annual averages – 2002

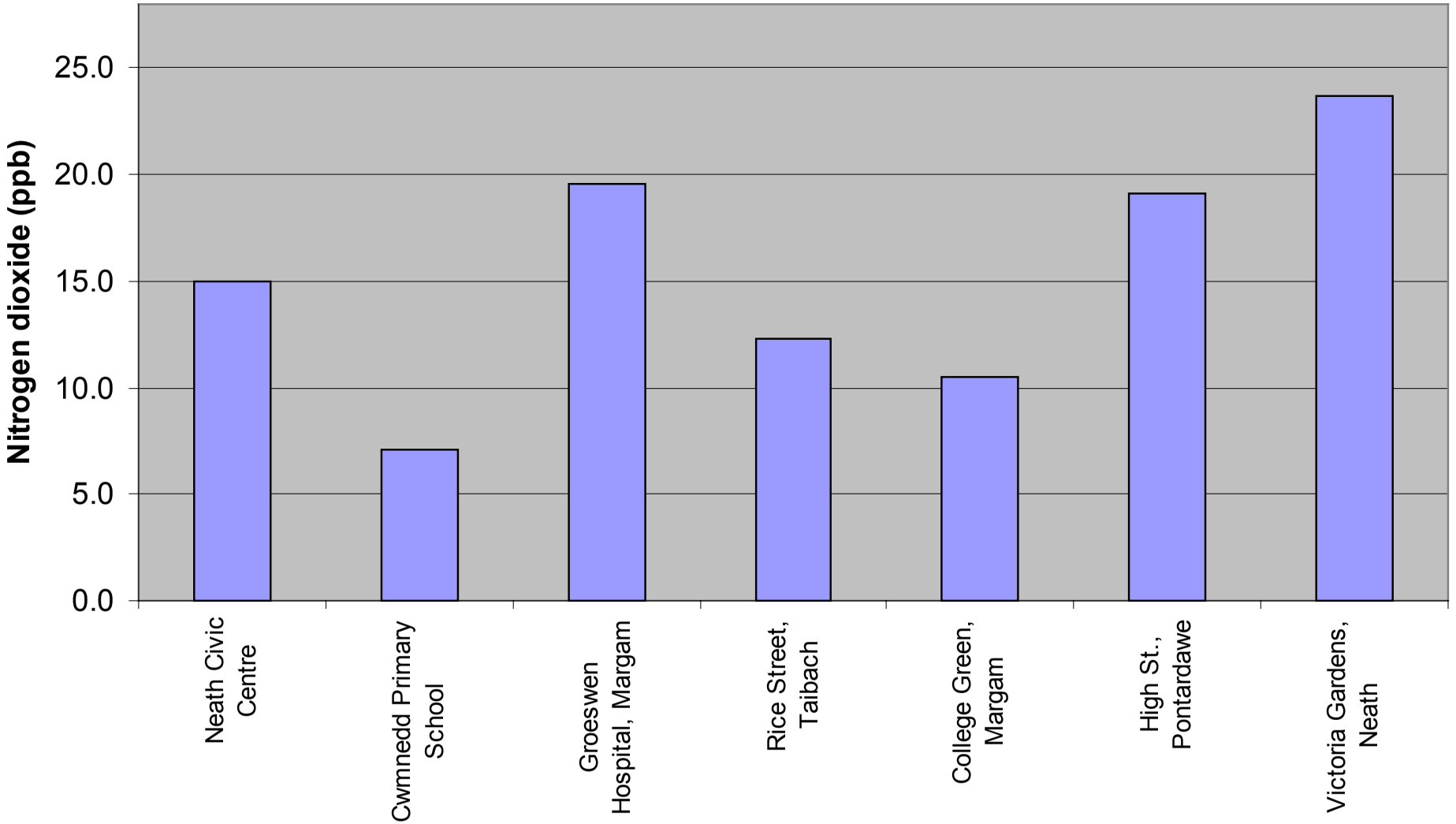
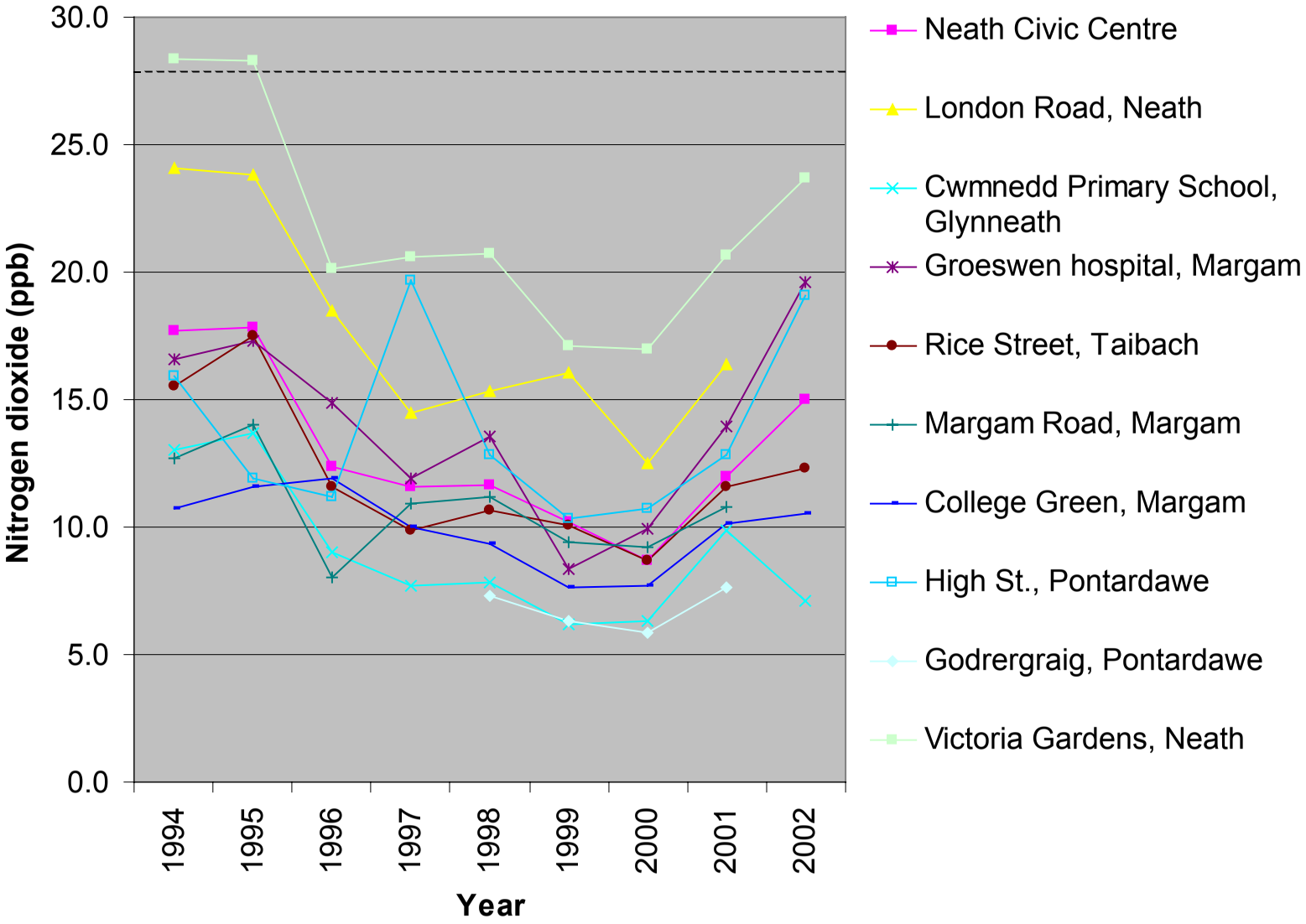


Figure 33 Annual nitrogen dioxide summary graph



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)

Results

The annual mean nickel concentration found in 2002 was 92 ng/m^3, which is over four and a half times the proposed target value (20 ng/m^3 annual mean). This is more than twice the concentration which was found in 2001 and 2000. 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 1.4 ng/m^3 and 0.33 ng/m^3 respectively. These concentrations represent between 23% and ~7% of the proposed target values.

The annual mean air concentration of lead at the Pontedawe site was found to be 7.7 ng/m^3, which represents ~1.5% of the present air quality limit value (500 ng/m^3 to be met by 2005) or approximately 3% of the UK's air quality objective (250 ng/ m^3) 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 Pontedawe monitoring site.

The trends in air concentration of metal measured at the Pontedawe site have been assessed for the four metals, which have EU Directive Limit Values or proposed Target Values (lead, arsenic, cadmium and nickel). Arsenic, cadmium and lead are all decreasing in concentration. Arsenic decreasing by 11%/year, cadmium by 2%/year and lead by 23%/year. However, nickel has been found to be increasing at the Pontedawe site with an average increase of 11% per year since monitoring at the Pontedawe leisure centre began.

Table 5 Threshold Limit Ealues and Environmental Air Guidlines.

Element	Current or proposed Air Quality Limit Values (ng/m^3)	Environmental Assessment Level (EAL)## ($ng\ m^{-3}$)	Comment	Annual Mean Air Concentration in 2000 ($ng\ m^{-3}$)	% of Environmental Assessment Level (EAL)
Arsenic (As)	6		Proposed Limit Value	1.1	18
Cadmium (Cd)	5		Proposed Limit Value	0.23	4.6
Cobalt (Co)		200##	Cobalt and its compounds as Co	1.2	0.6
Chromium (Cr)		100##	Cr VI compunds	4.4	4.4
Copper (Cu)		10000##	Dust, fume and mists	3.9	0.039
Iron (Fe)		10000##	Iron salts as Fe	208	2.1
Nickel (Ni)	20		Proposed Limit Value	41.4	210
Lead (Pb)	2000* (500)** (250)***		Inorganic compounds	12.6 12.6 12.6	0.63 2.5 5
Antimony (Sb)		5000##		1.42	0.028
Selenium (Se)		1000##	Not including hydrogen selenimide	0.52	0.052

Notes:

1. # Expected proposed Air Quality Limit Values taken from ranges produced by Position paper. Ambient Air Pollution by As, CD and Ni Compounds (EC, 2000).
2. ## Environmental Assessmemt Levels: IPPC H1 Environment Agency Version 1, June 2001.
3. * Current EC Directive limit value for annual mean air concentration.
4. ** EU Daughter Directive (1999) limit value and DEFRA air quality objective to be met by 31st December 2004 (annual mean air concentration).
5. *** DEFRA air quality objective for Pb in the UK to be met by 2008 (annual mean air concentration).

