Neath Port Talbot County Borough Council

Air quality report – 2005

EIGHTH ANNUAL REPORT (2005)

The purpose of this report is to present the results of all pollution monitoring data collected during the calendar year 2005. 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:

- 2005 was a better year with regard to ozone pollution with less exceedences than in 2004.
- The Air Quality Objective for PM_{10} was not breached in 2005. But a significant amount of data was lost due to equipment failure, which might have affected the figures. It is too early to consider undeclaration of the Air Quality Management area for this reason.
- Once again there were no exceedences of the relevant Air Quality Objective levels for nitrogen dioxide, carbon monoxide or sulphur dioxide.

Deposit gauges showed that:

- The four sites with highest fallout rates continued to be those located in Port Talbot around the steel works. Fallout levels at Prince Street worsened considerably during 2005, more than doubling 2004 levels and restoring this site to it’s number one ranking position. Eglwys Nunydd site improved a little in 2005, but Ffrwdwyllt House saw the third consecutive year of increasing fallout levels.
- 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 annual average at Glynneath was the lowest ever recorded at any of the sites in the survey since monitoring commenced in 1993.

The nitrogen dioxide diffusion tube survey showed that:

- Monitoring at one lamp post near the junction at Eastland Road/Victoria Gardens was 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 twice the EC target value. This will necessitate action by central government if the Target Value of 20 ng/m^3 is likely to be exceeded by the Target Date of 31 December 2012. Additional monitoring was commenced during 2006 in order to investigate the source of the pollution.

Concentrations of volatile organic compounds (VOC's) at Baglan have decreased largely to background levels since the progressive shut down of the Baglan Bay plant. Consequently, the monitoring was discontinued in 2006.

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 2005, 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 $mg/m^2/day$ 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 24 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 2005 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.

Results by site

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

The "nuisance limit" was not exceeded in 2005 and no samples reached within 10% of 200 mg/m^2/day. The maximum fallout rate was 70 mg/m^2/day and the average 42 mg/m^2/day, the corresponding values for 2004 were 68 and 35 mg/m^2/day respectively. There was a 20% increase in fallout rates compared to the previous year, which was mainly due to more sand fallout.

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

The "nuisance limit" was not exceeded in 2005 and no samples reached within 10% of 200 mg/m^2/day. The maximum fallout rate was 43 mg/m^2/day and the average 18 mg/m^2/day, the corresponding values for 2004 were 68 and 30 mg/m2/day respectively. There was 40% decrease in fallout rates compared to the previous year, which was mainly due to less coal, dirt and iron rich fallout.

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

The "nuisance limit" (200 mg/m^2/day) was exceeded on 126 days in 2005 and a further 28 days were within 10% of the exceedence level. There were 28 exceedences during the previous year. The maximum fallout rate was 371 mg/m^2/day and the average 175 mg/m^2/day, the corresponding values for 2004 were 210 and 86 mg/m^2/day respectively. The average fallout level was 103% higher than the previous year, which was mainly due to increases in coal, dust and iron fallout.

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

The "nuisance limit" was exceeded on 15 days during 2005, whilst there were none during 2004. No samples reached within 10% of 200 mg/m^2/day. The maximum fallout rate was 323 mg/m^2/day and the average 99 mg/m^2/day, and the corresponding values for 2004 were 143 and 89 mg/m^2/day respectively. There was a 11% increase in fallout rates compared to the previous year, which was mainly due to an increase in dirt and coal fallout, although there was a decrease in plant/animal fragments.

Eglwys Nunydd Reservoir, Port Talbot (Figs. 9 & 10)
The "nuisance limit" was not exceeded during 2005, but there were 28 days within 10% of the exceedence level. This compares to a total of 28 days of exceedence during 2004. The maximum fallout rate was 187 mg/m^2/day and the average 67 mg/m^2/day, and the corresponding values for 2004 were 443 and 77 mg/m^2/day respectively. There was a 13% decrease in fallout rates compared to the previous year, the results for which were unusually high due one very high monthly sample.

Gwaun Cae Gurwen (Figs. 11 & 12)
The "nuisance limit" was not exceeded during 2005 and no samples reached within 10% of 200 mg/m^2/day. The maximum fallout rate was 40 mg/m^2/day and the average 14 mg/m^2/day, and the corresponding values for 2004 were 137 and 33 mg/m^2/day respectively. The average fallout level was 58% lower than the previous year, which was mainly due to decreases in coal and dirt.

Tairgwaith (Figs. 13 & 14)
The "nuisance limit" was not exceeded and no samples reached within 10% of 200 mg/m^2/day. The maximum fallout rate was 45 mg/m^2/day and the average 22 mg/m^2/day, the corresponding values for 2004 were 124 and 30 mg/m^2/day respectively. There was a 27% decrease in fallout rates compared to the previous year. The decrease was primarily due to less sand and dirt fallout.

Parish Road, Cwmgwrach (Figs. 15 & 16)
The "nuisance limit" was not exceeded and no samples reached within 10% of 200 mg/m^2/day. The maximum fallout rate was 40 mg/m^2/day and the average 18 mg/m^2/day, the corresponding values for 2004 were 54 and 20 mg/m^2/day respectively. There was a 10% decrease in fallout rates compared to the previous year.

Llygad yr Haul, Glynneath (Figs. 17 & 18)
The "nuisance limit" was not exceeded and no samples reached within 10% of 200 mg/m^2/day. The average fallout rate at 11 mg/m^2/day was very low, the corresponding figure for 2004 was 19 mg/m^2/day. The 2005 annual average is the lowest ever recorded at any site since monitoring began as part this survey.

Wembley Avenue, Onllwyn (Figs. 19 & 20)
The "nuisance limit" was not exceeded and no samples reached within 10% of 200 mg/m^2/day. The maximum fallout rate was 63 mg/m^2/day and the average 26 mg/m2/day, the corresponding values for 2004 were 83 and 38 mg/m^2/day respectively. Average fallout levels in 2005 decreased by some 32%. The annual average is the lowest recorded at this site since monitoring began in 1993 and is due to decreases in coal and dirt fallout. This is likely to have been due to further 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/m^2/day. The average fallout rate at 14 mg/m2/day was very low, the corresponding figure for 2004 was 32 mg/m2/day. There was a 56% decrease in fallout rates compared to the previous year. The decrease was primarily due to less dirt, coal, sand and iron rich fallout.

Little Warren, Port Talbot (Figs. 23 & 24)
The "nuisance limit" was not exceeded and no samples reached within 10% of 200 mg/m^2/day. The maximum fallout rate was 95 mg/m^2/day and the average 52 mg/m^2/day, the corresponding values for 2004 were 75 and 46 mg/m^2/day respectively. There was an 13% increase in fallout

rates compared to the previous year. The increase was mainly due to increased dirt and plant/animal fragments fallout. But there was also a decrease in the iron rich component.

Cwmllynfell

The site at Cwmllynfell was discontinued in 2003 since all properties in the area had become unoccupied and vandalism of the equipment had become a problem. But, this site was re-established halfway through 2005 in order to monitor the effect of the extension to the East Pit opencast coal site. There were insufficient data to report for 2005, but data will be reported in 2006.

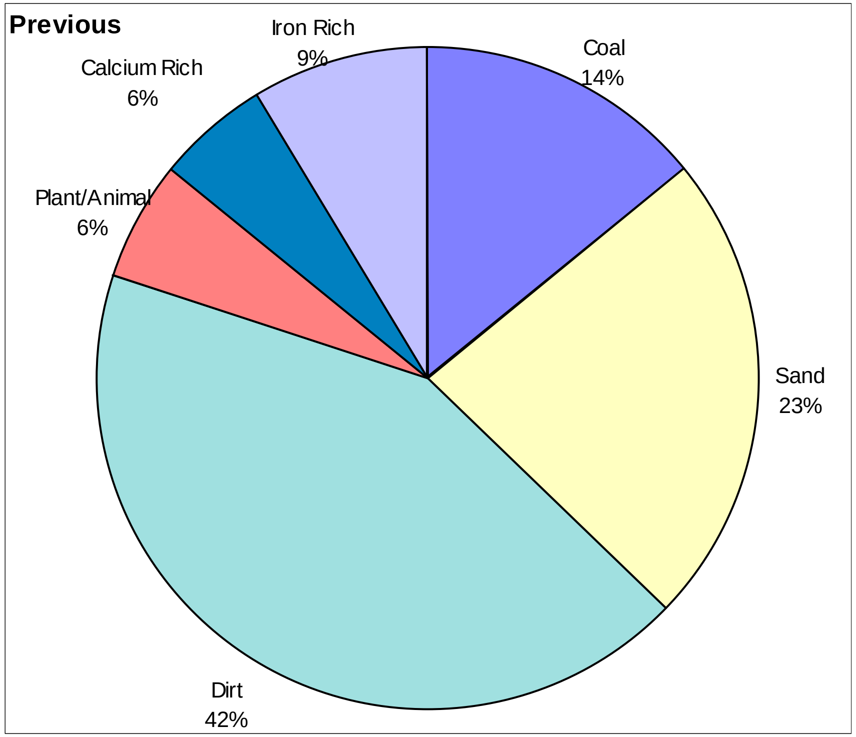
Figure 1

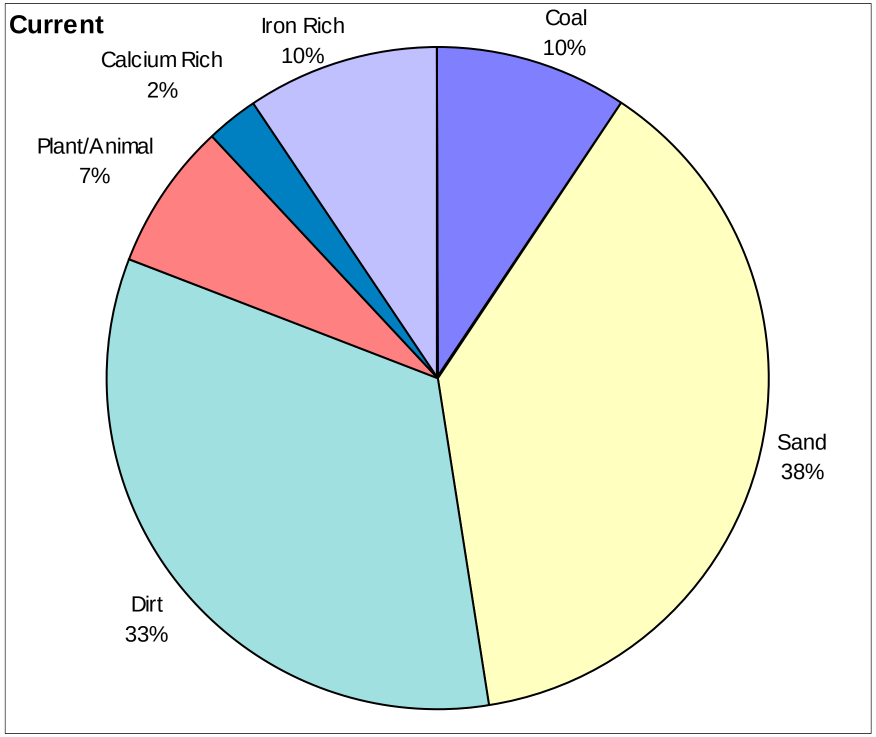
Deposit Gauge Analysis Report

Jeremy's Oil Distributors, Baldwins Crescent

Comparison of Fallout Composition

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





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	16	14	0	3	1	4	0
	Previous	5	0	8	15	0	2	2	3	0

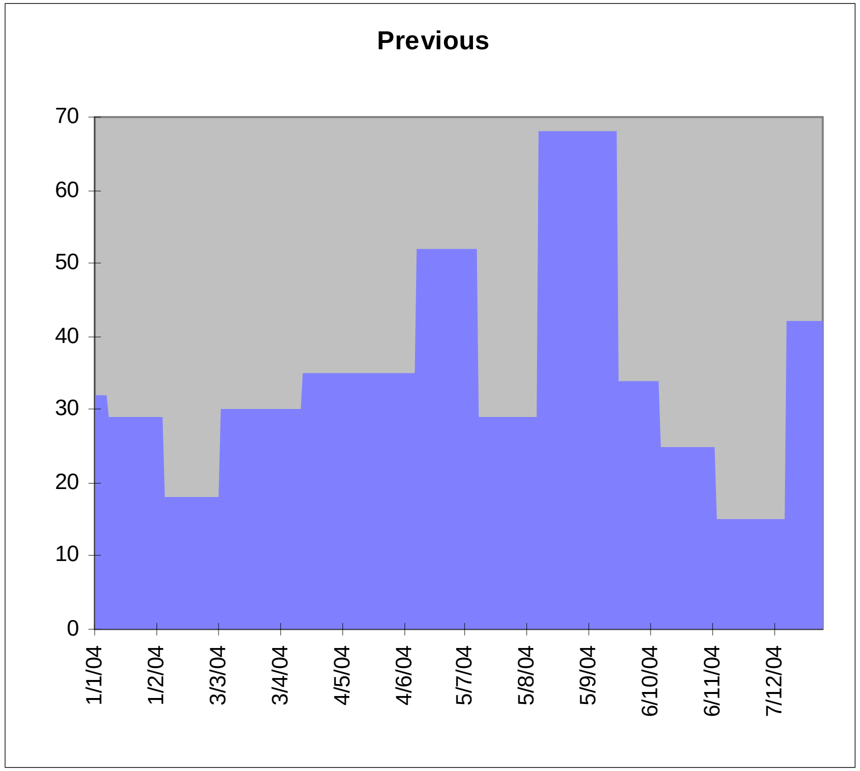
Figure 2

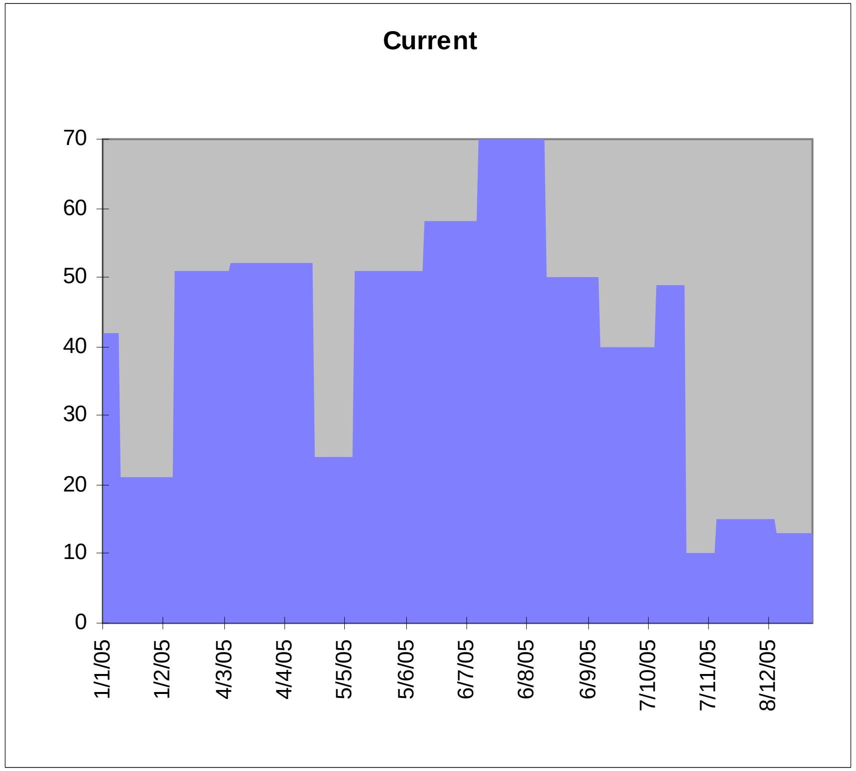
Deposit Gauge Analysis Report

Jeremy's Oil Distributors, Baldwins Crescent

Comparison of Fallout Rate with Time

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





Period	Fallout Level (mg/M2/day)		No. Samples	% Data	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum		Capture	Days within 10% of	Days Exceeding
Current	42	70	13	100.0	0	0
Previous	35	68	11	100.0	0	0
Change	7	Increase 20%				

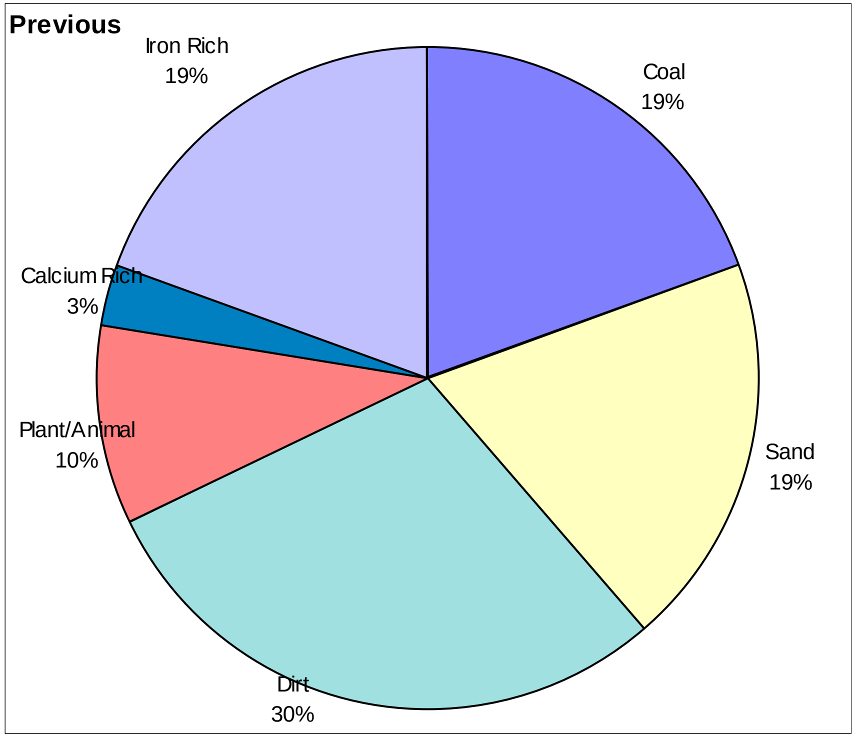
Figure 3

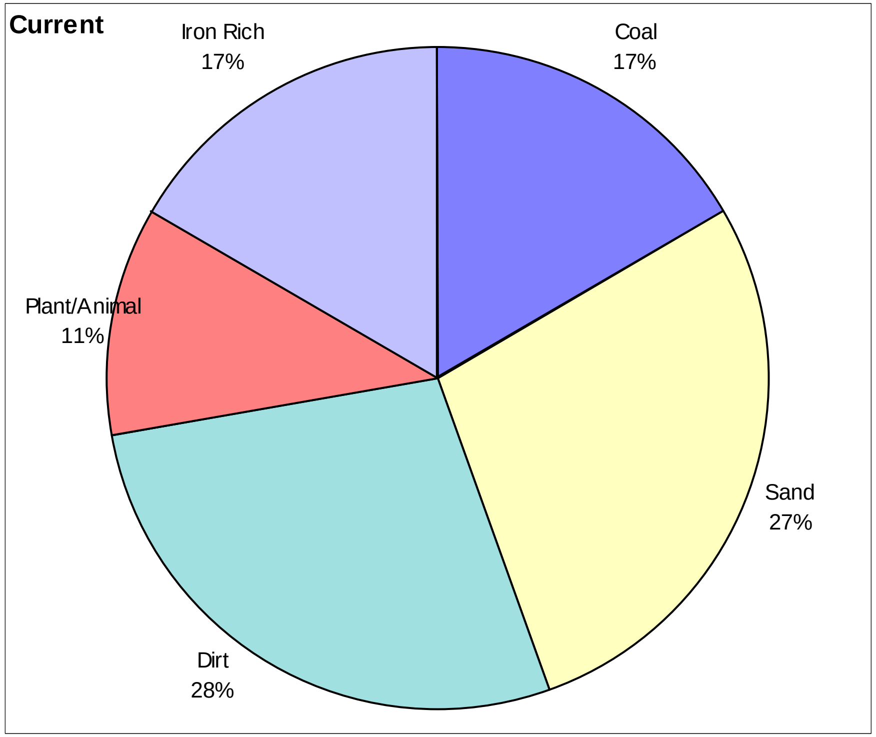
Deposit Gauge Analysis Report

Cil Carne Farm, Port Talbot

Comparison of Fallout Composition

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





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	5	5	0	2	0	3	0
	Previous	6	0	6	9	0	3	1	6	0

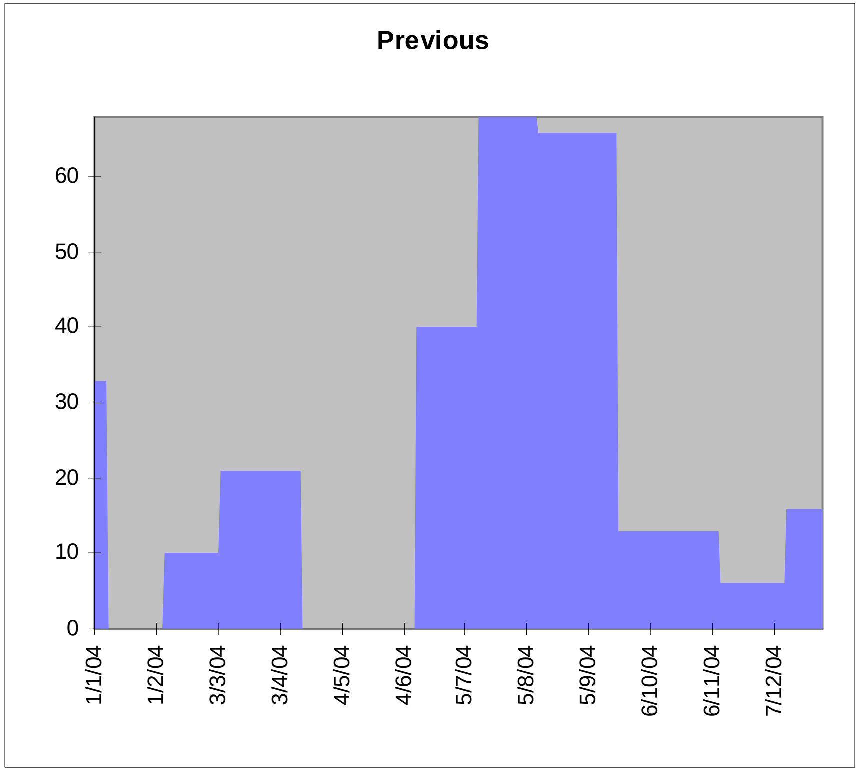
Figure 4

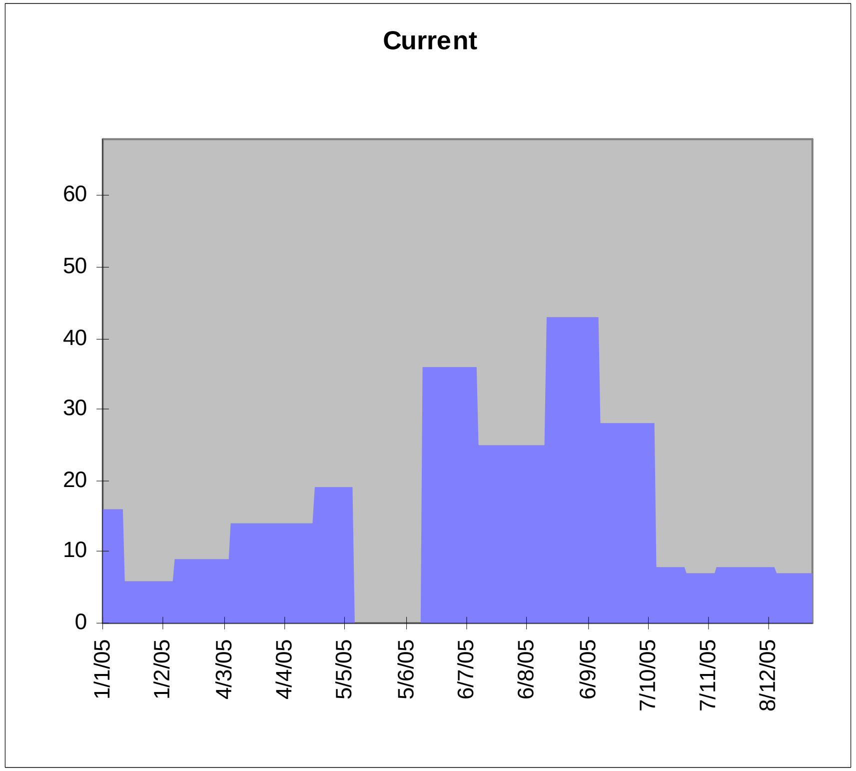
Deposit Gauge Analysis Report

Cil Carne Farm, Port Talbot

Comparison of Fallout Rate with Time

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





Period	Fallout Level (mg/M2/day)		No. Samples	% Data	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum		Capture	Days within 10% of	Days Exceeding
Current	18	43	12	90.4	0	0
Previous	30	68	9	76.3	0	0
Change	-12	Decrease -40%				

Figure 5

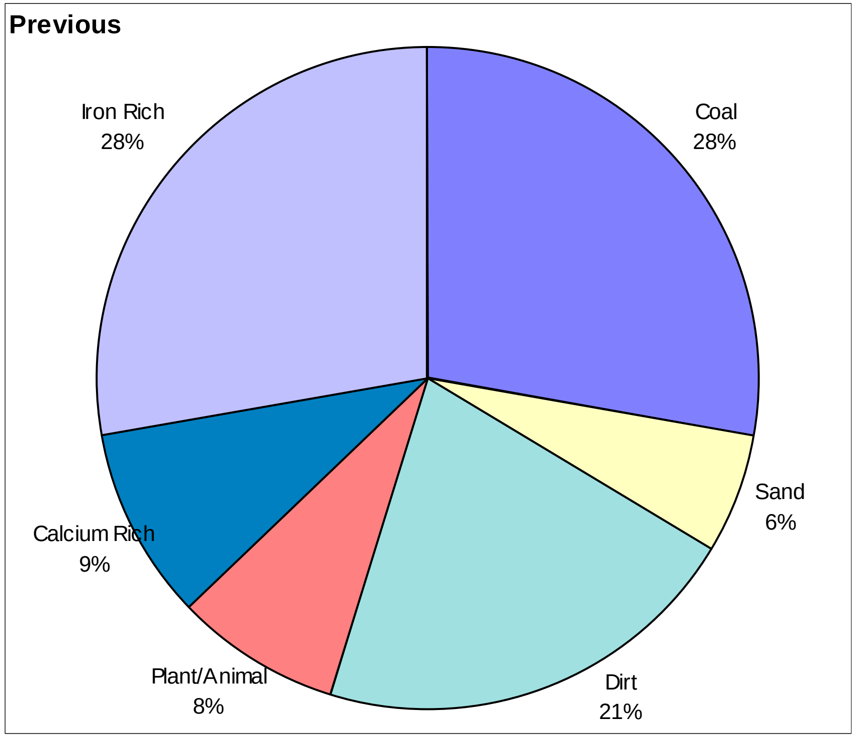
Deposit Gauge Analysis Report

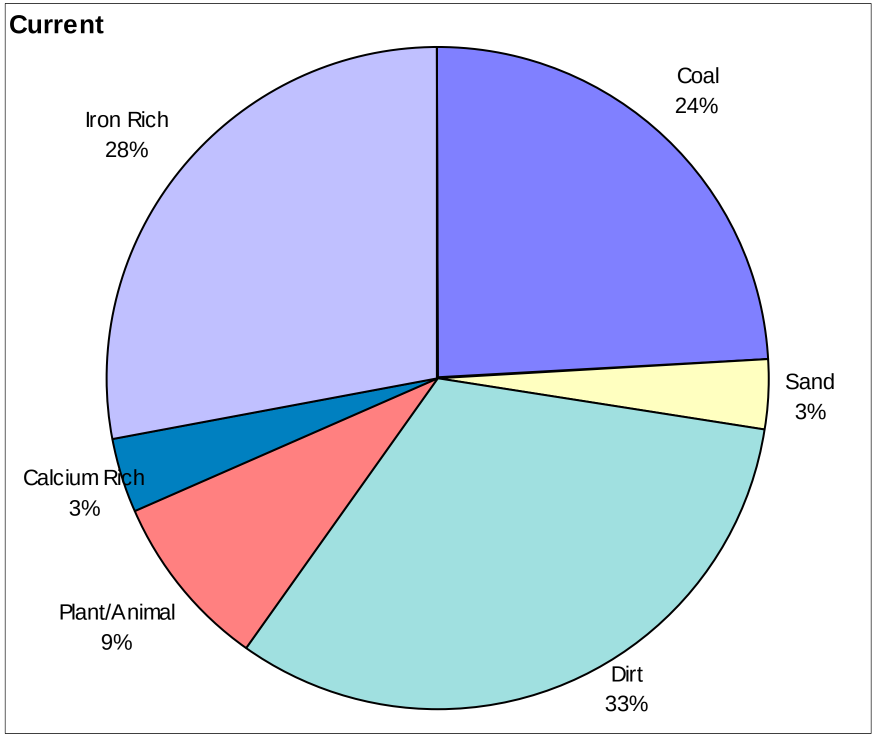
24, Prince Street, Port Talbot

Comparison of Fallout Composition

Current Period = 01-Jan-05 to 31-Dec-05

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





Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	42	0	6	56	0	15	6	49	0
	Previous	24	0	5	18	0	7	8	24	0

