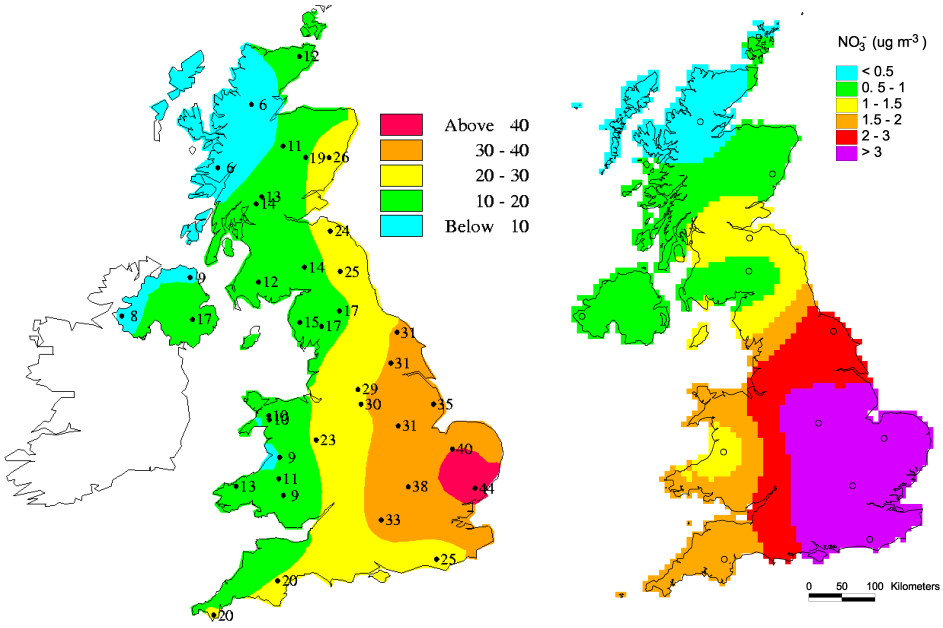
REPORT

# Management and Operation of the UK Acid Deposition Monitoring Network: Data Summary for 2004

A Report produced for
the Department for Environment, Food and Rural Affairs,
the Scottish Executive, the Welsh Assembly Government,
and the Department of the Environment Northern Ireland




Maps of the Precipitation-weighted Concentration of Nitrate (in μeq $l^{-1}$)
and of gaseous Nitric Acid (in μg $m^{-3}$) for 2004

AEAT/ENV/R/2093 Issue 1
December 2005

# Management and Operation of the UK Acid Deposition Monitoring Network: Data Summary for 2004

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December 2005

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|---|---|
| **Title** | Management and Operation of the UK Acid Deposition Monitoring Network: Data Summary for 2004 |
| **Customer** | Department for Environment, Food and Rural Affairs and the Devolved Administrations |
| **Customer reference** | EPG 1/3/193 |
| **Confidentiality, copyright and reproduction** | |
| **File reference** | |
| **Report number** | AEAT/ENV/R/2093 |
| **Report status** | Issue 1 |

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# Executive Summary

This is the fourth annual data report prepared on the contract *Management and Operation of the UK Acid Deposition Monitoring Network* (EPG 1/3/193), let by the Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations (the Scottish Executive, the National Assembly for Wales and the Northern Ireland Department of the Environment). This data report contains a comprehensive summary of the measurements made in the network for the year 2004.

The Acid Deposition Monitoring network was established in 1986 to monitor the composition of precipitation and hence to provide information on deposition of acidifying compounds in the United Kingdom. The aims of the rainwater sampling programme are to provide (1) high quality data which can be used to identify trends with time and (2) information on the spatial distribution of acid deposition in the United Kingdom. In addition to the sampling of rainwater at the network sites, a range of other measurements are made which provide a more complete understanding of precipitation chemistry in the United Kingdom.

Following the retendering of the monitoring contract in 2001, significant changes were made to the measurement programme and the acid deposition sampling at the Jenny Hurn site in Lincolnshire was discontinued. These changes were effective from the commencement of the new contract in November 2001.

**The 2004 Measurements**

2004 was a low pollution year. The average rainfall for England and Wales in 2004 was 40% larger than the long-term average. Such a wet year will tend to produce lower volume weighted concentrations for sites in England. Scotland was slightly drier (~3% lower than the long term average and Northern Ireland slightly wetter than the long term average (~8% larger than the long-term average). England and Scotland were particularly wet during August. Northern Ireland and Scotland experienced a wet June. Northern Ireland and England were dry during November.

The key highlights from the 2004 measurements were:

- The concentrations were lower than the high values observed in 2003 and more consistent with long-term trends. There were no major episodes of elevated concentrations.
- The 2004 measurements provided further confirmation of the spatial patterns in trends previously observed.
- The maps of the precipation-weighted concentrations of acidity, ammonium, nitrate and non-seasalt sulphate show that:
  - the hydrogen ion concentration tends to be highest on the eastern sea board where the rainwater volume is smallest. Concentrations appear relatively constant in recent years.
  - the highest concentrations continue to be measured in the source region.
  - the nitrate concentrations are remarkably consistent throughout the six years. There is no obvious trend.
  - ammonium concentrations are highest in the areas of the United Kingdom where intensive livestock activity is highest.
- Sulphur dioxide concentrations were lower in 2004. The annual mean sulphur dioxide concentration has decreased substantially at all sites. For example, the annual mean at High Muffles has decreased by a factor of 10 from an annual mean concentration of 7.3 $\mu$g $SO_2$ (as S) $m^{-3}$ in 1987 to 0.77 $\mu$g $SO_2$ (as S) $m^{-3}$ in 2004. Particulate sulphate concentrations were also lower in 2004 but the decline in concentrations has been less marked.
- The annual mean concentrations of nitrogen dioxide were amongst the lowest measured at the network sites. The highest concentrations were observed in the Midlands and southern England

with an annual mean concentration of 9.5 ppb determined at Woburn in 2004. This reflects the proximity to the sampling sites of roads and other aspects of urbanisation. The maps show little difference in the spatial patterns between 1999 and 2004 but clear evidence of a decrease in nitrogen dioxide concentrations across the UK.

- The Nitric Acid Monitoring network continues to provide new data on the behaviour of gaseous and aerosol species involved in transboundary and urban air pollution. The measurement data have been used to derive maps of the spatial distribution of gaseous nitric acid and hydrogen chloride in the UK and of the corresponding aerosol components - nitrate and chloride.

The measurements made in the nitric acid denuder network were used to calculate UK deposition budgets for $HNO_3$. Using interpolated concentrations, the deposition budgets were calculated to be 57, 73, 62 and 87 ktonne $HNO_3$ (as N) per annum for the years 2000-2003. The variation between years is due to the variability in the interpolated concentrations.

**Use of the Measurement Data**

The UK network also forms part of the wider network of the European Monitoring and Evaluation Programme. Results from this network are used to underpin the modelling studies that form the basis of negotiation of UN ECE Protocols for controlling the transboundary transport of acidifying pollutants.

The measurements made in the networks have been passed to CEH Edinburgh, the current holder of the contract of the Acid Deposition Processes in the UK, to enable the calculation of deposition maps and budgets. Further, acid deposition and critical load exceedence at protected sites (SSSIs, SACs, SPAs, RAMSAR sites) is an area of increasing importance as a result of the Habitats Directive. The Department has a Public Service Agreement target (Target 6) which aims to bring 95% of all nationally important wildlife sites into favourable condition by 2010, compared to 60% of sites currently estimated to be in such condition. The maps produced by CEH for this PSA target are derived from the measurements made in this monitoring programme.

The measurements made in the networks have been and continue to be key inputs into the expert reviews of our understanding of acid deposition provided formerly by the Review Group on Acid Rain and more recently by the National Expert Group on Transboundary Air Pollution (NEGTAP).

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# Appendices

# 1. Introduction

This is the fourth annual data report prepared on the contract *Management and Operation of the UK Acid Deposition Monitoring Network* (EPG 1/3/193), let by the Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations (the Scottish Executive, the National Assembly for Wales and the Northern Ireland Department of the Environment). This data report contains a comprehensive summary of the measurements made in the network for the year 2004.

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The measurements made in the networks have provided key inputs into the comprehensive reviews of our understanding of acid deposition undertaken by the Review Group on Acid Rain [RGAR, 1990; RGAR, 1997]. The third and fourth reports of RGAR covered the periods from 1986 to 1988 and from 1992 to 1994, respectively [RGAR, 1990; RGAR, 1997]. The results informed the deliberations of the National Expert Group on Transboundary Air Pollution (NEGTAP) which the Department established in 1999 to advise on transboundary air pollution issues and specifically whether the reductions in the emissions of acidifying pollutants have been effective in promoting the recovery of ecosystems affected by acid deposition. A report was published by NEGTAP in 2001 [NEGTAP, 2001].

This annual data report is structured as follows:

- Section 2 describes the monitoring networks and the sampling techniques employed, together with the changes made to the network in 2004;
- Section 3 gives an overview of the results from the Acid Deposition Networks for 2004 and presents concentration maps for non-seasalt sulphate, nitrate, ammonium, hydrogen ion and nitrogen dioxide, together with the trends in all acidifying components measured as part of the acid rain monitoring programme;
- Section 4 describes the nitric acid monitoring network and the measurements made;
- Section 5 reports (a) on the comparison of the measurements made by co-located weekly and fortnightly bulk rainwater collectors and (b) the results of the 22$^{nd}$ EMEP Laboratory Intercomparison.

Summary tables of the bulk precipitation composition data for 2004 at the individual sites are presented in Appendix 1. Time series graphs for data collected since 1986 and seasonal variation plots are presented, together with details of the sites themselves. Appendix 2 presents all the annual concentrations at each site since 1986, together with the annual rainfall amounts determined using the bulk rain collector. The individual measurements of sulphur dioxide and particulate sulphate are provided in Appendix 3, together with the monthly and annual mean concentrations calculated for each site. Appendix 4 provides a summary of the nitrogen dioxide measurements, together with the annual mean concentrations calculated for each site. Appendix 5 provides a complete set of the measurements made in the $HNO_3$ Denuder Monitoring Network in 2004. Appendix 6 describes the geostatistical techniques that have been used to calculate the concentration maps in this report.

# 2. The Monitoring Programme

## 2.1 THE ACID DEPOSITION MONITORING NETWORK

### 2.1.1 Site Locations

The Acid Deposition Monitoring Network formerly comprised two monitoring networks in which rainwater samples were collected and analysed. The aim of the first network, known as the "Primary" network, was to provide high quality and high frequency data, which could be used to identify trends with time. The second network, the "Secondary" network, provided information on the spatial distribution of acid deposition in the UK. Originally there were 9 primary and 59 secondary sampling sites. Following recommendations from RGAR, both networks were reduced in size to 5 and 32 sites, respectively, in 1989. The spatial distribution of the sites is shown in Figure 2.1.

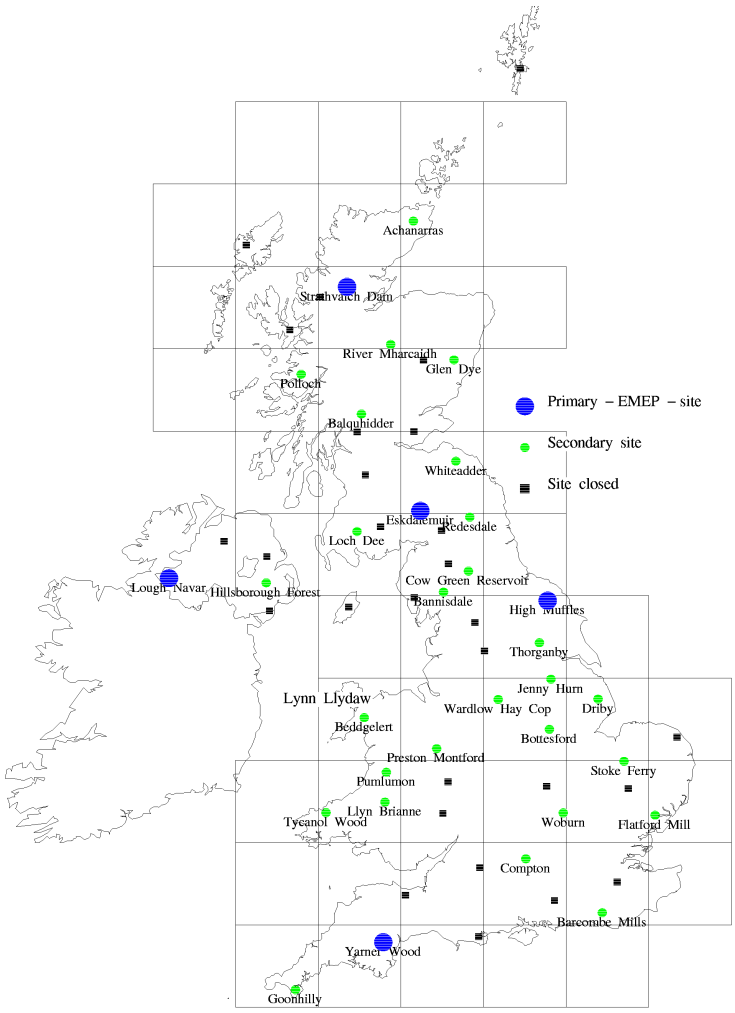



**Figure 2.1:** ***Location of the Current Primary and Secondary Sampling Sites (Also presented are the locations of the sites no longer operating. The 100 km squares show how the sampling site coverage meets the original coverage objective.)***

In recent years, the distinction between the "Primary" and "Secondary" networks has become blurred with the changes to the monitoring programme.

Seven new sites were established in the early part of 1999 to monitor rainwater composition in ecologically sensitive locations. The locations of the sites are

- Lochnagar
- Scoat Tarn
- River Etherow
- Llyn Llagi
- Loch Chon/Tinker
- Beaghs Burn
- Crai Reservoir
  (Head of the Valleys)

The sites are shown in Figure 2.2.

The rainwater samples are collected on a fortnightly basis using bulk collectors.


**Figure 2.2:** ***The New Bulk Rainwater Sites.***

### 2.1.2 The Sampling Programme

Following the retendering of the monitoring contract in 2001, significant changes were made to the measurement programme and the acid deposition sampling at the Jenny Hurn site in Lincolnshire was discontinued. These changes were effective from the commencement of the new contract in November 2001. Following the change to the sampling frequency of the sulphur dioxide measurements in the related Rural $SO_2$ Monitoring programme, the measurements of sulphur dioxide concentrations at the 8 sites in the Acid Deposition Monitoring programme was changed to 4-weekly sampling at the beginning of 2004.

The monitoring programme in 2004 comprised the measurement and determination of

| | |
|---|---|
| ➢ Precipitation Composition | – Bulk rainwater sampling on a daily basis at Eskdalemuir |
| | – Bulk rainwater sampling on a fortnightly basis at 38 sites |
| ➢ Sulphur Dioxide | – Sampling on a 4-weekly basis at 8 sites |
| ➢ Particulate Sulphate | – Sampling on a daily basis at 5 sites |
| ➢ Nitrogen Dioxide | – Diffusion tube measurements on a monthly basis at 32 sites |
| ➢ Nitric Acid and Other Acid Gases | – Denuder measurements on a monthly basis at 12 sites |

The sites in operation are listed together with the local operators who perform the sample changeovers in Table 2.1 and Table 2.2. The sampling techniques used to make these measurements are summarised in Section 2.2.

**Table 2.1:** ***Network Sites and Measurements Made in 2004.***

| **Measurement:** | **Precipitation** | | **$NO_2$** | **$SO_2$** | **Part. $SO_4$** | **Denuder $HNO_3$-$NO_3$** |
|---|---|---|---|---|---|---|
| ***Frequency*: SITE:** | *daily bulk* | *fortnightly bulk* | *monthly* | *4-weekly* | *daily* | *monthly* |
| Yarner Wood | | ✓ - 1 | ✓ | ✓ - 2 | ✓ | ✓ |
| Lough Navar | | ✓ - 1 | ✓ | ✓ - 2, 4 | ✓ | ✓ - 3 |
| High Muffles | | ✓ - 1 | ✓ | ✓ - 2 | ✓ | ✓ - 3 |
| Eskdalemuir | ✓ | ✓ - 1 | ✓ | ✓ - 2 | ✓ | ✓ - 3 |
| Strathvaich Dam | | ✓ - 1 | ✓ | ✓ - 2, 4 | ✓ - 6 | ✓ - 3 |
| | | | | | | |
| Barcombe Mills | | ✓ - 1 | ✓ | ✓ - 2 | ✓ | ✓ - 3 |
| Stoke Ferry | | ✓ - 1 | ✓ | ✓ - 2 | ✓ - 6 | ✓ - 3 |
| Glen Dye | | ✓ - 1 | ✓ | ✓ - 2 | ✓ - 6 | |
| | | | | | | |
| Goonhilly | | ✓ - 1 | ✓ | | | |
| Compton | | ✓ - 1 | ✓ | | | |
| Flatford Mill | | ✓ - 1 | ✓ | | | |
| Woburn | | ✓ - 1 | ✓ | | | |
| Tycanol Wood | | ✓ - 1 | ✓ | | | |
| Llyn Brianne | | ✓ - 1 | ✓ | | | |
| Pumlumon | | ✓ - 1 | ✓ | | | |
| Preston Montford | | ✓ - 1 | ✓ | | | |
| Bottesford | | ✓ - 1 | ✓ | | | |
| Llyn Llydaw | | ✓ - 1 | ✓ | | | |
| Wardlow Hay Cop | | ✓ - 1 | ✓ | | | |
| Driby | | ✓ - 1 | ✓ | | | |
| Jenny Hurn - 7 | | | | | | |
| Thornganby | | ✓ - 1 | ✓ | | | |
| Bannisdale | | ✓ - 1 | ✓ | | | |
| Hillsborough Forest | | ✓ - 1 | ✓ | | | |
| Cow Green Reservoir | | ✓ - 1 | ✓ | | | |
| Loch Dee | | ✓ - 1 | ✓ | | | |
| Redesdale | | ✓ - 1 | ✓ | | | |
| Whiteadder | | ✓ - 1 | ✓ | | | |
| Balquhidder | | ✓ - 1 | ✓ | | | |
| Polloch | | ✓ - 1 | ✓ | | | |
| Allt a' Mharcaidh | | ✓ - 1 | ✓ | | | |
| Achanarras | | ✓ - 1 | ✓ | | | |
| | | | | | | |
| Crai Reservoir | | ✓ | | | | |
| Beaghs Burn | | ✓ | | | | |
| Loch Chon | | ✓ | | | | |
| Lochnagar | | ✓ | | | | |
| River Etherow | | ✓ | | | | |
| Scoat Tarn | | ✓ | | | | |
| Llyn Llagi | | ✓ | | | | |

Notes (1) The sampling frequency of the bulk deposition monitoring was changed from weekly to fortnightly with effect from November 2001; (2) The daily bubbler measurement programme was replaced with a fortnightly filter-pack measurement programme during 2001, which has since moved to 4-weekly sampling; (3) A site in the CEH $HNO_3$ Denuder Monitoring Network (see Section 4); (4) This site, together with those at Bush, Cwmystwyth and Sutton Bonington, was used as a overlap site for the introduction of the filter-pack sampler; (5) The daily wet-only measurement was stopped with effect from November 2001; (6) The daily particulate sulphate measurements were stopped with effect from November 2001; (7) This site was closed with effect from November 2001.

**Table 2.2:** ***Network Site Details (those in bold are EMEP Sites with the Daily Measurements - Bulk Sampling and Particulate Sulphate - reported to EMEP).***

| Site Code | Site Name | O.S. Reference | Altitude (m) | Operator |
|---|---|---|---|---|
| 5003 | Goonhilly | SW 723214 | 108 | British Telecom |
| **5008** | **Yarner Wood** | **SX 786789** | **119** | **English Nature** |
| **5007** | **Barcombe Mills** | TQ 437149 | 10 | South East Water plc |
| 5129 | Compton | SU 512804 | 105 | AEA Technology plc |
| 5154 | Crai Reservoir | SN 288222 | 310 | Welsh Water plc |
| 5024 | Flatford Mill | TM 077333 | 5 | Field Studies Council |
| 5127 | Woburn | SP 964361 | 89 | Rothamsted Experimental Station |
| 5123 | Tycanol Wood | SN 093364 | 205 | Countryside Council for Wales |
| 5124 | Llyn Brianne | SN 822507 | 420 | Environment Agency and Forest Enterprise |
| 5150 | Pumlumon | SN 823854 | 390 | Centre for Ecology and Hydrology (Bangor) |
| 5004 | Stoke Ferry | TL 700988 | 15 | Kings Lynn and West Norfolk Borough Council |
| 5023 | Preston Montford | SJ 432143 | 70 | Field Studies Council |
| 5121 | Bottesford | SK 797376 | 32 | E.On (PowerGen) |
| 5160 | Llyn Llagi | SH 647483 | 490 | CEH Bangor |
| 5153 | Llyn Llydaw | SH 556518 | 358 | Countryside Council for Wales |
| 5158 | River Etherow | SK 125986 | 485 | ENSIS |
| 5120 | Wardlow Hay Cop | SK 177739 | 350 | English Nature |
| 5136 | Driby | TF 386744 | 47 | Anglian Water |
| 5118 | Jenny Hurn | SK 816986 | 4 | E.On (PowerGen, see note 1) |
| 5117 | Thorganby | SE 676428 | 8 | Selby District Council |
| **5009** | **High Muffles** | SE 776939 | 267 | Forest Research (see note 2) |
| 5111 | Bannisdale | NY 515043 | 265 | Ray Newport (see note 3) |
| 5149 | Hillsborough Forest | J 243577 | 120 | Department of Agriculture and Rural Development (NI) |
| **5006** | **Lough Navar** | H 065545 | 130 | Forestry Service, Northern Ireland |
| 5113 | Cow Green Reservoir | NY 817298 | 510 | English Nature |
| 5159 | Scoat Tarn | NY 158103 | 595 | ENSIS |
| 5107 | Loch Dee | NX 468779 | 230 | Scottish Environment Protection Agency/Forest Enterprise |
| 5155 | Beaghs Burn | D 165283 | 250 | Department of Agriculture and Rural Development (NI) |
| 5109 | Redesdale | NY 833954 | 240 | ADAS |
| **5002** | **Eskdalemuir** | NT 235030 | 259 | Meteorological Office |
| 5106 | Whiteadder | NT 664633 | 250 | East of Scotland Water |
| 5156 | Loch Chon | NN 429084 | 150 | Fisheries Research Services |
| 5152 | Balquhidder 2 | NN 545207 | 135 | Mountain Environments |
| 5151 | Polloch | NM 792689 | 30 | Jim Kirby (see note 4) |
| 5157 | Loch Nagar | NO 252859 | 785 | ENSIS |
| 5011 | Glen Dye | NO 642864 | 185 | Scottish Environment Protection Agency |
| 5103 | Allt a' Mharcaidh | NH 876052 | 274 | Fisheries Research Services |
| 5010 | Strathvaich Dam | NH 347750 | 270 | Clova Environmental Research and Testing Services |
| 5140 | Achanarras | ND 151550 | 98 | Mrs J Erridge |

Notes (1) This site was closed in November 2001; (2) The site operator changed to Forestry Research at the end of 2001 following the retirement of the previous site operator; (3) Ray Newport took over as site operator from CEH Windermere with effect from November 2001. He had effectively been acting as the site operator; (4) Jim Kirby took over as site operator from Forest Enterprise with effect from November 2001. He had effectively been acting as the site operator.

## 2.2 SAMPLING TECHNIQUES

### 2.2.1 Precipitation Composition

Fortnightly precipitation samples were collected at 38 sites using bulk collectors based on the design of Hall [1986]. An assessment of the collection efficiency of the bulk collector is provided by Stone and Tily [1992]. For the two-year period 1986 to 1987, the bulk collector was found to have collection efficiencies, which ranged from 77% to 99% when compared to the 5-inch meteorological rain gauge.

To assess whether the switch from single week to fortnightly sampling had any effect on sampling performance an intercomparison exercise was initiated at the end of 2001 and is on-going. Preliminary results from this intercomparison were presented in the 2002 data report (using available results from the start of sampling to August 2003, see Hayman *et al.*, 2004). These results showed excellent agreement between the samplers at Thorganby. Good agreement was observed at Eskdalemuir and rather poorer agreement at Lough Navar. The intercomparison will be stopped at the end of 2005. The results from the measurements made to date are discussed in Section 5.1 of this report.

### 2.2.2 Sulphur Dioxide and Particulate Sulphate

The concentrations of particulate sulphate and sulphur dioxide were previously determined using a single sampler - the eight-port hydrogen peroxide bubbler instrument (AGL, Hitchin). This sampler is still used to determine concentrations of particulate sulphate. Particulate sulphate is collected by drawing air through a Whatman 40 filter and the sulphate concentrations are determined by ion chromatography.

As the concentrations of sulphur dioxide measured at some of the sites in the Acid Deposition Monitoring and the related Rural Sulphur Dioxide Monitoring networks, especially the daily sites in remote areas, were at or below the Limit of Detection (LOD) of the bubbler method, a new sampling technique for sulphur dioxide has been introduced into the monitoring networks. Following a method intercomparison exercise undertaken in collaboration with CEH Edinburgh at the Auchencorth Moss site near Edinburgh between September 1998 and May 1999 [Hasler *et al.*, 2000], the filter-pack sampler was selected as the replacement method on the grounds of cost, improved sensitivity, method robustness, ease of operation and the quality of the measurements. The filter pack method samplers were introduced into the monitoring networks from April 2001.

The filter pack sampler consists of two filters in series, which are enclosed in an airtight holder. Air is drawn through the filter pack and sulphate aerosol particles are removed on the first filter. Sulphur dioxide is absorbed by the second filter, which has been previously washed with potassium carbonate and then impregnated with a glycerol/potassium hydroxide solution. It is quantitatively converted to solid potassium sulphite by reaction with the potassium hydroxide and oxidising species in the air convert the sulphite to sulphate during sampling. The sulphate on the exposed impregnated filter is extracted using water. The sulphate concentration in the solution is determined using ion chromatography and this is converted into a gas-phase concentration of sulphur dioxide.

Following a change to the sampling frequency of the sulphur dioxide measurements in the related Rural $SO_2$ Monitoring programme, the measurements of sulphur dioxide concentrations at the 8 sites in the Acid Deposition Monitoring programme was changed from fortnightly to 4-weekly sampling at the beginning of 2004.

### 2.2.3 Nitrogen Dioxide

Diffusion tubes have been used to measure nitrogen dioxide concentrations. Tubes are mounted on the upright of the rain collector stand and are exposed for twelve four or five-week periods throughout each year.

### 2.2.4 Nitric Acid Denuder Technique

The denuder technique used to determine concentrations of nitric acid and other acid gases is described later in Section 4.

# 2.3 ANALYTICAL PROCEDURES

### 2.3.1 Sample Registration and Preparation

Due to the reduction in sampling frequency the number of samples received and analysed by the laboratory in 2004 was significantly less than previous years. Samples returned to AEA Technology were logged on a computerised sample register and their volumes recorded. Sample preparation and handling were carried out using standard operating procedures.

On receipt in the analytical laboratory rainwater samples were sub-sampled into polyethylene bottles (Nalgene). The pH and conductivity were recorded and the samples filtered through 1μm disposable filters to remove insoluble particulate material and micro-organisms that might compromise sample integrity before analysis. The samples were then stored at 4°C until analysis by ion chromatography. Samples were analysed for: sulphate, nitrate, chloride, phosphate, sodium, magnesium, calcium, potassium, pH and conductivity. Analysis was usually completed within one month.

### 2.3.2 Analysis

Samples were analysed using UKAS accredited methods. All samples with exception of diffusion tubes are analysed using ion chromatography.

The rapid analysis of a large number of rainwater samples in which concentrations vary over several orders of magnitude is a complex task. To verify the analytical results, the ion balance, I (Equation 1), is calculated for each rainwater sample.

$$I = \left| \frac{2(\Sigma c - \Sigma a)}{\Sigma c + \Sigma a} \right| \qquad \text{(Equation 1)}$$

where $\Sigma c$ = sum of cation concentrations in equivalents (μeq $l^{-1}$) and $\Sigma a$ = sum of anion concentrations in equivalents (μeq $l^{-1}$). A correction is estimated for the concentration of bicarbonate in samples which have a pH greater than 5.5. Samples, which fall outside the criteria listed in Table 2.3, are submitted for reanalysis. The reanalysis is usually completed within four months of sampling.

With the introduction of new ion chromatographs [see Hayman *et al.*, 2001d], less than 10% of the samples fail the criteria and would need to be reanalysed.

**Table 2.3:** ***Ion Balance Criteria Used to Select Samples for Reanalysis.***

| Ionic strength concentration range (μeq $l^{-1}$) | Samples are resubmitted when the ion difference (%) is: |
|---|---|
| Less than 50 | > 60 |
| 50-100 | > 30 |
| Greater than 100 | > 15 |

# 2.4 DATA REPORTING CYCLE

Sample collection, analysis, reanalysis and verification are continuous processes. Figure 2.3 and Figure 2.4 define the reporting cycles for the measurements made in the monitoring programme. Reanalysis is only undertaken for the composition of precipitation using the ion balance as the criterion. Simple data verification is undertaken for the other measurements. The cycles show that the measurements made in *Year N* would be available by July of *Year N+1*. Although the existing cycles approach this, it is intended to adhere to these reporting cycles more closely.

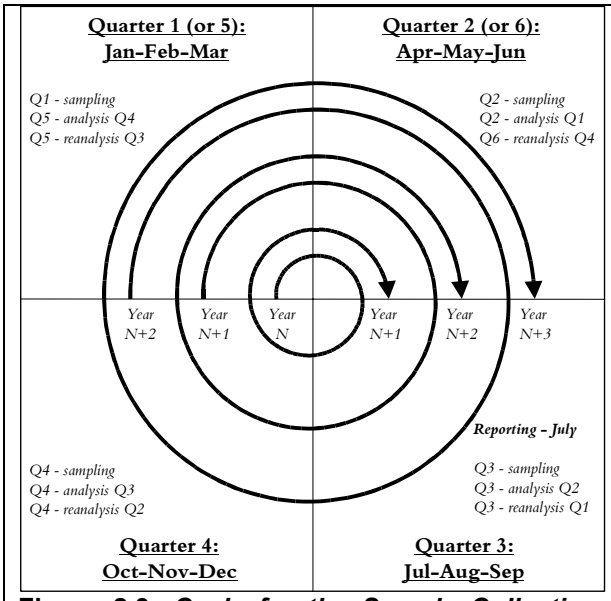



**Figure 2.3:** ***Cycle for the Sample Collection, Analysis, Reanalysis and Reporting of the Composition of Precipitation.***

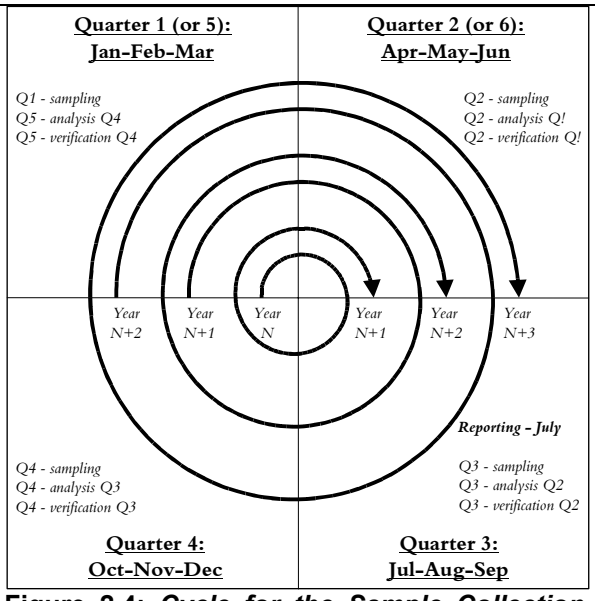



**Figure 2.4:** ***Cycle for the Sample Collection, Analysis and Verification and Reporting of the Other Measurements.***

# 3. 2004 Measurements and Trends

## 3.1 DATA SUMMARY

The complete set of precipitation measurements made in the Acid Deposition Monitoring Network during 2004 is provided in the following appendices:

- Appendix 1 – Precipitation Composition from Weekly Bulk Collectors
- Appendix 2 – Annual Mean Precipitation-weighted Concentrations
- Appendix 3 – $SO_2$ and Particulate Sulphate Measurements and Statistics
- Appendix 4 – $NO_2$ Measurements and Statistics
- Appendix 5 – CEH $HNO_3$ Denuder Measurements and Statistics (see Section 0)

Information is also provided in Appendix 1 about the site and the measurements made. Appendix 6 describes the geostatistical techniques that have been used to calculate the precipitation concentration maps in this report.

## 3.2 RAIN WATER VOLUMES IN 2004

According to rainwater amounts measured by the Meteorological Office[1], the average rainfall for England and Wales in 2004 was 40% larger than the long-term average. Such a wet year will tend to produce lower volume weighted concentrations for sites in England. Scotland was slightly drier (~3% lower than the long term average and Northern Ireland slightly wetter than the long term average (~8% larger than the long-term average). Figure 3.1 shows the monthly rainfall data for 2004. England and Scotland were particularly wet during August. Northern Ireland and Scotland experienced a wet June. Northern Ireland and England were dry during November.

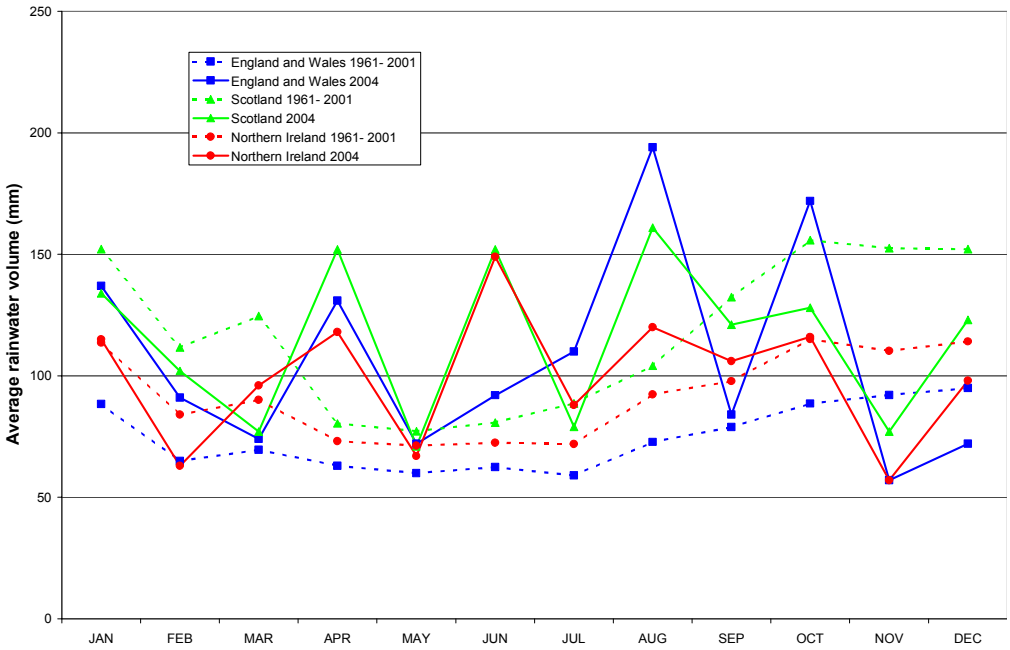



**Figure 3.1:** ***A comparison of Average Monthly Rainwater Volumes for 2004 and the Long-term Average (1961 to 2001) for England and Wales, Scotland and Northern Ireland.***

[1](http://www.metoffice.com/climate/uk/2004) The data for England and Wales, Scotland and Northern Ireland were obtained by downloading the respective rainfall series on the web site. These measurements were obtained from available rain gauge data with allowances made for topographic, coastal and urban effects where relationships are found to exist.

# 3.3 PRECIPITATION CHEMISTRY

### 3.3.1 The Measurements

The measurements of precipitation composition made using the bulk collectors are presented in Appendix 1. It should be noted that the tables in Appendix 1 contain all the analytical results obtained, including those samples affected by contamination by birdstrike. A phosphate concentration >0.01 mg P $l^{-1}$ (or >1.0 μeq $l^{-1}$) was taken as evidence of contamination. Although all these samples have been included in the tables, they were not included in the calculation of annual mean precipitation-weighted ion concentrations[2]. The mean annual rainfall and the precipitation-weighted mean annual concentrations of all ions for the period from 1986 to 2004 are also tabulated in Appendix 2. The rainfall totals presented in Appendix 2, Table 10 include all samples collected and are therefore sometimes higher than the totals used for the calculation of the annual mean concentrations.

Appendix 1 also contains two plots, which show (a) the trend in the annual precipitation-weighted mean concentrations for non-seasalt sulphate, nitrate, ammonium and hydrogen ion since the commencement of the site and (b) the trend in the annual rainfall and in the corresponding annual deposition of the four species. The trends shown in the two plots varies from site to site (Appendix 1), although in general annual precipitation-weighted mean non-seasalt sulphate and hydrogen ion concentrations have tended to decline whereas nitrate and ammonium have not changed much at all. A box has been included in Appendix 1, which contains a statistical summary of the trends of the four ions shown in the plots.

Previously, Appendix 1 also included a figure for each site, which showed the seasonal variation in the concentrations. The seasonal plots presented previously [see Hayman *et al.*, 2000, 2001c, d] clearly showed that the largest concentrations of both non-seasalt sulphate and nitrate occur in the period from April to June at most of the sites. This is partly a consequence of the seasonal variation of emissions and of the oxidising capacity of the atmosphere, as demonstrated by the seasonal variation observed in particulate sulphate. However, the variation in concentration of particulate sulphate concentration is much smaller than that of non-seasalt sulphate in precipitation. The concentrations of ions in precipitation are also affected by the seasonal variation in rainfall amount. The monthly mean rainfall amount tends to be smaller in early summer than in the rest of the year and the inverse correlation between rainfall amount and the concentrations of non-seasalt sulphate, nitrate, ammonium results in a corresponding opposite seasonal variation.

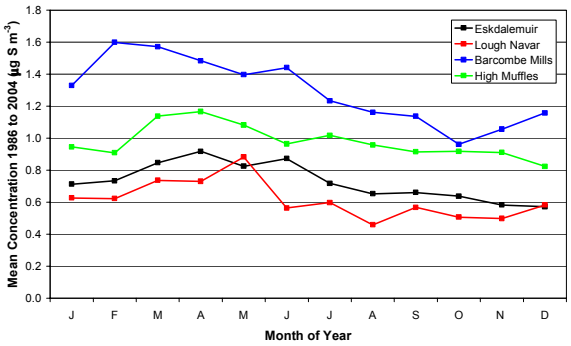



**Figure 3.2:** ***Seasonal Variation in the Particulate Sulphate Concentration at 4 of the 5 Sites as Averages for the years 1986-2004.***

### 3.3.2 Concentration Maps for 2004

The spatial patterns of the annual mean precipitation-weighted concentration of acidity, non-sea sulphate, nitrate and ammonium are presented in Figure 3.3 to Figure 3.6 for the last six years. The parameters used in the interpolation are presented in Appendix 6. No hydrogen ion maps were prepared for 2000 as the acidity measurements were removed from the 2000 dataset.

The maps show that:

- the hydrogen ion concentration tends to be highest on the eastern sea board where the rainwater volume is smallest. Concentrations appear relatively constant over the three years shown.
- the highest concentrations continue to be measured in the source region.

[2] Ion concentrations are conventionally reported as precipitation-weighted annual mean concentrations as rainfall is episodic and a few rainfall events can dominate the annual deposition. The wet deposition is then the precipitation-weighted annual mean concentration multiplied by the annual rainfall.

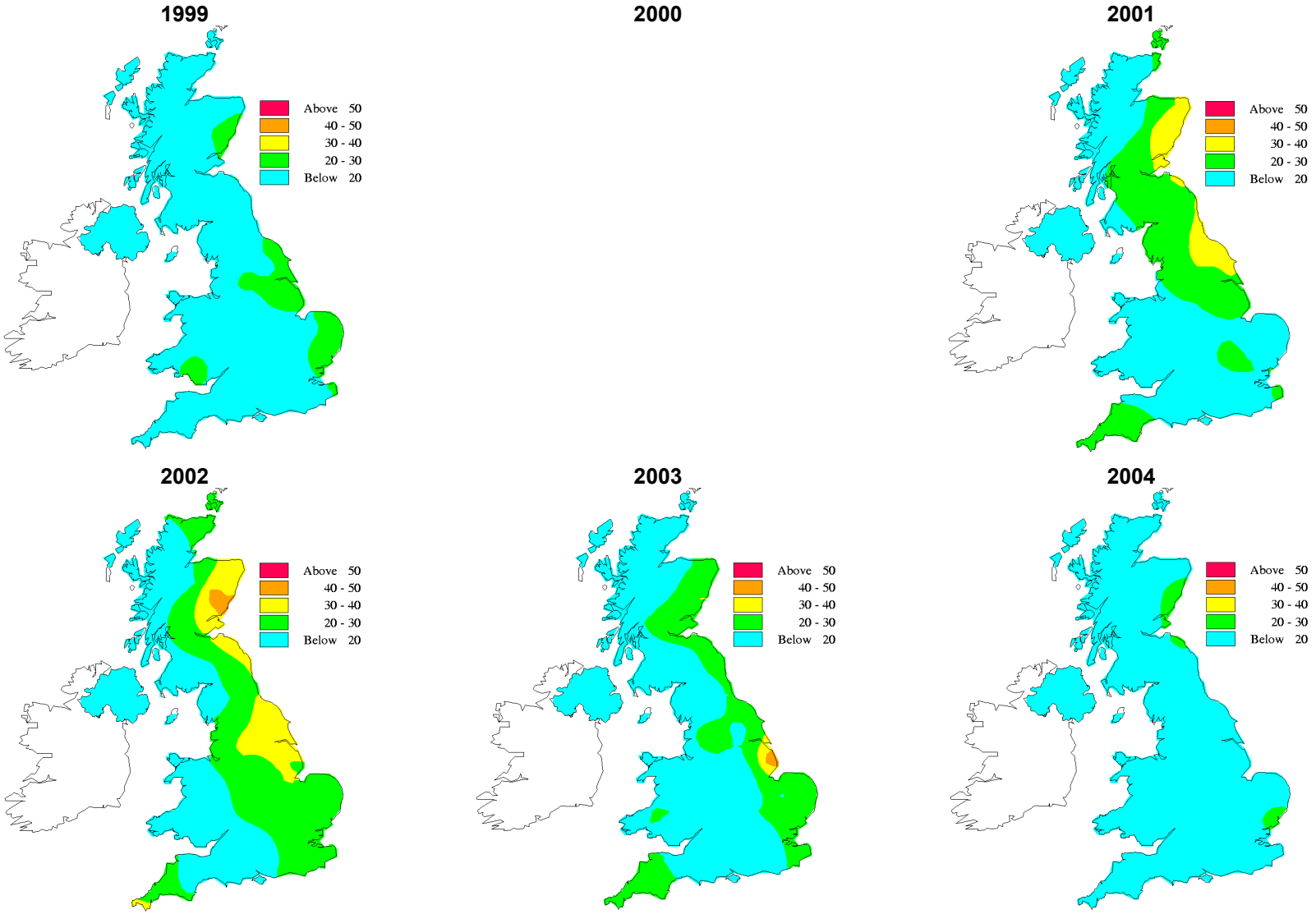



**Figure 3.3:** ***Precipitation-weighted concentration maps of Acidity (in µeq $l^{-1}$) for 1999-2004.***

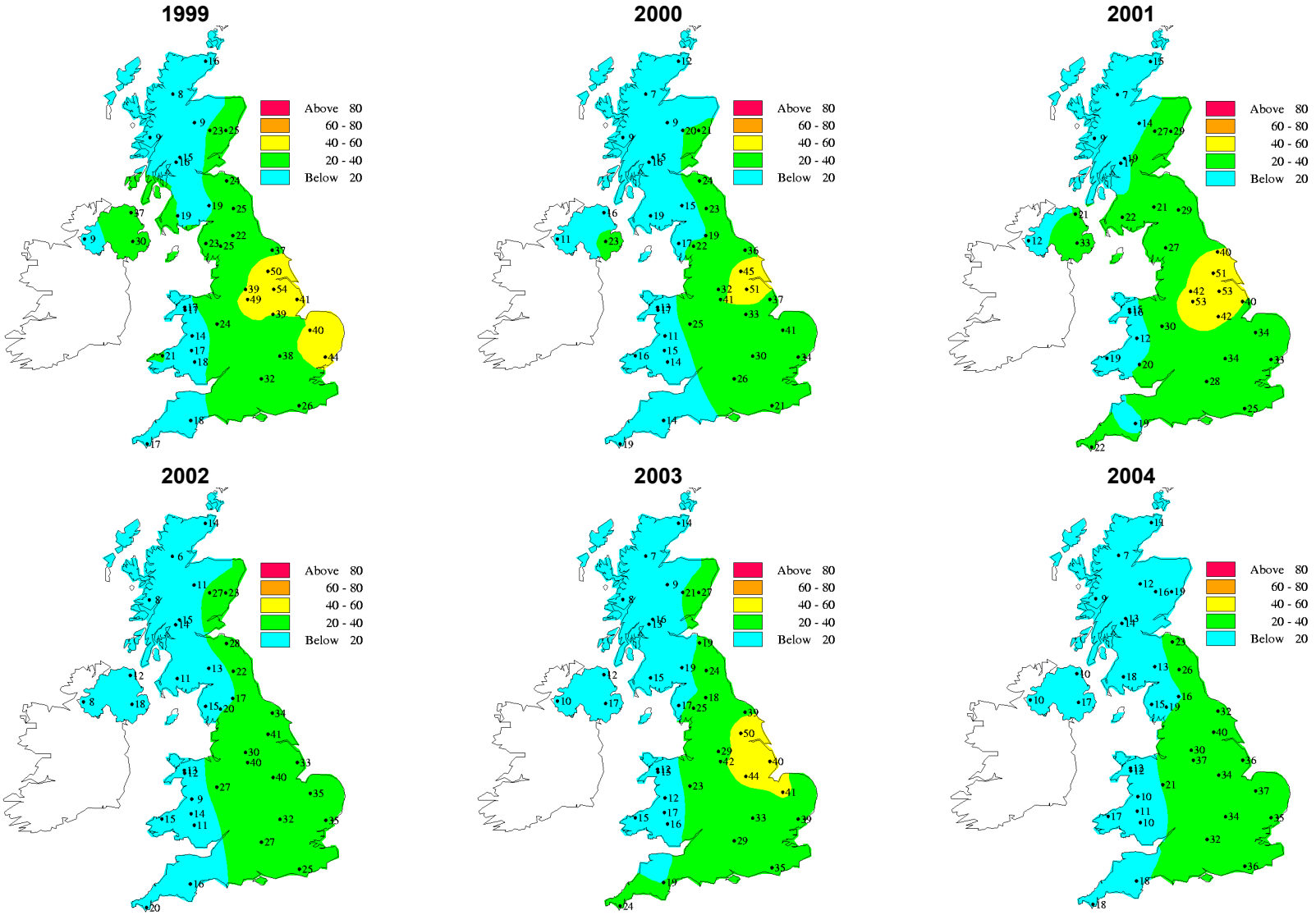



**Figure 3.4:** ***Precipitation-weighted Concentration Maps of Non Seasalt Sulphate (in μeq $l^{-1}$) for 1999-2004.***

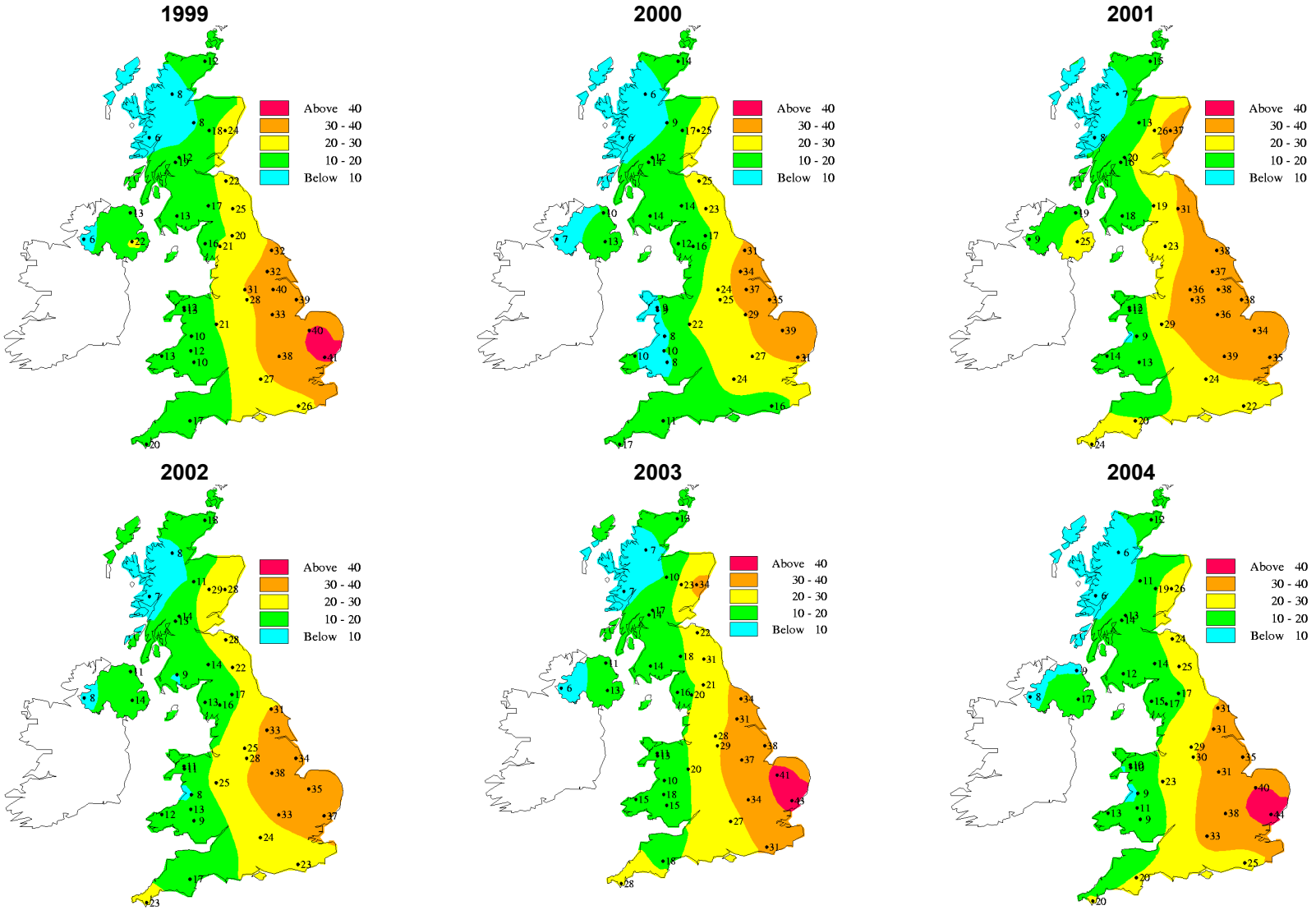



**Figure 3.5:** ***Precipitation-weighted Concentration Maps of Nitrate (in µeq $l^{-1}$) for 1999-2004.***

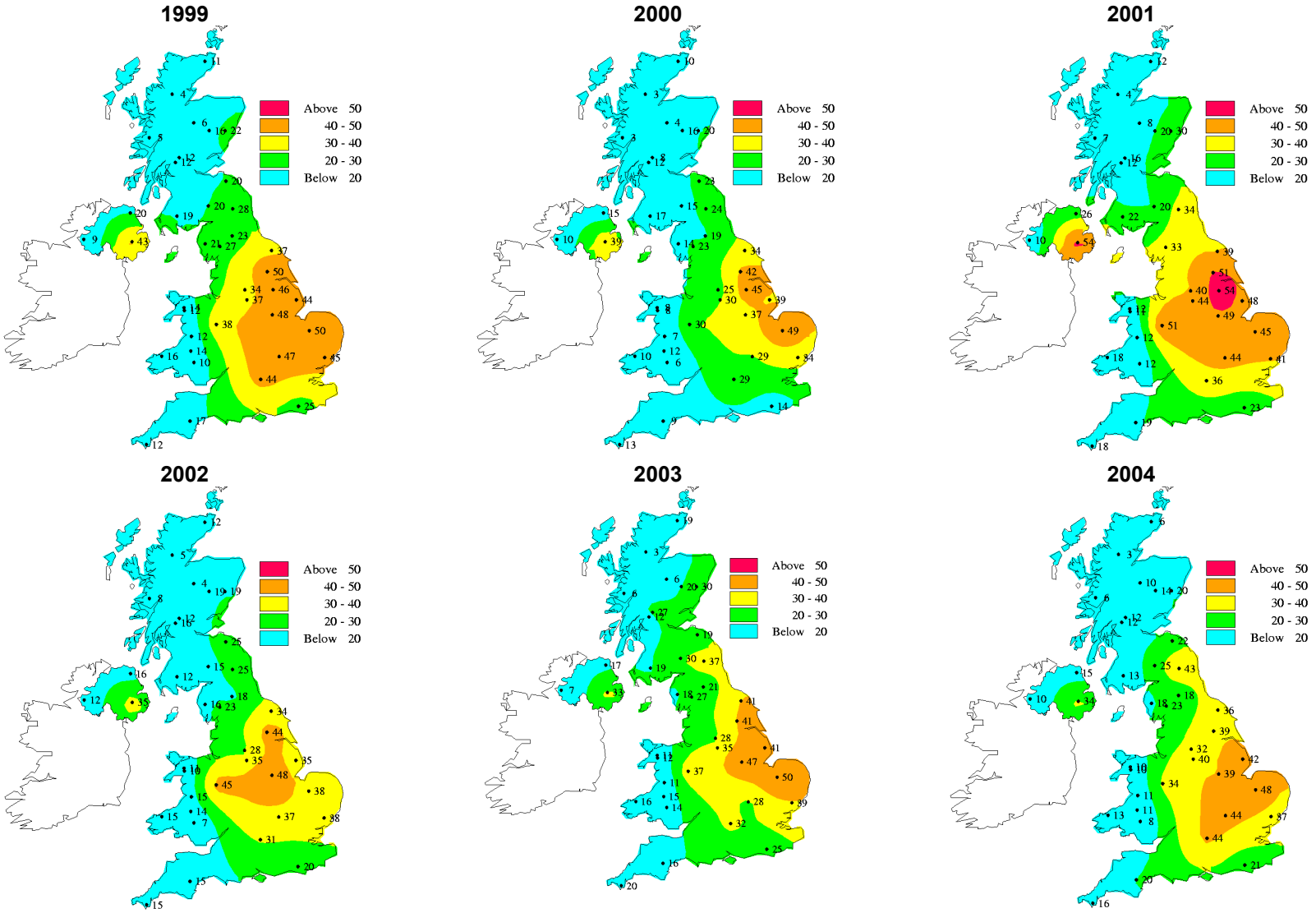



**Figure 3.6:** ***Precipitation-weighted Concentration Maps of Ammonium (in µeq $l^{-1}$) for 1999-2004.***

- the nitrate concentrations are remarkably consistent throughout the five years. The trend, or lack of trend, in nitrate concentrations will be discussed in the next section.
- ammonium concentrations are highest in the areas of the United Kingdom where intensive livestock activity is highest.

### 3.3.3 Precipitation Chemistry Trends

Analysis of the data has been undertaken to quantify the significance of the trends. The concentration data have been analysed using a linear-least squares approach. The regression coefficient, or slope of the trend line, will have units of $\mu eq\ l^{-1}\ year^{-1}$. Associated with the regression analysis is a parameter called the F statistic. The F statistic is a measure of how successfully the linear regression can account for the variation in the dataset. It is formally defined as the ratio of the variance due to regression, standardised by the respective degrees of freedom ($MS_R$), to the variance about the regression also standardised by the respective degrees of freedom ($MS_E$). The value of the F statistic can be compared to points on an appropriate F distribution curve. If the value is greater than a certain (critical F) value, it is assumed that a real, statistically significant, change in the concentration has occurred.

In the analysis presented below, a 5% significance level has been used. This means that there is a 5% chance that the trend is not significant. Further, the "strength" of the observed trend is quantified using multiples of the ratio of the calculated F statistic to the critical F value. These multiples (more or less arbitrarily defined) are presented in Table 3.1.

**Table 3.1:** ***Strength of the Significance of the Trend.***

| Ratio | Value of ratio | Symbol | Comment |
|---|---|---|---|
| F calculated/F critical | ratio < 1 | - | No Significant trend |
| F calculated/F critical | 1 < ratio < 2 | + | Significant trend detected |
| F calculated/F critical | 2 < ratio < 5 | ++ | Moderate trend detected |
| F calculated/F critical | 5 < ratio < 10 | +++ | Strong trend detected |
| F calculated/F critical | 10 < ratio < 20 | ++++ | Very strong trend detected |
| F calculated/F critical | ratio > 20 | +++++ | Exceptionally strong trend detected |

Table 3.2 presents a summary of the trend analysis performed on the non-sea salt sulphate and nitrate concentrations measured at the sampling sites in the acid rain monitoring network. Sites that show a very strong trend are situated in relatively dry locations, often downwind of major sources. Values of "$F_{calculated}/F_{critical}$" less than one indicate that no statistically significant trend can be detected. This most often occurs for sites which are in the more remote parts of the United Kingdom.

Although the primary focus of the monitoring programme has been on the deposition of nitrate and non seasalt sulphate, there is increasing interest in the other components of rainwater, such as the base cations (Na, K, Mg and Ca).

## 3.4 SULPHUR DIOXIDE AND PARTICULATE SULPHATE

### 3.4.1 The 2004 Measurements

A summary of the sulphur dioxide measurements and the daily measurements of particulate sulphate are presented in Appendices 3.1 and 3.2 respectively.

The measurement of sulphur dioxide concentrations is also made in the Rural $SO_2$ Monitoring Network at a further 32 sites. This monitoring programme is covered by a separate Defra contract (*Acid Deposition Processes in the UK*, through a sub-contract from CEH Edinburgh). The mapping of the sulphur dioxide concentration is undertaken under that contract and is not discussed in this report. Data reports have been prepared for the years 1995 to 2000 by Vincent and Campbell [1996], Hasler and Downing [1998], Hasler *et al.* [2001], and Hayman *et al.* [2001a, b, 2003b], respectively.