Figure 34

Figure 1e: Mean Annual Concentrations of Cerium and Scandium in Air at Trebanos (1972-1996) and Pontardawe (1997-2002)

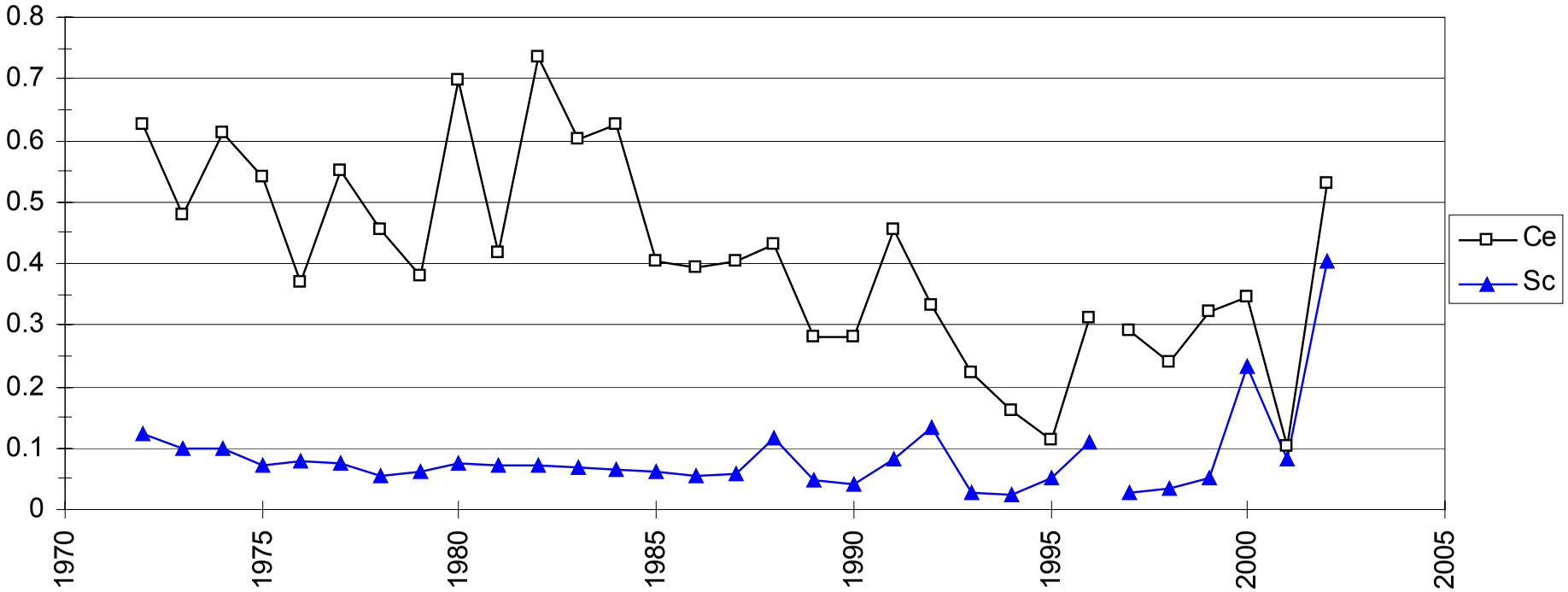


Figure 35

Figure 1d: Annual Mean Concentrations of Antimony, Cobalt and Selenium in Air at Trebanos (1972-1996) and at Pontardawe (1997-2002)

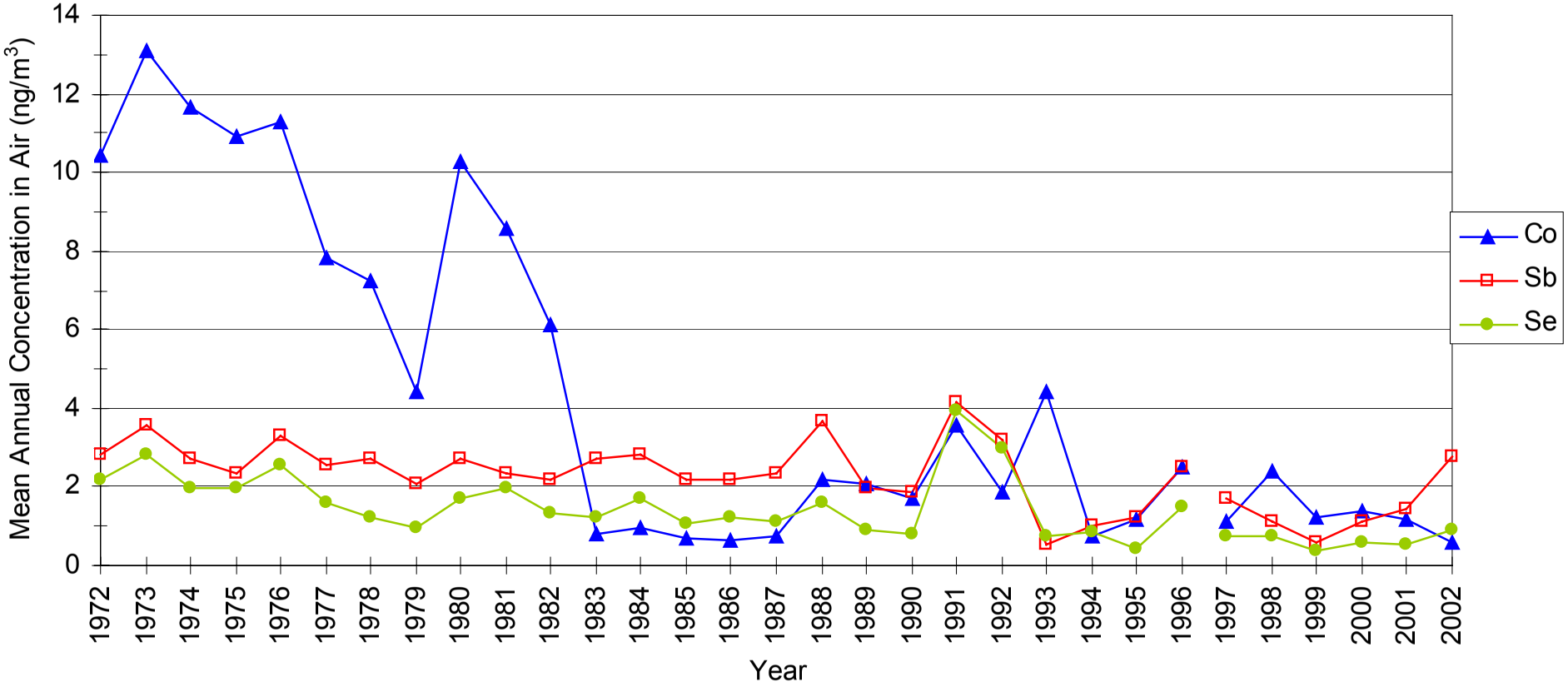


Figure 36

Figure 1b Annual Mean Concentrations of Arsenic, Cadmium, Chromium and Copper in Air at Trebanos (1972-1996) and at Pontardawe (1997-2002)

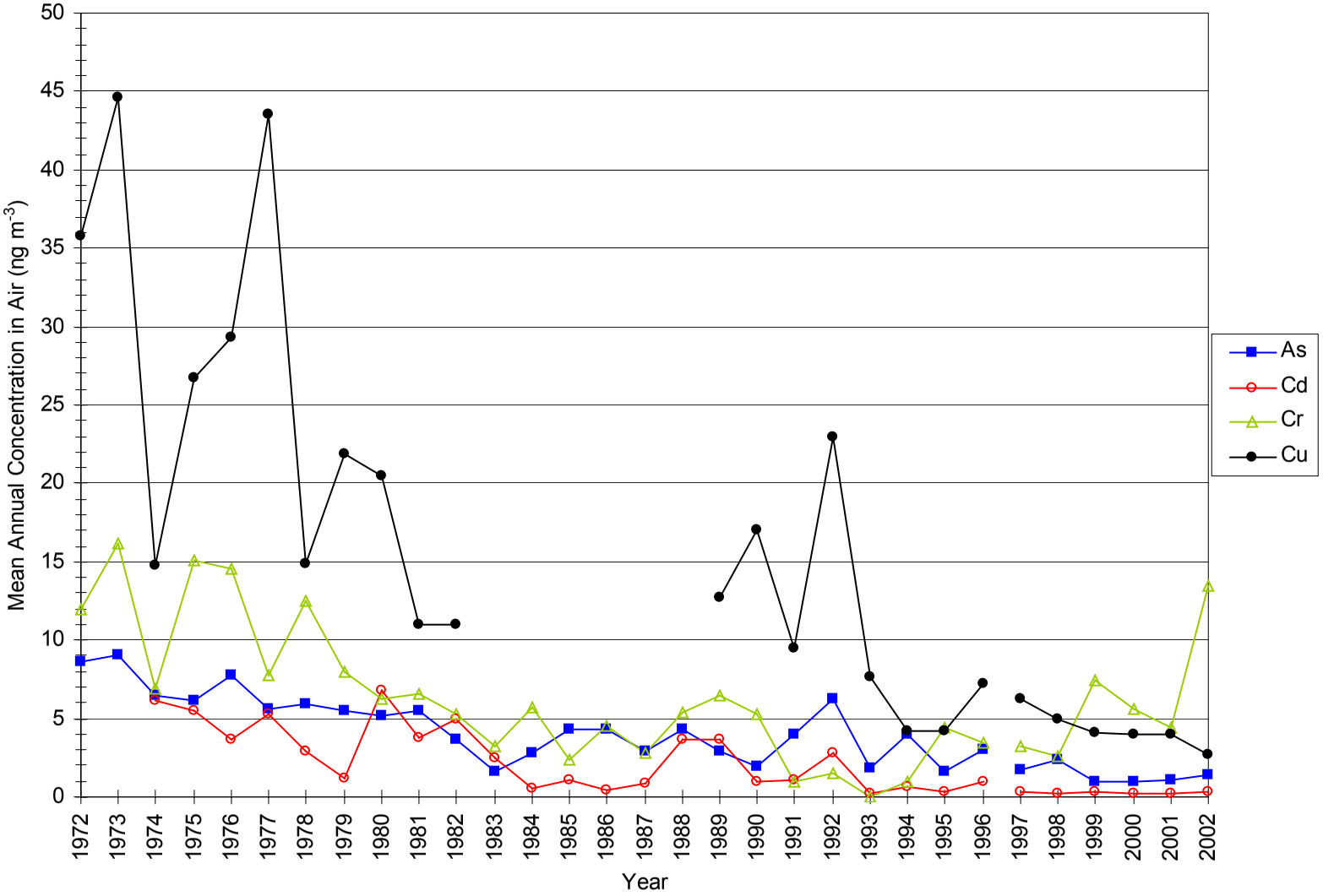


Figure 37

Figure 1c: Annual Mean Concentrations of Iron in Air at Trebanos (1972-1996) and at Pontardawe (1997-2002)