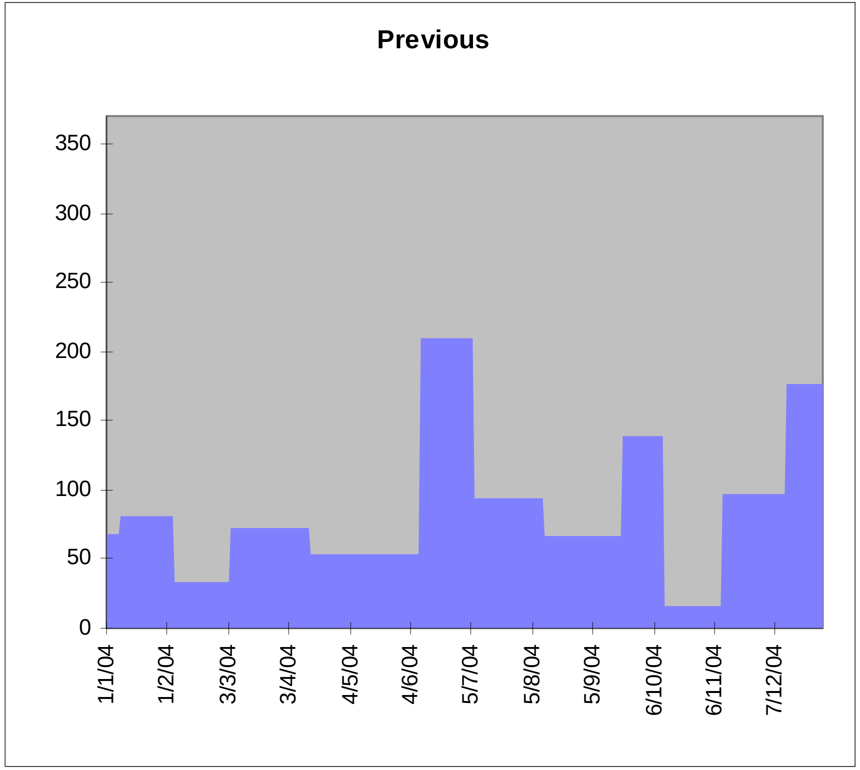
Figure 6

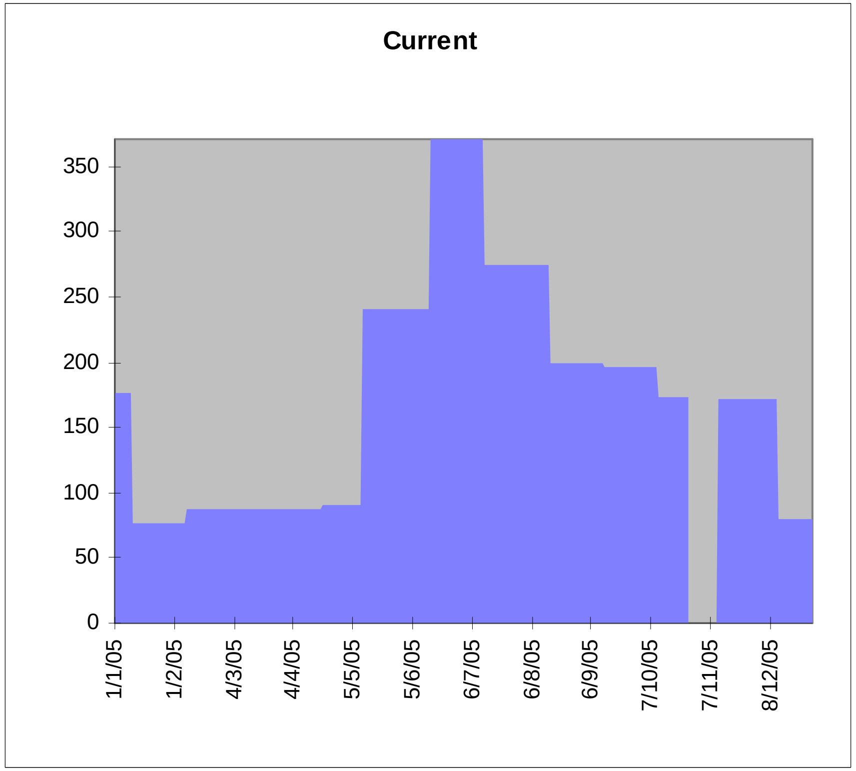
Deposit Gauge Analysis Report

24, Prince Street, Port Talbot

Comparison of Fallout Rate with Time

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





Period	Fallout Level (mg/M2/day)		No. Samples	% Data	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum		Capture	Days within 10% of	Days Exceeding
Current	175	371	12	95.9	28	126
Previous	86	210	11	100.0	0	28
Change	89	Increase 103%				

Figure 7

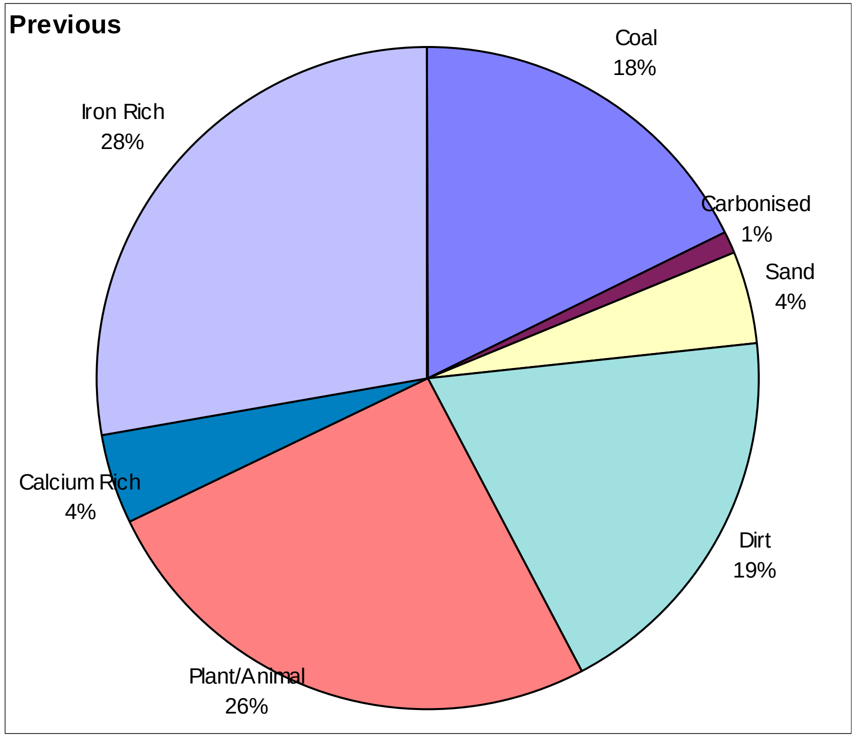
Deposit Gauge Analysis Report

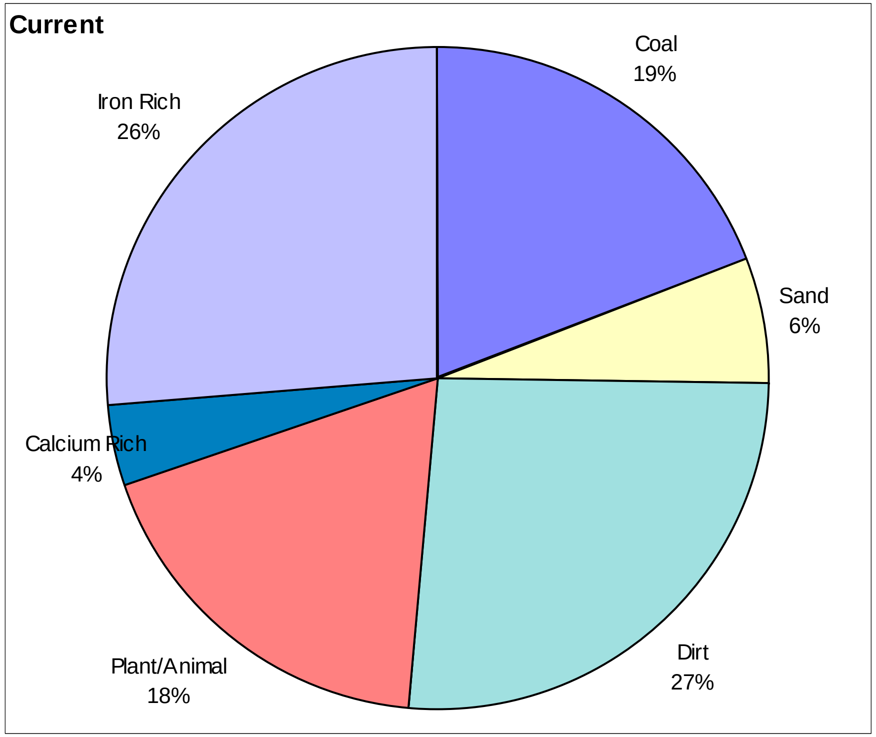
Ffrwdwyllt House, Margam Road, Port Talbot

Comparison of Fallout Composition

Current Period = 01-Jan-05 to 31-Dec-05

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





Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	19	0	6	26	0	18	4	26	0
	Previous	16	1	4	17	0	23	4	25	0

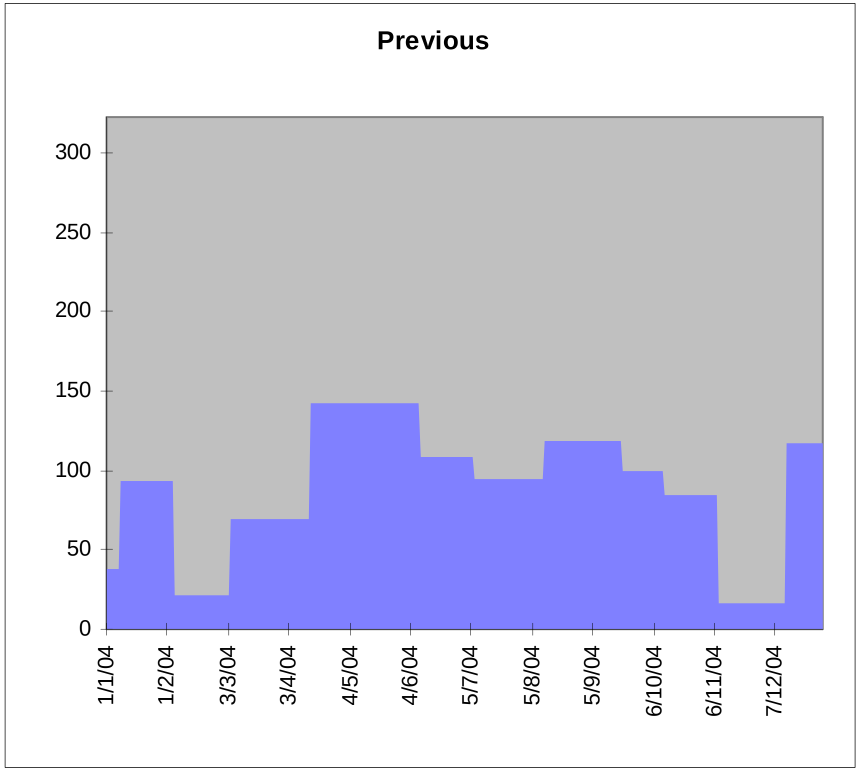
Figure 8

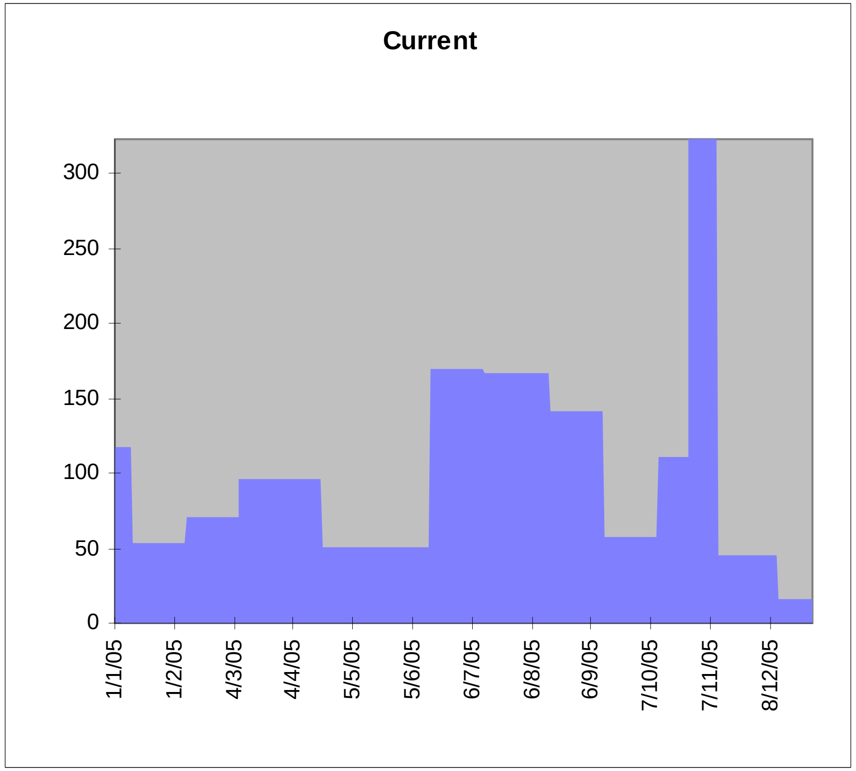
Deposit Gauge Analysis Report

Ffrwdwyllt House, Margam Road, Port Talbot

Comparison of Fallout Rate with Time

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





Period	Fallout Level (mg/M2/day)		No. Samples	% Data	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum		Capture	Days within 10% of	Days Exceeding
Current	99	323	13	100.0	0	15
Previous	89	143	11	100.0	0	0
Change	10	Increase 11%				

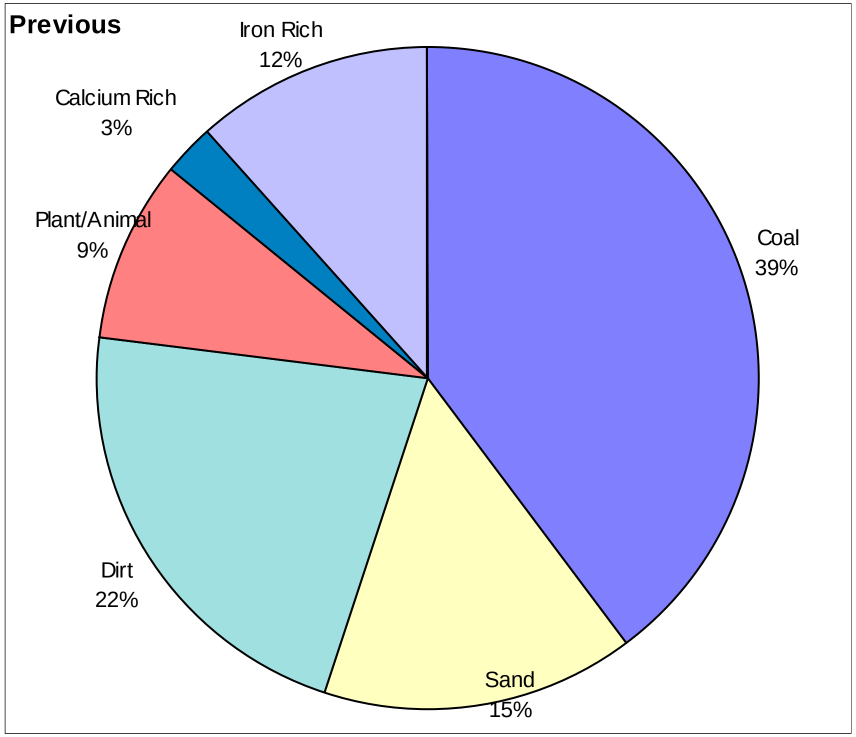
Figure 9

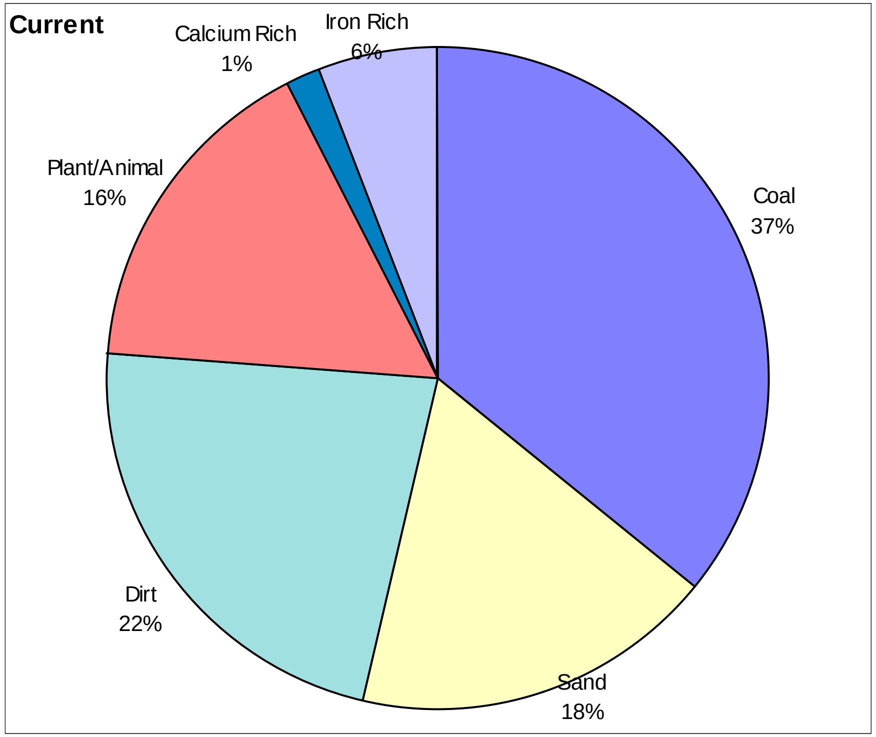
Deposit Gauge Analysis Report

Eglwys Nunydd Resevoir, Port Talbot

Comparison of Fallout Composition

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	24	0	12	15	0	11	1	4	0
	Previous	31	0	12	17	0	7	2	9	0

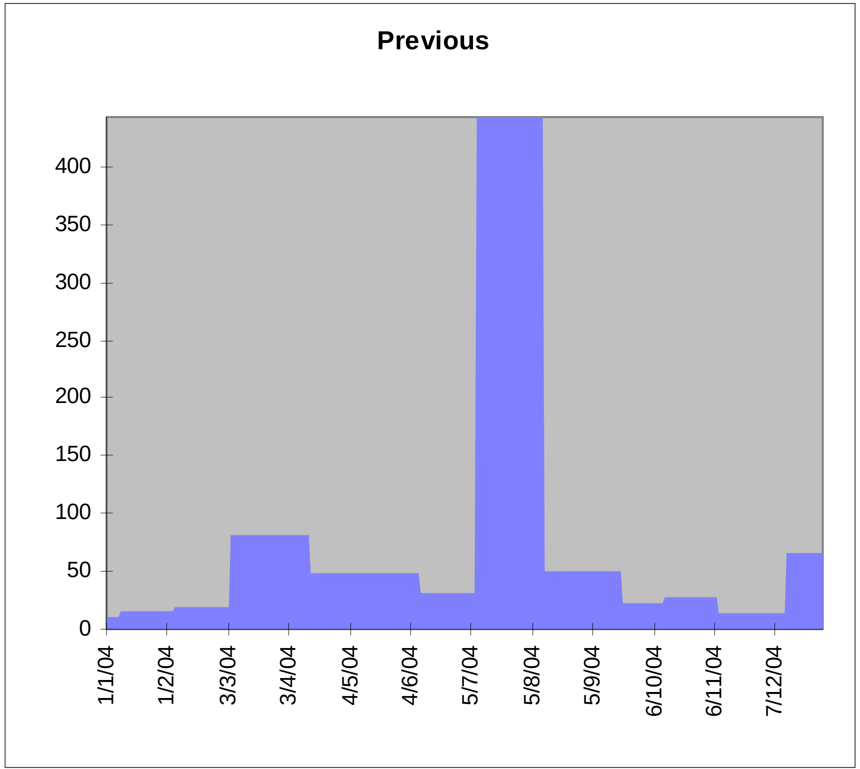
Figure 10

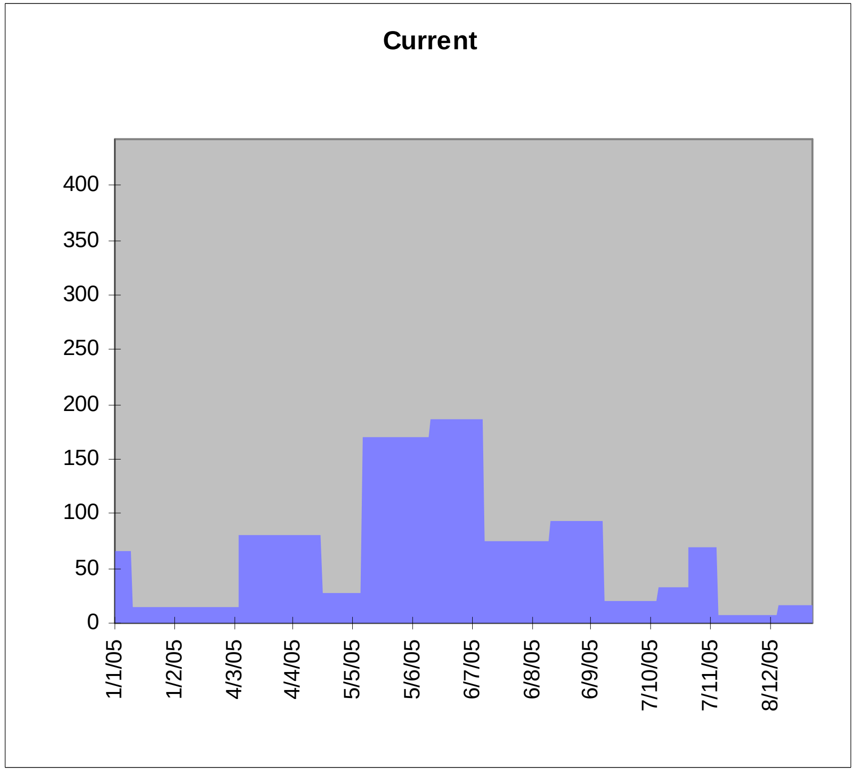
Deposit Gauge Analysis Report

Eglwys Nunydd Resevoir, Port Talbot

Comparison of Fallout Rate with Time

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





Period	Fallout Level (mg/M2/day)			No. Samples	% Data	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Capture	Days within 10% of	Days Exceeding
Current	67	187		13	100.0	28	0
Previous	77	443		11	100.0	0	34
Change	-10	Decrease	-13%				

Figure 11

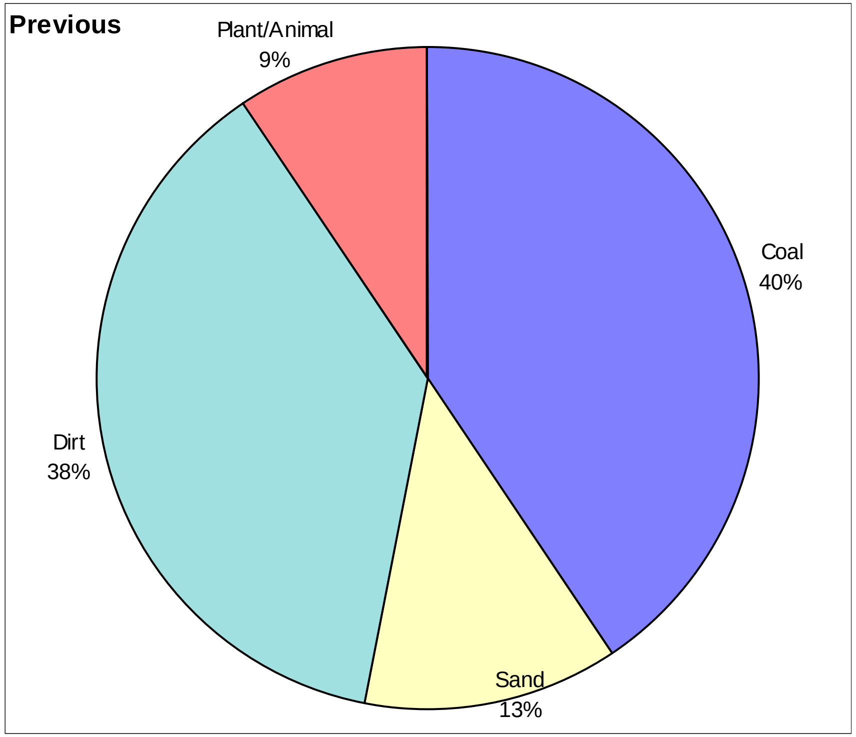
Deposit Gauge Analysis Report

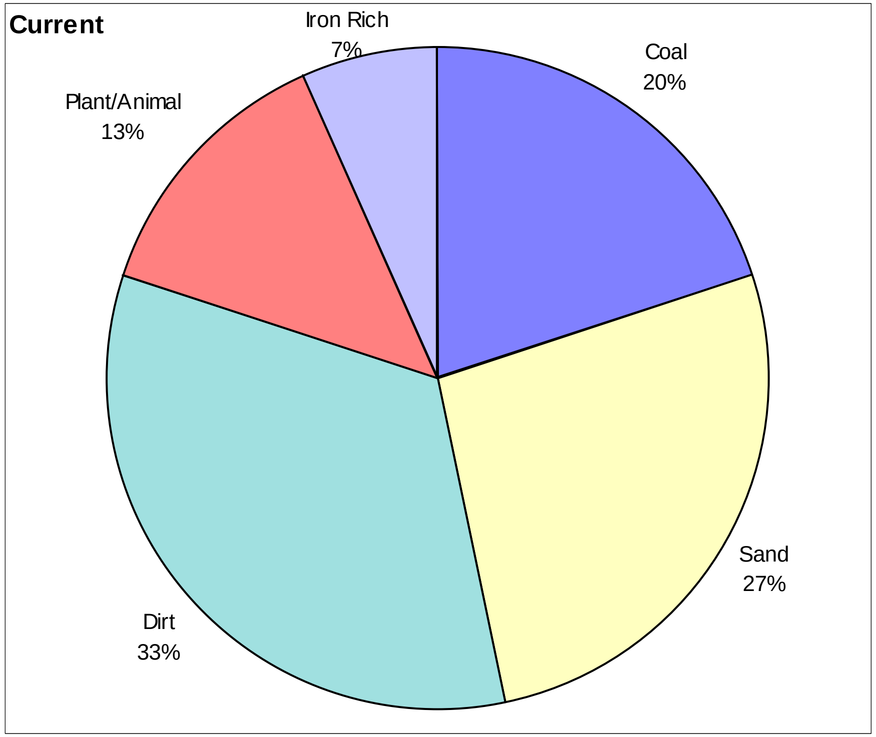
Primary School, Gwaen Cae Gurwen

Comparison of Fallout Composition

Current Period = 01-Jan-05 to 31-Dec-05

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





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	4	5	0	2	0	1	0
	Previous	13	0	4	12	0	3	0	0	0

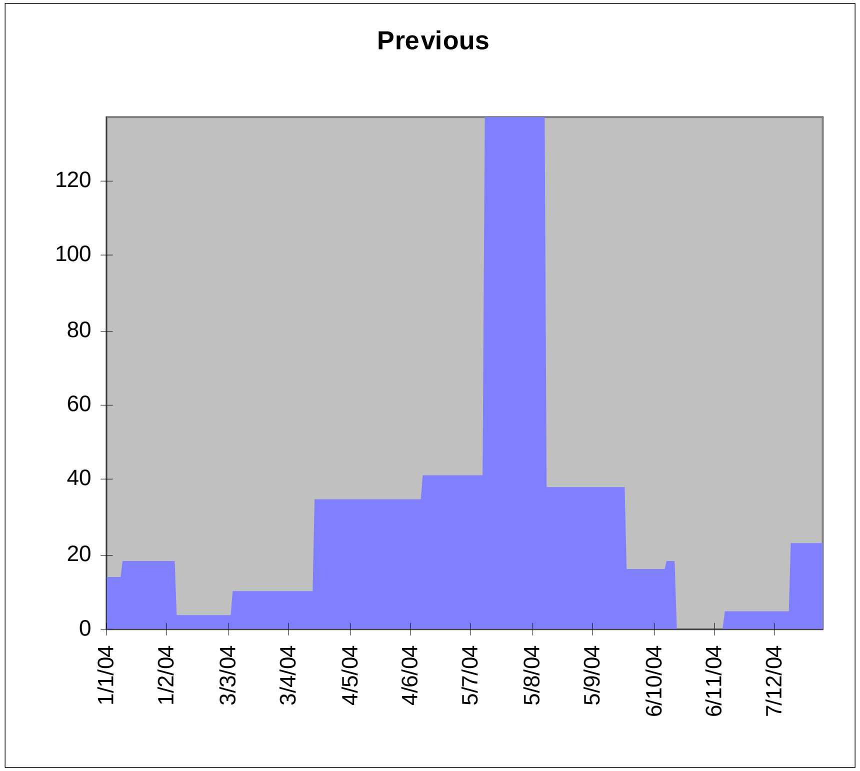
Figure 12

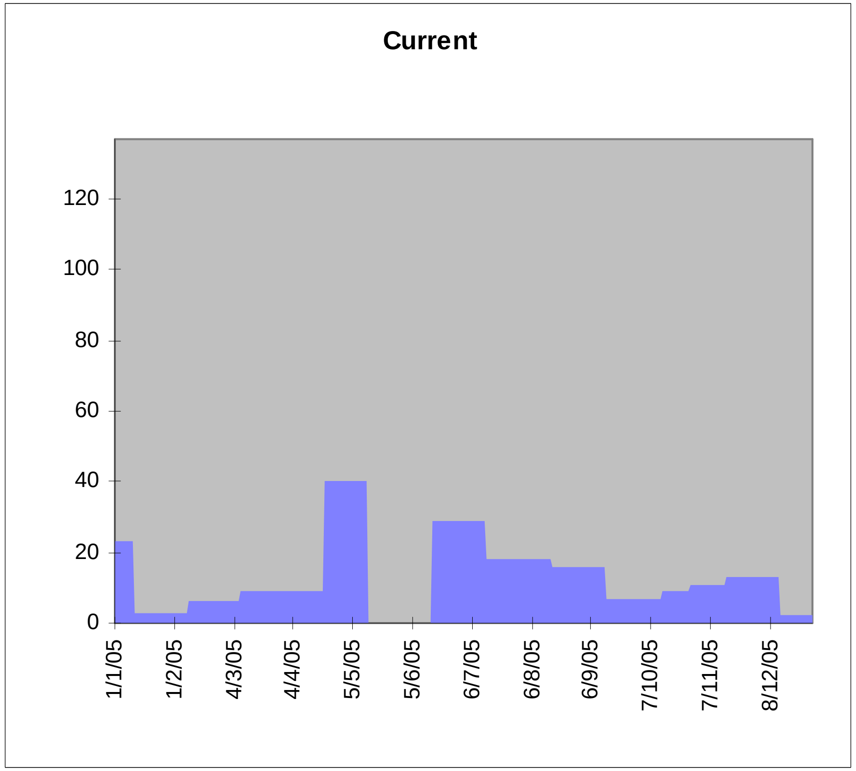
Deposit Gauge Analysis Report

Primary School, Gwaen Cae Gurwen

Comparison of Fallout Rate with Time

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





Period	Fallout Level (mg/M2/day)		No. Samples	% Data	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum		Capture	Days within 10% of	Days Exceeding
Current	14	40	12	90.9	0	0
Previous	33	137	11	93.3	0	0
Change	-19	Decrease -58%				