**Table 3.2:** ***Summary of the Trend Analysis for nss-Sulphate and Nitrate Observed at the Acid Deposition Monitoring Network Sites and its Significance.***

| Sampling site | Site Code | Sulphate | | | Nitrate | | |
|---|---|---|---|---|---|---|---|
| | | μeql year$^{-1}$ | % change year$^{-1}$ | Trend Status | μeql year$^{-1}$ | % change year$^{-1}$ | Trend Status |
| Achanarras | 5140 | -1.00 | -3.37 | ++++ | -0.43 | -1.97 | ++ |
| Allt a' Mharcaidh | 5103 | -0.81 | -2.74 | ++ | -0.02 | -0.12 | - |
| Balquhidder | 5152 | -1.33 | -2.89 | ++++ | -0.06 | -0.28 | - |
| Bannisdale | 5111 | -1.17 | -2.54 | ++ | -0.30 | -1.07 | - |
| Barcombe Mills | 5007 | -3.60 | -3.90 | +++++ | -0.59 | -1.41 | ++ |
| Bottesford | 5121 | -3.21 | -4.05 | ++++ | -0.77 | -1.98 | ++ |
| Compton | 5129 | -1.40 | -3.33 | ++++ | -0.24 | -1.05 | + |
| Cow Green Res. | 5113 | -2.70 | -3.34 | ++++ | -0.62 | -1.30 | ++ |
| Driby | 5136 | -1.02 | -3.01 | ++++ | -0.09 | -0.52 | - |
| Eskdalemuir | 5002 | -2.64 | -3.48 | ++++ | -0.36 | -0.83 | - |
| Flatford Mill | 5024 | -1.60 | -3.09 | ++ | -0.17 | -0.51 | - |
| Glen Dye | 5011 | -0.61 | -2.03 | ++ | 0.08 | 0.35 | - |
| Goonhilly | 5003 | -2.57 | -3.28 | ++++ | -0.66 | -1.51 | ++ |
| High Muffles | 5009 | -1.96 | -3.67 | +++ | -0.40 | -1.68 | - |
| Hillsborough Forest | 5149 | -4.13 | -3.77 | ++++ | -0.54 | -1.15 | + |
| Jenny Hurn | 5118 | -0.94 | -3.08 | ++++ | -0.06 | -0.43 | - |
| Llyn Brianne | 5124 | -1.31 | -4.02 | +++ | -0.21 | -1.52 | + |
| Llyn Llydaw | 5153 | -1.01 | -3.03 | +++ | -0.20 | -1.14 | - |
| Loch Dee | 5107 | -0.47 | -2.52 | +++ | -0.05 | -0.50 | - |
| Lough Navar | 5006 | -0.78 | -3.70 | +++ | -0.29 | -2.60 | ++ |
| Polloch | 5151 | -2.23 | -3.57 | +++ | -0.38 | -1.26 | - |
| Preston Montford | 5024 | -0.92 | -3.47 | +++ | -0.26 | -1.90 | - |
| Pumlumon | 5150 | -1.79 | -3.31 | +++ | -0.28 | -0.87 | - |
| Redesdale | 5109 | -0.68 | -3.14 | +++ | 0.03 | 0.27 | - |
| Stoke Ferry | 5004 | -2.86 | -3.49 | +++++ | -0.57 | -1.23 | ++ |
| Strathvaich Dam | 5010 | -0.48 | -3.12 | ++ | -0.09 | -1.05 | - |
| Thorganby | 5117 | -3.11 | -3.22 | +++ | -0.81 | -1.76 | +++ |
| Tycanol Wood | 5123 | -0.65 | -2.35 | +++ | -0.03 | -0.24 | - |
| Wardlow Hay Cop | 5121 | -2.74 | -3.09 | ++++ | -0.18 | -0.56 | - |
| Whiteadder | 5106 | -1.93 | -3.57 | ++++ | -0.65 | -1.85 | ++ |
| Woburn | 5127 | -2.92 | -3.74 | +++++ | -0.34 | -0.85 | - |
| Yarner Wood | 5008 | -0.69 | -2.33 | ++ | 0.03 | 0.18 | - |

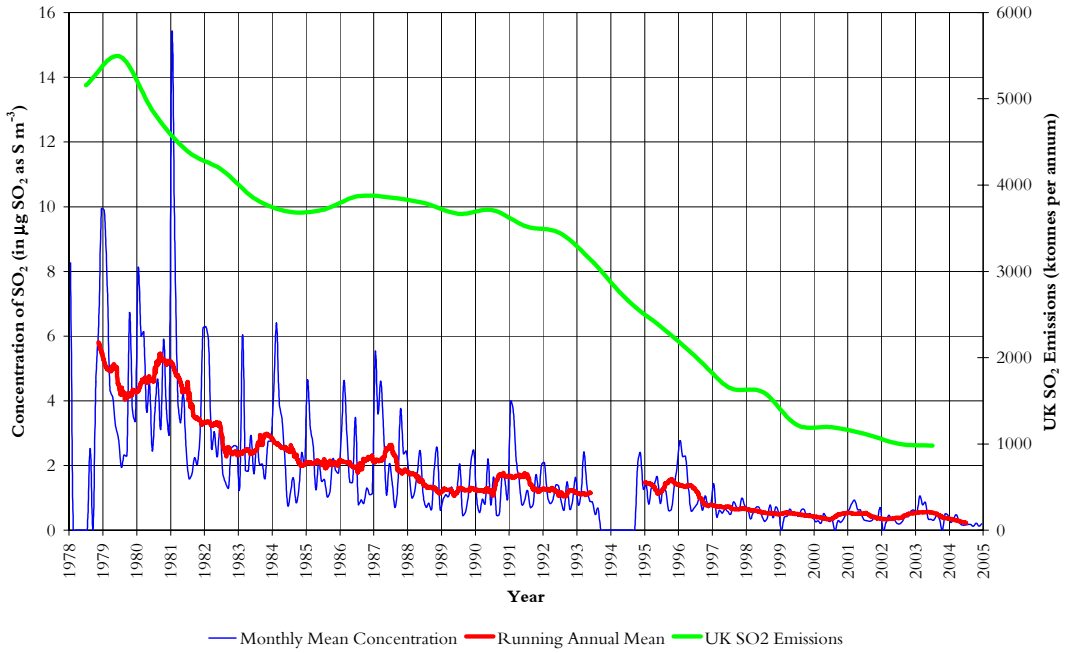



**Figure 3.7:** ***Monthly Mean and Running Annual Mean Concentrations of Sulphur Dioxide Observed at Eskdalemuir since 1978, compared with UK $SO_2$ Emissions.***

### 3.4.2 Trends in Sulphur Dioxide

Figure 3.7 shows both the monthly mean concentrations and running annual mean concentrations of sulphur dioxide at Eskdalemuir. There was a large change in concentration occurred between 1980 and 1990, during which time the average concentration decreased by a factor of four from around 4.6 μg S $m^{-3}$ to 1.1 μg S $m^{-3}$. From 1990 to 2004, the concentration has further decreased to 0.22 μg S $m^{-3}$ (although this is based on the uncorrected filter-pack data from 2001). Figure 3.7 shows that the downward trend in the $SO_2$ concentrations has followed the reduction in UK $SO_2$ emissions [Dore *et al*., 2004], at least in the early years.

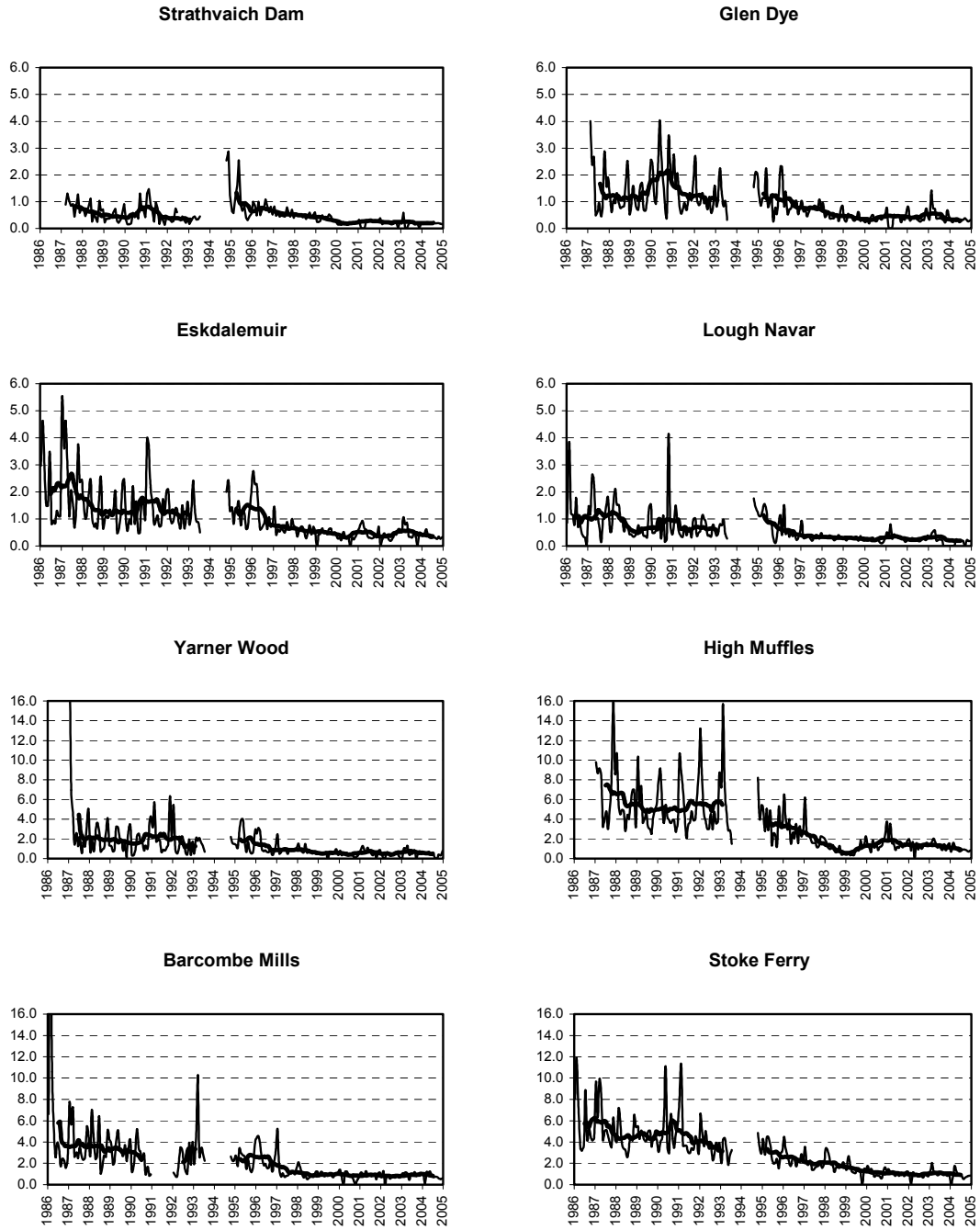



**Figure 3.8:** ***Monthly and Running Annual Mean Concentrations of Sulphur Dioxide at the Daily Sites, 1986 to 2004 (μg $SO_2$ as S $m^{-3}$).***

The monthly and running annual mean concentrations of sulphur dioxide measured at Eskdalemuir and the other primary sites are presented in Figure 3.8. The annual mean sulphur dioxide concentration has decreased substantially at all sites. For example, the annual mean at High Muffles has decreased by a factor of 10 from an annual mean concentration of 7.3 μg $SO_2$ as S $m^{-3}$ in 1987 to 0.77 μg $SO_2$ as S $m^{-3}$ in 2004.

Figure 3.7 also suggests that the large seasonal variations, where higher concentrations are observed during cold winter months, are no longer apparent. Higher concentrations are expected during the winter period because of the relatively higher emissions at this time of the year, combined with poorer vertical dispersion of the emissions.

### 3.4.3 Trends in Particulate Sulphate

Figure 3.9 shows the monthly mean and running annual mean concentrations of particulate sulphate at Eskdalemuir. The decrease in the concentration of particulate sulphate is much less marked than that of sulphur dioxide. There is more variation around the running annual mean and there is an apparent increase in concentration from 1978 to 1984 followed by a decrease from 1992 to 2004. The higher concentrations in 2003 are evident in this figure. Over the period from 1978 to 2004 the average concentration declined from around 1.0 μg [$SO_4$ as S] $m^{-3}$ to about 0.4 μg [$SO_4$ as S] $m^{-3}$ in 2004.

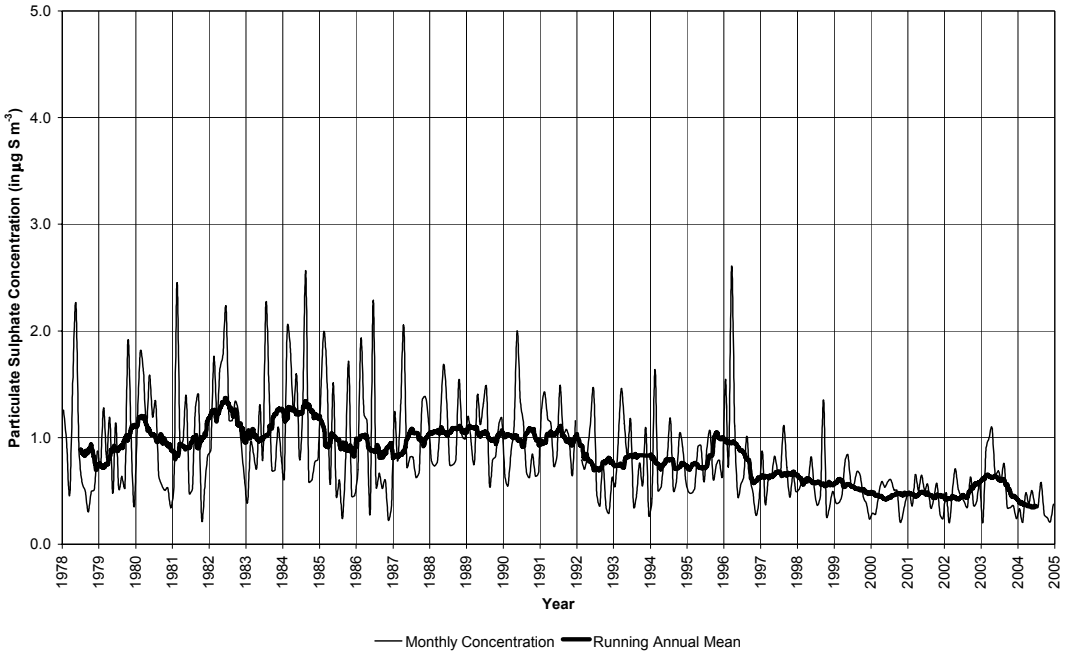



**Figure 3.9:** ***Trends in the Particulate Sulphate Concentration at Eskdalemuir since 1978.***

Since 2002 daily sulphate concentrations are measured at only five sites; measurements at Strathvaich Dam, Glen Dye and Stoke Ferry were discontinued in 2001. Figure 3.10 shows the annual mean concentration at the current sites. Concentrations were consistently highest at Barcombe Mills and lowest at Lough Navar, reflecting the proximity of these sites to the European mainland. The relative trends in concentration are somewhat regular. For example, the mean concentrations at each site decreased steadily until about 1992 then remained constant until about 1996 and then decreased rapidly until about 1999 and have remained more or less constant since then.

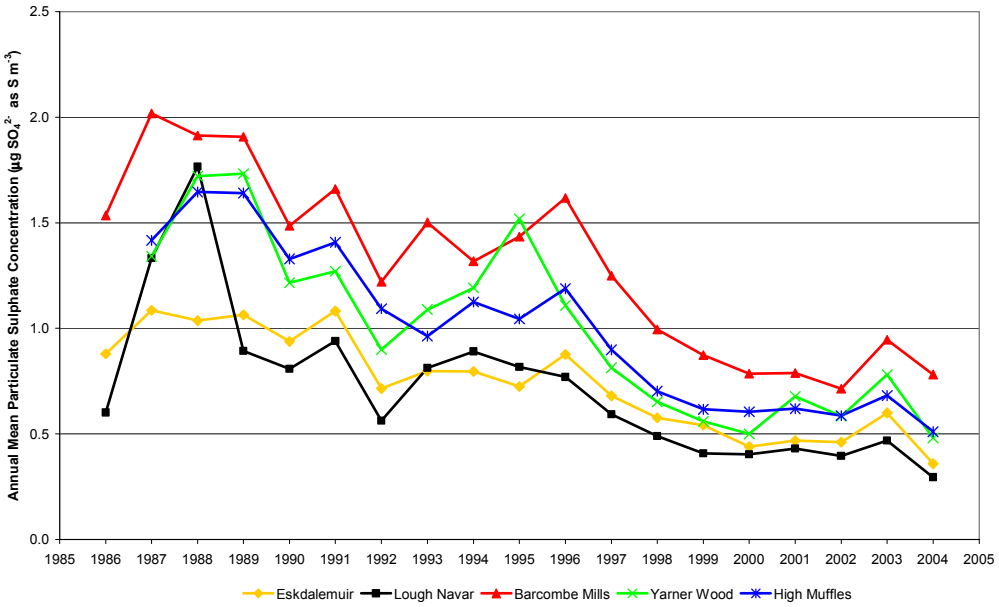



**Figure 3.10:** ***Annual Mean Concentrations of Particulate Sulphate (µg $SO_4$ as S $m^{-3}$) at the Daily Sites, 1986 to 2004.***

# 3.5 NITROGEN DIOXIDE

## 3.5.1 The 2004 Measurements

The nitrogen dioxide diffusion tube measurements made in 2004 are presented in Appendix 4. The determination of nitrogen dioxide at the rural locations in the acid rain network provides a key input to the mapping of nitrogen dioxide in the United Kingdom [Stedman, 1997].

## 3.5.2 Comparison with Other Measurements

In 2004, nitrogen dioxide measurements were also made using automatic instruments at a number of rural locations in the UK, primarily in England. Two of these sites are also in the Acid Deposition Monitoring Network (Yarner Wood and High Muffles). Table 3.3 compares the monthly and annual mean concentrations determined at these sites from the diffusion tube and automatic measurements.

**Table 3.3:** ***Comparison of the 2004 Monthly and Annual Mean Concentrations of Nitrogen Dioxide (in µg $NO_2$ $m^{-3}$) determined at High Muffles and Yarner Wood using Diffusion Tubes and Automatic Analyser.***

| | High Muffles | | | Yarner Wood | | |
|---|---|---|---|---|---|---|
| | DT [1] | Automatic | Automatic Data Capture | DT | Automatic | Automatic Data Capture |
| **Jan-04** | 13.0 | 11.3 | 78.4 | 5.8 | 5.0 | 98.9 |
| **Feb-04** | 8.5 | 9.8 | 86.5 | 7.2 | 10.0 | 95.8 |
| **Mar-04** | 3.8 | 7.9 | 82.8 | 4.6 | 10.0 | 99.2 |
| **Apr-04** | 6.3 | - [2] | 70.6 | 4.5 | 7.0 | 99.6 |
| **May-04** | 3.4 | - [2] | 53.8 | 3.6 | 8.0 | 98.8 |
| **Jun-04** | 3.3 | - [2] | 57.8 | 2.8 | 6.0 | 99.0 |
| **Jul-04** | 4.0 | 7.2 | 99.1 | 2.2 | 5.0 | 96.8 |
| **Aug-04** | 3.5 | - [2] | 32.0 | 1.4 | 5.0 | 94.5 |
| **Sep-04** | 5.4 | - [2] | 22.8 | 1.1 | 8.0 | 99.3 |
| **Oct-04** | 9.9 | 7.7 | 82.8 | 8.0 | 8.0 | 99.5 |
| **Nov-04** | 11.6 | - [2] | 74.6 | 5.0 | 9.0 | 99.4 |
| **Dec-04** | 16.1 | 15.0 | 99.1 | 11.9 | 12.0 | 99.6 |
| **Annual Mean** | 7.4 | - [2] | 70.1 | 4.8 | 7.8 | 98.5 |

Notes: (1) DT = Diffusion Tube; (2) The monthly or annual mean concentrations are only determined if the data capture is greater than 75%.

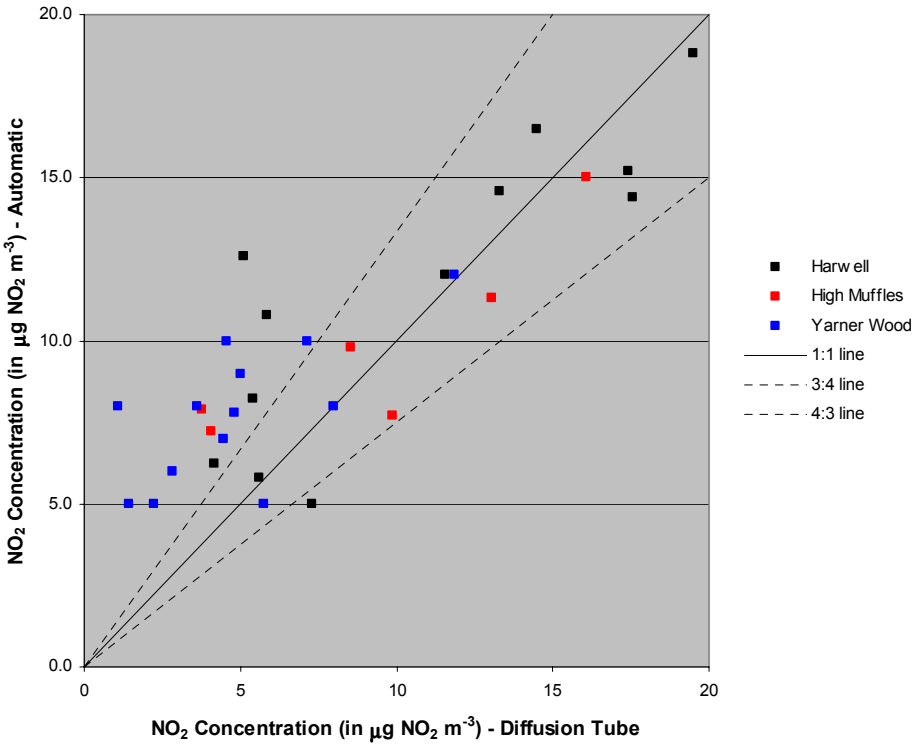



**Figure 3.11:** ***Scatter Plot of the $NO_2$ Concentrations determined in 2004 from the Automatic Analyser and Diffusion Tubes for 3 Sites – Harwell/Compton, High Muffles and Yarner Wood.***

Figure 3.11 shows a scatter plot of valid pairs of measurements made at the 2 sites. The figure also includes a comparison of the diffusion tube measurements made at the Compton site in the monitoring network with the automatic measurements made at the nearby site at Harwell. As can be seen from Table 3.3 and Figure 3.11, the measurements at High Muffles are in reasonable agreement- this may be regarded as fortuitous as the diffusion tube analyser provides only an indicative concentration measurement. At Yarner Wood the nitrogen dioxide concentrations measured by diffusion tube are generally lower than those measured by the continuous analyser perhaps reflecting a lower limit to the sensitivity of the diffusion tube analyser. Although 8 km apart the nitrogen dioxide concentrations measured at Compton and Harwell also show reasonable agreement.

From 2005 sampling will be in triplicate at a number of sites, this will help to improve the uncertainty in the measurement technique.

### 3.5.3 Trends in Nitrogen Dioxide

Figure 3.12 presents the annual average concentrations for nitrogen dioxide determined at 8 of the sites in the monitoring network between 1997 and 2004. As noted elsewhere, 2004 was a low pollution year. In consequence, the annual mean concentrations in 2004 were lower than those measured in 2003, which was a high pollution year, and were the lowest or close to the lowest in the timeseries.

UK total emissions of nitrogen oxides have decreased since 1990 with the switch from coal to gas for power generation and the introduction of catalytic converters on petrol-engined vehicles. Given the relatively poor precision of the passive sampler method at low concentrations, the fall in nitrogen dioxide concentrations is most clearly observed at the relatively high concentration sites such as High Muffles, Stoke Ferry and Barcombe Mills, although lower concentration sites such as Yarner Wood, Eskdalemuir and Glen Dye also show evidence of a decline.

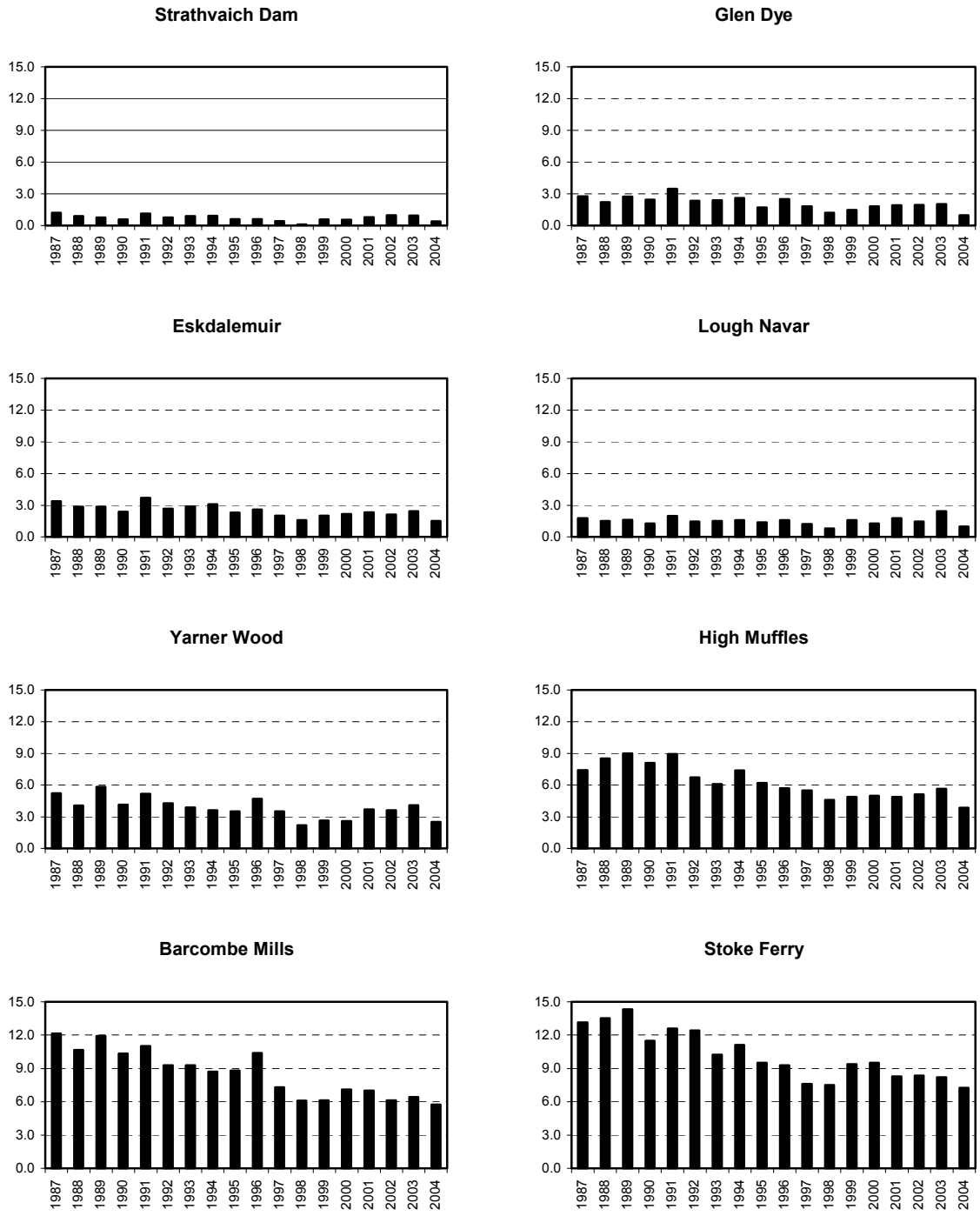



**Figure 3.12:** ***Annual average nitrogen dioxide concentration (ppb).***

### 3.5.4 Concentration Map

The diffusion tube measurements have been used to produce a map of the rural nitrogen dioxide concentrations in the UK for 2004, as shown in Figure 3.13 (bottom right-hand panel). The highest concentrations were observed in the Midlands and southern England with an annual mean concentration of 9.5 ppb determined at Woburn in 2004. In the main, this reflects the proximity to the sampling sites of roads and other aspects of urbanisation. The same figure also shows the 1999 to 2003 maps for comparison. The maps show little difference in the spatial patterns between 1999 and 2004 but clear evidence of a decrease in nitrogen dioxide concentrations across the UK.

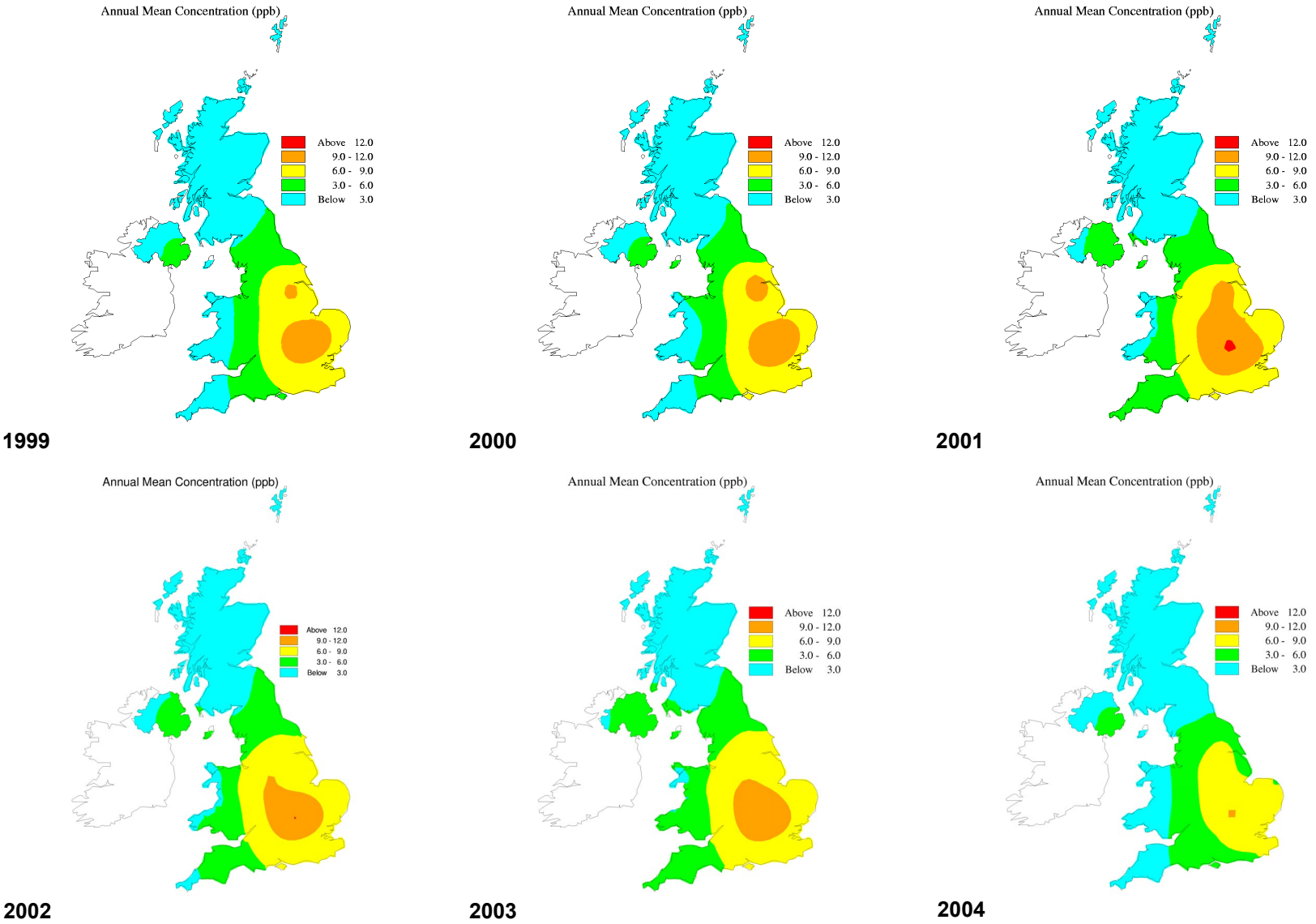



**Figure 3.13:** ***Interpolated concentration maps of nitrogen dioxide (in ppb) for 1999-2004.***

Historically, these UK maps, based on diffusion tube measurements defined the rural nitrogen dioxide concentration field, upon which urban contributions were superimposed. With the introduction of automatic analysers, mainly in England, a hybrid approach is now adopted in the mapping work. The preparation of the Urban-enhanced maps is undertaken under another contract (Pollution Climate Mapping). The measurements were provided to the Pollution Climate Mapping project team.

# 4. Nitric Acid Monitoring Network

## 4.1 INTRODUCTION

The UK Nitric Acid Monitoring Network has been in operation since September 1999, providing data on nitric acid, particulate nitrate and other species as part of the UK acid deposition monitoring programme. In this section, the sampling methods and measurement data for 2004 are summarised and the measurements compared against previous years.

Nitric acid and related species are monitored on a monthly basis at 12 locations using the CEH DELTA denuder system, in an integrated fashion with the UK Ammonia Monitoring Network. The aim of these measurements is to explore spatial patterns, compare results with dispersion models, seasonality and contribute to national N deposition estimates.

A map of the sites in the monthly $HNO_3$ monitoring network is shown in Figure 4.1.


**Figure 4.1:** ***Map of 12 monitoring sites for $HNO_3$, $NO_3^-$ and related acid gas/particle measurements.***

## 4.2 METHOD AND DATA COLLECTION

The sampling train used in the CEH DELTA system is shown Figure 4.2. $HNO_3$, $SO_2$ and HCl are removed by the first set of $K_2CO_3$/ glycerol coated denuders, and a second set of citric acid coated denuders removes $NH_3$. Two sets of filter packs at the end of the sampling train removes the aerosol components - $NO_3^-$, $SO_4^{2-}$, $Cl^-$ and $NH_4^+$.

Returned samples are stored in a cold room at 4 ºC until analysis. For the denuders, 5 ml of 0.05 % $H_2O_2$ is added to both the first and second denuders, while the initial uncoated short length of Teflon inlet is not extracted. (Tests have shown that <1% of the total is captured in this portion.). Filters from the filter packs are also extracted in 0.05 % $H_2O_2$. Extracted aqueous samples from the denuders and filter packs are sent to Harwell Scientifics Ltd on a monthly basis for chemical analysis. Denuder sample extracts are analysed for $NO_3^-$, $SO_4^{2-}$ and $Cl^-$ and filter sample extracts are analysed for $NO_3^-$, $SO_4^{2-}$, $Cl^-$, $Na^+$, $Mg^{2+}$ and $Ca^{2+}$.

The amount of a gas collected ($Q$) on a denuder due to air sampling is given by:

$$Q = (c_e - c_b)^* v \quad (1)$$

where $c_e$ is the liquid concentration of an exposed tube, $c_b$ is the liquid concentration of a blank tube and $v$ is the liquid volume of the extraction solution. The air concentrations ($\chi_a$) of the gas of interest is then determined as:

$$\chi_a = Q/V \quad (2)$$

where V is the effective volume of air sampled. For denuder samples this is found directly from the gas meter readings, and is typically 15 $m^3$ per month.

The use of two denuders in series allow for the determination of capture efficiency, by comparing the amounts of trace gas in both. An infinite series correction factor, based on the capture efficiency, is applied for trace gas not captured. The corrected air concentration of the gas ($\chi_{a\ (corrected)}$) is then determined as:

$$\chi_{a\ (corrected)} = \chi_{a\ (Denuder\ 1)} * \frac{1}{[1-(\chi_{a\ (Denuder\ 2)} / \chi_{a\ (Denuder\ 1)})]} \quad (3)$$

The absolute amount of the correction is added to the value for the acid gas, and subtracted from the aerosol value. At a typical capture efficiency of 90 % in the first denuder, the correction represents 1 % of the corrected air concentration. At 80 %, 75 % and 70 % capture, the correction amounts to 6 %, 11 % and 17 % of the total, respectively. Below 60 % capture efficiency, the correction amounts to greater than 50 % and should not be applied. The air concentration of the trace gas is then determined as:

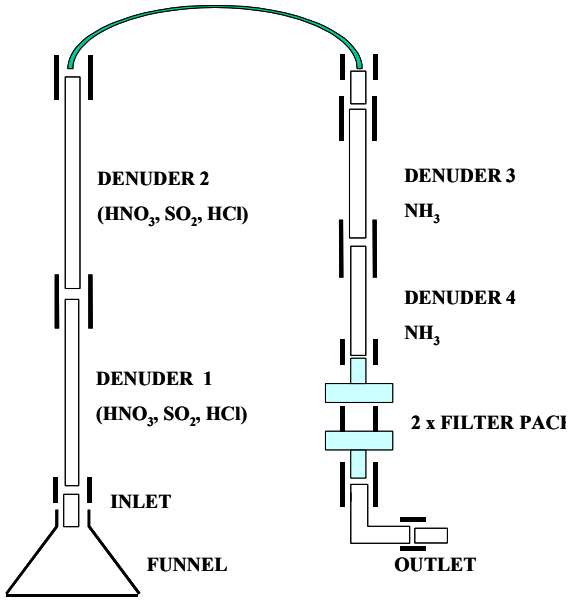



**Figure 4.2:** ***Sampling train for monthly air measurements.***

$$\chi_a = \chi_{a\ (Denuder\ 1)} + \chi_{a\ (Denuder\ 2)} \quad (4)$$

## 4.3 NITRIC ACID NETWORK MEASUREMENTS

### 4.3.1 Denuder Capture Efficiency

The use of 2 glass denuders in series allows the capture efficiency of every sample to be assessed, by comparing the amount of $HNO_3/SO_2/HCl$ in both tubes. A collection efficiency correction is applied to the measurement based on the capture efficiency. Where less than 75% of the total captured is recorded in the first denuder, data are marked as being less certain. The monthly averaged denuder capture efficiencies from the 12 monitoring sites for $HNO_3$, $SO_2$ and HCl are shown in Figure 4.3. The quality control using a double denuder system confirms that the capture efficiency in the denuders is adequate and that the correction factors are small (typically ~ 1 %).

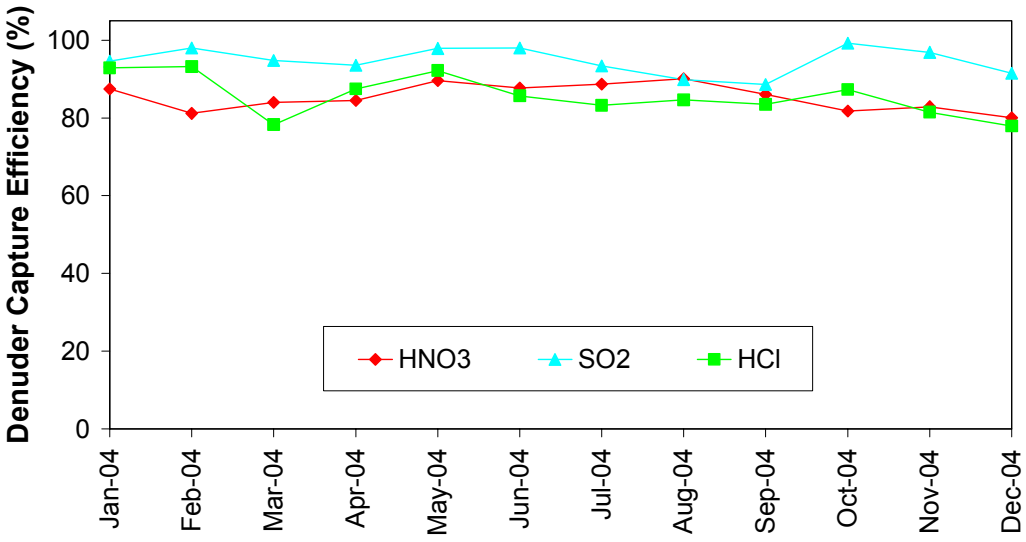
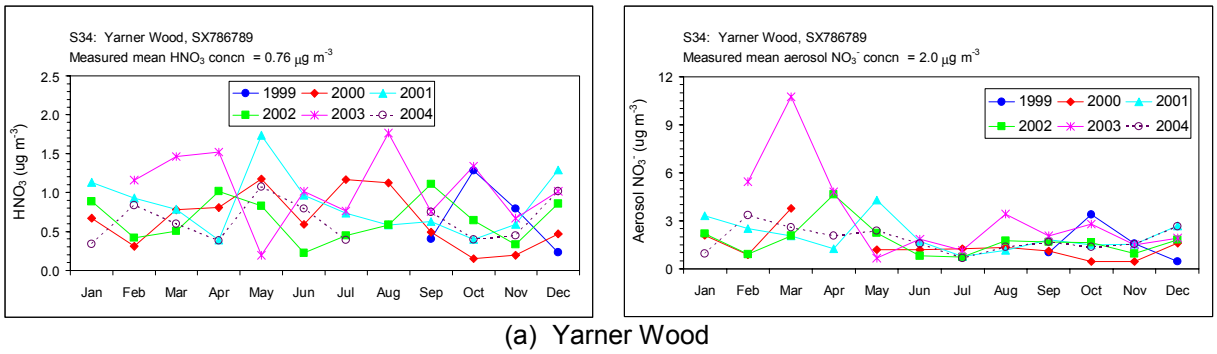


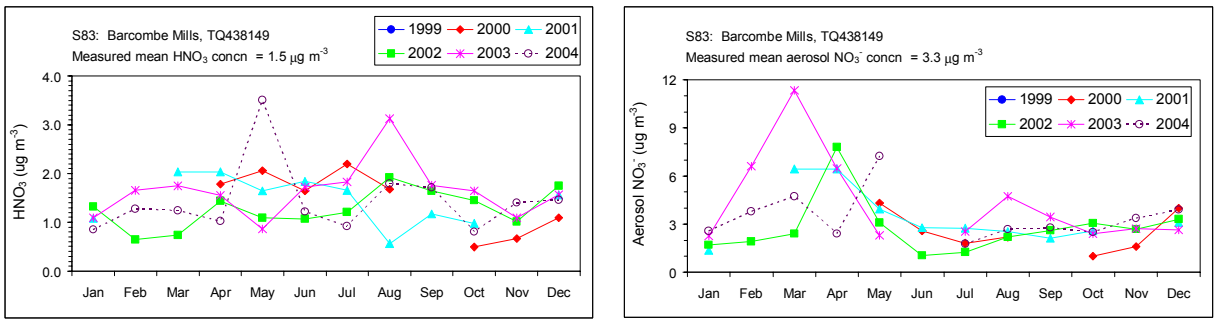

**Figure 4.3:** ***Monthly mean denuder capture efficiency for $NH_3$, $HNO_3$, $SO_2$ and HCl from the 12 monitoring sites (= amount in 1st Denuder / (Amounts captured in 1st + 2nd Denuders)*100 %).***

### 4.3.2 The 2004 Measurements

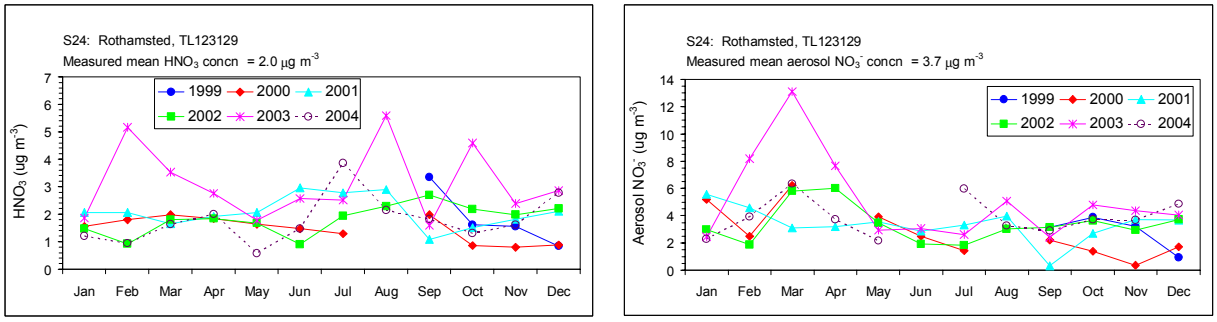
Graphs of the concentrations of $HNO_3$ and $NO_3^-$ at each site are shown in Figure 4.4. The complete set of the monthly measurements of acidic trace gases, acidic aerosol and base cations made in 2004 can be found in Appendix 5.1.



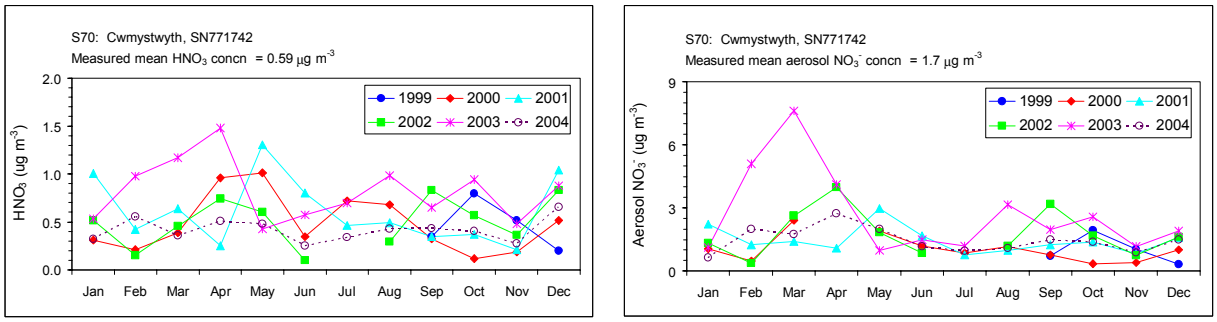

(a) Yarner Wood




(b) Barcombe Mills

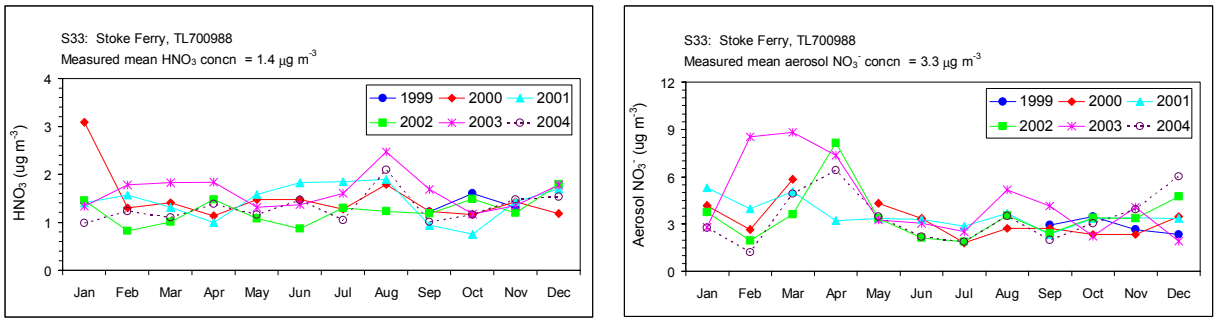



(c) Rothamsted

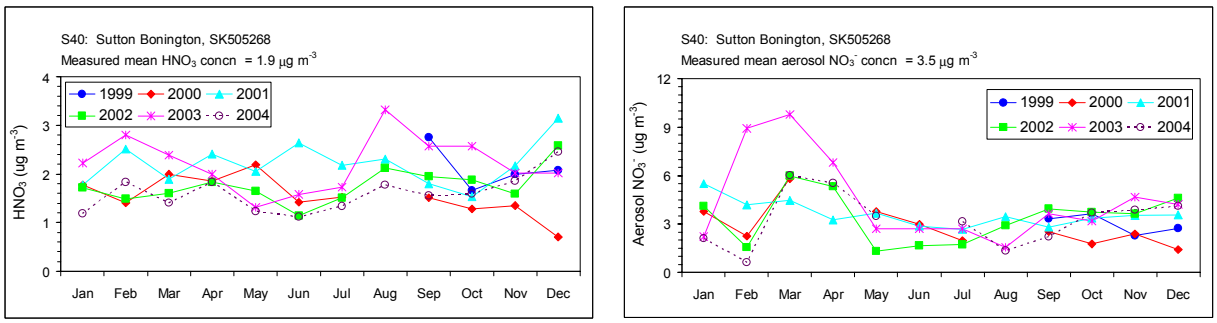



(d) Cwmystwyth

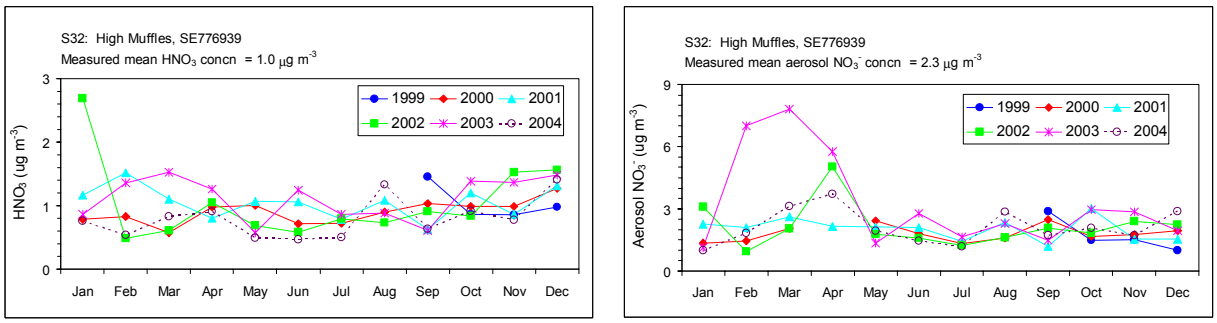
**Figure 4.4:** ***Measurements of Gaseous $HNO_3$ and aerosol $NO_3^-$ made in the Nitric Acid Monitoring Network between September 1999 and December 2004.***



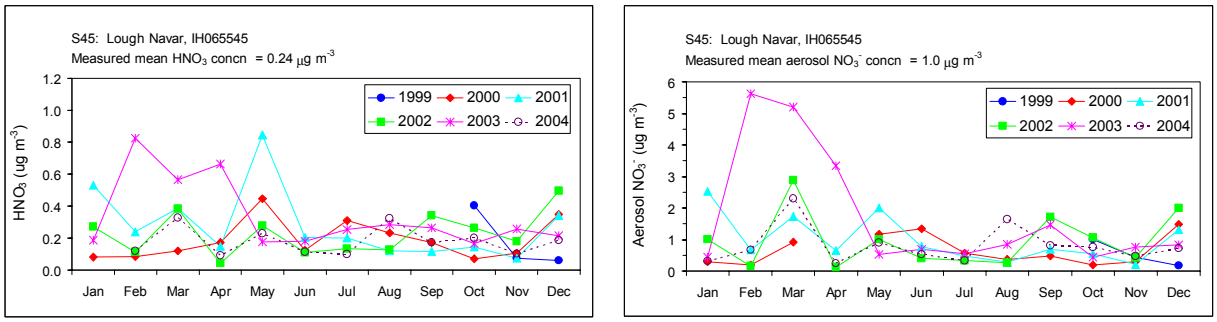

(e) Stoke Ferry




(f) Sutton Bonington

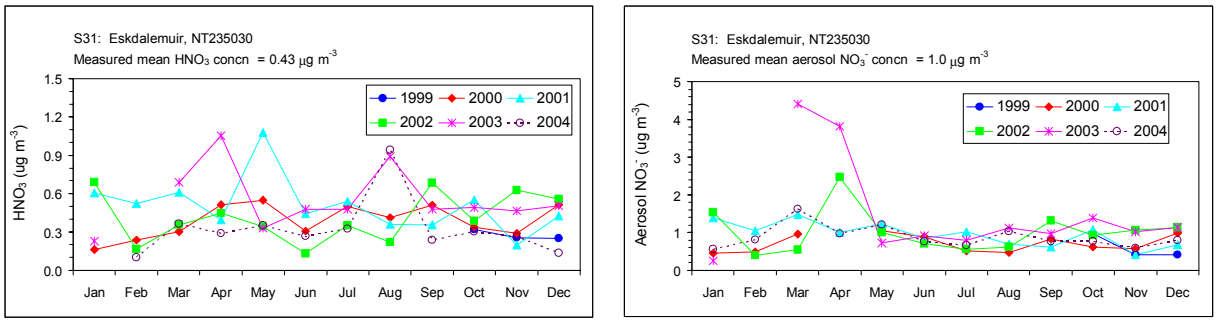



(g) High Muffles

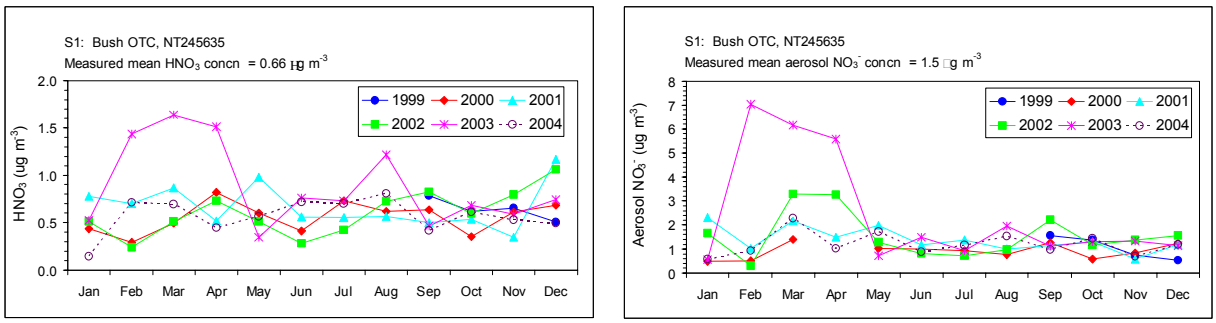



(h) Lough Navar

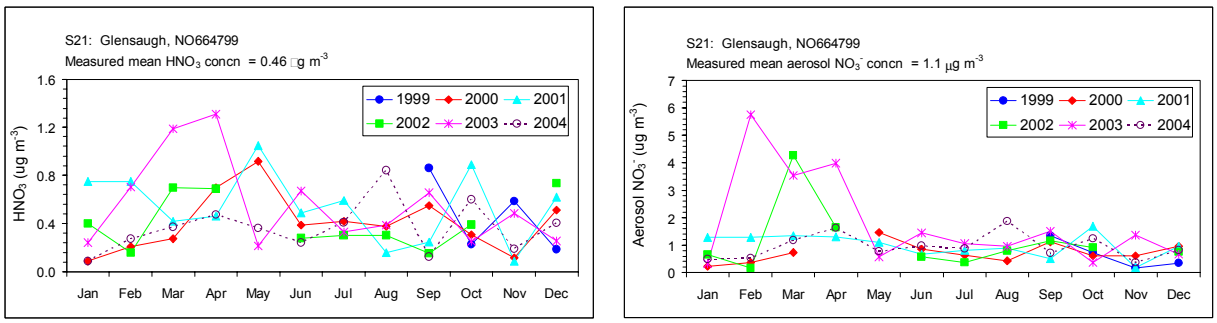
**Figure 4.4: *Measurements of Gaseous HNO3 and aerosol NO3- made in the Nitric Acid Monitoring Network between September 1999 and December 2004.* (continued)**



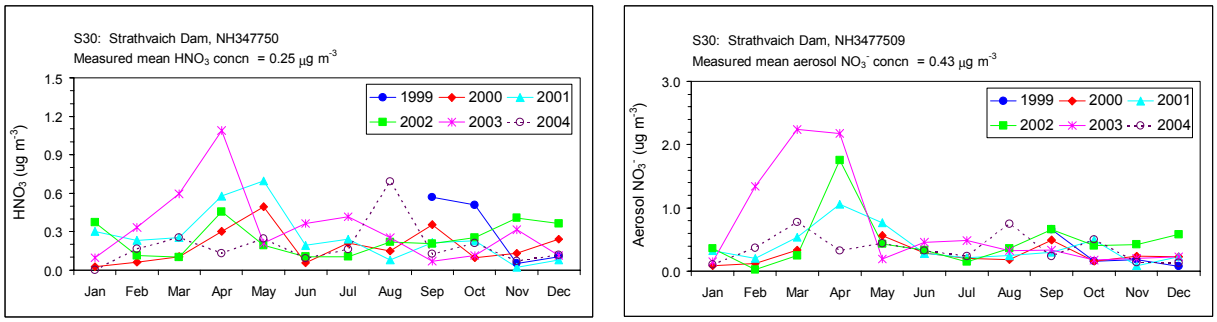

(i) Eskdalemuir




(j) Bush, near Edinburgh




(k) Glensaugh




(l) Strathvaich Dam

**Figure 4.4: *Measurements of Gaseous HNO3 and aerosol NO3- made in the Nitric Acid Monitoring Network between September 1999 and December 2004.* (continued)**

The plots in Figure 4.4 show that the concentrations of both species are reasonably stable at a monthly level, and have a weak seasonal variability. The annual cycle for $HNO_3/NO_3^-$ has an observed maximum during late spring and early summer, which may be related to increased ozone concentrations during the season and an enhancement of $HNO_3$ formation. During the winter months, low temperature and high humidity favour the formation of $NH_4NO_3$ from the gas phase $NH_3$ and $HNO_3$. Coupled to changes in boundary layer conditions, this produces the winter minimum in the

cycle. The ratio of the concentrations of $HNO_3$ and $NO_3^-$ is similar throughout the year; fluctuations in the ratio are influenced by the loss of $HNO_3$ due to dry deposition.

Statistical summaries of the measurements made in 2004 of the acid gas, and the acid and base cation aerosol components are given in Table 4.1, Table 4.2 and Table 4.3, respectively.