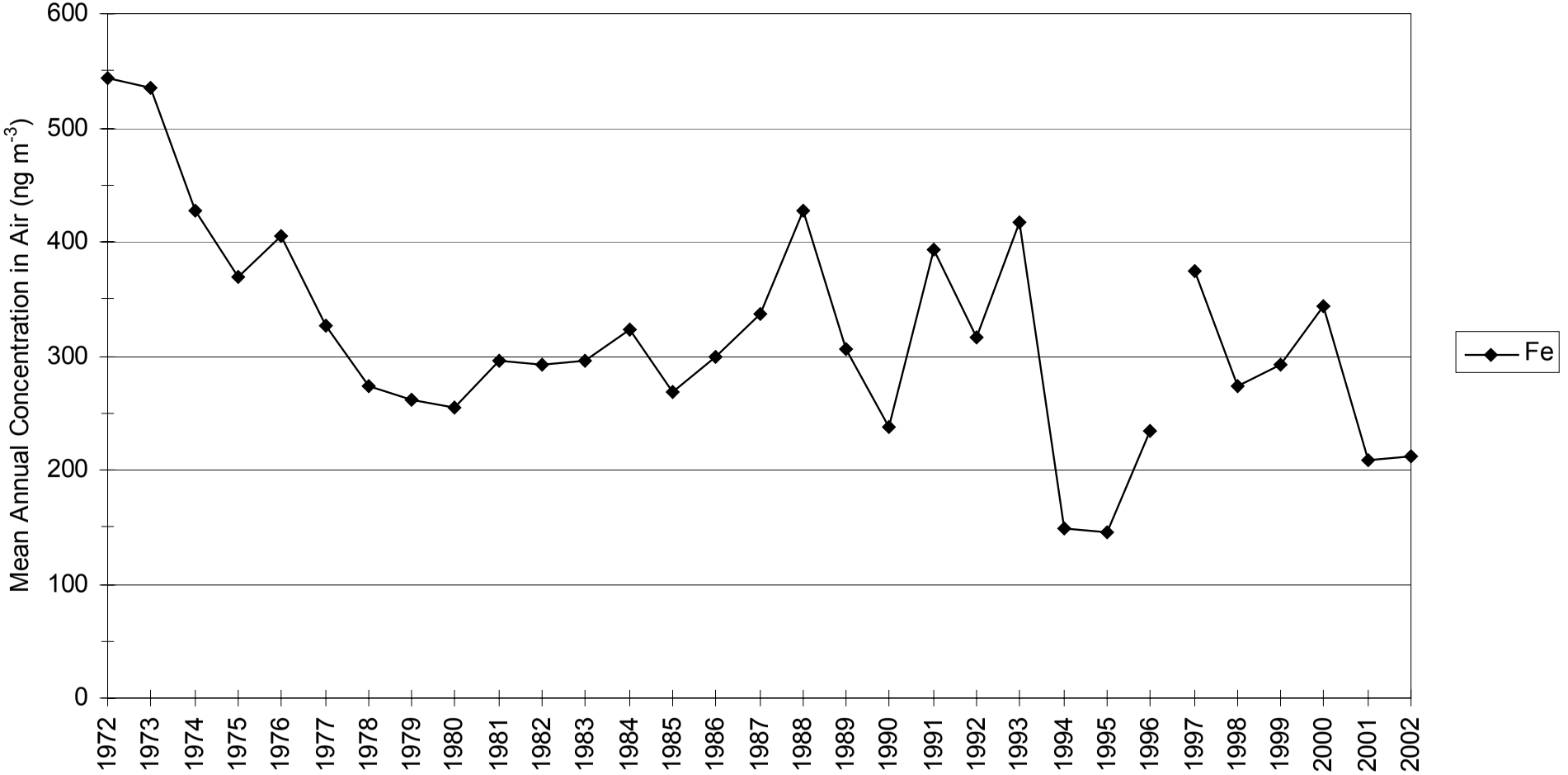
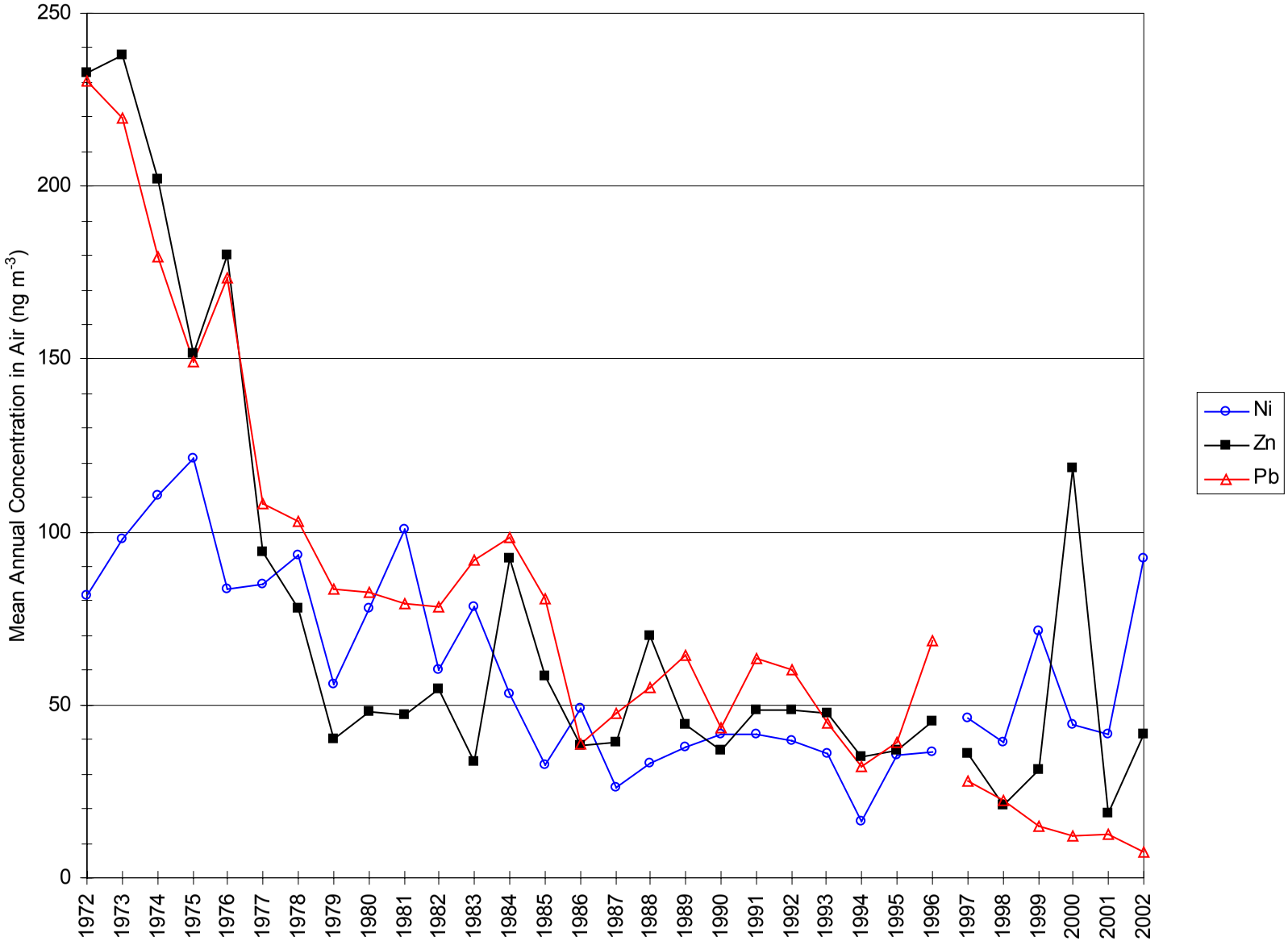


Figure 38

Figure 1a Annual Mean Concentrations of Lead, Nickel and Zinc in Air at Trebanos (1972-1996) and at Pontardawe (1997-2002)



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 2000 has now been fully ratified and can therefore be reported with confidence. Data is collected in respect of PM_{10} particulates, oxides of nitrogen (NO_x), sulphur dioxide (SO_2) and ozone (O_3). 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 53.

Pollutants monitored

PM_{10}

PM_{10} 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.

PM_{10} 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 (SO_2)

Sulphur dioxide is a corrosive acid gas that combines with water vapour in the atmosphere to produce acid rain. SO_2 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 (NO_2)

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 (O_3)

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, NO_2 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 NO_2. 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 15 shows the objectives of the UK National Air Quality Strategy, whereas Table 16 shows the air quality bands. The results for each of the pollutants should be read in the context of these tables.

Meteorological data

Figure 39 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 (NO_2)

The results are summarised in Table 6. Figure 40 shows time series graphs of NO_2 concentration for each month expressed as hourly averages.

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 105ppb or 200$\mu g/m^3$ 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 21ppb or 40$\mu g/m^3$ as the limit. The maximum hourly value was 46ppb (87.9 $\mu g/m^3$) and the annual average was 10ppb (19.1 $\mu g/m^3$). Therefore, no exceedences of the Air Quality Objective level occurred. No exceedences of the World Health Organisation (WHO) guideline (hourly average > 110ppb) occurred. Air pollution levels were "low" at all times. The EU Directive (98 percentile >104.6ppb or 199.8 $\mu g/m^3$) was not breached.

There is now also a limit for the protection of vegetation and ecosystems that applies to all oxides of nitrogen, not just nitrogen dioxide. As the annual concentration was 17 ppb (32.5 $\mu g/m^3$), this limit was exceeded. However, 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 41). Levels were highest from a generally northerly direction, the maximum being 13 ppb (24.8 $\mu g/m^3$) from the north-north west.

Summary

There were no exceedences of the Air Quality objective levels for NO_2 during 2002, as was the case in previous years.

Sulphur dioxide (SO_2)

The results are summarised in Table 8. Figure 42 shows the time series graphs for SO_2 concentration for each month expressed as hourly averages.

Limits and objectives

The Air Quality objective level (100ppb or 266μg/m^3 as a 15-minute average) was not breached during 2001, therefore the Air Quality Objective, which is based upon the 99.9 percentile of all 15-minute average values, was not breached. The maximum 15-minute average was 65ppb (172.9 μg/m^3). The maximum daily average was 11ppb and neither the Air Quality Objective (daily average 47 ppb or 125μg/m^3 not to be exceeded more than 3 times per year) or the EU Directive (daily average >38) were breached. The Air Quality Objective also has an hourly averaged limit, which is 132ppb or 350μg/m^3, not to be breached more than 24 times a year, was not breached. The maximum hourly average was 44ppb (117 μg/m^3). The WHO guideline (hourly average > 122ppb) was not breached. Air pollution was low throughout the year.

Directional analysis

SO_2 levels (Figure 44, Table 7) were generally greatest from the south-western quadrant, peaking at 6 ppb in the west-south-west.

Summary

No breaches of any Air Quality Objective levels arose during 2002.

Ozone (O_3)

The results are summarised in Table 9. Figure 45 shows the time series graphs for O_3 concentration for each month expressed as hourly averages.

Limits and objectives

The Air Quality recommended objective for ozone is 50ppb (100 $\mu g/m^3$), measured as a rolling 8hour average. This was breached on a total of 65 occasions on a total of 9 days. This is an improvement upon the figures for 2001, which were 79 exceedences on 21 days. All exceedences occurred between the months of March and June. 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 132 hours of 'moderate' pollution.

Directional analysis

O_3 levels were not particularly direction dependent (see figure 46), but were slightly biased to the south and west.

Summary

In 2002 there were 65 breaches of the Air quality strategy recommended objective for Ozone. There has been improvements in ozone measurements for two years running, having decreased from 79 exceedences in 2001 and 130 exceedences in 2000.

PM_{10}

The results are summarised in Table 10. Figure 47 shows the time series graphs for PM_{10} concentration for each month expressed as 24hour running averages.

Limits and objectives

The average concentration was 21 $\mu g/m^3$, whilst the hourly maximum was 155 $\mu g/m^3$. The Air Quality Objective level is 50 $\mu g/m^3$ 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 24 days in 2002 where the daily averages exceeded 50 $\mu g/m^3$. Consequently the Air Quality Objective Level, which is to be achieved by 31st December 2004, was not breached. Air pollution was 'moderate' for 113 hours and 'low' 8462 hours.

Directional analysis

Figure 48 shows that PM_{10} levels were once again highest from the west south-west (57 $\mu g/m^3$).

Summary

The Air Quality Objective level was not breached again during 2002. The relatively low number of exceedences is likely to be due to blast furnace number 5 being out of order at the Corus steel works throughout the year.

Carbon monoxide (CO)

The results are summarised in Table 11. Figure 49 shows the time series graphs for CO concentration for each month expressed as hourly averages.

Limits and objectives

The Air Quality Objective level (10 mg/m^3 or 8.6 ppm expressed as an 8hour rolling average) was not exceeded. 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 25 ppm as an hourly average. This guideline was not exceeded, since the maximum hourly average was 3 ppm (3.5 mg/m^3).

Directional analysis

Figure 50 shows that average CO concentrations showed a pronounced bias towards the south westerly direction (0.75 ppm or 0.87 mg/m^3).

Summary

There was no breach of the Air Objective level during 2002.

Discussion

The number of PM_{10} exceedences during 2002 was significantly lower than during 2001. This may in part relate to the non-operation of Blast Furnace Number 5 at the Corus works throughout the year.