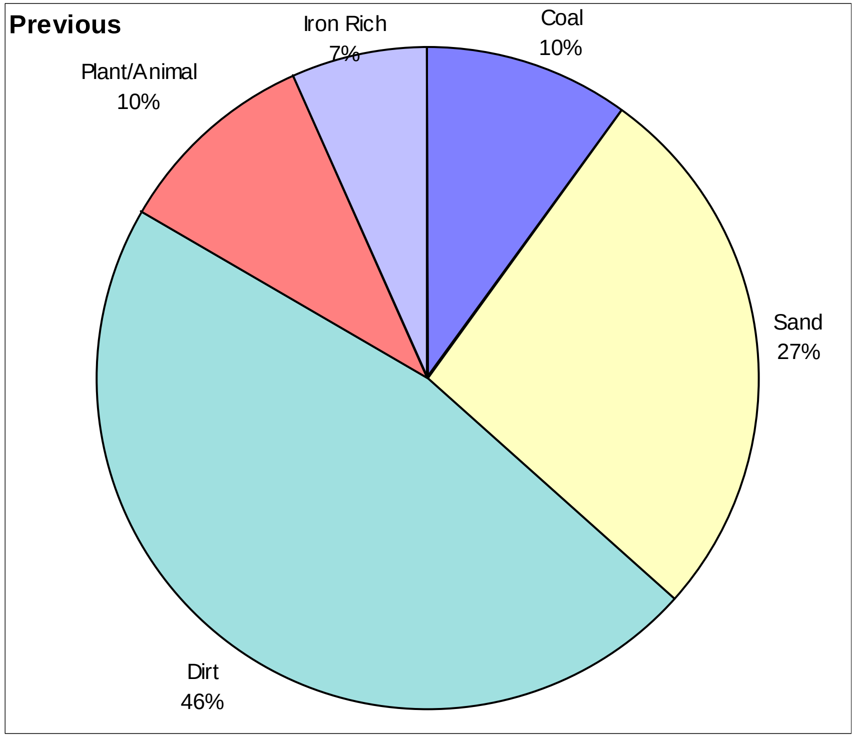
Figure 13

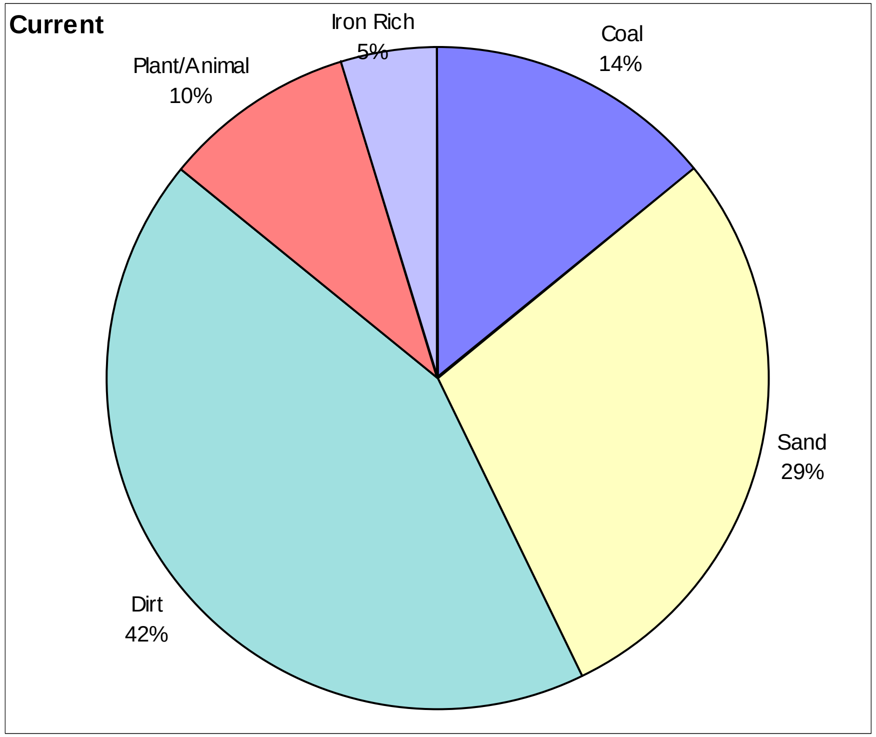
Deposit Gauge Analysis Report

Workingmens Club, Tairgwaith

Comparison of Fallout Composition

Current Period = 01-Jan-05 to 31-Dec-05
Previous Period = 01-Jan-04 to 31-Dec-04





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	6	9	0	2	0	1	0
	Previous	3	0	8	14	0	3	0	2	0

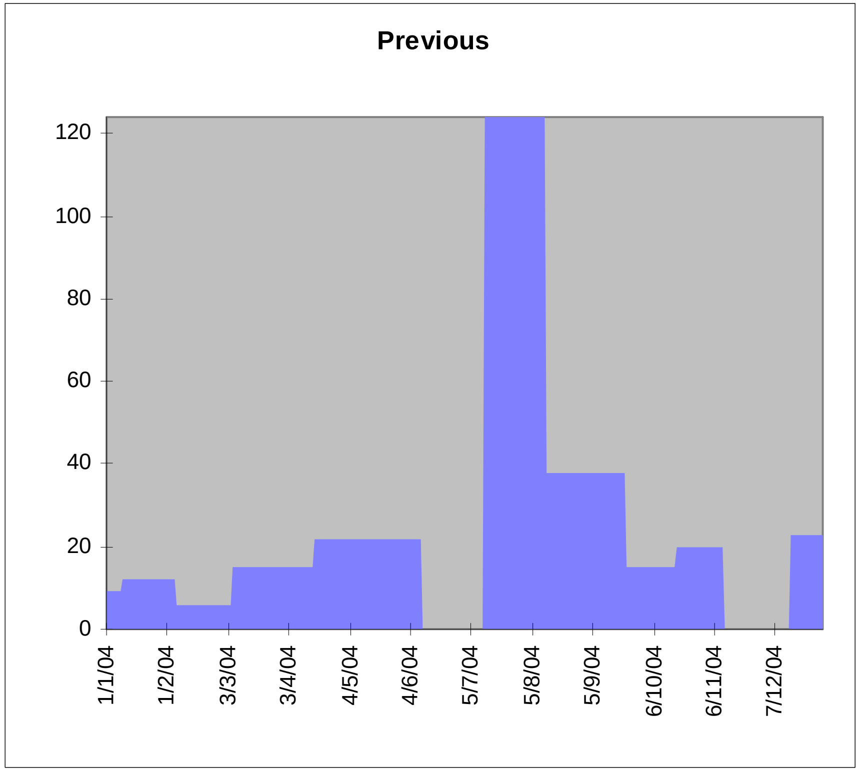
Figure 14

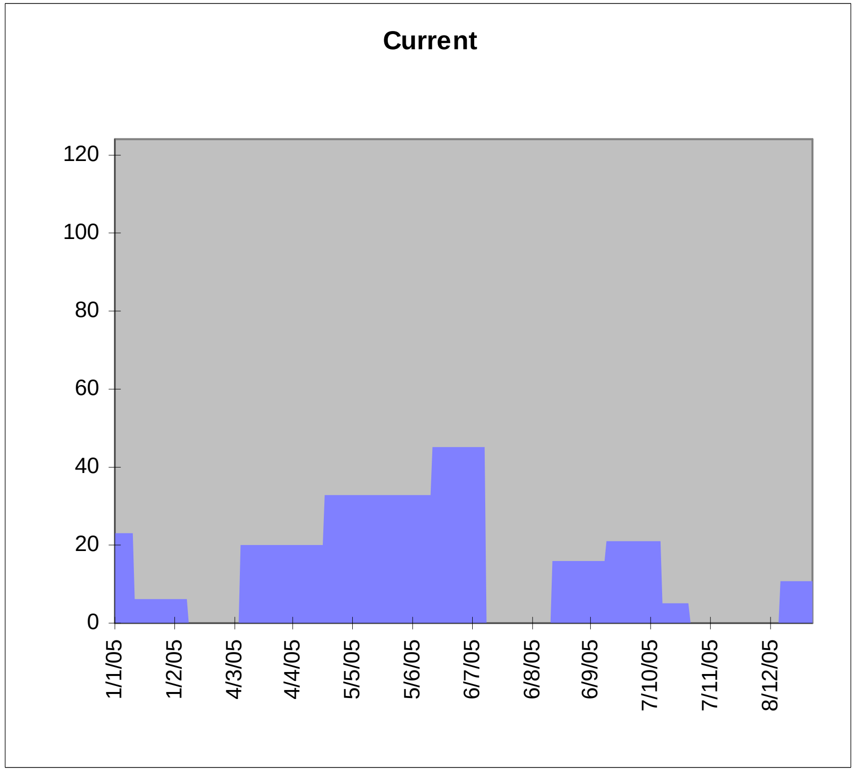
Deposit Gauge Analysis Report

Workingmens Club, Tairgwaith

Comparison of Fallout Rate with Time

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





Period	Fallout Level (mg/M2/day)			No. Samples	% Data	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Capture	Days within 10% of	Days Exceeding
Current	22	45		9	70.0	0	0
Previous	30	124		9	81.6	0	0
Change	-8	Decrease	-27%				

Figure 15

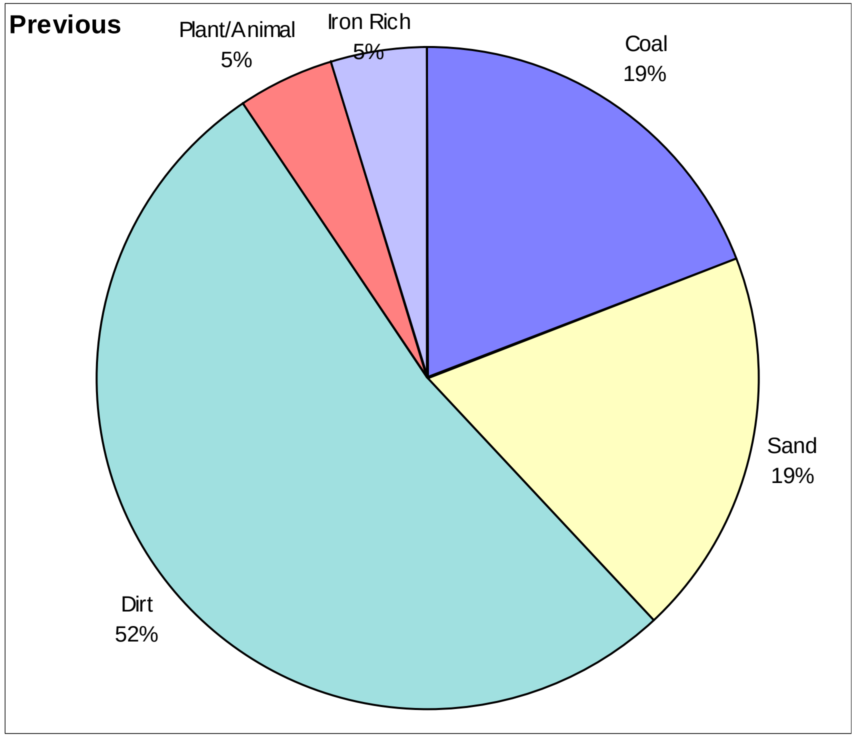
Deposit Gauge Analysis Report

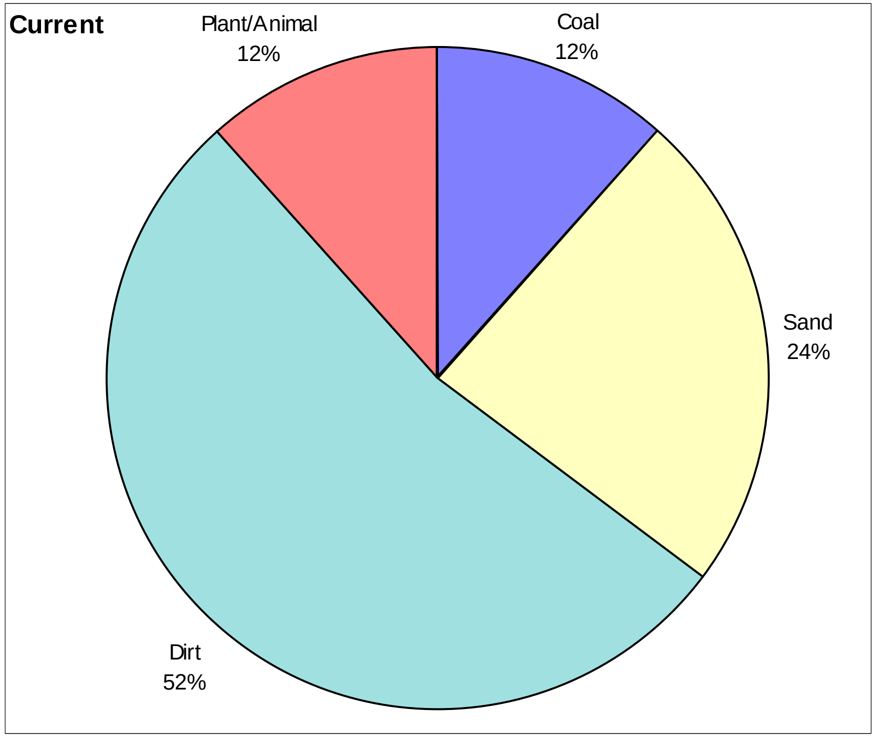
41, Parish Road, Cwmgwrach

Comparison of Fallout Composition

Current Period = 01-Jan-05 to 31-Dec-05

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





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

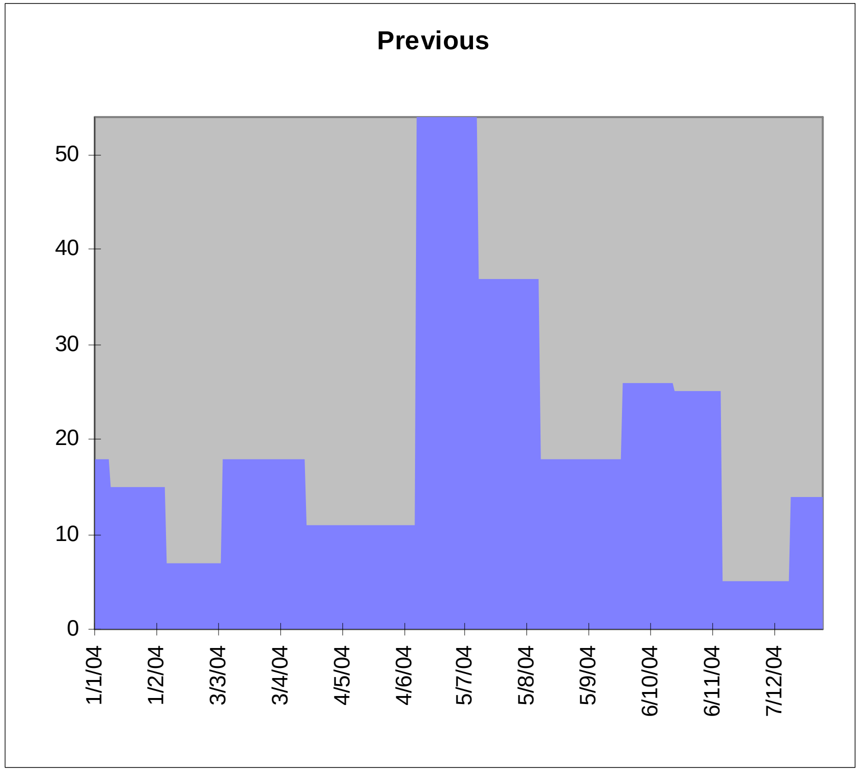
Figure 16

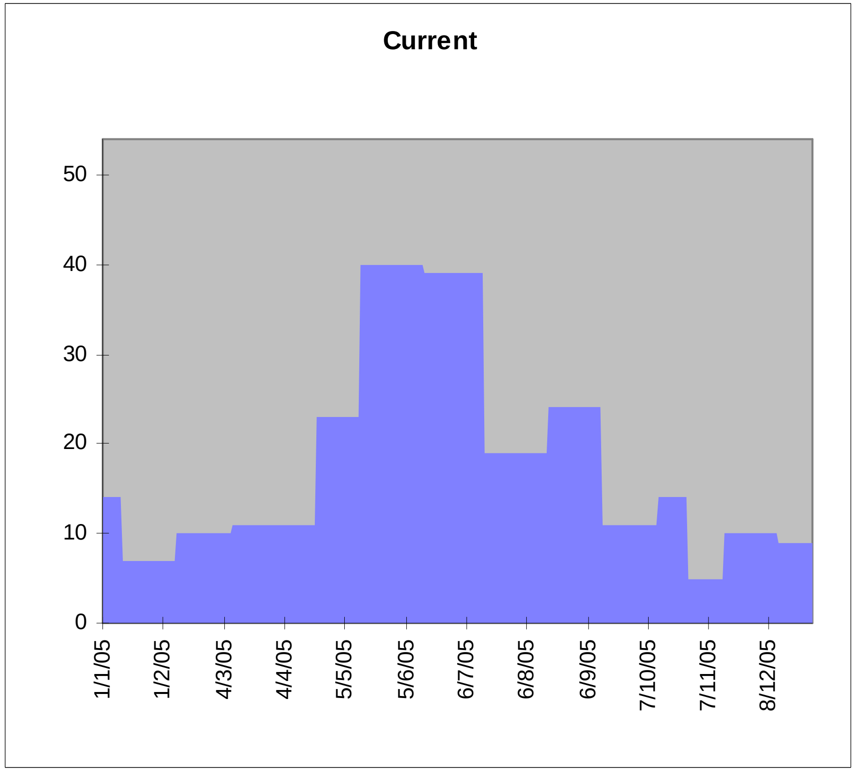
Deposit Gauge Analysis Report

41, Parish Road, Cwmgwrach

Comparison of Fallout Rate with Time

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





Period	Fallout Level (mg/M2/day)		No. Samples	% Data	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum		Capture	Days within 10% of	Days Exceeding
Current	18	40	13	100.0	0	0
Previous	20	54	11	100.0	0	0
Change	-2	Decrease -10%				

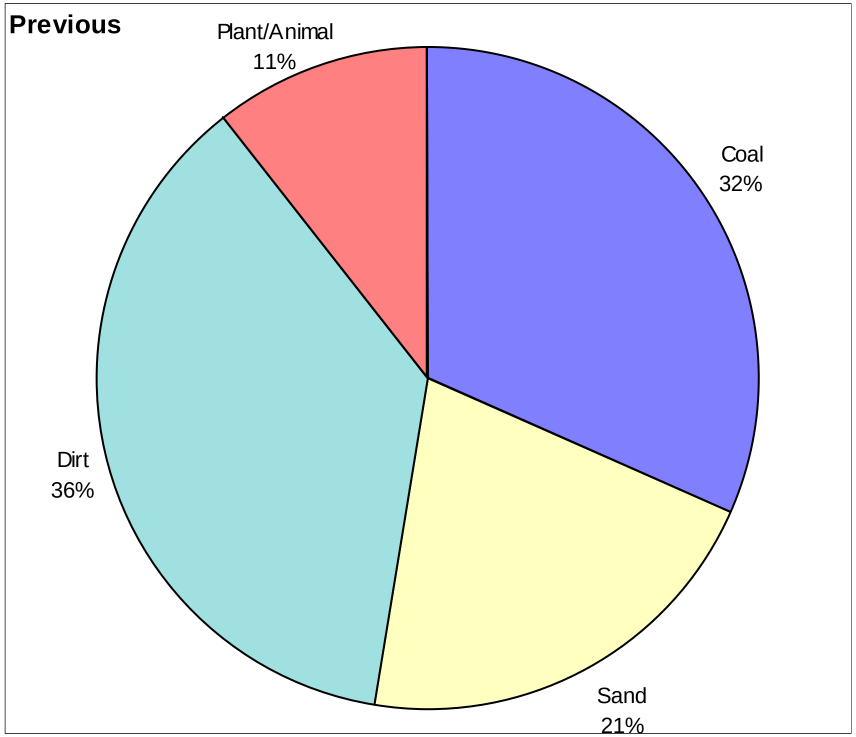
Figure 17

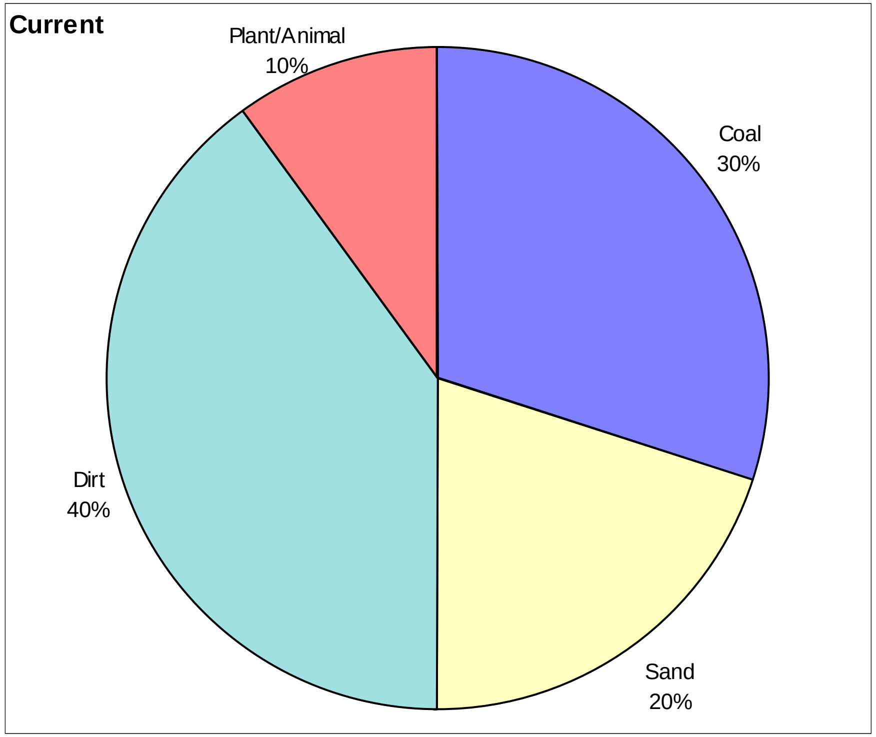
Deposit Gauge Analysis Report

2, Llygad Yr Haul, Glynneath

Comparison of Fallout Composition

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





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	2	4	0	1	0	0	0
	Previous	6	0	4	7	0	2	0	0	0

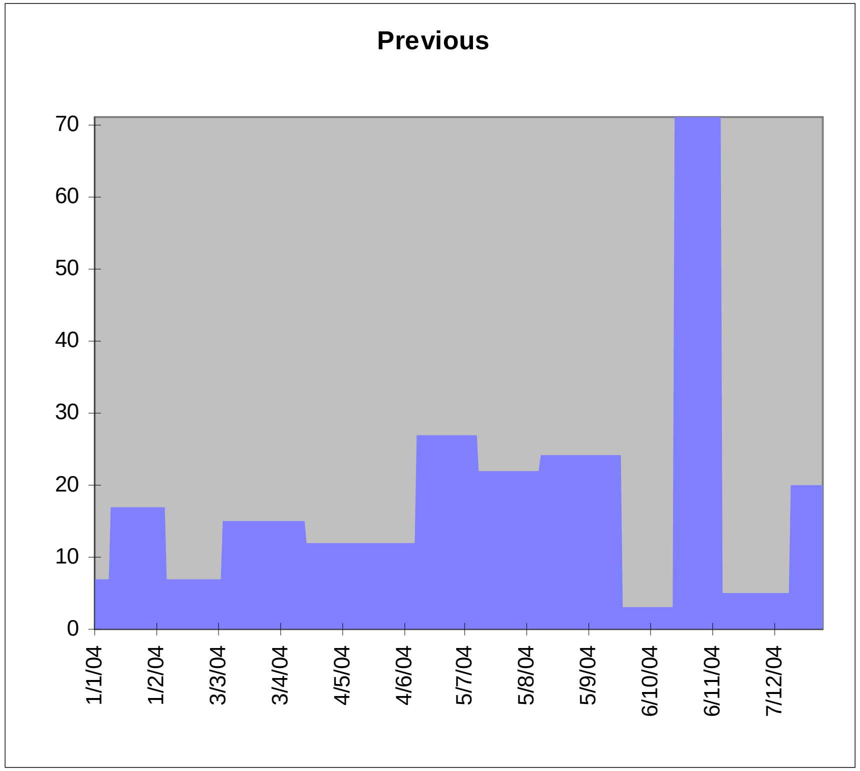
Figure 18

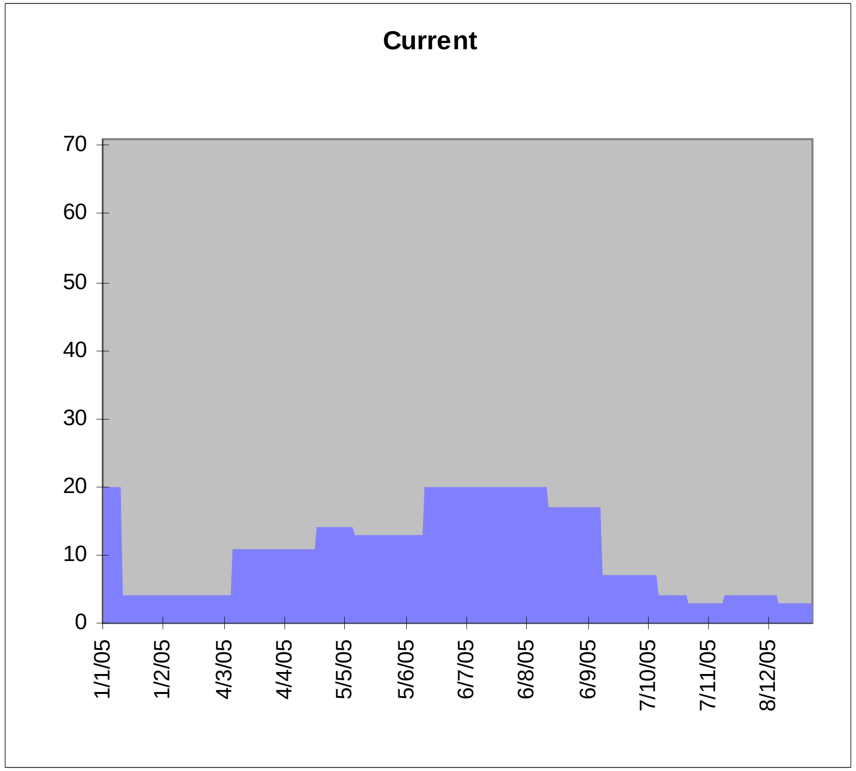
Deposit Gauge Analysis Report

2, Llygad Yr Haul, Glynneath

Comparison of Fallout Rate with Time

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





Period	Fallout Level (mg/M2/day)		No. Samples	% Data	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum		Capture	Days within 10% of	Days Exceeding
Current	11	20	13	100.0	0	0
Previous	19	71	11	100.0	0	0
Change	-8	Decrease -42%				