**Table 4.1:** ***Summary of statistics for Monthly Measurements of Acidic Trace Gases in 2004.***

| No. | Name | Nitric Acid: µg $HNO_3$ $m^{-3}$ | | | | | | Sulphur Dioxide: µg $SO_2$ $m^{-3}$ | | | | | | Hydrochloric acid: µg HCl $m^{-3}$ | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Min | Max | SD | CV (%) | N | Mean | Min | Max | SD | CV (%) | N | Mean | Min | Max | SD | CV (%) | N |
| 1 | Bush OTC | 0.57 | 0.15 | 0.81 | 0.18 | 31.5 | 12 | 1.33 | 0.35 | 4.01 | 0.99 | 74.4 | 12 | 0.25 | 0.00 | 0.42 | 0.11 | 45.5 | 12 |
| 21 | Glensaugh | 0.36 | 0.09 | 0.84 | 0.21 | 57.6 | 12 | 0.33 | 0.09 | 0.54 | 0.13 | 39.2 | 12 | 0.32 | 0.00 | 0.69 | 0.20 | 63.1 | 12 |
| 24 | Rothamsted | 1.78 | 0.57 | 3.86 | 0.87 | 49.1 | 12 | 2.04 | 0.93 | 4.49 | 0.97 | 47.7 | 12 | 0.35 | 0.12 | 0.71 | 0.15 | 43.6 | 12 |
| 30 | Strathvaich Dam | 0.19 | 0.00 | 0.69 | 0.17 | 91.9 | 12 | 0.09 | 0.00 | 0.25 | 0.08 | 82.8 | 12 | 0.22 | 0.01 | 0.51 | 0.13 | 57.2 | 12 |
| 31 | Eskdalemuir | 0.33 | 0.10 | 0.94 | 0.22 | 67.8 | 11 | 0.34 | 0.02 | 0.94 | 0.27 | 81.4 | 11 | 0.14 | 0.00 | 0.25 | 0.08 | 60.4 | 11 |
| 32 | High Muffles | 0.80 | 0.46 | 1.42 | 0.31 | 39.3 | 12 | 1.66 | 0.70 | 2.44 | 0.56 | 33.9 | 12 | 0.25 | 0.07 | 0.38 | 0.09 | 35.1 | 12 |
| 33 | Stoke Ferry | 1.30 | 0.98 | 2.09 | 0.31 | 24.1 | 12 | 1.69 | 0.61 | 2.94 | 0.54 | 31.9 | 12 | 0.37 | 0.13 | 0.63 | 0.16 | 42.7 | 12 |
| 34 | Yarner Wood | 0.64 | 0.34 | 1.07 | 0.27 | 42.2 | 11 | 0.63 | 0.22 | 1.35 | 0.34 | 54.4 | 11 | 0.26 | 0.12 | 0.50 | 0.12 | 47.1 | 11 |
| 83 | Barcombe Mills | 1.43 | 0.80 | 3.51 | 0.73 | 50.6 | 12 | 1.63 | 0.99 | 3.15 | 0.56 | 34.2 | 12 | 0.41 | 0.19 | 1.12 | 0.25 | 62.0 | 12 |
| 40 | Sutton Bonington | 1.60 | 1.11 | 2.46 | 0.38 | 23.7 | 12 | 2.70 | 1.14 | 6.82 | 1.54 | 57.1 | 12 | 0.39 | 0.18 | 0.65 | 0.17 | 43.6 | 12 |
| 45 | Lough Navar | 0.16 | 0.00 | 0.33 | 0.10 | 59.0 | 12 | 0.24 | 0.00 | 1.22 | 0.34 | 146.6 | 11 | 0.14 | 0.02 | 0.50 | 0.14 | 100.6 | 12 |
| 70 | Cwmystwyth | 0.42 | 0.25 | 0.65 | 0.12 | 28.2 | 12 | 0.58 | 0.13 | 1.44 | 0.39 | 66.8 | 12 | 0.28 | 0.10 | 0.66 | 0.15 | 54.4 | 12 |

**Table 4.2:** ***Summary of Statistics for Monthly Measurements of Acidic Aerosols in 2004.***

| No. | Name | Nitrate: µg $NO_3^-$ $m^{-3}$ | | | | | | Sulphate: µg $SO_4^{2-}$ $m^{-3}$ | | | | | | Chloride: µg $Cl^-$ $m^{-3}$ | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Min | Max | SD | CV (%) | N | Mean | Min | Max | SD | CV (%) | N | Mean | Min | Max | SD | CV (%) | N |
| 1 | Bush OTC | 1.21 | 0.58 | 2.28 | 0.48 | 39.7 | 12 | 1.01 | 0.50 | 1.74 | 0.43 | 43.0 | 12 | 1.15 | 0.54 | 1.67 | 0.40 | 34.6 | 12 |
| 21 | Glensaugh | 0.95 | 0.37 | 1.87 | 0.45 | 47.6 | 12 | 0.71 | 0.22 | 1.96 | 0.46 | 64.3 | 12 | 0.83 | 0.51 | 1.13 | 0.23 | 28.0 | 12 |
| 24 | Rothamsted | 3.90 | 2.17 | 6.36 | 1.35 | 34.7 | 11 | 2.06 | 0.98 | 3.79 | 0.80 | 39.0 | 12 | 1.34 | 0.18 | 2.56 | 0.68 | 50.9 | 12 |
| 30 | Strathvaich Dam | 0.36 | 0.11 | 0.78 | 0.22 | 61.1 | 12 | 0.58 | 0.23 | 1.51 | 0.32 | 56.0 | 12 | 1.04 | 0.62 | 1.63 | 0.33 | 32.3 | 12 |
| 31 | Eskdalemuir | 0.88 | 0.56 | 1.62 | 0.30 | 33.7 | 12 | 0.77 | 0.05 | 1.51 | 0.39 | 50.3 | 12 | 0.92 | 0.44 | 1.45 | 0.34 | 37.4 | 12 |
| 32 | High Muffles | 2.12 | 0.99 | 3.71 | 0.84 | 39.4 | 12 | 1.33 | 0.40 | 2.37 | 0.57 | 42.8 | 12 | 1.16 | 0.52 | 1.88 | 0.48 | 41.0 | 12 |
| 33 | Stoke Ferry | 3.44 | 1.21 | 6.41 | 1.64 | 47.6 | 12 | 1.77 | 0.42 | 3.83 | 0.89 | 50.5 | 12 | 1.15 | 0.20 | 1.89 | 0.54 | 46.6 | 12 |
| 34 | Yarner Wood | 1.84 | 0.66 | 3.35 | 0.78 | 42.2 | 12 | 1.41 | 0.78 | 2.96 | 0.64 | 45.6 | 12 | 1.49 | 0.36 | 2.61 | 0.71 | 47.7 | 12 |
| 83 | Barcombe Mills | 3.43 | 1.78 | 7.24 | 1.52 | 44.2 | 11 | 2.03 | 1.06 | 4.76 | 0.97 | 47.7 | 12 | 1.69 | 0.87 | 2.78 | 0.69 | 40.5 | 12 |
| 40 | Sutton Bonington | 3.28 | 0.64 | 6.00 | 1.64 | 50.1 | 11 | 1.91 | 0.90 | 3.03 | 0.73 | 38.5 | 12 | 1.45 | 0.43 | 2.37 | 0.66 | 45.7 | 12 |
| 45 | Lough Navar | 0.81 | 0.25 | 2.30 | 0.60 | 73.7 | 12 | 0.80 | 0.45 | 1.39 | 0.31 | 38.4 | 11 | 1.37 | 0.60 | 1.95 | 0.46 | 33.8 | 12 |
| 70 | Cwmystwyth | 1.46 | 0.65 | 2.75 | 0.59 | 40.2 | 12 | 1.20 | 0.63 | 1.69 | 0.35 | 28.9 | 12 | 1.66 | 0.69 | 2.44 | 0.64 | 38.6 | 12 |

**Table 4.3:** ***Summary of Statistics for Monthly Measurements of Base Cations in 2004.***

| No. | Name | Calcium: µg $Ca^{2+}$ $m^{-3}$ | | | | | | Magnesium: µg $Mg^{2+}$ $m^{-3}$ | | | | | | Sodium: µg $Na^+$ $m^{-3}$ | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Min | Max | SD | CV (%) | N | Mean | Min | Max | SD | CV (%) | N | Mean | Min | Max | SD | CV (%) | N |
| 1 | Bush OTC | 0.00 | 0.00 | 0.03 | 0.01 | 277.3 | 12 | 0.01 | 0.00 | 0.02 | 0.01 | 102.3 | 12 | 0.59 | 0.21 | 0.99 | 0.25 | 41.6 | 12 |
| 21 | Glensaugh | 0.01 | 0.00 | 0.07 | 0.02 | 242.2 | 12 | 0.03 | 0.00 | 0.05 | 0.02 | 49.8 | 12 | 0.49 | 0.11 | 0.78 | 0.21 | 42.4 | 12 |
| 24 | Rothamsted | 0.04 | 0.00 | 0.18 | 0.06 | 162.6 | 12 | 0.05 | 0.01 | 0.07 | 0.02 | 46.2 | 12 | 0.74 | 0.27 | 1.20 | 0.35 | 47.6 | 12 |
| 30 | Strathvaich Dam | 0.01 | 0.00 | 0.06 | 0.02 | 140.8 | 12 | 0.04 | 0.02 | 0.07 | 0.02 | 39.6 | 12 | 0.60 | 0.17 | 0.92 | 0.23 | 38.6 | 12 |
| 31 | Eskdalemuir | 0.01 | 0.00 | 0.06 | 0.02 | 153.5 | 12 | 0.03 | 0.00 | 0.06 | 0.02 | 49.9 | 12 | 0.45 | 0.17 | 0.86 | 0.20 | 43.3 | 12 |
| 32 | High Muffles | 0.03 | 0.00 | 0.10 | 0.03 | 123.7 | 12 | 0.04 | 0.00 | 0.08 | 0.03 | 65.8 | 12 | 0.61 | 0.16 | 1.13 | 0.27 | 45.2 | 12 |
| 33 | Stoke Ferry | 0.04 | 0.00 | 0.09 | 0.03 | 71.6 | 12 | 0.05 | 0.00 | 0.08 | 0.03 | 55.4 | 12 | 0.65 | 0.27 | 1.06 | 0.26 | 40.3 | 12 |
| 34 | Yarner Wood | 0.05 | 0.00 | 0.12 | 0.03 | 64.6 | 12 | 0.07 | 0.03 | 0.12 | 0.03 | 40.9 | 12 | 0.87 | 0.39 | 1.30 | 0.33 | 38.1 | 12 |
| 83 | Barcombe Mills | 0.08 | 0.00 | 0.13 | 0.04 | 47.9 | 12 | 0.09 | 0.02 | 0.14 | 0.04 | 46.1 | 12 | 1.08 | 0.32 | 1.61 | 0.40 | 37.2 | 12 |
| 40 | Sutton Bonington | 0.05 | 0.01 | 0.11 | 0.03 | 58.2 | 12 | 0.06 | 0.02 | 0.09 | 0.02 | 38.6 | 12 | 0.73 | 0.28 | 1.19 | 0.32 | 44.4 | 12 |
| 45 | Lough Navar | 0.04 | 0.01 | 0.08 | 0.02 | 50.8 | 12 | 0.06 | 0.02 | 0.10 | 0.02 | 38.0 | 12 | 0.71 | 0.20 | 1.14 | 0.29 | 40.2 | 12 |
| 70 | Cwmystwyth | 0.03 | 0.00 | 0.06 | 0.02 | 77.3 | 12 | 0.07 | 0.00 | 0.11 | 0.04 | 52.6 | 12 | 0.87 | 0.30 | 1.31 | 0.36 | 41.4 | 12 |

Figure 4.5 shows the annual cycle in the concentrations of the 3 gas-phase and the 6 aerosol components, as monthly network average concentrations, for the years 2000 through to 2004.

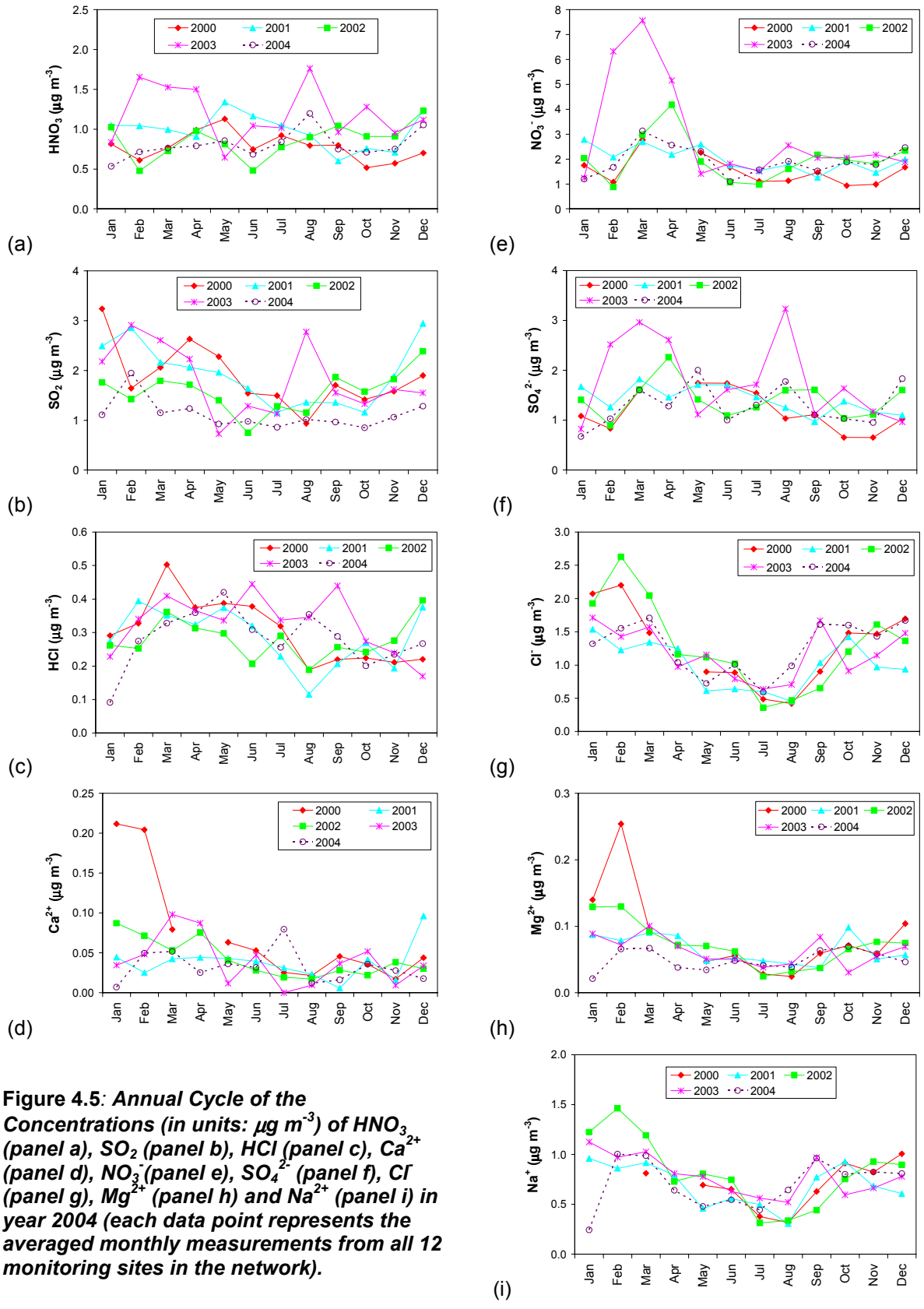



**Figure 4.5**: ***Annual Cycle of the Concentrations (in units: µg $m^{-3}$) of $HNO_3$ (panel a), $SO_2$ (panel b), HCl (panel c), $Ca^{2+}$ (panel d), $NO_3^-$ (panel e), $SO_4^{2-}$ (panel f), $Cl^-$ (panel g), $Mg^{2+}$ (panel h) and $Na^{2+}$ (panel i) in year 2004 (each data point represents the averaged monthly measurements from all 12 monitoring sites in the network).***

Scatter plots of the concentration of gas and aerosol phases of the different components show that there are significant spatial correlations between the concentrations of the different pollutants (Figure 4.6)[3].

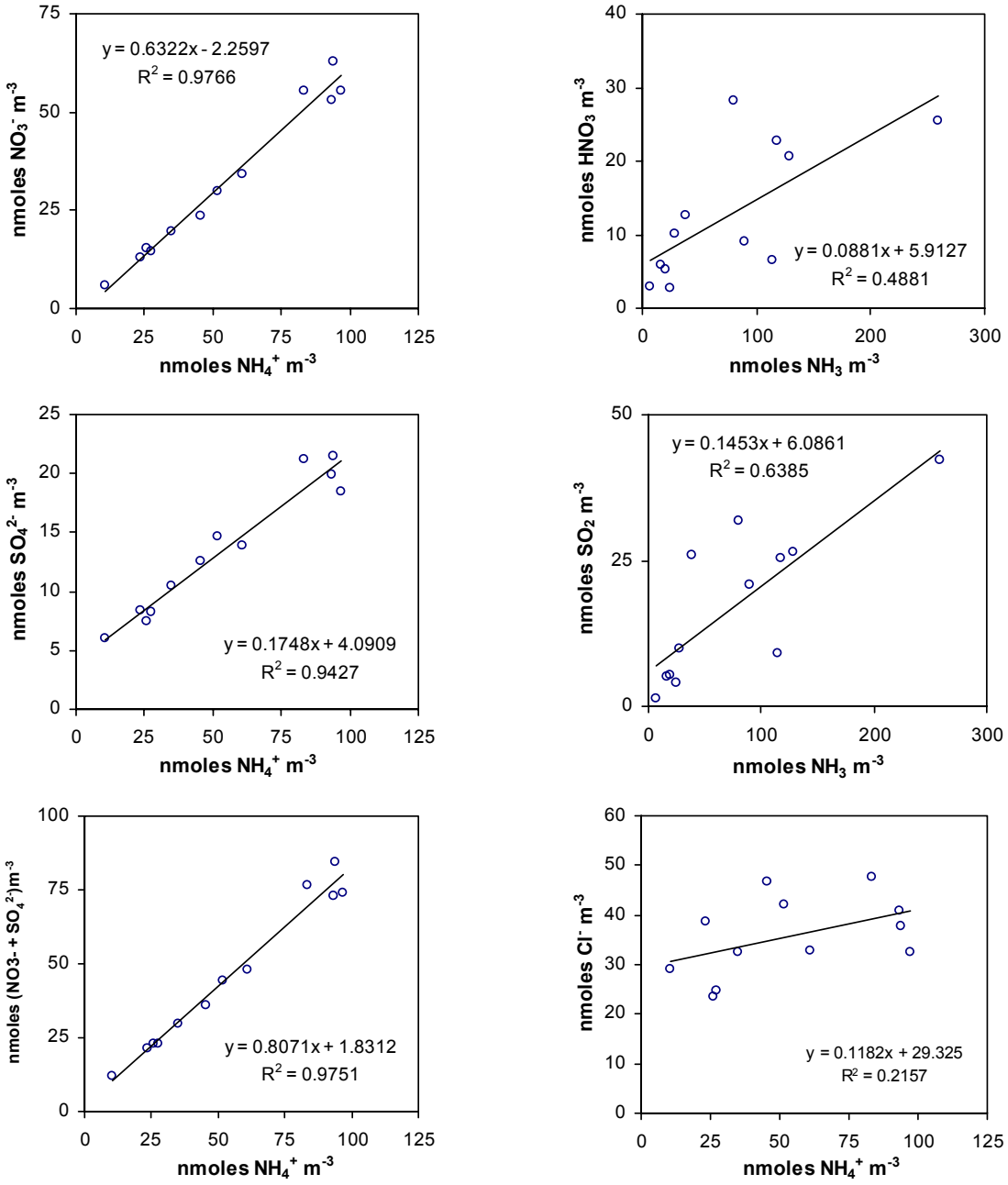



**Figure 4.6**: ***Scatter plots of showing the relationships between concentrations of $HNO_3$, $SO_2$, $NH_3$, $NO_3^-$, $SO_4^{2-}$ and , $NH_4^+$ from the monthly measurements at 12 sites (units: nmol $m^{-3}$).***

Much of this may be related to correlation in the emission distribution of precursor gases or the effect of long-range transport of aerosol across the UK and from Europe. The comparison of the gas phase concentrations shows that there is more $NH_3$ than either $SO_2$ or $HNO_3$ at these sites (on molar basis), while $SO_2$ is in excess over $HNO_3$. The correlations are highest for the aerosol components. This

[3] The $NH_3$ and $NH_4^+$ measurements are made under a separate contract *Ammonia Monitoring in the UK* (EPG 1/3/136), let by DEFRA to CEH Edinburgh. The measurements are reported under that contract. but are available from the CARA website at the address: http://www.nbu.ac.uk/cara/UKNAMN/UKNAMN.htm.

reflects the longer residence time of these measurements leading to more representative sampling, as well as the close coupling between acidic and basic aerosol components. As with the gases, reduced nitrogen ($NH_4^+$) is in molar excess over $SO_4^{2-}$ and $NO_3^-$. However, aerosol $NO_3^-$ is in molar excess over $SO_4^{2-}$ and is even somewhat larger in terms of equivalents of $H^+$.

The high correlations between the aerosol species also indicate the quality of the measurements, since uncertainty in the measurements on a monthly basis would propagate through to scatter in these plots.

### 4.3.3 The 2004 Maps

Interpolated concentration fields for 2004 across the UK from the 12 monitoring sites are shown in Figure 4.7. A bilinear interpolation procedure was used to provide the mean concentration field at a grid resolution of 10 km x 10 km. The spatial distributions of $HNO_3$ and $NO_3^-$ are seen to be rather different to that of HCl and $Cl^-$. Both the nitrogen species are largest in central and south east England, with the lowest concentrations of $HNO_3$ in Scotland and Northern Ireland. $HNO_3$ is seen to be more spatially variable than $NO_3^-$ aerosol, reflecting the long atmospheric residence time of the latter, although detail in the spatial concentration field is necessarily limited by measurements from 12 sites.

Figure 4.7 shows the distribution of annual mean $SO_2$ concentrations for 2004. The largest annual concentrations of 2.7 $\mu g\ m^{-3}$ occurred at the Sutton Bonington site, derived from the DELTA measurements. It should be noted that a separate DEFRA network is dedicated to measurement of $SO_2$ concentrations. $SO_2$ concentrations generally decreased towards the West and North of the UK, with the lowest concentrations of < 0.5 $\mu g\ SO_2\ m^{-3}$ in northern Scotland. $SO_2$ is seen to be more spatially variable than $SO_4^{2-}$ aerosol, reflecting the long atmospheric residence time of the latter.

HCl and $Cl^-$ concentrations are largest in the south east and south west of England (Barcombe Mills, Yarner Wood) (see Figure 4.7). The distribution may reflect the dual contribution to atmospheric $Cl^-$ from anthropogenic and marine sources. The highest HCl concentrations in the south may be derived from emission or reaction of sea salt with $HNO_3$ to produce HCl. In contrast, the larger concentration of $Cl^-$ in the south west probably reflects a marine contribution to the aerosol.

The concentrations of base cations varies greatly depending on the species. In all cases, however ($Ca^{2+}$, $Mg^{2+}$ and $Na^+$), concentrations are the largest at Barcombe Mills (see Figure 4.7). This may reflect a large contribution of marine aerosol to this site, as well as possible agricultural sources of base cation emission in the vicinity.

## 4.4 DISCUSSION

Monthly values from the 12 sites provided a basic estimate of the spatial variability of these components across the UK, as well as their main seasonal and inter-annual trends.

The main features of the spatial distribution in the pollutants measured are shown in the annual maps (Figure 4.7). In general, there is a reasonable correlation between the concentrations of the different pollutants at the 12 monthly monitoring sites, and for some species there are very high spatial correlations. In the case of the gases this can be attributed to the regional distribution of sources being similar, while for aerosol the chemistry must obviously balance between major cations and anions. Figure 4.7 shows that there is in general a low correlation between concentrations of gaseous $NH_3$ and those of $SO_2$ and $HNO_3$, and this may be attributed to the different sources of these pollutants, with $NH_3$ derived predominantly from agricultural sources, and $SO_2$ and $HNO_3$ from combustion sources.

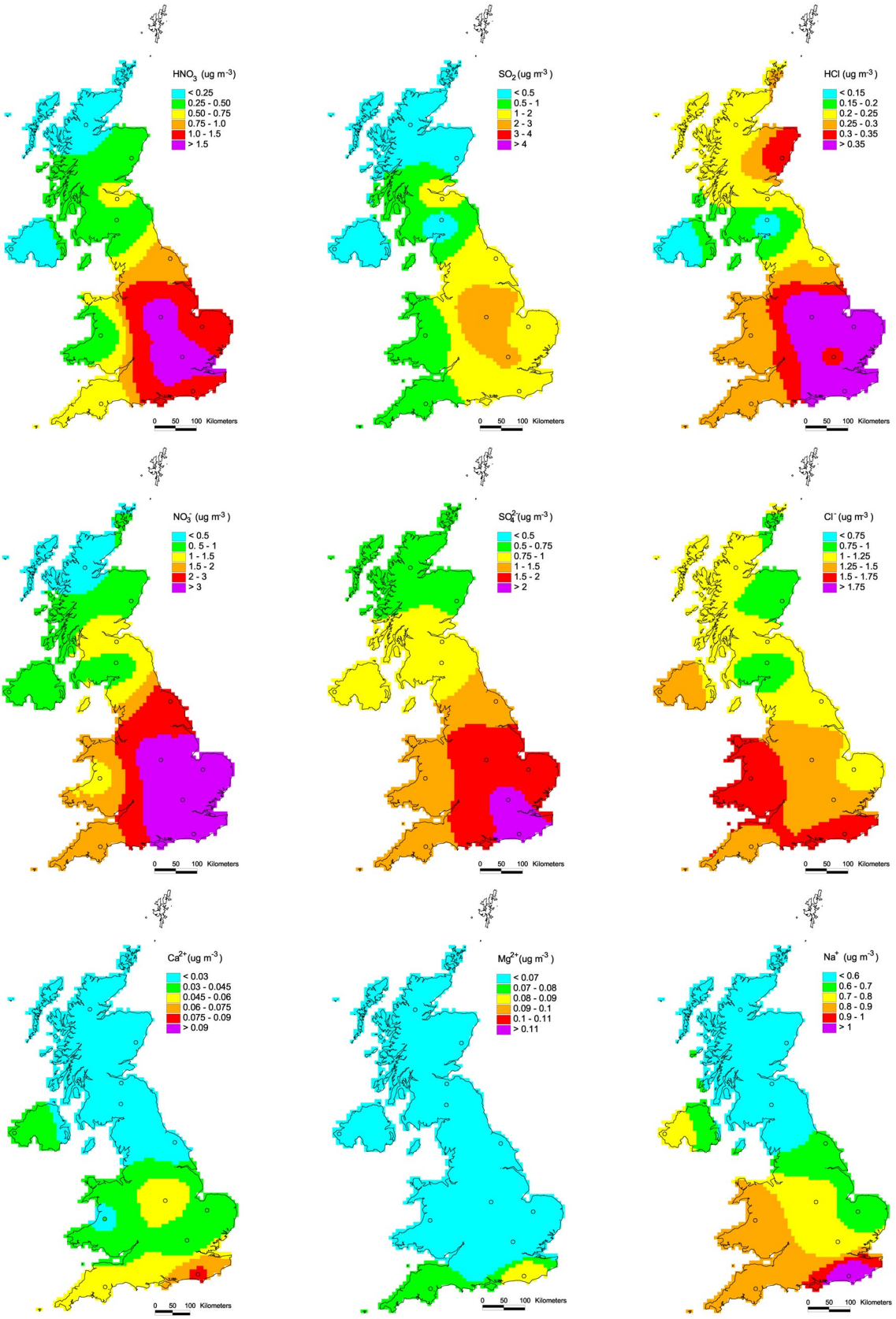



**Figure 4.7:** ***Spatial patterns of the concentrations of $HNO_3$, $SO_2$, HCl and of aerosol $NO_3^-$, $SO_4^{2-}$, $Cl^-$, $Ca^{2+}$, $Mg^{2+}$ and $Na^+$ concentrations in the UK from the averaged monthly measurements (January-to December-2004).***

It should be noted that the maps of the acid gas and aerosol concentrations shown in Figure 4.7 are constructed using bi-linear interpolation. This is because the number of sites is not sufficient to permit more sophisticated interpolation methods (e.g. krigging) and provides no estimate of uncertainty in the interpolation. It is clear, however, from the maps that each part of the country is fully dependent on only one point in the interpolation and that, while there is a high correlation between the pollutants measured at the sites, there are major differences in concentrations between all adjacent sites. It is clear therefore, that the present network of 12 sites is an absolute minimum and that an increase in site density would be warranted. Such an increase (*e.g.*, to 20-30 sites) would allow interpolation uncertainties to be quantified and could also be expected to change the estimates of regional dry deposition budgets.

The UK deposition budgets for $HNO_3$, using interpolated concentrations from the 12 sites in the monitoring network are shown in Table 4.4. The variation between years is due to the variability in the interpolated concentrations, and demonstrates clearly that large errors can potentially arise due to use of only 12 sites in the present network.

**Table 4.4: UK Annual Deposition Budgets for $HNO_3$ (based on Interpolated Concentrations from the 12 sites in the UK Nitric Acid Monitoring Network)**

| Year | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|
| **Annual Deposition Budgets for $HNO_3$ (kt N)** | 57 | 73 | 62 | 87 |

The monthly site data provide information on the overall seasonal behaviour of the different pollutants. Figure 4.4 presents the monthly changes at each site, and after four full years of monitoring, the seasonal trends are clearly distinctive and replicated for each site. Figure 4.5 shows the average seasonal changes for 2000 to 2004 from all of the sites, and indicates more clearly the main differences for the pollutants. $HNO_3$, HCl and $NO_3^-$ have a maximum during late spring and early summer, which may reflect the importance of photochemical production processes. Conversely, $SO_2$, $Na^+$ and $Cl^-$ have maxima during winter, reflecting the importance of combustion processes for $SO_2$ and marine sources in winter for sea salt. The reasons for the observed seasonal trends in $SO_4^{2-}$, $Mg^{2+}$ and $Ca^{2+}$ are less clear.

# 5. Other Activities

## 5.1 COMPARISON OF SINGLE WEEK VERSUS FORTNIGHTLY BULK RAINWATER SAMPLING

The precipitation composition measurements are one of the two key inputs in the determination of wet deposition budgets. The measurements are currently based on fortnightly sampling, although weekly sampling was used up to the end of 2001. It is therefore important that the measurements are robust and not subject to any sampling artefacts. A possible artefact is biodegradation of the sample during and after sampling.

To assess whether the switch from single week to fortnightly sampling had any effect on sampling performance an intercomparison exercise was initiated at three of the monitoring sites (Eskdalemuir, Thorganby and Lough Navar) at the end of 2001 and is on-going. Preliminary results from this intercomparison were presented in the 2002 data report (using available results from the start of sampling to August 2003, see Hayman *et al.* [2004]). The intercomparison is on going and the results will be presented formally when the single week samplers will be finally withdrawn from use at the end of the 2005.

A preliminary assessment of the first three years of the assessment shows that there is good agreement between the parameters collected for the different sampling durations, as shown in Figure 5.1. The figure compares the rainwater volume, non-sea salt sulphate and nitrate deposition at each site. Least scatter about the 1:1 line can be seen for volumes and depositions observed for Thorganby, followed by values at Eskdalemuir and Lough Navar. Table 5.1 provides a statistical summary of the comparison.

Leakage of collected rainwater from the collection bottles appears to be responsible for some of the discrepancy between sample-pairs at Lough Navar (Steps have since been taken to ensure that the collection bottle lids are secured properly). Wind effects due to local turbulence around the sampling collectors may also have lead to variations in rainwater collected - the Lough Navar site is surrounded by trees.

**Table 5.1*: Comparison of Parameters from Precipitation Composition Sampling Frequency Intercomparison*.**

| Sampling site | Eskdalemuir | | Lough Navar | | Thorganby | |
|---|---|---|---|---|---|---|
| Start date for intercomparison | 16/01/02 | | 26/11/01 | | 5/6/02 | |
| End date for intercomparison | 27/08/03 | | 14/7/03 | | 27/08/03 | |
| Sampling Frequency | Two single weeks summed | Fortnightly | Two single weeks summed | Fortnightly | Two single weeks summed | Fortnightly |
| Total rain volume (mm) | 1691 | 1768 | 1786 | 1837 | 746 | 743 |
| VWM nss concentration ($\mu eq\ l^{-1}$) | 15.4 | 15.0 | 7.9 | 9.0 | 39.4 | 41.7 |
| VWM nitrate concentration ($\mu eq\ l^{-1}$) | 14.2 | 14.0 | 8.3 | 8.7 | 31.9 | 32.3 |
| $R^2$ between rain volumes | 0.94 | | 0.59 | | 0.97 | |
| $R^2$ between nss depositions | 0.59 | | 0.56 | | 0.95 | |
| $R^2$ between nitrate depositions | 0.80 | | 0.76 | | 0.96 | |

Abbreviations: nss = non-marine seasalt sulphate; VWM = volume-weighted mean

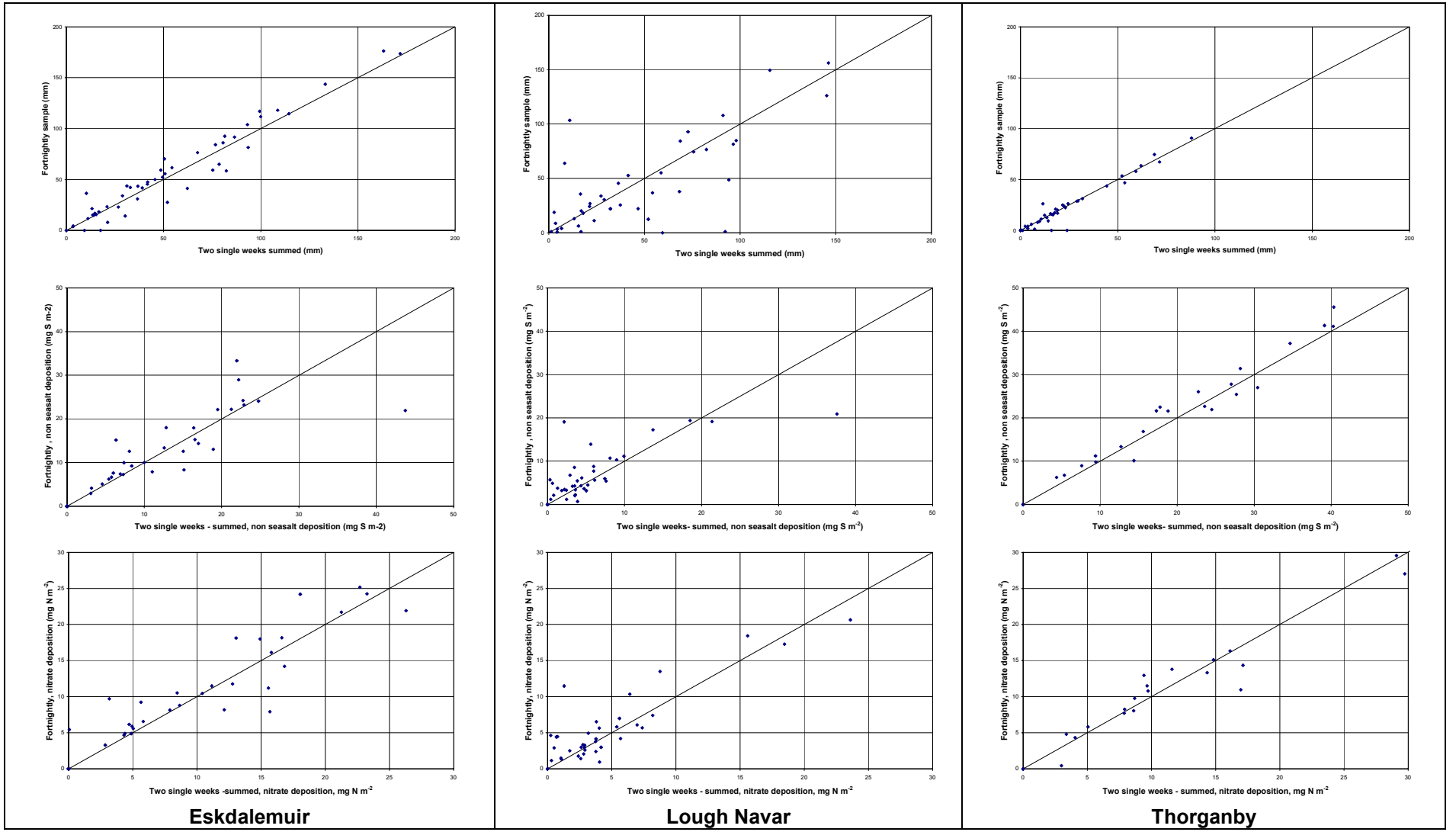



**Figure 5.1***: A comparison of Rainwater Volume (top row), Sulphur Deposition (middle row) and Nitrate Deposition (bottom row) measured at Eskdalemuir, Lough Navar and Thorganby from Weekly and Fortnightly Sampling.*

In addition, precipitation has been collected using a daily bulk collector at Eskdalemuir since the inception of the monitoring network. Figure 5.2 shows a comparison of the combined daily or weekly rainfall volume against the rainfall volumes measured for the same fortnightly sampling periods. Only those sampling periods have been included for which there are valid measurements from all three collectors.

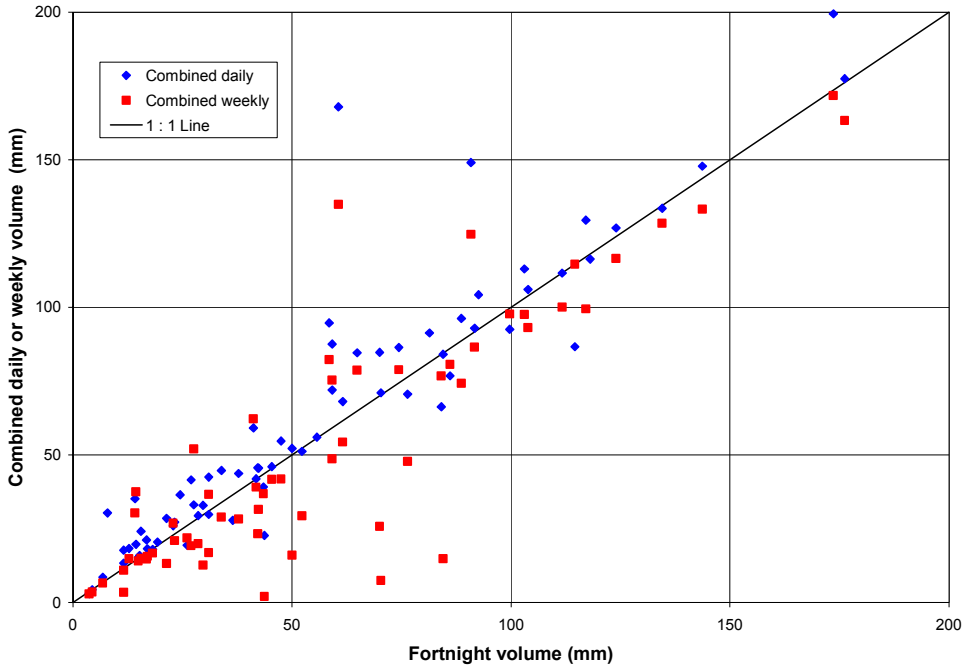



**Figure 5.2*: A Comparison of Rain Water Volume for each sampling period.***

Table 5.2 compares the rainwater volume, sulphate deposition, nitrate deposition and ammonium deposition measured for each sampler and each sampling period. Table 5.3 Gives the correlation coefficients derived from the valid measurement pairs.

**Table 5.2*: A Comparison of Annual Average (2002 to 2004) Rainwater Volumes, Sulphate Deposition, Nitrate Deposition and Ammonium Deposition at Eskdalemuir.***

| Parameter | Sampling duration | | |
|---|---|---|---|
| | Fortnightly bulk | Combined daily bulk | Combined weekly bulk |
| Rain water volume, mm | 1148.87 | 1284.73 | 1046.27 |
| Sulphate deposition, kg S $ha^{-1}$ | 3.9 | 3.9 | 3.4 |
| Nitrate Deposition, kg N $ha^{-1}$ | 2.3 | 2.2 | 2.1 |
| Ammonium deposition, kg N $ha^{-1}$ | 3.0 | 2.4 | 3.0 |

**Table 5.3*: Correlation Coefficients derived from a Comparison of Annual Average (2002 to 2004) Rainwater Volumes, Sulphate Deposition, Nitrate Deposition and Ammonium Deposition at Eskdalemuir.***

| | RainWater Volume | | Sulphate Deposition | | Nitrate Deposition | | Ammonium deposition | |
|---|---|---|---|---|---|---|---|---|
| | Fortnight | Combined Daily | Fortnight | Combined Daily | Fortnight | Combined Daily | Fortnight | Combined Daily |
| Fortnight | | | | | | | | |
| Combined Daily | 0.92 | | 0.71 | | 0.75 | | 0.83 | |
| Combined Weekly | 0.93 | 0.88 | 0.93 | 0.63 | 0.87 | 0.64 | 0.70 | 0.65 |

In a positive sense, both studies suggest that there is no significant evidence of biodegradation and the differences give some measure of the precision and accuracy of the sampling programme.

## 5.2 EMEP INTERCOMPARISONS

An important data quality assessment is organised annually by the Chemical Co-ordinating Centre (CCC) at the Norwegian Institute for Air Research (NILU). Each July samples are sent to about 36 analytical laboratories in Europe and about 25 other internationally recognised analytical laboratories. The intercomparison exercise is required as part of the EMEP Programme - such a fundamental check on analytical performance is essential if response to emission reductions can be observed consistently throughout Europe.

2004 was the 22nd time such an intercomparison took place. The samples provided included sulphur dioxide in absorbing solution, nitrogen dioxide in absorbing solution, the main components in synthetic rainwater samples and metals in synthetic rainwater samples. The results were submitted to the CCC in October 2004 with the expected results provided in November 2004. Table 5.4-Table 5.6 compare the expected and measured concentrations for the different samples of nitrogen dioxide, sulphur dioxide and rainwater composition.

**Table 5.4:** ***Comparison of Expected and Measured Concentrations of Nitrogen Dioxide in Absorbing Solution.***

| Sample code | Expected concentration µg NO2-N/ml | Measured concentration µg NO2-N/ml | Absolute mean difference (%) |
|---|---|---|---|
| C1 | 0.112 | 0.114 | 1.77 |
| C2 | 0.071 | 0.07 | -1.42 |
| C3 | 0.125 | 0.127 | 1.59 |
| C4 | 0.142 | 0.144 | 1.40 |

**Table 5.5:** ***Comparison of Expected and Measured Concentrations of Sulphur Dioxide in Absorbing Solution.***

| Sample code | Expected concentration µg SO2-S/ml | Measured concentration µg SO2-S/ml | Absolute mean difference (%) |
|---|---|---|---|
| A1 | 0.321 | 0.343 | 6.75 |
| A3 | 0.361 | 0.391 | 8.07 |
| A4 | 0.168 | 0.186 | 9.98 |
| A5 | 0.140 | 0.155 | 9.98 |

Excellent agreement can be seen for nitrogen dioxide in absorbing solution. For the sulphur dioxide in absorbing solution, the measurement data appears to be over reading. For the rainwater samples, the pH probe showed excellent agreement between measured and expected concentrations. All other major components apart from sodium in samples G1 and G2 showed good agreement.

The 23rd EMEP laboratory intercomparison is currently in progress with the analytical measurements made and submitted to EMEP. The results of the intercomparison will be reported in due course.

**Table 5.6:** ***Comparison of Expected and Measured Concentrations of the Main Component in Rainwater Samples.***

| Species | Sample code | Expected concentration µeq $l^{-1}$ | Measured concentration µeq $l^{-1}$ | Absolute Mean difference (%) |
|---|---|---|---|---|
| Sulphate-S | G1 | 101.1 | 99.4 | -1.7 |
| | G2 | 110.0 | 108.2 | -1.7 |
| | G3 | 56.0 | 54.1 | -3.3 |
| | G4 | 61.4 | 60.1 | -2.2 |
| Nitrate-N | G1 | 31.6 | 33.1 | 4.6 |
| | G2 | 26.8 | 27.7 | 3.1 |
| | G3 | 47.3 | 49.4 | 4.3 |
| | G4 | 42.1 | 43.9 | 4.1 |
| Ammonium-N | G1 | 17.2 | 17.8 | 3.3 |
| | G2 | 12.6 | 13.3 | 5.5 |
| | G3 | 28.6 | 30.0 | 4.6 |
| | G4 | 26.3 | 28.7 | 8.6 |
| Magnesium | G1 | 7.2 | 6.7 | -7.1 |
| | G2 | 8.1 | 7.7 | -5.2 |
| | G3 | 10.2 | 9.6 | -5.8 |
| | G4 | 11.2 | 11.5 | 2.9 |
| Sodium | G1 | 11.8 | 8.9 | -28.2 |
| | G2 | 14.0 | 11.9 | -16.1 |
| | G3 | 29.1 | 27.6 | -5.2 |
| | G4 | 27.8 | 25.4 | -9.0 |
| Chloride | G1 | 5.2 | 5.6 | 6.8 |
| | G2 | 6.5 | 6.3 | -4.0 |
| | G3 | 15.0 | 14.9 | -0.8 |
| | G4 | 15.7 | 15.1 | -4.0 |
| Calcium | G1 | 9.9 | 9.4 | -5.7 |
| | G2 | 11.9 | 11.1 | -7.0 |
| | G3 | 13.8 | 12.5 | -9.5 |
| | G4 | 14.2 | 15.1 | 6.1 |
| Potassium | G1 | 7.8 | 7.5 | -4.7 |
| | G2 | 6.8 | 6.8 | 0.0 |
| | G3 | 4.7 | 4.5 | -3.3 |
| | G4 | 3.7 | 3.5 | -4.3 |

| | | Measured pH, pH Units | Expected pH, pH Units | |
|---|---|---|---|---|
| pH | G1 | 4.1 | 4.1 | 0.0 |
| | G2 | 4.1 | 4.1 | 0.7 |
| | G3 | 4.4 | 4.5 | 2.5 |
| | G4 | 4.4 | 4.5 | 2.3 |

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# 7. Acknowledgements

This work was funded by the UK Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations, under the contract **The Management and Operation of the UK Acid Deposition Monitoring Network** (EPG 1/3/193).

Thanks are due to the site operators, all of whom conscientiously serviced the equipment regardless of weather conditions.

The Nitric Acid Monitoring programme, operated and managed by the Centre for Ecology and Hydrology, was funded under this contract together with supporting funds from NERC and the DEFRA-funded UK National Ammonia Monitoring Network. CEH are grateful to site operators at the monitoring sites for their contributions, and other colleagues at CEH who assisted in the project.

# Appendices

## CONTENTS

# Appendix 1
# Bulk Precipitation Data, 2004



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# Appendix 1.1: Bulk Precipitation Data, 2004 - Fortnightly Measurements

**Notes to Appendix 1.1**

There are two pages of information for each site. The first includes site characteristics, time and seasonal trends; the second page presents individual concentrations for all samples collected (including those samples contaminated with bird strike). Also included are the Ordnance Survey co-ordinates, latitude and longitude and altitude of the site and the average rainfall for the 5 x 5 km square containing the site for the years 1941 to 1970.

Abbreviations for monitoring equipment, which also includes co-located sampling instrumentation, are given below:

- WOC — Wet-only collector for daily measurement of rainfall composition
- DT — Monthly diffusion tube. Measurement for nitrogen dioxide
- Daily $SO_2$ — Daily measurements of $SO_2$, by hydrogen peroxide bubbler and of particulate sulphate on a Whatman 40 filter with ion chromatographic analysis
- Weekly $SO_2$ — Weekly measurements of $SO_2$ by hydrogen peroxide bubbler with ion chromatographic analysis
- ozone — Hourly measurements surface ozone
- $SO_2$ — Hourly measurements of $SO_2$
- $NO_x$ — Hourly measurements of $NO_x$
- $HNO_3$ Denuder — Monthly measurements of nitric acid, sulphur dioxide, hydrogen chloride and acid and base aerosol components using the CEH DELTA samplers
- Met — Meteorological measurements.
- UKAWMN — Catchment monitored by the UK Acid Waters Monitoring Network.
- EMEP — Daily data from this site are made available to EMEP

In the tables of data, a '-' indicates a missing value. A dry week is indicated by a complete row of '-'s. Some weeks only have rainfall volumes reported; this is because no analyses were carried out on very low volume rainfall samples or on samples that were visibly contaminated. Individual ion concentrations or conductivities are missing for some low volume weeks, due to there being insufficient sample for complete analysis. A '< *Value*' indicates that the concentration was less than the detection limit of the analysis. Annual precipitation-weighted mean concentrations and rainfall total are included at the bottom of the table.

A phosphate concentration was also determined for each rainwater sample. A phosphate concentration > 0.1 mg P $l^{-1}$ (or > 9.7 $\mu$eq $l^{-1}$) was taken as evidence of contamination by birds. Although all these samples have been included in the tables, they were not included in the calculation of annual means.

The rainfall totals presented in Appendices 1 and 2 (Table A2.10) include all samples collected. In some instances, there may be some small rounding discrepancies between these totals and the sum of the individual rainfall amounts.

# Goonhilly

**2004**

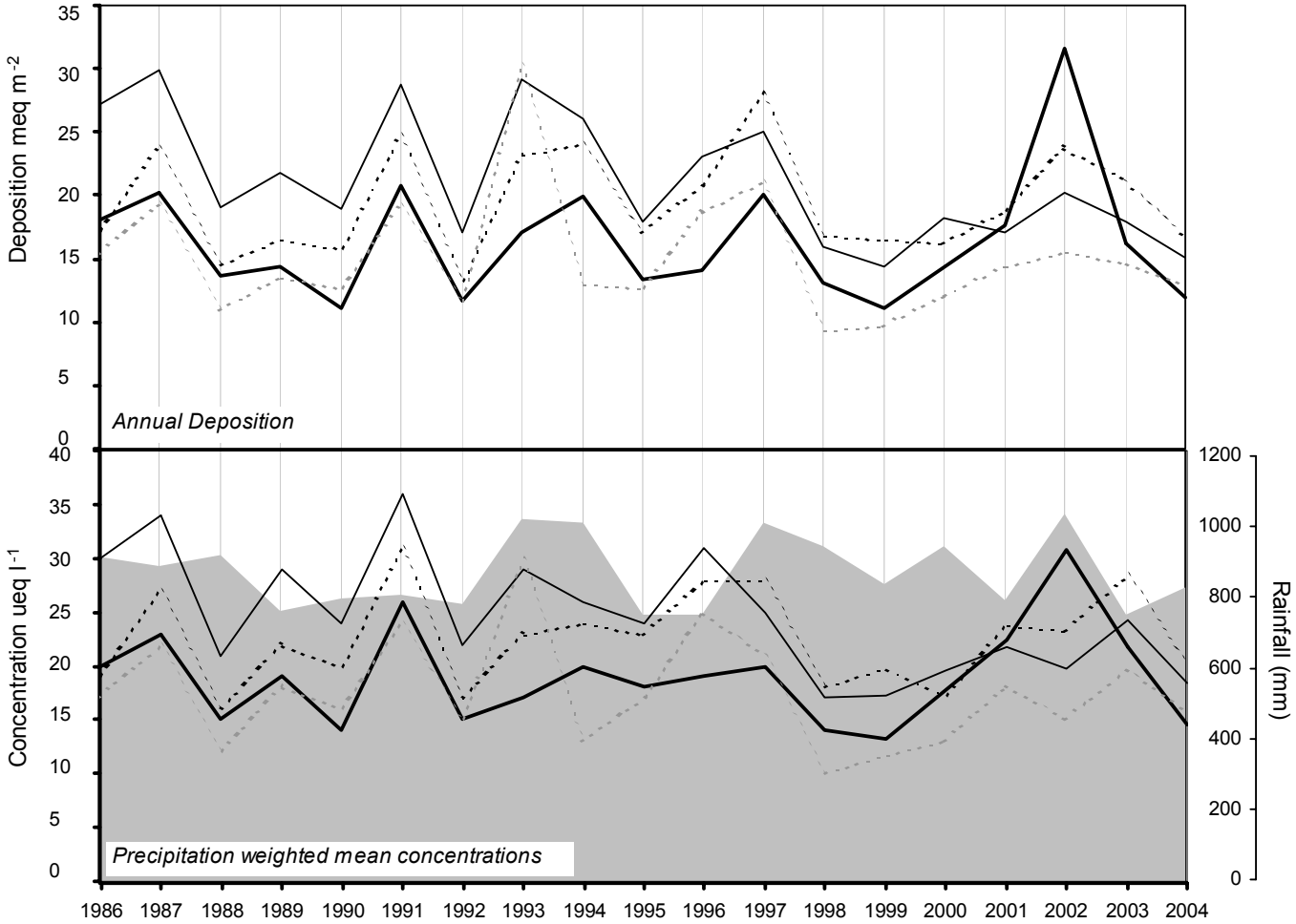
| | |
|---|---|
| *Site Code:* | **5003** |
| *Easting:* | **1723** |
| *Northing:* | **214** |
| *Latitude:* | **50 02 54 N** |
| *Longitude:* | **05 10 52 W** |
| *Altitude (m):* | **108** |
| *Rainfall (mm):* | **973** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland, Satellite tracking station**

*Other measurements:*
**DT**

*Site Operator:*
**British Telecom**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
0.09 ueq/l (0.50 %/year): 18 years' data
\- No significant trend detected

*non-marine sulphate*
-0.61 ueq/l (-2.03 %/year): 19 years' data
++ Moderately strong trend detected

*nitrate*
0.08 ueq/l (0.35 %/year): 19 years' data
\- No significant trend detected

*ammonium*
-0.16 ueq/l (-0.84 %/year): 19 years' data
\- No significant trend detected



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## 5003 Goonhilly

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/01/04 | 28/01/04 | 5.2 | 27.8 | 6.6 | 4.6 | 197.3 | 39.9 | 10.0 | 203.6 | 3.9 | <1.0 | 4.0 | 6.2 | 33.0 | 59.2 |
| 28/01/04 | 05/02/04 | 5.0 | 49.0 | 17.3 | 3.1 | 308.8 | 65.7 | 21.3 | 360.3 | 6.6 | <1.0 | 11.8 | 10.0 | 57.0 | 63.0 |
| 05/02/04 | 11/02/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 11/02/04 | 25/02/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.5 |
| 25/02/04 | 10/03/04 | 4.5 | 57.1 | 29.0 | 28.0 | 256.3 | 56.4 | 12.9 | 274.7 | 8.7 | 2.8 | 26.2 | 30.9 | 52.0 | 18.1 |
| 10/03/04 | 07/04/04 | 4.8 | 66.0 | 27.7 | 21.8 | 528.1 | 52.7 | 11.9 | 465.9 | 8.1 | <1.0 | 2.4 | 15.1 | 72.0 | 85.9 |
| 07/04/04 | 21/04/04 | 6.8 | 56.8 | 62.5 | 367.2 | 151.2 | 25.7 | 4.2 | 181.6 | 45.1 | 59.4 | 38.6 | 0.2 | 71.0 | 44.4 |
| 21/04/04 | 19/05/04 | 4.7 | 112.6 | 66.6 | 53.4 | 532.6 | 119.3 | 36.4 | 576.9 | 12.4 | <1.0 | 48.5 | 19.5 | 100.0 | 19.2 |
| 19/05/04 | 04/06/04 | 4.3 | 52.5 | 53.4 | 11.8 | 106.0 | 25.3 | 25.4 | 90.7 | 4.6 | <1.0 | 39.7 | 50.1 | 36.5 | 17.6 |
| 04/06/04 | 17/06/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.1 |
| 17/06/04 | 05/07/04 | 4.6 | 51.7 | 12.7 | 20.8 | 182.9 | 39.6 | 13.7 | 222.7 | 5.5 | <1.0 | 29.6 | 25.7 | 44.0 | 89.9 |
| 05/07/04 | 28/07/04 | 6.0 | 59.0 | 32.7 | 86.9 | 79.0 | 10.1 | 3.8 | 87.8 | 12.3 | 24.8 | 49.5 | 1.1 | 26.0 | 38.5 |
| 28/07/04 | 11/08/04 | 5.1 | 45.9 | 16.7 | 7.6 | 99.5 | 21.6 | 16.8 | 92.9 | 2.3 | <1.0 | 33.9 | 8.7 | 24.0 | 12.7 |
| 11/08/04 | 26/08/04 | 5.4 | 31.3 | 6.6 | 4.2 | 104.9 | 21.8 | 11.1 | 118.0 | 6.6 | 4.1 | 18.7 | 4.5 | 22.0 | 92.4 |
| 26/08/04 | 01/10/04 | 6.2 | 3.9 | <1.4 | <1.4 | 403.0 | 53.5 | 19.2 | 399.1 | 6.7 | <1.0 | - | 0.7 | 54.6 | 18.0 |
| 01/10/04 | 06/10/04 | 5.1 | 11.6 | 9.1 | 1.3 | 145.3 | 29.6 | 7.8 | 155.8 | 3.6 | <1.0 | - | 8.7 | 25.2 | 44.0 |
| 06/10/04 | 21/10/04 | 4.6 | 59.9 | 43.4 | 29.1 | 350.2 | 85.4 | 28.1 | 396.5 | 7.5 | <1.0 | 17.7 | 23.4 | 71.3 | 79.0 |
| 21/10/04 | 04/11/04 | 5.9 | 83.9 | 18.7 | 21.2 | 587.0 | 125.7 | 34.3 | 746.8 | 24.7 | <1.0 | 13.2 | 1.3 | 100.0 | 51.3 |
| 04/11/04 | 19/11/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 19/11/04 | 06/12/04 | 4.5 | 37.9 | 27.2 | 15.9 | 140.7 | 31.0 | 8.3 | 159.2 | 3.1 | <1.0 | 21.0 | 33.9 | 37.0 | 19.1 |
| 06/12/04 | 17/12/04 | 4.7 | 53.9 | 29.9 | 58.3 | 136.4 | 23.7 | 7.1 | 358.6 | 25.1 | <1.0 | 37.4 | 20.0 | 55.0 | 17.7 |
| 17/12/04 | 04/01/05 | 5.0 | 79.5 | 10.0 | 7.5 | 456.3 | 103.8 | 21.3 | 542.8 | 10.4 | <1.0 | 24.6 | 9.5 | 80.0 | 48.6 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5003 | | 51.4 | 20.3 | 15.8 | 298.1 | 57.3 | 17.4 | 331.6 | 8.3 | - | 18.5 | 14.6 | 54.3 | 819.4 |

# Yarner Wood

**2004**

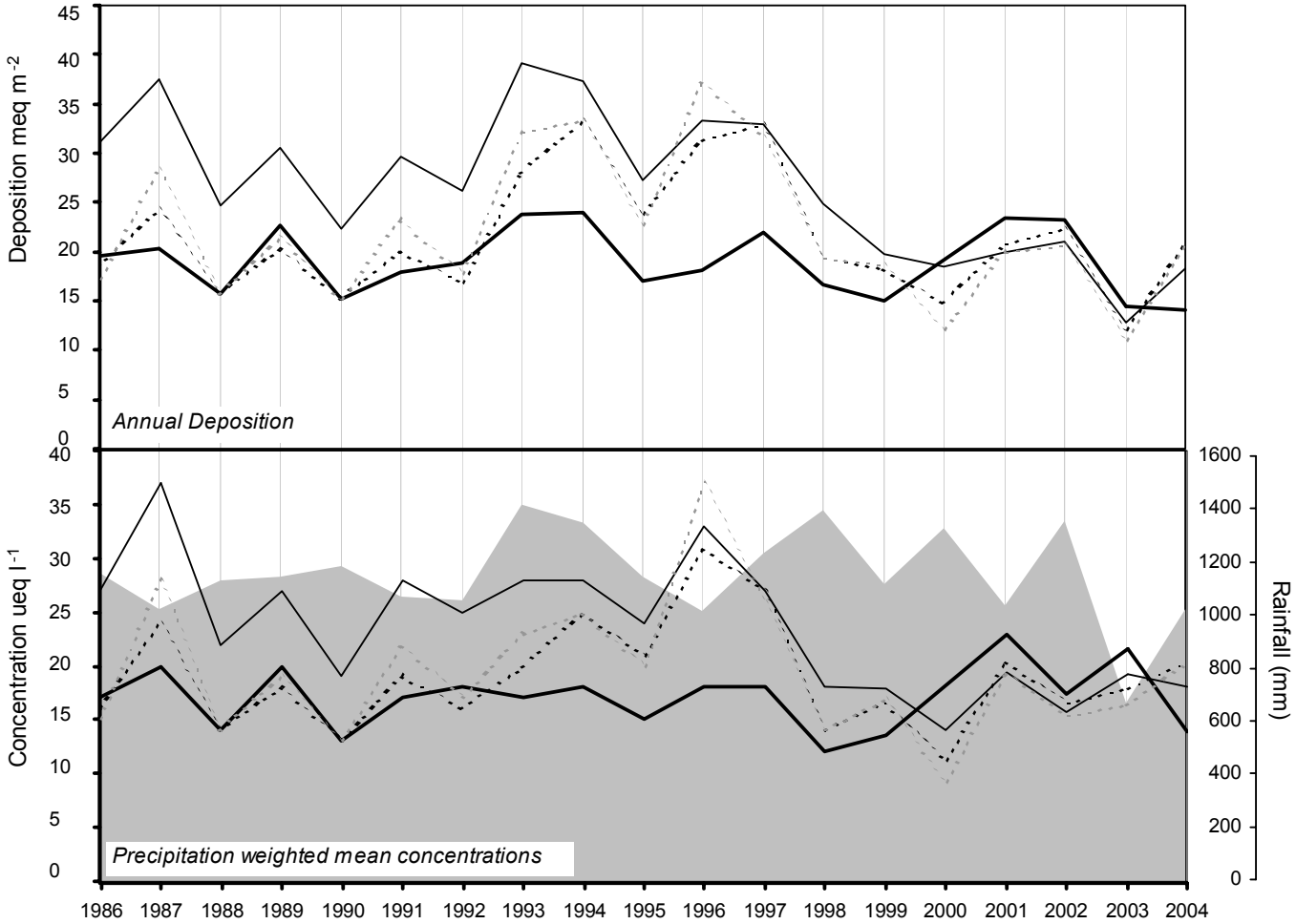
| | |
|---|---|
| *Site Code:* | **5008** |
| *Easting:* | **2786** |
| *Northing:* | **789** |
| *Latitude:* | **50 35 48 N** |
| *Longitude:* | **03 42 56 W** |
| *Altitude (m):* | **119** |
| *Rainfall (mm):* | **1377** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland, nature reserve**

*Other measurements:*
**DT, SO2, Daily SO4, HNO3 Denuder, ozone, EMEP**

*Site Operator:*
**English Nature**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
0.03 ueq/l (0.18 %/year): 18 years' data
\- No significant trend detected

*non-marine sulphate*
-0.69 ueq/l (-2.33 %/year): 19 years' data
++ Moderately strong trend detected

*nitrate*
0.03 ueq/l (0.18 %/year): 19 years' data
\- No significant trend detected

*ammonium*
-0.11 ueq/l (-0.55 %/year): 19 years' data
\- No significant trend detected