Table 6 Nitrogen dioxide summary statistics 2002

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	667	669	648	719	741	716	724	742	659	740	718	738	8481
Max 15-min mean (ppb)	40	42	47	51	41	36	33	42	46	44	54	38	54
Max hourly mean (ppb)	38	39	41	46	39	29	28	39	34	37	44	35	46
Max running 8-hour mean (ppb)	30	26	30	28	23	25	19	23	27	31	28	30	31
Max running 24-hour mean (ppb)	22	22	24	22	19	12	13	16	22	24	23	28	28
Max daily mean (ppb)	21	21	21	21	17	11	11	16	21	24	21	28	28
Average (ppb)	13	9	11	10	8	6	7	10	12	12	11	13	10
Data Capture (%)	89.7	99.6	87.1	99.9	99.6	99.4	97.3	99.7	91.5	99.5	99.7	99.2	96.8
Annual mean > 21 ppb	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly mean > 105 ppb	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual mean nitrogen oxides >16 ppb	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Table 7 Average PM_{10}, NO_2, SO_2, O_3 and CO levels by direction 2002

Direction	PM_{10} (ug/M3)	NO_2 (ppb)	SO_2 (ppb)	O_3 (ppb)	CO (ppm)
N	14	12	1	21	0.27
NNE	14	12	1	21	0.24
NE	16	11	2	23	0.29
ENE	16	11	2	23	0.26
E	15	11	3	23	0.24
ESE	16	11	2	26	0.23
SE	18	10	2	29	0.22
SSE	22	10	3	29	0.25
S	31	9	4	31	0.28
SSW	28	6	2	35	0.38
SW	32	5	2	36	0.75
WSW	45	7	6	32	0.67
W	28	6	4	35	0.25
WNW	17	8	1	29	0.24
NW	13	12	1	23	0.21
NNW	14	13	1	21	0.22

Table 8 Sulphur dioxide summary statistics 2002

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	2633	2612	2541	2814	2889	2808	2837	2906	2513	2899	2798	2898	33148
Max 15-min mean (ppb)	38	43	52	64	29	29	31	30	37	65	59	55	65
Max hourly mean (ppb)	22	38	32	29	22	17	19	14	28	44	29	39	44
Max running 8-hour mean (ppb)	11	22	14	15	9	5	9	5	16	21	10	20	22
Max running 24-hour mean (ppb)	6	11	10	9	6	3	5	3	10	9	7	11	11
Max daily mean (ppb)	6	11	7	8	5	3	5	3	9	9	6	11	11
Average (ppb)	2	3	2	3	2	2	1	1	2	3	1	2	2
Data Capture (%)	90.3	99.1	87.0	99.9	99.2	99.6	97.6	99.6	89.0	99.3	99.4	99.3	96.6
15-min mean > 100 ppb	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly mean > 132 ppb	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily mean > 47ppb	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual mean	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Table 9 Ozone summary statistics 2002

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	15	18	56	36	0	0	7	0	0	0	132
Number Low (ppb)	676	672	641	702	688	684	559	744	661	744	720	744	8235
Max 15-min mean (ppb)	46	48	61	56	66	64	47	60	62	46	45	44	66
Max hourly mean (ppb)	45	46	61	54	64	63	42	45	60	46	44	43	64
Max running 8-hour mean (ppb)	44	44	57	52	59	59	37	41	50	43	41	40	59
Max running 24-hour mean (ppb)	41	41	49	45	50	55	33	30	39	41	38	38	55
Max daily mean (ppb)	41	41	41	45	49	51	32	28	36	38	37	36	51
Average (ppb)	22	31	30	35	36	32	23	14	26	21	25	18	26
Data Capture (%)	90.3	99.6	87.0	99.7	99.5	99.4	74.9	99.6	91.4	99.2	99.7	99.5	94.9
Running 8-hour mean > 50 ppb – exceedences(No. days)	0(0)	0(0)	9(2)	4(1)	24(4)	28(2)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	65(9)

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

Table 10 PM_{10} summary statistics 2002

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	9	0	0	0	0	0	0	0	0	0	0	9
Number Moderate	32	41	0	40	0	0	0	0	0	0	0	0	113
Number Low	631	622	679	680	744	720	744	744	690	744	720	744	8642
Max 15-min mean (µg/m^3)	181	190	179	197	248	173	177	148	117	219	139	184	248
Max hourly mean (µg/m^3)	132	155	149	151	150	118	118	93	87	112	124	84	155
Max running 8-hour mean (µg/m^3)	81	104	61	82	73	70	82	55	53	61	58	56	104
Max running 24-hour mean (µg/m^3)	64	77	43	67	49	42	43	35	38	42	46	40	77
Max daily mean (µg/m^3)	57	77	42	63	46	40	38	34	36	39	43	34	77
Average (µg/m^3)	25	30	23	28	24	21	18	17	19	17	18	18	21
Data Capture (%)	90.5	99.6	93.0	99.6	99.6	99.9	99.3	99.9	96.3	98.7	97.9	98.5	97.7
Daily mean > 50 (gravimetric)	4	5	2	6	4	1	0	0	0	1	1	0	24
Annual mean > 40 (gravimetric)	-	-	-	-	-	-	-	-	-	-	-	-	0

Note: All concentrations expressed in µg/m^3.

Table 11 Carbon monoxide summary statistics 2002

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	662	664	592	651	703	610	651	372	638	735	714	678	7720
Max 15-min mean (ppm)	3	5	5	3	5	4	7	4	3	3	4	3	7
Max hourly mean (ppm)	2	2	2	2	2	3	3	2	2	3	3	2	3
Max running 8-hour mean (ppm)	1	1	1	1	1	1	1	1	1	1	1	2	2
Average (ppm)	0.3	0.4	0.2	0.2	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.3
Data Capture (%)	90.3	99.6	80.9	91.8	95.8	86.8	90.2	50.7	91.4	99.5	99.9	93.1	89.0
Exceedences of 10mg/m3 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 ppm	0	0	0	0	0	0	0	0	0	0	0	0	0