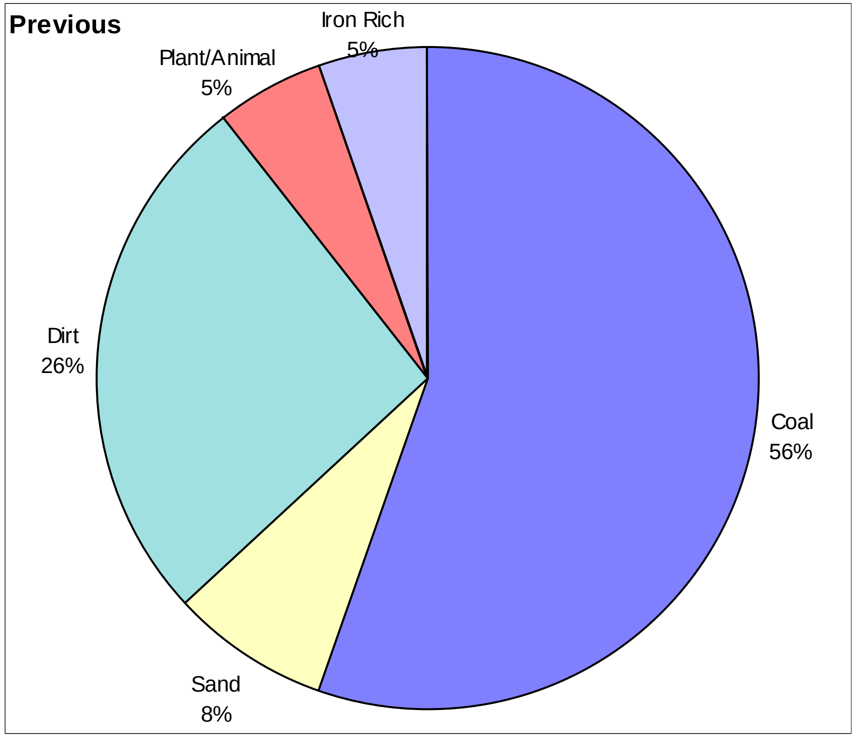
Figure 19

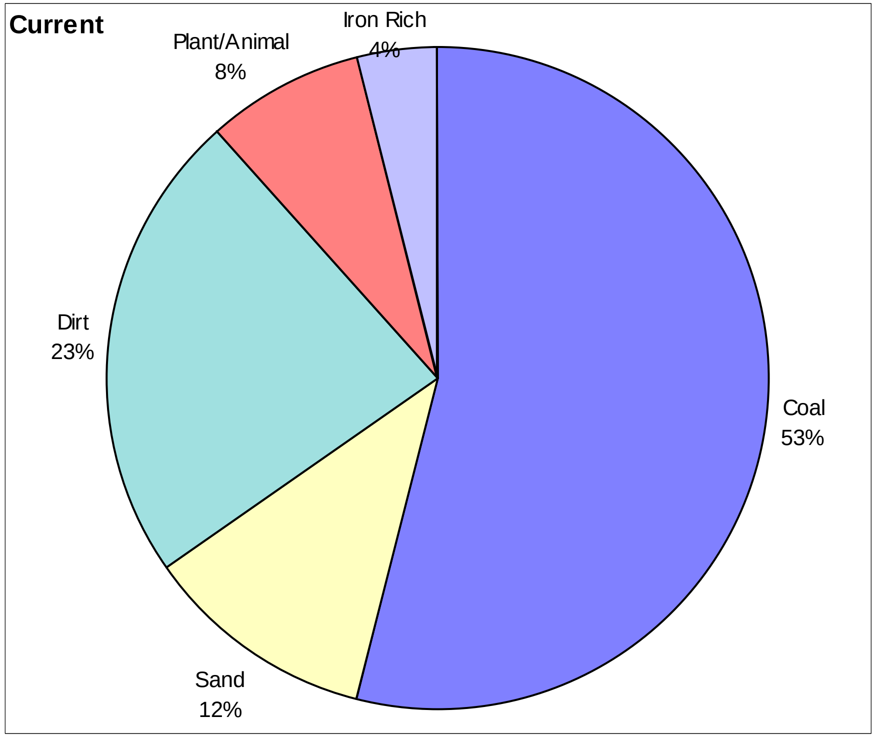
Deposit Gauge Analysis Report

11, Wembley Avenue, Onllwyn

Comparison of Fallout Composition

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





Measurement Type	Period	Coal	Carbonised	Sand	Dirt	Fly Ash	Plant/Animal	Calcium Rich	Iron Rich	Others
Av. Deposition Rate (mg/m2/day)	Current	14	0	3	6	0	2	0	1	0
	Previous	21	0	3	10	0	2	0	2	0

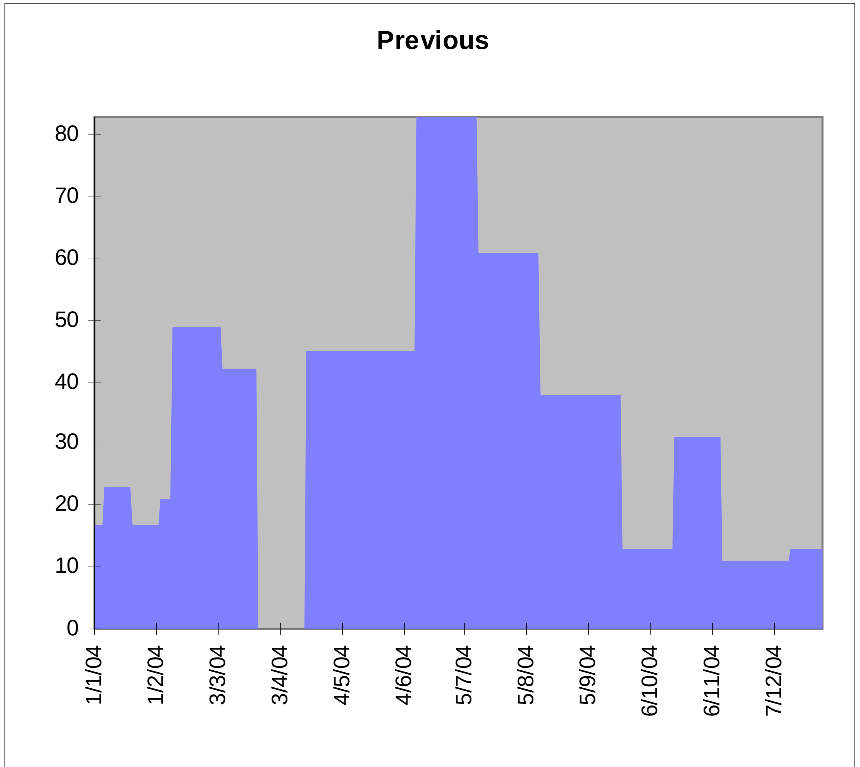
Figure 20

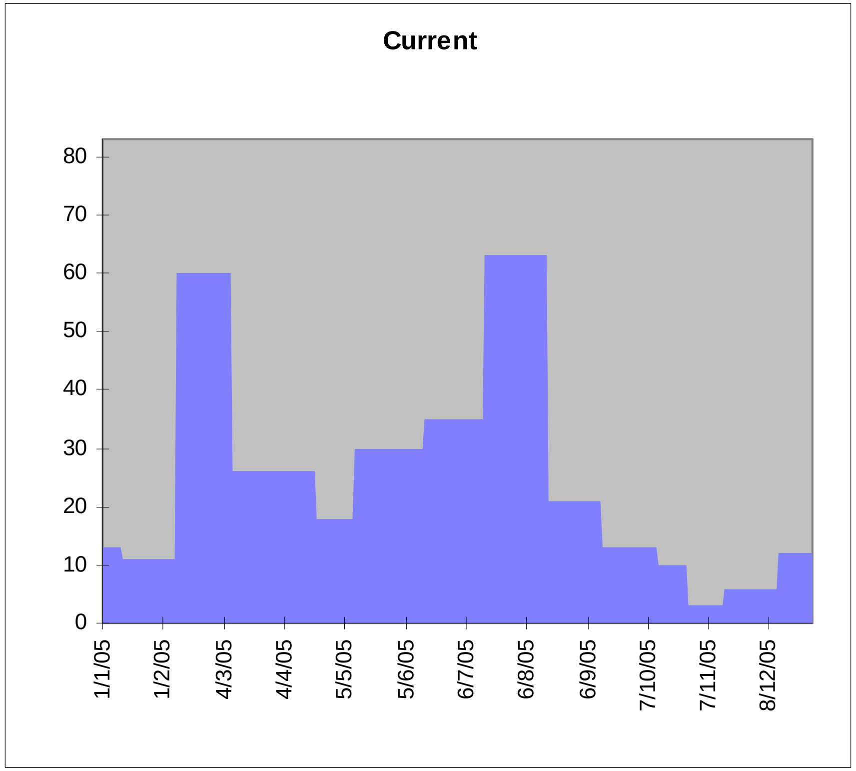
Deposit Gauge Analysis Report

11, Wembley Avenue, Onllwyn

Comparison of Fallout Rate with Time

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





Period	Fallout Level (mg/M2/day)		No. Samples	% Data	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum		Capture	Days within 10% of	Days Exceeding
Current	26	63	13	100.0	0	0
Previous	38	83	13	93.2	0	0
Change	-12	Decrease -32%				

Figure 21

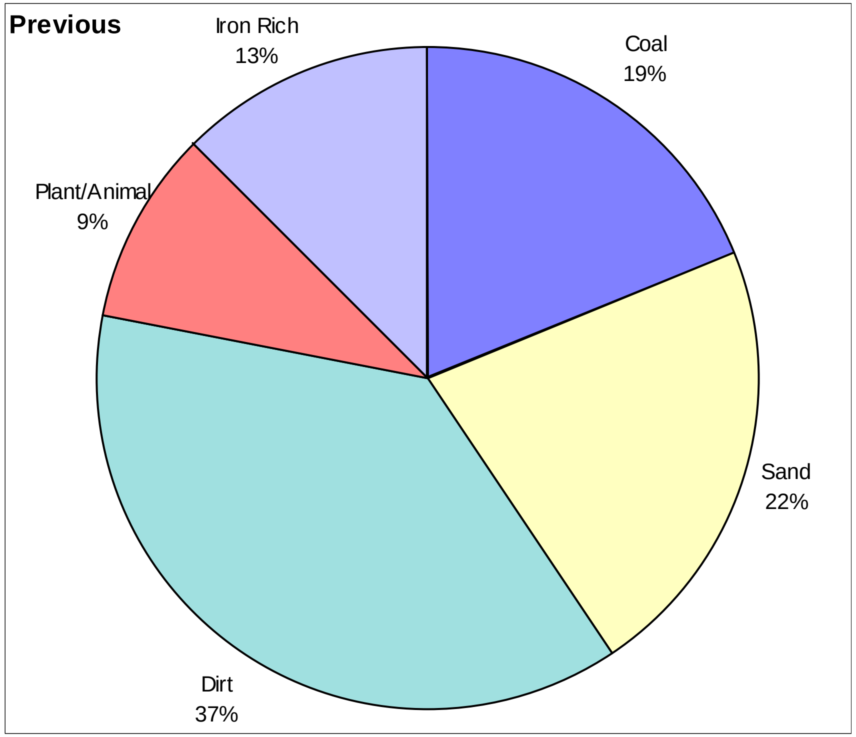
Deposit Gauge Analysis Report

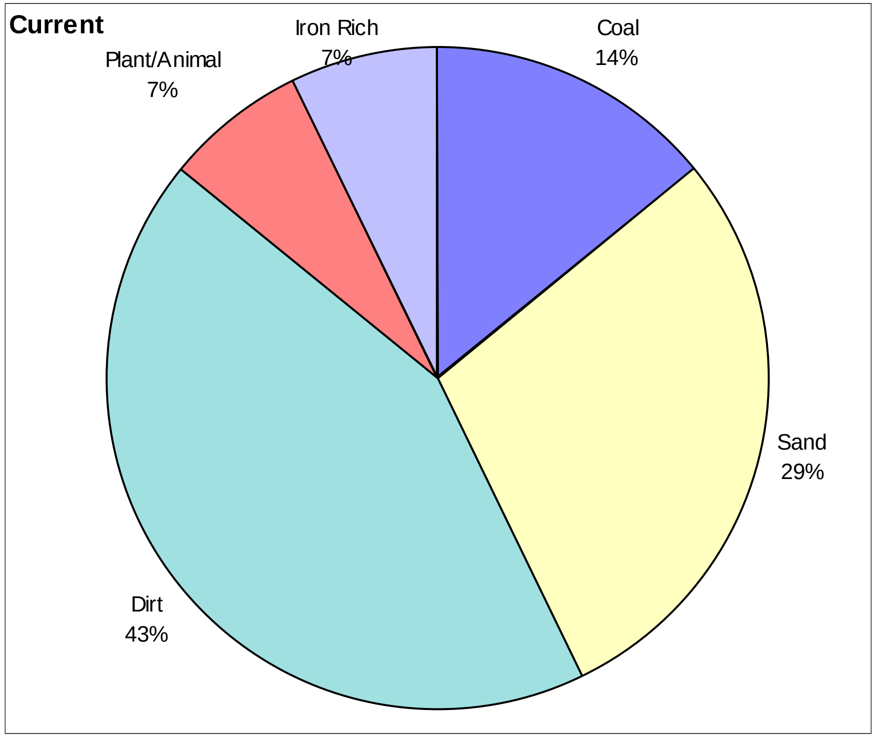
Cardonnel Road, Skewen

Comparison of Fallout Composition

Current Period = 01-Jan-05 to 31-Dec-05

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





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

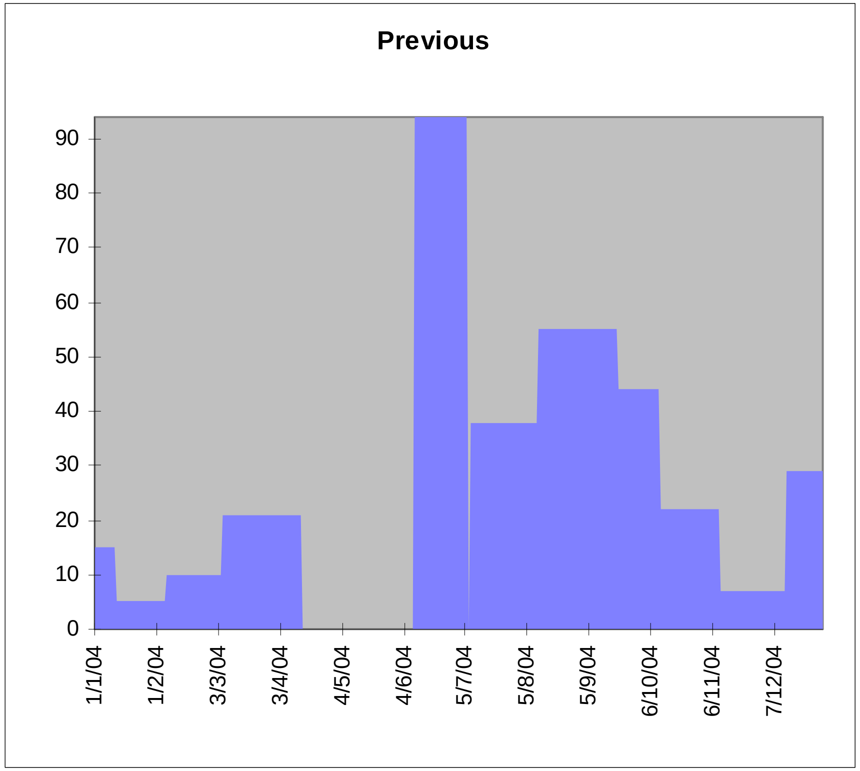
Figure 22

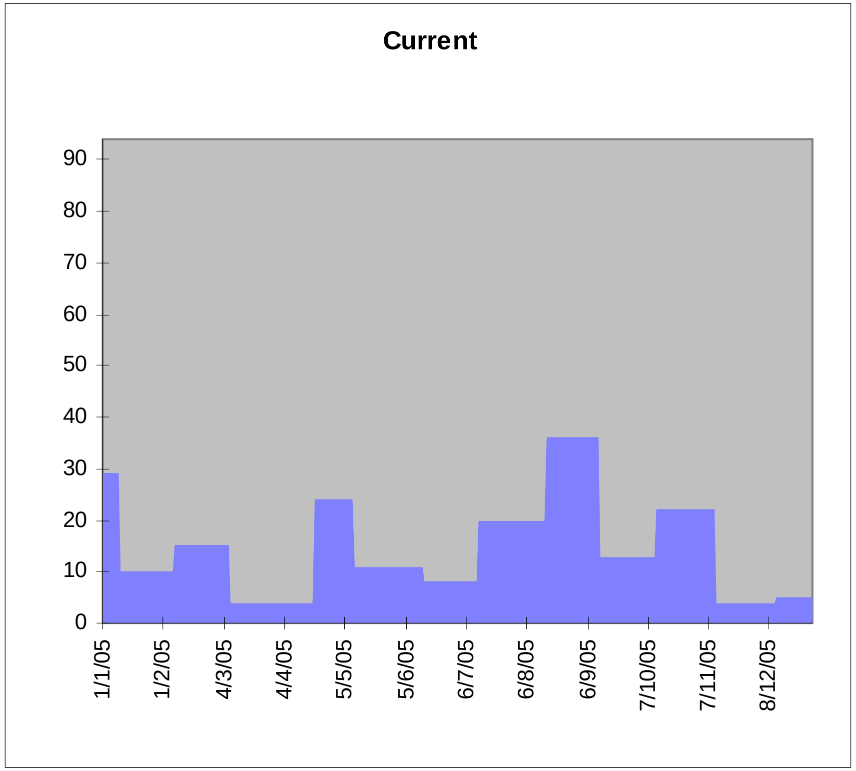
Deposit Gauge Analysis Report

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	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum			Capture	Days within 10% of	Days Exceeding
Current	14	36		13	100.0	0	0
Previous	32	94		10	84.1	0	0
Change	-18	Decrease	-56%				

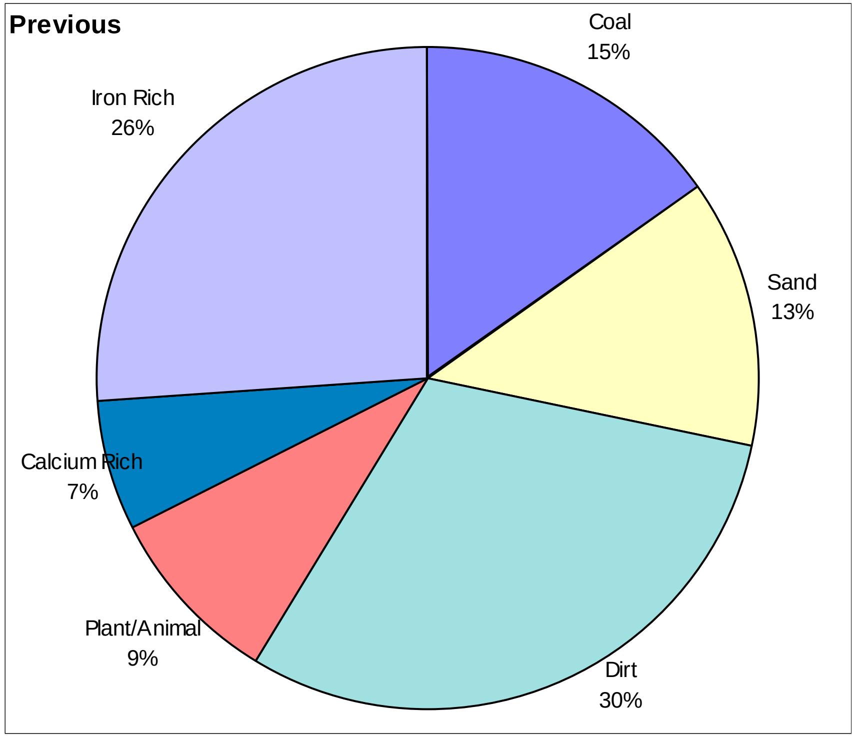
Figure 23

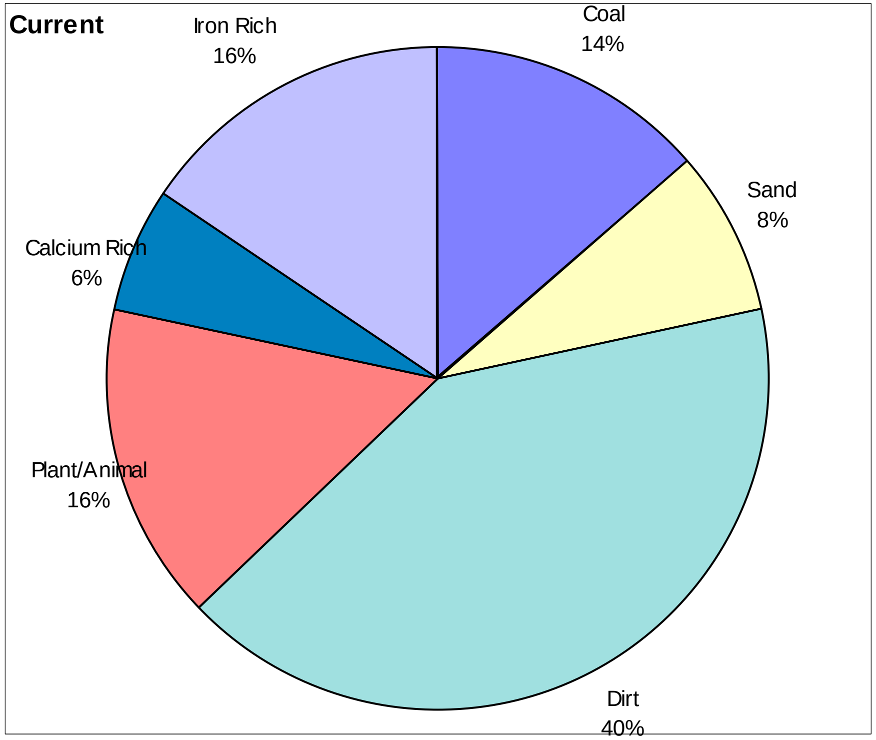
Deposit Gauge Analysis Report

Little Warren, Port Talbot

Comparison of Fallout Composition

Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





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	4	21	0	8	3	8	0
	Previous	7	0	6	14	0	4	3	12	0

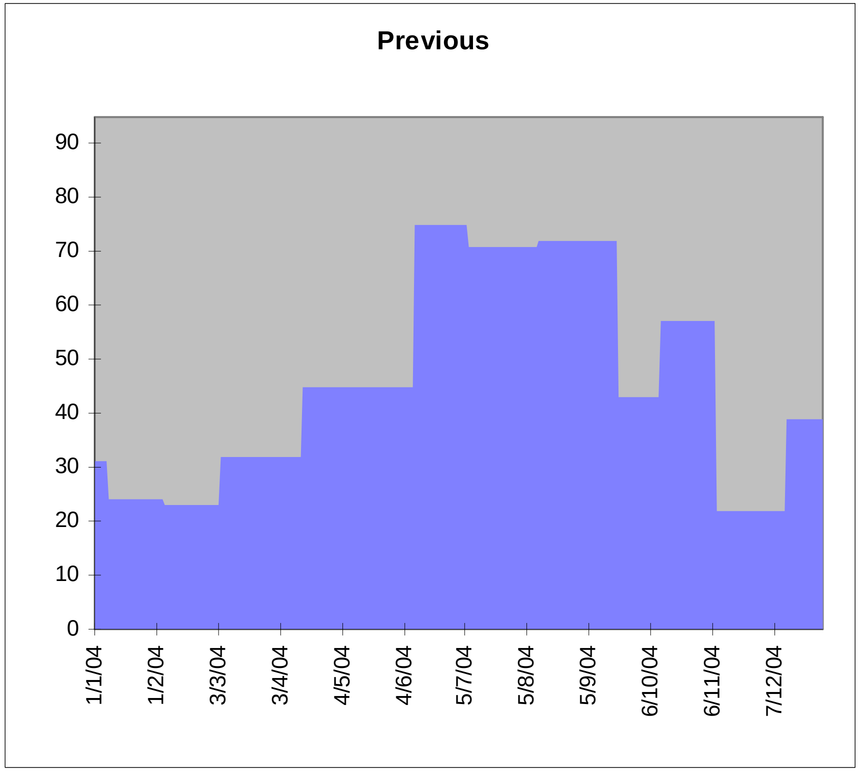
Figure 24

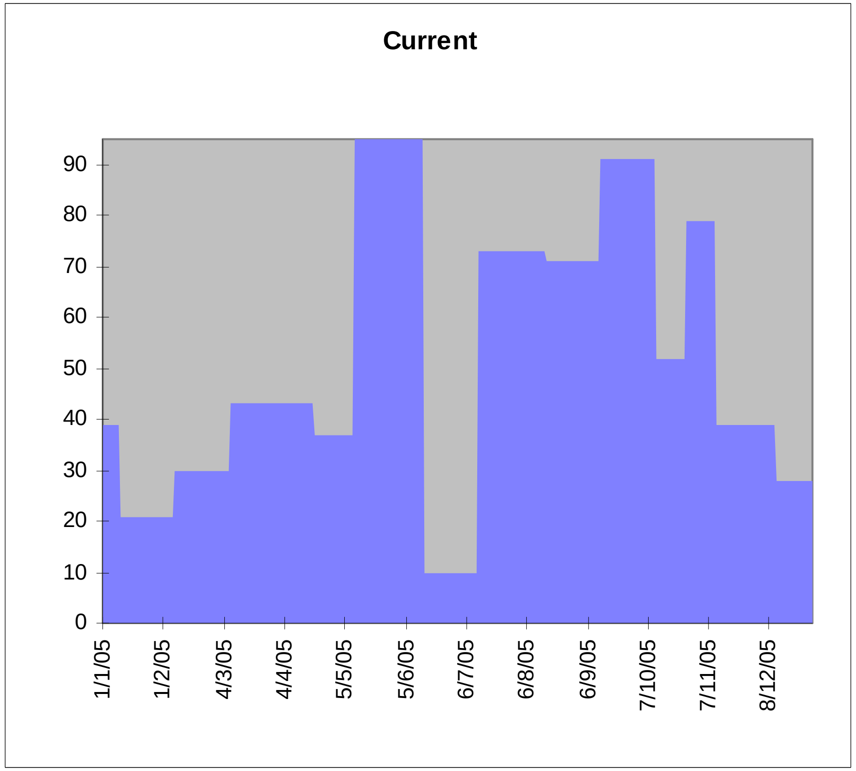
Deposit Gauge Analysis Report

Little Warren, Port Talbot

Comparison of Fallout Rate with Time

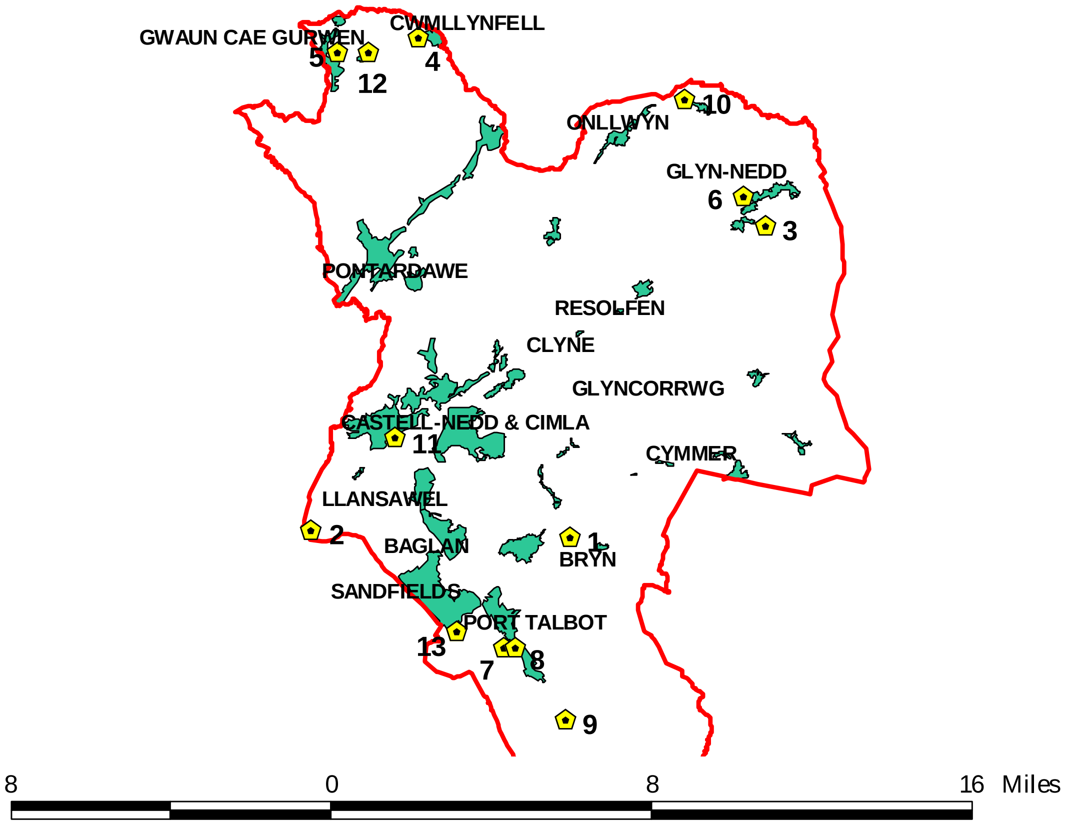
Current Period	=	01-Jan-05	to	31-Dec-05
Previous Period	=	01-Jan-04	to	31-Dec-04





Period	Fallout Level (mg/M2/day)		No. Samples	% Data	200 mg/M2/day 'Nuisance Limit'	
	Average	Maximum		Capture	Days within 10% of	Days Exceeding
Current	52	95	13	100.0	0	0
Previous	46	75	11	100.0	0	0
Change	6	Increase 13%				

Figure 25 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

Neath Port Talbot Boundary

Main Populated Areas

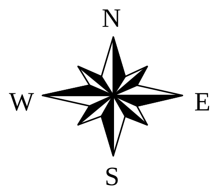


Figure 26 Comparison of average fallout rates, 2005.