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## 5008 Yarner Wood

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/01/04 | 27/01/04 | 5.1 | 8.1 | 3.2 | 6.5 | 144.1 | 30.2 | 9.2 | 44.8 | 3.4 | <1.0 | - | 8.9 | 28.0 | 47.4 |
| 27/01/04 | 10/02/04 | 4.9 | 27.2 | 14.2 | 5.6 | 126.4 | 29.1 | 11.5 | 148.5 | 4.2 | <1.0 | 11.9 | 12.9 | 27.0 | 106.5 |
| 10/02/04 | 24/02/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 24/02/04 | 08/03/04 | 5.6 | 48.0 | 58.7 | 69.8 | 92.2 | 19.1 | 32.0 | 95.4 | 6.9 | <1.0 | 36.9 | 2.5 | 28.0 | 7.5 |
| 08/03/04 | 23/03/04 | 4.9 | 30.4 | 25.8 | 28.0 | 135.8 | 27.3 | 10.6 | 149.9 | 3.2 | <1.0 | 14.0 | 11.7 | 29.0 | 97.6 |
| 23/03/04 | 06/04/04 | 5.1 | 40.0 | 26.0 | 32.2 | 112.1 | 24.1 | 14.0 | 121.1 | 2.7 | <1.0 | 26.5 | 7.6 | 26.0 | 27.2 |
| 06/04/04 | 20/04/04 | 5.5 | 39.3 | 40.2 | 57.9 | 68.4 | 15.4 | 11.1 | 74.6 | 3.3 | <1.0 | 31.1 | 3.0 | 23.0 | 17.6 |
| 20/04/04 | 05/05/04 | 4.6 | 45.5 | 35.4 | 29.4 | 91.0 | 19.9 | 11.9 | 99.5 | 3.6 | <1.0 | 34.5 | 24.0 | 32.0 | 59.0 |
| 05/05/04 | 19/05/04 | 5.9 | 85.7 | 65.5 | 108.4 | 94.1 | 25.0 | 36.4 | 104.9 | 7.2 | <1.0 | 74.4 | 1.2 | 35.0 | 6.5 |
| 19/05/04 | 16/06/04 | 4.7 | 57.2 | 67.2 | 45.4 | 47.4 | 19.5 | 38.8 | 54.8 | 5.9 | <1.0 | 51.5 | 18.6 | 31.0 | 9.0 |
| 16/06/04 | 30/06/04 | 4.9 | 37.2 | 13.4 | 15.5 | 83.7 | 17.3 | 10.4 | 106.6 | 1.5 | 20.1 | 27.1 | 12.3 | 21.0 | 49.1 |
| 30/06/04 | 14/07/04 | 4.9 | 23.5 | 26.2 | 17.7 | 50.0 | 6.9 | 9.7 | 52.2 | 5.0 | <1.0 | 17.5 | 13.5 | 15.0 | 54.5 |
| 14/07/04 | 28/07/04 | 4.3 | 57.6 | 37.7 | 13.7 | 34.7 | 9.7 | 28.7 | 33.3 | 1.3 | <1.0 | 53.4 | 56.2 | 33.0 | 5.6 |
| 28/07/04 | 11/08/04 | 3.8 | 132.0 | 114.1 | 33.4 | 42.3 | 17.2 | 76.7 | 42.3 | 3.1 | <1.0 | 126.9 | 154.9 | 80.0 | 5.9 |
| 11/08/04 | 25/08/04 | 4.8 | 48.2 | 7.0 | 709.4 | 29.3 | 3.8 | 1.3 | 27.2 | 40.1 | 111.6 | 44.6 | 16.2 | 13.0 | 144.4 |
| 25/08/04 | 09/09/04 | 5.3 | 5.0 | 5.9 | 1.9 | 22.1 | 7.7 | 8.8 | 25.2 | 3.2 | <1.0 | 2.4 | 4.7 | <10.0 | 4.4 |
| 09/09/04 | 22/09/04 | 4.9 | 29.1 | 10.2 | <0.7 | 146.4 | 32.7 | 11.5 | 160.4 | 2.8 | <1.0 | 11.5 | 11.7 | 29.5 | 37.3 |
| 22/09/04 | 06/10/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 06/10/04 | 20/10/04 | 4.8 | 22.6 | 29.4 | 31.3 | 61.5 | 12.4 | 6.6 | 63.1 | 2.1 | <1.0 | 15.2 | 14.8 | 21.4 | 60.6 |
| 20/10/04 | 03/11/04 | 4.7 | 37.9 | 14.4 | 9.1 | 242.9 | 53.0 | 12.1 | 278.3 | 5.6 | <1.0 | 8.6 | 20.0 | 45.3 | 124.8 |
| 03/11/04 | 17/11/04 | 5.8 | 103.9 | 69.5 | 121.1 | 353.9 | 75.9 | 30.3 | 448.1 | 11.1 | <1.0 | 61.2 | 1.6 | 50.0 | 0.8 |
| 17/11/04 | 01/12/04 | 5.3 | 25.6 | 17.8 | 23.9 | 38.7 | 8.2 | 6.0 | 47.6 | 4.7 | <1.0 | 20.9 | 5.4 | 15.0 | 14.0 |
| 01/12/04 | 15/12/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 15/12/04 | 29/12/04 | 6.1 | 30.1 | 6.8 | 35.4 | 91.7 | 17.8 | 8.3 | 112.4 | 7.5 | <1.0 | 19.0 | 0.9 | 23.0 | 74.3 |
| 29/12/04 | 12/01/05 | 5.0 | 36.2 | 7.5 | 5.6 | 208.8 | 45.2 | 12.0 | 238.8 | 5.8 | <1.0 | 11.0 | 10.2 | 40.0 | 58.2 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5008 | | 32.4 | 20.4 | 20.3 | 131.3 | 28.2 | 11.9 | 141.9 | 4.4 | - | 18.1 | 13.9 | 30.1 | 1012.3 |

# Barcombe Mills

**2004**

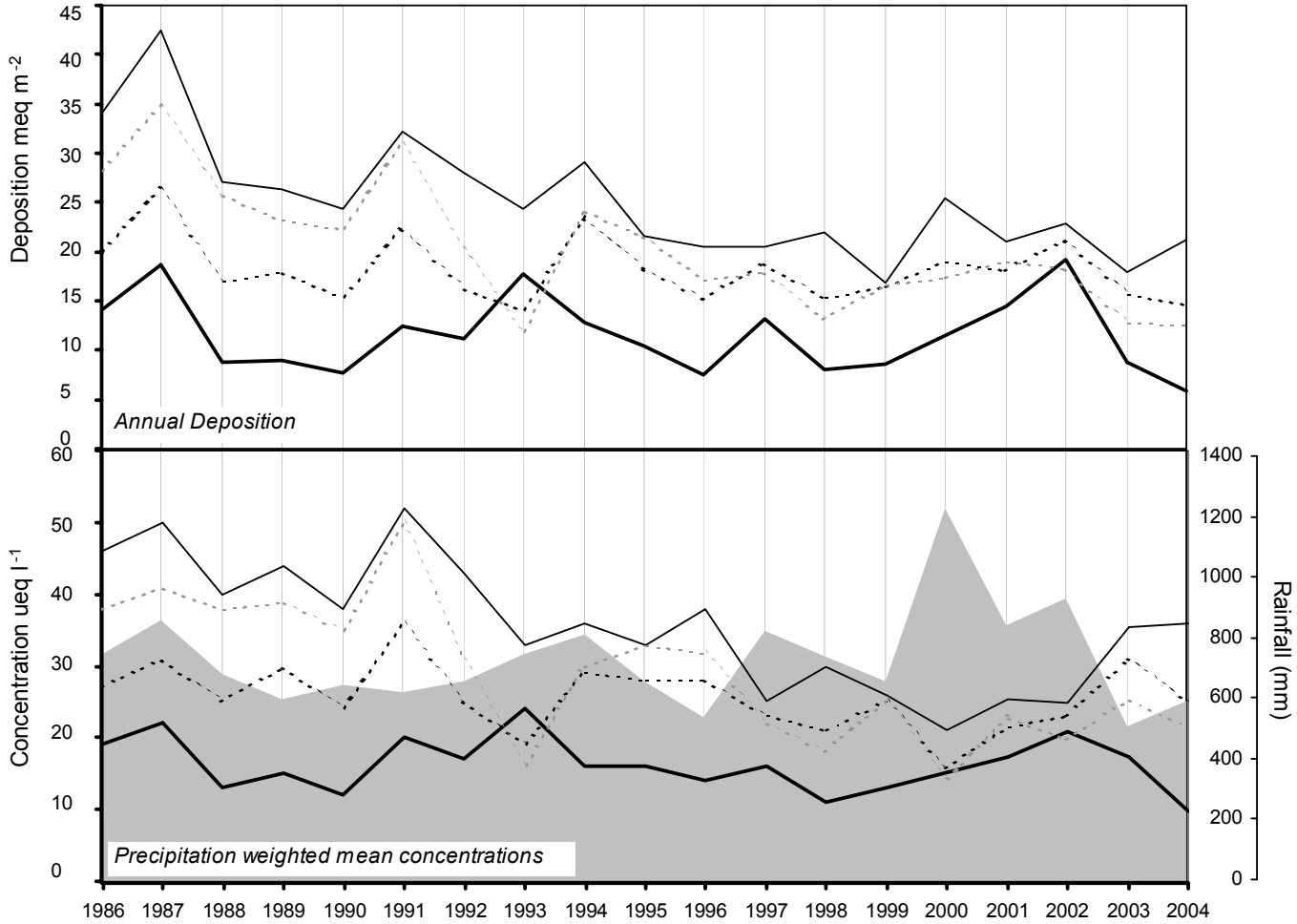
| | |
|---|---|
| *Site Code:* | **5007** |
| *Easting:* | **5437** |
| *Northing:* | **1149** |
| *Latitude:* | **50 54 54 N** |
| *Longitude:* | **00 02 40 E** |
| *Altitude (m):* | **10** |
| *Rainfall (mm):* | **876** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Water pumping site**

*Other measurements:*
**DT, SO2, Daily SO4, HNO3 Denuder, EMEP**

*Site Operator:*
**South East Water plc**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.17 ueq/l (-0.97 %/year): 18 years' data
\- No significant trend detected

*non-marine sulphate*
-1.17 ueq/l (-2.54 %/year): 19 years' data
++ Moderately strong trend detected

*nitrate*
-0.30 ueq/l (-1.07 %/year): 19 years' data
\- No significant trend detected

*ammonium*
-1.27 ueq/l (-3.13 %/year): 19 years' data
++ Moderately strong trend detected



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## 5007 Barcombe Mills

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 07/01/04 | 21/01/04 | 5.0 | 32.5 | 13.3 | 4.4 | 217.7 | 48.8 | 10.9 | 230.8 | 4.3 | <1.0 | 6.3 | 9.3 | 40.0 | 66.9 |
| 21/01/04 | 04/02/04 | 4.9 | 59.2 | 25.7 | 19.2 | 320.2 | 68.9 | 20.8 | 377.0 | 9.2 | <1.0 | 20.6 | 12.3 | 56.0 | 38.1 |
| 04/02/04 | 18/02/04 | 4.6 | 71.6 | 75.5 | 49.7 | 128.3 | 35.5 | 31.8 | 170.6 | 7.0 | <1.0 | 56.2 | 25.7 | 45.0 | 12.2 |
| 18/02/04 | 03/03/04 | 4.0 | 241.3 | 173.8 | 195.0 | 676.1 | 134.4 | 80.5 | 777.8 | 24.5 | <1.0 | 159.9 | 100.0 | - | 1.6 |
| 03/03/04 | 17/03/04 | 4.8 | 67.7 | 68.4 | 76.7 | 178.2 | 37.3 | 22.1 | 191.9 | 6.9 | <1.0 | 46.3 | 15.8 | 48.0 | 20.1 |
| 17/03/04 | 31/03/04 | 5.4 | 88.9 | 34.0 | 31.3 | 318.2 | 75.3 | 66.6 | 391.3 | 28.9 | <1.0 | 50.6 | 4.2 | 66.0 | 23.5 |
| 31/03/04 | 14/04/04 | 6.2 | 40.0 | 30.7 | 76.2 | 102.5 | 17.3 | 16.4 | 123.4 | 67.9 | <1.0 | 27.7 | 0.7 | 42.0 | 24.8 |
| 14/04/04 | 28/04/04 | 5.1 | 55.1 | 36.6 | 11.9 | 142.5 | 34.1 | 42.9 | 149.7 | 10.4 | <1.0 | 38.0 | 8.3 | 36.0 | 23.7 |
| 28/04/04 | 12/05/04 | 4.9 | 41.4 | 24.1 | 27.1 | 103.4 | 25.7 | 20.3 | 112.3 | 14.9 | 4.0 | 28.9 | 14.1 | 28.0 | 50.1 |
| 12/05/04 | 26/05/04 | 4.5 | 46.3 | 67.6 | 35.4 | 8.4 | 7.5 | 40.9 | 10.6 | 10.7 | <1.0 | 45.3 | 33.1 | 28.0 | 11.0 |
| 26/05/04 | 09/06/04 | 6.5 | 60.3 | 13.2 | 2.4 | 48.3 | 7.4 | 55.3 | 54.4 | 25.2 | <1.0 | 54.5 | 0.3 | 18.0 | 11.2 |
| 09/06/04 | 25/06/04 | 6.4 | 158.1 | <1.4 | <0.7 | 102.8 | 42.1 | 117.8 | 118.3 | 104.7 | <1.0 | 145.7 | 0.4 | 46.3 | 16.8 |
| 25/06/04 | 07/07/04 | 5.9 | 70.0 | <0.7 | 1.2 | 163.5 | 50.1 | 72.1 | 216.3 | 73.4 | <1.0 | 50.3 | 1.3 | 52.0 | 21.1 |
| 07/07/04 | 21/07/04 | 6.2 | 27.4 | 22.6 | 119.3 | 27.3 | 4.8 | 9.9 | 31.3 | 13.7 | 14.4 | 24.1 | 0.7 | 22.0 | 28.7 |
| 21/07/04 | 04/08/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.7 |
| 04/08/04 | 18/08/04 | 4.8 | 33.3 | 26.9 | 24.5 | 55.6 | 11.7 | 15.9 | 62.2 | 4.2 | <1.0 | 26.6 | 14.8 | 21.0 | 41.7 |
| 18/08/04 | 01/09/04 | 5.1 | 24.2 | 6.7 | <0.7 | 75.2 | 18.4 | 14.3 | 87.8 | 5.0 | <1.0 | 15.1 | 8.5 | 18.0 | 39.7 |
| 01/09/04 | 15/09/04 | 6.7 | 112.0 | 31.3 | 98.5 | 382.8 | 97.2 | 93.9 | 476.1 | 74.4 | 28.8 | 65.9 | 0.2 | 94.5 | 20.7 |
| 15/09/04 | 27/09/04 | 6.8 | 122.0 | <1.4 | 37.0 | 269.1 | 106.2 | 199.9 | 450.9 | 147.9 | <1.0 | 89.6 | 0.1 | 96.4 | 14.1 |
| 27/09/04 | 13/10/04 | 6.1 | 70.7 | 48.6 | 60.6 | 171.9 | 32.4 | 31.8 | 222.3 | 153.9 | 49.7 | 49.9 | 0.9 | 55.3 | 12.7 |
| 13/10/04 | 27/10/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 27/10/04 | 10/11/04 | 6.3 | 76.3 | 39.2 | 22.9 | 147.6 | 44.9 | 80.2 | 240.5 | 84.3 | 7.0 | 58.5 | 0.5 | 50.0 | 21.8 |
| 10/11/04 | 24/11/04 | 6.9 | 108.4 | 10.7 | 1.9 | 151.7 | 51.1 | 189.8 | 271.1 | 130.8 | <1.0 | 90.1 | 0.1 | 66.0 | 5.8 |
| 24/11/04 | 08/12/04 | 6.3 | 120.7 | 82.0 | 36.7 | 146.0 | 75.3 | 206.3 | 412.7 | 159.7 | 67.7 | 103.1 | 0.5 | 83.0 | 5.6 |
| 08/12/04 | 22/12/04 | 4.9 | 24.8 | 15.9 | <0.7 | 74.9 | 17.9 | 23.1 | 86.0 | 7.2 | <1.0 | 15.8 | 12.0 | 20.0 | 34.5 |
| 22/12/04 | 05/01/05 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20.6 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5007 | | 54.4 | 24.8 | 21.6 | 152.8 | 37.9 | 39.2 | 183.7 | 27.7 | - | 36.0 | 9.8 | 39.1 | 567.9 |

# Compton

**2004**

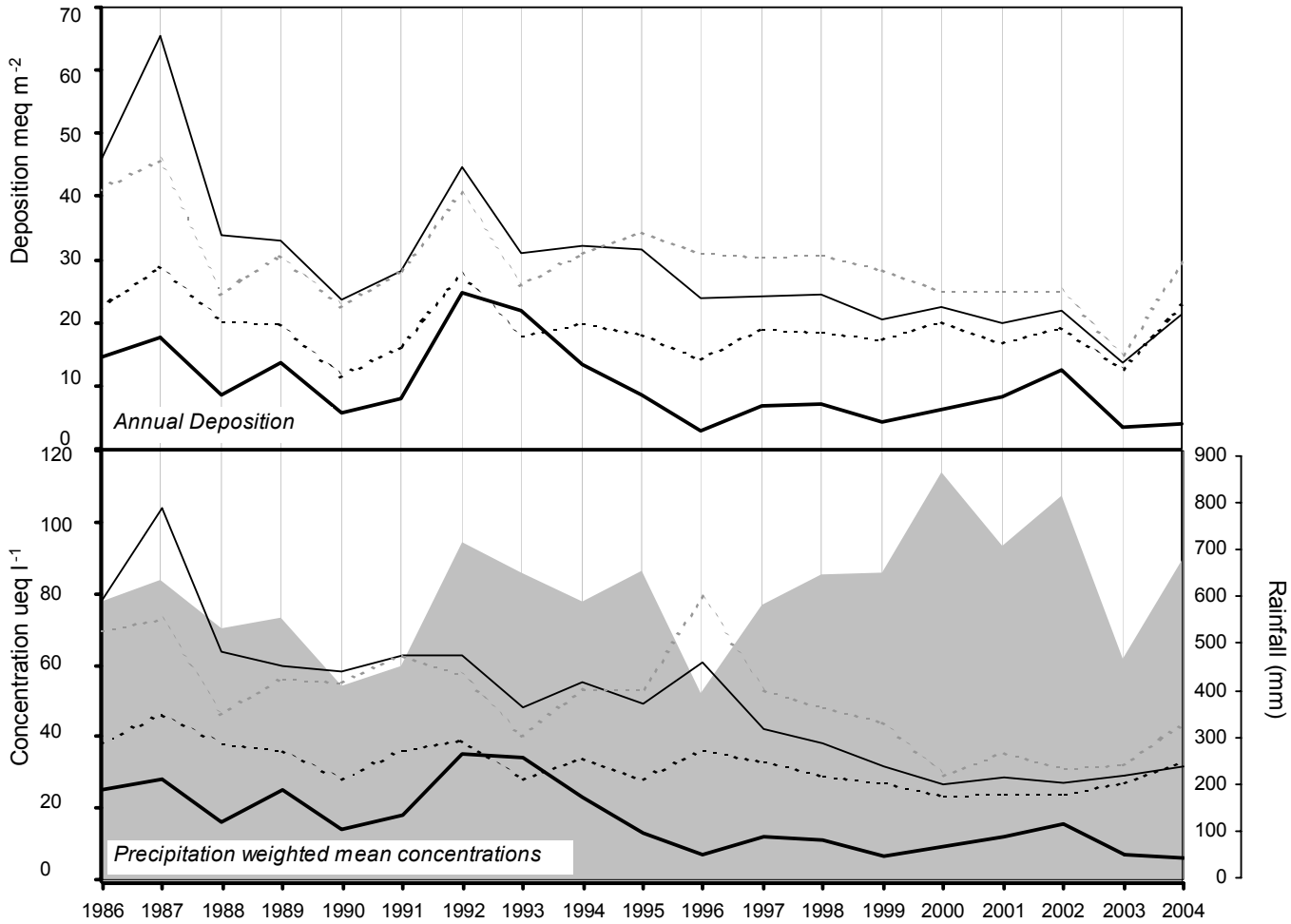
| | |
|---|---|
| *Site Code:* | **5129** |
| *Easting:* | **4512** |
| *Northing:* | **1804** |
| *Latitude:* | **51 31 11 N** |
| *Longitude:* | **01 15 43 W** |
| *Altitude (m):* | **105** |
| *Rainfall (mm):* | **707** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Rough meadow, near pumping station**

*Other measurements:*
**DT**

*Site Operator:*
**AEA Technology plc**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-1.07 ueq/l (-4.04 %/year): 18 years' data
++ Moderately strong trend detected

*non-marine sulphate*
-3.21 ueq/l (-4.05 %/year): 19 years' data
++++ Very strong trend detected

*nitrate*
-0.77 ueq/l (-1.98 %/year): 19 years' data
++ Moderately strong trend detected

*ammonium*
-1.70 ueq/l (-2.58 %/year): 19 years' data
++ Moderately strong trend detected



AEA Technology
National Environmental Technology Centre

## 5129 Compton

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02/01/04 | 13/01/04 | 5.4 | 23.8 | 11.0 | 18.5 | 69.1 | 12.7 | 7.5 | 68.6 | 2.1 | <1.0 | 15.4 | 4.4 | 14.0 | 42.1 |
| 13/01/04 | 28/01/04 | 5.5 | 21.5 | 20.4 | 34.7 | 55.1 | 10.5 | 11.7 | 66.6 | 1.6 | <1.0 | 14.8 | 3.2 | 15.0 | 16.5 |
| 28/01/04 | 09/02/04 | 6.0 | 35.2 | 20.0 | 21.4 | 86.5 | 17.8 | 17.7 | 114.5 | 1.6 | <1.0 | 24.8 | 1.0 | 19.0 | 40.1 |
| 09/02/04 | 25/02/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.3 |
| 25/02/04 | 08/03/04 | 6.0 | 202.2 | 86.7 | 212.8 | 192.1 | 27.7 | 108.6 | 197.7 | 14.0 | <1.0 | 179.0 | 1.1 | 74.0 | 2.7 |
| 08/03/04 | 24/03/04 | 5.3 | 37.8 | 33.1 | 39.4 | 76.3 | 16.1 | 14.6 | 90.6 | 1.7 | <1.0 | 28.6 | 5.0 | 23.0 | 36.7 |
| 24/03/04 | 06/04/04 | 5.6 | 57.2 | 45.1 | 84.6 | 51.7 | 12.7 | 21.0 | 57.1 | 1.9 | <1.0 | 51.0 | 2.8 | 24.0 | 23.5 |
| 06/04/04 | 19/04/04 | 5.8 | 47.0 | 34.5 | 60.6 | 17.0 | 5.0 | 18.0 | 23.2 | 1.6 | <1.0 | 45.0 | 1.4 | 17.0 | 24.0 |
| 19/04/04 | 04/05/04 | 4.7 | 66.8 | 79.5 | 104.9 | 15.2 | 14.8 | 26.2 | 19.8 | 2.3 | <1.0 | 65.0 | 20.9 | 30.0 | 45.8 |
| 04/05/04 | 17/05/04 | 5.5 | 24.9 | 14.1 | 29.3 | 44.2 | 8.8 | 10.8 | 50.6 | 3.0 | <1.0 | 19.6 | 3.3 | 13.0 | 12.4 |
| 17/05/04 | 01/06/04 | 5.7 | 43.3 | 40.1 | 39.0 | 12.7 | 6.1 | 50.7 | 12.7 | 5.4 | <1.0 | 41.7 | 2.2 | 16.6 | 9.9 |
| 01/06/04 | 14/06/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.2 |
| 14/06/04 | 28/06/04 | 6.0 | 33.0 | 20.7 | 21.6 | 71.5 | 15.6 | 25.7 | 86.0 | 2.7 | <1.0 | 24.4 | 0.9 | 21.0 | 23.6 |
| 28/06/04 | 12/07/04 | 5.7 | 27.3 | 32.4 | 24.8 | 34.0 | 6.2 | 16.4 | 33.1 | 3.7 | <1.0 | 23.2 | 1.9 | 14.0 | 33.6 |
| 12/07/04 | 26/07/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 26/07/04 | 09/08/04 | 4.8 | 57.7 | 73.3 | 93.6 | 2.1 | 2.4 | 28.5 | 10.3 | 5.0 | <1.0 | 57.4 | 14.8 | 21.0 | 44.1 |
| 09/08/04 | 24/08/04 | 5.1 | 19.9 | 19.5 | 23.8 | 17.6 | 4.3 | 5.4 | 22.7 | 1.0 | <1.0 | 17.8 | 8.1 | 11.0 | 65.7 |
| 24/08/04 | 21/09/04 | 5.9 | 30.4 | 22.8 | <0.7 | 92.9 | 18.9 | 59.3 | 99.8 | 2.7 | <1.0 | 19.2 | 1.4 | 22.3 | 32.9 |
| 21/09/04 | 06/10/04 | 5.8 | 16.1 | 18.6 | 24.7 | 31.1 | 6.3 | 12.3 | 34.3 | 2.8 | <1.0 | 12.4 | 1.7 | 11.5 | 31.7 |
| 06/10/04 | 18/10/04 | 5.2 | 35.7 | 30.5 | 42.0 | 48.0 | 9.5 | 17.2 | 51.4 | 2.2 | <1.0 | 29.9 | 6.9 | 16.8 | 48.2 |
| 18/10/04 | 01/11/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 58.9 |
| 01/11/04 | 18/11/04 | 5.4 | 76.3 | 78.0 | 114.0 | 53.2 | 12.6 | 38.5 | 59.0 | 5.1 | <1.0 | 69.9 | 4.2 | 29.0 | 11.4 |
| 18/11/04 | 13/12/04 | 5.5 | 72.1 | 42.2 | 85.1 | 30.5 | 7.0 | 28.5 | 37.6 | 1.6 | <1.0 | 68.4 | 3.2 | 22.0 | 15.1 |
| 13/12/04 | 07/01/05 | 5.3 | 20.0 | 15.2 | 18.8 | 50.2 | 11.3 | 7.7 | 53.2 | 1.7 | <1.0 | 14.0 | 5.6 | 13.0 | 50.7 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5129 | | 37.2 | 33.3 | 43.6 | 45.3 | 10.5 | 19.7 | 52.2 | 2.4 | - | 31.8 | 6.0 | 18.3 | 671.0 |

# Crai Reservoir

**2004**

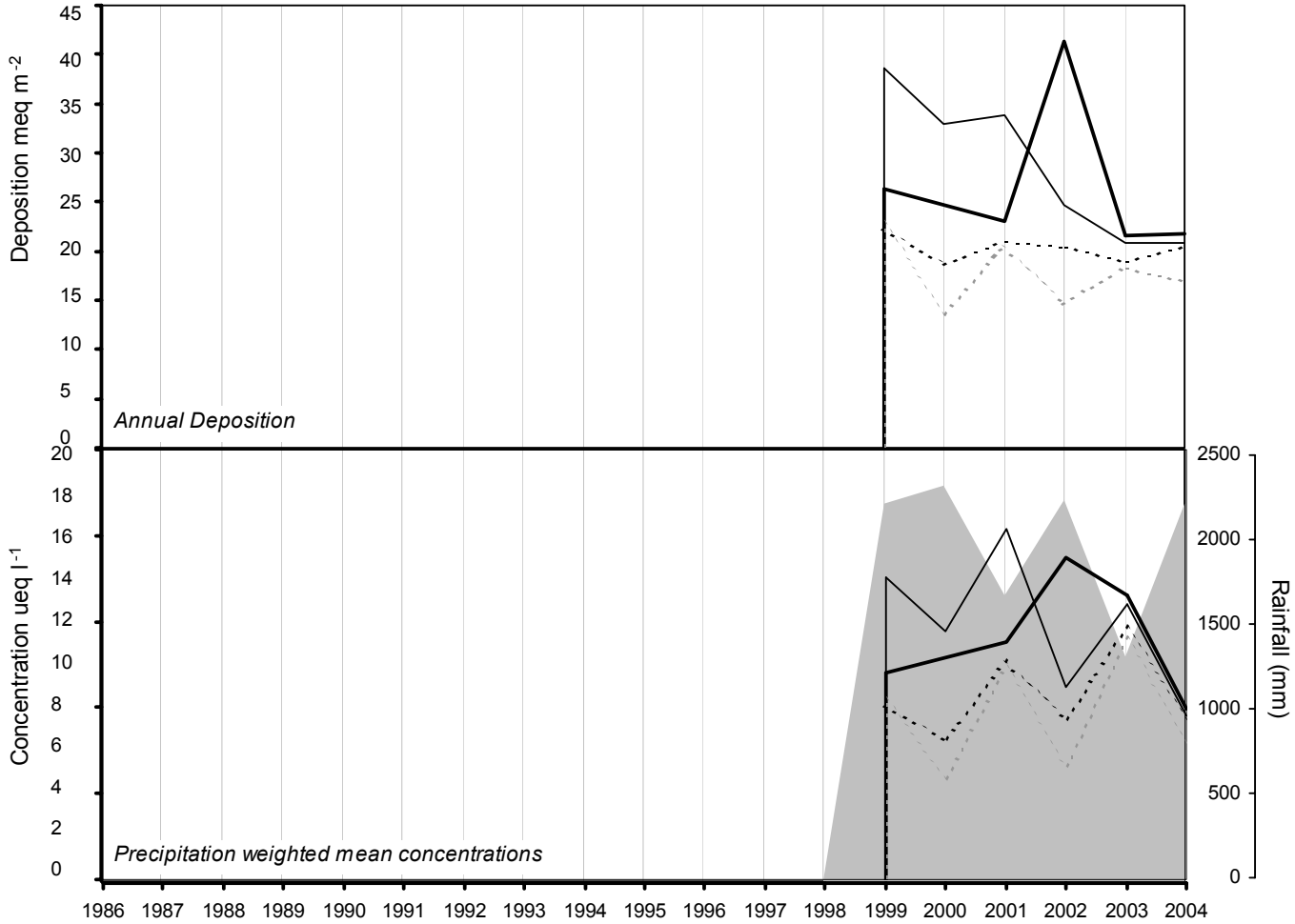
| | |
|---|---|
| *Site Code:* | **5154** |
| *Easting:* | **2882** |
| *Northing:* | **2219** |
| *Latitude:* | **51 53 25 N** |
| *Longitude:* | **03 37 10 W** |
| *Altitude (m):* | **310** |
| *Rainfall (mm):* | **-** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Bank of Crai Reservoir in valley. Sheep grazing.**

*Other measurements:*
**Close to Rural SO2 site (5335)**

*Site Operator:*
**Welsh Water plc**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
0.00 ueq/l (0.00 %/year): 4 years' data
n/a Insufficient Data

*non-marine sulphate*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data

*nitrate*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data

*ammonium*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data



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## 5154 Crai Reservoir

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02/01/04 | 02/02/04 | 5.2 | 24.0 | 4.8 | 4.7 | 176.5 | 35.0 | 7.7 | 186.3 | 3.4 | <1.0 | 2.7 | 6.8 | 28.0 | 291.3 |
| 02/02/04 | 26/03/04 | 5.1 | 19.9 | 9.0 | 6.6 | 81.9 | 15.2 | 5.4 | 83.7 | 1.3 | <1.0 | 10.1 | 8.9 | 17.0 | 320.4 |
| 26/03/04 | 23/04/04 | 5.2 | 26.2 | 17.3 | 21.0 | 68.7 | 14.7 | 6.6 | 77.9 | 2.0 | <1.0 | 18.0 | 6.0 | 17.0 | 113.0 |
| 23/04/04 | 28/05/04 | 4.7 | 21.2 | 21.6 | 17.2 | 34.8 | 8.2 | 10.3 | 36.7 | 2.1 | <1.0 | 17.0 | 19.1 | 17.3 | 123.3 |
| 28/05/04 | 11/06/04 | 5.7 | 26.1 | 13.3 | 32.4 | 37.6 | 5.3 | 4.4 | 45.4 | 5.2 | <1.0 | 21.6 | 2.1 | 14.0 | 28.9 |
| 11/06/04 | 26/06/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 26/06/04 | 30/07/04 | 4.4 | 41.5 | 25.1 | 19.3 | 49.2 | 13.4 | 12.3 | 57.9 | 2.1 | <1.0 | 35.6 | 39.8 | 24.0 | 82.4 |
| 30/07/04 | 27/08/04 | 4.9 | 18.3 | 9.5 | 4.9 | 34.3 | 7.3 | 5.6 | 41.3 | 1.7 | <1.0 | 14.2 | 13.2 | 12.0 | 157.6 |
| 27/08/04 | 30/09/04 | 5.2 | 20.0 | 6.9 | 7.2 | 123.1 | 25.1 | 8.3 | 130.9 | 3.3 | <1.0 | 5.1 | 6.3 | 21.7 | 251.0 |
| 30/09/04 | 29/10/04 | 5.1 | 17.8 | 5.5 | 2.3 | 105.9 | 22.0 | 5.5 | 112.6 | 2.2 | <1.0 | 5.0 | 8.7 | 19.9 | 318.2 |
| 29/10/04 | 26/11/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 76.3 |
| 26/11/04 | 24/12/04 | 5.0 | 18.3 | 8.7 | 6.5 | 90.7 | 19.2 | 7.5 | 102.5 | 2.3 | <1.0 | 7.4 | 10.0 | 18.0 | 228.6 |
| 24/12/04 | 24/01/05 | 5.3 | 31.8 | 7.3 | 6.2 | 195.2 | 35.8 | 21.6 | 227.1 | 3.9 | <1.0 | 8.3 | 5.6 | 34.0 | 196.2 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5154 | | 22.3 | 9.4 | 7.8 | 106.1 | 21.3 | 8.4 | 115.5 | 2.5 | - | 9.5 | 10.0 | 21.1 | 2187.0 |

# Flatford Mill

**2004**

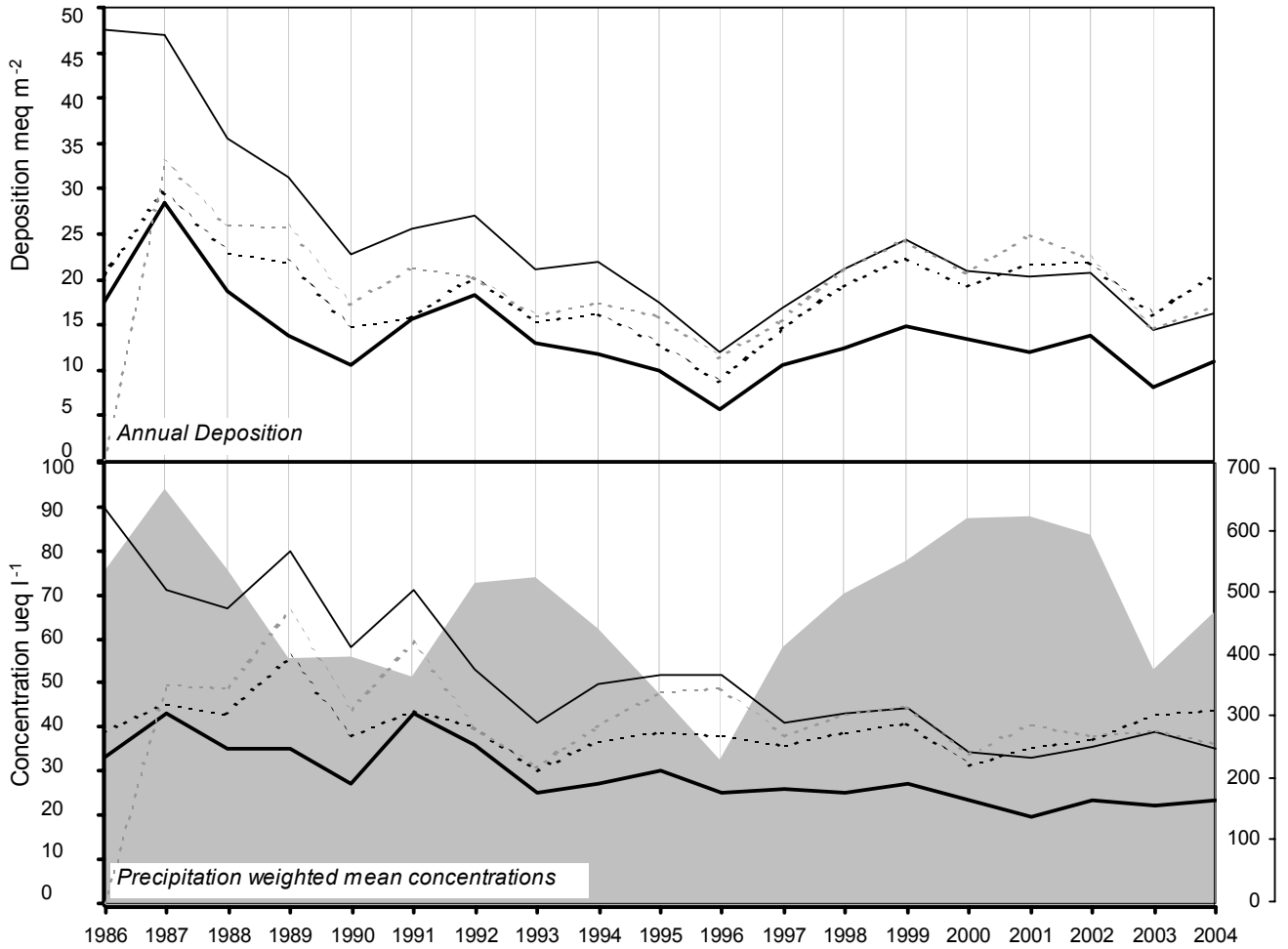
| | |
|---|---|
| *Site Code:* | **5024** |
| *Easting:* | **6077** |
| *Northing:* | **2333** |
| *Latitude:* | **51 57 32 N** |
| *Longitude:* | **01 01 24 E** |
| *Altitude (m):* | **5** |
| *Rainfall (mm):* | **599** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open meadow near River Stour**

*Other measurements:*
**DT**

*Site Operator:*
**Field Studies Council**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.94 ueq/l (-2.51 %/year): 18 years' data
+++ Strong trend detected

*non-marine sulphate*
-2.64 ueq/l (-3.48 %/year): 19 years' data
++++ Very strong trend detected

*nitrate*
-0.36 ueq/l (-0.83 %/year): 18 years' data
- No significant trend detected

*ammonium*
-0.94 ueq/l (-1.77 %/year): 18 years' data
+ Significant trend detected



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## 5024 Flatford Mill

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13/01/04 | 27/01/04 | 4.3 | 30.9 | 55.4 | 22.2 | 48.8 | 12.1 | 7.1 | 67.1 | 1.1 | <1.0 | 25.1 | 56.2 | 31.0 | 20.0 |
| 27/01/04 | 10/02/04 | 5.0 | 32.0 | 26.6 | 20.0 | 83.7 | 17.7 | 11.4 | 104.8 | 4.6 | <1.0 | 21.9 | 9.8 | 22.0 | 26.8 |
| 10/02/04 | 24/02/04 | 4.3 | 129.3 | 124.4 | 119.7 | 278.5 | 59.0 | 38.7 | 306.6 | 7.7 | <1.0 | 95.7 | 49.0 | 87.0 | 7.6 |
| 24/02/04 | 09/03/04 | 4.4 | 61.4 | 104.4 | 93.3 | 42.5 | 8.8 | 11.4 | 51.3 | 1.4 | <1.0 | 56.3 | 38.0 | 39.0 | 16.9 |
| 09/03/04 | 23/03/04 | 5.4 | 62.8 | 52.4 | 73.0 | 95.2 | 19.3 | 16.5 | 100.5 | 3.3 | <1.0 | 51.3 | 4.4 | 32.0 | 14.1 |
| 23/03/04 | 06/04/04 | 6.0 | 44.6 | 33.6 | 56.2 | 45.5 | 9.6 | 14.5 | 53.8 | 2.3 | <1.0 | 39.2 | 1.1 | 19.0 | 16.9 |
| 06/04/04 | 21/04/04 | 4.8 | 42.3 | 38.3 | 46.8 | 58.5 | 14.5 | 14.4 | 58.6 | 5.4 | <1.0 | 35.3 | 15.1 | 25.8 | 21.7 |
| 21/04/04 | 18/05/04 | 4.5 | 48.8 | 71.8 | 64.5 | 19.0 | 7.4 | 15.8 | 23.0 | 7.6 | <1.0 | 46.5 | 33.1 | 30.6 | 59.4 |
| 18/05/04 | 01/06/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 5.7 |
| 01/06/04 | 29/06/04 | 4.7 | 51.0 | 44.4 | 8.8 | 47.0 | 13.8 | 42.8 | 56.3 | 13.1 | <1.0 | 45.4 | 22.4 | 24.0 | 25.9 |
| 29/06/04 | 15/07/04 | 4.5 | 38.6 | 43.2 | 22.6 | 60.1 | 13.2 | 14.2 | 69.0 | 2.6 | <1.0 | 31.4 | 33.9 | 27.0 | 34.4 |
| 15/07/04 | 27/07/04 | 4.3 | 46.3 | 53.6 | 25.5 | 10.1 | 4.2 | 22.8 | 20.0 | 7.6 | <1.0 | 45.0 | 56.2 | 26.0 | 19.1 |
| 27/07/04 | 10/08/04 | 5.6 | 48.7 | 58.0 | 61.7 | 6.1 | 6.5 | 41.6 | 15.0 | 10.0 | 5.0 | 48.0 | 2.5 | 18.0 | 21.7 |
| 10/08/04 | 25/08/04 | 4.6 | 34.1 | 30.1 | 16.6 | 41.5 | 9.9 | 12.6 | 49.9 | 2.6 | <1.0 | 29.1 | 26.9 | 21.0 | 45.1 |
| 25/08/04 | 07/09/04 | 4.7 | 16.7 | <1.4 | 1.0 | 15.2 | 7.4 | 12.1 | 17.4 | 2.3 | <1.0 | 14.8 | 19.1 | 12.0 | 10.7 |
| 07/09/04 | 21/09/04 | 6.0 | 61.6 | 37.6 | 30.5 | 141.5 | 32.7 | 54.0 | 156.7 | 9.7 | <1.0 | 44.5 | 1.0 | 36.1 | 7.3 |
| 21/09/04 | 05/10/04 | 5.1 | 22.6 | 34.6 | 59.2 | 24.9 | 6.3 | 14.0 | 23.2 | 4.0 | <1.0 | 19.7 | 8.3 | 13.6 | 16.2 |
| 05/10/04 | 19/10/04 | 4.8 | 33.3 | 30.5 | 16.2 | 75.8 | 17.9 | 15.7 | 89.4 | 4.9 | <1.0 | 24.2 | 14.8 | 23.8 | 27.1 |
| 19/10/04 | 03/11/04 | 4.7 | 41.7 | 18.6 | 25.7 | 89.5 | 16.8 | 15.2 | 93.0 | 4.9 | <1.0 | 30.9 | 20.0 | 28.0 | 22.5 |
| 03/11/04 | 19/11/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 19/11/04 | 30/11/04 | 4.7 | 15.2 | 22.2 | 12.0 | 12.7 | 2.7 | 4.5 | 15.3 | 0.1 | <1.0 | 13.6 | 19.5 | 13.0 | 22.7 |
| 30/11/04 | 14/12/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 14/12/04 | 28/12/04 | 4.8 | 22.8 | 16.6 | 17.2 | 49.9 | 11.7 | 7.6 | 54.7 | 1.3 | <1.0 | 16.8 | 14.5 | 18.0 | 21.7 |
| 28/12/04 | 11/01/05 | 5.1 | 91.1 | 68.6 | 61.4 | 225.6 | 51.6 | 35.7 | 322.8 | 7.2 | <1.0 | 64.0 | 7.6 | 55.0 | 1.2 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5024 | | 41.1 | 44.1 | 36.6 | 50.9 | 12.3 | 17.4 | 59.3 | 4.9 | - | 35.0 | 23.6 | 25.5 | 464.5 |

# Woburn

**2004**

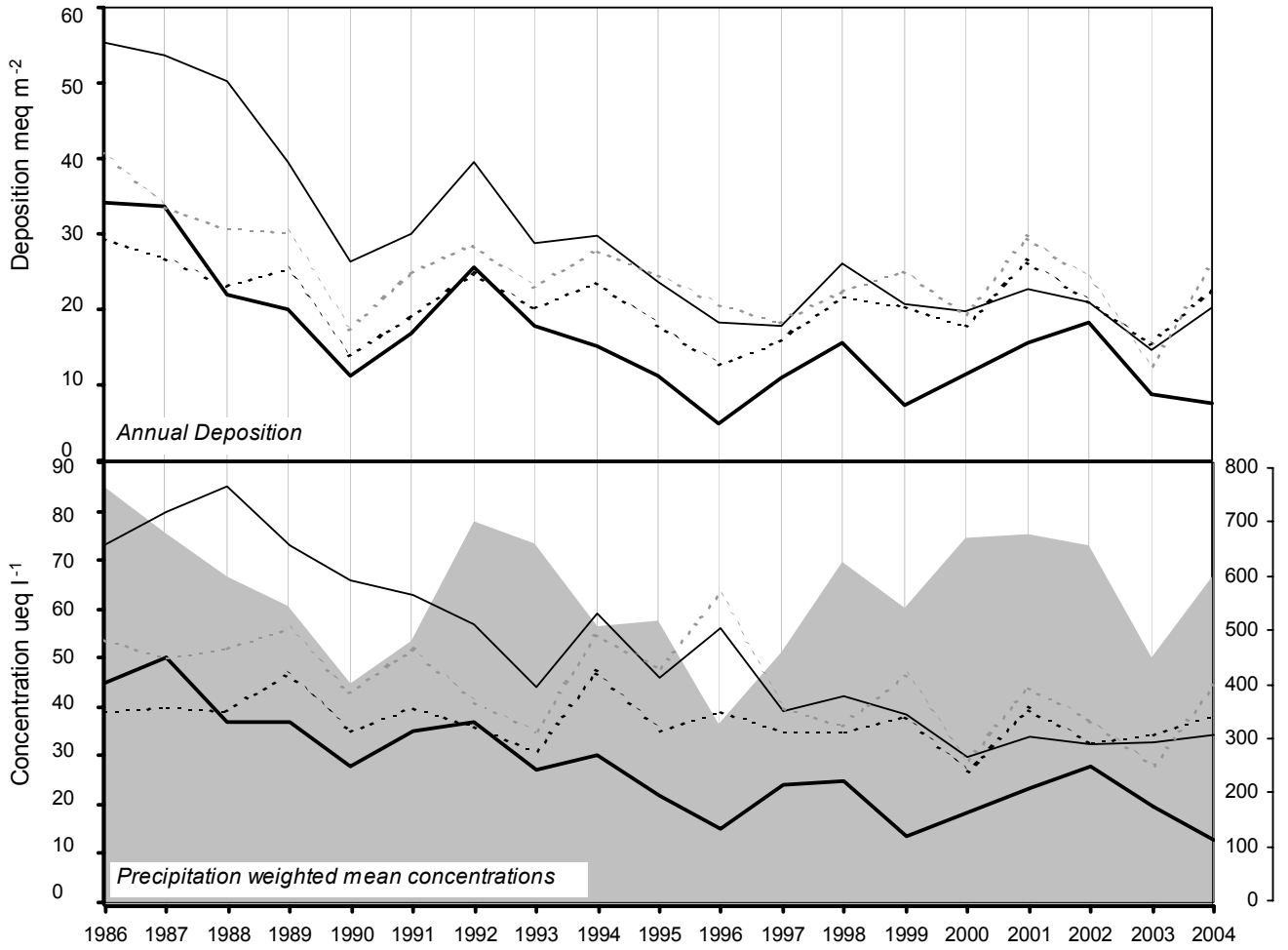
| | |
|---|---|
| *Site Code:* | **5127** |
| *Easting:* | **4964** |
| *Northing:* | **2361** |
| *Latitude:* | **52 00 52 N** |
| *Longitude:* | **00 35 43 W** |
| *Altitude (m):* | **89** |
| *Rainfall (mm):* | **646** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Pasture**

*Other measurements:*
**DT, SO2, Met**

*Site Operator:*
**Rothamsted Experimental Station**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-1.51 ueq/l (-3.64 %/year): 18 years' data
+++ Strong trend detected

*non-marine sulphate*
-2.92 ueq/l (-3.74 %/year): 19 years' data
++++ Very strong trend detected

*nitrate*
-0.34 ueq/l (-0.85 %/year): 19 years' data
- No significant trend detected

*ammonium*
-0.93 ueq/l (-1.75 %/year): 19 years' data
+ Significant trend detected



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## 5127 Woburn

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 05/01/04 | 15/01/04 | 5.2 | 23.7 | 14.0 | 15.3 | 65.2 | 11.6 | 6.0 | 69.8 | 1.2 | <1.0 | 15.8 | 5.9 | 14.0 | 28.9 |
| 15/01/04 | 02/02/04 | 4.8 | 25.5 | 24.6 | 22.1 | 88.2 | 18.2 | 9.4 | 97.6 | 1.5 | <1.0 | 14.9 | 14.5 | 23.0 | 33.6 |
| 02/02/04 | 19/02/04 | 5.0 | 45.3 | 34.0 | 35.1 | 64.5 | 13.5 | 19.5 | 65.5 | 2.4 | <1.0 | 37.6 | 9.3 | 21.0 | 23.9 |
| 19/02/04 | 24/03/04 | 5.0 | 67.1 | 56.2 | 73.7 | 120.0 | 19.8 | 23.7 | 129.4 | 3.1 | <1.0 | 52.6 | 10.2 | 39.0 | 30.8 |
| 24/03/04 | 08/04/04 | 5.5 | 62.7 | 36.1 | 61.3 | 53.4 | 11.1 | 20.3 | 61.0 | 1.6 | <1.0 | 56.2 | 3.5 | 23.0 | 18.7 |
| 08/04/04 | 23/04/04 | 4.9 | 35.3 | 25.1 | 37.6 | 15.0 | 5.1 | 11.2 | 15.8 | 5.2 | <1.0 | 33.5 | 13.2 | 15.0 | 32.6 |
| 23/04/04 | 07/05/04 | 5.2 | 66.0 | 79.9 | 135.0 | 16.9 | 5.7 | 12.5 | 20.0 | 2.1 | <1.0 | 64.0 | 6.3 | 25.0 | 50.9 |
| 07/05/04 | 18/05/04 | 5.0 | 53.7 | 44.3 | 69.6 | 8.6 | 4.7 | 20.4 | 11.5 | 2.1 | <1.0 | 52.7 | 11.2 | 18.0 | 5.1 |
| 18/05/04 | 01/06/04 | 4.3 | 91.6 | 128.1 | 58.1 | 29.4 | 13.0 | 81.4 | 31.4 | 11.5 | <1.0 | 88.1 | 55.0 | 49.0 | 14.9 |
| 01/06/04 | 18/06/04 | 4.3 | 143.6 | 153.1 | 86.0 | 45.6 | 21.3 | 88.2 | 64.1 | 30.2 | <1.0 | 138.1 | 50.1 | 58.0 | 2.1 |
| 18/06/04 | 16/07/04 | 5.0 | 33.9 | 28.3 | 18.2 | 31.2 | 8.0 | 20.9 | 44.6 | 4.5 | <1.0 | 30.1 | 10.2 | 17.0 | 61.8 |
| 16/07/04 | 30/07/04 | 5.3 | 63.0 | 55.1 | 75.9 | 6.0 | 4.3 | 33.4 | 18.2 | 7.9 | <1.0 | 62.3 | 5.4 | 21.0 | 4.3 |
| 30/07/04 | 13/08/04 | 4.7 | 48.6 | 61.0 | 62.0 | 3.2 | 2.9 | 19.0 | 9.6 | 3.5 | <1.0 | 48.2 | 19.1 | 21.0 | 33.9 |
| 13/08/04 | 25/08/04 | 5.1 | 18.0 | 17.1 | 16.6 | 16.5 | 5.6 | 11.1 | 15.7 | 1.4 | <1.0 | 16.0 | 7.4 | <10.0 | 52.7 |
| 25/08/04 | 13/09/04 | 5.7 | 35.4 | 40.8 | 27.7 | 65.0 | 16.4 | 33.8 | 68.0 | 5.3 | <1.0 | 27.6 | 1.9 | 22.0 | 18.1 |
| 13/09/04 | 14/10/04 | 5.4 | 23.6 | 23.7 | 33.7 | 50.5 | 12.8 | 13.2 | 53.5 | 1.8 | <1.0 | 17.6 | 4.0 | 16.9 | 58.7 |
| 14/10/04 | 04/11/04 | 4.7 | 32.7 | 33.0 | 31.0 | 41.7 | 10.5 | 8.4 | 48.4 | 1.5 | <1.0 | 27.7 | 22.4 | 22.0 | 49.3 |
| 04/11/04 | 16/11/04 | 4.4 | 63.7 | 71.4 | 84.5 | 22.4 | 8.8 | 12.3 | 30.0 | 2.2 | <1.0 | 61.0 | 44.7 | 34.0 | 11.0 |
| 16/11/04 | 08/12/04 | 4.7 | 22.6 | 20.1 | 24.6 | 19.5 | 5.8 | 7.0 | 23.7 | 0.8 | <1.0 | 20.3 | 19.1 | 13.0 | 37.7 |
| 08/12/04 | 11/01/05 | 5.0 | 34.5 | 27.2 | 33.1 | 96.9 | 20.0 | 12.1 | 117.4 | 2.3 | <1.0 | 22.8 | 11.0 | 28.0 | 25.3 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5127 | | 39.3 | 38.3 | 43.9 | 43.0 | 10.3 | 16.4 | 49.0 | 2.8 | - | 34.1 | 12.7 | 20.9 | 594.6 |

# Tycanol Wood

**2004**

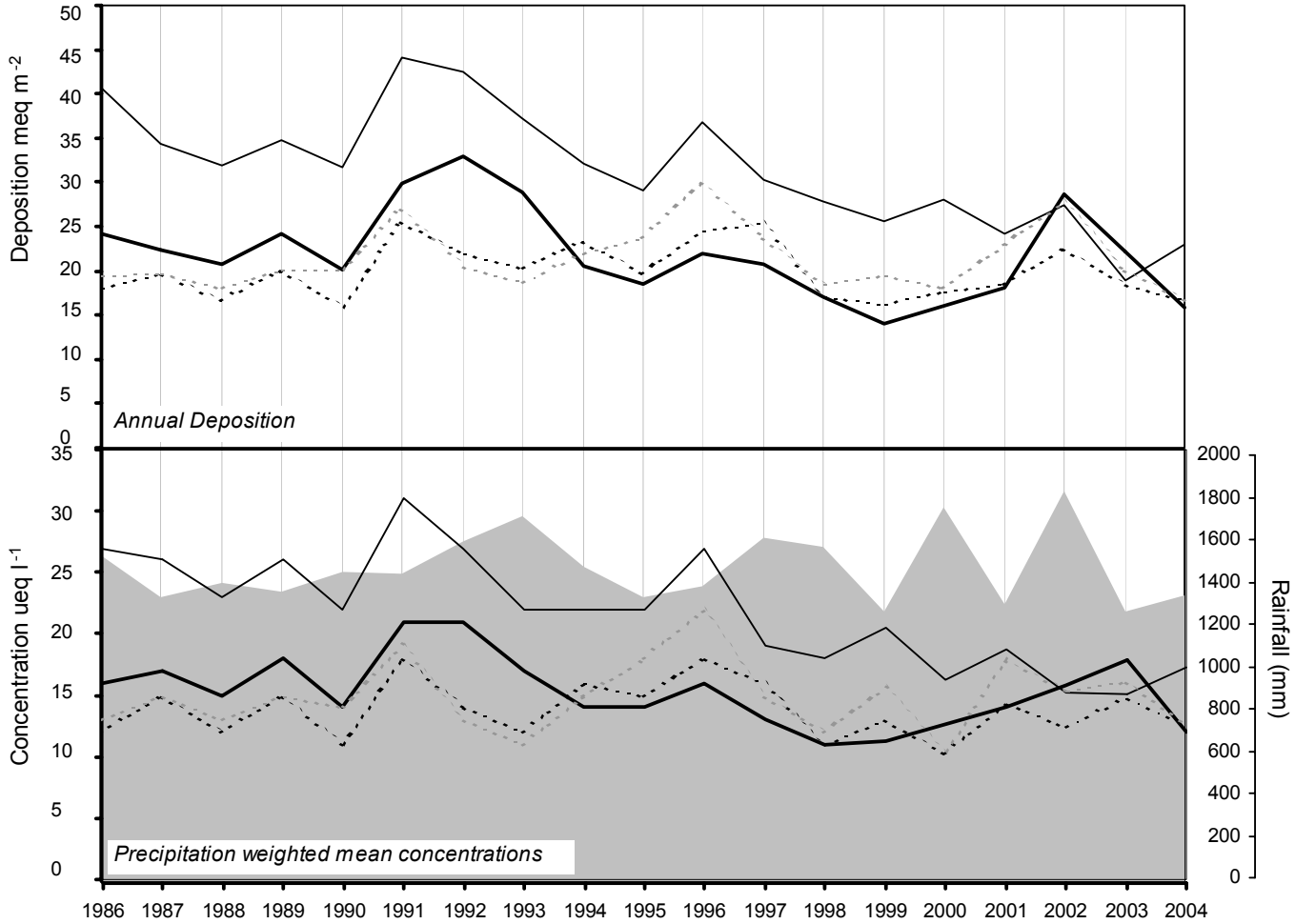
| | |
|---|---|
| *Site Code:* | **5123** |
| *Easting:* | **2093** |
| *Northing:* | **2364** |
| *Latitude:* | **51 59 34 N** |
| *Longitude:* | **04 46 41 W** |
| *Altitude (m):* | **205** |
| *Rainfall (mm):* | **1847** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland**

*Other measurements:*
**DT**

*Site Operator:*
**Countryside Council for Wales**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.21 ueq/l (-1.22 %/year): 18 years' data
\- No significant trend detected

*non-marine sulphate*
-0.65 ueq/l (-2.35 %/year): 19 years' data
+++ Strong trend detected

*nitrate*
-0.03 ueq/l (-0.24 %/year): 19 years' data
\- No significant trend detected

*ammonium*
0.03 ueq/l (0.23 %/year): 19 years' data
\- No significant trend detected



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# 5123 Tycanol Wood

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/01/04 | 28/01/04 | 5.3 | 27.2 | 13.0 | 18.2 | 131.4 | 25.2 | 7.8 | 134.5 | 3.0 | <1.0 | 11.3 | 5.5 | 23.0 | 20.5 |
| 28/01/04 | 11/02/04 | 4.8 | 33.0 | 5.3 | 2.5 | 119.4 | 24.1 | 7.5 | 123.4 | 1.6 | <1.0 | 18.6 | 15.5 | 23.0 | 173.2 |
| 11/02/04 | 10/03/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 10/03/04 | 26/03/04 | 4.9 | 42.5 | 11.9 | 15.7 | 186.1 | 40.2 | 11.5 | 203.8 | 4.3 | <1.0 | 20.1 | 12.9 | 37.0 | 86.1 |
| 26/03/04 | 07/04/04 | 5.5 | 28.5 | 15.6 | 17.9 | 117.6 | 15.1 | 13.8 | 111.7 | 1.5 | <1.0 | 14.3 | 3.2 | 22.0 | 30.1 |
| 07/04/04 | 21/04/04 | 5.1 | 27.4 | 14.4 | 16.6 | 94.0 | 19.4 | 6.9 | 97.2 | 2.1 | <1.0 | 16.1 | 8.9 | 21.0 | 70.3 |
| 21/04/04 | 05/05/04 | 5.3 | 44.5 | 29.3 | 34.0 | 160.5 | 34.1 | 17.7 | 169.9 | 4.9 | <1.0 | 25.1 | 4.9 | 33.0 | 14.4 |
| 05/05/04 | 19/05/04 | 4.8 | 59.0 | 65.6 | 61.9 | 57.4 | 9.1 | 16.3 | 58.5 | 3.8 | <1.0 | 52.1 | 15.1 | 30.0 | 22.1 |
| 19/05/04 | 07/06/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 07/06/04 | 16/06/04 | 4.7 | 84.3 | 34.4 | 50.9 | 100.7 | 20.6 | 17.5 | 112.4 | 3.2 | <1.0 | 72.1 | 18.6 | 36.0 | 4.7 |
| 16/06/04 | 30/06/04 | 5.0 | 23.0 | 9.5 | 8.1 | 54.5 | 9.0 | 4.7 | 60.0 | 0.6 | <1.0 | 16.4 | 11.0 | 14.0 | 61.6 |
| 30/06/04 | 19/07/04 | 4.8 | 35.8 | 18.0 | 18.7 | 99.8 | 22.0 | 11.2 | 101.3 | 4.5 | <1.0 | 23.8 | 14.5 | 24.5 | 26.8 |
| 19/07/04 | 28/07/04 | 4.7 | 31.2 | 16.2 | 18.7 | 27.7 | 13.3 | 7.8 | 29.8 | 2.3 | <1.0 | 27.9 | 18.6 | 15.0 | 22.3 |
| 28/07/04 | 11/08/04 | 4.6 | 52.5 | 49.2 | 51.5 | 29.8 | 8.8 | 23.2 | 29.6 | 3.5 | <1.0 | 48.9 | 28.2 | 23.0 | 23.9 |
| 11/08/04 | 25/08/04 | 4.7 | 21.1 | 8.3 | 7.8 | 40.1 | 8.7 | 3.2 | 47.6 | 0.9 | <1.0 | 16.2 | 18.6 | 14.0 | 143.1 |
| 25/08/04 | 08/09/04 | 5.0 | 36.0 | 21.3 | 18.9 | 113.7 | 26.1 | 14.7 | 145.9 | 4.7 | <1.0 | 22.3 | 9.8 | 29.0 | 10.1 |
| 08/09/04 | 22/09/04 | 5.0 | 36.8 | 9.4 | 9.6 | 177.5 | 38.6 | 12.4 | 198.6 | 3.8 | <1.0 | 15.4 | 11.0 | 33.3 | 107.9 |
| 22/09/04 | 05/10/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 05/10/04 | 20/10/04 | 5.0 | 21.1 | 11.7 | 10.5 | 97.6 | 19.6 | 5.8 | 123.8 | 2.3 | <1.0 | 9.4 | 10.0 | 20.9 | 90.9 |
| 20/10/04 | 09/11/04 | 5.1 | 34.8 | 9.7 | 9.2 | 226.0 | 50.3 | 11.8 | 255.1 | 5.2 | <1.0 | 7.5 | 8.9 | 41.0 | 179.5 |
| 09/11/04 | 17/11/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 17/11/04 | 01/12/04 | 4.8 | 26.7 | 17.7 | 19.4 | 78.0 | 15.6 | 4.7 | 88.7 | 2.0 | <1.0 | 17.3 | 14.8 | 19.0 | 38.3 |
| 01/12/04 | 15/12/04 | 4.4 | 98.1 | 115.7 | 105.9 | 198.8 | 43.8 | 36.4 | 230.5 | 5.0 | <1.0 | 74.1 | 37.2 | 61.0 | 9.9 |
| 15/12/04 | 29/12/04 | 5.2 | 33.5 | 6.4 | 6.2 | 193.4 | 41.8 | 11.7 | 249.3 | 3.9 | <1.0 | 10.2 | 5.9 | 38.0 | 108.9 |
| 29/12/04 | 12/01/05 | 5.1 | 71.7 | 7.3 | 7.2 | 393.6 | 89.0 | 19.3 | 473.8 | 8.0 | <1.0 | 24.3 | 7.4 | 69.0 | 79.4 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5123 | | 34.9 | 12.6 | 12.5 | 146.3 | 31.4 | 10.0 | 167.0 | 3.2 | - | 17.3 | 12.0 | 29.9 | 1324.1 |