Conversion factor: 1ppb = 1.16 $\mu g/m^3$

Figure 39 Wind speed and direction: 2002

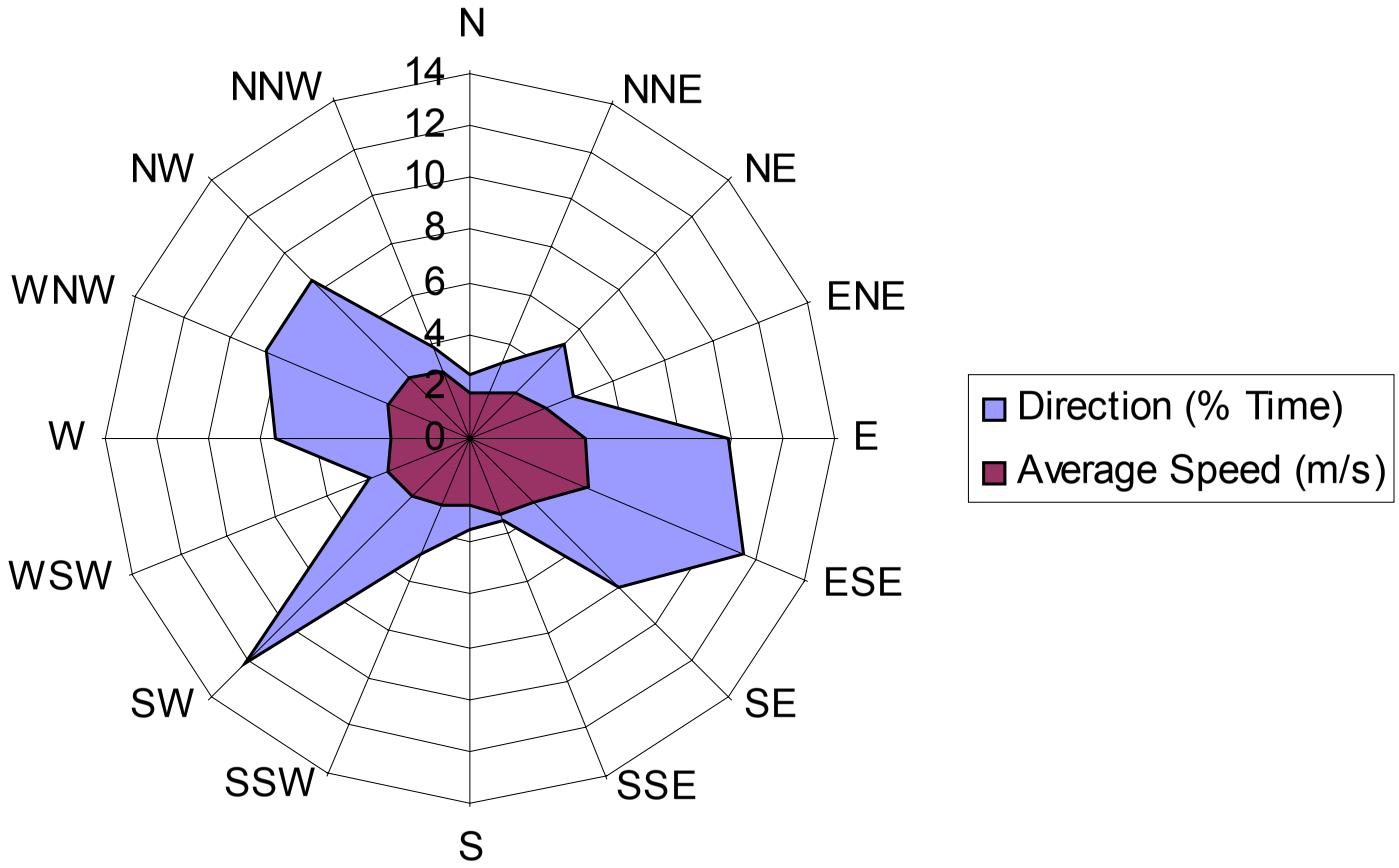


Figure 40 Nitrogen dioxide results – 2002 - hourly averages

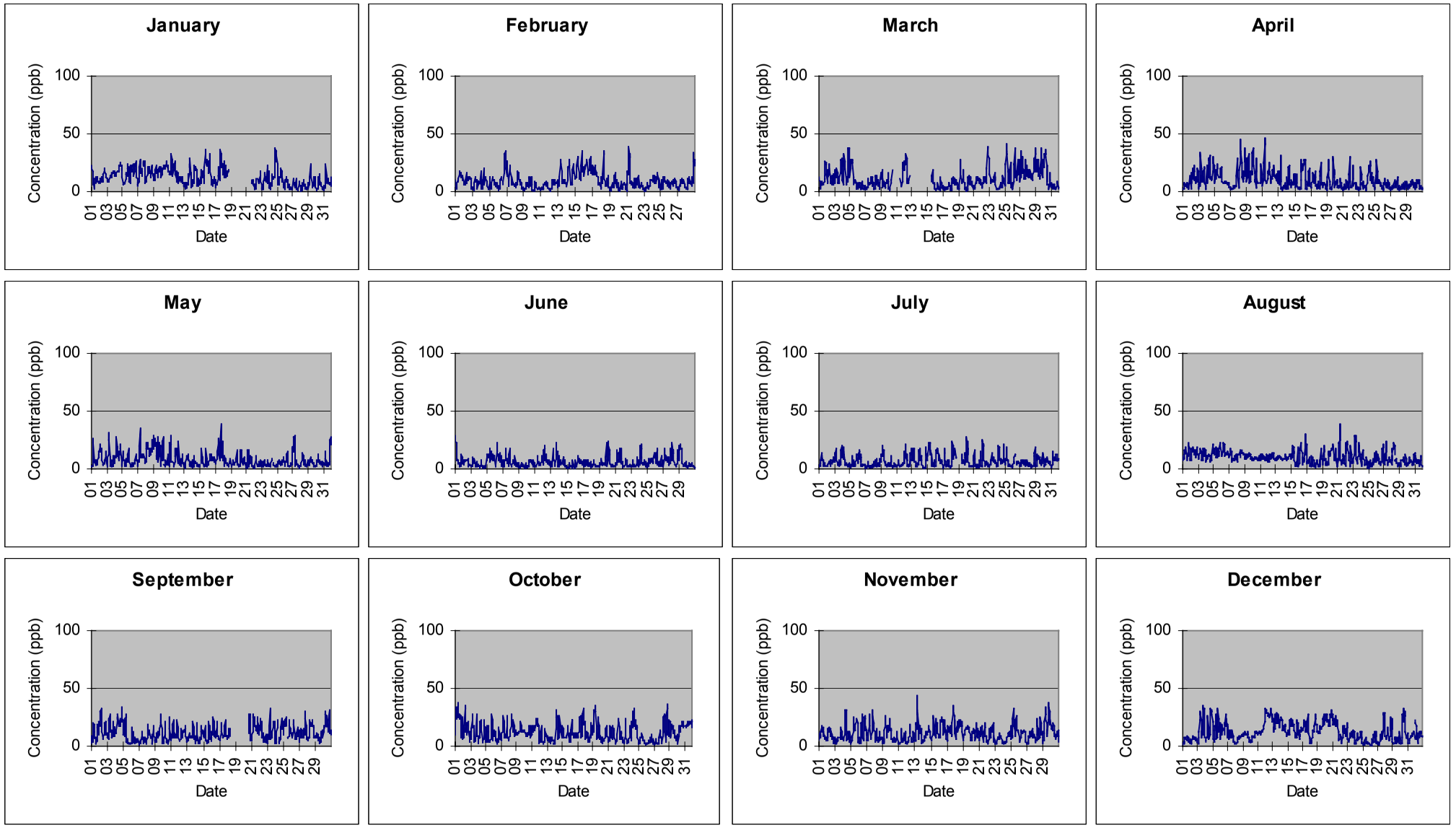


Figure 41 Average nitrogen dioxide levels by wind direction in 2002

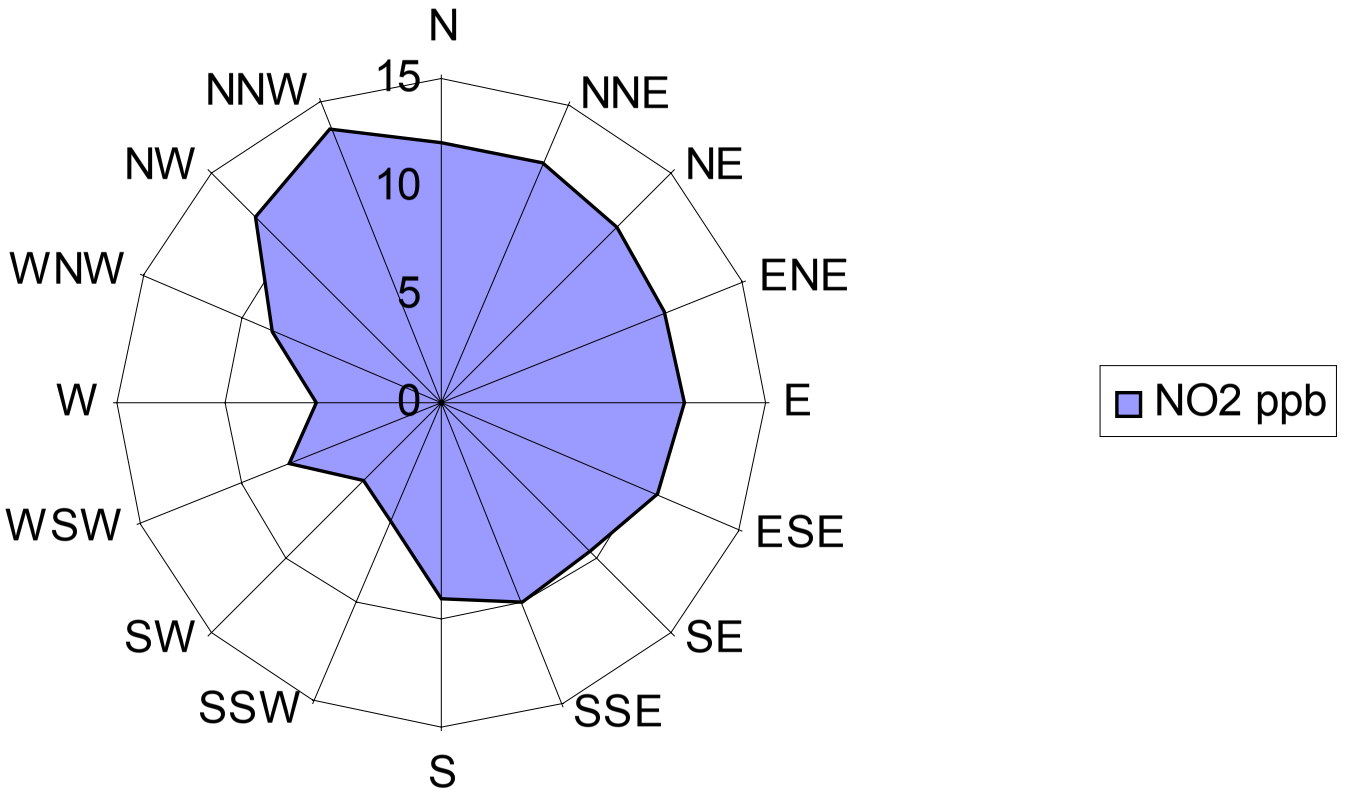


Figure 42 Sulphur dioxide results – 2002 – 15minute averages

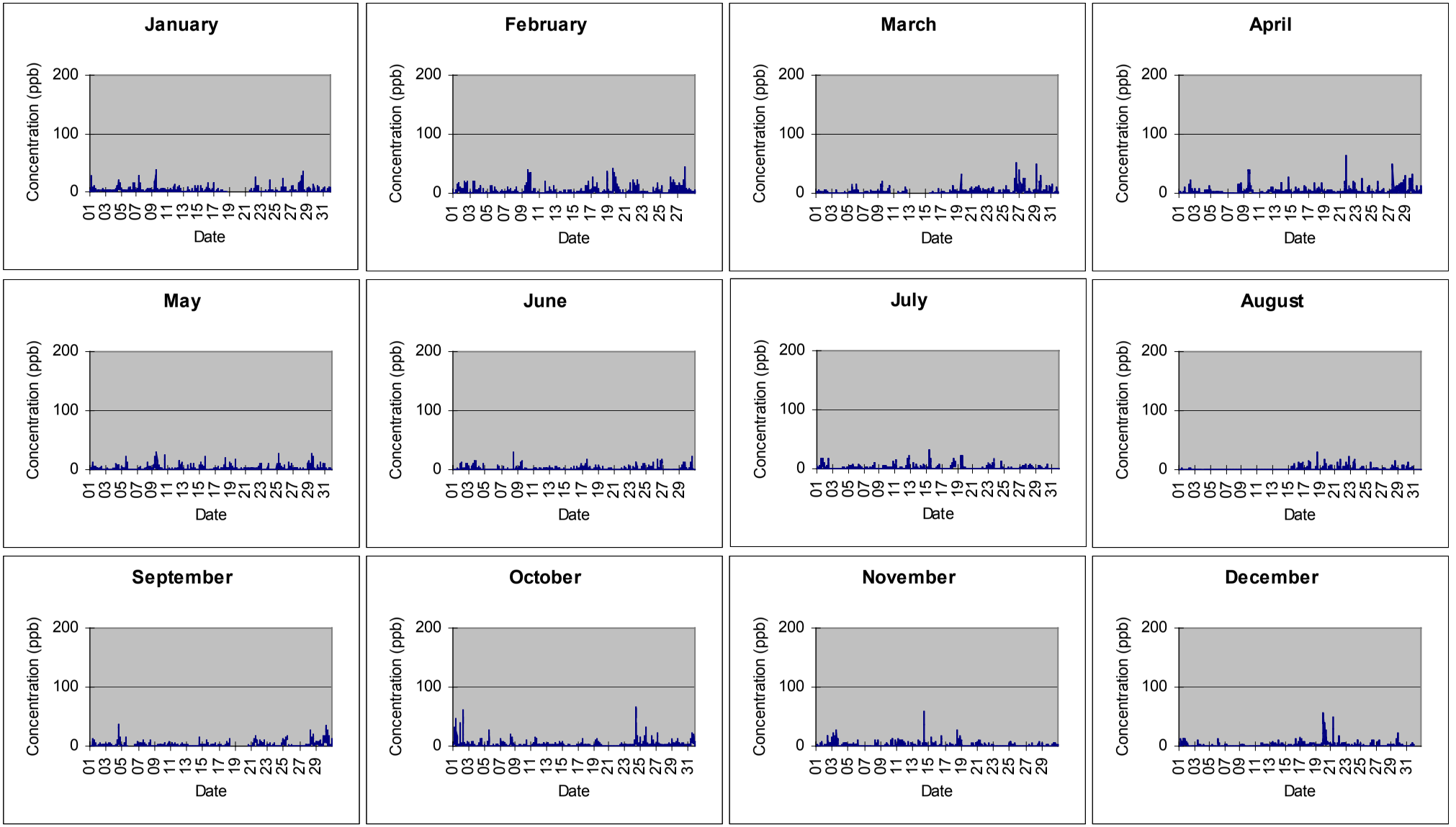


Figure 44 Average sulphur dioxide levels by wind direction in 2002

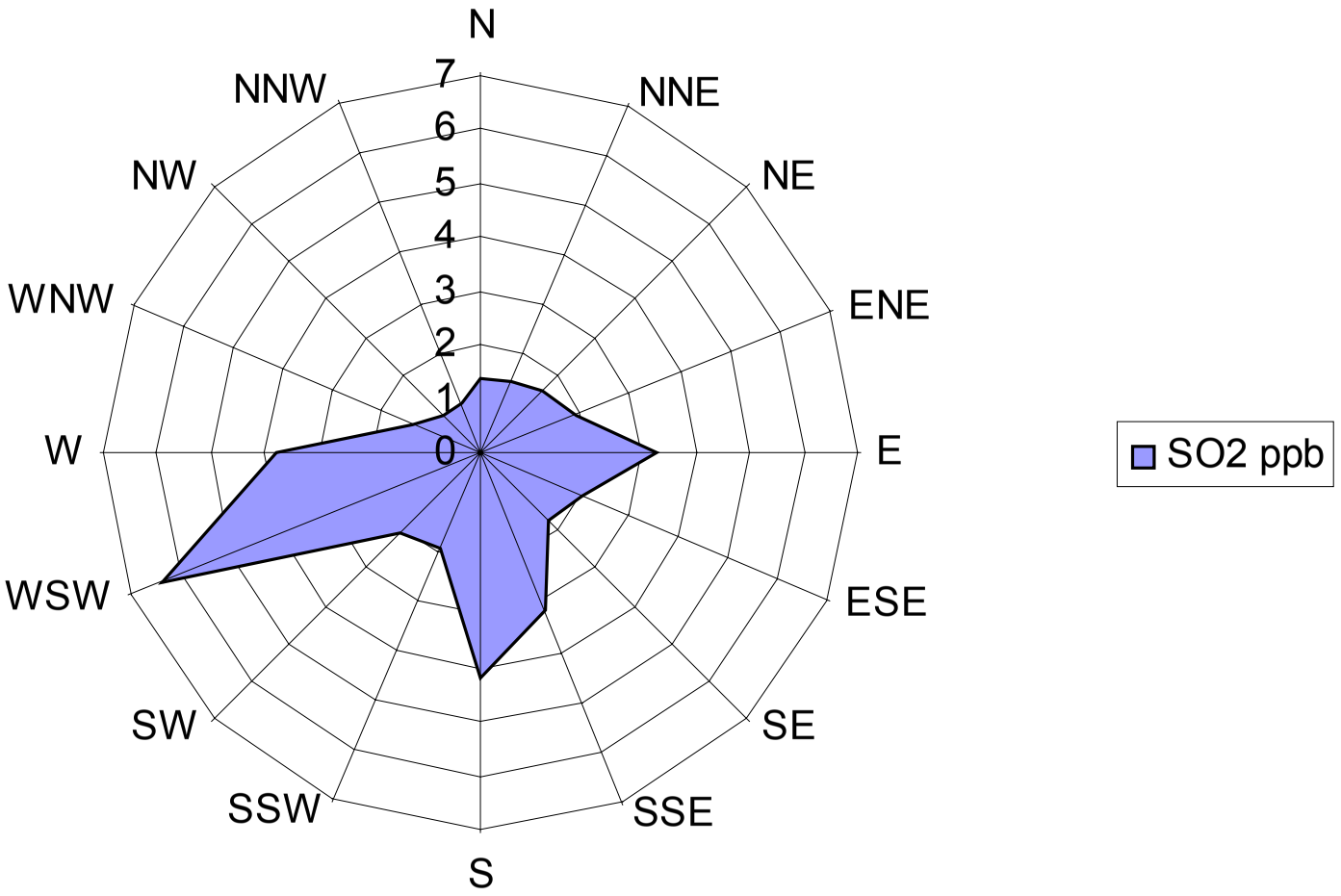


Figure 45 Ozone results – 2001 – 8hour running averages

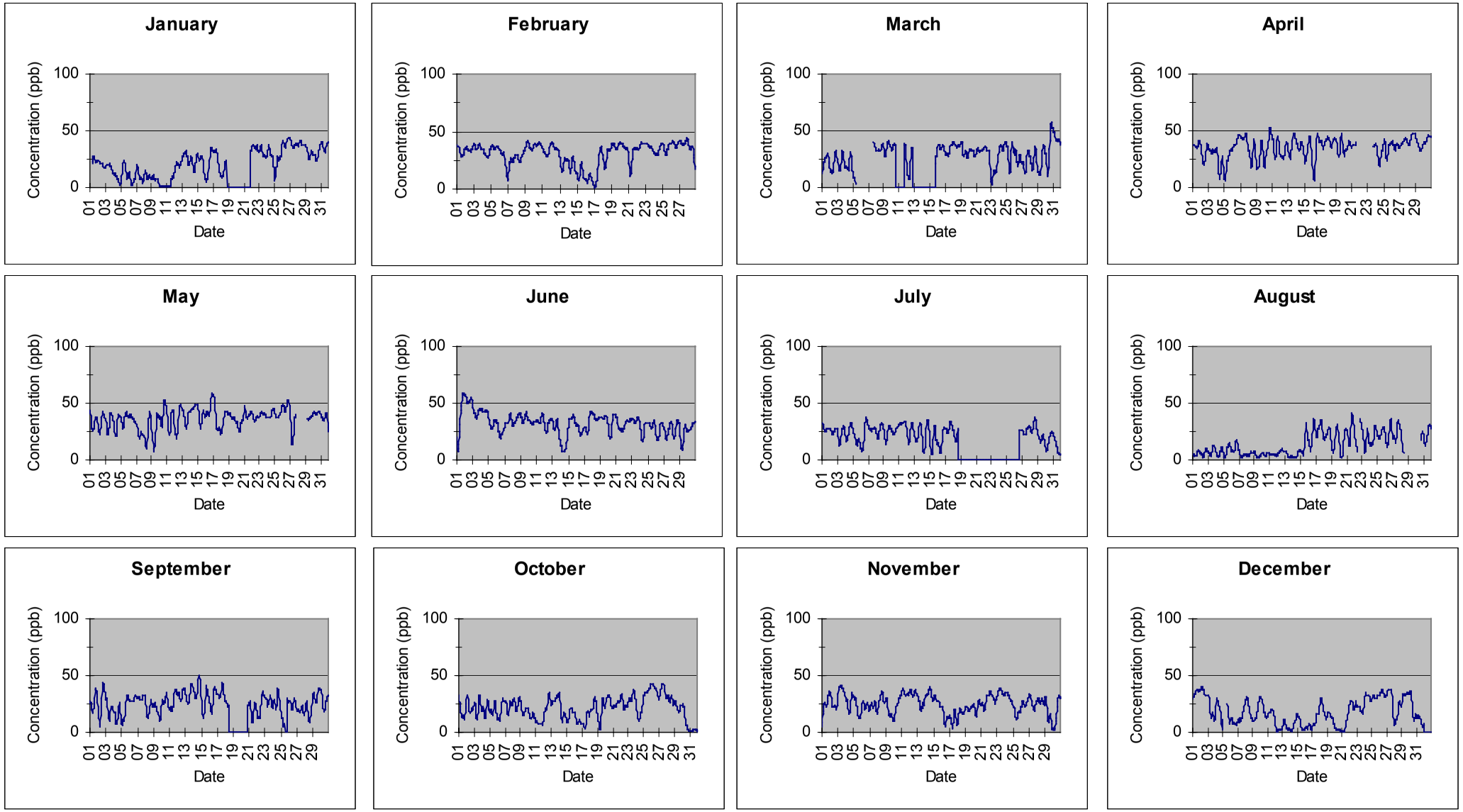


Figure 46 Average ozone levels by wind direction in 2002

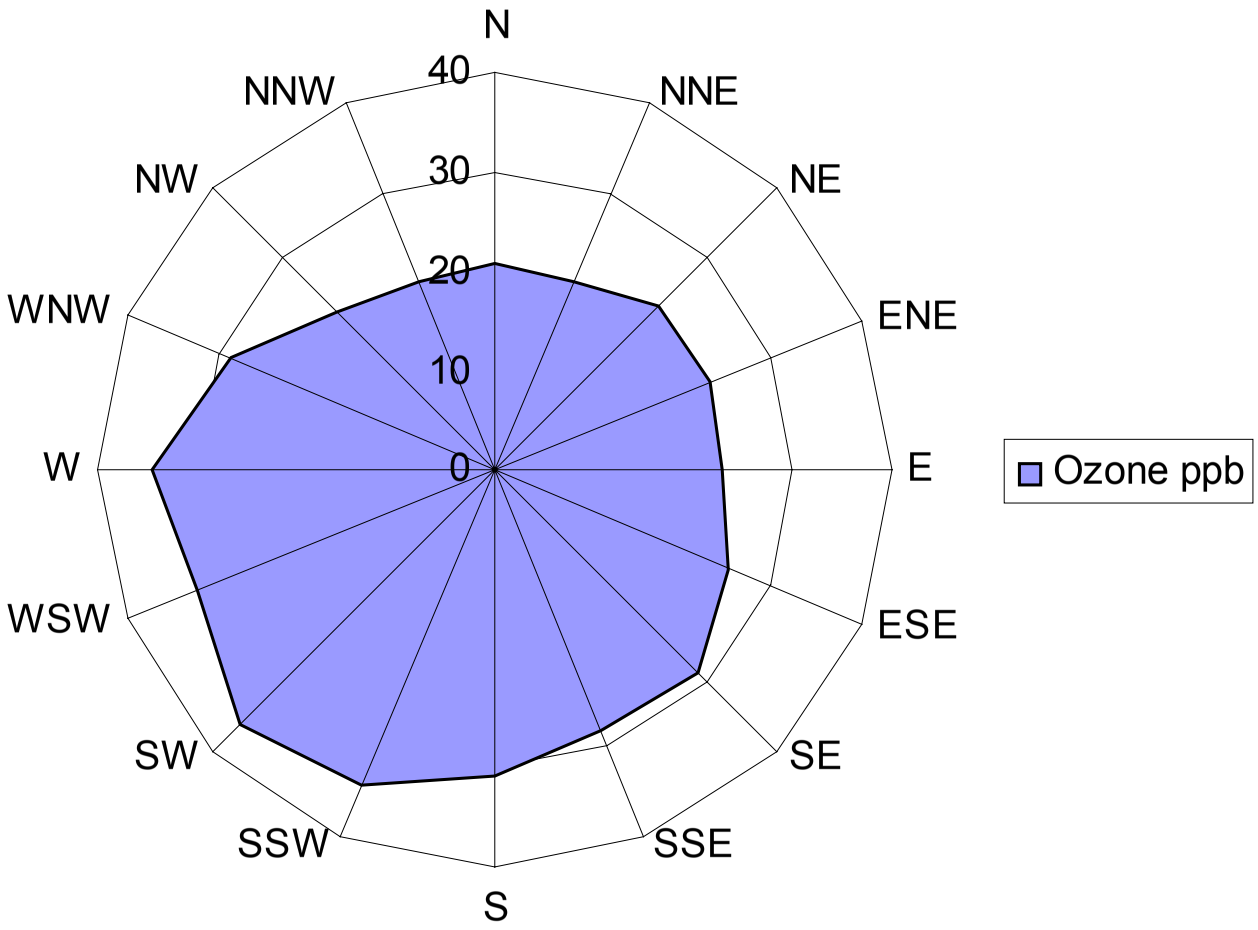


Figure 47 PM_{10} results – 2002 - 24hour running averages

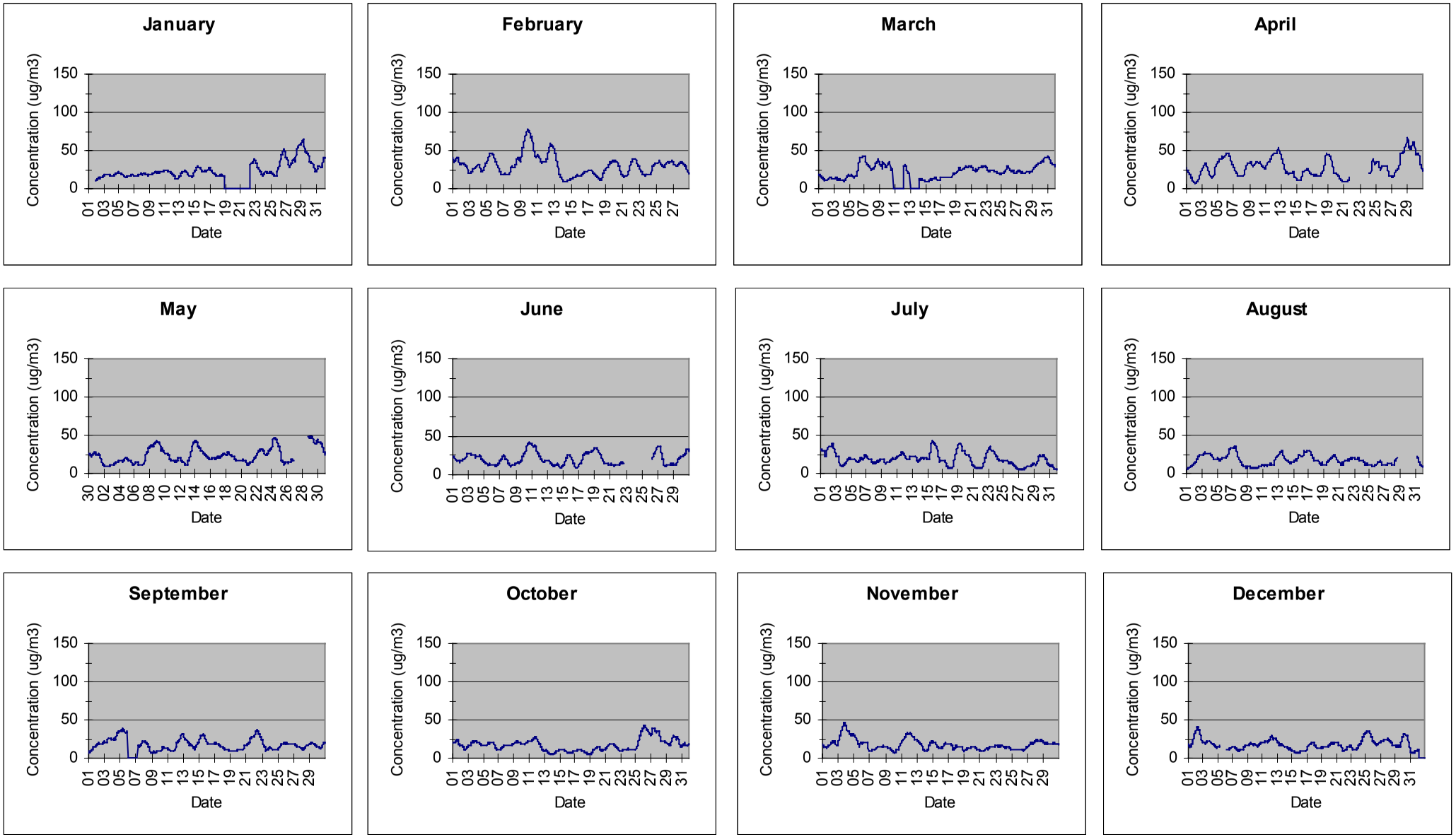


Figure 48 PM_{10} particulate levels by wind direction in 2002

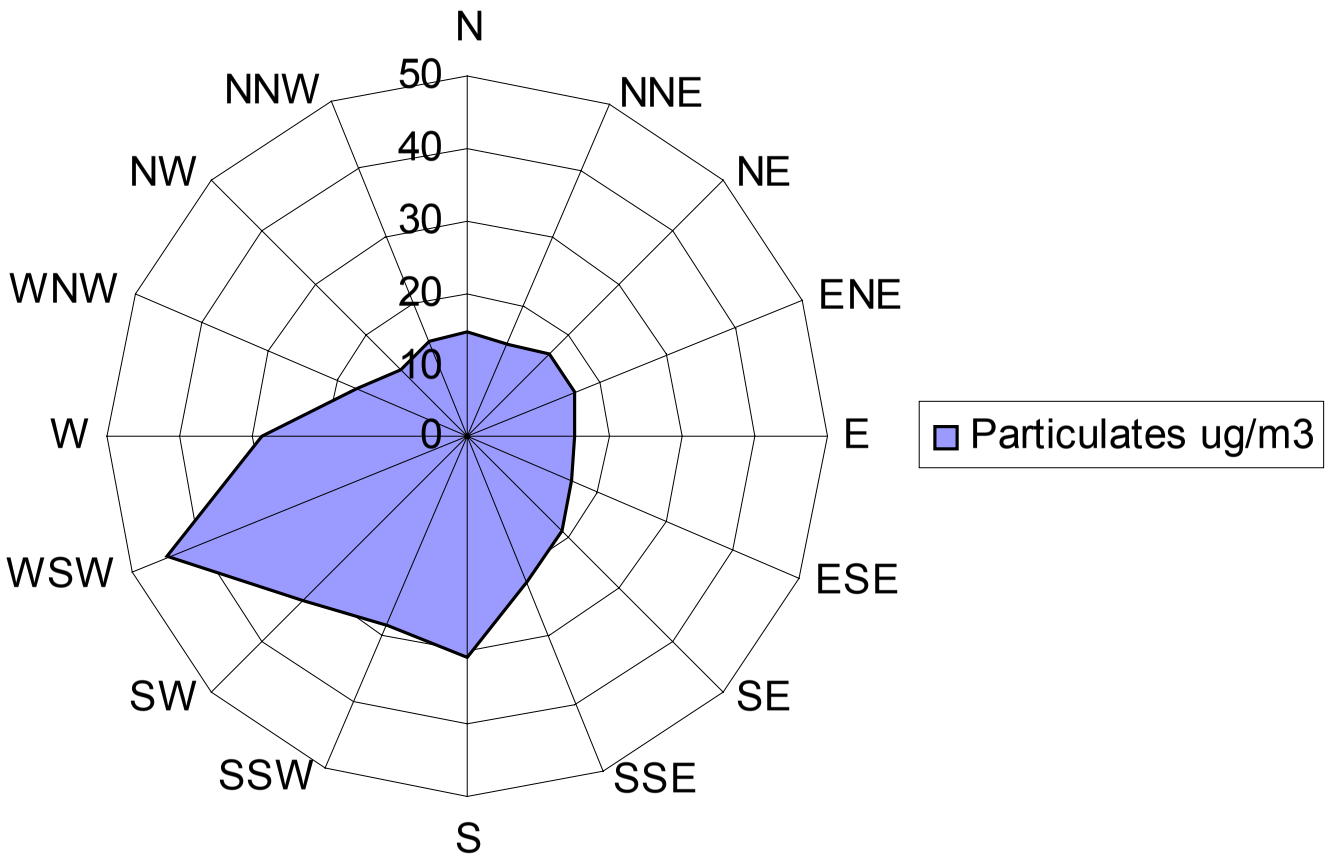


Figure 49 CO results – 2002 - 8hour running averages

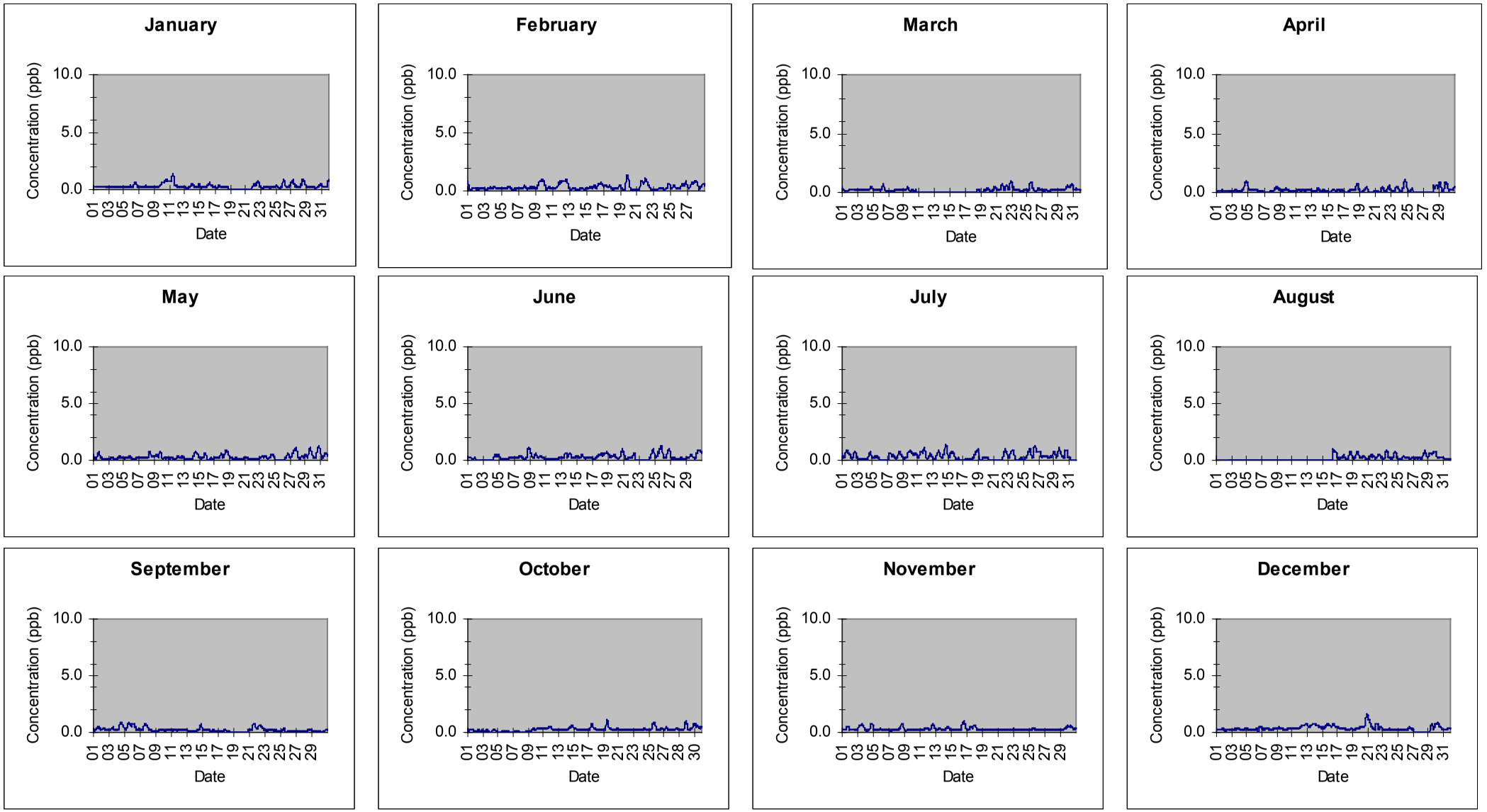
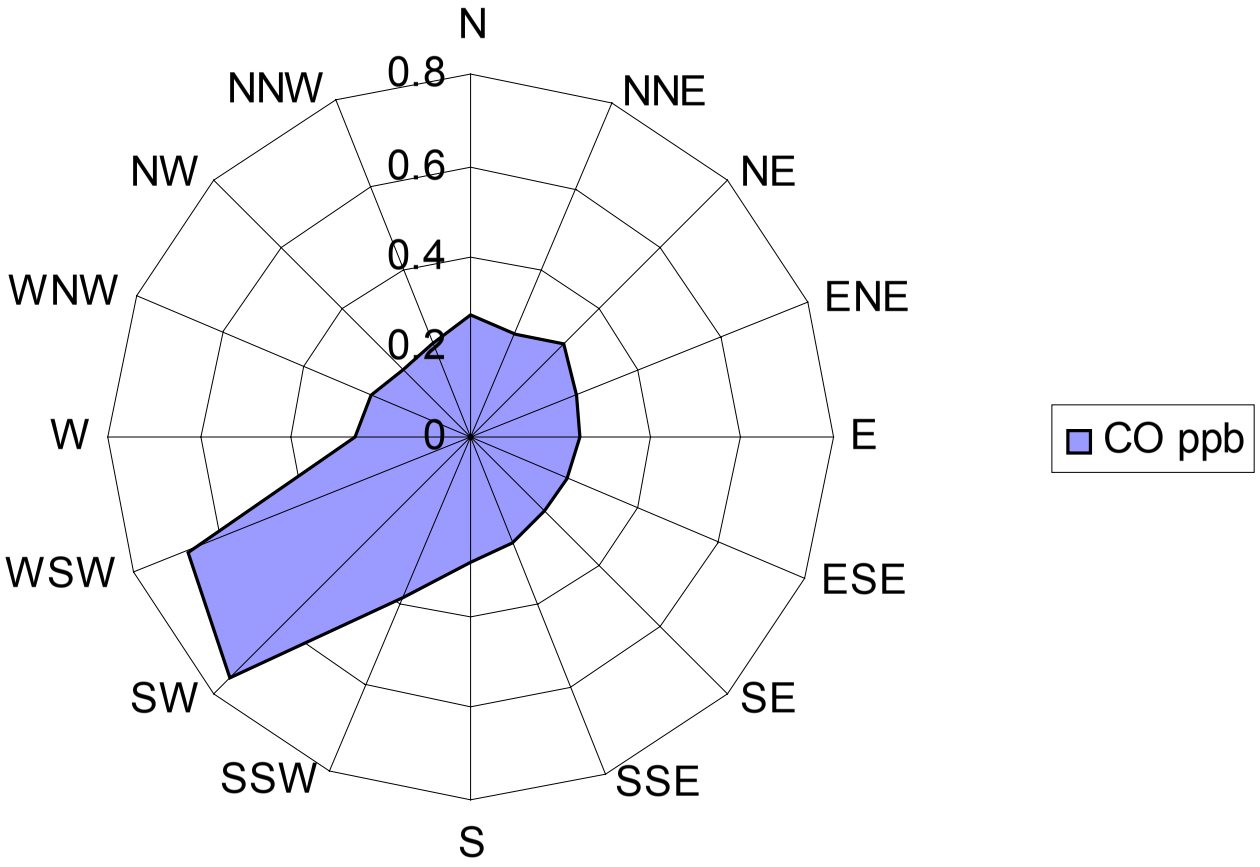


Figure 50 CO levels by wind direction in 2002



Organics –Ozone Precursor System
Baglan, Port Talbot

Introduction