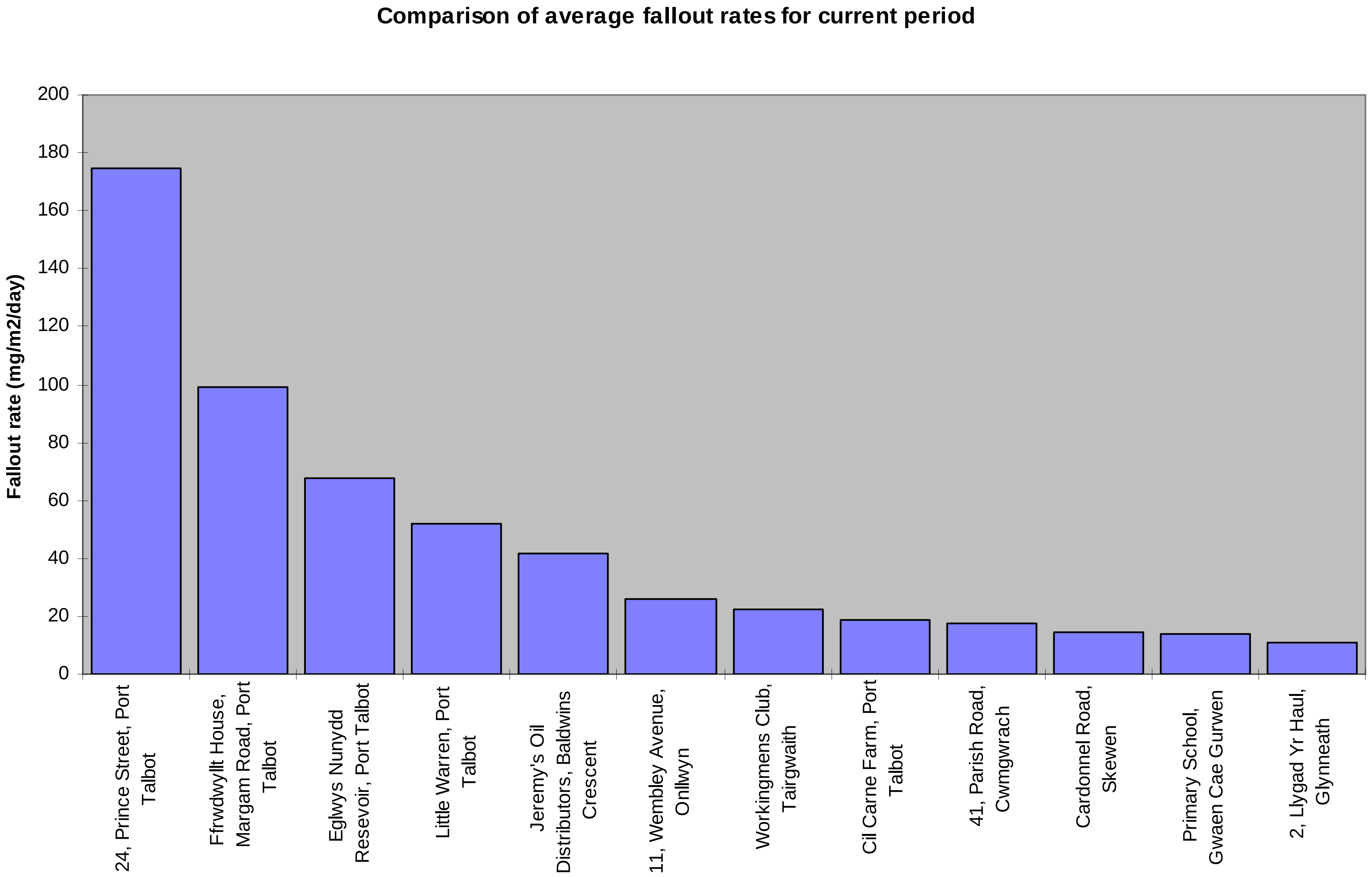


Table 1 Sites ranked by average fallout level (mg/m2/day), 2005.

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	175	371	28	126
Ffrwdwyllt House, Margam Road, Port Talbot	99	323	0	15
Eglwys Nunydd Resevoir, Port Talbot	67	187	28	0
Little Warren, Port Talbot	52	95	0	0
Jeremy's Oil Distributors, Baldwins Crescent	42	70	0	0
11, Wembley Avenue, Onllwyn	26	63	0	0
Workingmens Club, Tairgwaith	22	45	0	0
Cil Carne Farm, Port Talbot	18	43	0	0
41, Parish Road, Cwmgwrach	18	40	0	0
Cardonnel Road, Skewen	14	36	0	0
Primary School, Gwaen Cae Gurwen	14	40	0	0
2, Llygad Yr Haul, Glynneath	11	20	0	0

Figure 27 Long term deposition rates.

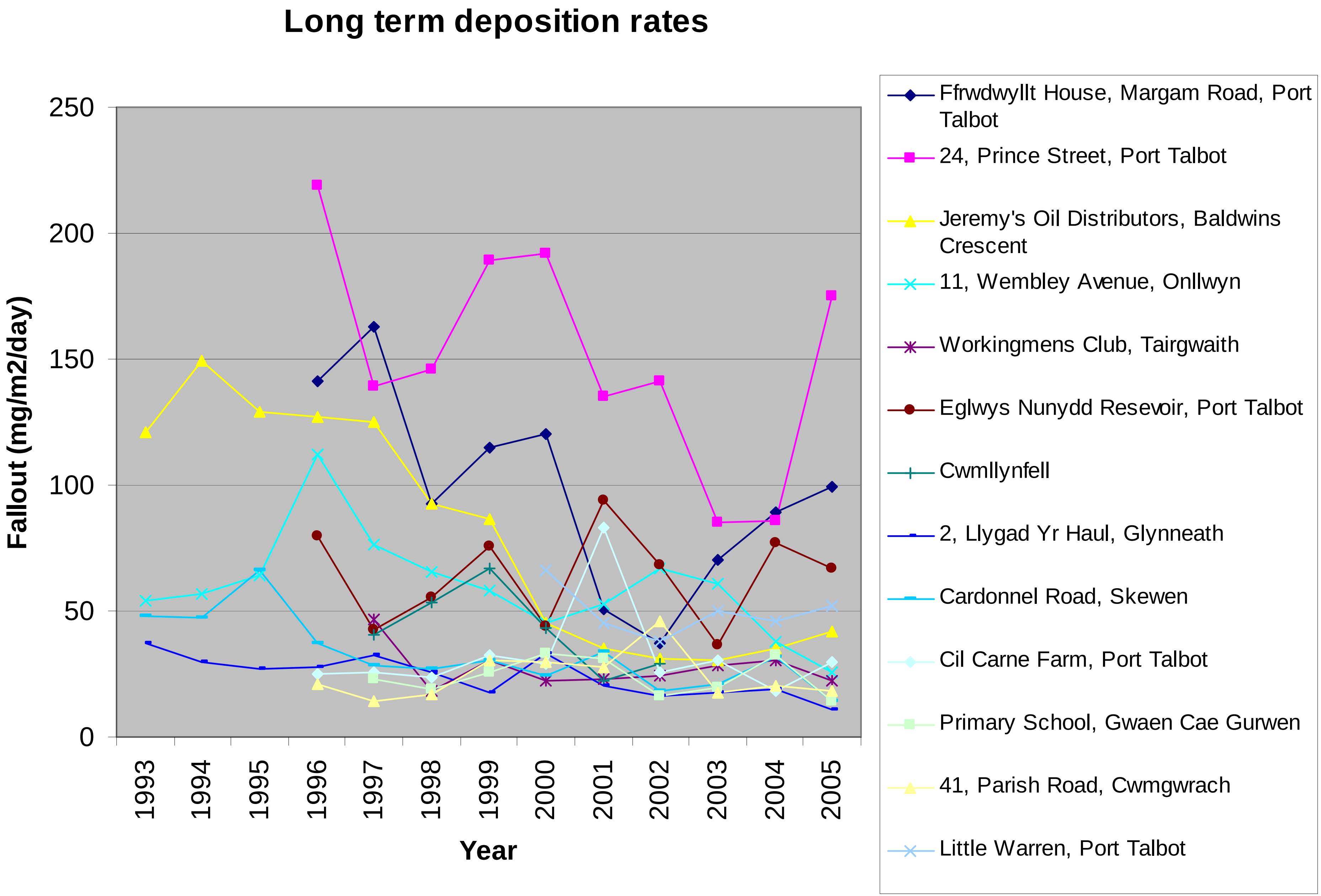


Table 2 Long term deposition rates

Site Name	Fallout rate (mg/m2/day)												
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Ffrwdwyllt House, Margam Road, Port Talbot				141	163	92	115	120	51	37	70	89	99
24, Prince Street, Port Talbot				219	139	146	189	192	135	141	85	86	175
Jeremy's Oil Distributors, Baldwins Crescent	121	149	129	127	125	93	86	45	35	31	30	35	42
11, Wembley Avenue, Onllwyn	54	57	64	112	76	66	58	45	53	67	60	38	26
Workingmens Club, Tairgwaith					47	18	30	22	23	24	28	30	22
Eglwys Nunydd Resevoir, Port Talbot				80	42	55	76	44	94	68	36	77	67
Cwmllynfell					41	53	67	43	22	29			
2, Llygad Yr Haul, Glynneath	37	30	27	28	32	26	18	33	20	16	18	19	11
Cardonnel Road, Skewen	48	47	66	37	28	27	30	24	34	18	21	32	14
Cil Carne Farm, Port Talbot				25	26	24	32	29	83	26	30	30	30
Primary School, Gwaen Cae Gurwen					23	19	26	33	31	16	19	33	14
41, Parish Road, Cwmgwrach				21	14	17	31	30	28	46	18	20	18
Little Warren, Port Talbot								66	45	38	50	46	52

Nitrogen dioxide - diffusion tubes

Neath Port Talbot County Borough was one of approximately 300 local authorities that contributed to the UK Nitrogen Dioxide Survey. The survey was co-ordinated by AEA Technology, which was also responsible for quality control/assurance, interpretation and dissemination of data. There were three categories of site i.e. kerbside, intermediate and urban background. Individual authorities normally had four tubes, two of which were 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). The UK survey was stopped in 2005 since it was felt that information on spatial distribution and trends are now more effectively provided by the AURN and by modelling. However, it was recognised that NO2 diffusion tubes remain an important tool for Local Air Quality Monitoring. Therefore AEA Technology still acts as a national repository for the information that is collected by local authorities. Data 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

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 2005 was 0.91.

Table 3 shows the bias adjusted results for 2005, 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 during 2005. It is a welcome development that levels at Victoria Gardens, which tends to produce the highest results, decreased for the first time since 2000.

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 $\mu g/m^3$ and 53.5 $\mu g/m^3$ for the guide value. No local sites have ever come close to breaching the limit or guide values during 2005. The National Air Quality objective for NO_2 is 40$\mu g/m^3$ as an annual average, to be achieved by 2005. The relatively new site at the junction of Eastland Road/Victoria Gardens (46.2 $\mu g/m^3$) was the only site to have exceeded this figure during 2005. But Air Quality Management Areas are only declared where there is "relevant exposure" and this is deemed to relate to the frontages of houses in the case of nitrogen dioxide. The tubes on the frontages of properties at Eastland Road (36.9 $\mu g/m^3$) and Victoria Gardens (36.2 $\mu g/m^3$) 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

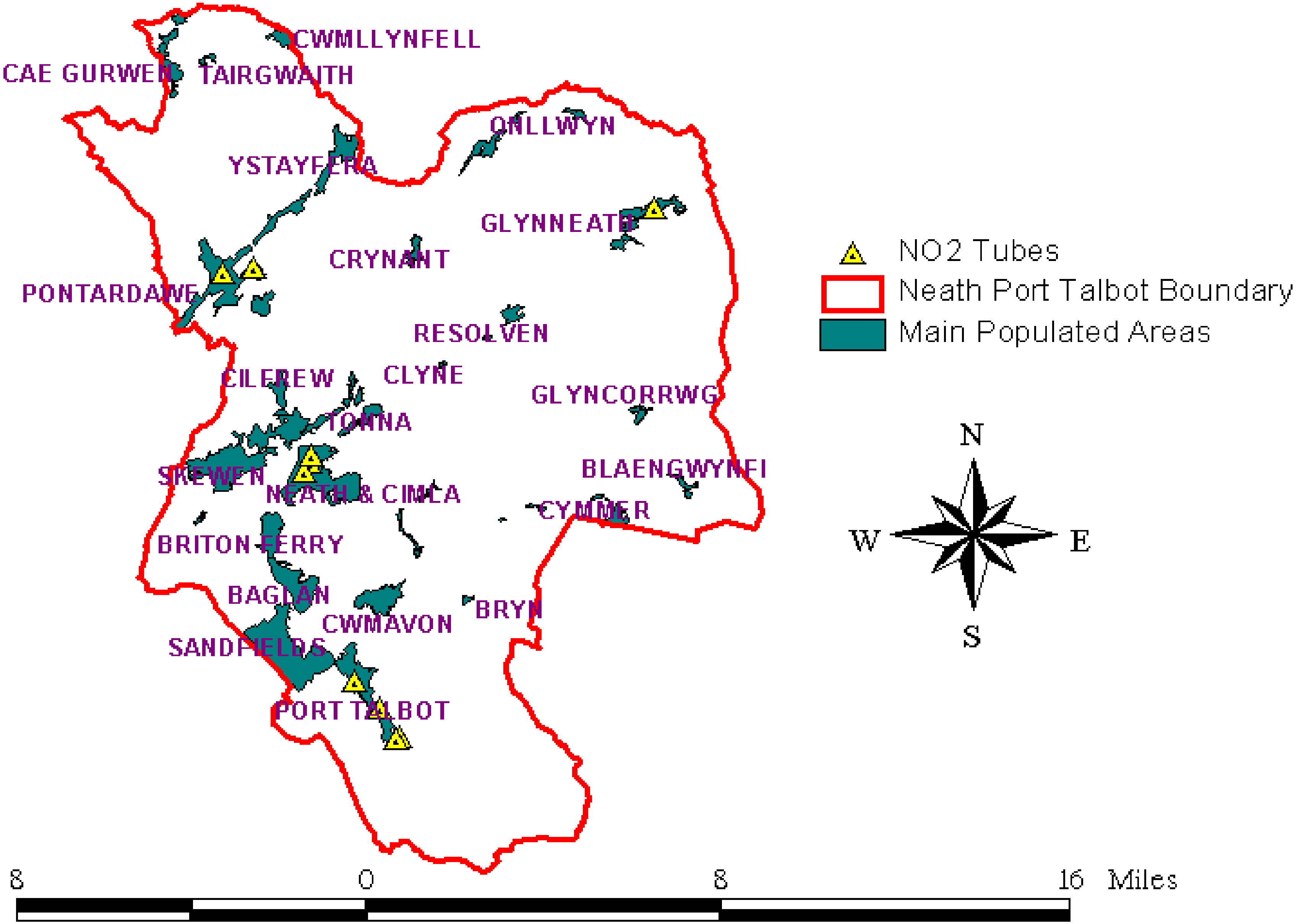


Table 3 Bias Adjusted Nitrogen Dioxide Diffusion Tube Results ($\mu g/m^3$) – 2005

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Neath Civic Centre	24.0	26.9	25.4	21.4	12.5	14.4	16.0	ND	20.7	22.8	30.4	ND	21.4
Cwmnedd Primary School	13.9	19.1	17.9	16.9	11.0	9.9	10.6	11.1	14.3	18.9	19.3	ND	14.8
Groeswen Hospital, Margam	39.8	38.2	41.2	30.4	25.6	23.6	29.2	21.6	29.4	36.7	41.0	ND	32.4
Rice Street, Taibach	24.0	25.6	26.8	20.7	14.3	14.1	ND	ND	17.7	20.7	26.4	ND	21.1
College Green, Margam	22.1	20.3	20.0	17.7	14.4	16.3	18.3	17.7	19.3	23.6	26.8	ND	19.7
High St., Pontardawe	29.4	36.2	34.8	31.6	21.2	21.9	21.4	21.2	26.8	28.9	31.3	ND	27.7
Victoria Gardens, Neath	44.0	23.1	48.0	41.0	32.9	35.5	36.2	32.9	45.2	44.7	45.4	ND	39.0
Victoria Gardens Junction	51.4	52.3	52.7	48.1	40.3	35.5	39.3	38.2	45.5	48.5	56.5	ND	46.2
8 Victoria Gardens	43.1	43.5	43.5	36.7	28.9	31.3	28.0	28.7	36.2	43.6	42.8	ND	36.9
28 Eastland Road	36.8	42.9	37.0	38.4	29.9	ND	36.7	27.5	36.7	31.1	45.4	ND	36.2
102 Commercial Road	26.2	28.5	ND	23.1	17.9	18.9	ND	17.9	22.9	27.1	32.0	ND	23.9
Groeswen Hospital 2	22.9	23.5	ND	20.9	15.8	15.5	20.5	15.6	18.8	24.3	28.9	ND	20.7

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

ND – No data

Table 4 Nitrogen dioxide annual averages (μg/m^3) – 1994 to 2005

Year	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Neath Civic Centre	17.7	17.8	12.4	11.6	11.7	10.2	8.7	12.0	15	14.6	25.6	25.2
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	17.2
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	29.5
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	23.0
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	19.2
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	27.8
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	43.0

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/m^3

Figure 29 Bias adjusted monthly nitrogen dioxide diffusion tube results (µg/m³) – 2005

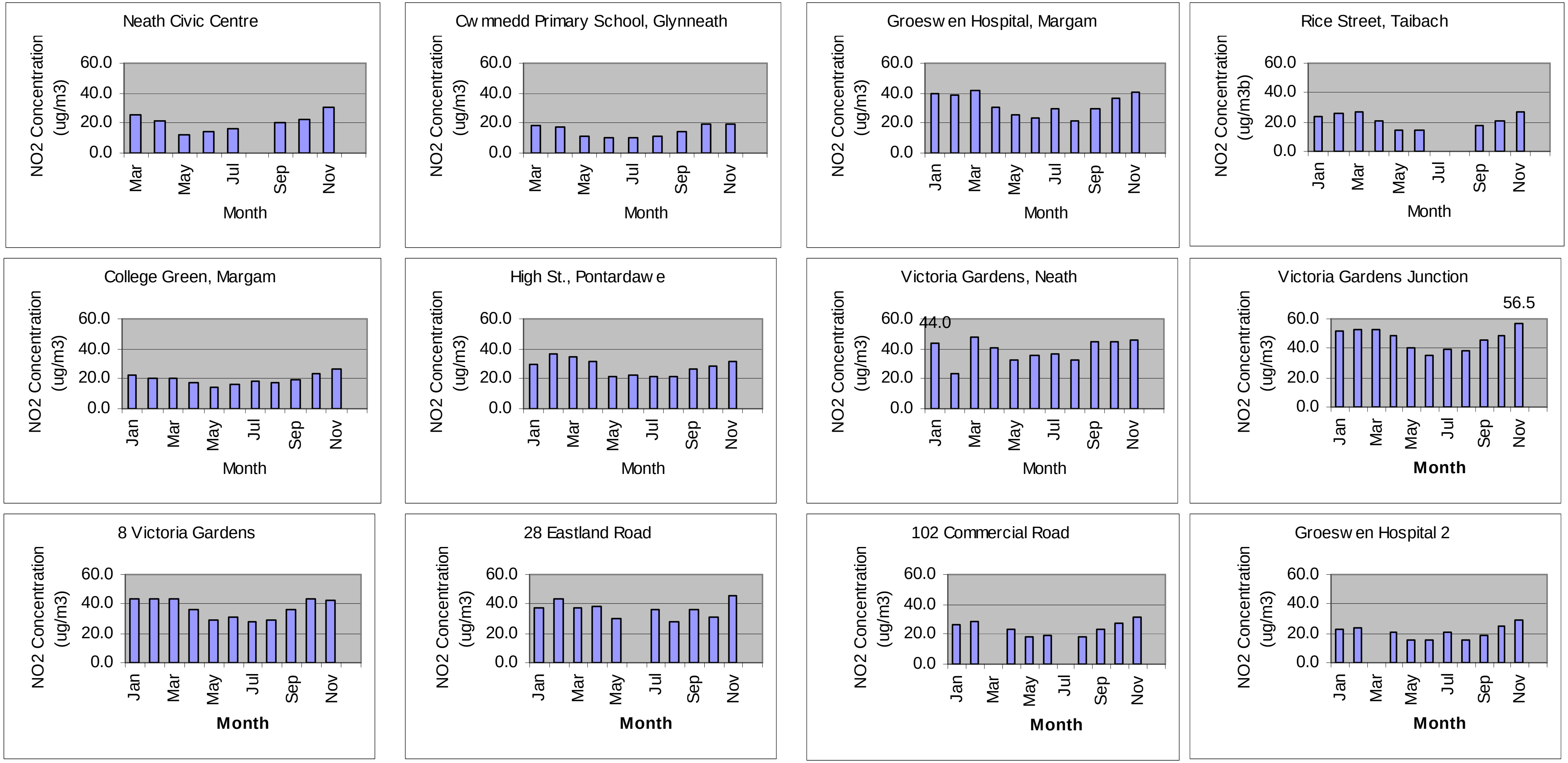


Figure 30 Bias adjusted nitrogen dioxide annual averages – 2005

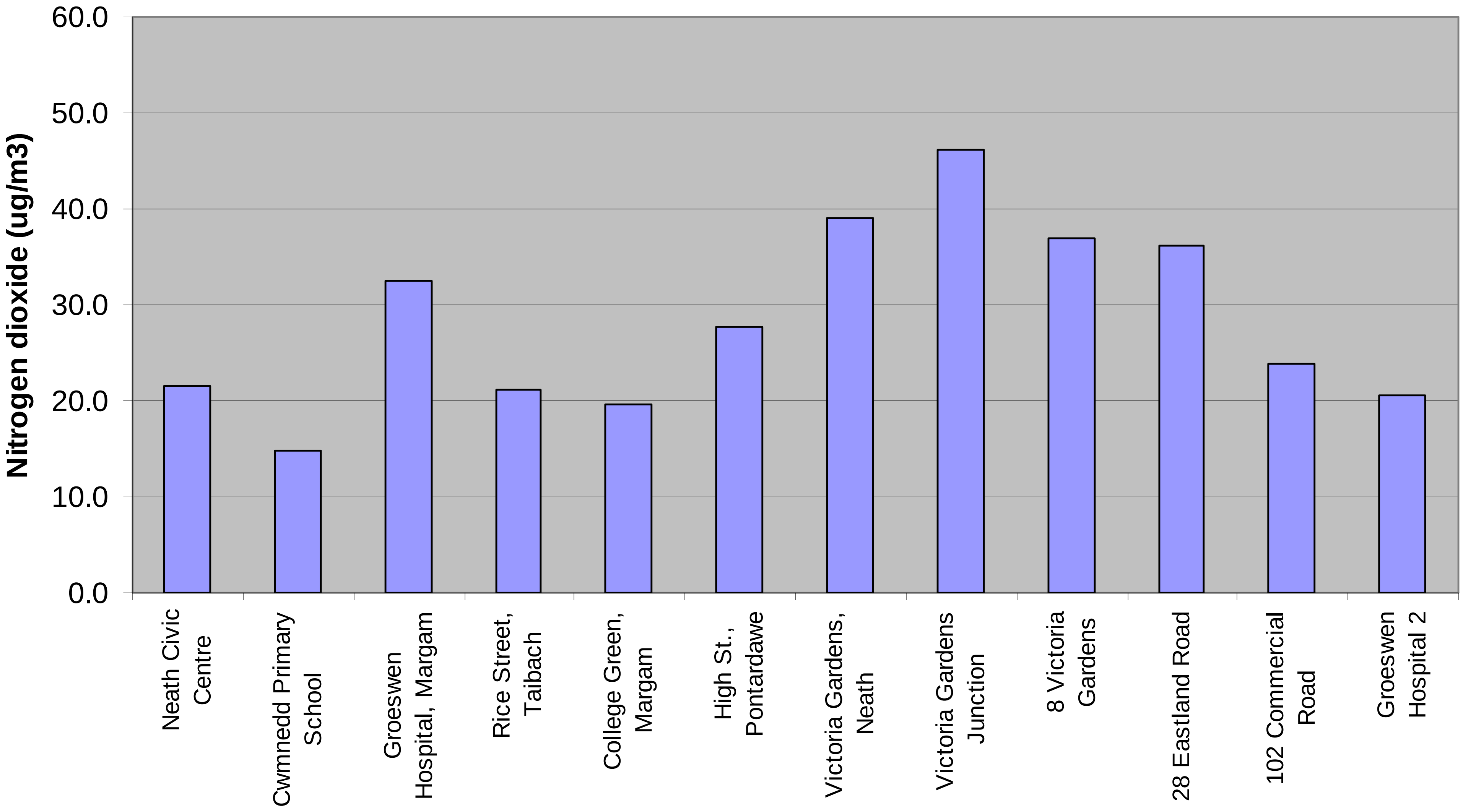
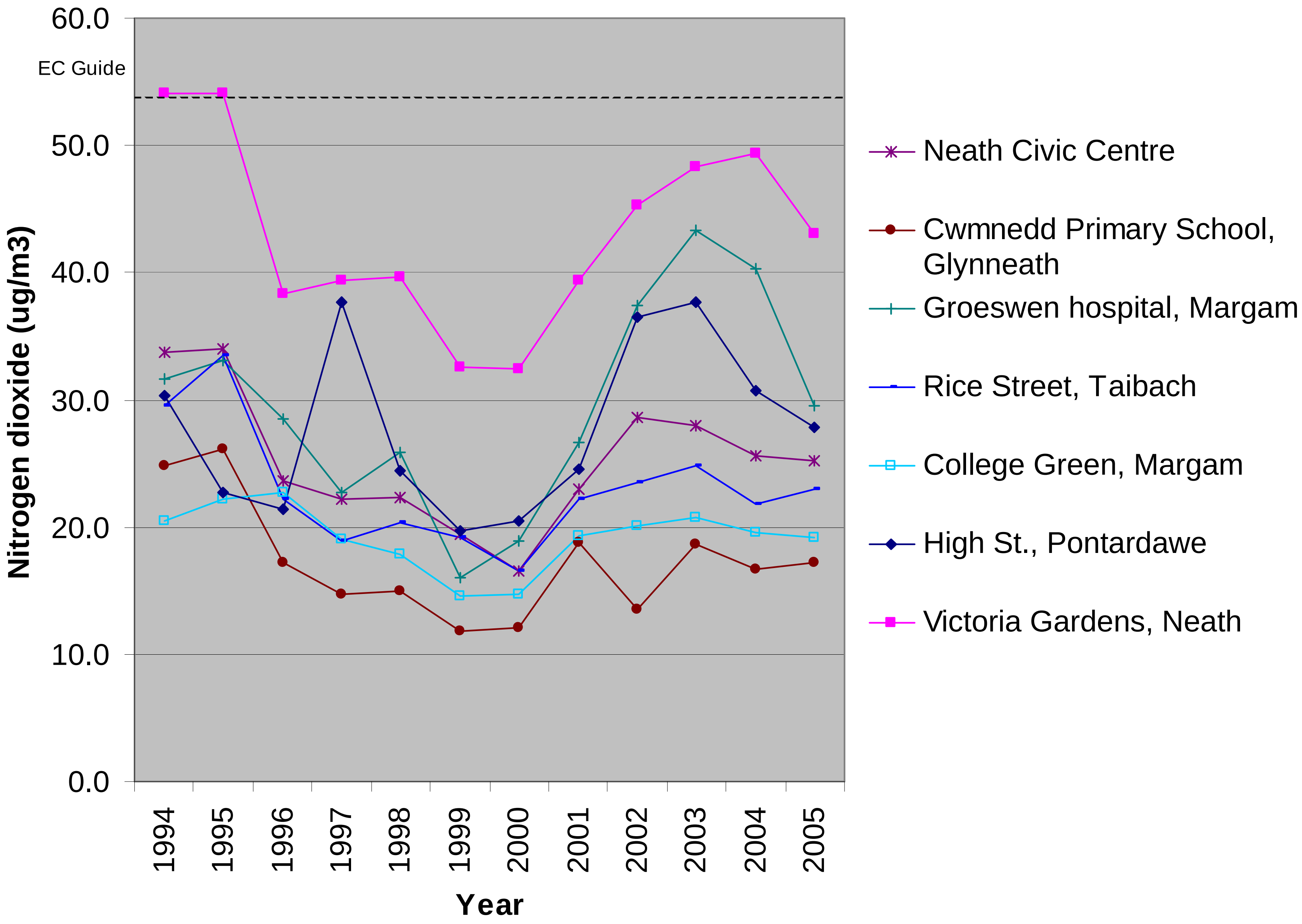


Figure 31 Annual nitrogen dioxide summary graph 2005



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)

The 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 PM_{10} fraction averaged over a calendar year. The target values from the Directive are shown below:

Nickel	**20 ng/m^3**
Arsenic	**6 ng/m^3**
Cadmium	**5 ng/m^3**

It should be noted that the Directive requires measurement of air concentrations for Directive compliance to be made using valid PM_{10} monitoring methods. The polypropylene ducts used to hold the filters do not conform exactly to a PM_{10} 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 2005 was 47 ng/m^3, which is 2.3 times the EC target value (20 ng/m^3 annual mean). The 2005 nickel level was 38% less than that measured in the previous year. But, there is considerable variability in nickel levels from year to year. 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/m^3 and 0.14 ng/m^3 respectively. These concentrations represent approximately 11% and 3% of their proposed target values. The concentrations for both substances have not changed significantly since 2004.

The annual mean air concentration of lead at the Pontardawe site was found to be 6.7 ng/m^3, which represents about 1.3% of the present air quality limit value (500 ng/m^3 to be met by 2005) and 2.7% 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 Pontardawe monitoring site. There was a 23% decrease on the 2004 average concentration.

From assessment of the measured concentrations at the Trebanos and Pontardawe sites between 1990 and 2005 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 show in brackets):

- Arsenic (average decrease of 10%/year)
- Antinomy (average decrease of 6%/year)
- Cadmium (average decrease of 15%/year)
- Cerium (average decrease of 3%/year)
- Cobalt (average decrease of 8%/year)
- Copper (average decrease of 11%/year)
- Iron (average decrease of 2%/year)
- Lead (average decrease of 14%/year)
- Selenium (average decrease of 10%/year)

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

- Chromium (average increase of 10%/year)
- Nickel (average increase of 4%/year)
- Scandium (average increase of 5%/year)
- Zinc (average increase of 2%/year)

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

Conclusions

The nickel concentration now and in recent years suggests that the Target Value of 20 ng/m^3 is likely to be exceeded by the Target Date of 31 December 2012, unless matters change. The current analysis method allows direct comparison with historical data set, but it does not comply with the specification laid down by the 2004 EC Directive. In recognition of these facts this Authority, INCO, City and County of Swansea, Environment Agency and Defra have commenced additional monitoring in 2006 aimed at further investigating the source of the nickel pollution. The additional monitoring is being carried out using methods compatible with the EC Directive. These results will be reported in future years. Monitoring using the new method will supercede the existing method after a period of contemporaneous measurement in order to determine equivalence of the two methods.

Table 5 Threshold Limit Ealues and Environmental Air Guidlines.