# Llyn Brianne

**2004**

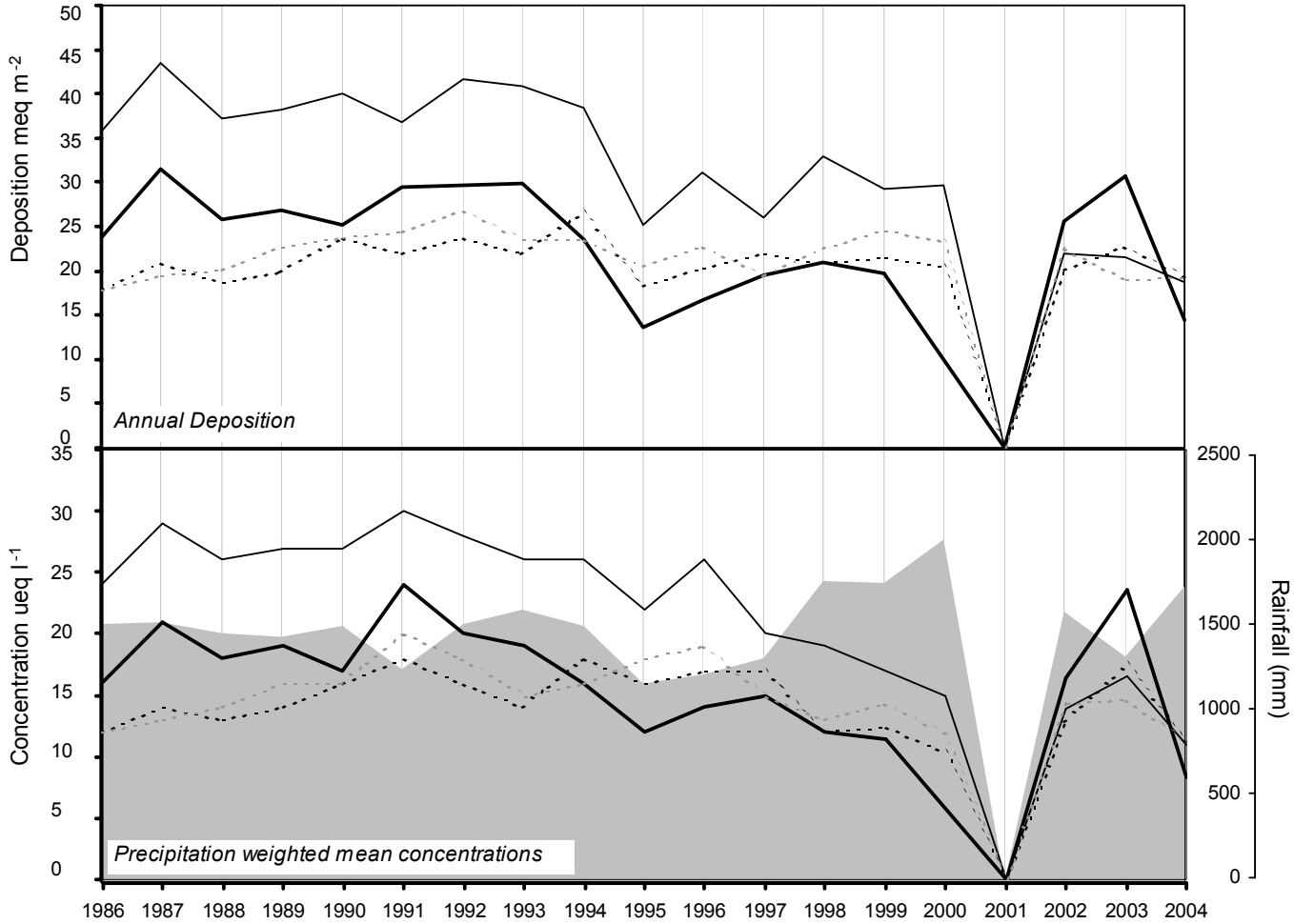
| | |
|---|---|
| *Site Code:* | **5124** |
| *Easting:* | **2807** |
| *Northing:* | **2492** |
| *Latitude:* | **52 07 32 N** |
| *Longitude:* | **03 44 34 W** |
| *Altitude (m):* | **372** |
| *Rainfall (mm):* | **1774** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland, upland hill farming**

*Other measurements:*
**DT, UKAWMN (nearby), Met**

*Site Operator:*
**Environment Agency**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.35 ueq/l (-1.80 %/year): 17 years' data
\- No significant trend detected

*non-marine sulphate*
-0.94 ueq/l (-3.08 %/year): 18 years' data
++++ Very strong trend detected

*nitrate*
-0.06 ueq/l (-0.43 %/year): 18 years' data
\- No significant trend detected

*ammonium*
-0.10 ueq/l (-0.60 %/year): 18 years' data
\- No significant trend detected



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## 5124 Llyn Brianne

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 05/01/04 | 14/01/04 | 5.3 | 26.6 | 5.2 | 5.6 | 139.6 | 26.1 | 6.6 | 164.5 | 2.1 | <1.0 | 9.7 | 5.6 | 23.0 | 79.6 |
| 14/01/04 | 02/02/04 | 5.1 | 24.2 | 8.2 | 6.9 | 122.8 | 23.1 | 5.0 | 153.0 | 2.3 | <1.0 | 9.4 | 8.3 | 24.0 | 130.3 |
| 02/02/04 | 11/02/04 | 5.3 | 15.4 | 5.5 | <1.4 | 65.7 | 13.6 | 4.6 | 82.4 | 1.0 | <1.0 | 7.5 | 4.7 | 13.0 | 91.9 |
| 11/02/04 | 25/02/04 | 4.7 | 141.7 | 195.0 | 164.9 | 259.8 | 62.1 | 54.5 | 260.5 | 7.4 | <1.0 | 110.4 | 20.0 | - | 2.2 |
| 25/02/04 | 10/03/04 | 5.3 | 47.9 | 48.2 | 54.8 | 146.8 | 31.3 | 15.1 | 168.8 | 5.6 | <1.0 | 30.2 | 4.7 | 34.0 | 9.7 |
| 10/03/04 | 23/03/04 | 5.2 | 28.0 | 8.5 | 7.1 | 157.6 | 31.9 | 10.5 | 168.6 | 3.9 | <1.0 | 9.0 | 6.8 | 29.0 | 78.2 |
| 23/03/04 | 07/04/04 | 5.0 | 27.8 | 14.1 | 10.4 | 114.7 | 23.6 | 9.4 | 124.5 | 2.3 | <1.0 | 14.0 | 9.5 | 25.0 | 34.5 |
| 07/04/04 | 22/04/04 | 4.8 | 24.9 | 17.3 | 13.9 | 51.2 | 11.2 | 5.1 | 55.4 | 1.3 | <1.0 | 18.7 | 14.5 | 17.0 | 44.2 |
| 22/04/04 | 05/05/04 | 5.3 | 27.5 | 21.8 | 26.7 | 72.8 | 15.6 | 10.4 | 78.0 | 1.7 | <1.0 | 18.7 | 5.6 | 19.0 | 46.9 |
| 05/05/04 | 19/05/04 | 4.6 | 30.0 | 19.9 | 12.7 | 67.2 | 9.9 | 10.6 | 55.0 | 13.3 | <1.0 | 21.9 | 28.2 | 19.0 | 32.5 |
| 19/05/04 | 02/06/04 | 4.9 | 39.2 | 51.8 | 44.7 | 24.0 | 4.8 | 21.5 | 32.0 | 1.9 | <1.0 | 36.3 | 12.0 | 18.0 | 29.8 |
| 02/06/04 | 16/06/04 | 4.3 | 99.6 | 56.9 | 47.7 | 141.3 | 38.1 | 49.4 | 151.9 | 1.4 | <1.0 | 82.6 | 55.0 | 51.0 | 4.6 |
| 16/06/04 | 30/06/04 | 5.2 | 22.8 | 10.4 | 10.4 | 58.5 | 10.7 | 4.7 | 66.4 | 0.7 | <1.0 | 15.8 | 6.6 | 14.0 | 68.5 |
| 30/06/04 | 14/07/04 | 6.2 | 61.8 | 17.3 | 114.4 | 75.1 | 14.8 | 9.3 | 101.9 | 15.2 | 51.3 | 52.8 | 0.6 | 36.0 | 26.1 |
| 14/07/04 | 28/07/04 | 5.4 | 28.6 | 13.9 | 34.2 | 14.5 | 1.6 | <1.0 | 19.4 | 2.8 | <1.0 | 26.9 | 4.4 | <10.0 | 39.9 |
| 28/07/04 | 25/08/04 | 4.8 | 19.1 | 13.6 | 5.9 | 25.8 | 6.6 | 5.7 | 30.1 | 0.7 | <1.0 | 16.0 | 17.4 | 13.0 | 143.8 |
| 25/08/04 | 08/09/04 | 6.0 | 32.4 | 8.1 | 2.2 | 135.8 | 27.9 | 10.6 | 192.1 | 5.0 | <1.0 | 16.1 | 1.0 | 25.0 | 21.7 |
| 08/09/04 | 22/09/04 | 5.0 | 23.8 | 9.2 | 3.4 | 131.9 | 26.2 | 11.1 | 145.8 | 2.2 | <1.0 | 7.9 | 9.3 | 25.3 | 156.0 |
| 22/09/04 | 11/10/04 | 5.3 | 14.4 | 12.5 | 17.2 | 91.9 | 17.3 | 6.6 | 72.1 | 4.3 | <1.0 | 3.4 | 5.5 | 14.5 | 106.5 |
| 11/10/04 | 20/10/04 | 7.3 | 50.2 | 13.2 | 553.4 | 54.9 | 5.3 | 4.8 | 47.5 | 42.0 | 70.1 | 43.6 | 0.1 | 76.9 | 87.0 |
| 20/10/04 | 02/11/04 | 5.2 | 18.0 | 4.8 | 1.4 | 135.9 | 28.1 | 7.6 | 144.5 | 4.9 | <1.0 | 1.6 | 6.8 | 24.3 | 162.8 |
| 02/11/04 | 16/11/04 | 7.3 | 117.6 | 23.1 | 677.8 | 145.9 | 28.1 | 10.3 | 170.8 | 68.8 | 184.6 | 100.0 | 0.0 | 126.0 | 25.4 |
| 16/11/04 | 02/12/04 | 5.2 | 18.6 | 14.9 | 18.9 | 48.0 | 7.8 | 4.0 | 45.4 | 1.4 | <1.0 | 12.8 | 6.5 | 12.0 | 62.2 |
| 02/12/04 | 15/12/04 | 4.3 | 81.6 | 80.6 | 50.0 | 164.4 | 37.9 | 19.3 | 176.9 | 2.0 | <1.0 | 61.8 | 47.9 | 53.0 | 9.9 |
| 15/12/04 | 29/12/04 | 6.0 | 19.8 | 3.6 | 27.2 | 143.0 | 25.1 | 5.2 | 164.2 | 3.0 | <1.0 | 2.6 | 1.0 | 26.0 | 127.1 |
| 29/12/04 | 13/01/05 | 5.2 | 33.2 | 3.5 | 0.9 | 225.9 | 39.2 | 21.4 | 266.5 | 3.1 | <1.0 | 6.0 | 6.8 | 40.0 | 88.0 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5124 | | 23.8 | 11.3 | 11.4 | 106.3 | 20.6 | 8.3 | 118.7 | 2.8 | - | 10.9 | 8.4 | 21.6 | 1709.2 |

# Pumlumon

**2004**

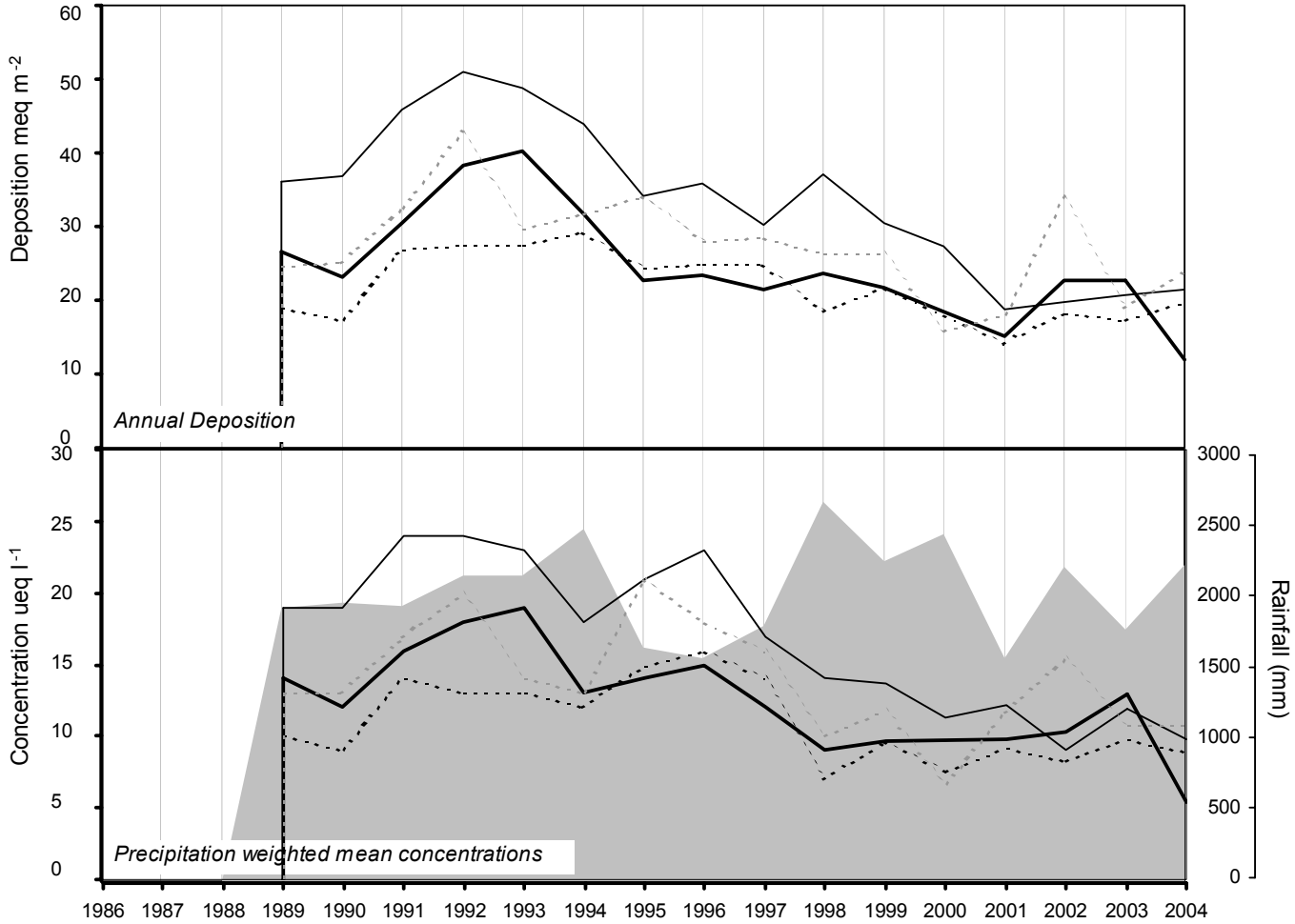
| | |
|---|---|
| *Site Code:* | **5150** |
| *Easting:* | **2823** |
| *Northing:* | **2854** |
| *Latitude:* | **52 27 13 N** |
| *Longitude:* | **03 43 56 W** |
| *Altitude (m):* | **390** |
| *Rainfall (mm):* | **2182** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland, upland hill farming**

*Other measurements:*
**DT, UKAWMN**

*Site Operator:*
**Centre for Ecology and Hydrology (Bangor)**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.51 ueq/l (-2.84 %/year): 15 years' data
++ Moderately strong trend detected

*non-marine sulphate*
-0.92 ueq/l (-3.47 %/year): 16 years' data
+++ Strong trend detected

*nitrate*
-0.26 ueq/l (-1.90 %/year): 16 years' data
- No significant trend detected

*ammonium*
-0.36 ueq/l (-2.04 %/year): 16 years' data
- No significant trend detected



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## 5150 Pumlumon

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13/01/04 | 27/01/04 | 5.7 | 31.1 | 7.1 | 3.6 | 212.9 | 44.9 | 12.0 | 234.6 | 7.4 | <1.0 | 5.4 | 2.1 | 36.0 | 26.1 |
| 27/01/04 | 10/02/04 | 5.4 | 13.4 | 2.7 | 4.7 | 76.4 | 13.9 | 4.8 | 87.9 | 2.4 | <1.0 | 4.2 | 3.7 | 14.0 | 239.4 |
| 10/02/04 | 24/02/04 | 4.4 | 98.6 | 139.7 | 95.8 | 131.5 | 41.8 | 34.1 | 89.8 | 5.5 | <1.0 | 82.7 | 40.7 | 57.0 | 6.4 |
| 24/02/04 | 09/03/04 | 5.7 | 51.1 | 43.2 | 50.0 | 205.4 | 43.3 | 16.5 | 233.0 | 4.7 | <1.0 | 26.3 | 1.9 | 43.0 | 6.0 |
| 09/03/04 | 23/03/04 | 5.2 | 19.8 | 4.8 | 5.7 | 112.1 | 21.1 | 5.9 | 121.4 | 2.2 | <1.0 | 6.3 | 6.9 | 20.0 | 92.5 |
| 23/03/04 | 06/04/04 | 5.3 | 29.3 | 14.5 | 21.0 | 116.5 | 23.8 | 9.0 | 115.0 | 2.4 | <1.0 | 15.3 | 5.1 | 23.0 | 38.5 |
| 06/04/04 | 20/04/04 | 5.1 | 20.5 | 14.2 | 16.0 | 44.5 | 9.2 | 4.0 | 51.3 | 0.7 | <1.0 | 15.1 | 7.8 | 14.0 | 29.9 |
| 20/04/04 | 04/05/04 | 5.3 | 23.4 | 14.4 | 16.4 | 63.0 | 11.5 | 6.9 | 62.0 | 1.3 | <1.0 | 15.8 | 4.9 | 15.0 | 49.1 |
| 04/05/04 | 18/05/04 | 4.9 | 25.9 | 17.9 | 22.2 | 56.8 | 12.0 | 5.3 | 65.9 | 1.6 | <1.0 | 19.1 | 13.8 | 17.0 | 49.7 |
| 18/05/04 | 01/06/04 | 4.7 | 26.0 | 28.1 | 15.5 | 23.6 | 4.4 | 10.7 | 19.4 | 3.3 | <1.0 | 23.2 | 18.6 | 13.3 | 29.3 |
| 01/06/04 | 15/06/04 | 6.2 | 25.9 | 15.0 | 29.3 | 58.5 | 5.9 | 4.8 | 57.4 | 10.0 | <1.0 | 18.8 | 0.6 | 14.0 | 24.5 |
| 15/06/04 | 29/06/04 | 5.3 | 20.1 | 9.4 | 9.7 | 65.8 | 11.7 | 3.6 | 76.4 | 1.1 | <1.0 | 12.2 | 5.6 | 15.0 | 82.3 |
| 29/06/04 | 13/07/04 | 4.5 | 30.2 | 18.1 | 5.4 | 72.1 | 15.8 | 13.4 | 87.9 | 1.4 | <1.0 | 21.5 | 30.9 | 24.0 | 48.9 |
| 13/07/04 | 27/07/04 | 5.1 | 13.4 | 8.1 | 16.1 | 13.9 | 2.7 | 2.8 | 13.3 | 1.3 | <1.0 | 11.7 | 7.4 | <10.0 | 76.4 |
| 27/07/04 | 10/08/04 | 7.5 | 63.6 | 21.2 | 1273.9 | 38.9 | 20.2 | 9.2 | 36.3 | 113.0 | 159.2 | 58.9 | 0.0 | 138.0 | 14.2 |
| 10/08/04 | 24/08/04 | 7.3 | 19.2 | 10.6 | 8.8 | 37.8 | 9.3 | 3.0 | 44.7 | 1.2 | <1.0 | 14.6 | 0.1 | 88.0 | 125.6 |
| 24/08/04 | 07/09/04 | 5.2 | 15.1 | <1.4 | <0.7 | 52.4 | 11.8 | 5.7 | 60.5 | 0.9 | <1.0 | 8.8 | 6.0 | 14.0 | 63.9 |
| 07/09/04 | 21/09/04 | 5.3 | 10.8 | 10.9 | 6.2 | 100.3 | 19.7 | 8.1 | 111.9 | 4.6 | <1.0 | - | 5.0 | 19.2 | 196.9 |
| 21/09/04 | 05/10/04 | 5.6 | 10.7 | 10.7 | 8.2 | 58.1 | 11.0 | 2.8 | 58.0 | 0.9 | <1.0 | 3.7 | 2.8 | 12.0 | 211.2 |
| 05/10/04 | 19/10/04 | 5.7 | 21.1 | 13.3 | 26.5 | 93.6 | 19.5 | 6.7 | 93.3 | 7.4 | 7.3 | 9.9 | 2.0 | 22.1 | 58.0 |
| 19/10/04 | 02/11/04 | 5.4 | 15.0 | 4.9 | 0.1 | 114.8 | 24.6 | 6.0 | 128.8 | 4.0 | <1.0 | 1.1 | 4.5 | 21.4 | 177.4 |
| 02/11/04 | 16/11/04 | 5.0 | 26.7 | 16.7 | 22.6 | 107.7 | 22.6 | 5.4 | 118.7 | 2.4 | <1.0 | 13.7 | 10.7 | 24.0 | 29.4 |
| 16/11/04 | 30/11/04 | 5.1 | 16.7 | 8.9 | 15.7 | 47.4 | 9.0 | 2.8 | 57.4 | 1.3 | <1.0 | 11.0 | 7.4 | 12.0 | 146.1 |
| 30/11/04 | 14/12/04 | 5.8 | 41.7 | 29.5 | 31.3 | 71.5 | 14.8 | 32.8 | 78.2 | 0.7 | <1.0 | 33.0 | 1.5 | 21.0 | 14.5 |
| 14/12/04 | 28/12/04 | 5.2 | 18.8 | 4.8 | 8.8 | 123.9 | 26.6 | 6.7 | 142.3 | 3.0 | <1.0 | 3.9 | 5.8 | 22.0 | 204.6 |
| 28/12/04 | 11/01/05 | 6.3 | 30.4 | 3.1 | 21.3 | 101.6 | 24.3 | 11.8 | 124.5 | 11.2 | 8.1 | 18.1 | 0.5 | 32.0 | 163.2 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5150 | | 18.6 | 9.0 | 10.8 | 81.8 | 16.8 | 6.3 | 91.6 | 3.2 | - | 9.8 | 5.4 | 22.5 | 2204.0 |

# Stoke Ferry

**2004**

| | |
|---|---|
| *Site Code:* | **5004** |
| *Easting:* | **5700** |
| *Northing:* | **2988** |
| *Latitude:* | **52 33 36 N** |
| *Longitude:* | **00 30 29 E** |
| *Altitude (m):* | **15** |
| *Rainfall (mm):* | **629** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Grassed land at water treatment works**

*Other measurements:*
**DT, SO2, Daily SO4, HNO3 Denuder, WF, EMEP**

*Site Operator:*
**Kings Lynn and West Norfolk BC**


hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-1.02 ueq/l (-3.13 %/year): 18 years' data
++ Moderately strong trend detected

*non-marine sulphate*
-2.86 ueq/l (-3.49 %/year): 19 years' data
++++ Very strong trend detected

*nitrate*
-0.57 ueq/l (-1.23 %/year): 19 years' data
++ Moderately strong trend detected

*ammonium*
-1.28 ueq/l (-1.91 %/year): 19 years' data
++ Moderately strong trend detected



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## 5004 Stoke Ferry

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06/01/04 | 13/01/04 | 5.1 | 38.1 | 31.2 | 42.8 | 83.5 | 15.7 | 11.4 | 91.2 | 3.2 | <1.0 | 28.1 | 7.4 | 22.0 | 5.8 |
| 13/01/04 | 27/01/04 | 4.5 | 37.0 | 49.8 | 43.6 | 54.5 | 11.2 | 8.5 | 63.2 | 1.4 | <1.0 | 30.5 | 30.9 | 24.0 | 27.1 |
| 27/01/04 | 10/02/04 | 5.2 | 23.2 | 17.1 | 12.8 | 102.3 | 14.0 | 7.8 | 88.1 | 1.3 | <1.0 | 10.9 | 6.8 | 18.0 | 41.4 |
| 10/02/04 | 24/02/04 | 4.5 | 122.1 | 92.4 | 108.4 | 246.2 | 56.3 | 33.6 | 267.2 | 6.4 | <1.0 | 92.4 | 35.5 | 70.0 | 10.4 |
| 24/02/04 | 09/03/04 | 4.2 | 82.1 | 69.8 | 146.4 | 158.2 | 30.8 | 26.3 | 148.8 | 5.8 | <1.0 | 63.1 | 61.7 | 52.0 | 7.4 |
| 09/03/04 | 23/03/04 | 5.1 | 62.8 | 55.4 | 67.2 | 72.8 | 17.2 | 23.2 | 87.4 | 3.7 | <1.0 | 54.0 | 8.7 | 30.0 | 25.9 |
| 23/03/04 | 06/04/04 | 5.3 | 84.8 | 68.0 | 80.6 | 120.9 | 29.8 | 52.5 | 132.2 | 6.3 | <1.0 | 70.3 | 5.6 | 40.0 | 7.1 |
| 06/04/04 | 20/04/04 | 4.9 | 63.7 | 39.8 | 53.3 | 57.5 | 13.5 | 26.0 | 68.0 | 1.7 | <1.0 | 56.7 | 11.5 | 26.0 | 17.5 |
| 20/04/04 | 05/05/04 | 5.3 | 49.0 | 64.6 | 95.3 | 45.9 | 11.2 | 19.1 | 51.2 | 2.2 | <1.0 | 43.4 | 5.5 | 25.0 | 32.2 |
| 05/05/04 | 18/05/04 | 4.4 | 54.0 | 78.8 | 61.7 | 12.3 | 6.5 | 24.1 | 16.9 | 4.6 | <1.0 | 52.5 | 42.7 | 32.0 | 11.8 |
| 18/05/04 | 01/06/04 | 6.1 | 209.4 | 244.8 | 121.1 | 118.2 | 33.3 | 235.8 | 131.2 | 17.7 | <1.0 | 195.1 | 0.8 | 40.0 | 4.3 |
| 01/06/04 | 15/06/04 | 6.3 | 108.6 | 77.0 | 153.8 | 20.9 | 8.1 | 46.2 | 31.0 | 5.7 | <1.0 | 106.1 | 0.5 | 38.0 | 7.0 |
| 15/06/04 | 30/06/04 | 6.1 | 35.8 | 31.0 | 43.2 | 25.3 | 6.2 | 18.4 | 30.5 | 1.2 | <1.0 | 32.7 | 0.9 | 15.0 | 29.6 |
| 30/06/04 | 13/07/04 | 4.8 | 44.0 | 37.1 | 40.8 | 40.2 | 11.1 | 23.1 | 40.0 | 1.8 | <1.0 | 39.2 | 14.8 | 24.2 | 35.3 |
| 13/07/04 | 27/07/04 | 5.2 | 38.5 | 34.2 | 53.9 | <1.5 | 4.1 | 11.9 | 6.2 | 1.8 | <1.0 | 38.7 | 6.0 | 15.0 | 22.7 |
| 27/07/04 | 09/08/04 | 5.7 | 47.4 | 56.2 | 68.1 | 9.5 | 4.1 | 41.6 | 13.3 | 7.1 | <1.0 | 46.3 | 2.2 | 17.0 | 13.2 |
| 09/08/04 | 24/08/04 | 5.3 | 26.1 | 28.3 | 33.3 | 18.2 | 6.5 | 10.4 | 20.6 | 2.1 | <1.0 | 23.9 | 5.6 | 12.0 | 49.6 |
| 24/08/04 | 04/09/04 | 5.4 | 18.3 | 16.4 | 24.9 | 12.4 | 5.9 | 7.0 | 14.1 | 2.1 | <1.0 | 16.9 | 4.3 | <10.0 | 31.3 |
| 04/09/04 | 21/09/04 | 6.2 | 49.6 | 46.2 | 8.2 | 134.8 | 25.3 | 77.1 | 166.8 | 12.8 | <1.0 | 33.3 | 0.6 | 34.6 | 10.0 |
| 21/09/04 | 06/10/04 | 5.7 | 34.3 | 30.9 | 51.2 | 24.5 | 5.7 | 12.1 | 24.5 | 3.4 | <1.0 | 31.4 | 2.0 | 13.5 | 22.0 |
| 06/10/04 | 19/10/04 | 4.6 | 34.8 | 30.9 | 26.1 | 28.7 | 7.4 | 7.8 | 33.2 | 1.6 | <1.0 | 31.3 | 25.1 | 19.2 | 49.0 |
| 19/10/04 | 02/11/04 | 5.2 | 25.8 | 27.9 | 36.4 | 55.2 | 11.1 | 9.2 | 53.7 | 1.7 | <1.0 | 19.1 | 5.8 | 17.0 | 25.4 |
| 02/11/04 | 16/11/04 | 4.5 | 70.1 | 72.6 | 99.0 | 72.4 | 18.7 | 18.6 | 80.5 | 4.1 | <1.0 | 61.4 | 33.9 | 36.0 | 8.7 |
| 16/11/04 | 30/11/04 | 5.0 | 26.2 | 24.2 | 27.7 | 33.6 | 5.3 | 9.4 | 40.6 | 3.4 | <1.0 | 22.1 | 9.3 | 14.0 | 27.8 |
| 30/11/04 | 14/12/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 14/12/04 | 21/12/04 | 5.2 | 79.4 | 47.3 | 91.5 | 62.1 | 14.4 | 23.8 | 72.2 | 3.6 | <1.0 | 71.9 | 6.8 | 28.0 | 4.8 |
| 21/12/04 | 04/01/05 | 5.3 | 30.7 | 14.9 | 30.3 | 41.5 | 8.0 | 8.0 | 52.3 | 1.8 | <1.0 | 25.7 | 4.9 | 15.0 | 11.3 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5004 | | 42.6 | 40.2 | 48.1 | 49.4 | 11.2 | 18.6 | 53.6 | 2.8 | - | 36.6 | 11.8 | 21.5 | 538.8 |

# Preston Montford

**2004**

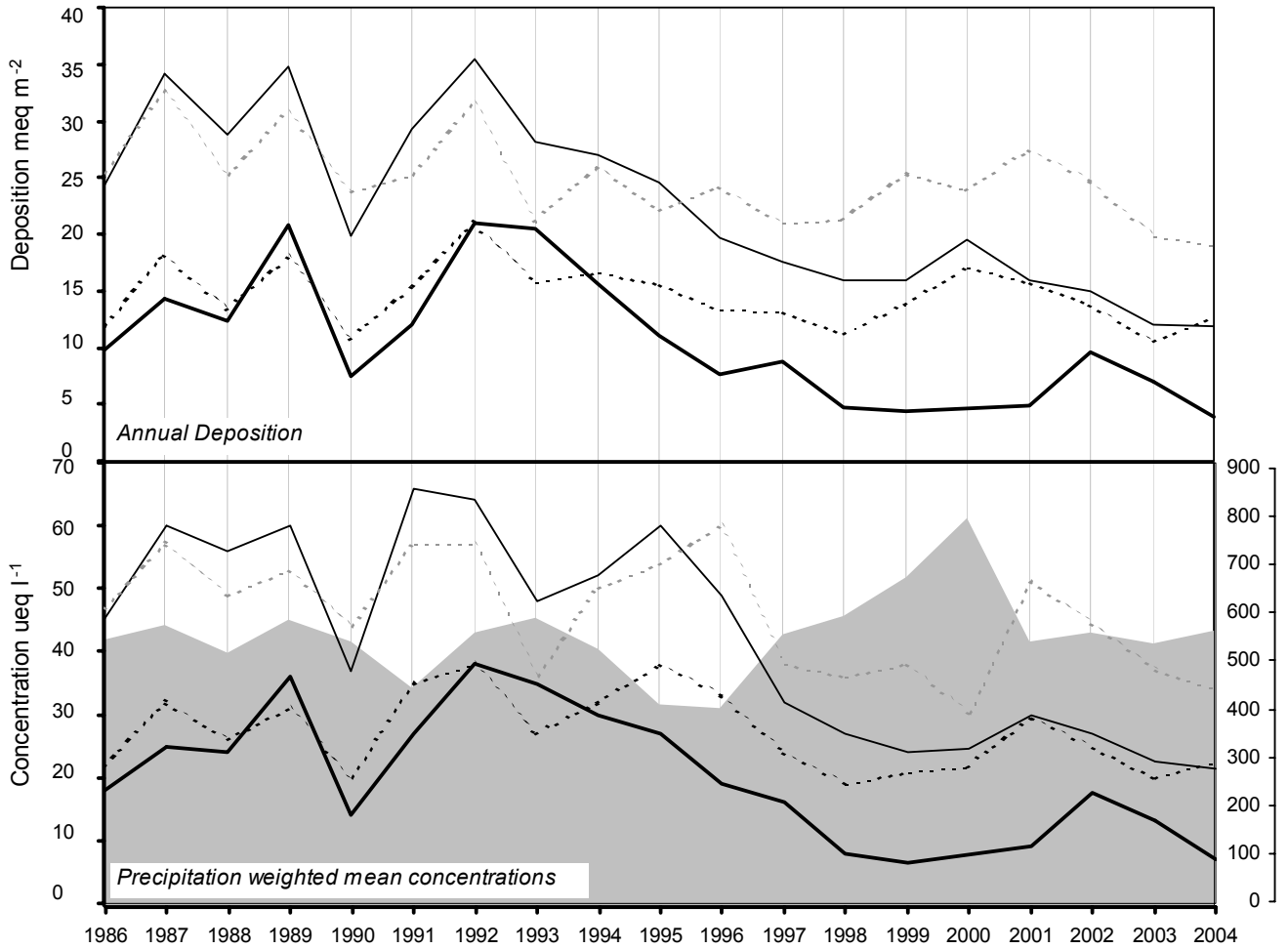
| | |
|---|---|
| *Site Code:* | **5023** |
| *Easting:* | **3432** |
| *Northing:* | **3143** |
| *Latitude:* | **52 43 23 N** |
| *Longitude:* | **02 50 17 W** |
| *Altitude (m):* | **70** |
| *Rainfall (mm):* | **695** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Field adjacent to Study Centre**

*Other measurements:*
**DT, SO2, Met**

*Site Operator:*
**Field Studies Council**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-1.09 ueq/l (-3.61 %/year): 18 years' data
\+ Significant trend detected

*non-marine sulphate*
-2.23 ueq/l (-3.57 %/year): 19 years' data
+++ Strong trend detected

*nitrate*
-0.38 ueq/l (-1.26 %/year): 19 years' data
\- No significant trend detected

*ammonium*
-0.89 ueq/l (-1.65 %/year): 19 years' data
\+ Significant trend detected



AEA Technology
National Environmental Technology Centre

## 5023 Preston Montford

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/01/04 | 28/01/04 | 5.8 | 18.1 | 7.6 | 29.5 | 51.6 | 6.3 | 4.8 | 40.8 | 3.9 | <1.0 | 11.9 | 1.8 | 11.0 | 18.9 |
| 28/01/04 | 25/02/04 | 6.0 | 22.7 | 7.9 | 26.4 | 52.7 | 8.4 | 3.4 | 65.6 | 3.0 | <1.0 | 16.4 | 1.0 | 13.0 | 53.7 |
| 25/02/04 | 10/03/04 | 6.0 | 149.3 | 56.5 | 171.1 | 272.4 | 36.6 | 41.4 | 302.6 | 10.7 | <1.0 | 116.5 | 0.9 | 72.0 | 3.3 |
| 10/03/04 | 24/03/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 24/03/04 | 07/04/04 | 5.9 | 30.7 | 17.1 | 31.7 | 93.4 | 18.1 | 13.8 | 103.1 | 5.4 | <1.0 | 19.5 | 1.3 | 23.0 | 62.7 |
| 07/04/04 | 22/04/04 | 5.6 | 49.2 | 42.4 | 74.9 | 14.1 | 4.8 | 10.2 | 23.1 | 2.6 | <1.0 | 47.5 | 2.3 | 18.0 | 20.2 |
| 22/04/04 | 04/05/04 | 5.9 | 61.7 | 66.6 | 134.9 | 22.9 | 5.0 | 17.6 | 17.7 | 6.4 | <1.0 | 58.9 | 1.3 | 25.0 | 16.5 |
| 04/05/04 | 18/05/04 | 6.4 | 22.7 | 22.1 | 50.2 | 25.2 | 3.0 | 4.7 | 72.3 | 5.1 | <1.0 | 19.6 | 0.4 | 14.0 | 9.5 |
| 18/05/04 | 02/06/04 | 5.6 | 40.8 | 55.4 | 52.4 | 21.7 | 6.1 | 28.3 | 21.4 | 7.0 | <1.0 | 38.2 | 2.4 | 18.5 | 10.9 |
| 02/06/04 | 21/06/04 | 6.4 | 35.6 | 1.4 | 678.7 | 47.3 | 11.3 | 14.5 | 56.0 | 99.5 | 64.9 | 29.9 | 0.4 | 124.0 | 12.7 |
| 21/06/04 | 30/06/04 | 6.4 | 17.3 | 9.9 | 44.8 | 17.0 | 2.2 | 1.3 | 23.6 | 6.4 | <1.0 | 15.3 | 0.4 | 13.0 | 30.6 |
| 30/06/04 | 14/07/04 | 4.3 | 25.9 | 45.2 | <0.7 | 36.4 | 8.4 | 21.7 | 35.6 | 6.4 | <1.0 | 21.5 | 50.1 | 28.1 | 35.8 |
| 14/07/04 | 25/07/04 | 4.8 | 18.2 | 8.1 | <1.4 | 11.3 | 2.8 | 5.8 | 17.5 | 4.6 | <1.0 | 16.9 | 15.8 | 11.0 | 13.7 |
| 25/07/04 | 08/08/04 | 4.9 | 40.0 | 66.2 | 87.9 | 0.1 | 1.6 | 11.0 | 9.1 | 5.0 | <1.0 | 40.0 | 12.0 | 19.0 | 36.5 |
| 08/08/04 | 22/08/04 | 5.0 | 28.0 | 28.1 | 35.3 | 19.1 | 5.4 | 8.9 | 25.2 | 2.4 | <1.0 | 25.7 | 10.7 | 14.0 | 42.6 |
| 22/08/04 | 10/09/04 | 6.4 | 51.8 | <1.4 | 1177.9 | 48.5 | 15.5 | 26.9 | 61.9 | 148.6 | 159.1 | 46.0 | 0.4 | 165.0 | 30.3 |
| 10/09/04 | 19/09/04 | 12.4 | 7.4 | 4.2 | 0.9 | 41.1 | 7.0 | 5.4 | 60.3 | 5.3 | <1.0 | 2.4 | 0.0 | 9.5 | 33.2 |
| 19/09/04 | 04/10/04 | 5.8 | 8.2 | 1.8 | <1.4 | 48.2 | 9.9 | 8.6 | 50.1 | 18.3 | <1.0 | 2.4 | 1.5 | 12.1 | 30.2 |
| 04/10/04 | 17/10/04 | 5.3 | 32.0 | 29.0 | 37.0 | 48.5 | 10.3 | 11.3 | 60.8 | 4.7 | <1.0 | 26.1 | 5.6 | 17.6 | 13.7 |
| 17/10/04 | 01/11/04 | 5.4 | 23.3 | 11.9 | 15.1 | 69.2 | 15.5 | 10.3 | 78.4 | 4.6 | <1.0 | 15.0 | 4.1 | 15.6 | 44.0 |
| 01/11/04 | 14/11/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.3 |
| 14/11/04 | 12/12/04 | 5.4 | 12.6 | 11.0 | 24.5 | 18.0 | 3.8 | 3.0 | 21.3 | 1.2 | <1.0 | 10.4 | 4.0 | <10.0 | 21.9 |
| 12/12/04 | 27/12/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 27/12/04 | 11/01/05 | 5.7 | 40.0 | 3.4 | 20.6 | 179.9 | 33.5 | 12.4 | 258.8 | 11.6 | <1.0 | 18.4 | 1.9 | 36.0 | 18.7 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5023 | | 27.1 | 22.6 | 34.1 | 48.0 | 9.4 | 10.0 | 58.4 | 5.6 | - | 21.3 | 7.0 | 17.5 | 560.0 |

# Bottesford

**2004**

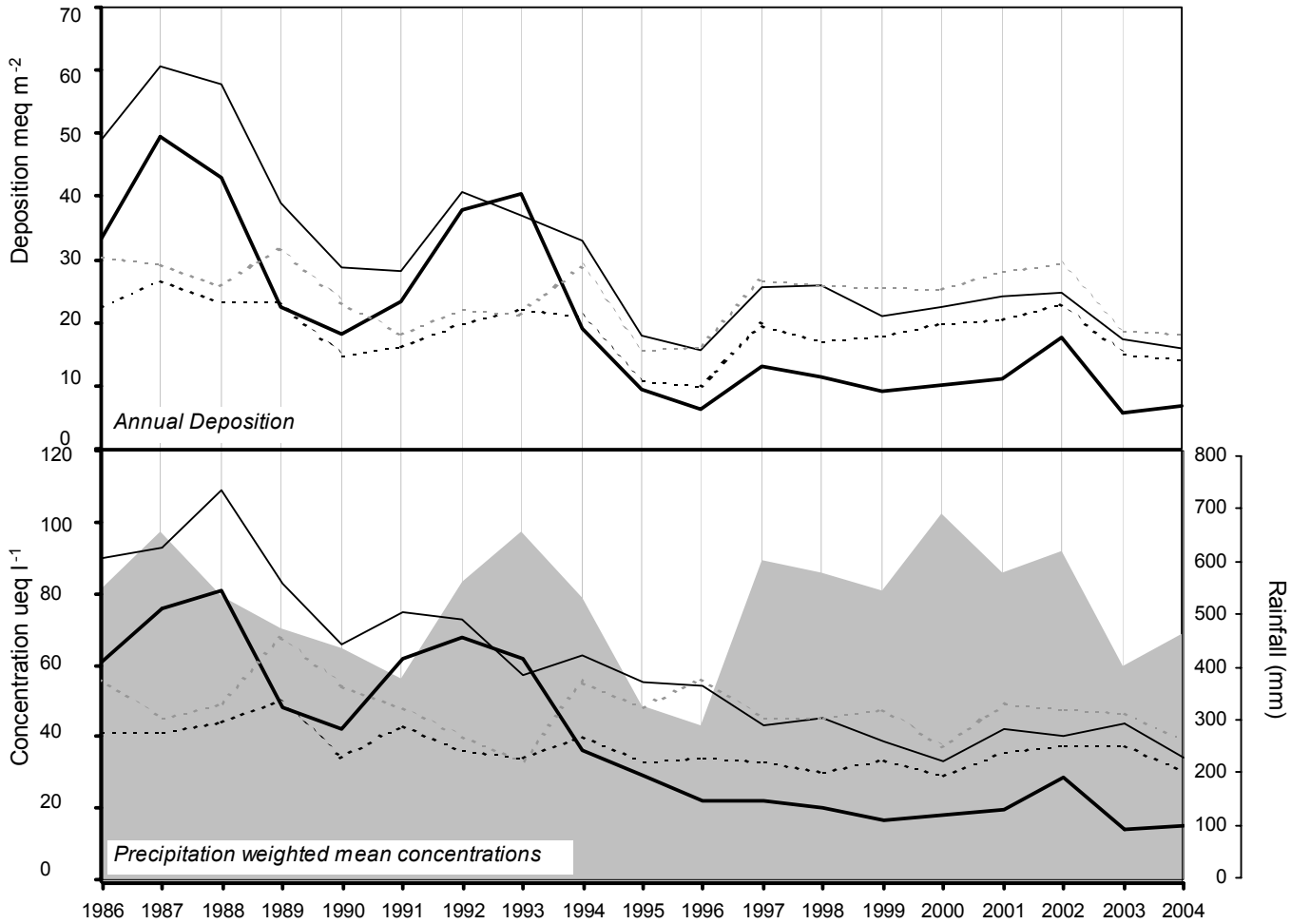
| | |
|---|---|
| *Site Code:* | **5121** |
| *Easting:* | **4797** |
| *Northing:* | **3376** |
| *Latitude:* | **52 55 46 N** |
| *Longitude:* | **00 48 51 W** |
| *Altitude (m):* | **32** |
| *Rainfall (mm):* | **561** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Rural pasture**

*Other measurements:*
**DT, SO2 (PowerGen), ozone (PowerGen)**

*Site Operator:*
**PowerGen**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-3.45 ueq/l (-4.91 %/year): 18 years' data
+++ Strong trend detected

*non-marine sulphate*
-3.60 ueq/l (-3.90 %/year): 19 years' data
++++ Very strong trend detected

*nitrate*
-0.59 ueq/l (-1.41 %/year): 19 years' data
++ Moderately strong trend detected

*ammonium*
-0.53 ueq/l (-1.01 %/year): 19 years' data
- No significant trend detected



AEA Technology
National Environmental Technology Centre

# 5121 Bottesford

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13/01/04 | 03/02/04 | 5.0 | 21.2 | 15.1 | 18.4 | 31.5 | 6.4 | 5.7 | 41.5 | 0.9 | <1.0 | 17.4 | 10.2 | 12.0 | 49.4 |
| 03/02/04 | 17/02/04 | 4.7 | 39.6 | 23.2 | 58.8 | 121.3 | 27.8 | 23.6 | 74.5 | 3.3 | <1.0 | 25.0 | 19.5 | 38.0 | 13.8 |
| 17/02/04 | 08/03/04 | 4.6 | 214.2 | 91.5 | 152.5 | 325.5 | 60.3 | 102.7 | 390.0 | 8.3 | <1.0 | 175.0 | 22.9 | 96.0 | 4.7 |
| 08/03/04 | 22/03/04 | 5.9 | 50.4 | 31.6 | 62.2 | 86.3 | 14.3 | 16.7 | 92.9 | 4.3 | <1.0 | 40.0 | 1.1 | 27.0 | 17.7 |
| 22/03/04 | 05/04/04 | 5.8 | 56.5 | 27.4 | 68.6 | 38.8 | 9.5 | 21.1 | 46.6 | 5.2 | <1.0 | 51.8 | 1.6 | 22.0 | 16.9 |
| 05/04/04 | 26/04/04 | 5.1 | 28.5 | 14.4 | 29.9 | 9.5 | 3.8 | 8.8 | 15.2 | 0.9 | <1.0 | 27.3 | 8.1 | 11.0 | 38.5 |
| 26/04/04 | 05/05/04 | 4.7 | 65.9 | 81.9 | 118.1 | 15.2 | 7.2 | 18.7 | 22.4 | 1.3 | <1.0 | 64.1 | 20.9 | 29.0 | 32.8 |
| 05/05/04 | 18/05/04 | 4.2 | 82.9 | 66.6 | 66.3 | 5.2 | 6.6 | 24.0 | 10.6 | 0.4 | <1.0 | 82.3 | 61.7 | 37.0 | 11.7 |
| 18/05/04 | 03/06/04 | 5.7 | 47.5 | 49.5 | 48.2 | 25.7 | 10.9 | 48.0 | 23.7 | 2.9 | <1.0 | 44.4 | 2.2 | 19.4 | 13.6 |
| 03/06/04 | 17/06/04 | 4.5 | 64.1 | 53.4 | 11.5 | 18.8 | 11.4 | 59.4 | 24.9 | 11.6 | <1.0 | 61.8 | 30.9 | 28.0 | 3.1 |
| 17/06/04 | 01/07/04 | 5.0 | 37.6 | 17.2 | 19.3 | 19.3 | 6.6 | 23.9 | 24.0 | 0.9 | <1.0 | 35.3 | 9.8 | 15.4 | 43.4 |
| 01/07/04 | 15/07/04 | 5.0 | 34.4 | 21.2 | 22.7 | 67.4 | 16.3 | 19.9 | 67.2 | 2.2 | <1.0 | 26.3 | 9.3 | 19.6 | 25.9 |
| 15/07/04 | 27/07/04 | 4.7 | 25.3 | 24.1 | 7.8 | 1.9 | 8.9 | 16.1 | 9.2 | 2.1 | <1.0 | 25.1 | 21.9 | 14.0 | 56.0 |
| 27/07/04 | 20/09/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 20/09/04 | 04/10/04 | 5.2 | 23.1 | 20.5 | 30.8 | 28.2 | 7.3 | 12.1 | 33.9 | 1.0 | <1.0 | 19.7 | 6.2 | 13.0 | 27.1 |
| 04/10/04 | 21/10/04 | 4.5 | 30.2 | 42.9 | 32.8 | 29.4 | 8.9 | 11.1 | 37.0 | 1.1 | <1.0 | 26.7 | 34.7 | 25.7 | 37.0 |
| 21/10/04 | 08/11/04 | 4.8 | 26.3 | 27.7 | 33.0 | 62.4 | 13.9 | 14.6 | 63.4 | 6.5 | <1.0 | 18.8 | 16.2 | 22.0 | 33.6 |
| 08/11/04 | 09/12/04 | 5.0 | 34.2 | 21.9 | 33.6 | 25.1 | 7.9 | 11.1 | 33.2 | 1.1 | <1.0 | 31.2 | 11.0 | 14.0 | 17.3 |
| 09/12/04 | 21/12/04 | 5.4 | 105.7 | 51.0 | 109.6 | 119.1 | 28.2 | 32.9 | 149.5 | 5.5 | <1.0 | 91.4 | 3.6 | 43.0 | 4.3 |
| 21/12/04 | 20/01/05 | 5.8 | 62.4 | 37.0 | 59.8 | 183.4 | 42.1 | 23.6 | 230.0 | 6.8 | <1.0 | 40.3 | 1.8 | 41.0 | 14.5 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5121 | | 39.1 | 30.9 | 39.3 | 40.2 | 11.1 | 17.7 | 46.5 | 2.4 | - | 34.3 | 14.9 | 20.8 | 461.2 |

# Llyn Llagi

**2004**

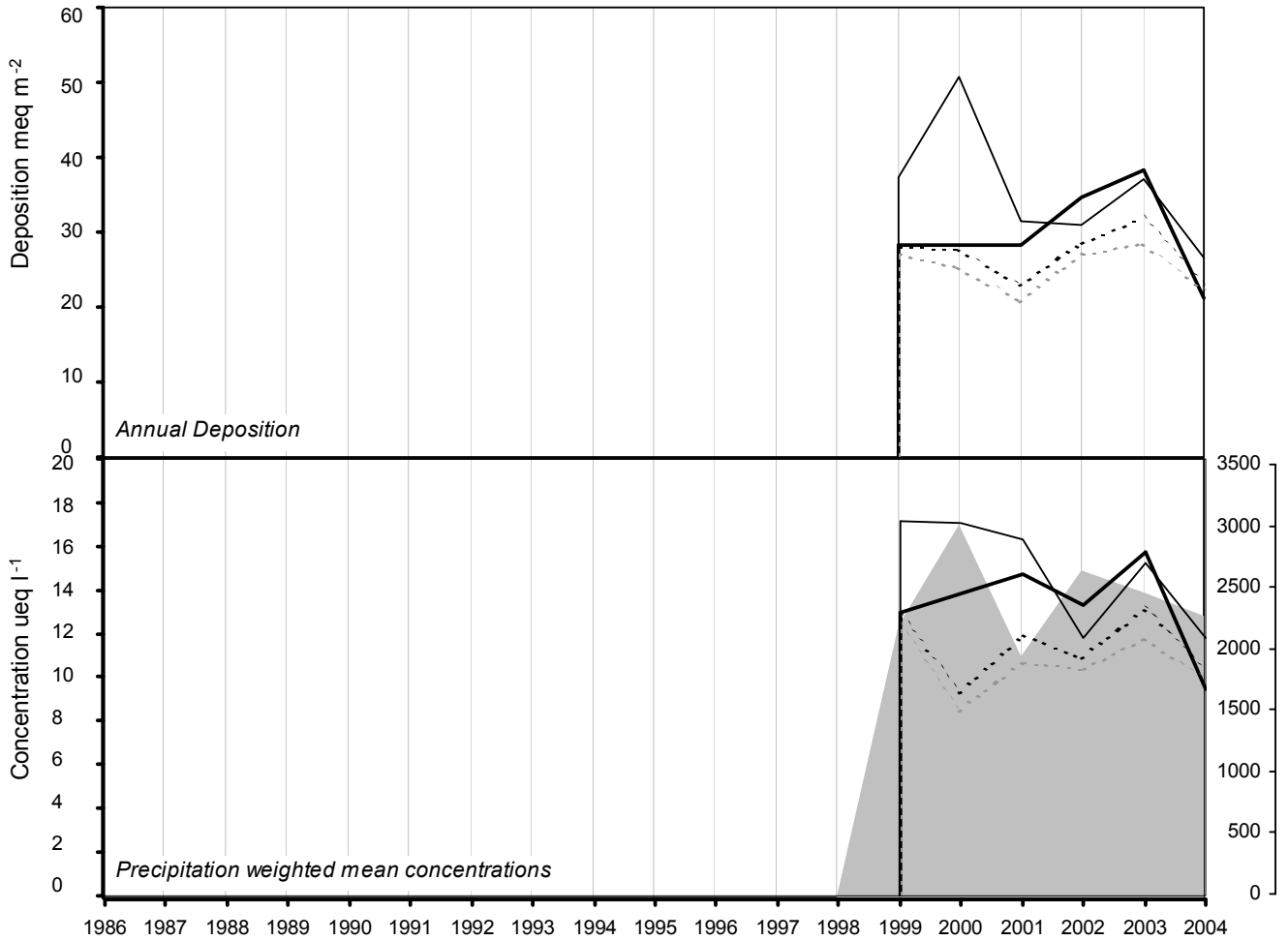
| | |
|---|---|
| *Site Code:* | **5160** |
| *Easting:* | **2647** |
| *Northing:* | **3483** |
| *Latitude:* | **53 01 48 N** |
| *Longitude:* | **04 01 82 W** |
| *Altitude (m):* | **380** |
| *Rainfall (mm):* | **-** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Grassland and moorland**

*Other measurements:*
**UKAWMN. Lakewater chemistry.**

*Site Operator:*
**CEH Bangor**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
0.00 ueq/l (0.00 %/year): 4 years' data
n/a Insufficient Data

*non-marine sulphate*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data

*nitrate*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data

*ammonium*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data



AEA Technology
National Environmental Technology Centre

## 5160 Llyn Llagi

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/01/04 | 26/01/04 | 4.9 | 13.7 | 7.6 | 6.5 | 98.8 | 19.3 | 5.6 | 104.9 | 1.6 | <1.0 | 1.8 | 12.3 | 19.0 | 138.8 |
| 26/01/04 | 09/02/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 09/02/04 | 23/02/04 | 4.5 | 71.7 | 78.8 | 63.3 | 143.0 | 32.9 | 25.3 | 157.3 | 3.1 | <1.0 | 54.5 | 31.6 | 48.0 | 16.7 |
| 23/02/04 | 08/03/04 | 4.8 | 45.9 | 30.8 | 21.1 | 173.5 | 36.8 | 11.7 | 195.0 | 3.4 | <1.0 | 25.0 | 15.8 | 39.0 | 26.6 |
| 08/03/04 | 22/03/04 | 4.9 | 23.4 | 7.9 | 2.9 | 93.3 | 19.9 | 1.3 | 112.8 | 1.4 | <1.0 | 12.1 | 12.3 | 22.0 | 143.6 |
| 22/03/04 | 05/04/04 | 5.3 | 27.9 | 14.9 | 13.5 | 126.5 | 26.2 | 10.4 | 126.4 | 2.0 | <1.0 | 12.7 | 4.9 | 23.0 | 39.3 |
| 05/04/04 | 19/04/04 | 5.1 | 34.7 | 17.1 | 19.5 | 121.7 | 29.1 | 9.8 | 134.0 | 2.3 | <1.0 | 20.0 | 7.6 | 26.0 | 36.2 |
| 19/04/04 | 04/05/04 | 7.4 | 87.5 | 15.6 | 837.8 | 146.7 | 28.8 | 7.3 | 162.3 | 60.3 | 165.5 | 69.8 | 0.0 | 128.0 | 56.8 |
| 04/05/04 | 17/05/04 | 7.3 | 77.0 | 16.5 | 760.2 | 78.3 | 10.3 | 2.9 | 84.0 | 39.2 | 148.4 | 67.6 | 0.1 | 123.0 | 23.4 |
| 17/05/04 | 02/06/04 | 7.3 | 298.4 | 49.3 | 2788.4 | 128.9 | 60.1 | 19.0 | 152.1 | 226.3 | 80.7 | 282.8 | 0.0 | 352.0 | 22.2 |
| 02/06/04 | 14/06/04 | 7.7 | 2279.6 | - | 25274.2 | 637.4 | 301.3 | 106.7 | 741.3 | 1562.9 | 5206.2 | 2202.8 | 0.0 | 22300.0 | 25.9 |
| 14/06/04 | 28/06/04 | 7.4 | 87.2 | <0.7 | 7001.3 | 160.3 | 105.7 | 32.9 | 32.5 | 341.0 | 261.8 | 67.8 | 0.0 | 832.0 | 48.1 |
| 28/06/04 | 12/07/04 | 5.6 | 42.7 | 17.3 | 46.8 | 81.0 | 16.9 | 3.7 | 103.2 | 7.1 | 40.8 | 32.9 | 2.3 | 26.0 | 68.9 |
| 12/07/04 | 26/07/04 | 4.9 | 27.2 | 9.4 | 35.9 | 39.0 | 5.9 | 2.7 | 36.5 | 5.2 | 10.8 | 22.5 | 12.9 | 12.0 | 156.6 |
| 26/07/04 | 09/08/04 | 7.7 | 92.0 | 79.7 | 527.8 | 26.9 | 2.5 | 1.4 | 33.5 | 39.1 | 77.7 | 88.7 | 0.0 | 91.0 | 15.2 |
| 09/08/04 | 23/08/04 | 4.9 | 20.0 | 8.6 | 4.2 | 87.3 | 18.4 | 5.0 | 98.2 | 2.0 | <1.0 | 9.5 | 12.9 | 19.0 | 74.8 |
| 23/08/04 | 06/09/04 | 5.2 | 21.2 | 5.0 | 0.1 | 46.0 | 10.6 | 21.8 | 66.2 | 3.0 | <1.0 | 15.7 | 6.3 | 13.0 | 117.5 |
| 06/09/04 | 23/09/04 | 5.2 | 21.1 | 6.0 | 7.2 | 128.6 | 26.3 | 6.4 | 135.7 | 2.0 | <1.0 | 5.6 | 6.5 | 22.3 | 303.7 |
| 23/09/04 | 07/10/04 | 5.2 | 15.5 | 11.6 | 31.5 | 257.9 | 54.3 | 16.9 | 116.5 | 12.6 | <1.0 | - | 5.9 | 20.4 | 48.1 |
| 07/10/04 | 18/10/04 | 4.6 | 33.8 | 27.6 | 7.8 | 87.3 | 17.0 | 8.7 | 90.2 | 3.1 | <1.0 | 23.3 | 26.3 | 27.0 | 20.2 |
| 18/10/04 | 01/11/04 | 5.0 | 17.7 | 4.8 | 2.3 | 158.3 | 31.9 | 6.6 | 171.1 | 3.9 | <1.0 | - | 10.7 | 27.5 | 180.1 |
| 01/11/04 | 15/11/04 | 4.8 | 37.9 | 24.8 | 29.8 | 143.4 | 31.3 | 12.7 | 154.7 | 3.2 | <1.0 | 20.6 | 16.6 | 31.0 | 42.5 |
| 15/11/04 | 29/11/04 | 5.5 | 23.5 | 14.2 | 20.1 | 47.6 | 7.6 | 6.7 | 52.8 | 6.2 | <1.0 | 17.7 | 3.4 | 13.0 | 118.7 |
| 29/11/04 | 13/12/04 | 4.4 | 61.7 | 60.1 | 65.3 | 101.3 | 21.8 | 7.5 | 116.6 | 2.4 | <1.0 | 49.5 | 43.7 | 41.0 | 33.7 |
| 13/12/04 | 29/12/04 | 4.9 | 27.2 | 12.3 | 11.6 | 123.4 | 28.9 | 19.5 | 147.5 | 1.5 | <1.0 | 12.3 | 11.5 | 27.0 | 221.7 |
| 29/12/04 | 10/01/05 | 5.5 | 36.4 | 3.2 | 3.1 | 239.2 | 53.2 | 16.1 | 301.6 | 5.4 | <1.0 | 7.5 | 3.1 | 44.0 | 260.0 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5160 | | 25.8 | 10.4 | 9.9 | 132.7 | 28.3 | 10.8 | 148.6 | 3.2 | - | 11.8 | 9.5 | 26.0 | 2239.0 |