This 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 53.

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, but it is hoped that they may in future be incorporated.

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 $\mu g/m^3$, 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 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 $\mu g/m^3$ measured as an annual running average.

Results and analysis

The results for 2002 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 - 2002

VOC Species	Average (ppb)		Max (ppb)	
	Baglan	Cardiff	Baglan	Cardiff
1,3-butadiene	0.02	0.2	0.30	1.99
1-butene	0.04	ND	11.37	ND
3-methyl pentane	0.11	ND	4.61	ND
Benzene	0.20	0.22	13.44	3.16
Ethane	2.22	ND	83.73	ND
Ethene	2.55	ND	196.13	ND
Ethyl benzene	0.08	0.09	5.23	1.07
Ethyne	0.50	ND	14.24	ND
Propane	1.26	ND	53.16	ND
Propene	1.45	ND	66.46	ND
Toluene	0.26	0.86	57.31	11.37
cis 2-butene	0.03	ND	0.39	ND
cis 2-pentene	0.03	ND	0.31	ND
iso-pentane	0.26	ND	7.21	ND
Isobutane	0.27	ND	13.60	ND
m-xylene	0.14	0.34	16.64	4.75
o-xylene	0.59	0.15	46.23	1.94
n-butane	0.04	ND	19.64	ND
n-heptane	0.10	ND	4.26	ND
n-hexane	0.02	ND	0.29	ND
n-pentane	0.07	ND	5.42	ND
trans 2-butene	0.06	ND	3.18	ND
trans 2-pentene	0.03	ND	0.51	ND

The information is represented graphically in Figures 51 (averages) and 52 (maxima).

The average annual concentration of benzene at 0.20ppb is only 4% of the National Air Quality objective level and marginally less than that measured in Cardiff during the same period. The 1,3-butadiene concentrations were lower, both in absolute and comparative terms. The relatively low levels with comparison to Cardiff probably reflect the difference between the urban city environment and that found at Baglan. The average 1,3-butadiene concentration was only 2% of the National Air Quality objective level and was close to the limit of detection for the instrument.

Average ethene levels at Baglan (2.55 ppb) were substantially less that those measured during 2001. This is due to the shutdown of the ethanol plant at B.P. Baglan Bay in late February 2002. The 2003 levels should therefore be

even lower. In previous years propene has also been higher at Baglan, but no measurements were made in Cardiff during 2001. The level of propene in 2002 was 1.45ppb, slightly less than the 2001 figure of 1.87ppb, but greater than the corresponding value fro 2000 (1.69ppb). The process at B.P. Baglan is regulated by the Environment Agency, which has been informed of the results in previous years.