Element	Current or proposed Air Quality Limit Values (ng/m^3)	Environmental Assessment Levels (EALs) (ng m^{-3})	Comment	Annual Mean Air Concentration in 2005 (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	0.7	12%
Cadmium (Cd)	5		Target value	0.14	2.8%
Cobalt (Co)		200##	Cobalt and its compounds as Co	0.72	0.4%
Chromium (Cr)		100##	Cr VI compunds	7.9	7.9%
Copper (Cu)		10000##	Dust, fume and mists	4.1	0.04%
Iron (Fe)		10000##	Iron salts as Fe	261	2.6%
Nickel (Ni)	20		Target value	47	235%
Lead (Pb)	(500)** (250)***		Inorganic compounds	6.7	1.3%
Antimony (Sb)		5000##	Except antimony trisulphide and antimony trioxide		2.7%
Selenium (Se)		1000##	Not including hydrogen selenimide	0.5	0.01%

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 (1997-2005)

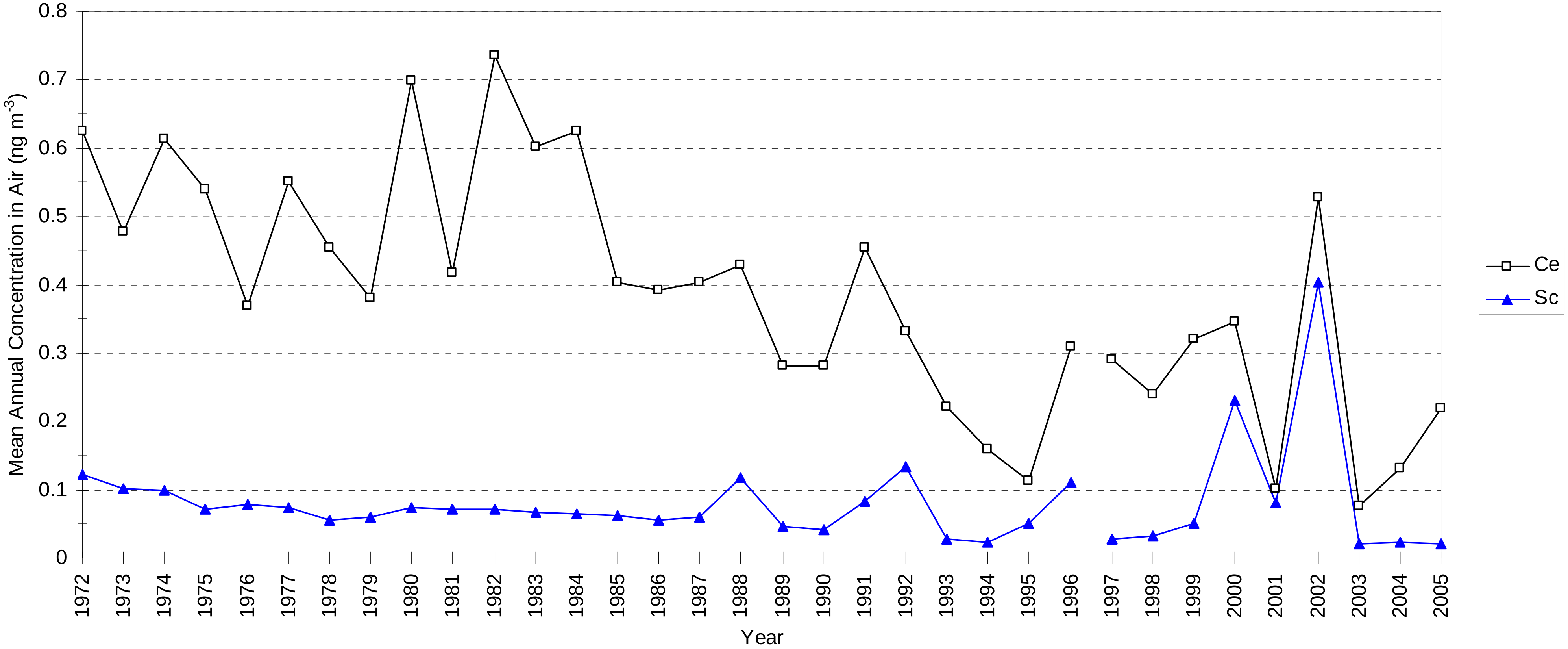


Figure 33

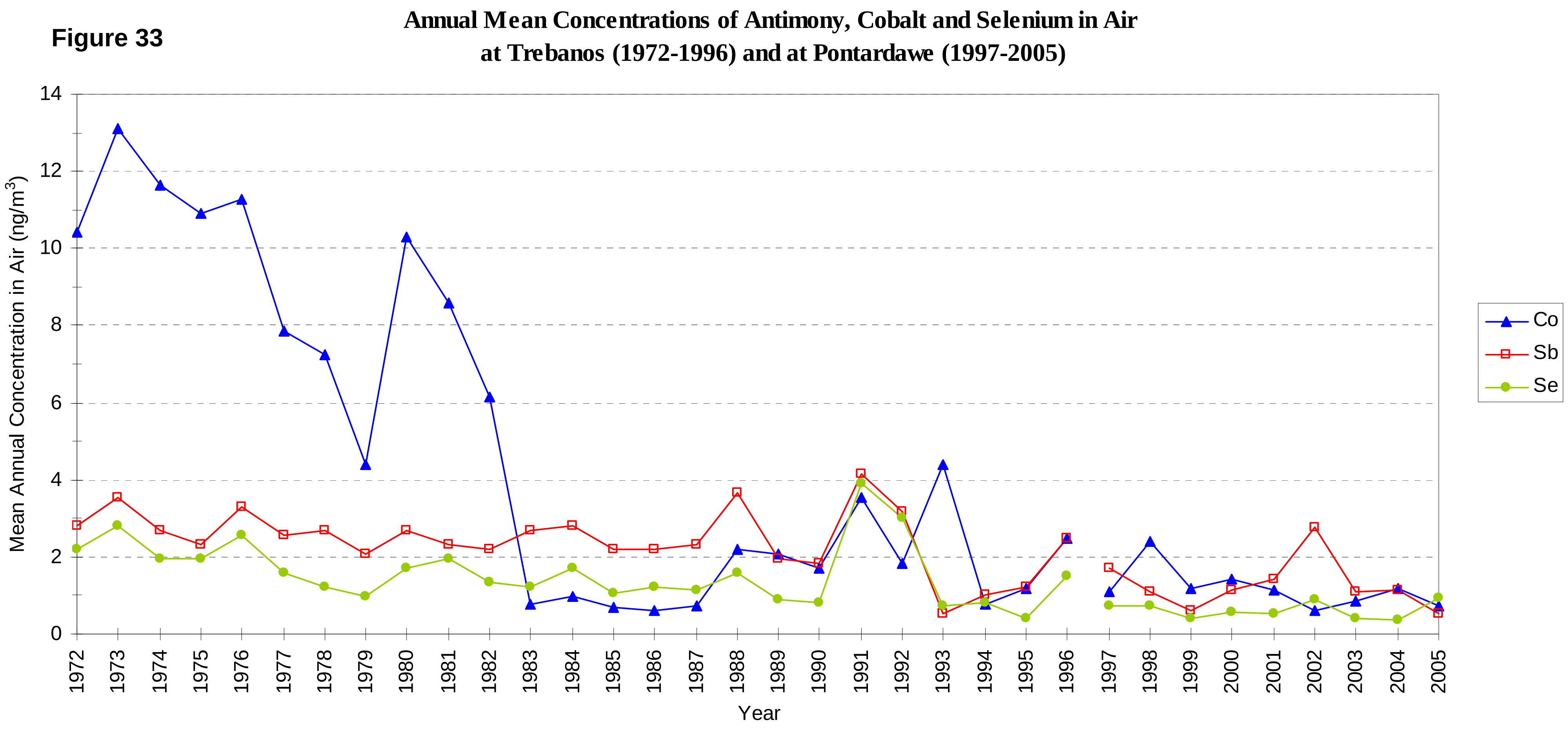
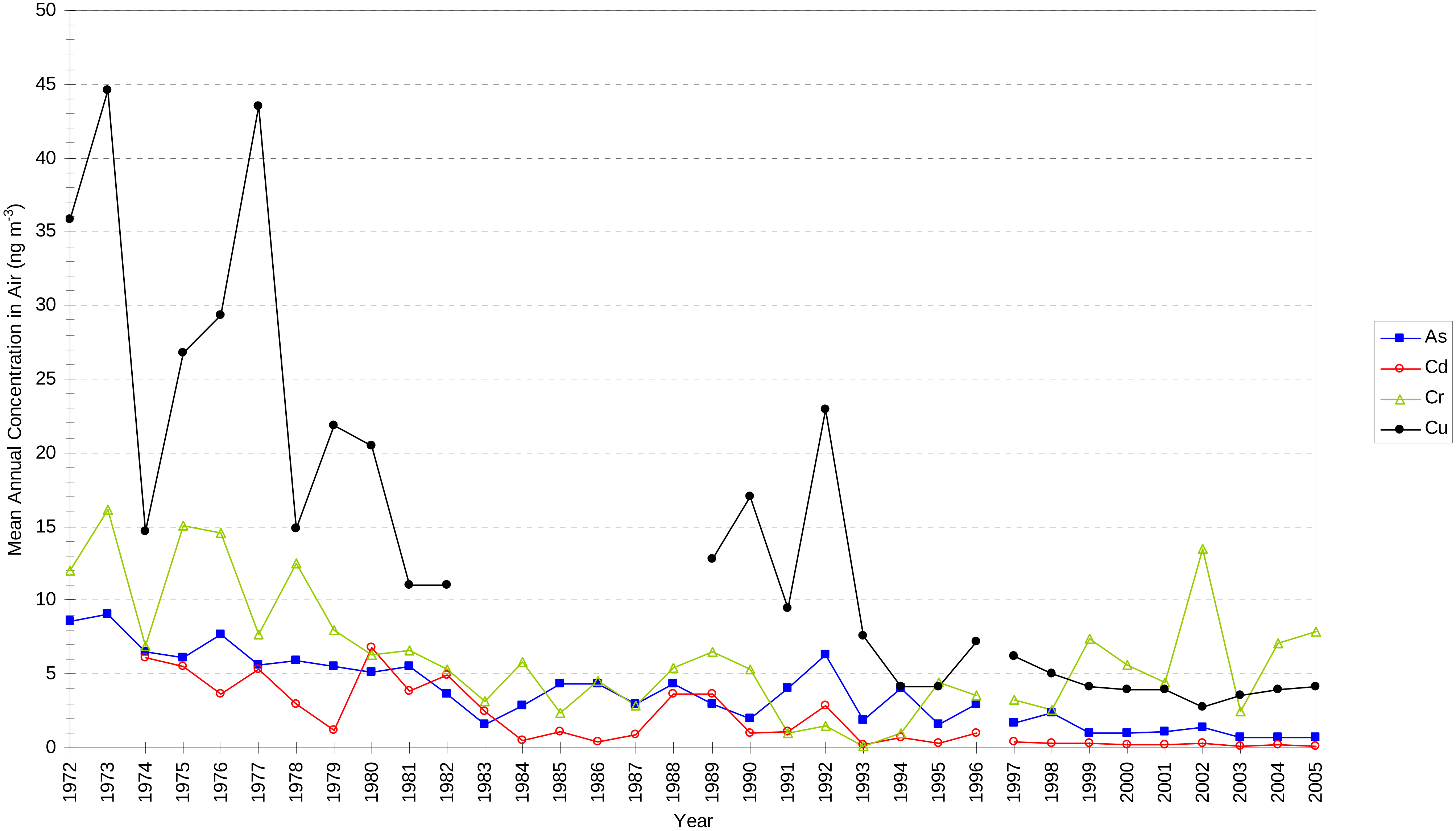

Annual Mean Concentrations of Antimony, Cobalt and Selenium in Air
at Trebanos (1972-1996) and at Pontardawe (1997-2005)
Mean Annual Concentration in Air (ng/m3)
Year
Co
Sb
Se
0
2
4
6
8
10
12
14
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005

Figure 34

Annual Mean Concentrations of Arsenic, Cadmium, Chromium and Copper in Air at Trebanos (1972-1996) and at Pontardawe (1997-2005)



No measurements of copper were made during 1983-1988.

Figure 35

Annual Mean Concentrations of Iron in Air at Trebanos (1972-1996) and at Pontardawe (1997-2005)

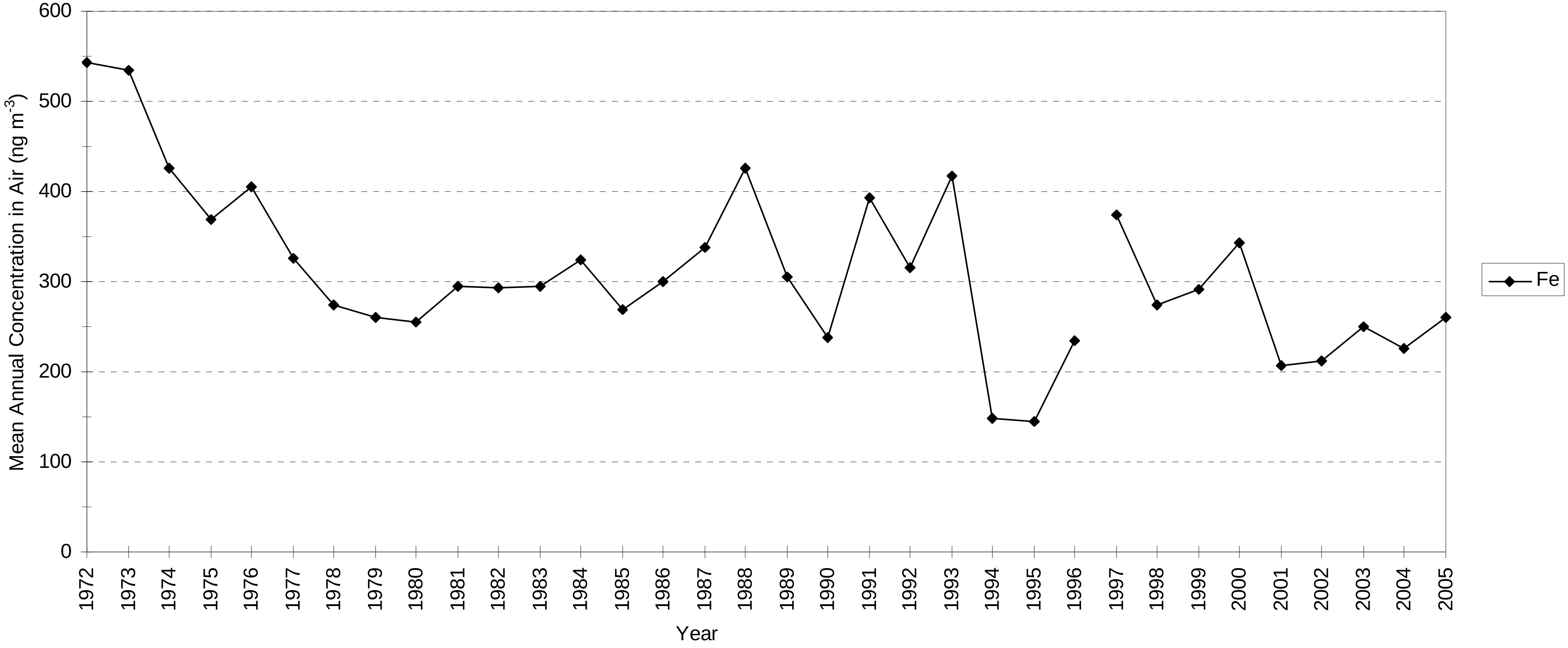
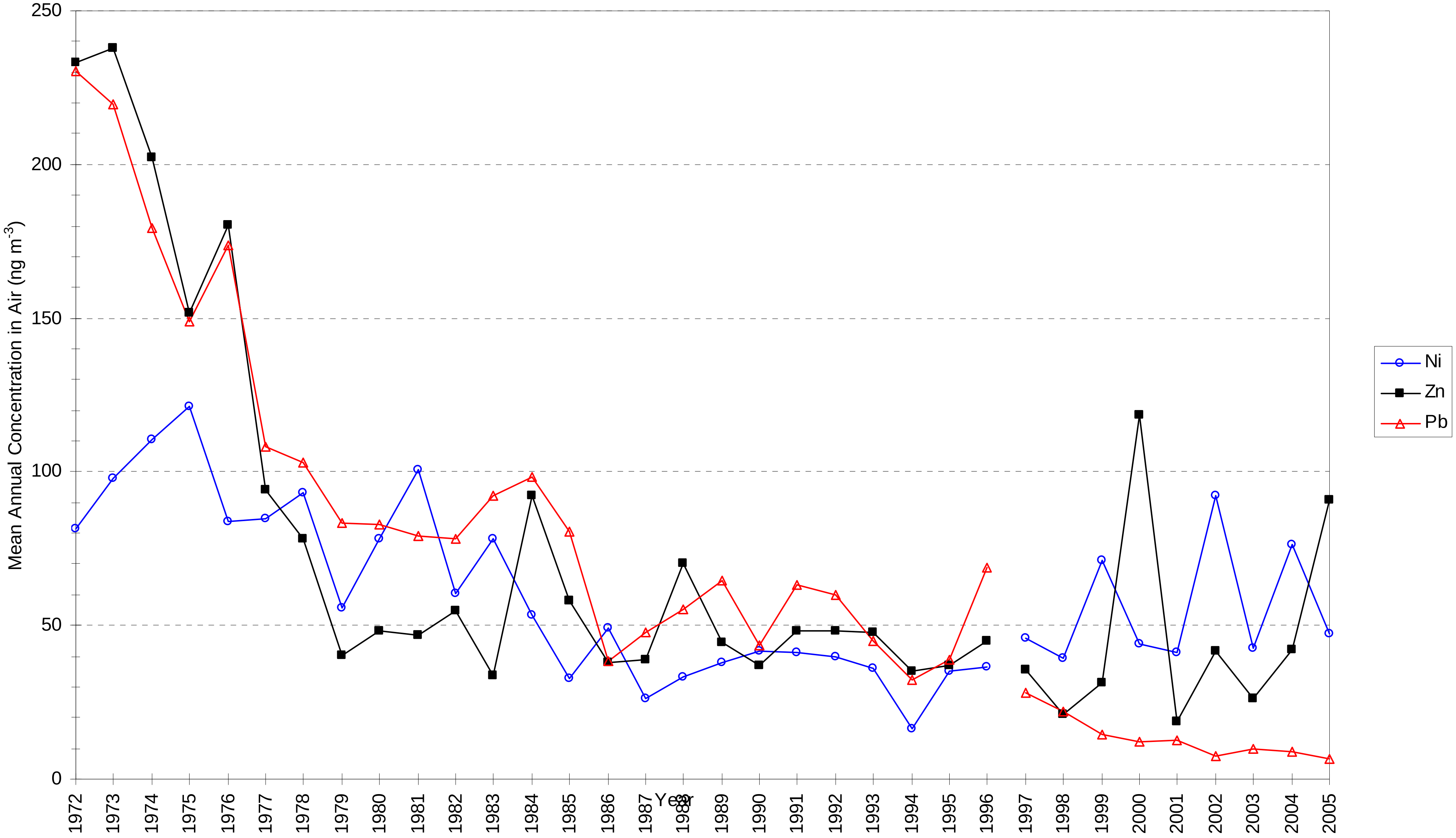


Figure 36

Annual Mean Concentrations of Lead, Nickel and Zinc in Air at Trebanos (1972-1996) and at Pontardawe (1997-2005)



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 2005 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 51.

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 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 (NO_2)

The results are summarised in Table 6. Figure 38 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 200μg/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 40μg/m^3 as the limit. The maximum hourly value was 101 μg/m^3 and the annual average was 19 μg/m^3. Therefore, no exceedences of the Air Quality Objective level occurred. No exceedences of the World Health Organisation (WHO) guideline (hourly average > 210 μg/m^3) occurred. Air pollution levels were "low" at all times. The EU Directive (98 percentile > 199.8 μg/m^3 was not breached.

There is also a limit for the protection of vegetation and ecosystems that applies to all oxides of nitrogen (30.6 μg/m^3), not just nitrogen dioxide. As the annual concentration was 19 μg/m^3, 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 27 μg/m^3 from the north.

Summary

There were no exceedences of the Air Quality objective levels for NO_2 during 2005, as was the case in previous years.

Sulphur dioxide (SO_2)

The results are summarised in Table 8. Figure 40 shows the time series graphs for SO_2 concentration for each month expressed as 15 minute averages.

Limits and objectives

The Air Quality objective level, 266µg/m^3 as a 15-minute average, was breached on one occasion during 2005. But 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 287 µg/m^3. The maximum daily average was 43 µg/m^3 and neither the Air Quality Objective (daily average 125µg/m^3 not to be exceeded more than 3 times per year) or the EU Directive (daily average >125 µg/m^3) were breached. The Air Quality Objective also has an hourly averaged limit, which is 350µg/m^3, not to be breached more than 24 times a year, which was not breached. The maximum hourly average was 223 µg/m^3. The WHO guideline (hourly average > 324.5 µg/m^3) was not breached. Air pollution was moderate for two 15 minute periods and low throughout the rest of the year.

Directional analysis

SO_2 levels (Figure 42, Table 7) were generally greatest from the south-western quadrant, peaking at 21 µg/m^3 in the west-south-west.

Summary

No breaches of any Air Quality Objective levels arose during 2005.

Ozone (O_3)

The results are summarised in Table 9. Figure 43 shows the time series graphs for O_3 concentration for each month expressed as 8 hourly running averages.

Limits and objectives

The Air Quality recommended objective for ozone is 100 µg/m^3, measured as a rolling 8hour average. This was breached on a total of 56 occasions on a total of 11 days. This is a significant improvement on the figures for 2004, where there were 83 exceedences on 12 days. All exceedences occurred between the months of March 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 142 hours of 'moderate' pollution.

Directional analysis

O_3 levels were not particularly direction dependent (see figure 44), but were slightly biased to the south west.

Summary

In 2005 there were 56 breaches of the Air quality strategy recommended objective for Ozone, an improvement on 2004.

PM_{10}

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

Limits and objectives

The average concentration was 23 μg/m^3, which was the same as during the previous year. The hourly maximum was 344 μg/m^3. The Air Quality Objective level is 50 μg/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 29 days in 2005 where the daily averages exceeded 50 μg/m^3. This is a little less than the corresponding number of exceedences in 2004, i.e. 38. However, nearly one month of data was lost in November/December due to equipment failure, which necessitated the analyser being returned to the manufacturer for repair. Air pollution was 'high' for 24 hours, 'moderate' for 293 hours and 'low' 7295 hours.

Directional analysis

Figure 46 shows that PM_{10} levels were once again highest from the west south-west (52 μg/m^3).

Summary

The Air Quality Objective Level, which is to be achieved by 31st December 2004, was complied with, but it is possible that additional exceedences may have arisen during the weeks when the equipment was being fixed. Consequently it is too soon to consider un-declaration of the Air Quality Management Area.

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/m^3 expressed as an 8hour rolling average not was exceeded. The maximum 8-hour average was 3.9 mg/m^3. 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/m^3 as an hourly average and was not exceeded since the maximum hourly average was 10.8 mg/m^3.

Directional analysis

Figure 48 shows that average CO concentrations showed a pronounced bias towards the south westerly direction 1.48 mg/m^3.

Summary

There were no breaches of the Air Quality Objective level or World Health Organisation guidelines during 2005.

An approach was previously made to Defra in order to have the carbon monoxide analyser incorporated onto the AURN national network. This was carried out because there had been an incident in 2003, when an exceedence had arisen because of an emission that arose on restarting the No.5 blast furnace. The analyser has not been incorporated yet, but is under consideration.

Summary

In 2005 there were 85 exceedences of the Air Quality Strategy recommended objective levels for all pollutants on 40 days.

The Air Quality Objective for PM_{10} was not breached in 2005 since there were only 29 exceedences, but nearly a month of data was lost due to equipment failure. Consequently it is too soon to consider un-declaration of the Air Quality Management Area.

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

There were more exceedences of air quality objectives during 2005 than the previous year, but fewer days were affected than in 2004.

Table 6 Nitrogen dioxide summary statistics 2005

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	736	620	736	716	729	713	680	742	640	741	717	740	8510
Max 15-min mean ($\mu g/m^3$)	115	115	96	94	82	80	78	73	73	86	94	84	115
Max hourly mean ($\mu g/m^3$)	101	97	88	74	65	67	67	55	63	71	78	74	101
Max running 8-hour mean ($\mu g/m^3$)	72	74	60	43	49	48	57	41	43	45	57	65	74
Max running 24-hour mean ($\mu g/m^3$)	43	43	47	35	28	37	40	35	36	34	48	51	51
Max daily mean ($\mu g/m^3$)	39	43	45	32	25	36	37	34	31	33	47	51	51
Average ($\mu g/m^3$)	18	22	24	17	14	15	15	16	17	20	26	25	19
Data Capture (%)	98.9	92.3	98.9	99.4	98.0	99.0	91.4	99.7	88.9	99.6	99.6	99.5	97.1
Annual mean > 40 $\mu g/m^3$	-	-	-	-	-	-	-	-	-	-	-	-	0
Hourly mean > 200 $\mu g/m^3$	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual mean nitrogen oxides >30 $\mu g/m^3$	-	-	-	-	-	-	-	-	-	-	-	-	0

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 2005

Direction	PM_{10} (ug/m^3)	NO_2 (ug/m^3)	SO_2 (ug/m^3)	O_3 (ug/m^3)	CO (ug/m^3)
N	11	27	2	38	0.25
NNE	12	22	2	42	0.27
NE	15	23	4	45	0.32
ENE	16	25	3	47	0.31
E	17	23	4	48	0.29
ESE	18	22	3	51	0.28
SE	20	21	3	55	0.32
SSE	24	19	7	57	0.32
S	34	18	11	59	0.36
SSW	34	13	6	65	0.58
SW	45	13	23	67	1.48
WSW	52	15	25	62	1.15
W	28	14	9	62	0.37
WNW	16	18	3	52	0.28
NW	12	23	2	45	0.25
NNW	11	27	2	41	0.24

Table 8 Sulphur dioxide summary statistics 2005

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	2	0	0	0	0	0	0	0	0	2
Number Low	2896	2434	2900	2807	2853	1402	2666	2906	2571	2896	2797	2904	32032
Max 15-min mean ($\mu g/m^3$)	133	90	141	287	162	130	136	133	117	136	221	138	287
Max hourly mean ($\mu g/m^3$)	85	59	80	223	96	90	101	88	67	90	74	88	223
Max running 8-hour mean ($\mu g/m^3$)	50	28	30	87	50	40	49	40	39	57	45	42	87
Max running 24-hour mean ($\mu g/m^3$)	29	15	15	43	24	28	22	26	23	44	22	23	44
Max daily mean ($\mu g/m^3$)	21	10	15	43	20	18	21	24	20	42	20	17	43
Average ($\mu g/m^3$)	7	6	6	9	6	6	7	9	9	7	7	6	7
Data Capture (%)	99.1	92.4	99.5	99.4	98.0	49.4	91.5	99.7	91.1	99.2	99.2	99.6	93.3
15-min mean > 266 ($\mu g/m^3$)	0	0	0	1	0	0	0	0	0	0	0	0	0
Hourly mean > 350 ($\mu g/m^3$)	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily mean > 125 ($\mu g/m^3$)	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual mean > 20 ($\mu g/m^3$)	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Table 9 Ozone summary statistics 2005

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	2	19	23	22	39	15	22	0	0	0	142
Number Low ($\mu g/m^3$)	743	624	742	646	711	692	566	729	641	2896	720	673	8271
Max 15-min mean ($\mu g/m^3$)	94	84	112	134	148	132	140	142	122	136	86	86	148
Max hourly mean ($\mu g/m^3$)	86	82	110	130	144	124	136	136	122	90	82	84	144
Max running 8-hour mean ($\mu g/m^3$)	78	80	91	115	116	108	122	123	106	57	79	81	123
Max running 24-hour mean ($\mu g/m^3$)	74	77	74	94	87	94	92	97	97	44	75	77	97
Max daily mean ($\mu g/m^3$)	73	76	73	91	85	85	89	90	87	42	73	75	91
Average ($\mu g/m^3$)	54	51	54	65	71	59	51	46	54	7	42	37	53
Data Capture (%)	99.1	92.4	99.1	91.4	96.9	98.3	80.4	99.7	91.3	99.2	99.6	89.9	94.8
Running 8-hour mean > 100 ($\mu g/m^3$) – exceedences (No. days)	0 (0)	0 (0)	0 (0)	9 (2)	10 (2)	7 (3)	13 (2)	11 (1)	6 (1)	0 (0)	0 (0)	0 (0)	56 (11)

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

Table 10 PM_{10} summary statistics 2005

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	10	4	10	0	0	0	0	0	24
Number Moderate	43	0	0	25	33	61	99	0	10	22	0	0	293
Number Low	701	611	744	695	651	655	546	714	624	722	68	564	7295
Max 15-min mean (µg/m^3)	541	176	223	181	320	301	266	163	153	164	109	146	541
Max hourly mean (µg/m^3)	344	111	136	152	251	223	236	113	116	128	62	100	344
Max running 8-hour mean (µg/m^3)	116	63	60	102	124	142	142	72	78	96	36	50	142
Max running 24-hour mean (µg/m^3)	70	37	38	54	79	76	77	47	51	72	32	44	79
Max daily mean (µg/m^3)	59	31	38	52	76	64	77	40	49	71	30	40	77
Average (µg/m^3)	24	16	20	23	22	29	29	23	23	22	26	17	23
Data Capture (%)	99.5	92.1	99.5	99.3	92.5	97.8	86.8	96.2	90.8	98.5	7.8	77.7	86.6
Daily mean > 50 (gravimetric)	6	0	0	2	3	8	6	1	1	1	0	1	29
Annual mean > 40 (gravimetric)	-	-	-	-	-	-	-	-	-	-	-	-	0