# Llyn Llydaw

**2004**

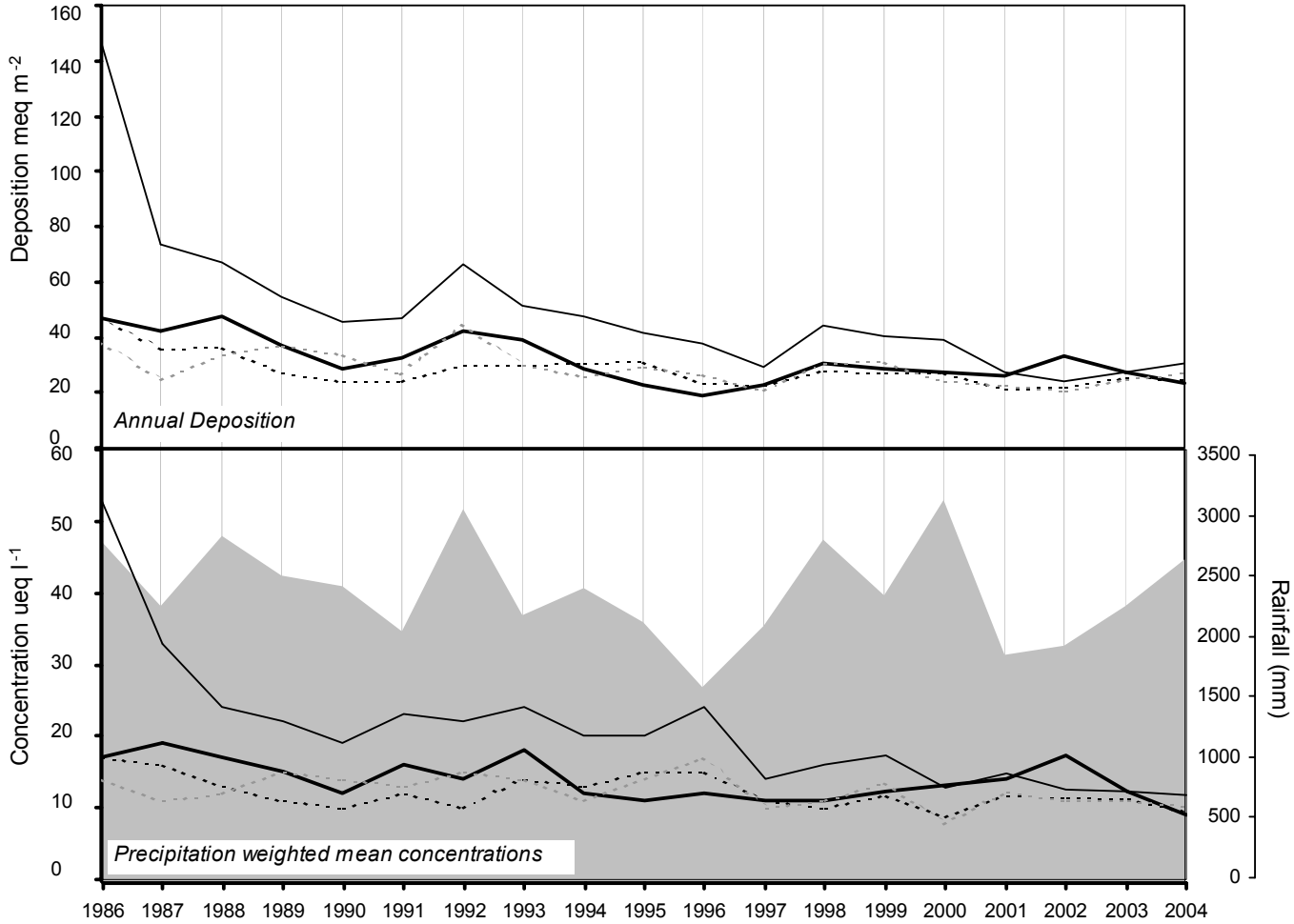
| | |
|---|---|
| *Site Code:* | **5153** |
| *Easting:* | **2638** |
| *Northing:* | **3549** |
| *Latitude:* | **53 04 35 N** |
| *Longitude:* | **04 01 42 W** |
| *Altitude (m):* | **490** |
| *Rainfall (mm):* | **2417** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Very open moorland in Snowdon Horseshoe**

*Other measurements:*
**DT**

*Site Operator:*
**Countryside Council for Wales**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.29 ueq/l (-1.77 %/year): 18 years' data
\+ Significant trend detected

*non-marine sulphate*
-1.31 ueq/l (-4.02 %/year): 19 years' data
+++ Strong trend detected

*nitrate*
-0.21 ueq/l (-1.52 %/year): 19 years' data
\+ Significant trend detected

*ammonium*
-0.17 ueq/l (-1.24 %/year): 19 years' data
\- No significant trend detected



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## 5153 Llyn Llydaw

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/01/04 | 25/01/04 | 5.1 | 11.6 | 5.6 | 6.1 | 72.3 | 14.9 | 5.0 | 86.0 | 1.1 | <1.0 | 2.9 | 8.7 | 15.0 | 90.6 |
| 25/01/04 | 11/02/04 | 5.2 | 20.6 | 3.0 | 2.7 | 82.5 | 13.1 | 3.5 | 74.8 | 1.3 | <1.0 | 10.6 | 6.2 | 13.0 | 322.6 |
| 11/02/04 | 25/02/04 | 5.3 | 19.0 | 16.1 | 130.2 | 87.7 | 18.2 | 19.6 | 46.8 | 1.9 | <1.0 | 8.5 | 5.1 | 22.0 | 13.9 |
| 25/02/04 | 10/03/04 | 4.8 | 55.0 | 57.4 | 44.1 | 178.5 | 36.8 | 11.1 | 192.1 | 4.9 | <1.0 | 33.4 | 16.2 | 43.0 | 14.8 |
| 10/03/04 | 24/03/04 | 5.0 | 19.4 | 5.6 | 3.1 | 91.2 | 19.7 | 5.4 | 98.7 | 2.0 | <1.0 | 8.4 | 10.0 | 18.0 | 100.0 |
| 24/03/04 | 07/04/04 | 5.5 | 27.9 | 10.3 | 15.0 | 135.4 | 27.6 | 8.5 | 140.0 | 2.4 | <1.0 | 11.6 | 2.9 | 25.0 | 41.2 |
| 07/04/04 | 21/04/04 | 5.1 | 24.0 | 14.1 | 19.6 | 53.4 | 10.2 | 4.8 | 53.3 | 1.0 | <1.0 | 17.5 | 8.7 | 15.0 | 64.3 |
| 21/04/04 | 05/05/04 | 5.1 | 25.7 | 13.3 | 17.9 | 94.1 | 18.4 | 8.1 | 94.0 | 1.8 | <1.0 | 14.3 | 8.1 | 20.0 | 63.3 |
| 05/05/04 | 19/05/04 | 4.5 | 23.1 | 32.2 | 5.8 | 74.3 | 14.4 | 9.9 | 56.3 | 0.1 | <1.0 | 14.1 | 31.6 | 23.0 | 17.9 |
| 19/05/04 | 02/06/04 | 4.8 | 45.3 | 42.8 | 42.0 | 48.3 | 9.2 | 9.6 | 52.1 | 2.3 | <1.0 | 39.5 | 17.4 | 19.4 | 36.8 |
| 02/06/04 | 16/06/04 | 5.5 | 42.3 | 22.6 | 37.7 | 43.9 | 9.0 | 13.6 | 52.2 | 1.8 | <1.0 | 37.0 | 3.1 | 17.0 | 7.3 |
| 16/06/04 | 30/06/04 | 4.9 | 20.7 | 10.1 | 8.3 | 45.3 | 13.0 | 12.0 | 53.6 | 1.0 | <1.0 | 15.3 | 14.1 | 14.0 | 103.2 |
| 30/06/04 | 14/07/04 | 4.8 | 39.5 | 25.6 | 22.7 | 75.7 | 15.9 | 9.6 | 91.3 | 2.4 | <1.0 | 30.4 | 14.8 | 24.0 | 28.6 |
| 14/07/04 | 28/07/04 | 5.1 | 15.3 | 7.7 | 12.2 | 3.1 | 0.8 | <1.0 | 12.3 | 0.7 | <1.0 | 14.9 | 8.9 | <10.0 | 129.7 |
| 28/07/04 | 11/08/04 | 4.5 | 97.4 | 88.1 | 112.3 | 19.5 | 6.9 | 30.3 | 19.7 | 5.3 | 4.2 | 95.0 | 30.9 | 39.0 | 9.9 |
| 11/08/04 | 25/08/04 | 5.0 | 11.8 | 6.5 | 4.8 | 25.2 | 4.5 | 2.2 | 30.1 | 1.0 | <1.0 | 8.7 | 10.2 | <10.0 | 212.2 |
| 25/08/04 | 08/09/04 | 5.2 | 6.9 | 6.7 | <2.1 | 37.8 | 10.1 | 6.5 | 46.3 | 2.2 | <1.0 | 2.3 | 6.6 | 10.0 | 35.5 |
| 08/09/04 | 22/09/04 | 5.1 | 21.0 | 7.6 | 6.2 | 113.1 | 23.0 | 6.0 | 146.1 | 2.4 | <1.0 | 7.4 | 7.4 | 20.0 | 274.8 |
| 22/09/04 | 06/10/04 | 5.2 | 12.7 | 11.4 | 21.5 | 113.3 | 24.2 | 7.9 | 71.8 | 3.1 | <1.0 | - | 5.8 | 14.6 | 207.4 |
| 06/10/04 | 20/10/04 | 4.7 | 22.1 | 21.3 | 15.1 | 76.7 | 15.6 | 6.3 | 78.0 | 1.7 | <1.0 | 12.9 | 21.9 | 22.7 | 77.7 |
| 20/10/04 | 03/11/04 | 5.1 | 25.1 | 7.5 | 3.2 | 127.3 | 25.4 | 6.0 | 141.6 | 2.7 | <1.0 | 9.8 | 7.6 | 23.0 | 181.6 |
| 03/11/04 | 17/11/04 | 5.1 | 26.2 | 11.8 | 20.7 | 124.7 | 25.8 | 5.5 | 136.4 | 2.5 | <1.0 | 11.1 | 7.6 | 24.0 | 104.6 |
| 17/11/04 | 01/12/04 | 4.9 | 16.0 | 19.2 | 11.1 | 35.0 | 6.2 | 3.0 | 40.4 | 0.6 | <1.0 | 11.7 | 11.5 | 13.0 | 97.1 |
| 01/12/04 | 15/12/04 | 4.4 | 52.5 | 43.5 | 34.6 | 113.1 | 26.1 | 11.1 | 128.2 | 3.1 | <1.0 | 38.9 | 43.7 | 37.0 | 24.8 |
| 15/12/04 | 12/01/05 | 5.3 | 27.4 | <0.7 | <1.4 | 155.9 | 33.0 | 8.6 | 167.3 | 3.1 | <1.0 | 8.6 | 5.6 | 29.0 | 313.5 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5153 | | 21.5 | 9.6 | 10.5 | 89.5 | 18.1 | 6.1 | 94.2 | 2.0 | - | 11.7 | 9.1 | 18.4 | 2573.4 |

# River Etherow

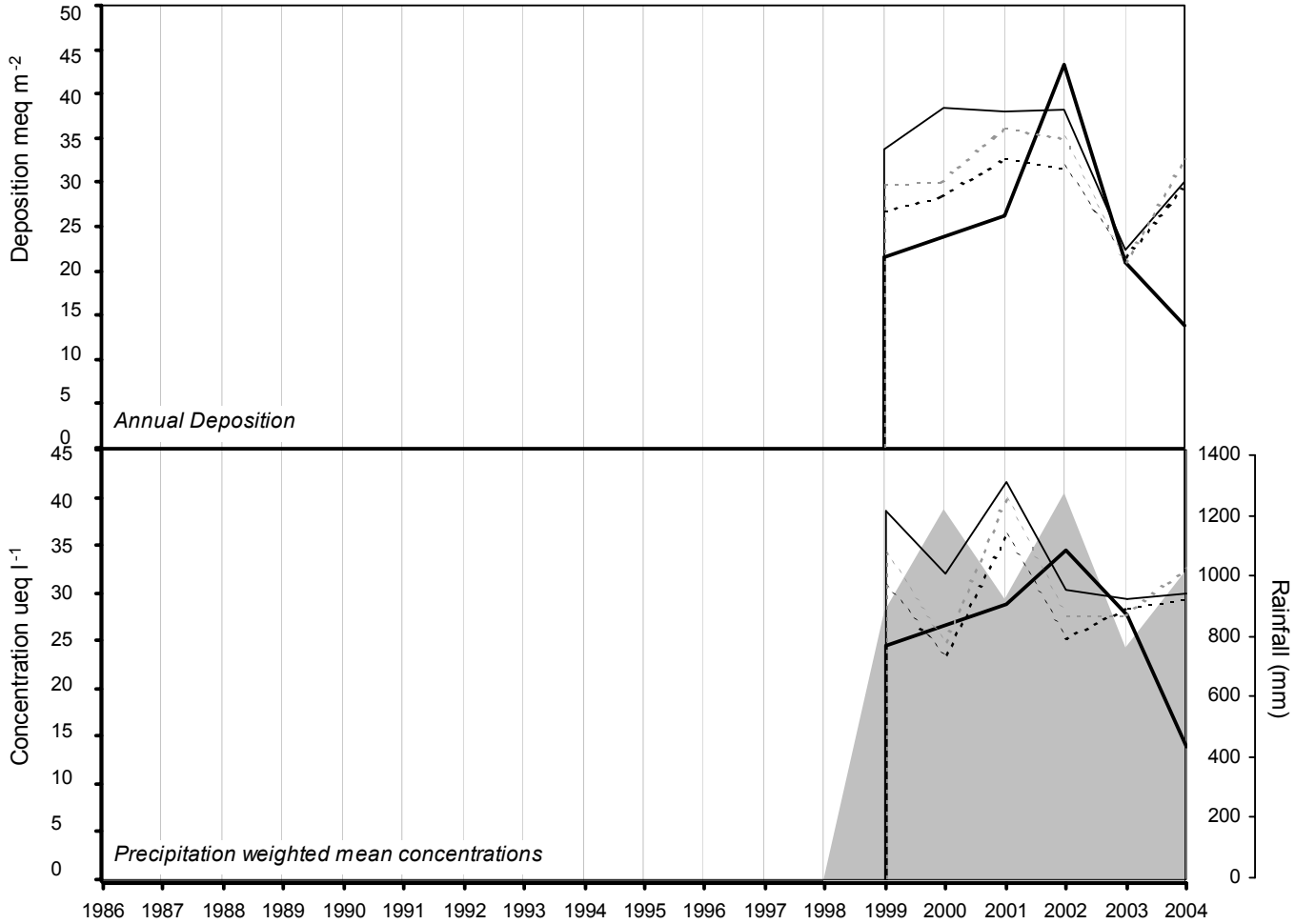
**2004**

| | |
|---|---|
| *Site Code:* | **5158** |
| *Easting:* | **4125** |
| *Northing:* | **3986** |
| *Latitude:* | **53 48 39 N** |
| *Longitude:* | **01 81 31 W** |
| *Altitude (m):* | **485** |
| *Rainfall (mm):* | **-** |
| *[30 year mean 1940 - 1971]* | |

*Site Environment:*
**Moorland**

*Other measurements:*
**UKAWMN. Streamwater and soil chemistry**

*Site Operator:*
**ENSIS**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
0.00 ueq/l (0.00 %/year): 4 years' data
n/a Insufficient Data

*non-marine sulphate*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data

*nitrate*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data

*ammonium*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data



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## 5158 River Etherow

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16/01/04 | 26/01/04 | 5.3 | 37.4 | 26.2 | 28.6 | 123.7 | 26.0 | 13.4 | 128.3 | 3.3 | <1.0 | 22.5 | 5.0 | - | 2.7 |
| 26/01/04 | 10/02/04 | 5.3 | 15.9 | 7.7 | 6.4 | 444.2 | 95.6 | 16.6 | 64.1 | 10.0 | <1.0 | - | 5.2 | 10.0 | 90.2 |
| 10/02/04 | 24/02/04 | 5.0 | 86.0 | 68.8 | 74.8 | 123.6 | 27.9 | 32.1 | 137.7 | 3.5 | <1.0 | 71.1 | 10.0 | - | 9.1 |
| 24/02/04 | 09/03/04 | 4.5 | 126.2 | 155.1 | 128.6 | 194.3 | 31.5 | 63.4 | 189.6 | 4.2 | <1.0 | 102.8 | 30.2 | 68.0 | 4.4 |
| 09/03/04 | 23/03/04 | 5.3 | 56.7 | 30.0 | 41.7 | 178.7 | 36.5 | 15.6 | 204.7 | 3.8 | <1.0 | 35.1 | 5.5 | 40.0 | 31.8 |
| 23/03/04 | 07/04/04 | 5.4 | 39.2 | 27.8 | 42.6 | 73.6 | 15.7 | 11.1 | 78.1 | 1.7 | <1.0 | 30.3 | 4.2 | 21.0 | 46.2 |
| 07/04/04 | 20/04/04 | 4.7 | 42.5 | 48.8 | 61.6 | 12.6 | 4.5 | 10.0 | 17.7 | 0.4 | <1.0 | 41.0 | 18.6 | 19.0 | 40.8 |
| 20/04/04 | 05/05/04 | 4.7 | 51.2 | 44.9 | 52.6 | 45.3 | 9.1 | 20.1 | 37.2 | 2.3 | 32.9 | 45.7 | 18.6 | 24.0 | 36.5 |
| 05/05/04 | 18/05/04 | 6.0 | 64.2 | 66.3 | 87.6 | 32.6 | 7.2 | 38.9 | 24.4 | 10.8 | <1.0 | 60.2 | 1.0 | 25.2 | 4.1 |
| 18/05/04 | 01/06/04 | 5.2 | 136.2 | 168.5 | 66.2 | 79.5 | 28.3 | 142.5 | 67.1 | 5.9 | <1.0 | 126.7 | 6.8 | 47.0 | 6.6 |
| 01/06/04 | 16/06/04 | 5.8 | 59.3 | 33.6 | 48.2 | 46.5 | 12.5 | 24.6 | 53.2 | 2.0 | <1.0 | 53.7 | 1.5 | 21.0 | 20.8 |
| 16/06/04 | 29/06/04 | 5.1 | 23.1 | 17.3 | 17.3 | 46.6 | 9.4 | 7.4 | 51.6 | <0.5 | <1.0 | 17.4 | 7.9 | 13.0 | 86.9 |
| 29/06/04 | 15/07/04 | 5.0 | 46.4 | 26.2 | 30.2 | 51.8 | 10.1 | 11.3 | 54.7 | 2.6 | <1.0 | 40.2 | 9.3 | 17.5 | 53.0 |
| 15/07/04 | 31/07/04 | 5.3 | 43.3 | 38.0 | 48.8 | 37.5 | 6.5 | 13.2 | 47.3 | 6.3 | <1.0 | 38.8 | 4.6 | 17.0 | 32.9 |
| 31/07/04 | 12/08/04 | 4.8 | 37.6 | 39.9 | 65.9 | 2.5 | 4.1 | 18.0 | 5.1 | 2.5 | <1.0 | 37.3 | 16.2 | 16.0 | 90.2 |
| 12/08/04 | 26/08/04 | 4.7 | 24.9 | 23.8 | 18.7 | 13.9 | 3.4 | 6.0 | 18.1 | 3.3 | <1.0 | 23.2 | 21.4 | 14.0 | 109.5 |
| 26/08/04 | 05/09/04 | 5.5 | 19.8 | 9.8 | 18.6 | 79.1 | 16.7 | 9.9 | 100.3 | 4.2 | <1.0 | 10.3 | 3.5 | 19.0 | 14.7 |
| 05/09/04 | 21/09/04 | 5.2 | 47.9 | 26.2 | 23.7 | 182.7 | 39.1 | 21.6 | 195.8 | 6.7 | <1.0 | 25.9 | 5.9 | 35.4 | 43.8 |
| 21/09/04 | 06/10/04 | 5.1 | 20.4 | 17.8 | 22.3 | 62.6 | 19.0 | 9.9 | 50.0 | 6.4 | <1.0 | 12.8 | 8.3 | 14.8 | 53.4 |
| 06/10/04 | 19/10/04 | 4.3 | 53.2 | 63.1 | 42.7 | 108.4 | 24.6 | 17.7 | 116.0 | 3.1 | <1.0 | 40.2 | 45.7 | 40.9 | 33.5 |
| 19/10/04 | 03/11/04 | 4.4 | 29.6 | 37.2 | 26.9 | 53.4 | 13.3 | 8.7 | 62.9 | 1.3 | <1.0 | 23.2 | 38.0 | 25.7 | 67.1 |
| 03/11/04 | 16/11/04 | 4.9 | 44.3 | 32.6 | 45.8 | 103.0 | 23.4 | 17.7 | 118.5 | 3.9 | <1.0 | 31.9 | 13.5 | 28.0 | 23.5 |
| 16/11/04 | 01/12/04 | 4.7 | 29.8 | 22.9 | 24.8 | 48.8 | 11.3 | 7.4 | 60.9 | 1.4 | <1.0 | 24.0 | 18.6 | 18.0 | 35.9 |
| 01/12/04 | 14/12/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 14/12/04 | 31/12/04 | 5.1 | 43.9 | 17.4 | 25.7 | 196.8 | 41.1 | 13.0 | 230.4 | 4.1 | <1.0 | 20.2 | 8.7 | 40.0 | 52.2 |
| 31/12/04 | 09/01/05 | 5.6 | 39.0 | 17.0 | 8.3 | 77.8 | 15.5 | 6.4 | 277.5 | 3.1 | <1.0 | 29.6 | 2.3 | 38.0 | 12.2 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5158 | | 36.0 | 29.3 | 32.5 | 102.0 | 22.7 | 13.8 | 75.9 | 3.7 | - | 30.0 | 13.8 | 21.2 | 1002.1 |

# Wardlow Hay Cop

**2004**

| | |
|---|---|
| *Site Code:* | **5120** |
| *Easting:* | **4177** |
| *Northing:* | **3739** |
| *Latitude:* | **53 55 41 N** |
| *Longitude:* | **01 44 05 W** |
| *Altitude (m):* | **350** |
| *Rainfall (mm):* | **1081** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland**

*Other measurements:*
**DT**

*Site Operator:*
**English Nature**


hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-1.58 ueq/l (-4.08 %/year): 18 years' data
+++ Strong trend detected

*non-marine sulphate*
-2.74 ueq/l (-3.09 %/year): 19 years' data
++++ Very strong trend detected

*nitrate*
-0.18 ueq/l (-0.56 %/year): 19 years' data
- No significant trend detected

*ammonium*
-0.26 ueq/l (-0.59 %/year): 19 years' data
- No significant trend detected



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## 5120 Wardlow Hay Cop

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/01/04 | 25/01/04 | 5.7 | 40.3 | 12.7 | 29.5 | 107.8 | 22.7 | 21.9 | 113.5 | 3.5 | <1.0 | 27.3 | 2.0 | 25.0 | 51.9 |
| 25/01/04 | 08/02/04 | 5.8 | 38.0 | 6.5 | 15.3 | 190.4 | 39.4 | 20.1 | 212.5 | 4.0 | <1.0 | 15.1 | 1.5 | 34.0 | 83.0 |
| 08/02/04 | 22/02/04 | 6.3 | 84.7 | 41.6 | 130.9 | 262.1 | 59.9 | 130.0 | 148.6 | 6.6 | <1.0 | 53.1 | 0.6 | 85.0 | 4.5 |
| 22/02/04 | 07/03/04 | 5.9 | 160.9 | 87.2 | 107.1 | 179.7 | 33.7 | 178.6 | 203.4 | 7.2 | <1.0 | 139.3 | 1.1 | 65.0 | 9.5 |
| 07/03/04 | 23/03/04 | 6.0 | 30.0 | 28.2 | 51.1 | 122.4 | 24.0 | 31.3 | 142.5 | 2.7 | <1.0 | 15.3 | 1.0 | 33.0 | 37.1 |
| 23/03/04 | 04/04/04 | 5.5 | 39.5 | 26.7 | 31.3 | 20.0 | 5.4 | 32.3 | 25.1 | 1.6 | <1.0 | 37.1 | 3.0 | 14.0 | 29.3 |
| 04/04/04 | 20/04/04 | 5.7 | 54.9 | 47.8 | 71.5 | 77.9 | 15.3 | 27.5 | 91.9 | 1.9 | <1.0 | 45.5 | 2.2 | 27.0 | 45.5 |
| 20/04/04 | 03/05/04 | 4.5 | 77.2 | 82.6 | 85.8 | 30.8 | 23.0 | 35.6 | 26.2 | 4.3 | <1.0 | 73.5 | 34.7 | 35.0 | 45.0 |
| 03/05/04 | 18/05/04 | 6.5 | 23.0 | 19.7 | 31.3 | 23.6 | 4.3 | 18.6 | 34.4 | 2.7 | <1.0 | 20.2 | 0.3 | 13.0 | 23.0 |
| 18/05/04 | 30/05/04 | 6.4 | 191.7 | 175.9 | 72.1 | 76.7 | 27.0 | 313.7 | 84.1 | 36.1 | <1.0 | 182.4 | 0.4 | 57.0 | 2.7 |
| 30/05/04 | 13/06/04 | 6.4 | 50.3 | 37.5 | 33.4 | 21.2 | 2.0 | 50.4 | 28.3 | 5.8 | <1.0 | 47.7 | 0.4 | 19.0 | 17.4 |
| 13/06/04 | 27/06/04 | 5.7 | 33.4 | 17.9 | 25.7 | 51.7 | 15.8 | 21.2 | 60.9 | 2.2 | <1.0 | 27.2 | 1.9 | 17.0 | 77.3 |
| 27/06/04 | 11/07/04 | 5.0 | 44.2 | 35.9 | 29.1 | 42.1 | 9.3 | 36.8 | 44.4 | 5.4 | <1.0 | 39.1 | 9.5 | 21.8 | 41.3 |
| 11/07/04 | 26/07/04 | 6.4 | 73.6 | 80.9 | 60.0 | 48.0 | 15.6 | 117.4 | 36.8 | 20.0 | <1.0 | 67.8 | 0.4 | 33.9 | 1.4 |
| 26/07/04 | 08/08/04 | 5.4 | 79.0 | 88.8 | 109.5 | 5.1 | 3.6 | 59.5 | 17.3 | 4.7 | <1.0 | 78.3 | 3.8 | 25.0 | 19.7 |
| 08/08/04 | 24/08/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 24/08/04 | 05/09/04 | 5.4 | 26.4 | 16.5 | 18.7 | 47.7 | 12.2 | 17.5 | 64.7 | 2.9 | <1.0 | 20.7 | 4.4 | 15.0 | 21.1 |
| 05/09/04 | 20/09/04 | 5.7 | 38.3 | 18.7 | 22.1 | 73.1 | 15.3 | 32.3 | 101.2 | 3.1 | <1.0 | 29.5 | 1.8 | 19.6 | 39.2 |
| 20/09/04 | 10/10/04 | 5.8 | 45.7 | 23.4 | 17.8 | 108.0 | 23.5 | 31.4 | 120.9 | 4.1 | <1.0 | 32.7 | 1.5 | 25.2 | 53.9 |
| 10/10/04 | 18/10/04 | 4.5 | 40.0 | 56.9 | 37.9 | 48.8 | 12.3 | 24.0 | 45.2 | 1.3 | <1.0 | 34.1 | 32.4 | 28.0 | 26.3 |
| 18/10/04 | 31/10/04 | 4.8 | 33.5 | 24.6 | 29.8 | 69.1 | 15.0 | 13.2 | 79.2 | 3.0 | <1.0 | 25.2 | 14.8 | 20.3 | 40.7 |
| 31/10/04 | 21/11/04 | 5.7 | 52.3 | 26.0 | 56.1 | 47.4 | 10.6 | 26.1 | 50.6 | 1.3 | <1.0 | 46.6 | 1.9 | 19.0 | 57.4 |
| 21/11/04 | 28/11/04 | 5.3 | 64.6 | 36.3 | 59.7 | 60.9 | 11.9 | 25.7 | 71.7 | 1.8 | <1.0 | 57.2 | 5.6 | 22.0 | 3.1 |
| 28/11/04 | 12/12/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 12/12/04 | 26/12/04 | 6.1 | 91.8 | 22.3 | 39.0 | 226.1 | 47.4 | 37.7 | 257.2 | 4.9 | <1.0 | 64.5 | 0.8 | 49.0 | 30.4 |
| 26/12/04 | 09/01/05 | 6.2 | 55.5 | 7.9 | 46.2 | 219.8 | 41.2 | 25.0 | 282.4 | 5.5 | <1.0 | 29.0 | 0.7 | 51.0 | 32.6 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5120 | | 48.1 | 29.8 | 40.0 | 90.9 | 20.4 | 31.2 | 103.8 | 3.5 | - | 37.1 | 5.7 | 27.0 | 793.1 |

# Driby

**2004**

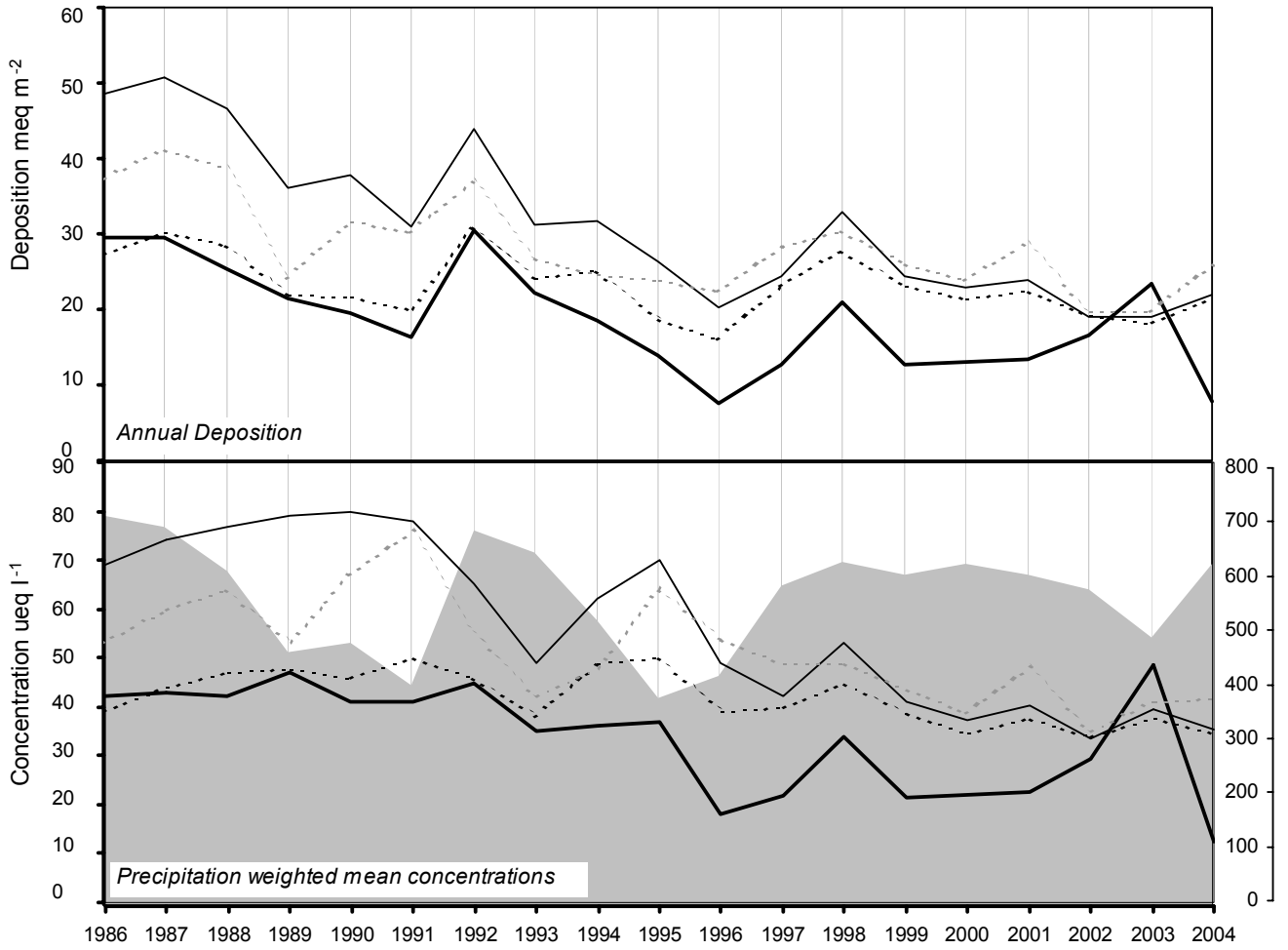
| | |
|---|---|
| *Site Code:* | **5136** |
| *Easting:* | **5386** |
| *Northing:* | **3744** |
| *Latitude:* | **53 14 54 N** |
| *Longitude:* | **00 04 39 E** |
| *Altitude (m):* | **47** |
| *Rainfall (mm):* | **737** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Sheep pasture**

*Other measurements:*
**DT, Met**

*Site Operator:*
**Anglian Water Services Ltd**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-1.19 ueq/l (-2.66 %/year): 18 years' data
++ Moderately strong trend detected

*non-marine sulphate*
-2.70 ueq/l (-3.34 %/year): 19 years' data
++++ Very strong trend detected

*nitrate*
-0.62 ueq/l (-1.30 %/year): 19 years' data
++ Moderately strong trend detected

*ammonium*
-1.32 ueq/l (-2.08 %/year): 19 years' data
++ Moderately strong trend detected

ACID DEPOSITION DATA REPORT, 2004

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## 5136 Driby

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/01/04 | 28/01/04 | 4.6 | 41.2 | 32.4 | 36.1 | 74.2 | 18.0 | 8.1 | 69.5 | 1.8 | <1.0 | 32.2 | 25.1 | 25.0 | 34.2 |
| 28/01/04 | 11/02/04 | 5.2 | 26.6 | 15.6 | 21.8 | 49.7 | 10.2 | 5.3 | 56.4 | 2.1 | <1.0 | 20.7 | 6.5 | 14.0 | 32.0 |
| 11/02/04 | 25/02/04 | 4.7 | 72.5 | 51.3 | 42.0 | 214.6 | 48.9 | 27.8 | 245.9 | 5.5 | <1.0 | 46.6 | 21.9 | 54.0 | 6.6 |
| 25/02/04 | 24/03/04 | 5.4 | 67.6 | 46.6 | 78.8 | 150.8 | 32.0 | 23.2 | 161.8 | 3.4 | <1.0 | 49.5 | 3.9 | 38.0 | 33.7 |
| 24/03/04 | 07/04/04 | 6.0 | 50.3 | 27.7 | 65.6 | 52.2 | 9.1 | 13.3 | 68.2 | 2.9 | <1.0 | 44.1 | 1.0 | 22.0 | 8.4 |
| 07/04/04 | 23/04/04 | 5.3 | 49.3 | 27.2 | 57.0 | 36.5 | 9.0 | 13.8 | 38.8 | 1.8 | <1.0 | 44.9 | 4.9 | 18.0 | 30.8 |
| 23/04/04 | 05/05/04 | 5.0 | 62.4 | 73.6 | 103.4 | 66.9 | 21.6 | 16.2 | 73.6 | 2.9 | <1.0 | 54.3 | 10.7 | 31.0 | 46.5 |
| 05/05/04 | 19/05/04 | 4.6 | 54.0 | 45.2 | 49.9 | 19.4 | 7.6 | 19.4 | 20.5 | 2.0 | <1.0 | 51.6 | 23.4 | 22.0 | 6.8 |
| 19/05/04 | 03/06/04 | 4.8 | 54.9 | 59.2 | 54.2 | 28.0 | 7.8 | 23.0 | 31.3 | 2.7 | <1.0 | 51.5 | 15.1 | 25.0 | 16.7 |
| 03/06/04 | 16/06/04 | 4.9 | 116.7 | 68.0 | 38.5 | 32.7 | 21.7 | 96.9 | 37.0 | 13.0 | <1.0 | 112.8 | 13.5 | 40.0 | 3.8 |
| 16/06/04 | 30/06/04 | 5.5 | 43.1 | 28.5 | 40.2 | 26.9 | 8.8 | 13.1 | 35.6 | 3.8 | <1.0 | 39.9 | 3.3 | 16.0 | 42.3 |
| 30/06/04 | 14/07/04 | 5.2 | 39.9 | 21.3 | 30.9 | 94.9 | 18.7 | 8.1 | 108.2 | 5.3 | <1.0 | 28.4 | 6.3 | 22.0 | 52.1 |
| 14/07/04 | 28/07/04 | 5.1 | 32.4 | 26.7 | 29.2 | <0.9 | 1.8 | 9.6 | 7.4 | 1.9 | <1.0 | 32.5 | 8.3 | 11.0 | 58.0 |
| 28/07/04 | 11/08/04 | 5.7 | 58.5 | 71.0 | 98.4 | 7.0 | 6.8 | 40.0 | 11.3 | 4.0 | <1.0 | 57.6 | 2.2 | 24.0 | 21.6 |
| 11/08/04 | 25/08/04 | 5.0 | 27.0 | 26.3 | 28.9 | 21.3 | 5.6 | 10.3 | 27.2 | 1.5 | <1.0 | 24.4 | 9.8 | 14.0 | 54.0 |
| 25/08/04 | 08/09/04 | 5.0 | 50.0 | 14.8 | 17.4 | 40.7 | 13.9 | 39.0 | 73.1 | 6.0 | <1.0 | 45.1 | 10.2 | 18.0 | 7.8 |
| 08/09/04 | 22/09/04 | 5.2 | 33.7 | 20.3 | 14.7 | 77.9 | 17.9 | 29.8 | 86.6 | 1.3 | <1.0 | 24.3 | 6.3 | 20.3 | 22.6 |
| 22/09/04 | 06/10/04 | 4.8 | 23.5 | 34.5 | 32.7 | 19.6 | 6.5 | 11.0 | 21.9 | 2.1 | <1.0 | 21.1 | 17.4 | 16.8 | 13.8 |
| 06/10/04 | 03/11/04 | 4.6 | 25.5 | 31.6 | 18.7 | 57.1 | 12.3 | 10.5 | 52.7 | 1.9 | <1.0 | 18.6 | 26.3 | 23.0 | 75.7 |
| 03/11/04 | 17/11/04 | 4.3 | 59.6 | 39.0 | 33.2 | 105.3 | 22.2 | 13.6 | 127.6 | 2.2 | <1.0 | 46.9 | 45.7 | 35.0 | 17.5 |
| 17/11/04 | 01/12/04 | 4.8 | 41.8 | 17.9 | 17.1 | 144.6 | 27.8 | 10.5 | 163.4 | 2.9 | <1.0 | 24.4 | 17.0 | 29.0 | 27.6 |
| 01/12/04 | 15/12/04 | 4.8 | 215.6 | 97.9 | 73.7 | 53.1 | 7.2 | 5.7 | 153.6 | 1.7 | <1.0 | 209.2 | 17.8 | 64.0 | 1.6 |
| 15/12/04 | 29/12/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 29/12/04 | 12/01/05 | 5.0 | 117.3 | 78.6 | 76.0 | 372.5 | 86.8 | 56.4 | 446.0 | 10.2 | <1.0 | 72.4 | 9.5 | 82.0 | 3.2 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5136 | | 42.8 | 34.7 | 41.8 | 60.3 | 14.3 | 14.9 | 67.7 | 2.8 | - | 35.5 | 12.6 | 22.6 | 617.3 |

# Jenny Hurn

**2004**

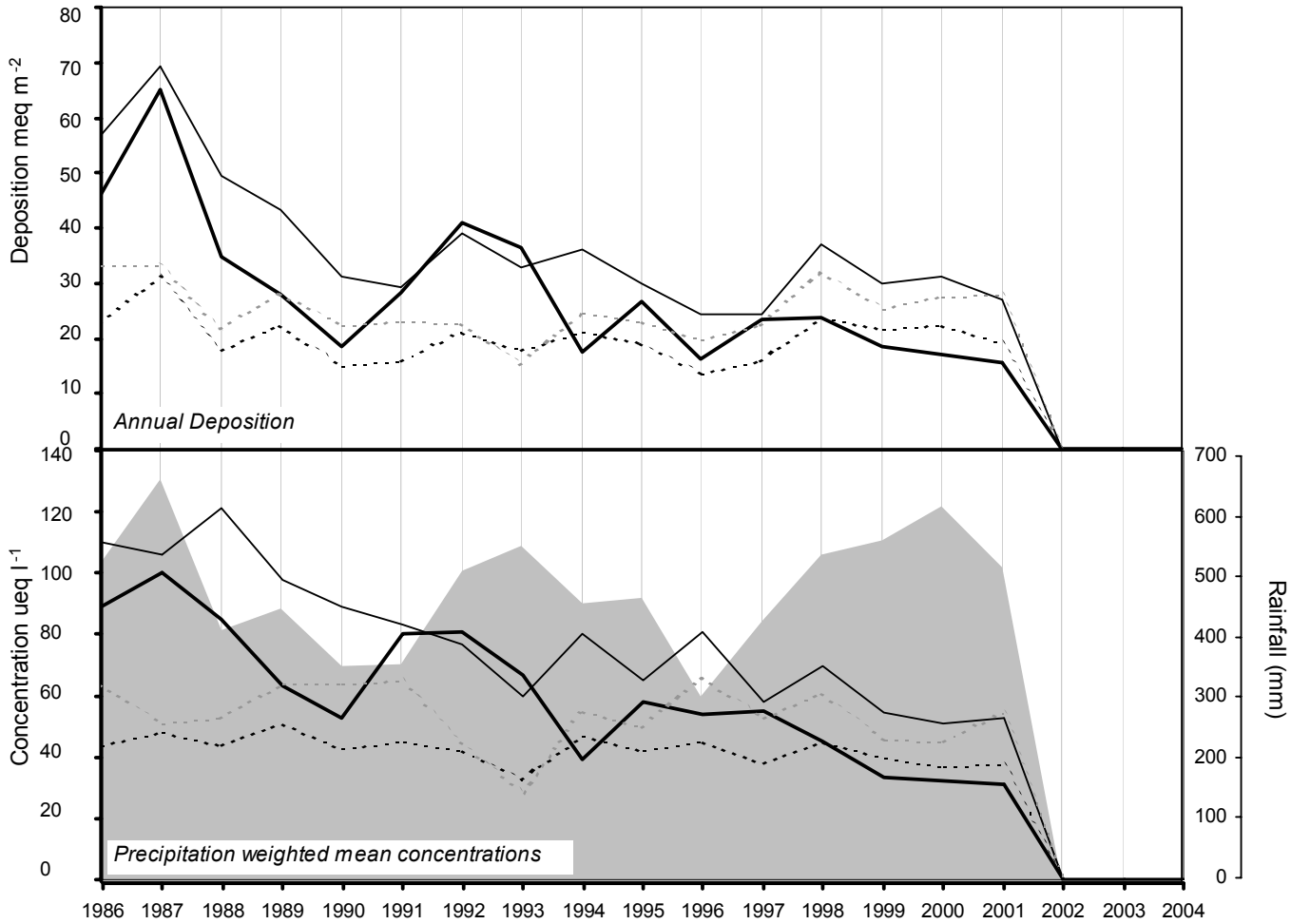
| | |
|---|---|
| *Site Code:* | **5118** |
| *Easting:* | **4816** |
| *Northing:* | **3986** |
| *Latitude:* | **53 28 39 N** |
| *Longitude:* | **00 46 13 W** |
| *Altitude (m):* | **4** |
| *Rainfall (mm):* | **563** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open arable land**

*Other measurements:*
**DT, SO2 (PowerGen)**

*Site Operator:*
**PowerGen**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-3.92 ueq/l (-4.36 %/year): 15 years' data
+++ Strong trend detected

*non-marine sulphate*
-4.13 ueq/l (-3.77 %/year): 16 years' data
++++ Very strong trend detected

*nitrate*
-0.54 ueq/l (-1.15 %/year): 16 years' data
+ Significant trend detected

*ammonium*
-0.52 ueq/l (-0.91 %/year): 16 years' data
- No significant trend detected



AEA Technology
National Environmental Technology Centre

**5118 Jenny Hurn**

The measurement programme was discontinued in November 2001.

# Thorganby

**2004**

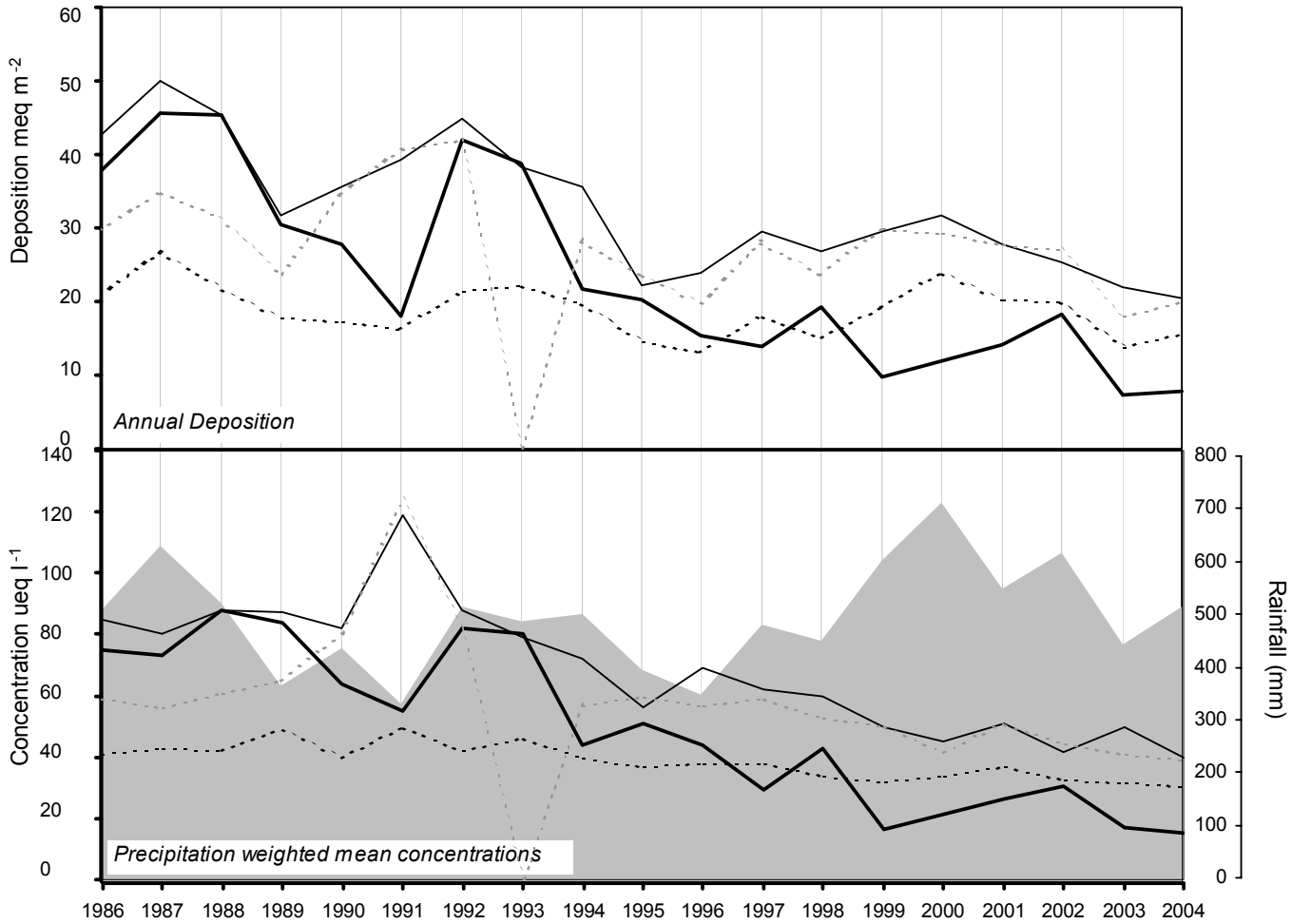
| | |
|---|---|
| *Site Code:* | **5117** |
| *Easting:* | **4676** |
| *Northing:* | **4428** |
| *Latitude:* | **53 52 36 N** |
| *Longitude:* | **00 58 19 W** |
| *Altitude (m):* | **8** |
| *Rainfall (mm):* | **565** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open meadow and arable land**

*Other measurements:*
**DT**

*Site Operator:*
**Selby District Council**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-4.01 ueq/l (-4.66 %/year): 18 years' data
++++ Very strong trend detected

*non-marine sulphate*
-3.11 ueq/l (-3.22 %/year): 19 years' data
+++ Strong trend detected

*nitrate*
-0.81 ueq/l (-1.76 %/year): 19 years' data
+++ Strong trend detected

*ammonium*
-2.00 ueq/l (-2.59 %/year): 18 years' data
+ Significant trend detected



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## 5117 Thorganby

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/01/04 | 28/01/04 | 4.7 | 20.7 | 17.3 | 25.0 | 43.1 | 10.9 | 10.4 | 67.5 | 1.1 | <1.0 | 15.5 | 22.4 | 19.0 | 30.6 |
| 28/01/04 | 11/02/04 | 4.7 | 27.8 | 12.5 | 11.1 | 54.8 | 11.7 | 11.7 | 72.6 | 1.2 | <1.0 | 21.2 | 19.1 | 21.0 | 28.4 |
| 11/02/04 | 25/02/04 | 7.5 | 232.5 | 33.0 | 1959.1 | 223.9 | 24.4 | 13.7 | 238.6 | 265.8 | 741.1 | 205.5 | 0.0 | 280.0 | 10.6 |
| 25/02/04 | 11/03/04 | 6.4 | 93.3 | 47.5 | 143.8 | 180.6 | 29.9 | 31.8 | 177.2 | 5.0 | <1.0 | 71.5 | 0.4 | 55.0 | 7.2 |
| 11/03/04 | 24/03/04 | 5.4 | 82.7 | 46.0 | 75.3 | 105.2 | 24.6 | 40.3 | 124.3 | 2.6 | <1.0 | 70.1 | 3.6 | 36.0 | 17.8 |
| 24/03/04 | 21/04/04 | 5.2 | 45.3 | 28.0 | 38.1 | 13.7 | 6.8 | 27.4 | 23.2 | 0.9 | <1.0 | 43.7 | 5.8 | 15.0 | 64.3 |
| 21/04/04 | 05/05/04 | 6.2 | 71.1 | 63.8 | 191.6 | 36.7 | 8.4 | 32.1 | 31.7 | 20.6 | <1.0 | 66.6 | 0.6 | 38.0 | 50.7 |
| 05/05/04 | 19/05/04 | 6.0 | 98.9 | 50.9 | 32.6 | 22.7 | 15.0 | 82.7 | 34.2 | 6.4 | <1.0 | 96.1 | 1.0 | 23.0 | 3.7 |
| 19/05/04 | 02/06/04 | 7.0 | 536.1 | 52.7 | 2117.2 | 135.4 | 96.7 | 122.2 | 140.2 | 197.3 | <1.0 | 519.8 | 0.1 | 302.0 | 15.4 |
| 02/06/04 | 16/06/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.1 |
| 16/06/04 | 30/06/04 | 5.2 | 34.5 | 21.0 | 18.4 | 14.2 | 7.7 | 20.1 | 21.6 | 1.1 | <1.0 | 32.8 | 6.5 | 12.0 | 41.5 |
| 30/06/04 | 14/07/04 | 3.8 | 465.4 | 8.2 | 4.7 | 222.8 | 344.7 | 223.1 | 669.8 | 483.0 | 512.0 | 438.6 | 154.9 | 247.0 | 27.9 |
| 14/07/04 | 28/07/04 | 5.4 | 66.4 | 44.4 | 48.3 | 16.7 | 10.1 | 44.5 | 33.5 | 5.4 | <1.0 | 64.4 | 4.4 | 21.0 | 13.4 |
| 28/07/04 | 11/08/04 | 4.6 | 48.2 | 38.9 | 51.2 | 1.9 | 2.2 | 16.3 | 9.4 | 3.2 | <1.0 | 48.0 | 22.9 | 20.0 | 103.6 |
| 11/08/04 | 25/08/04 | 4.7 | 33.2 | 24.5 | 27.1 | 13.5 | 6.9 | 15.9 | 19.0 | 1.7 | <1.0 | 31.6 | 18.2 | 15.0 | 60.9 |
| 25/08/04 | 08/09/04 | 4.4 | 165.0 | 69.4 | 28.7 | 120.3 | 40.7 | 117.5 | 179.1 | 11.2 | <1.0 | 150.5 | 38.9 | 63.0 | 2.7 |
| 08/09/04 | 22/09/04 | 6.1 | 112.7 | 53.1 | 55.4 | 121.8 | 44.1 | 123.3 | 159.0 | 12.3 | <1.0 | 98.0 | 0.9 | 47.7 | 5.7 |
| 22/09/04 | 06/10/04 | 5.1 | 34.3 | 26.6 | 41.9 | 36.2 | 11.9 | 27.8 | 47.2 | 4.6 | <1.0 | 30.0 | 7.8 | 17.8 | 11.0 |
| 06/10/04 | 20/10/04 | 4.6 | 29.6 | 37.4 | 35.6 | 26.7 | 7.8 | 10.6 | 31.2 | 1.0 | <1.0 | 26.4 | 27.5 | 23.0 | 50.3 |
| 20/10/04 | 03/11/04 | 7.1 | 99.5 | 33.3 | 544.4 | 71.6 | 18.3 | 11.1 | 85.7 | 85.0 | 311.5 | 90.9 | 0.1 | 93.0 | 27.6 |
| 03/11/04 | 17/11/04 | 6.0 | 56.6 | 28.3 | 75.2 | 102.0 | 20.0 | 23.4 | 123.6 | 7.8 | <1.0 | 44.3 | 0.9 | 30.0 | 4.1 |
| 17/11/04 | 01/12/04 | 5.5 | 48.4 | 18.7 | 48.0 | 122.0 | 25.4 | 16.4 | 149.2 | 3.6 | <1.0 | 33.7 | 3.2 | 29.0 | 13.9 |
| 01/12/04 | 15/12/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 15/12/04 | 29/12/04 | 6.8 | 160.2 | 14.7 | 288.3 | 114.4 | 28.3 | 24.6 | 168.3 | 30.9 | 56.0 | 146.4 | 0.1 | 71.0 | 12.2 |
| 29/12/04 | 09/02/05 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5117 | | 43.7 | 30.6 | 39.2 | 29.9 | 9.2 | 21.6 | 40.9 | 2.3 | - | 40.1 | 15.5 | 20.4 | 605.4 |

# High Muffles

**2004**

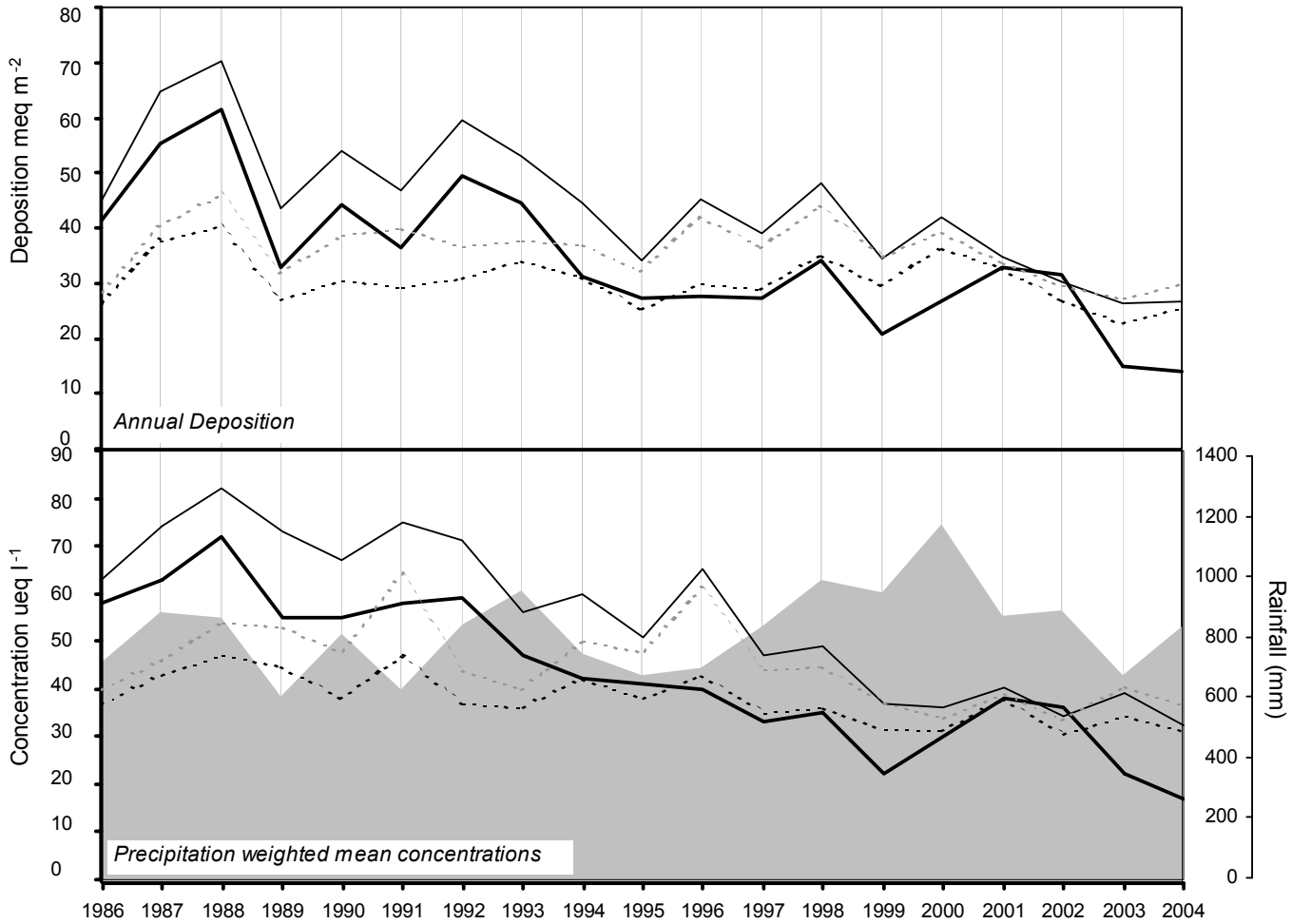
| | |
|---|---|
| *Site Code:* | **5009** |
| *Easting:* | **4776** |
| *Northing:* | **4939** |
| *Latitude:* | **54 20 05 N** |
| *Longitude:* | **00 48 23 W** |
| *Altitude (m):* | **267** |
| *Rainfall (mm):* | **897** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Forestry plantation**

*Other measurements:*
**DT, SO2, Daily SO4, HNO3 Denuder, ozone, EMEP**

*Site Operator:*
**Forest Research**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-2.48 ueq/l (-3.78 %/year): 18 years' data
++++ Very strong trend detected

*non-marine sulphate*
-2.57 ueq/l (-3.28 %/year): 19 years' data
++++ Very strong trend detected

*nitrate*
-0.66 ueq/l (-1.51 %/year): 19 years' data
++ Moderately strong trend detected

*ammonium*
-0.80 ueq/l (-1.53 %/year): 19 years' data
+ Significant trend detected