Figure 51 VOC Average concentrations – 2002

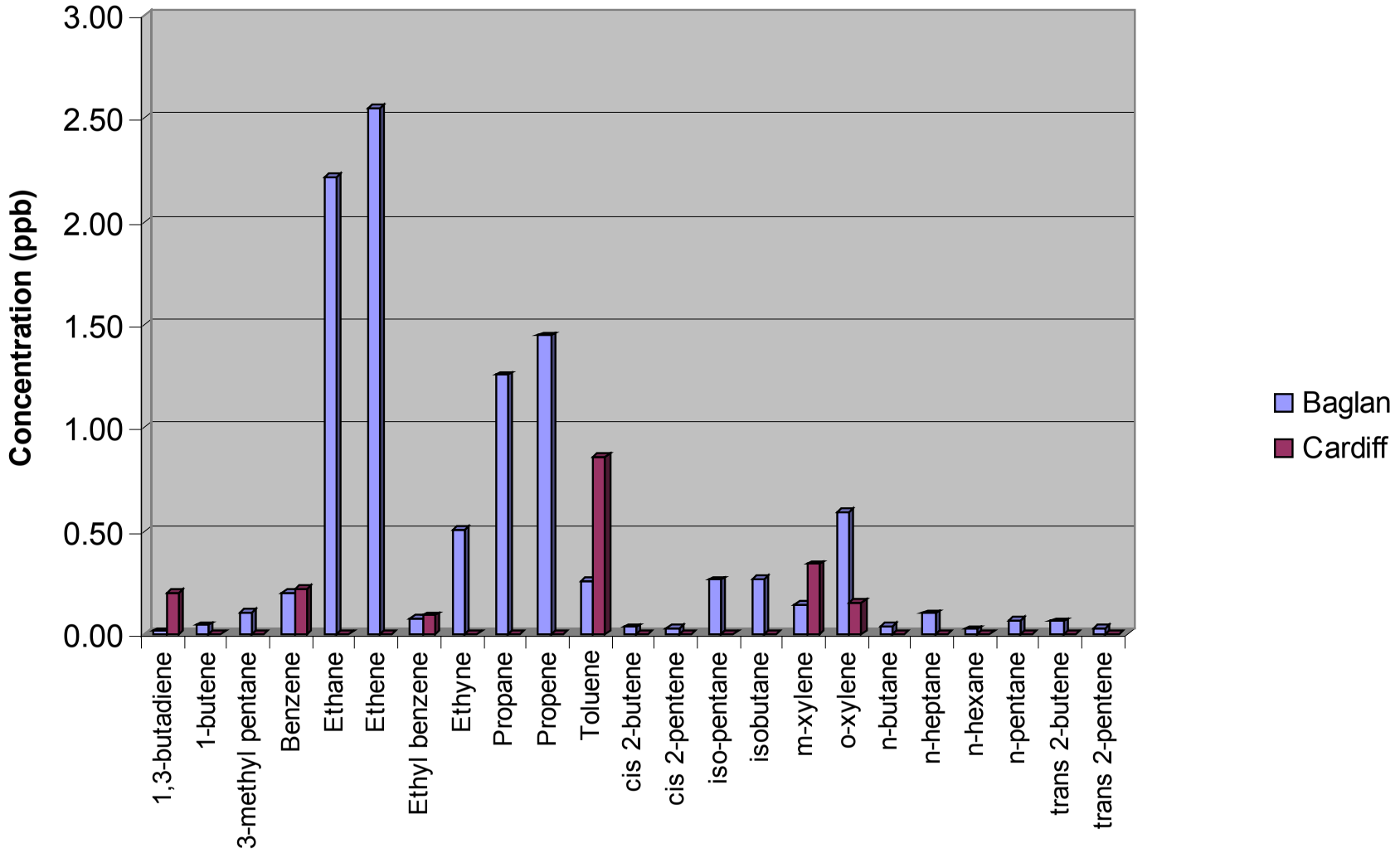


Figure 52 VOC maximum concentrations – 2002

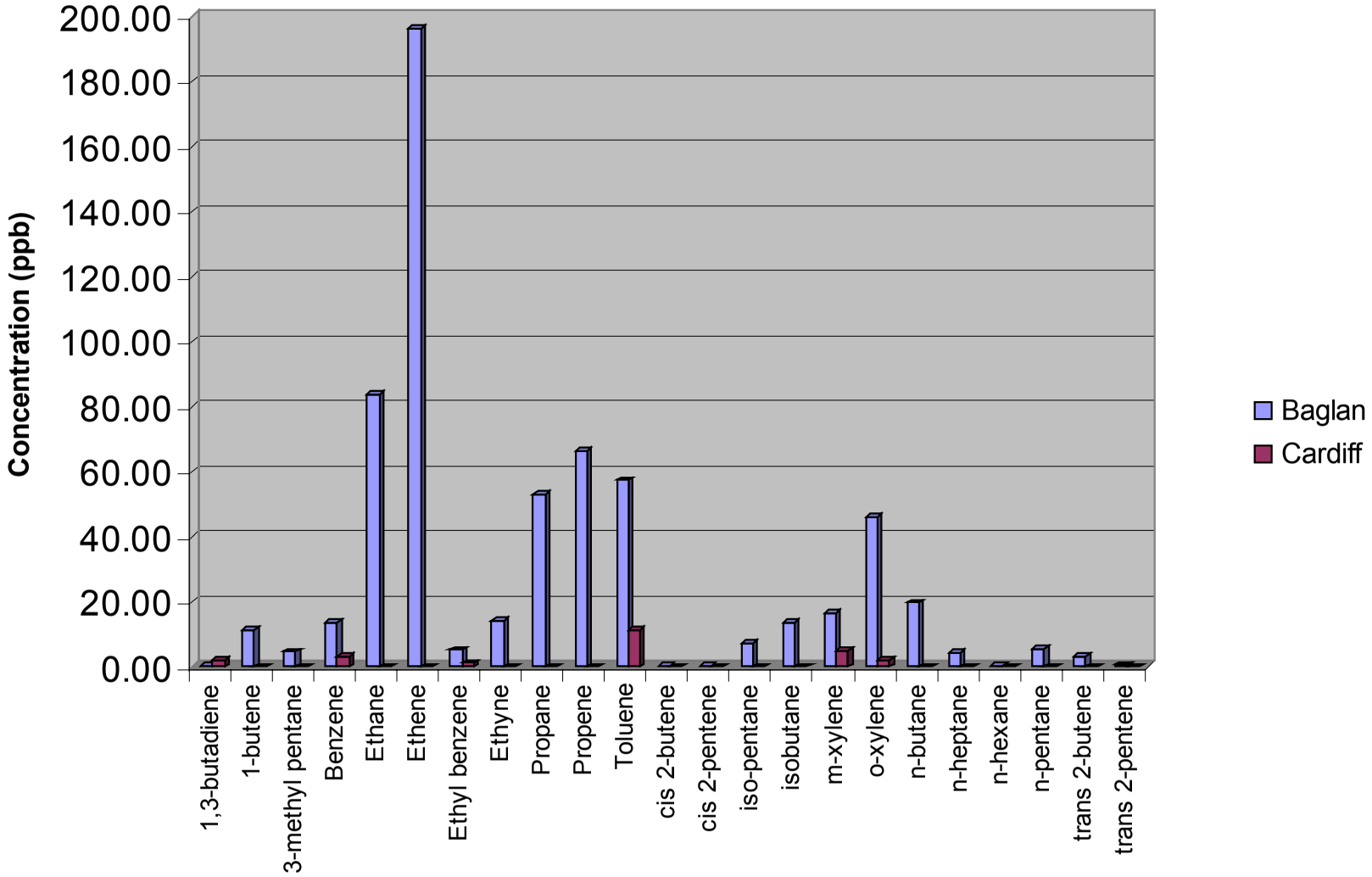
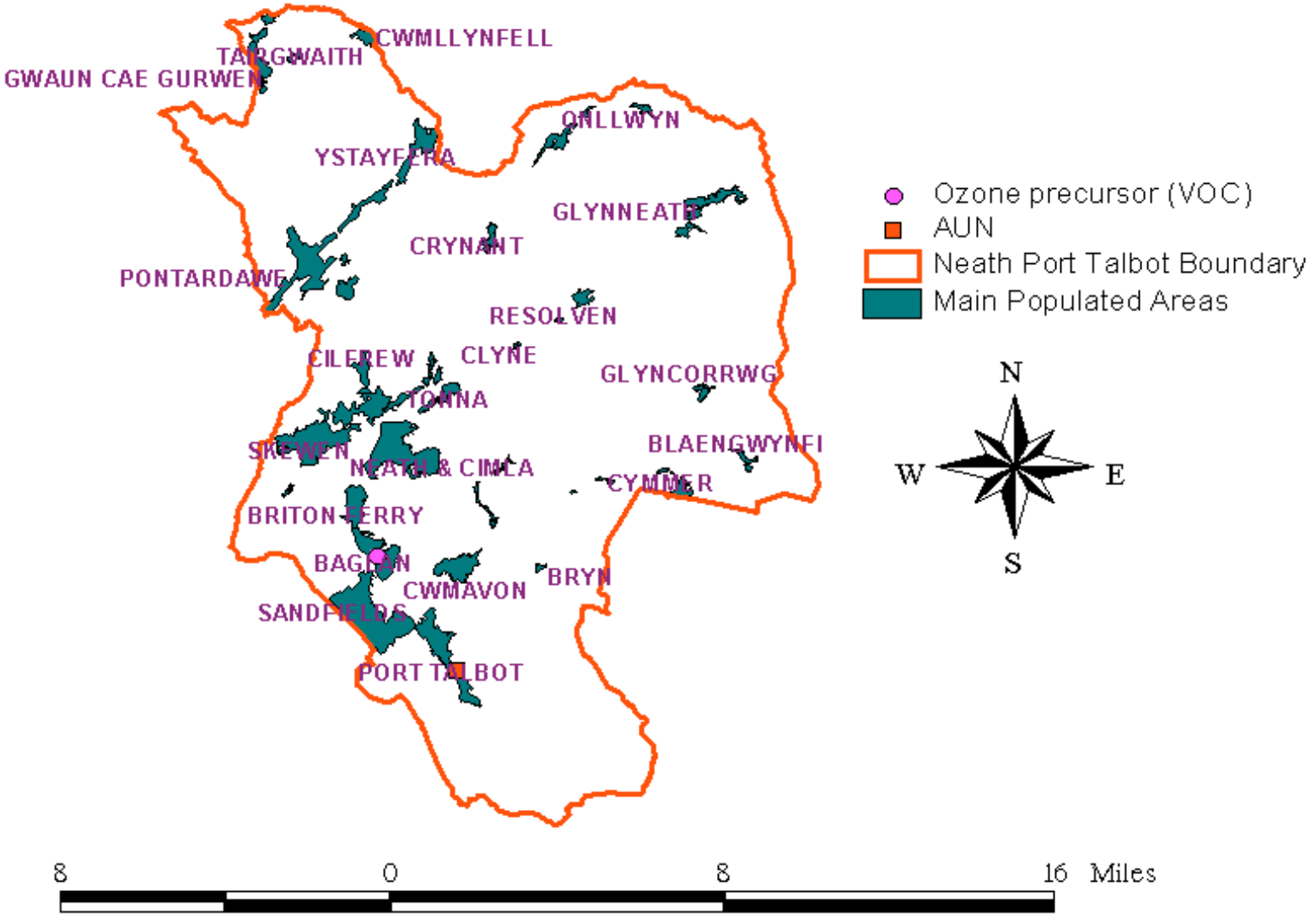


Figure 53 Continuous analyser locations



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 µg/m^3 (100 ppb) Not to be exceeded more than 35 times per year	15 Minute Mean	31 December 2005
	350 µg/m^3 (132 ppb) Not to be exceeded more than 24 times per year	1 Hour Mean	31 December 2004
	125 µg/m^3 (47 ppb) Not to be exceeded more than 3 times per year	24 Hour Mean	31 December 2004
	(V) 20 µg/m^3 (8 ppb)	Annual Mean	31 December 2000
	(V) 20 µg/m^3 (8 ppb)	Winter Mean (01 October - 31 March)	31 December 2000

Notes:
µg/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.

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