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

Table 11 Carbon monoxide summary statistics 2005

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	727	612	620	705	379	704	665	739	661	737	713	733	7995
Max 15-min mean (mg/m^3)	5.8	5.2	7.7	7.7	4.8	12.5	12.0	5.4	3.2	2.3	7.2	4.9	12.5
Max hourly mean (mg/m^3)	3.8	5.3	5.7	6.3	3.6	10.8	6.6	2.9	3.5	2.1	6.0	3.8	10.8
Max running 8-hour mean (mg/m3)	2.7	3.4	2.9	3.9	2.7	3.0	2.3	2.0	2.3	1.9	2.7	2.1	3.9
Average (mg/m^3)	0.5	0.3	0.4	0.7	0.7	0.5	0.5	0.4	0.3	0.2	0.4	0.5	0.4
Data Capture (%)	99.1	92.6	84.8	99.0	55.9	99.2	91.4	100.0	93.9	99.6	99.7	99.2	92.8
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/m^3

Figure 37 Wind speed and direction: 2005

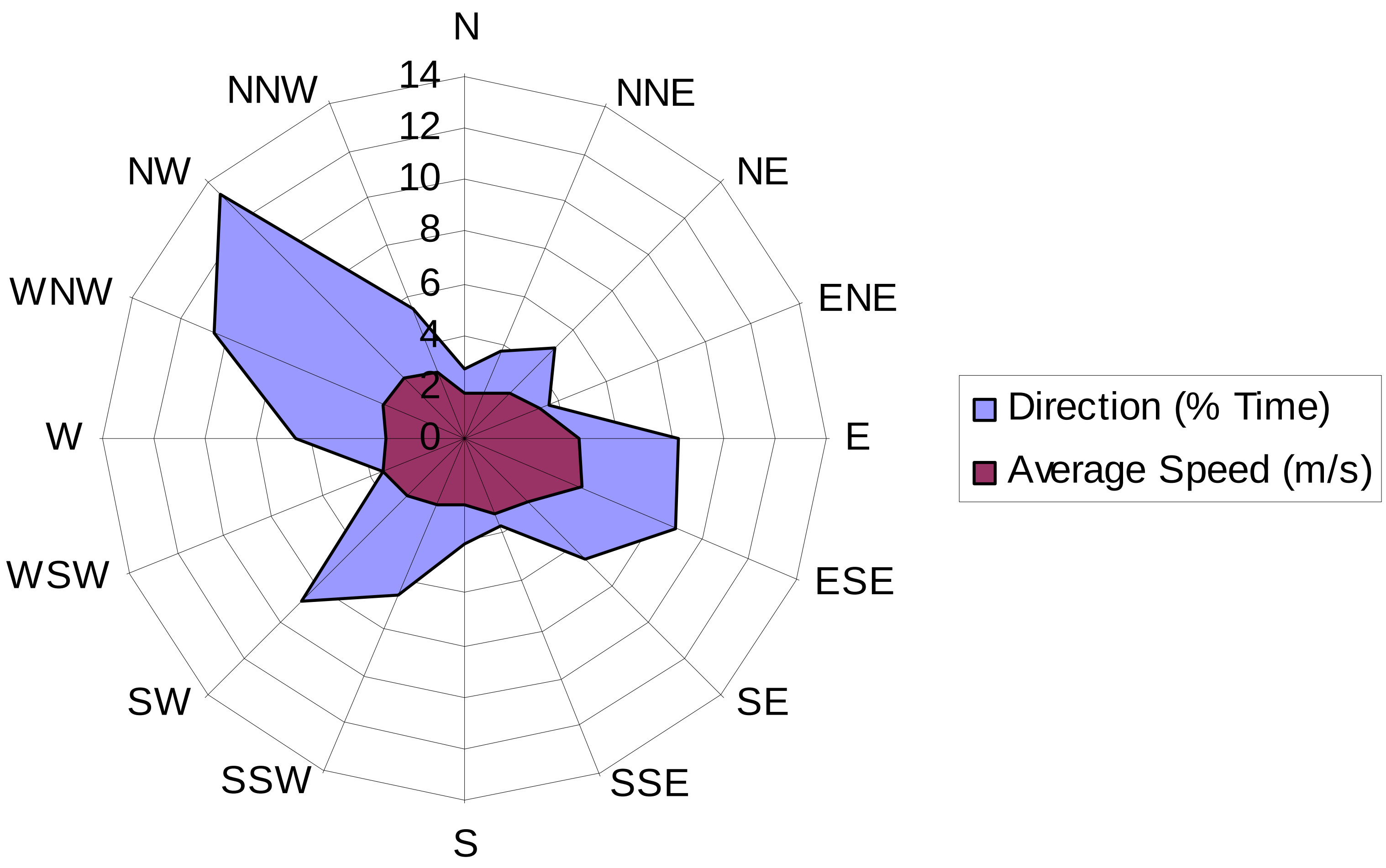


Figure 38 Nitrogen dioxide results – 2005 - hourly averages

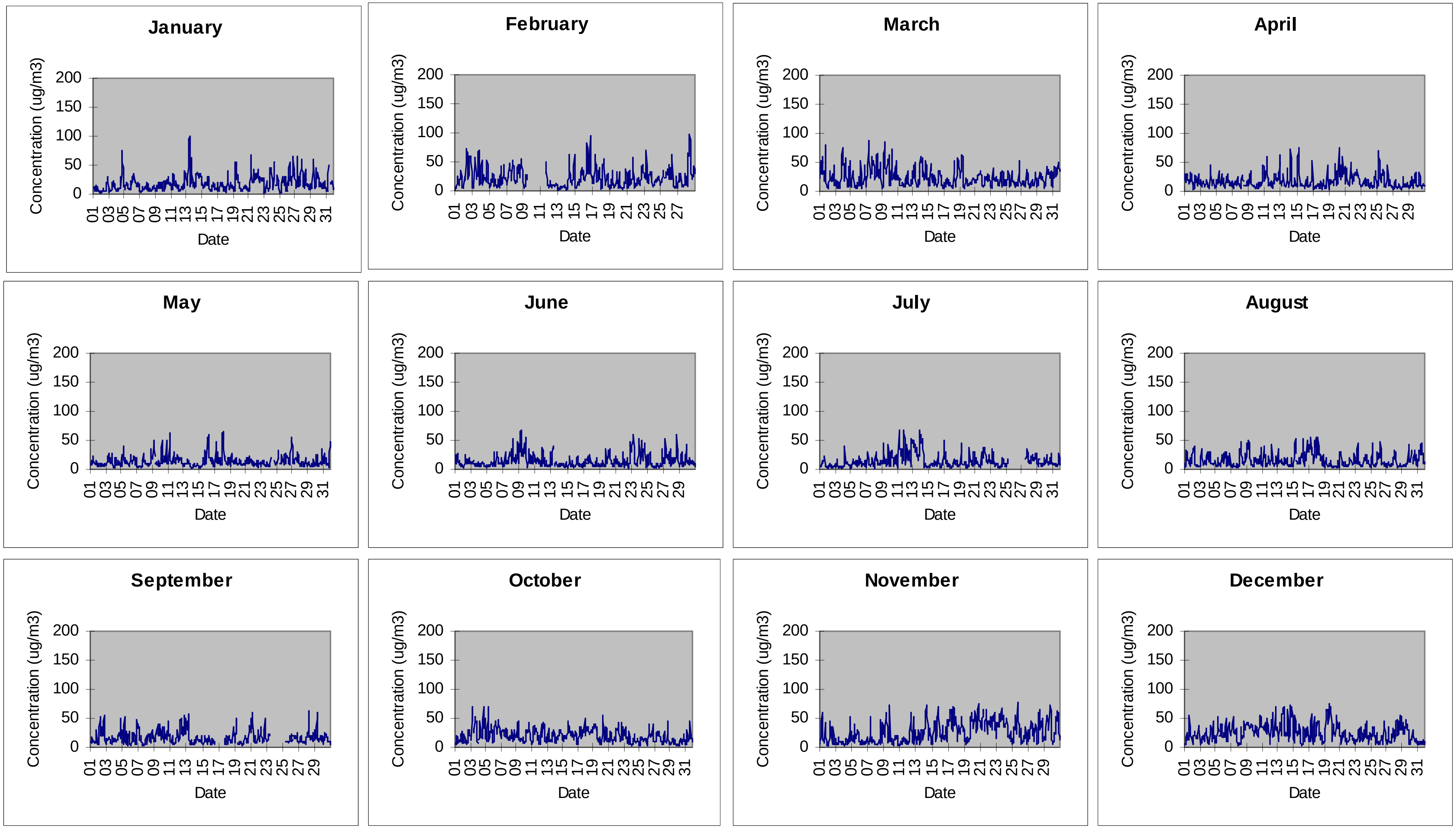


Figure 39 Average nitrogen dioxide levels by wind direction in 2005

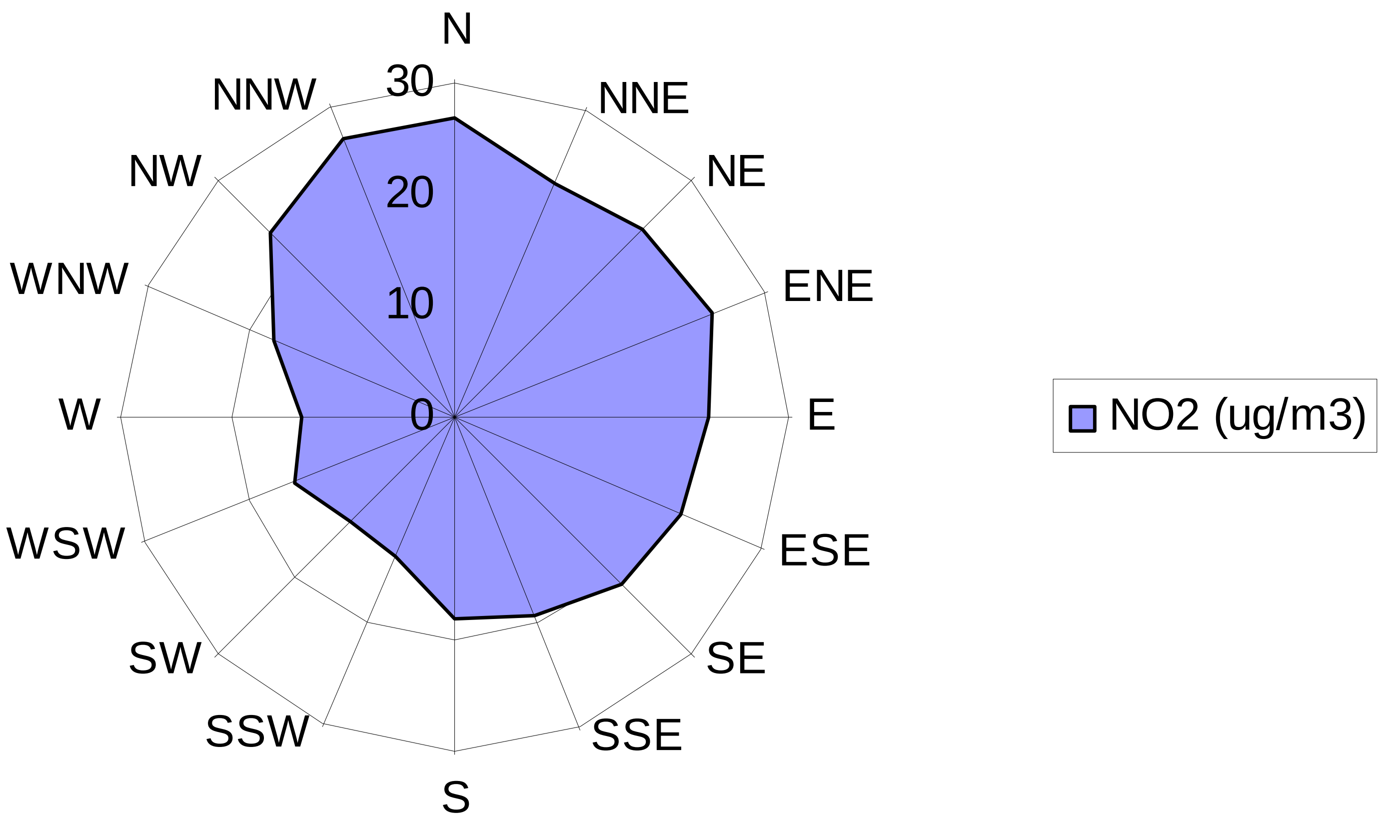


Figure 40 Sulphur dioxide results – 2005 – 15minute averages

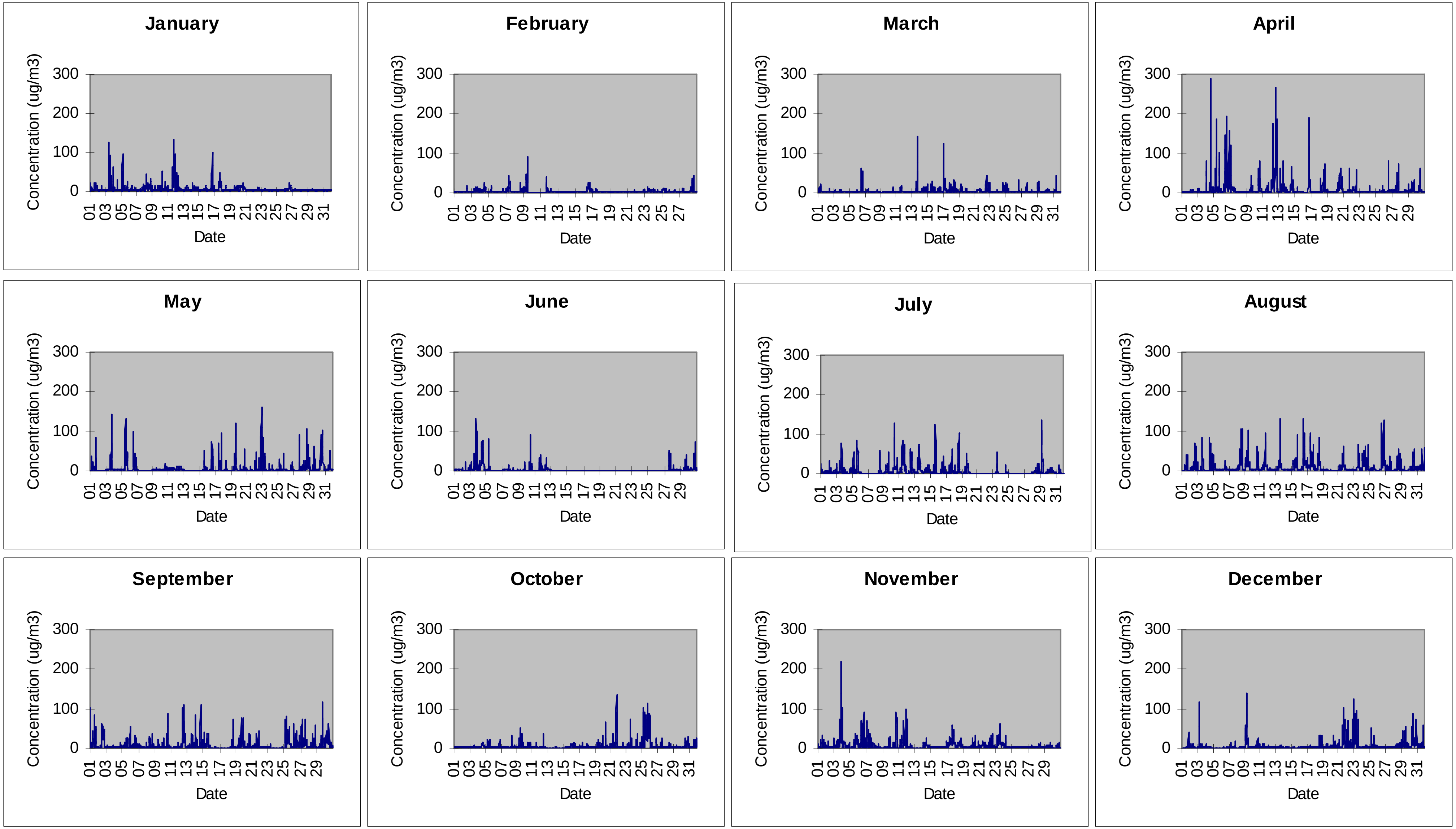


Figure 42 Average sulphur dioxide levels by wind direction in 2005

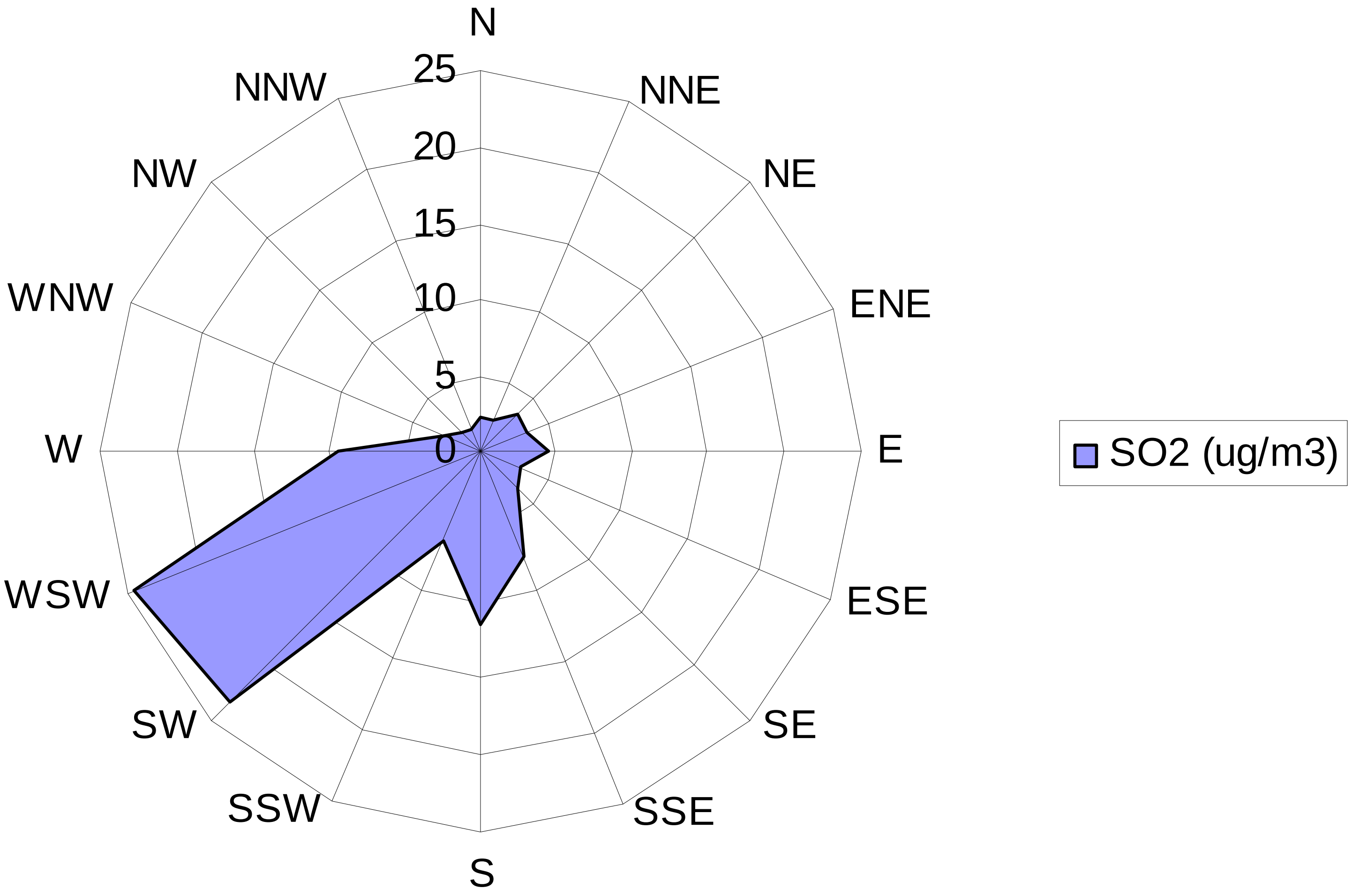


Figure 43 Ozone results – 2005 – 8hour running averages

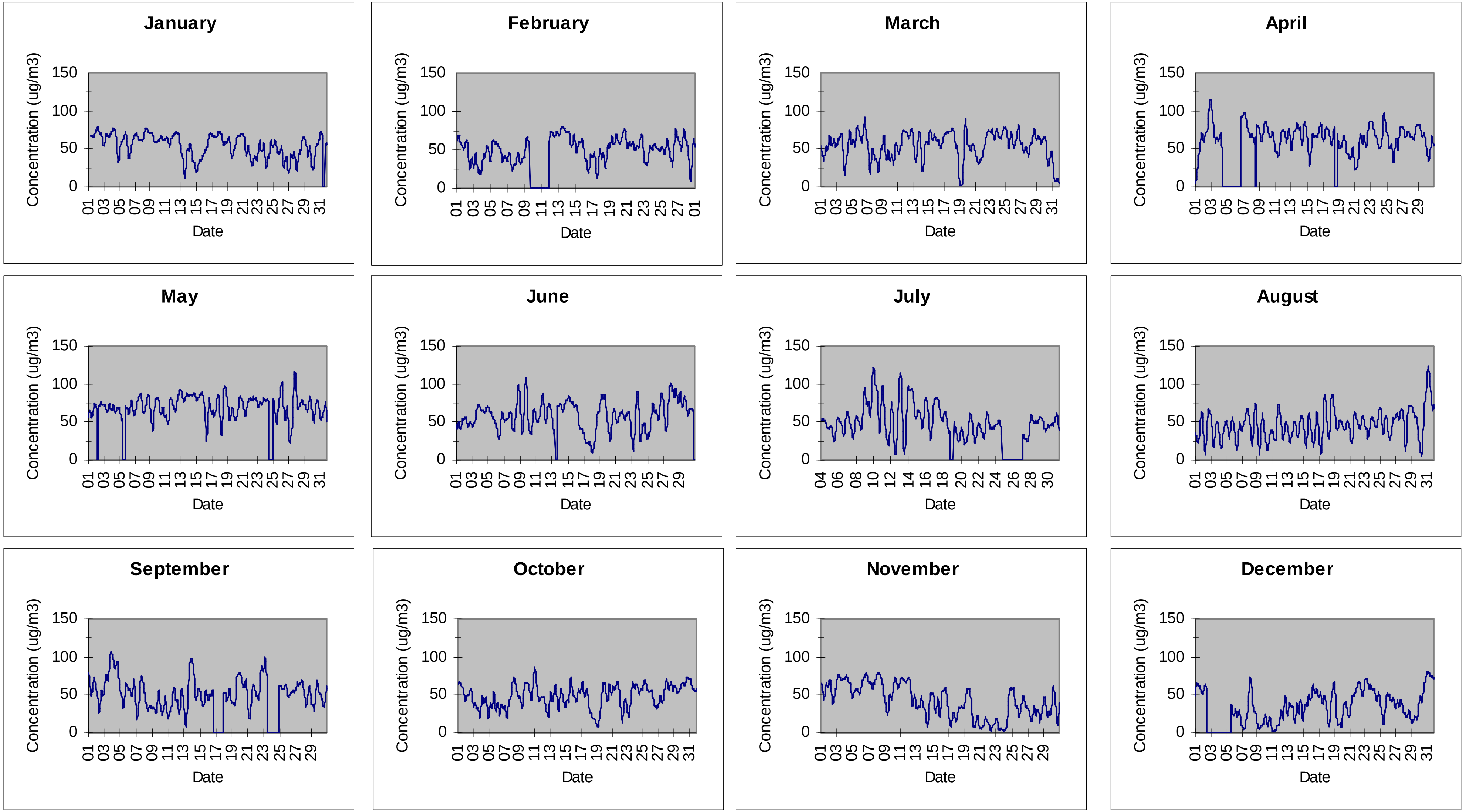


Figure 44 Average ozone levels by wind direction in 2005

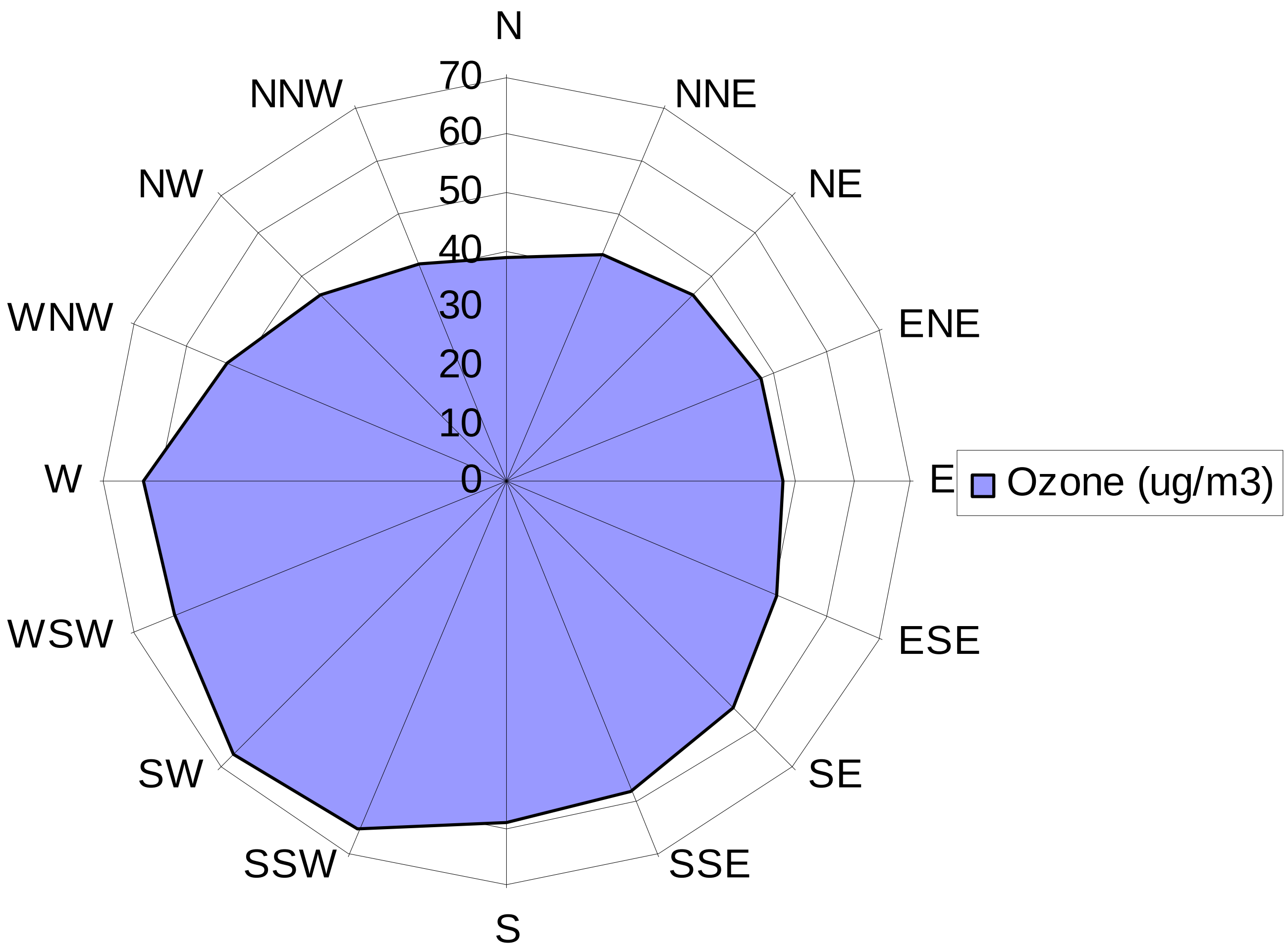


Figure 45 PM_{10} results – 2005 - 24hour running averages

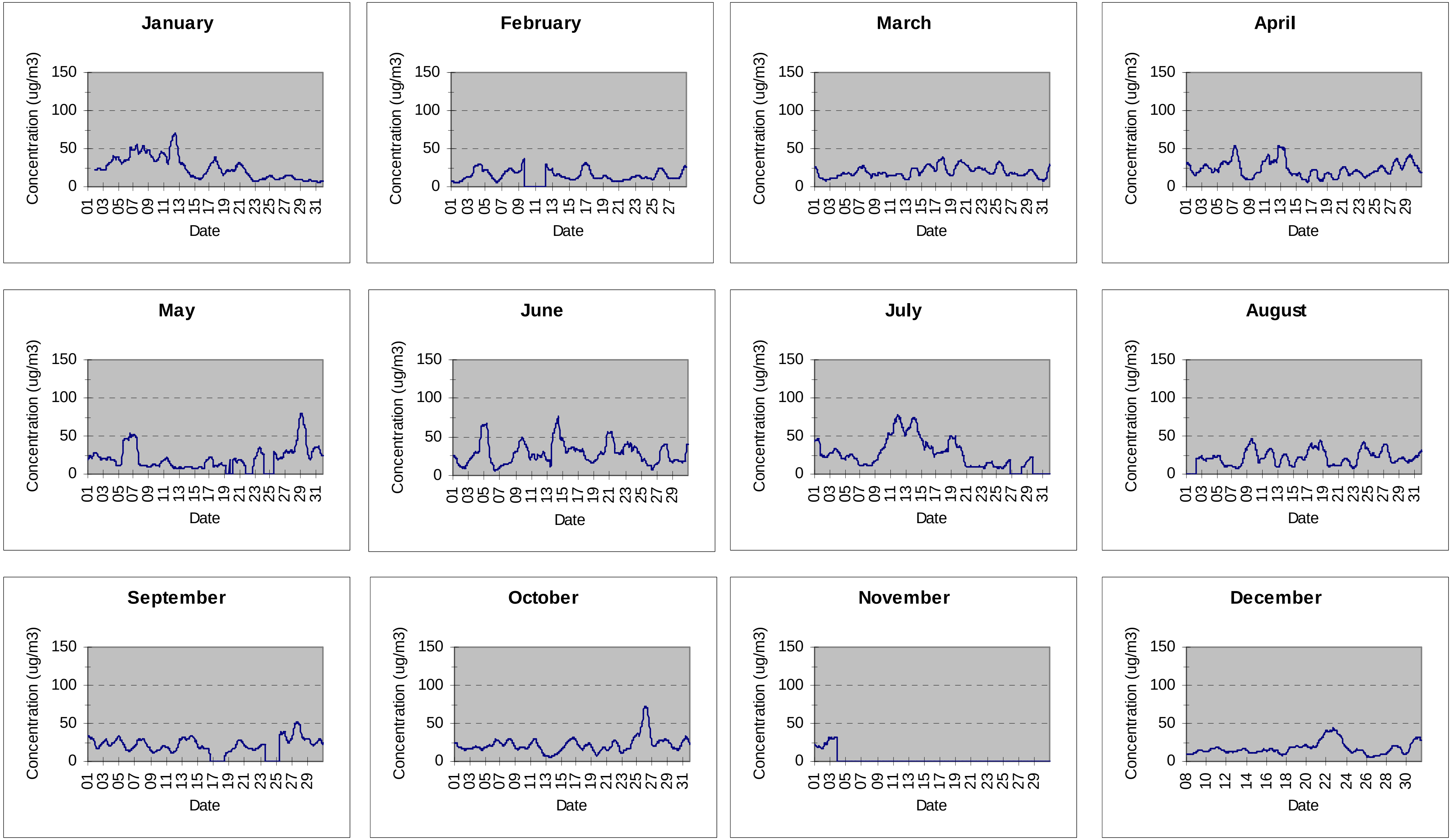


Figure 46 PM_{10} particulate levels by wind direction in 2005

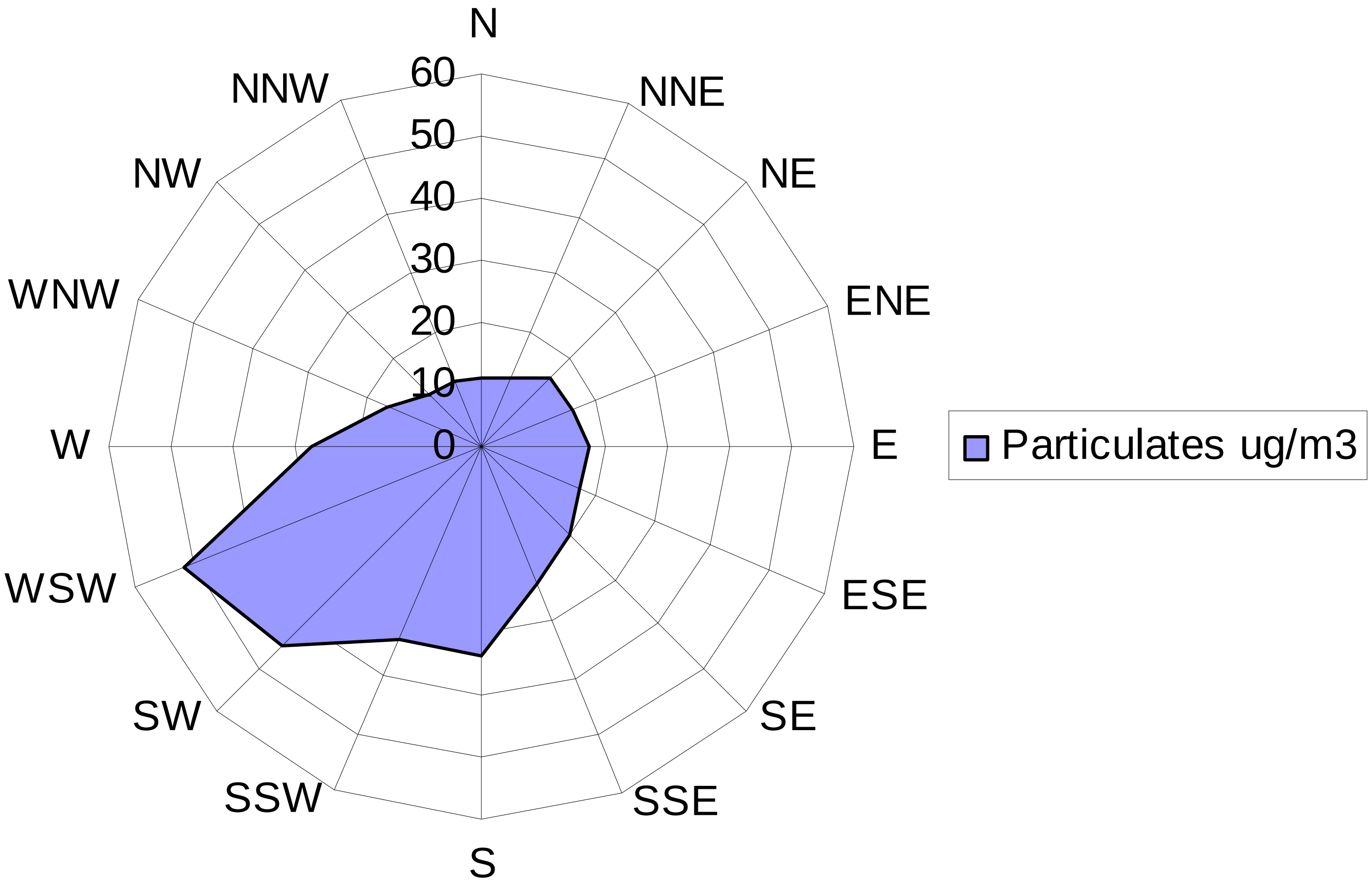


Figure 47 CO results – 2005 - 8hour running averages

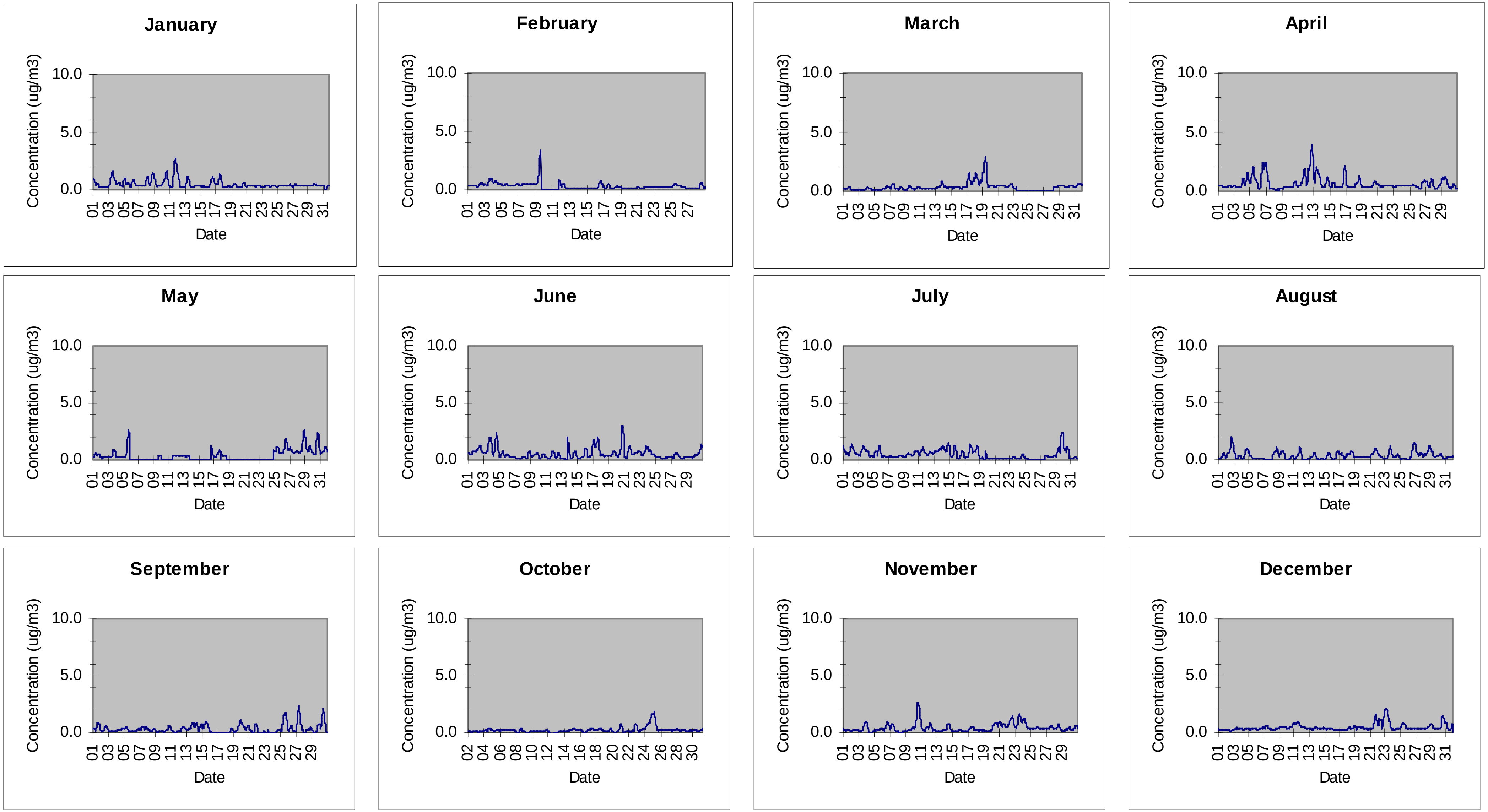
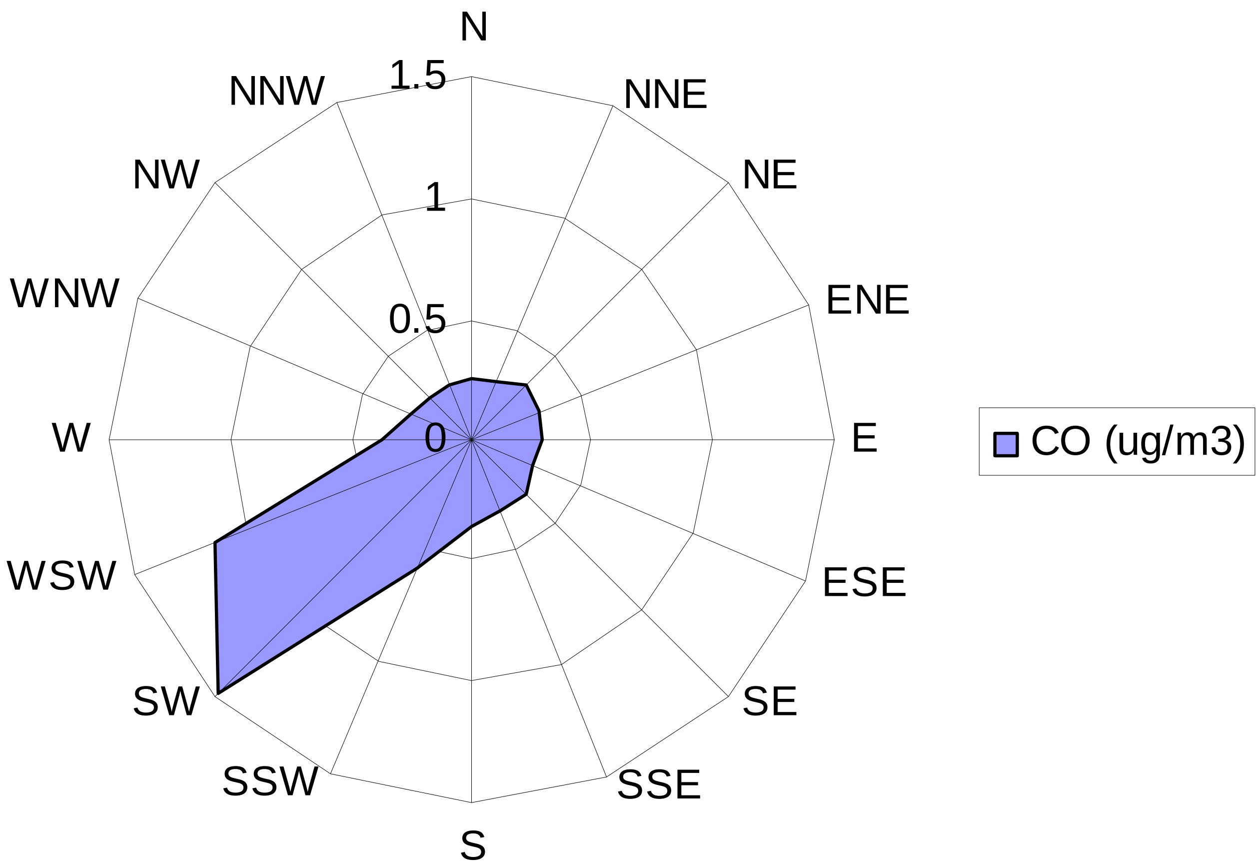


Figure 48 CO levels by wind direction in 2005



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

Results and analysis

The results for 2005 at Baglan are summarised in Table 15 below. The National Hydrocarbon Network site at Cardiff has been used previously for comparison since it is the nearest such site where similar measurements are carried out. However, the data capture rate during 2005 was less than 75% and statistics cannot be quoted where data capture rates are less than this value. Therefore only data collected at Baglan is reported.