ACID DEPOSITION DATA REPORT, 2004

AEA Technology
National Environmental Technology Centre

## 5009 High Muffles

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/01/04 | 28/01/04 | 4.6 | 23.5 | 22.4 | 17.2 | 32.2 | 5.9 | 3.4 | 43.5 | 0.7 | <1.0 | 19.6 | 23.4 | 17.0 | 80.0 |
| 28/01/04 | 11/02/04 | 4.8 | 34.1 | 19.6 | 20.4 | 60.6 | 14.4 | 7.2 | 77.8 | 1.2 | <1.0 | 26.8 | 17.8 | 22.0 | 44.9 |
| 11/02/04 | 25/02/04 | 5.3 | 33.1 | 16.6 | 6.8 | 154.8 | 32.0 | 14.0 | 194.1 | 6.0 | <1.0 | 14.4 | 4.8 | 33.0 | 8.1 |
| 25/02/04 | 10/03/04 | 4.7 | 57.8 | 39.5 | 42.9 | 179.0 | 40.5 | 17.6 | 224.1 | 5.4 | <1.0 | 36.3 | 20.9 | 42.0 | 20.6 |
| 10/03/04 | 24/03/04 | 5.0 | 53.4 | 30.8 | 43.4 | 97.1 | 22.6 | 13.2 | 110.9 | 3.8 | <1.0 | 41.7 | 10.0 | 29.0 | 44.5 |
| 24/03/04 | 07/04/04 | 5.2 | 35.2 | 30.6 | 43.0 | 28.6 | 7.6 | 13.1 | 35.2 | 0.8 | <1.0 | 31.8 | 5.9 | 16.0 | 38.5 |
| 07/04/04 | 21/04/04 | 5.0 | 42.9 | 39.1 | 56.4 | 17.9 | 5.9 | 12.8 | 21.9 | 0.9 | <1.0 | 40.7 | 11.2 | 23.0 | 48.1 |
| 21/04/04 | 05/05/04 | 4.4 | 59.3 | 53.7 | 51.8 | 43.0 | 11.6 | 15.9 | 42.0 | 2.9 | <1.0 | 54.1 | 38.9 | 32.0 | 37.7 |
| 05/05/04 | 19/05/04 | 4.4 | 125.4 | 94.3 | 95.3 | 63.2 | 24.1 | 68.0 | 54.9 | 9.6 | 9.0 | 117.8 | 41.7 | 47.0 | 3.4 |
| 19/05/04 | 02/06/04 | 4.6 | 111.7 | 94.5 | 111.5 | 56.7 | 15.1 | 67.3 | 64.1 | 12.9 | <1.0 | 104.9 | 24.0 | 45.0 | 6.9 |
| 02/06/04 | 16/06/04 | 6.0 | 36.3 | 42.0 | 42.7 | 20.7 | 5.3 | 37.6 | 28.9 | 8.6 | <1.0 | 33.8 | 1.0 | 18.2 | 5.6 |
| 16/06/04 | 30/06/04 | 5.0 | 26.3 | 22.1 | 18.7 | 21.6 | 5.2 | 12.1 | 21.1 | 1.0 | <1.0 | 23.7 | 9.1 | 11.0 | 39.7 |
| 30/06/04 | 14/07/04 | 4.9 | 23.8 | 12.3 | 8.2 | 56.8 | 9.0 | 6.8 | 62.8 | 5.5 | <1.0 | 16.9 | 13.8 | 15.0 | 28.2 |
| 14/07/04 | 28/07/04 | 4.5 | 52.6 | 39.6 | 42.7 | 6.6 | 5.4 | 13.4 | 16.5 | 2.4 | <1.0 | 51.8 | 32.4 | 23.0 | 26.0 |
| 28/07/04 | 11/08/04 | 4.8 | 47.2 | 49.3 | 69.9 | 8.8 | 4.5 | 22.6 | 8.3 | 3.6 | <1.0 | 46.1 | 15.1 | 19.0 | 65.6 |
| 11/08/04 | 25/08/04 | 4.8 | 26.1 | 26.5 | 27.6 | 16.2 | 4.4 | 5.5 | 19.4 | 1.2 | <1.0 | 24.1 | 16.6 | 15.0 | 85.2 |
| 25/08/04 | 08/09/04 | 5.5 | 65.6 | 34.7 | 33.0 | 78.6 | 20.5 | 39.3 | 83.8 | 4.6 | <1.0 | 56.1 | 3.3 | 26.0 | 2.6 |
| 08/09/04 | 22/09/04 | 6.1 | 89.8 | 42.4 | 76.4 | 114.7 | 28.9 | 58.0 | 133.2 | 4.5 | <1.0 | 76.0 | 0.8 | 38.7 | 10.0 |
| 22/09/04 | 06/10/04 | 4.8 | 36.0 | 38.2 | 49.4 | 47.6 | 12.2 | 16.6 | 51.7 | 3.1 | <1.0 | 30.3 | 14.5 | 21.5 | 26.9 |
| 06/10/04 | 20/10/04 | 4.6 | 23.1 | 27.2 | 12.8 | 43.0 | 8.1 | 4.7 | 40.8 | 1.2 | <1.0 | 17.9 | 24.5 | 19.3 | 48.1 |
| 20/10/04 | 03/11/04 | 4.7 | 27.5 | 29.6 | 30.3 | 55.5 | 12.0 | 7.3 | 58.0 | 10.0 | <1.0 | 20.8 | 18.6 | 20.2 | 66.4 |
| 03/11/04 | 17/11/04 | 4.9 | 42.5 | 22.7 | 33.4 | 179.1 | 38.1 | 15.7 | 204.4 | 5.1 | <1.0 | 20.9 | 12.6 | 36.0 | 20.4 |
| 17/11/04 | 02/12/04 | 4.9 | 79.2 | 31.3 | 35.2 | 232.6 | 51.1 | 21.0 | 260.7 | 6.1 | <1.0 | 51.2 | 12.9 | 45.0 | 17.5 |
| 02/12/04 | 15/12/04 | 6.5 | 81.1 | 56.9 | 98.7 | 32.4 | 8.6 | 78.1 | 38.5 | 1.5 | <1.0 | 77.2 | 0.3 | 32.0 | 3.1 |
| 15/12/04 | 29/12/04 | 4.7 | 41.8 | 21.2 | 38.4 | 82.0 | 17.4 | 10.4 | 97.0 | 1.5 | <1.0 | 31.9 | 19.1 | 25.0 | 21.5 |
| 29/12/04 | 12/01/05 | 5.4 | 44.8 | 12.8 | 36.7 | 140.2 | 28.6 | 10.0 | 172.5 | 2.6 | <1.0 | 28.0 | 3.7 | 32.0 | 26.2 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5009 | | 39.1 | 31.3 | 36.4 | 54.6 | 12.6 | 12.7 | 63.4 | 3.1 | - | 32.5 | 16.9 | 22.5 | 825.8 |

# Bannisdale

**2004**

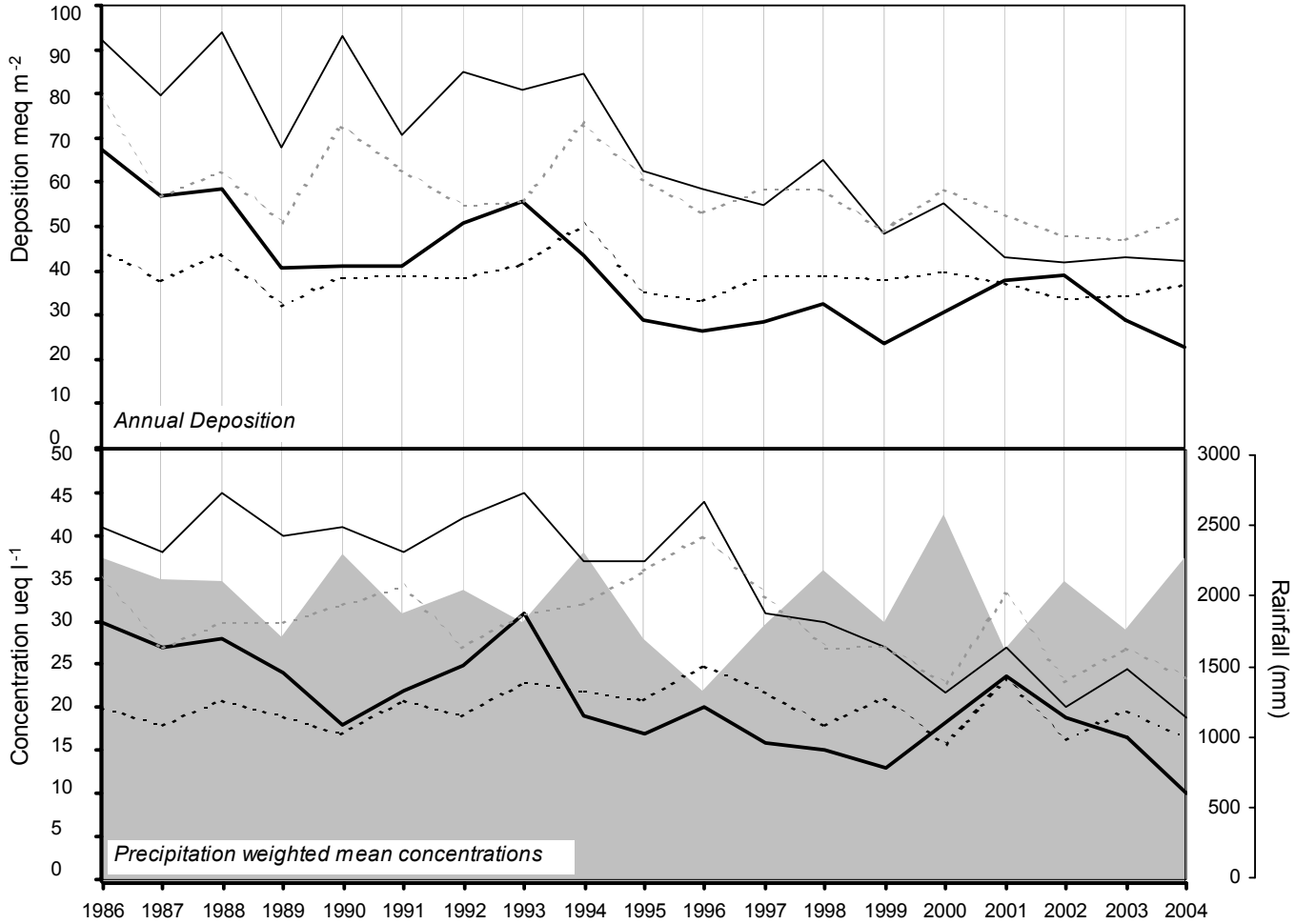
| | |
|---|---|
| *Site Code:* | **5111** |
| *Easting:* | **3515** |
| *Northing:* | **5043** |
| *Latitude:* | **54 25 54 N** |
| *Longitude:* | **02 44 52 W** |
| *Altitude (m):* | **265** |
| *Rainfall (mm):* | **1972** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland, sheep grazing**

*Other measurements:*
**DT**

*Site Operator:*
**Mr. R Newport**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.76 ueq/l (-2.76 %/year): 18 years' data
++ Moderately strong trend detected

*non-marine sulphate*
-1.33 ueq/l (-2.89 %/year): 19 years' data
++++ Very strong trend detected

*nitrate*
-0.06 ueq/l (-0.28 %/year): 19 years' data
- No significant trend detected

*ammonium*
-0.35 ueq/l (-1.04 %/year): 19 years' data
- No significant trend detected



AEA Technology
National Environmental Technology Centre

## 5111 Bannisdale

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/01/04 | 28/01/04 | 4.8 | 17.8 | 22.2 | 22.2 | 48.7 | 10.6 | 6.4 | 58.0 | 1.2 | <1.0 | 11.9 | 15.5 | 16.0 | 58.3 |
| 28/01/04 | 11/02/04 | 5.3 | 20.5 | 7.2 | 9.5 | 88.2 | 17.2 | 5.9 | 103.0 | 4.7 | <1.0 | 9.9 | 4.7 | 17.0 | 260.6 |
| 11/02/04 | 25/02/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 25/02/04 | 10/03/04 | 5.2 | 92.4 | 96.7 | 145.4 | 63.7 | 15.2 | 34.5 | 72.7 | 2.6 | <1.0 | 84.8 | 5.8 | 38.0 | 16.2 |
| 10/03/04 | 24/03/04 | 5.1 | 30.6 | 7.9 | 18.9 | 111.4 | 22.5 | 9.2 | 126.7 | 2.8 | <1.0 | 17.2 | 8.7 | 25.0 | 130.9 |
| 24/03/04 | 07/04/04 | 5.7 | 42.1 | 23.7 | 32.6 | 121.5 | 24.4 | 26.9 | 128.3 | 2.8 | <1.0 | 27.4 | 2.2 | 29.0 | 37.6 |
| 07/04/04 | 21/04/04 | 5.4 | 34.1 | 25.1 | 44.1 | 25.4 | 5.1 | 8.1 | 30.7 | 0.5 | <1.0 | 31.0 | 4.3 | 13.0 | 53.0 |
| 21/04/04 | 05/05/04 | 5.8 | 23.5 | 13.3 | 30.0 | 55.4 | 8.0 | 10.7 | 48.6 | 2.9 | <1.0 | 16.8 | 1.7 | 13.0 | 38.5 |
| 05/05/04 | 19/05/04 | 5.4 | 27.5 | 22.7 | 42.3 | 4.1 | 2.1 | 6.1 | 12.9 | 1.8 | <1.0 | 27.0 | 3.8 | <10.0 | 57.5 |
| 19/05/04 | 02/06/04 | 5.8 | 69.6 | 87.5 | 117.1 | 42.4 | 7.3 | 33.2 | 36.1 | 9.4 | <1.0 | 64.5 | 1.5 | 29.8 | 13.1 |
| 02/06/04 | 16/06/04 | 6.3 | 88.8 | 34.4 | 64.4 | 69.9 | 23.2 | 44.8 | 78.1 | 5.4 | <1.0 | 80.4 | 0.5 | 63.0 | 22.5 |
| 16/06/04 | 29/06/04 | 5.1 | 23.0 | 15.8 | 18.9 | 22.9 | 10.3 | 5.8 | 29.4 | 1.1 | <1.0 | 20.2 | 8.1 | 11.0 | 59.7 |
| 29/06/04 | 14/07/04 | 5.1 | 32.5 | 13.8 | 8.3 | 75.8 | 12.1 | 14.6 | 88.3 | 5.2 | <1.0 | 23.3 | 8.1 | 18.0 | 63.9 |
| 14/07/04 | 28/07/04 | 5.0 | 33.1 | 22.5 | 31.7 | 16.2 | 3.9 | 5.9 | 22.6 | 3.9 | <1.0 | 31.1 | 11.2 | 13.0 | 50.7 |
| 28/07/04 | 11/08/04 | 4.3 | 47.5 | 45.2 | 56.1 | <2.3 | 1.4 | 9.9 | 6.7 | 1.4 | <1.0 | 47.8 | 46.8 | 23.0 | 139.5 |
| 11/08/04 | 25/08/04 | 4.9 | 18.7 | 17.1 | 13.8 | 14.9 | 8.5 | 7.6 | 19.9 | 1.2 | <1.0 | 16.9 | 13.2 | 11.0 | 117.5 |
| 25/08/04 | 08/09/04 | 5.1 | 42.0 | 18.2 | 17.4 | 90.7 | 19.0 | 7.3 | 124.3 | 2.6 | <1.0 | 31.1 | 8.5 | 22.0 | 26.7 |
| 08/09/04 | 22/09/04 | 5.5 | 28.7 | 6.0 | 12.7 | 178.7 | 36.6 | 9.5 | 194.0 | 3.0 | <1.0 | 7.2 | 3.5 | 30.8 | 270.2 |
| 22/09/04 | 04/10/04 | 5.0 | 28.6 | 16.7 | 27.0 | 68.1 | 13.5 | 6.5 | 75.6 | 1.6 | <1.0 | 20.4 | 11.0 | 19.1 | 98.9 |
| 04/10/04 | 20/10/04 | 4.8 | 31.2 | 16.6 | 15.6 | 157.6 | 33.6 | 13.4 | 173.8 | 3.9 | <1.0 | 12.2 | 14.5 | 32.9 | 81.7 |
| 20/10/04 | 03/11/04 | 4.8 | 26.7 | 16.8 | 13.5 | 145.8 | 31.2 | 9.8 | 167.0 | 3.8 | <1.0 | 9.1 | 16.2 | 30.6 | 80.8 |
| 03/11/04 | 17/11/04 | 5.4 | 28.8 | 24.5 | 38.2 | 90.9 | 17.7 | 9.3 | 100.2 | 2.4 | <1.0 | 17.9 | 3.9 | 22.0 | 32.8 |
| 17/11/04 | 01/12/04 | 4.8 | 43.8 | 32.9 | 53.3 | 105.0 | 21.0 | 9.7 | 106.4 | 2.3 | <1.0 | 31.1 | 15.1 | 27.0 | 61.7 |
| 01/12/04 | 15/12/04 | 4.6 | 61.3 | 39.0 | 45.4 | 121.1 | 26.1 | 13.7 | 148.6 | 3.9 | <1.0 | 46.7 | 28.2 | 37.0 | 58.2 |
| 15/12/04 | 29/12/04 | 5.2 | 35.1 | 8.6 | 13.1 | 190.3 | 41.2 | 11.4 | 213.7 | 4.0 | <1.0 | 12.1 | 5.8 | 34.0 | 151.7 |
| 29/12/04 | 12/01/05 | 5.6 | 49.2 | 4.7 | 11.7 | 366.8 | 80.0 | 18.1 | 428.6 | 8.4 | <1.0 | 5.0 | 2.8 | 66.0 | 264.8 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5111 | | 34.1 | 16.5 | 23.4 | 127.1 | 27.2 | 11.0 | 145.3 | 3.6 | - | 18.8 | 10.1 | 28.5 | 2246.8 |

# Hillsborough Forest

**2004**

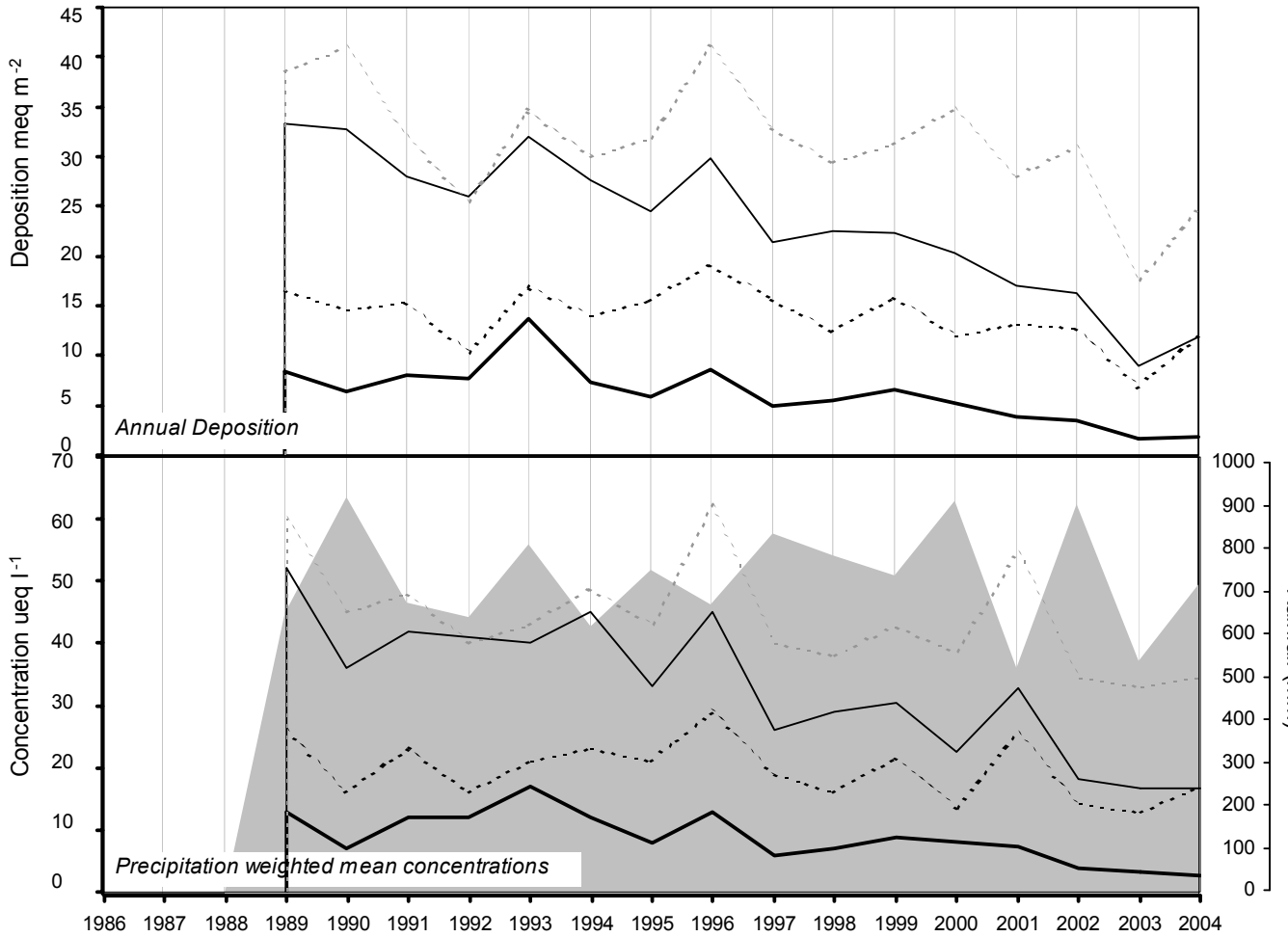
| | |
|---|---|
| *Site Code:* | **5149** |
| *Easting:* | **1349** |
| *Northing:* | **5156** |
| *Latitude:* | **54 27 09 N** |
| *Longitude:* | **06 05 03 W** |
| *Altitude (m):* | **120** |
| *Rainfall (mm):* | **863** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open arable, cows graze in summer**

*Other measurements:*
**DT**

*Site Operator:*
**Department of Agriculture NI**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.64 ueq/l (-4.16 %/year): 15 years' data
++ Moderately strong trend detected

*non-marine sulphate*
-1.96 ueq/l (-3.67 %/year): 16 years' data
+++ Strong trend detected

*nitrate*
-0.40 ueq/l (-1.68 %/year): 16 years' data
- No significant trend detected

*ammonium*
-0.96 ueq/l (-1.77 %/year): 16 years' data
+ Significant trend detected



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## 5149 Hillsborough Forest

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/01/04 | 28/01/04 | 5.6 | 29.4 | 9.7 | 38.7 | 82.6 | 11.5 | 7.5 | 85.9 | 4.1 | <1.0 | 19.5 | 2.5 | - | 3.4 |
| 28/01/04 | 11/02/04 | 6.0 | 23.3 | 8.2 | 23.8 | 59.0 | 11.3 | 2.9 | 87.8 | 0.8 | <1.0 | 16.2 | 0.9 | 12.0 | 59.2 |
| 11/02/04 | 25/02/04 | 6.3 | 139.9 | 32.6 | 153.8 | 335.1 | 55.2 | 33.3 | 337.7 | 8.2 | <1.0 | 99.5 | 0.5 | 76.0 | 3.3 |
| 25/02/04 | 03/03/04 | 6.7 | 47.9 | 25.3 | 33.7 | 190.0 | 41.9 | 19.7 | 200.6 | 4.0 | <1.0 | 25.0 | 0.2 | 39.0 | 2.5 |
| 03/03/04 | 10/03/04 | 4.7 | 85.0 | 30.9 | 161.2 | 157.5 | 20.7 | 24.0 | 171.7 | 11.3 | <1.0 | 66.1 | 20.0 | - | 1.2 |
| 10/03/04 | 24/03/04 | 4.9 | 51.9 | 38.0 | 53.7 | 178.0 | 37.6 | 10.7 | 200.5 | 3.9 | <1.0 | 30.5 | 11.7 | 42.0 | 44.5 |
| 24/03/04 | 07/04/04 | 5.6 | 36.9 | 15.9 | 29.9 | 154.6 | 31.1 | 14.0 | 163.8 | 2.8 | <1.0 | 18.3 | 2.3 | 32.0 | 28.3 |
| 07/04/04 | 14/04/04 | 6.1 | 20.9 | 12.4 | 45.5 | 30.7 | 2.8 | 4.7 | 34.0 | 1.5 | <1.0 | 17.2 | 0.8 | 13.0 | 5.0 |
| 14/04/04 | 21/04/04 | 5.8 | 14.5 | 7.3 | 15.7 | 38.9 | 7.4 | 5.9 | 44.2 | 1.3 | <1.0 | 9.8 | 1.6 | <10.0 | 29.0 |
| 21/04/04 | 05/05/04 | 5.9 | 33.4 | 14.1 | 36.8 | 117.4 | 39.8 | 21.6 | 130.8 | 4.7 | <1.0 | 19.2 | 1.3 | 25.0 | 15.2 |
| 05/05/04 | 20/05/04 | 5.9 | 65.0 | 41.3 | 72.4 | 114.1 | 18.6 | 20.2 | 115.2 | 13.0 | <1.0 | 51.3 | 1.4 | 32.0 | 2.8 |
| 20/05/04 | 02/06/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.6 |
| 02/06/04 | 16/06/04 | 6.2 | 39.3 | 22.9 | 60.8 | 61.5 | 7.9 | 21.1 | 73.0 | 8.7 | <1.0 | 31.9 | 0.6 | 24.0 | 10.9 |
| 16/06/04 | 30/06/04 | 5.5 | 26.3 | 16.7 | 15.8 | 39.0 | 7.0 | 10.1 | 48.7 | 7.9 | <1.0 | 21.6 | 3.1 | 14.0 | 68.8 |
| 30/06/04 | 28/07/04 | 6.7 | 93.5 | 6.2 | 1272.2 | 55.4 | 18.5 | 17.4 | 99.6 | 217.4 | 189.1 | 86.8 | 0.2 | 175.0 | 44.0 |
| 28/07/04 | 11/08/04 | 6.7 | 31.6 | 10.4 | 272.9 | 23.4 | 15.1 | 14.5 | 36.3 | 119.4 | 114.8 | 28.8 | 0.2 | 71.0 | 56.2 |
| 11/08/04 | 25/08/04 | 5.9 | 24.0 | 18.1 | 57.6 | 19.9 | 3.1 | 2.2 | 25.3 | 7.2 | 5.1 | 21.6 | 1.1 | 13.0 | 80.9 |
| 25/08/04 | 08/09/04 | 6.1 | 47.8 | 20.9 | 59.4 | 174.1 | 33.6 | 24.2 | 196.3 | 7.0 | <1.0 | 26.9 | 0.7 | 40.0 | 2.4 |
| 08/09/04 | 23/09/04 | 5.9 | 15.3 | 14.1 | 31.5 | 87.6 | 17.5 | 10.7 | 64.3 | 5.1 | <1.0 | 4.7 | 1.1 | 15.6 | 58.7 |
| 23/09/04 | 06/10/04 | 5.8 | 6.2 | 9.6 | 5.7 | 33.6 | 6.4 | 3.4 | 33.0 | 2.9 | <1.0 | 2.1 | 1.7 | <10.0 | 18.4 |
| 06/10/04 | 20/10/04 | 7.1 | 79.8 | 48.2 | 465.6 | 140.3 | 19.1 | 9.4 | 142.1 | 36.0 | 77.5 | 62.9 | 0.1 | 76.7 | 10.4 |
| 20/10/04 | 03/11/04 | 5.5 | 26.8 | 24.5 | 30.1 | 111.6 | 24.8 | 10.8 | 109.0 | 3.4 | <1.0 | 13.4 | 3.2 | 24.0 | 83.7 |
| 03/11/04 | 18/11/04 | 6.4 | 63.6 | 12.1 | 70.8 | 382.1 | 72.4 | 18.1 | 459.8 | 10.0 | <1.0 | 17.5 | 0.4 | 69.0 | 0.8 |
| 18/11/04 | 01/12/04 | 6.1 | 21.7 | 11.9 | 52.3 | 38.2 | 4.9 | 1.8 | 49.6 | 1.6 | <1.0 | 17.1 | 0.8 | 14.0 | 19.2 |
| 01/12/04 | 15/12/04 | 6.1 | 38.0 | 27.1 | 11.3 | 276.8 | 61.3 | 19.6 | 53.7 | 6.8 | <1.0 | 4.7 | 0.9 | 19.0 | 9.4 |
| 15/12/04 | 05/01/05 | 5.9 | 41.4 | 3.9 | 28.1 | 275.0 | 56.8 | 12.0 | 321.1 | 5.8 | <1.0 | 8.3 | 1.2 | 48.0 | 50.0 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5149 | | 28.7 | 16.9 | 34.5 | 98.9 | 20.3 | 9.1 | 104.9 | 4.7 | - | 16.8 | 2.5 | 22.0 | 708.9 |

# Lough Navar

**2004**

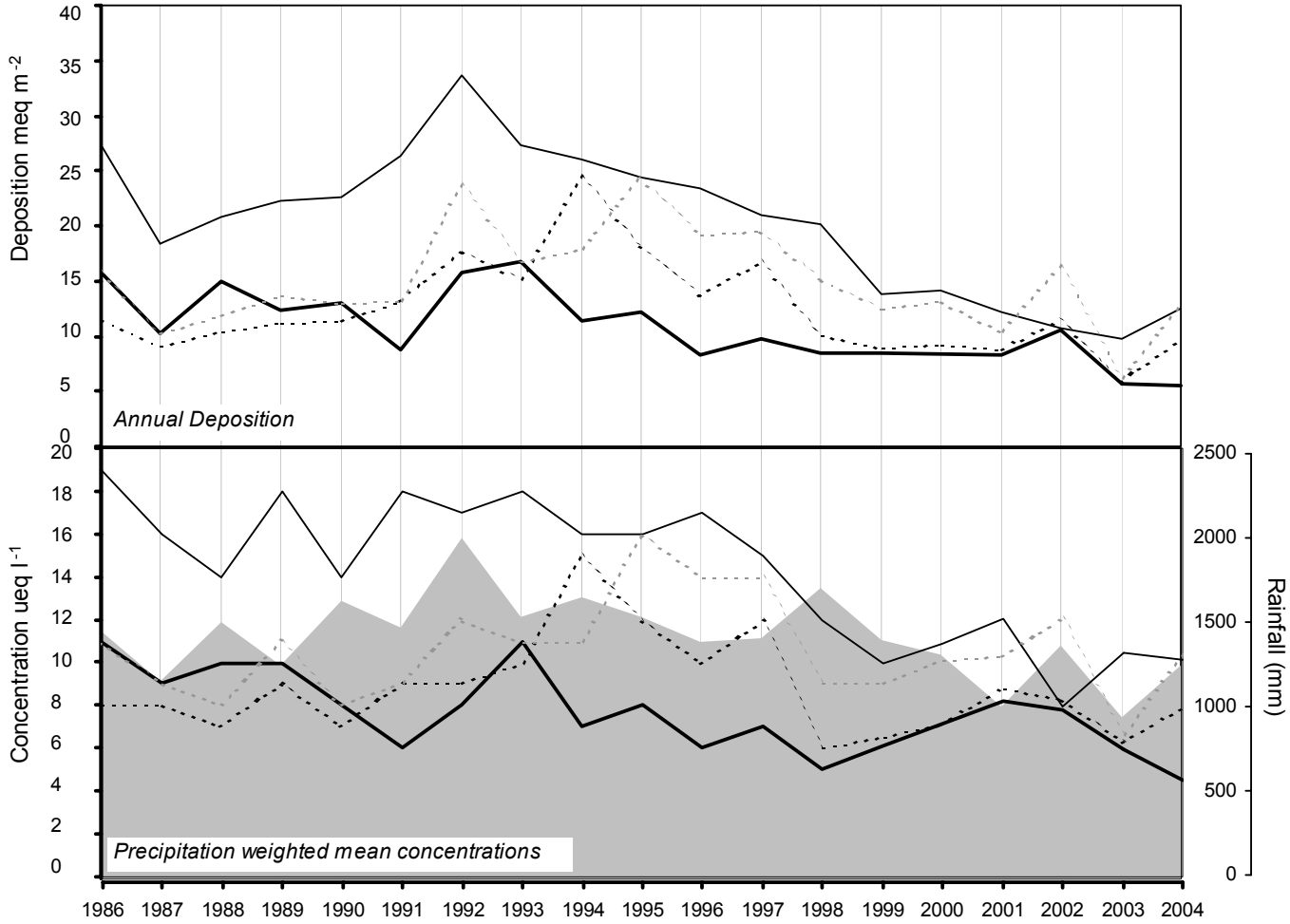
| | |
|---|---|
| *Site Code:* | **5006** |
| *Easting:* | **192** |
| *Northing:* | **5212** |
| *Latitude:* | **54 26 20 N** |
| *Longitude:* | **07 54 00 W** |
| *Altitude (m):* | **130** |
| *Rainfall (mm):* | **1412** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Clearing near Forestry Offices**

*Other measurements:*
**DT, SO2, Daily SO4, HNO3 Denuder, ozone, EMEP**

*Site Operator:*
**Forestry Service NI**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.24 ueq/l (-2.42 %/year): 18 years' data
++ Moderately strong trend detected

*non-marine sulphate*
-0.47 ueq/l (-2.52 %/year): 19 years' data
+++ Strong trend detected

*nitrate*
-0.05 ueq/l (-0.50 %/year): 19 years' data
- No significant trend detected

*ammonium*
0.02 ueq/l (0.14 %/year): 19 years' data
- No significant trend detected



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## 5006 Lough Navar

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/01/04 | 26/01/04 | 5.5 | 25.9 | 2.5 | <1.4 | 234.6 | 48.6 | 12.8 | 255.0 | 5.9 | <1.0 | - | 3.0 | 40.0 | 37.2 |
| 26/01/04 | 09/02/04 | 6.0 | 25.2 | 3.1 | 4.2 | 179.3 | 35.8 | 8.7 | 196.2 | 5.3 | <1.0 | 3.6 | 1.1 | 28.0 | 120.9 |
| 09/02/04 | 23/02/04 | 5.0 | 66.0 | 31.4 | 59.8 | 171.8 | 36.1 | 32.0 | 192.1 | 6.8 | <1.0 | 45.3 | 10.0 | - | 2.5 |
| 23/02/04 | 08/03/04 | 5.5 | 26.7 | 7.1 | 7.9 | 165.9 | 35.3 | 10.2 | 201.1 | 5.3 | <1.0 | 6.7 | 3.1 | 29.0 | 19.1 |
| 08/03/04 | 22/03/04 | 5.2 | 37.2 | 11.6 | 12.9 | 211.9 | 44.2 | 12.6 | 251.8 | 8.3 | <1.0 | 11.7 | 5.9 | 38.0 | 64.7 |
| 22/03/04 | 19/04/04 | 5.6 | 26.3 | 5.8 | 6.2 | 154.5 | 35.1 | 11.1 | 173.5 | 3.5 | <1.0 | 7.7 | 2.6 | 26.0 | 102.6 |
| 19/04/04 | 03/05/04 | 5.7 | 38.4 | 8.3 | 11.2 | 194.4 | 39.5 | 20.2 | 222.1 | 6.2 | <1.0 | 15.0 | 2.2 | 36.0 | 18.8 |
| 03/05/04 | 17/05/04 | 5.2 | 23.8 | 5.0 | 2.7 | 146.5 | 31.3 | 11.3 | 168.7 | 3.5 | <1.0 | 6.2 | 6.5 | 26.0 | 59.4 |
| 17/05/04 | 31/05/04 | 6.6 | 24.1 | 15.8 | 20.7 | 61.2 | 8.3 | 40.0 | 72.2 | 6.2 | <1.0 | 16.8 | 0.2 | 25.0 | 14.3 |
| 31/05/04 | 14/06/04 | 6.2 | 20.9 | 7.8 | 16.0 | 49.6 | 8.7 | 7.5 | 59.7 | 2.7 | <1.0 | 14.9 | 0.6 | 14.0 | 33.9 |
| 14/06/04 | 28/06/04 | 5.4 | 20.4 | 11.0 | 12.8 | 42.3 | 9.3 | 4.1 | 52.2 | 1.3 | <1.0 | 15.3 | 4.4 | 12.0 | 89.9 |
| 28/06/04 | 12/07/04 | 4.9 | 20.6 | 3.2 | 2.1 | 83.7 | 17.7 | 6.8 | 86.2 | 1.9 | <1.0 | 10.5 | 13.8 | 18.6 | 53.8 |
| 12/07/04 | 26/07/04 | 5.4 | 17.5 | 5.5 | 46.2 | 24.4 | 3.9 | <1.0 | 34.3 | <0.5 | 4.9 | 14.6 | 4.4 | 10.0 | 63.7 |
| 26/07/04 | 09/08/04 | 5.8 | 33.9 | 24.3 | 23.5 | 29.5 | 7.2 | 20.7 | 34.7 | 2.9 | <1.0 | 30.4 | 1.7 | 15.0 | 21.5 |
| 09/08/04 | 23/08/04 | 5.6 | 20.9 | 19.0 | 31.3 | 20.5 | 4.4 | 5.6 | 25.3 | 0.9 | <1.0 | 18.4 | 2.5 | 10.0 | 55.8 |
| 23/08/04 | 06/09/04 | 5.1 | 29.7 | 15.6 | 5.4 | 93.0 | 19.8 | 9.4 | 155.6 | 2.7 | <1.0 | 18.5 | 8.1 | 21.0 | 33.2 |
| 06/09/04 | 20/09/04 | 5.8 | 30.8 | 6.5 | 5.4 | 212.8 | 42.7 | 15.6 | 220.3 | 4.9 | <1.0 | 5.1 | 1.8 | 33.7 | 80.3 |
| 20/09/04 | 04/10/04 | 5.4 | 17.3 | 9.6 | 3.8 | 48.1 | 9.8 | 6.9 | 52.2 | 1.6 | <1.0 | 11.5 | 3.8 | 27.2 | 100.4 |
| 04/10/04 | 01/11/04 | 5.1 | 12.9 | 8.3 | 7.5 | 108.7 | 20.9 | 5.4 | 113.9 | 2.2 | <1.0 | - | 8.1 | 20.6 | 136.3 |
| 01/11/04 | 15/11/04 | 5.5 | 34.0 | 5.2 | 9.0 | 279.4 | 57.7 | 16.4 | 286.5 | 9.5 | <1.0 | 0.3 | 3.3 | 43.0 | 31.7 |
| 15/11/04 | 29/11/04 | 5.1 | 10.1 | 4.1 | 5.1 | 43.8 | 5.7 | 1.8 | 45.0 | 0.7 | <1.0 | 4.8 | 7.4 | <10.0 | 65.4 |
| 29/11/04 | 07/02/05 | 5.6 | 51.5 | 3.0 | 2.5 | 408.6 | 58.2 | 25.5 | 450.7 | 8.3 | <1.0 | 2.3 | 2.5 | 71.0 | 31.0 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5006 | | 23.6 | 7.9 | 10.3 | 124.8 | 24.9 | 9.4 | 139.3 | 3.5 | - | 10.1 | 4.5 | 24.6 | 1236.6 |

# Cow Green Reservoir

**2004**

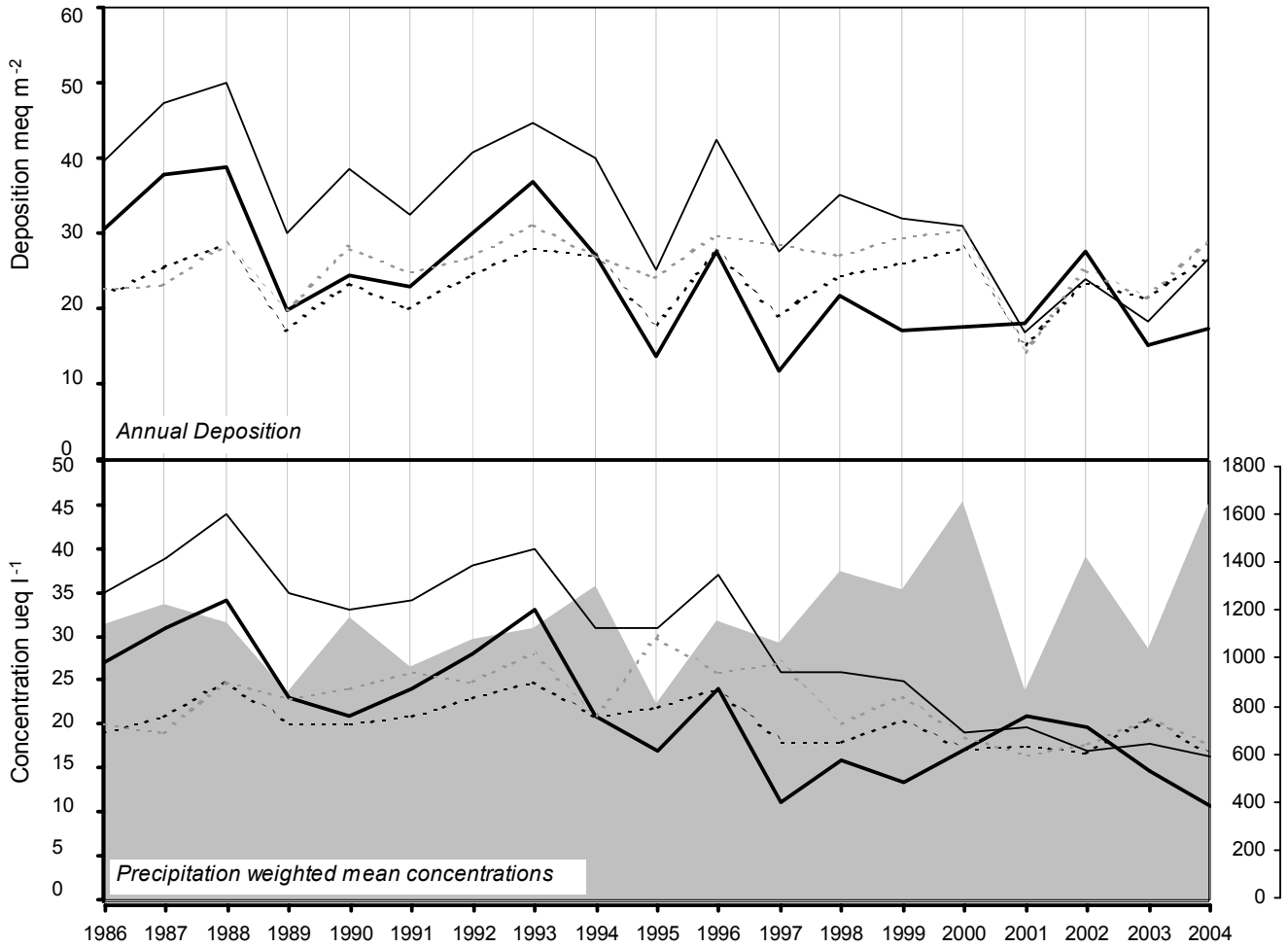
| | |
|---|---|
| *Site Code:* | **5113** |
| *Easting:* | **3817** |
| *Northing:* | **5298** |
| *Latitude:* | **54 39 46 N** |
| *Longitude:* | **02 17 01 W** |
| *Altitude (m):* | **510** |
| *Rainfall (mm):* | **2175** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Very open moorland**

*Other measurements:*
**DT, Met**

*Site Operator:*
**English Nature**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-1.07 ueq/l (-3.51 %/year): 17 years' data
++ Moderately strong trend detected

*non-marine sulphate*
-1.40 ueq/l (-3.33 %/year): 18 years' data
++++ Very strong trend detected

*nitrate*
-0.24 ueq/l (-1.05 %/year): 18 years' data
+ Significant trend detected

*ammonium*
-0.19 ueq/l (-0.79 %/year): 18 years' data
- No significant trend detected



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## 5113 Cow Green Reservoir

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 05/01/04 | 13/01/04 | 5.4 | 25.8 | 9.4 | 11.4 | 109.7 | 20.6 | 6.1 | 135.7 | 1.5 | <1.0 | 12.6 | 4.4 | 19.0 | 79.8 |
| 13/01/04 | 30/01/04 | 5.2 | 22.5 | 18.3 | 21.5 | 99.4 | 19.2 | 6.8 | 99.8 | 1.8 | <1.0 | 10.5 | 6.6 | 20.0 | 37.3 |
| 30/01/04 | 13/02/04 | 5.2 | 23.4 | 6.7 | 7.6 | 77.3 | 15.3 | 5.3 | 79.8 | 1.4 | <1.0 | 14.1 | 5.9 | 16.0 | 140.8 |
| 13/02/04 | 01/03/04 | 7.2 | 24.4 | 24.5 | 97.2 | 137.0 | 39.4 | 24.8 | 69.2 | 5.3 | <1.0 | 7.9 | 0.1 | 39.0 | 4.8 |
| 01/03/04 | 08/03/04 | 4.6 | 77.6 | 129.0 | 102.3 | 159.6 | 35.9 | 33.5 | 151.8 | 5.4 | <1.0 | 58.4 | 26.3 | 51.0 | 3.8 |
| 08/03/04 | 23/03/04 | 5.1 | 26.5 | 11.5 | 16.1 | 112.9 | 22.3 | 7.7 | 131.1 | 2.9 | <1.0 | 12.9 | 7.9 | 24.0 | 89.8 |
| 23/03/04 | 07/04/04 | 5.2 | 40.8 | 27.8 | 45.1 | 213.1 | 2.9 | 1.9 | 84.4 | 2.1 | 67.5 | 15.1 | 6.0 | 23.0 | 45.1 |
| 07/04/04 | 20/04/04 | 5.5 | 31.5 | 27.6 | 40.1 | 11.2 | 3.8 | 9.9 | 16.6 | 0.0 | <1.0 | 30.2 | 3.1 | 11.0 | 34.5 |
| 20/04/04 | 03/05/04 | 5.2 | 32.9 | 28.5 | 29.9 | 61.1 | 14.6 | 15.7 | 60.4 | 1.7 | <1.0 | 25.5 | 6.8 | 19.0 | 30.2 |
| 03/05/04 | 18/05/04 | 4.5 | 61.3 | 59.4 | 63.1 | 34.4 | 8.3 | 22.0 | 28.5 | 3.0 | <1.0 | 57.2 | 30.2 | 28.0 | 7.4 |
| 18/05/04 | 03/06/04 | 5.3 | 31.3 | 34.6 | 32.6 | 26.5 | 6.5 | 18.1 | 23.5 | 1.7 | <1.0 | 28.1 | 5.5 | 15.3 | 26.5 |
| 03/06/04 | 14/06/04 | 6.4 | 65.5 | 50.1 | 66.5 | 160.5 | 27.1 | 31.7 | 169.2 | 10.8 | <1.0 | 46.1 | 0.4 | 128.0 | 3.1 |
| 14/06/04 | 02/07/04 | 5.3 | 21.0 | 15.9 | 20.1 | 28.2 | 5.3 | 3.2 | 34.2 | 1.1 | <1.0 | 17.6 | 4.7 | 11.0 | 78.5 |
| 02/07/04 | 20/07/04 | 5.0 | 18.3 | 26.2 | 13.8 | 31.4 | 4.9 | 5.3 | 31.6 | 0.8 | <1.0 | 14.5 | 10.5 | 11.0 | 53.8 |
| 20/07/04 | 27/07/04 | 5.0 | 27.3 | 20.8 | 22.8 | 24.9 | 5.8 | 7.3 | 31.1 | 1.0 | <1.0 | 24.3 | 9.1 | 13.0 | 24.0 |
| 27/07/04 | 11/08/04 | 4.5 | 32.0 | 26.8 | 31.4 | 2.5 | 0.0 | 5.4 | 4.2 | 1.3 | <1.0 | 31.7 | 30.2 | 17.0 | 127.1 |
| 11/08/04 | 25/08/04 | 4.5 | 20.7 | 20.7 | 16.0 | 5.4 | 1.8 | 3.3 | 8.7 | 0.8 | <1.0 | 20.0 | 29.5 | 13.0 | 148.4 |
| 25/08/04 | 07/09/04 | 5.3 | 18.0 | 15.7 | 8.5 | 61.7 | 14.7 | 9.8 | 92.9 | 2.7 | <1.0 | 10.5 | 4.9 | 16.0 | 26.9 |
| 07/09/04 | 20/09/04 | 5.5 | 28.6 | 12.5 | 11.7 | 129.6 | 26.1 | 11.0 | 183.7 | 3.6 | <1.0 | 13.0 | 3.1 | 24.5 | 79.8 |
| 20/09/04 | 05/10/04 | 5.4 | 13.0 | 12.3 | 10.8 | 133.3 | 27.1 | 8.6 | 147.8 | 3.0 | <1.0 | - | 3.6 | 23.6 | 98.8 |
| 05/10/04 | 19/10/04 | 4.8 | 22.0 | 25.5 | 20.6 | 71.4 | 15.8 | 7.5 | 79.8 | 1.8 | <1.0 | 13.4 | 17.8 | 22.1 | 42.9 |
| 19/10/04 | 01/11/04 | 4.7 | 14.7 | 16.3 | 12.0 | 58.5 | 12.5 | 4.6 | 67.1 | 1.4 | <1.0 | 7.7 | 20.4 | 18.7 | 91.6 |
| 01/11/04 | 18/11/04 | 5.4 | 17.5 | 14.7 | 27.3 | 72.6 | 11.7 | 3.2 | 76.3 | 2.0 | <1.0 | 8.8 | 4.1 | 17.0 | 49.5 |
| 18/11/04 | 29/11/04 | 5.1 | 29.8 | 29.4 | 42.2 | 58.3 | 10.5 | 4.5 | 63.7 | 0.7 | <1.0 | 22.8 | 7.9 | 19.0 | 11.7 |
| 29/11/04 | 13/12/04 | 4.8 | 93.4 | 111.3 | 111.9 | 285.2 | 63.1 | 30.1 | 322.1 | 6.5 | <1.0 | 59.0 | 14.8 | 70.0 | 7.3 |
| 13/12/04 | 23/12/04 | 5.4 | 24.7 | 12.7 | 22.0 | 78.5 | 15.5 | 4.6 | 97.3 | 1.2 | <1.0 | 15.3 | 3.6 | 19.0 | 59.2 |
| 23/12/04 | 10/01/05 | 5.6 | 20.8 | 5.9 | 8.5 | 99.2 | 19.5 | 5.3 | 119.5 | 1.8 | <1.0 | 8.9 | 2.5 | 19.0 | 224.1 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5113 | | 23.6 | 16.5 | 17.9 | 70.1 | 14.1 | 6.6 | 82.2 | 1.8 | - | 16.4 | 10.6 | 18.5 | 1626.6 |

# Scoat Tarn

**2004**

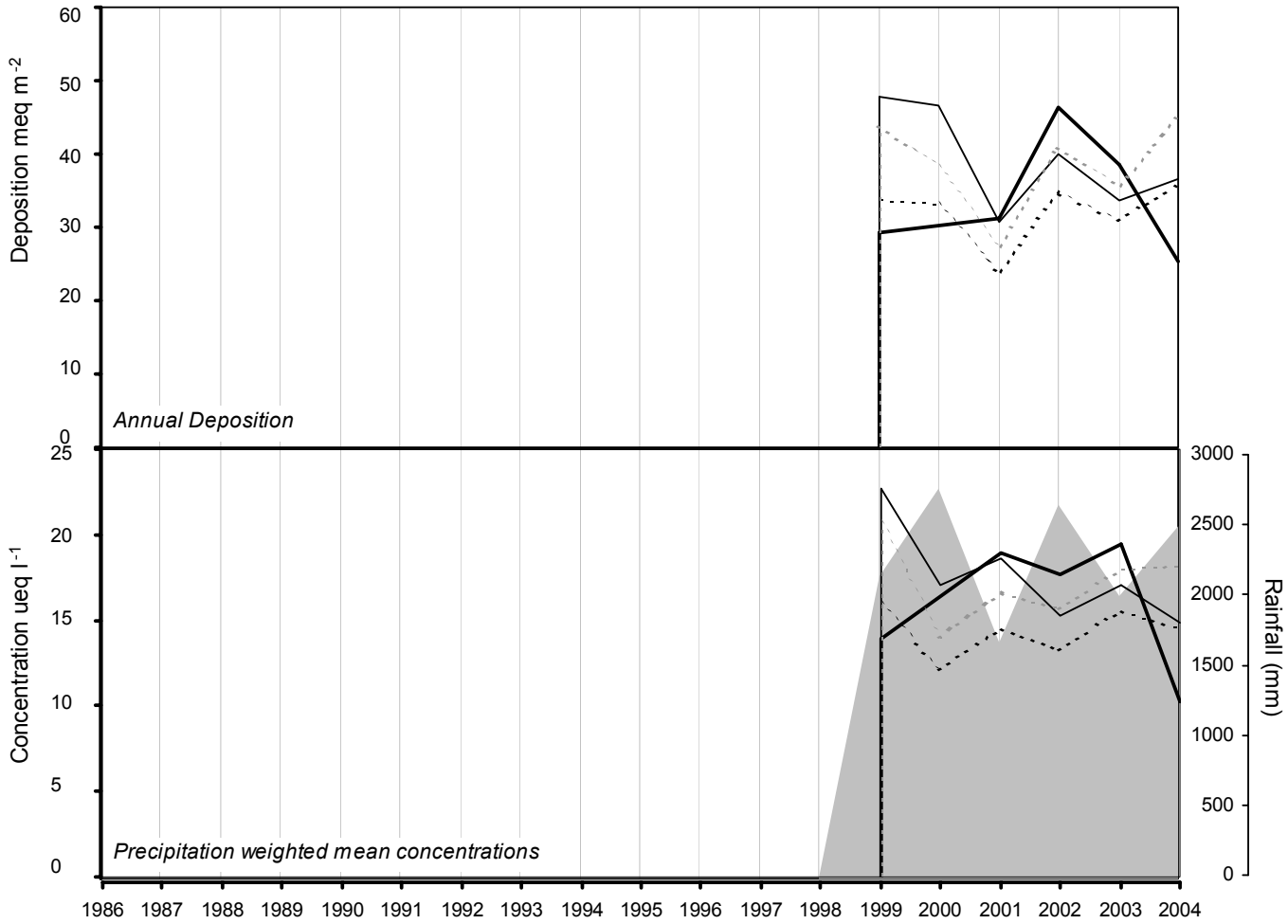
| | |
|---|---|
| *Site Code:* | **5159** |
| *Easting:* | **3158** |
| *Northing:* | **5103** |
| *Latitude:* | **54 48 10 N** |
| *Longitude:* | **03 30 10 W** |
| *Altitude (m):* | **595** |
| *Rainfall (mm):* | **-** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Grassland**

*Other measurements:*
**UKAWMN. Lakewater and soil chemistry**

*Site Operator:*
**ENSIS**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
0.00 ueq/l (0.00 %/year): 4 years' data
n/a Insufficient Data

*non-marine sulphate*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data

*nitrate*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data

*ammonium*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data



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## 5159 Scoat Tarn

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17/01/04 | 27/01/04 | 5.6 | 13.2 | 7.6 | 6.1 | 38.9 | 7.1 | 7.1 | 30.9 | 1.2 | <1.0 | 8.5 | 2.5 | <10.0 | 111.9 |
| 27/01/04 | 11/02/04 | 4.9 | 18.0 | 5.7 | <1.4 | 79.9 | 13.5 | 5.2 | 89.5 | 4.0 | <1.0 | 8.4 | 12.9 | 26.0 | 238.9 |
| 11/02/04 | 25/02/04 | 5.1 | 38.4 | 37.2 | 41.8 | 54.4 | 11.9 | 9.3 | 55.6 | 3.0 | <1.0 | 31.8 | 7.6 | 19.0 | 20.8 |
| 25/02/04 | 10/03/04 | 4.7 | 37.6 | 50.3 | 69.8 | 48.7 | 10.8 | 8.7 | 57.9 | 2.8 | <1.0 | 31.7 | 22.4 | 24.0 | 26.5 |
| 10/03/04 | 24/03/04 | 5.0 | 22.5 | 6.5 | 10.7 | 82.3 | 14.9 | 5.4 | 93.1 | 6.0 | <1.0 | 12.6 | 11.0 | 18.0 | 107.6 |
| 24/03/04 | 07/04/04 | 5.5 | 35.4 | 25.3 | 34.7 | 105.2 | 21.0 | 10.0 | 108.4 | <0.5 | <1.0 | 22.7 | 3.1 | 24.0 | 46.3 |
| 07/04/04 | 19/04/04 | 5.0 | 25.7 | 14.6 | 20.7 | 38.3 | 7.9 | 3.8 | 44.2 | 0.9 | <1.0 | 21.1 | 11.0 | 14.0 | 61.7 |
| 19/04/04 | 05/05/04 | 5.1 | 32.4 | 18.2 | 27.0 | 93.4 | 19.8 | 8.6 | 97.1 | 2.3 | <1.0 | 21.2 | 8.1 | 23.0 | 46.9 |
| 05/05/04 | 18/05/04 | 4.9 | 60.5 | 61.2 | 70.7 | 43.0 | 9.4 | 29.8 | 31.6 | 9.5 | <1.0 | 55.3 | 14.1 | 25.0 | 6.2 |
| 18/05/04 | 02/06/04 | 5.3 | 65.9 | 78.1 | 96.9 | 31.8 | 17.7 | 19.2 | 31.1 | 4.4 | <1.0 | 62.0 | 5.0 | 26.0 | 22.3 |
| 02/06/04 | 16/06/04 | 5.4 | 33.3 | 18.0 | 30.5 | 44.4 | 7.7 | 4.0 | 53.2 | 0.2 | <1.0 | 28.0 | 4.1 | 15.0 | 37.6 |
| 16/06/04 | 30/06/04 | 5.0 | 23.1 | 12.9 | 12.9 | 40.6 | 10.0 | 4.7 | 46.6 | 0.7 | <1.0 | 18.2 | 9.5 | 17.0 | 141.6 |
| 30/06/04 | 15/07/04 | 5.1 | 25.1 | 13.4 | 11.6 | 58.3 | 9.9 | 7.3 | 65.6 | 2.6 | <1.0 | 18.1 | 8.3 | 15.0 | 52.7 |
| 15/07/04 | 27/07/04 | 5.2 | 18.8 | 10.0 | 13.5 | 39.6 | 8.5 | 4.1 | 46.5 | 1.6 | <1.0 | 14.0 | 6.5 | 12.0 | 111.9 |
| 27/07/04 | 10/08/04 | 4.7 | 47.1 | 56.7 | 67.0 | 3.0 | 2.3 | 13.3 | 5.0 | 1.4 | <1.0 | 46.8 | 20.4 | 23.7 | 78.0 |
| 10/08/04 | 25/08/04 | 4.7 | 18.0 | 15.3 | 11.2 | 16.4 | 3.6 | 3.0 | 20.3 | 1.0 | <1.0 | 16.0 | 19.5 | 12.0 | 140.3 |
| 25/08/04 | 06/09/04 | 5.1 | 26.5 | 9.6 | 13.6 | 92.9 | 19.1 | 7.1 | 105.6 | 1.8 | <1.0 | 15.4 | 7.2 | 21.0 | 108.4 |
| 06/09/04 | 22/09/04 | 5.2 | 23.1 | 4.8 | 7.7 | 140.7 | 28.8 | 5.9 | 161.8 | 2.4 | <1.0 | 6.1 | 6.2 | 25.8 | 286.4 |
| 22/09/04 | 07/10/04 | 5.5 | 16.1 | 12.6 | 23.8 | 123.9 | 24.4 | 6.1 | 98.1 | 2.8 | <1.0 | 1.2 | 3.4 | 18.6 | 213.4 |
| 07/10/04 | 20/10/04 | 4.7 | 23.3 | 30.1 | 24.4 | 35.3 | 8.3 | 4.7 | 48.4 | 1.2 | <1.0 | 19.1 | 22.4 | 19.4 | 64.8 |
| 20/10/04 | 04/11/04 | 4.8 | 24.8 | 15.6 | 13.6 | 125.8 | 31.3 | 12.6 | 137.9 | 2.8 | <1.0 | 9.6 | 16.6 | 26.0 | 77.0 |
| 04/11/04 | 17/11/04 | 5.9 | 11.8 | 5.8 | 24.4 | 55.6 | 7.5 | 0.4 | 59.7 | 1.2 | <1.0 | 5.1 | 1.4 | 13.0 | 106.7 |
| 17/11/04 | 02/12/04 | 4.7 | 38.6 | 21.7 | 24.6 | 72.6 | 16.0 | 4.7 | 84.3 | 1.9 | <1.0 | 29.8 | 18.6 | 21.0 | 108.3 |
| 02/12/04 | 15/12/04 | 4.6 | 46.0 | 30.5 | 37.0 | 100.4 | 22.0 | 7.3 | 125.9 | 2.2 | <1.0 | 33.9 | 28.2 | 32.0 | 95.4 |
| 15/12/04 | 29/12/04 | 5.3 | 23.6 | 5.1 | 9.2 | 136.8 | 26.6 | 5.9 | 168.9 | 2.2 | <1.0 | 7.2 | 5.5 | 26.0 | 154.9 |
| 29/12/04 | 25/01/05 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5159 | | 24.6 | 14.6 | 18.3 | 80.3 | 16.3 | 6.1 | 88.1 | 2.3 | - | 14.9 | 10.3 | 20.4 | 2466.6 |