Table 12 VOC results at Baglan - 2005

	Average (ppb)	Max (ppb)
VOC Species	**Baglan**	**Baglan**
1,3-butadiene	0.02	1.34
1-butene	0.06	3.85
3-methyl pentane	ND	ND
Benzene	0.03	0.80
Ethane	0.62	15.52
Ethene	1.69	22.51
Ethyl benzene	0.06	4.16
Ethyne	0.27	5.07
Propane	0.04	0.46
Propene	0.14	50.68
Toluene	0.17	9.39
cis 2-butene	0.05	16.16
cis 2-pentene	0.58	10.11
iso-pentane	0.16	6.62
Isobutane	0.28	10.88
m-xylene	0.11	16.73
o-xylene	0.65	23.09
n-butane	0.04	1.37
n-heptane	0.02	0.31
n-hexane	0.01	0.28
n-pentane	0.05	5.69
trans 2-butene	0.03	1.40
trans 2-pentene	0.05	7.92

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

The average annual concentrations of benzene and 1,3-butadiene show that concentrations were generally 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.

Monitoring of these substances was discontinued in 2006 because the measured levels had decreased to around background concentrations and further monitoring could not be justified.

Figure 49 VOC Average concentrations – 2005

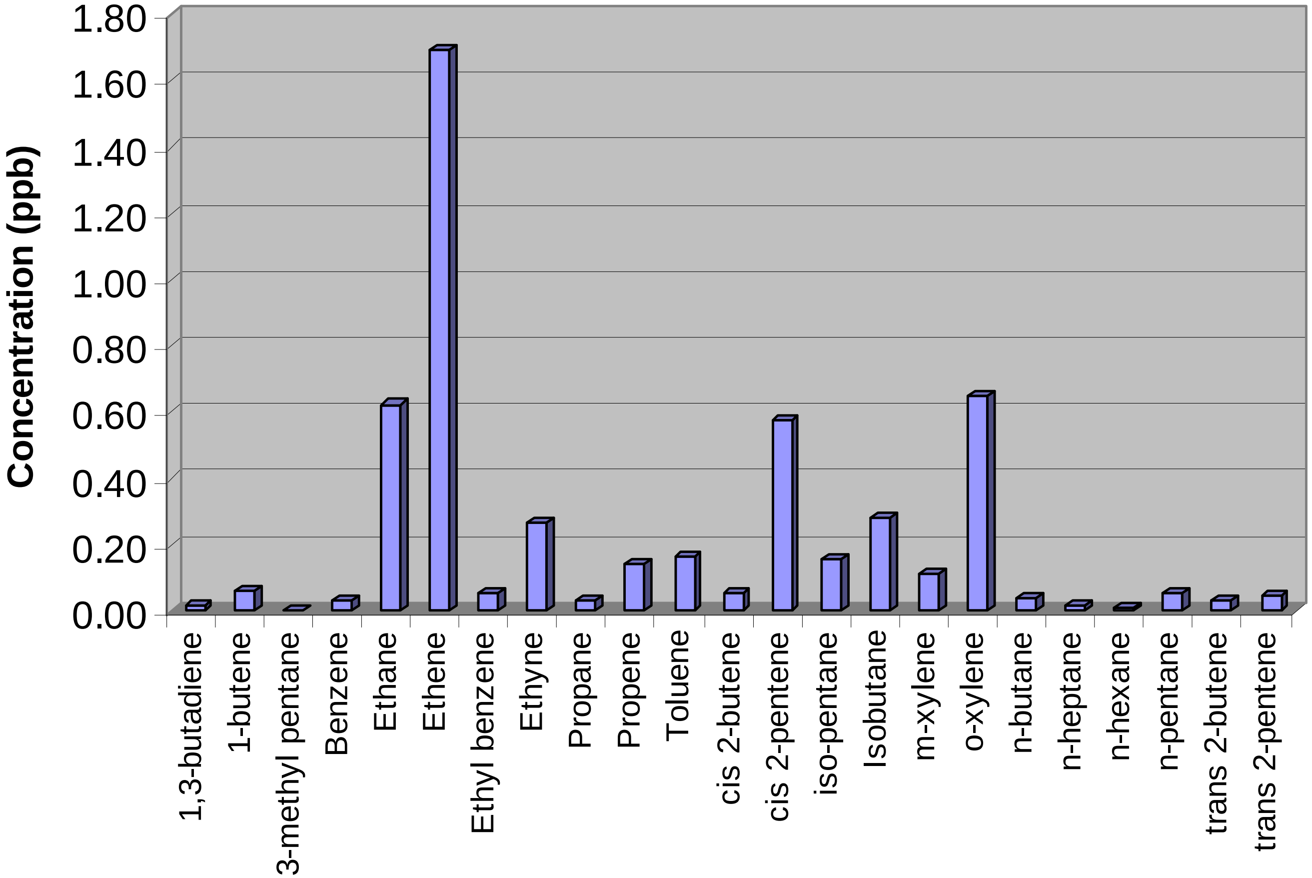


Figure 50 VOC maximum concentrations – 2005

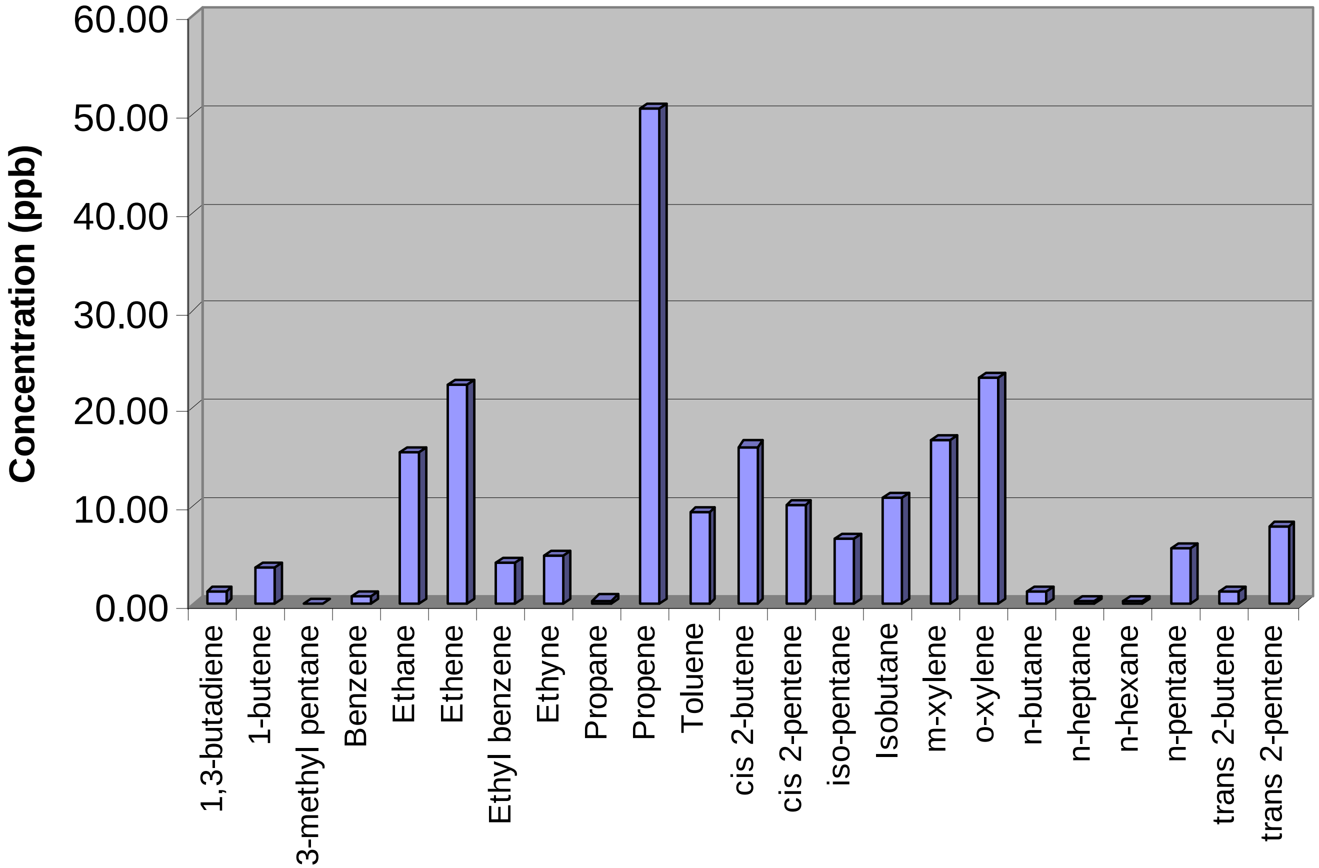


Figure 51 Continuous analyser locations

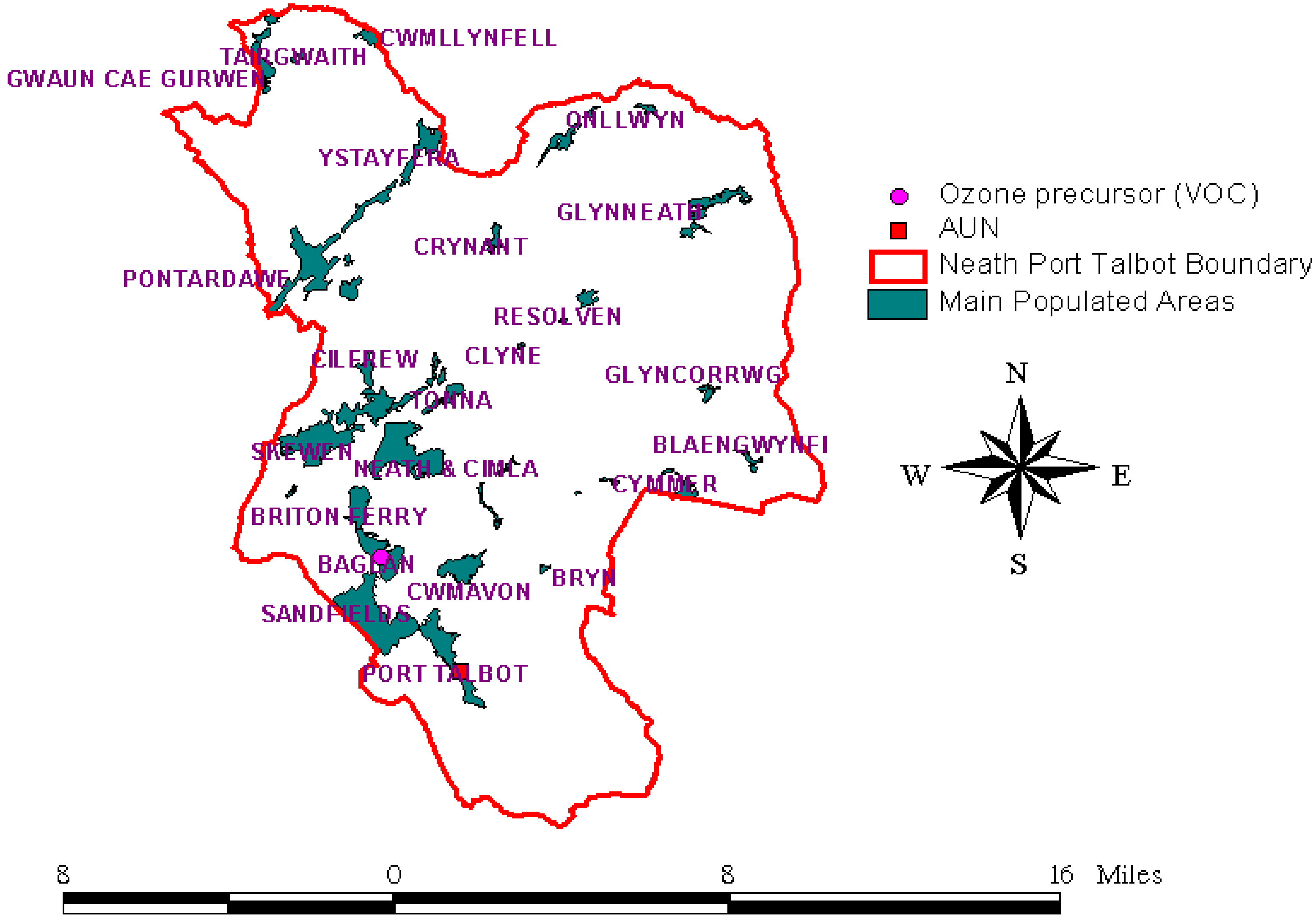
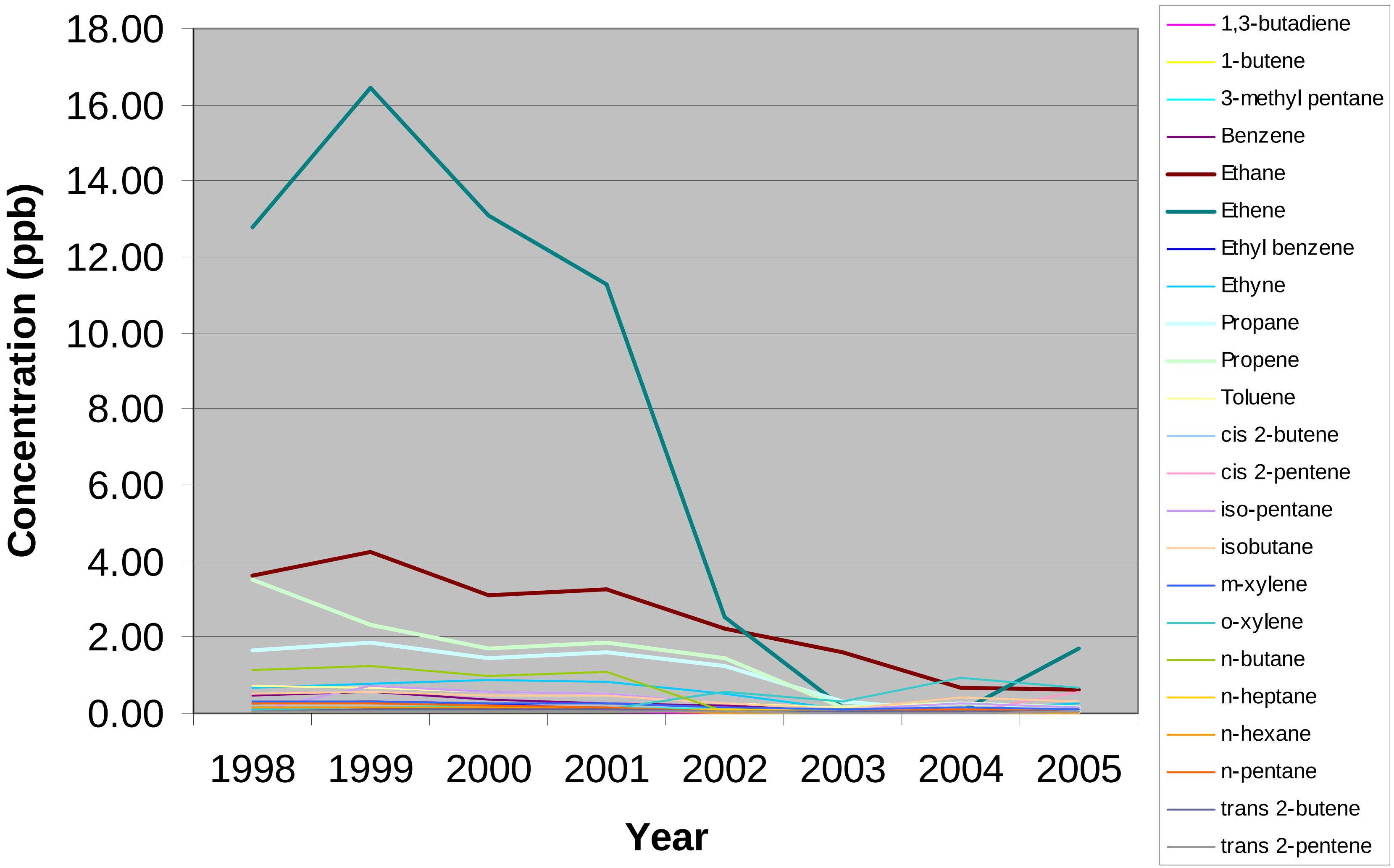


Figure 52 VOC maximum concentrations – 2005



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

Air Quality Objectives - Continued

	40 µg/m³	Annual Mean	31 December 2004
Sulphur dioxide	266 µg/m³ (100 ppb) Not to be exceeded more than 35 times per year	15 Minute Mean	31 December 2005
	350 µg/m³ (132 ppb) Not to be exceeded more than 24 times per year	1 Hour Mean	31 December 2004
	125 µg/m³ (47 ppb) Not to be exceeded more than 3 times per year	24 Hour Mean	31 December 2004
	(V) 20 µg/m³ (8 ppb)	Annual Mean	31 December 2000
	(V) 20 µg/m³ (8 ppb)	Winter Mean (01 October - 31 March)	31 December 2000

Notes:
µg/m³ - micrograms per cubic metre
mg/m³ - 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