# Loch Dee

**2004**

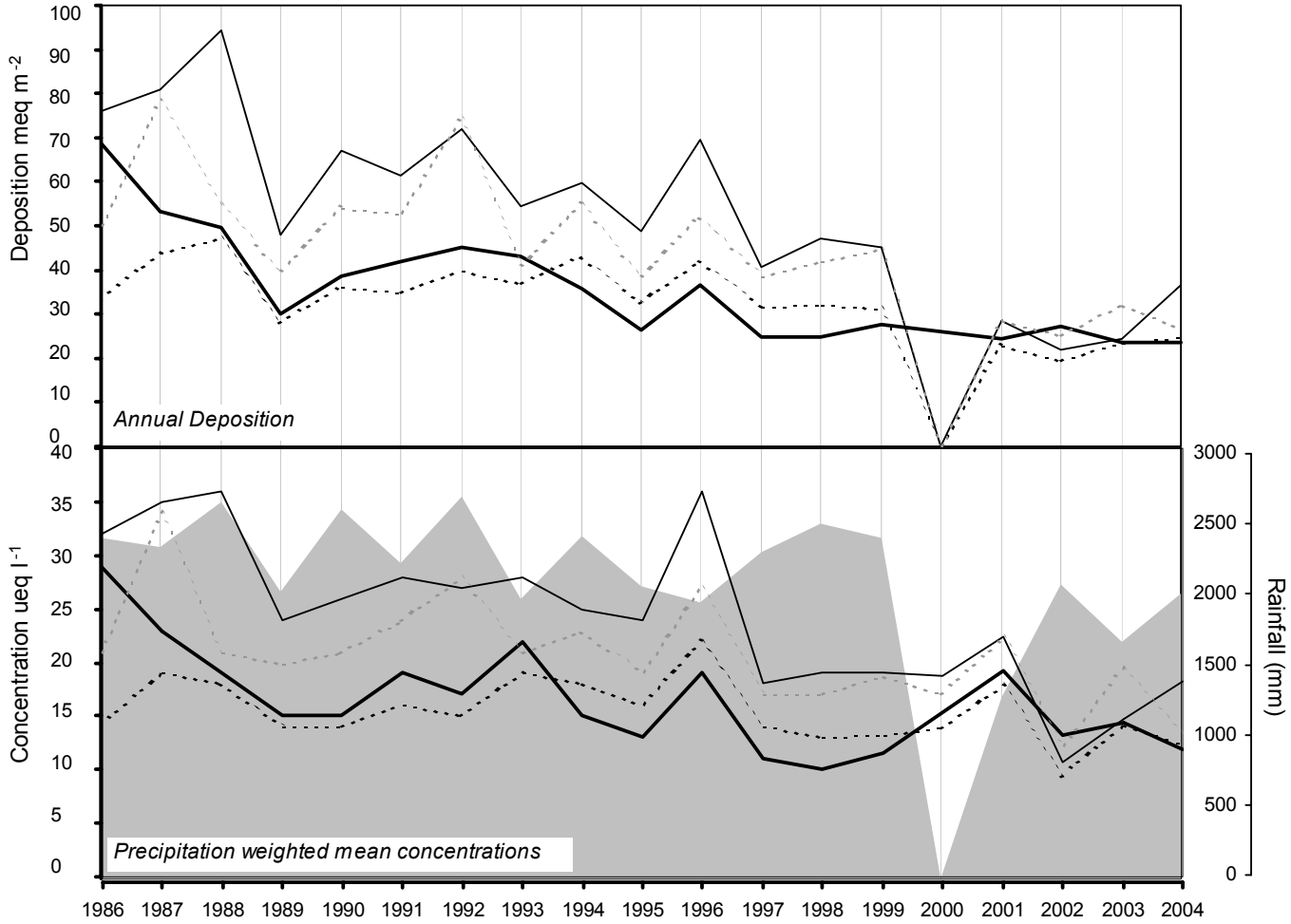
| | |
|---|---|
| *Site Code:* | **5107** |
| *Easting:* | **2468** |
| *Northing:* | **5779** |
| *Latitude:* | **55 04 19 N** |
| *Longitude:* | **04 23 59 W** |
| *Altitude (m):* | **230** |
| *Rainfall (mm):* | **1949** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland**

*Other measurements:*
**DT**

*Site Operator:*
**SEPA; West Region**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.55 ueq/l (-2.58 %/year): 18 years' data
++ Moderately strong trend detected

*non-marine sulphate*
-1.01 ueq/l (-3.03 %/year): 19 years' data
+++ Strong trend detected

*nitrate*
-0.20 ueq/l (-1.14 %/year): 19 years' data
- No significant trend detected

*ammonium*
-0.54 ueq/l (-2.10 %/year): 19 years' data
++ Moderately strong trend detected



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## 5107 Loch Dee

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/01/04 | 20/01/04 | 5.5 | 7.2 | 1.6 | 3.1 | 78.5 | 15.7 | 4.8 | 48.1 | 2.2 | <1.0 | - | 3.3 | 15.0 | 143.6 |
| 20/01/04 | 03/02/04 | 5.2 | 23.5 | 5.9 | 5.7 | 71.2 | 13.0 | 2.7 | 70.4 | 1.3 | <1.0 | 15.0 | 6.3 | 14.0 | 140.6 |
| 03/02/04 | 18/02/04 | 5.6 | 57.0 | 10.0 | 6.5 | 329.0 | 68.1 | 19.4 | 365.0 | 9.2 | <1.0 | 17.4 | 2.3 | 53.0 | 12.8 |
| 18/02/04 | 02/03/04 | 5.6 | 23.9 | 10.5 | 23.2 | 132.6 | 20.3 | 5.1 | 146.3 | 8.0 | <1.0 | 8.0 | 2.4 | 24.0 | 4.9 |
| 02/03/04 | 17/03/04 | 4.7 | 37.3 | 33.5 | 41.1 | 107.7 | 22.9 | 7.7 | 107.4 | 4.1 | <1.0 | 24.3 | 20.0 | 29.0 | 119.7 |
| 17/03/04 | 30/03/04 | 5.1 | 10.9 | 1.2 | <1.4 | 112.9 | 23.6 | 9.6 | 56.0 | 3.8 | <1.0 | - | 8.3 | 22.0 | 75.9 |
| 30/03/04 | 13/04/04 | 5.3 | 35.8 | 26.7 | 38.0 | 116.1 | 24.4 | 15.7 | 130.2 | 2.6 | 38.9 | 21.8 | 4.9 | 27.0 | 37.6 |
| 13/04/04 | 28/04/04 | 5.1 | 20.1 | 9.1 | 14.2 | 72.4 | 13.1 | 4.7 | 71.0 | 1.3 | <1.0 | 11.4 | 7.4 | 16.0 | 121.5 |
| 28/04/04 | 11/05/04 | 6.6 | 54.1 | 11.1 | 327.1 | 45.1 | 7.0 | 1.6 | 52.6 | 44.9 | 114.2 | 48.7 | 0.3 | 52.0 | 58.0 |
| 11/05/04 | 25/05/04 | 7.6 | 278.6 | 43.4 | 2895.5 | 151.3 | 38.1 | 13.6 | 154.0 | 200.6 | 132.0 | 260.4 | 0.0 | 396.0 | 4.6 |
| 25/05/04 | 08/06/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.5 |
| 08/06/04 | 22/06/04 | 6.7 | 71.7 | 15.1 | 164.0 | 84.5 | 13.2 | 12.3 | 98.5 | 25.2 | 96.8 | 61.6 | 0.2 | 39.0 | 19.1 |
| 22/06/04 | 06/07/04 | 4.8 | 19.1 | 10.7 | 7.8 | 31.4 | 7.6 | 7.0 | 39.4 | <0.3 | <1.0 | 15.3 | 17.8 | 12.0 | 127.9 |
| 06/07/04 | 20/07/04 | 4.6 | 22.1 | 20.8 | 9.1 | 16.4 | 3.9 | 4.3 | 15.1 | 1.0 | <1.0 | 20.2 | 26.9 | 16.2 | 27.1 |
| 20/07/04 | 03/08/04 | 4.7 | 25.1 | 15.6 | 16.7 | 20.5 | 4.0 | 2.4 | 29.2 | 5.9 | <1.0 | 22.6 | 21.4 | 13.0 | 51.6 |
| 03/08/04 | 18/08/04 | 4.6 | 28.4 | 20.1 | 13.5 | 11.2 | <0.8 | 2.6 | 7.8 | 0.8 | <1.0 | 27.1 | 25.1 | 12.0 | 139.3 |
| 18/08/04 | 01/09/04 | 4.9 | 20.8 | 12.7 | 10.6 | 40.9 | 9.6 | 5.3 | 47.0 | 1.2 | <1.0 | 15.9 | 12.9 | 15.0 | 85.8 |
| 01/09/04 | 14/09/04 | 7.2 | 120.1 | 17.8 | 1022.9 | 198.9 | 12.9 | 1.7 | 235.1 | 162.6 | 266.3 | 96.1 | 0.1 | 159.4 | 91.5 |
| 14/09/04 | 29/09/04 | 6.2 | 31.1 | 3.3 | 48.8 | 157.3 | 26.6 | 5.7 | 178.7 | 23.1 | 44.3 | 12.2 | 0.7 | 36.0 | 185.5 |
| 29/09/04 | 13/10/04 | 7.0 | 230.4 | <1.4 | 3377.6 | 281.3 | 191.0 | 590.3 | 227.7 | 132.5 | 602.9 | 196.5 | 0.1 | 485.0 | 125.6 |
| 13/10/04 | 27/10/04 | 5.2 | 11.3 | 9.6 | 2.5 | 52.3 | 9.5 | 5.0 | 49.9 | 3.9 | <1.0 | 5.0 | 6.0 | 12.4 | 71.8 |
| 27/10/04 | 10/11/04 | 6.9 | 48.0 | 31.8 | 131.3 | 118.1 | 19.9 | 10.4 | 143.0 | 29.1 | 51.9 | 33.7 | 0.1 | 52.0 | 61.1 |
| 10/11/04 | 26/11/04 | 5.1 | 26.1 | 5.1 | 10.7 | 120.4 | 19.7 | 12.2 | 126.6 | 1.9 | <1.0 | 11.6 | 7.9 | 21.0 | 39.8 |
| 26/11/04 | 09/12/04 | 4.8 | 29.0 | 18.2 | 21.5 | 56.7 | 12.0 | 8.3 | 72.2 | 1.3 | <1.0 | 22.2 | 15.8 | 17.0 | 65.1 |
| 09/12/04 | 29/12/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 29/12/04 | 12/01/05 | 5.4 | 58.4 | 12.8 | 21.8 | 298.5 | 66.7 | 14.2 | 388.5 | 5.9 | <1.0 | 22.4 | 4.5 | 57.0 | 179.5 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5107 | | 26.5 | 12.4 | 13.5 | 94.4 | 19.6 | 6.7 | 101.7 | 2.6 | - | 18.3 | 11.8 | 21.8 | 1990.2 |

# Beaghs Burn

**2004**

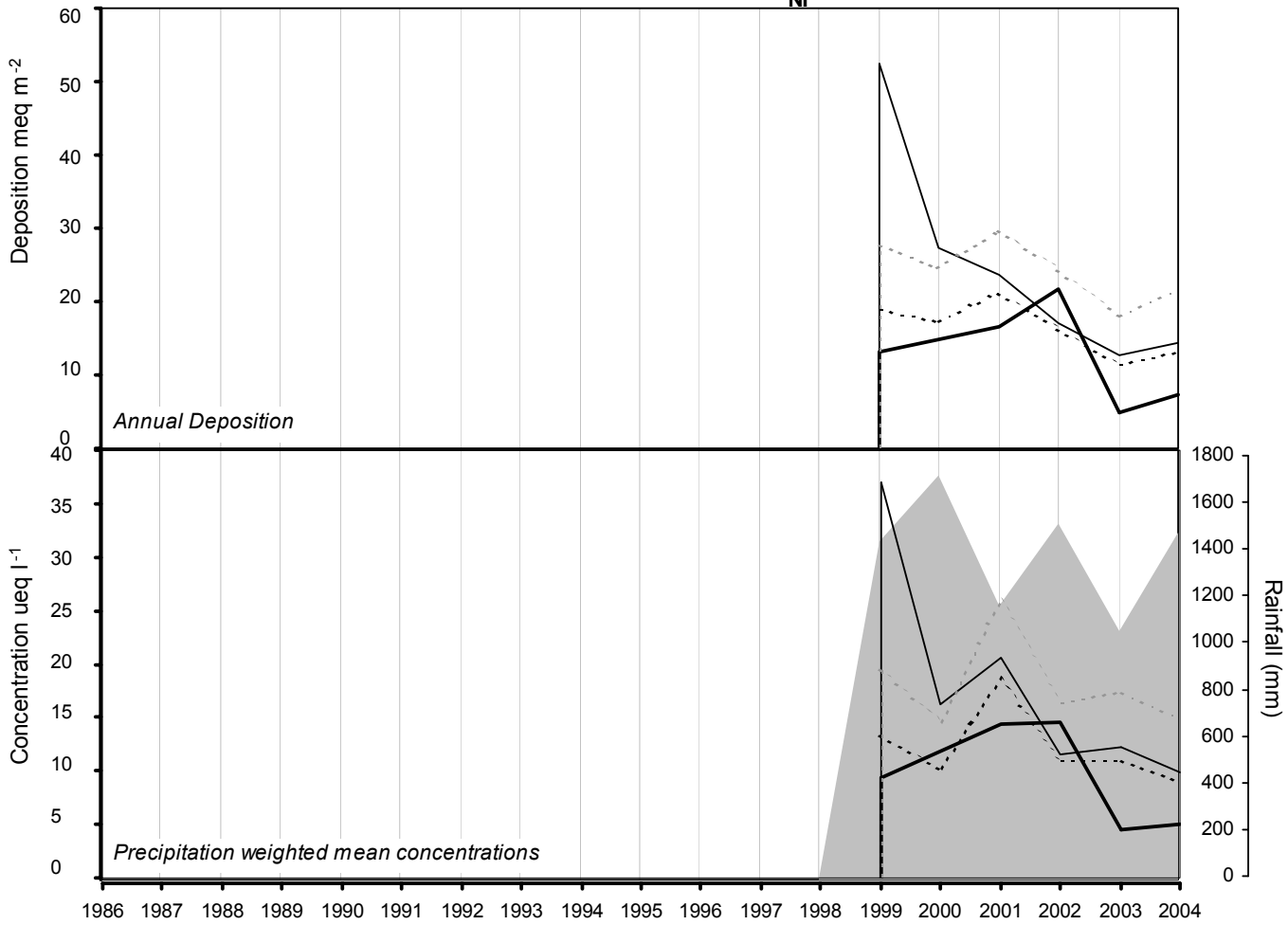
| | |
|---|---|
| *Site Code:* | **5155** |
| *Easting:* | **1345** |
| *Northing:* | **5865** |
| *Latitude:* | **55 05 00 N** |
| *Longitude:* | **00 06 11 W** |
| *Altitude (m):* | **250** |
| *Rainfall (mm):* | **-** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Turbary, open peat cutting.**

*Other measurements:*
**UKAWMN**

*Site Operator:*
**Department of Agriculture and Rural Development NI**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
0.00 ueq/l (0.00 %/year): 4 years' data
n/a Insufficient Data

*non-marine sulphate*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data

*nitrate*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data

*ammonium*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data



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## 5155 Beaghs Burn

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13/01/04 | 27/01/04 | 5.6 | 11.6 | 4.1 | 8.5 | 78.1 | 14.8 | 5.1 | 82.2 | 2.3 | <1.0 | 2.2 | 2.6 | 14.0 | 86.4 |
| 27/01/04 | 10/02/04 | 5.5 | 38.0 | 2.0 | 6.8 | 438.9 | 95.2 | 17.4 | 266.9 | 9.5 | <1.0 | - | 3.0 | 69.0 | 97.1 |
| 10/02/04 | 24/02/04 | 6.1 | 30.7 | 8.7 | 30.5 | 104.4 | 16.6 | 6.1 | 116.1 | 5.6 | <1.0 | 18.1 | 0.9 | 20.0 | 13.1 |
| 24/02/04 | 09/03/04 | 5.8 | 41.3 | 11.9 | 27.6 | 231.1 | 50.5 | 18.3 | 254.7 | 6.2 | <1.0 | 13.4 | 1.5 | 41.0 | 10.7 |
| 09/03/04 | 23/03/04 | 5.5 | 26.3 | 11.2 | 13.3 | 130.4 | 29.4 | 9.5 | 149.7 | 2.5 | <1.0 | 10.6 | 3.0 | 25.0 | 97.6 |
| 23/03/04 | 06/04/04 | 5.6 | 36.5 | 14.8 | 24.0 | 199.2 | 40.4 | 10.1 | 208.6 | 3.7 | <1.0 | 12.5 | 2.3 | 34.0 | 54.1 |
| 06/04/04 | 20/04/04 | 6.0 | 10.7 | 3.2 | 9.1 | 59.9 | 18.2 | 4.7 | 60.0 | 1.7 | <1.0 | 3.5 | 1.1 | 14.7 | 58.3 |
| 20/04/04 | 04/05/04 | 5.5 | 31.0 | 11.1 | 19.0 | 110.5 | 22.3 | 8.9 | 121.1 | 2.2 | <1.0 | 17.6 | 3.2 | 23.0 | 38.4 |
| 04/05/04 | 18/05/04 | 6.3 | 58.3 | 16.1 | 192.3 | 94.3 | 11.1 | 2.8 | 101.3 | 54.1 | 116.0 | 46.9 | 0.5 | 44.0 | 28.7 |
| 18/05/04 | 01/06/04 | 6.2 | 183.9 | 20.0 | 1618.6 | 333.9 | 53.4 | 23.6 | 297.2 | 336.2 | 222.7 | 143.7 | 0.6 | 291.0 | 4.7 |
| 01/06/04 | 14/06/04 | 5.8 | 16.8 | 10.7 | 38.3 | 30.9 | 1.8 | <1.0 | 66.1 | 2.4 | <1.0 | 13.1 | 1.7 | 11.0 | 30.8 |
| 14/06/04 | 29/06/04 | 5.2 | 23.1 | 14.8 | 14.9 | 90.9 | 10.1 | 3.0 | 100.2 | 1.1 | <1.0 | 12.1 | 6.0 | 15.0 | 116.1 |
| 29/06/04 | 27/07/04 | 5.5 | 17.5 | 5.1 | 13.0 | 44.8 | 5.0 | 0.5 | 50.1 | 5.4 | <1.0 | 12.1 | 3.0 | <10.0 | 99.8 |
| 27/07/04 | 10/08/04 | 4.4 | 30.2 | 35.1 | 28.8 | 23.2 | 4.6 | 7.4 | 29.8 | 3.7 | <1.0 | 27.4 | 38.9 | 16.0 | 22.5 |
| 10/08/04 | 24/08/04 | 4.6 | 33.8 | 27.5 | 29.8 | 51.7 | 11.6 | 5.1 | 58.8 | 1.8 | <1.0 | 27.6 | 24.5 | 23.0 | 84.5 |
| 24/08/04 | 07/09/04 | 5.6 | 22.4 | 7.8 | 10.4 | 107.4 | 22.0 | 6.8 | 141.5 | 2.5 | <1.0 | 9.4 | 2.5 | 22.0 | 32.6 |
| 07/09/04 | 21/09/04 | 5.7 | 21.3 | 3.8 | 21.4 | 206.1 | 41.2 | 11.1 | 211.7 | 5.3 | <1.0 | - | 1.8 | 36.0 | 74.3 |
| 21/09/04 | 05/10/04 | 5.7 | 8.0 | 8.9 | 1.9 | 129.2 | 26.9 | 8.5 | 108.6 | 4.3 | <1.0 | - | 2.2 | 16.4 | 41.3 |
| 05/10/04 | 19/10/04 | 5.2 | 17.5 | 11.1 | <0.7 | 138.4 | 28.8 | 8.4 | 141.9 | 3.2 | <1.0 | 0.8 | 6.0 | 24.5 | 87.6 |
| 19/10/04 | 02/11/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 02/11/04 | 16/11/04 | 5.4 | 37.2 | 7.5 | 17.6 | 268.8 | 56.1 | 11.3 | 333.8 | 5.8 | <1.0 | 4.9 | 4.4 | 44.0 | 98.7 |
| 16/11/04 | 30/11/04 | 5.4 | 16.3 | 4.3 | 10.6 | 84.2 | 13.0 | 2.9 | 96.7 | 1.2 | <1.0 | 6.2 | 4.5 | 15.0 | 76.4 |
| 30/11/04 | 14/12/04 | 5.8 | 21.0 | 16.9 | 51.8 | 40.8 | 6.2 | 3.0 | 43.5 | 1.4 | <1.0 | 16.1 | 1.4 | 14.0 | 26.3 |
| 14/12/04 | 04/01/05 | 5.7 | 43.1 | 2.4 | 10.8 | 304.7 | 64.9 | 13.9 | 324.9 | 6.2 | <1.0 | 6.4 | 1.8 | 55.0 | 177.8 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5155 | | 26.5 | 9.0 | 14.9 | 161.3 | 32.8 | 8.1 | 162.9 | 3.9 | - | 9.9 | 5.0 | 29.4 | 1457.7 |

# Redesdale

**2004**

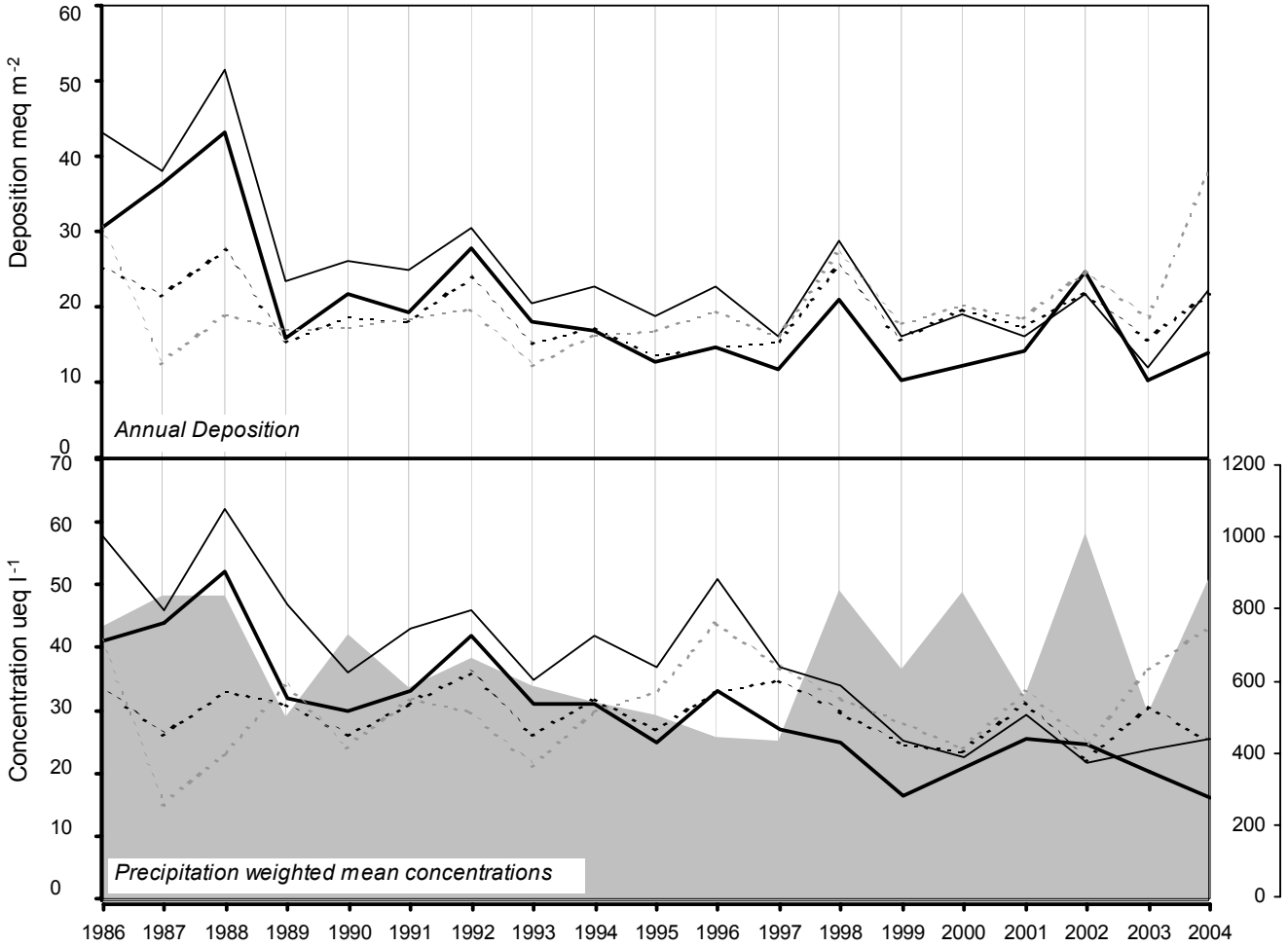
| | |
|---|---|
| *Site Code:* | **5109** |
| *Easting:* | **3833** |
| *Northing:* | **5954** |
| *Latitude:* | **55 14 59 N** |
| *Longitude:* | **02 15 46 W** |
| *Altitude (m):* | **240** |
| *Rainfall (mm):* | **875** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland, very open sheep farming land**

*Other measurements:*
**DT**

*Site Operator:*
**ADAS Redesdale**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-1.41 ueq/l (-3.30 %/year): 18 years' data
+++ Strong trend detected

*non-marine sulphate*
-1.79 ueq/l (-3.31 %/year): 19 years' data
+++ Strong trend detected

*nitrate*
-0.28 ueq/l (-0.87 %/year): 19 years' data
- No significant trend detected

*ammonium*
0.42 ueq/l (1.55 %/year): 19 years' data
- No significant trend detected



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## 5109 Redesdale

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13/01/04 | 22/01/04 | 5.1 | 12.6 | 13.1 | 11.6 | 55.5 | 11.4 | 6.2 | 49.4 | 2.3 | <1.0 | 5.9 | 8.1 | 15.0 | 28.4 |
| 22/01/04 | 11/02/04 | 6.7 | 68.5 | 8.6 | 131.9 | 76.7 | 34.9 | 39.3 | 112.2 | 36.8 | 7.6 | 59.3 | 0.2 | 46.0 | 88.8 |
| 11/02/04 | 24/02/04 | 6.8 | 36.4 | 25.1 | 26.1 | 110.5 | 26.7 | 495.8 | 65.0 | 12.1 | <1.0 | 23.1 | 0.1 | 82.0 | 6.3 |
| 24/02/04 | 15/03/04 | 4.3 | 50.7 | 45.5 | 30.5 | 149.9 | 19.8 | 23.3 | 123.2 | 15.3 | <1.0 | 32.6 | 45.7 | 52.0 | 16.2 |
| 15/03/04 | 23/03/04 | 4.9 | 16.8 | 6.1 | <1.4 | 73.6 | 17.4 | 2.5 | 97.4 | 1.6 | <1.0 | 7.9 | 11.5 | 18.0 | 39.0 |
| 23/03/04 | 06/04/04 | 6.6 | 80.5 | 66.7 | 385.0 | 228.1 | 10.8 | 9.6 | 120.1 | 51.4 | <1.0 | 53.1 | 0.3 | 74.0 | 18.8 |
| 06/04/04 | 20/04/04 | 6.1 | 16.6 | 13.9 | 53.4 | 12.4 | 1.5 | 1.7 | 15.4 | 1.0 | <1.0 | 15.1 | 0.8 | <10.0 | 20.2 |
| 20/04/04 | 06/05/04 | 5.3 | 34.8 | 39.2 | 55.6 | 53.4 | 12.9 | 12.4 | 56.0 | 1.6 | <1.0 | 28.4 | 5.5 | 20.0 | 19.8 |
| 06/05/04 | 18/05/04 | 4.4 | 171.0 | 163.7 | 215.4 | 57.9 | 25.9 | 76.7 | 61.6 | 6.8 | 5.4 | 164.0 | 36.3 | 60.0 | 3.0 |
| 18/05/04 | 01/06/04 | 5.7 | 103.1 | 105.3 | 82.6 | 78.7 | 24.6 | 54.7 | 94.1 | 7.2 | <1.0 | 93.6 | 1.9 | 12.0 | 10.3 |
| 01/06/04 | 15/06/04 | 5.4 | 20.1 | 13.1 | <1.4 | 46.9 | 9.2 | 21.4 | 39.9 | 1.6 | <1.0 | 14.4 | 4.2 | 13.0 | 10.7 |
| 15/06/04 | 29/06/04 | 4.7 | 22.4 | 15.2 | 7.4 | 13.5 | 3.2 | 7.2 | 17.9 | <0.5 | <1.0 | 20.8 | 21.4 | 12.0 | 45.8 |
| 29/06/04 | 13/07/04 | 5.1 | 20.6 | 10.3 | 3.5 | 27.4 | 5.7 | 4.8 | 37.0 | 2.8 | <1.0 | 17.3 | 8.9 | 10.0 | 40.5 |
| 13/07/04 | 29/07/04 | 4.8 | 32.5 | 34.0 | 44.4 | 24.1 | 6.7 | 11.5 | 35.1 | 3.3 | <1.0 | 29.5 | 14.8 | 15.0 | 10.7 |
| 29/07/04 | 10/08/04 | 4.4 | 46.4 | 49.8 | 63.2 | 1.7 | 2.2 | 13.1 | 8.8 | 1.9 | <1.0 | 46.2 | 38.9 | 25.0 | 69.0 |
| 10/08/04 | 24/08/04 | 4.3 | 35.6 | 33.4 | 29.0 | 7.9 | 2.8 | 5.4 | 11.8 | 0.9 | <1.0 | 34.6 | 46.8 | 22.0 | 98.8 |
| 24/08/04 | 07/09/04 | 5.2 | 31.5 | 16.9 | 23.6 | 73.6 | 15.3 | 8.6 | 81.0 | 1.9 | <1.0 | 22.6 | 6.8 | 21.0 | 10.8 |
| 07/09/04 | 21/09/04 | 5.2 | 19.3 | 12.8 | 10.4 | 88.9 | 16.4 | 8.4 | 120.1 | 6.0 | <1.0 | 8.6 | 6.2 | 17.3 | 41.1 |
| 21/09/04 | 05/10/04 | 5.5 | 19.6 | 15.5 | 14.6 | 115.5 | 23.9 | 8.2 | 119.9 | 3.1 | <1.0 | 5.7 | 3.5 | 21.9 | 36.7 |
| 05/10/04 | 19/10/04 | 5.0 | 26.3 | 34.9 | 34.0 | 73.0 | 13.7 | 9.4 | 78.3 | 9.2 | <1.0 | 17.5 | 10.5 | 21.7 | 47.1 |
| 19/10/04 | 02/11/04 | 4.6 | 20.8 | 32.4 | 10.4 | 51.3 | 9.3 | 5.0 | 51.0 | 1.4 | <1.0 | 14.6 | 27.5 | 22.0 | 74.3 |
| 02/11/04 | 16/11/04 | 4.7 | 30.4 | 29.4 | 16.5 | 112.2 | 20.6 | 11.6 | 118.3 | 3.0 | <1.0 | 16.9 | 19.5 | 30.0 | 1.8 |
| 16/11/04 | 02/12/04 | 6.1 | 44.5 | 31.3 | 57.4 | 183.0 | 28.5 | 12.4 | 216.3 | 23.0 | <1.0 | 22.4 | 0.8 | 40.0 | 11.8 |
| 02/12/04 | 14/12/04 | 4.4 | 121.5 | 100.1 | 145.7 | 333.9 | 73.7 | 28.7 | 386.1 | 8.3 | <1.0 | 81.3 | 39.8 | - | 2.2 |
| 14/12/04 | 29/12/04 | 5.4 | 31.3 | 9.3 | 19.9 | 118.8 | 25.2 | 8.3 | 147.2 | 3.1 | <1.0 | 17.0 | 3.7 | 24.0 | 34.3 |
| 29/12/04 | 24/01/05 | 5.6 | 22.8 | 9.7 | 9.8 | 182.8 | 39.5 | 9.9 | 214.6 | 4.9 | <1.0 | 0.8 | 2.5 | 32.0 | 87.8 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5109 | | 34.3 | 24.8 | 43.5 | 72.6 | 16.4 | 15.8 | 82.9 | 8.0 | - | 25.5 | 16.0 | 25.9 | 874.2 |

# Eskdalemuir

**2004**

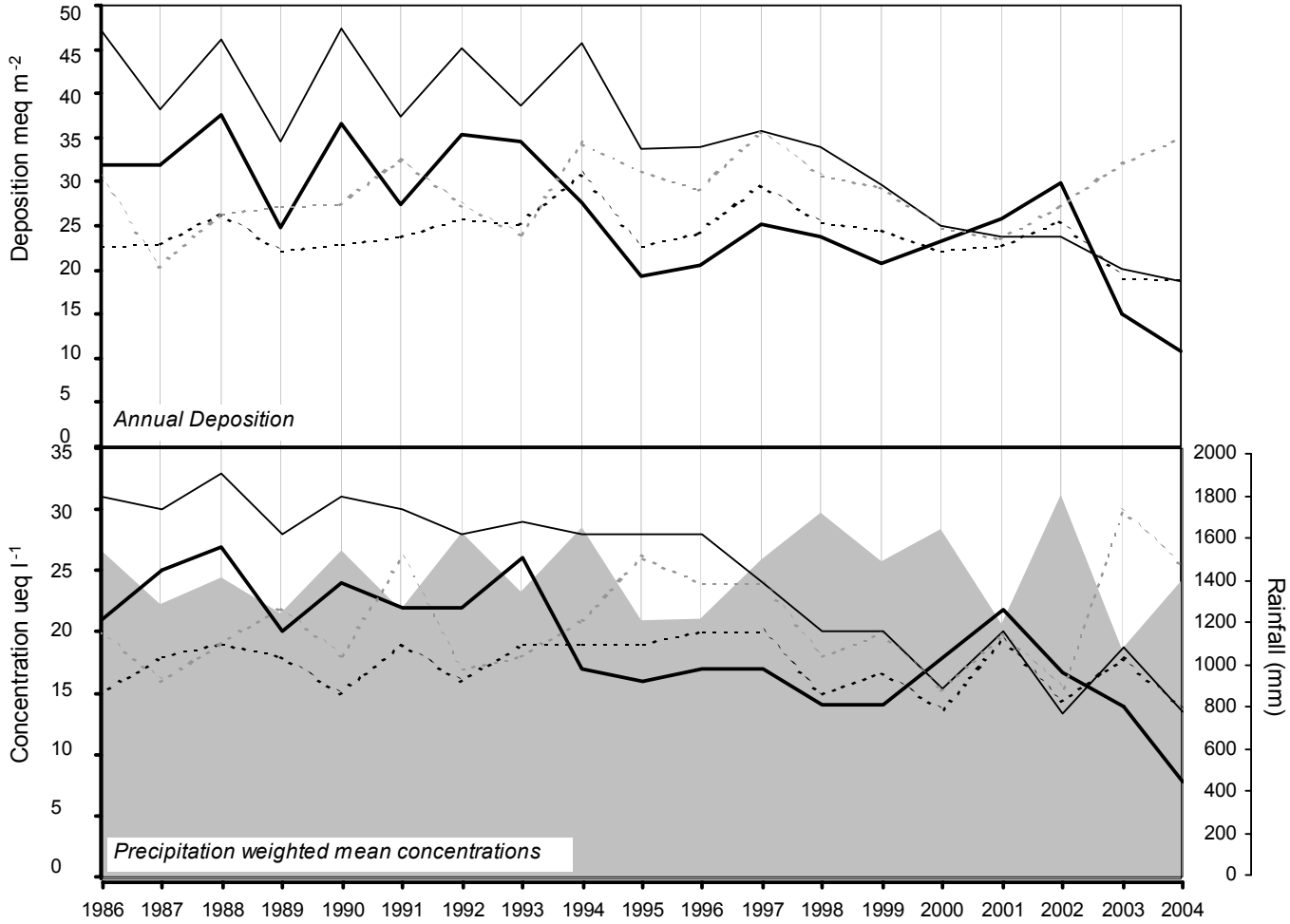
| | |
|---|---|
| *Site Code:* | **5002** |
| *Easting:* | **3235** |
| *Northing:* | **6030** |
| *Latitude:* | **55 18 54 N** |
| *Longitude:* | **03 12 20 W** |
| *Altitude (m):* | **259** |
| *Rainfall (mm):* | **1745** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland, Met Office Observatory**

*Other measurements:*
**Daily Bulk, DT, SO2, Daily SO4, HNO3 Denuder, ozone, Met, EMEP**

*Site Operator:*
**Meteorological Office**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.68 ueq/l (-2.71 %/year): 18 years' data
++ Moderately strong trend detected

*non-marine sulphate*
-1.02 ueq/l (-3.01 %/year): 19 years' data
++++ Very strong trend detected

*nitrate*
-0.09 ueq/l (-0.52 %/year): 19 years' data
- No significant trend detected

*ammonium*
0.18 ueq/l (0.93 %/year): 19 years' data
- No significant trend detected



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## 5002 Eskdalemuir

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/01/04 | 28/01/04 | 5.1 | 13.8 | 13.0 | 13.5 | 52.0 | 11.3 | 4.8 | 55.6 | 4.5 | <1.0 | 7.6 | 7.4 | 13.0 | 37.4 |
| 28/01/04 | 11/02/04 | 5.3 | 15.7 | 5.9 | 2.8 | 84.0 | 15.6 | 3.0 | 96.4 | 2.4 | <1.0 | 5.5 | 5.2 | 16.0 | 134.5 |
| 11/02/04 | 25/02/04 | 4.7 | 50.2 | 46.9 | 74.2 | 63.1 | 11.8 | 5.6 | 88.6 | 1.8 | <1.0 | 42.6 | 18.6 | 31.0 | 6.8 |
| 25/02/04 | 11/03/04 | 5.0 | 41.2 | 54.7 | 78.3 | 62.5 | 16.7 | 8.6 | 67.7 | 1.8 | <1.0 | 33.7 | 11.2 | 26.0 | 26.1 |
| 11/03/04 | 24/03/04 | 5.5 | 13.9 | 5.8 | 6.4 | 61.8 | 11.1 | 6.1 | 62.4 | 1.0 | <1.0 | 6.4 | 3.5 | 13.0 | 103.1 |
| 24/03/04 | 21/04/04 | 5.3 | 19.2 | 16.2 | 22.1 | 37.6 | 6.6 | 3.4 | 40.2 | 0.4 | <1.0 | 14.7 | 5.5 | 12.0 | 124.0 |
| 21/04/04 | 05/05/04 | 5.8 | 19.7 | 10.6 | 19.2 | 69.2 | 11.6 | 6.6 | 67.7 | 1.7 | <1.0 | 11.4 | 1.7 | 14.0 | 37.8 |
| 05/05/04 | 19/05/04 | 4.4 | 56.7 | 46.5 | 36.5 | 8.7 | 4.2 | 11.3 | 7.4 | 1.8 | <1.0 | 55.7 | 37.2 | 25.0 | 12.8 |
| 19/05/04 | 02/06/04 | 6.9 | 66.3 | 47.4 | 437.9 | 34.2 | 3.0 | <1.4 | 31.9 | 33.5 | 64.9 | 62.2 | 0.1 | 152.0 | 17.0 |
| 02/06/04 | 16/06/04 | 5.6 | 21.4 | 16.6 | 28.6 | 25.3 | 6.3 | 3.9 | 33.5 | 1.8 | <1.0 | 18.4 | 2.5 | 10.0 | 11.6 |
| 16/06/04 | 30/06/04 | 6.5 | 48.8 | 10.7 | 176.8 | 18.4 | 4.2 | 6.8 | 29.7 | 18.9 | <1.0 | 46.6 | 0.3 | 32.0 | 84.5 |
| 30/06/04 | 14/07/04 | 6.1 | 43.2 | 22.0 | 59.9 | 28.8 | 4.7 | 3.2 | 42.0 | 11.1 | 16.8 | 39.7 | 0.8 | 19.0 | 24.5 |
| 14/07/04 | 28/07/04 | 4.9 | 25.7 | 21.6 | 19.4 | 24.1 | 4.8 | 7.1 | 23.0 | 2.3 | <1.0 | 22.8 | 11.5 | 14.8 | 31.0 |
| 28/07/04 | 11/08/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 11/08/04 | 25/08/04 | 4.7 | 14.6 | 16.1 | 4.3 | 6.0 | 1.8 | 2.2 | 9.7 | 1.1 | <1.0 | 13.9 | 20.0 | 10.0 | 70.0 |
| 25/08/04 | 08/09/04 | 5.4 | 23.6 | 17.1 | 22.5 | 85.3 | 17.0 | 6.4 | 95.1 | 1.6 | <1.0 | 13.3 | 4.4 | 21.0 | 27.0 |
| 08/09/04 | 22/09/04 | 5.5 | 16.6 | 5.3 | 5.1 | 92.7 | 18.6 | 5.3 | 101.6 | 1.4 | <1.0 | 5.5 | 3.5 | 17.4 | 60.6 |
| 22/09/04 | 06/10/04 | 5.4 | 13.1 | 13.5 | 12.5 | 77.9 | 15.0 | 4.1 | 75.3 | 2.4 | <1.0 | 3.7 | 4.2 | 15.5 | 74.4 |
| 06/10/04 | 20/10/04 | 4.7 | 21.8 | 28.1 | 19.6 | 36.7 | 6.6 | 4.2 | 35.0 | 2.0 | <1.0 | 17.4 | 20.9 | 19.0 | 38.2 |
| 20/10/04 | 03/11/04 | 4.6 | 14.8 | 18.0 | 5.9 | 37.5 | 7.9 | 3.3 | 41.8 | 0.7 | <1.0 | 10.3 | 23.4 | 15.7 | 90.9 |
| 03/11/04 | 17/11/04 | 5.3 | 13.6 | 9.9 | 16.7 | 60.5 | 11.0 | 5.3 | 65.5 | 1.3 | <1.0 | 6.3 | 5.2 | 14.0 | 29.7 |
| 17/11/04 | 01/12/04 | 4.8 | 29.0 | 24.5 | 29.2 | 68.8 | 13.1 | 3.2 | 75.1 | 1.0 | <1.0 | 20.7 | 16.6 | 20.0 | 42.4 |
| 01/12/04 | 15/12/04 | 4.8 | 57.0 | 57.9 | 75.0 | 105.0 | 22.6 | 8.6 | 134.2 | 4.5 | <1.0 | 44.4 | 17.8 | 34.0 | 28.6 |
| 15/12/04 | 29/12/04 | 5.3 | 19.0 | 6.0 | 7.8 | 102.9 | 27.3 | 20.6 | 119.3 | 1.9 | <1.0 | 6.6 | 5.1 | 20.0 | 88.7 |
| 29/12/04 | 12/01/05 | 6.0 | 25.7 | 4.4 | 11.4 | 169.8 | 37.3 | 10.4 | 214.1 | 3.9 | <1.0 | 5.3 | 1.0 | 32.0 | 179.6 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5002 | | 22.3 | 13.7 | 25.3 | 73.1 | 15.3 | 6.5 | 84.5 | 3.0 | - | 13.5 | 7.7 | 19.3 | 1381.1 |

# Whiteadder

**2004**

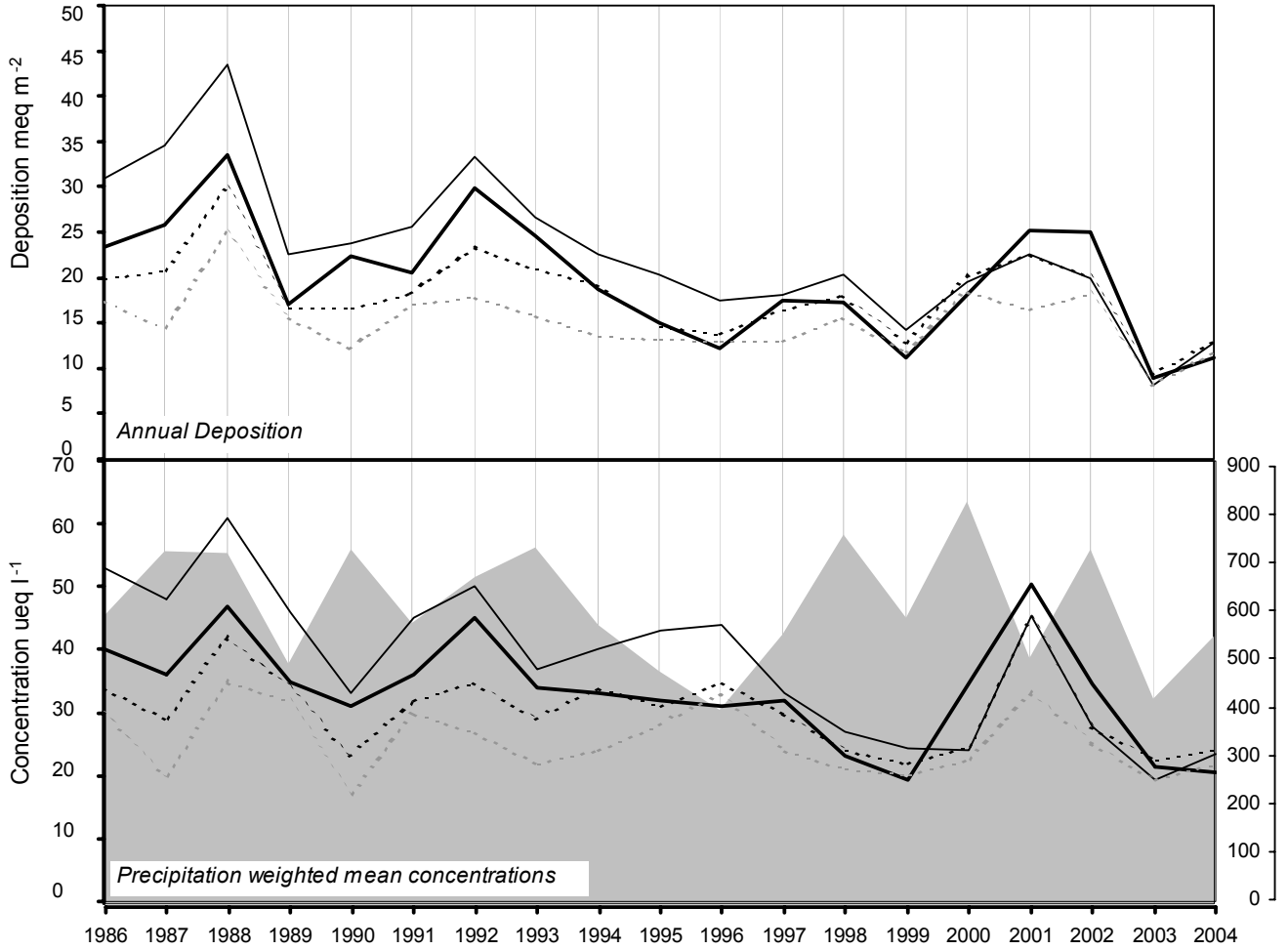
| | |
|---|---|
| *Site Code:* | **5106** |
| *Easting:* | **3664** |
| *Northing:* | **6633** |
| *Latitude:* | **55 51 42 N** |
| *Longitude:* | **03 32 13 W** |
| *Altitude (m):* | **250** |
| *Rainfall (mm):* | **1050** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland**

*Other measurements:*
**DT**

*Site Operator:*
**East of Scotland Water**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-1.12 ueq/l (-2.70 %/year): 17 years' data
++ Moderately strong trend detected

*non-marine sulphate*
-1.93 ueq/l (-3.57 %/year): 18 years' data
++++ Very strong trend detected

*nitrate*
-0.65 ueq/l (-1.85 %/year): 18 years' data
++ Moderately strong trend detected

*ammonium*
-0.40 ueq/l (-1.41 %/year): 18 years' data
- No significant trend detected



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## 5106 Whiteadder

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/01/04 | 26/01/04 | 4.7 | 21.2 | 15.8 | 5.5 | 76.3 | 17.6 | 6.8 | 88.6 | 2.2 | <1.0 | 12.0 | 18.2 | 23.0 | 54.5 |
| 26/01/04 | 10/02/04 | 5.3 | 16.4 | 8.0 | 5.5 | 94.0 | 16.3 | 5.8 | 102.8 | 4.2 | <1.0 | 5.1 | 5.5 | 18.0 | 26.7 |
| 10/02/04 | 08/03/04 | 4.9 | 43.2 | 27.1 | 31.6 | 107.5 | 24.7 | 10.3 | 126.9 | 4.7 | <1.0 | 30.3 | 11.7 | 28.0 | 26.7 |
| 08/03/04 | 22/03/04 | 4.9 | 32.6 | 26.1 | 23.9 | 68.7 | 13.5 | 8.7 | 67.0 | 2.8 | <1.0 | 24.4 | 13.2 | 21.0 | 5.7 |
| 22/03/04 | 19/04/04 | 4.7 | 47.8 | 36.3 | 45.7 | 43.6 | 12.3 | 11.4 | 49.1 | 1.9 | <1.0 | 42.5 | 20.0 | - | 2.0 |
| 19/04/04 | 17/05/04 | 4.4 | 71.6 | 59.4 | 55.6 | 80.8 | 18.4 | 17.4 | 78.0 | 3.8 | <1.0 | 61.8 | 40.7 | 38.0 | 17.3 |
| 17/05/04 | 24/05/04 | 4.7 | 71.5 | 40.8 | 32.7 | 117.9 | 28.9 | 34.2 | 123.6 | 5.3 | <1.0 | 57.3 | 20.9 | 36.0 | 2.9 |
| 24/05/04 | 31/05/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.5 |
| 31/05/04 | 14/06/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 4.6 |
| 14/06/04 | 21/06/04 | 5.4 | 22.1 | 9.9 | 10.0 | 23.6 | 3.2 | 4.8 | 21.9 | 1.2 | <1.0 | 19.2 | 4.5 | <10.0 | 17.0 |
| 21/06/04 | 12/07/04 | 4.6 | 23.0 | 14.5 | 11.2 | 31.4 | 6.8 | 3.3 | 32.7 | 0.3 | <1.0 | 19.2 | 24.5 | 16.1 | 115.1 |
| 12/07/04 | 26/07/04 | 5.2 | 25.0 | 18.0 | 14.1 | 24.1 | 7.2 | 9.7 | 28.3 | 0.9 | <1.0 | 22.1 | 6.6 | 15.0 | 7.0 |
| 26/07/04 | 28/07/04 | 4.7 | 37.6 | 39.9 | 45.3 | 6.8 | 3.8 | 8.3 | 9.8 | 1.6 | <1.0 | 36.7 | 22.4 | 19.0 | 126.7 |
| 28/07/04 | 23/08/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 23/08/04 | 04/10/04 | 4.5 | 35.6 | 20.9 | 9.2 | 82.0 | 19.2 | 11.1 | 87.7 | 1.5 | <1.0 | 25.7 | 33.9 | 27.6 | 38.9 |
| 04/10/04 | 01/11/04 | 4.6 | 23.7 | 30.3 | 24.2 | 75.6 | 14.3 | 5.2 | 80.0 | 3.6 | <1.0 | 14.6 | 26.9 | 23.2 | 38.5 |
| 01/11/04 | 15/11/04 | 5.1 | 40.7 | 33.2 | 29.1 | 91.0 | 26.8 | 14.0 | 95.2 | 2.8 | <1.0 | 29.7 | 7.9 | 23.0 | 5.9 |
| 15/11/04 | 01/12/04 | 4.6 | 19.9 | 22.0 | 16.6 | 49.1 | 11.6 | 5.3 | 52.9 | 1.5 | <1.0 | 14.0 | 25.7 | 18.0 | 16.6 |
| 01/12/04 | 13/12/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 13/12/04 | 30/12/04 | 5.0 | 42.3 | 21.7 | 21.5 | 167.8 | 36.4 | 15.1 | 205.3 | 4.7 | <1.0 | 22.1 | 10.7 | 35.0 | 3.8 |
| 30/12/04 | 10/01/05 | 5.9 | 9.4 | 4.4 | 2.2 | 37.9 | 6.9 | 3.4 | 45.4 | 1.7 | <1.0 | 4.8 | 1.3 | <10.0 | 33.4 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5106 | | 29.3 | 24.0 | 21.8 | 48.6 | 11.0 | 7.1 | 53.8 | 1.9 | - | 23.4 | 20.5 | 20.1 | 543.7 |

# Loch Chon

**2004**

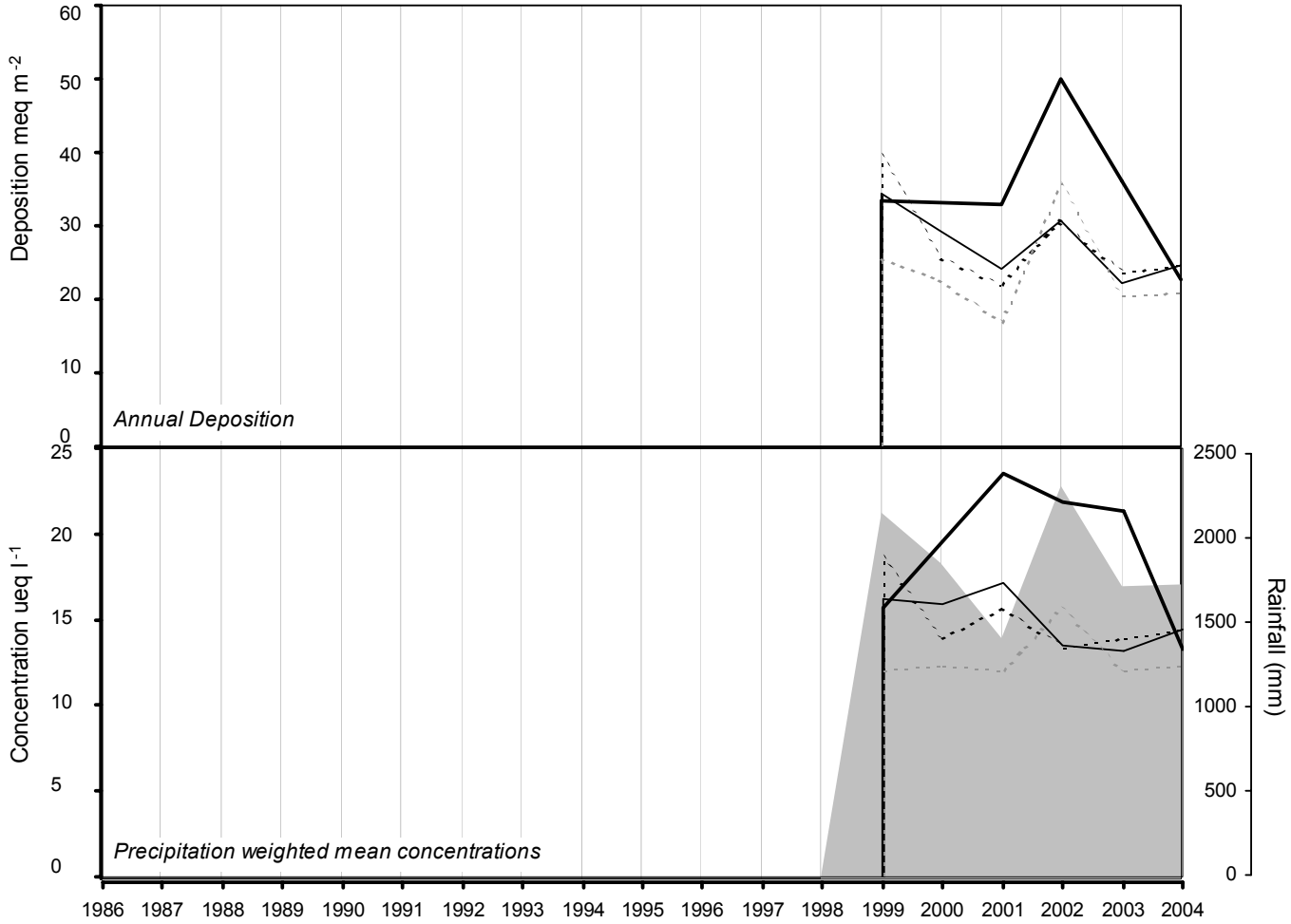
| | |
|---|---|
| *Site Code:* | **5156** |
| *Easting:* | **2429** |
| *Northing:* | **7084** |
| *Latitude:* | **56 14 52 N** |
| *Longitude:* | **04 32 09 W** |
| *Altitude (m):* | **150** |
| *Rainfall (mm):* | **-** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Moorland overlooking Loch Katrine**

*Other measurements:*
**UKAWMN**

*Site Operator:*
**Fisheries Research Services**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
0.00 ueq/l (0.00 %/year): 4 years' data
n/a Insufficient Data

*non-marine sulphate*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data

*nitrate*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data

*ammonium*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data



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## 5156 Loch Chon

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/01/04 | 29/01/04 | 5.1 | 16.3 | 5.1 | 1.9 | 123.0 | 23.7 | 5.9 | 136.1 | 2.5 | <1.0 | 1.5 | 7.8 | 22.0 | 36.6 |
| 29/01/04 | 11/02/04 | 5.2 | 30.3 | 5.3 | 4.4 | 160.1 | 32.5 | 8.3 | 173.3 | 2.8 | <1.0 | 11.0 | 6.9 | 27.0 | 77.0 |
| 11/02/04 | 25/02/04 | 4.7 | 56.5 | 72.9 | 53.3 | 92.4 | 31.9 | 41.1 | 96.3 | 4.0 | <1.0 | 45.4 | 20.0 | - | 3.1 |
| 25/02/04 | 10/03/04 | 5.0 | 52.6 | 48.0 | 71.5 | 73.3 | 13.9 | 2.9 | 88.1 | 3.1 | <1.0 | 43.8 | 9.1 | 27.0 | 20.5 |
| 10/03/04 | 24/03/04 | 5.1 | 23.9 | 8.9 | 8.5 | 124.4 | 25.6 | 6.6 | 136.7 | 2.3 | <1.0 | 8.9 | 7.8 | 24.0 | 128.9 |
| 24/03/04 | 07/04/04 | 5.4 | 28.3 | 30.3 | 40.3 | 59.4 | 13.9 | 6.2 | 61.1 | 0.7 | <1.0 | 21.2 | 4.4 | 18.0 | 55.4 |
| 07/04/04 | 24/04/04 | 5.0 | 15.7 | 12.0 | 12.2 | 16.9 | 4.0 | 3.5 | 20.1 | 0.9 | <1.0 | 13.7 | 9.1 | <10.0 | 105.4 |
| 24/04/04 | 05/05/04 | 7.7 | 554.7 | 1.2 | 9768.1 | 289.9 | 169.9 | 54.6 | 245.2 | 508.2 | 1297.7 | 519.8 | 0.0 | 1010.0 | 46.6 |
| 05/05/04 | 19/05/04 | 7.9 | 140.4 | 26.1 | 2026.5 | 41.0 | 22.0 | 9.3 | 52.8 | 65.8 | 224.4 | 135.4 | 0.0 | 268.0 | 28.0 |
| 19/05/04 | 02/06/04 | 4.8 | 49.0 | 59.0 | 61.5 | 42.5 | 17.3 | 11.8 | 47.4 | 1.8 | <1.0 | 43.9 | 17.0 | 78.0 | 19.9 |
| 02/06/04 | 17/06/04 | 6.7 | 48.8 | 14.3 | 263.5 | 20.6 | 1.5 | <0.8 | 33.2 | 22.1 | 90.2 | 46.3 | 0.2 | 44.0 | 26.9 |
| 17/06/04 | 30/06/04 | 8.2 | 367.2 | 15.0 | 3747.1 | 262.6 | 32.7 | 18.4 | 179.5 | 335.0 | 829.9 | 335.6 | 0.0 | 536.0 | 60.5 |
| 30/06/04 | 14/07/04 | 5.0 | 24.8 | <0.7 | 5.8 | 37.9 | 7.5 | 5.7 | 51.6 | <0.5 | <1.0 | 20.2 | 9.5 | 12.0 | 18.2 |
| 14/07/04 | 28/07/04 | 4.9 | 15.9 | 3.2 | 4.0 | 27.1 | 5.2 | 3.8 | 29.4 | 0.7 | <1.0 | 12.7 | 11.5 | <10.0 | 78.3 |
| 28/07/04 | 11/08/04 | 4.4 | 44.6 | 41.5 | 50.6 | <0.3 | 1.0 | 5.1 | 7.2 | 1.1 | <1.0 | 44.6 | 39.8 | 22.0 | 113.5 |
| 11/08/04 | 25/08/04 | 4.5 | 24.3 | 20.9 | 5.1 | 6.1 | 6.5 | 6.8 | 9.2 | 0.2 | <1.0 | 23.5 | 30.2 | 16.0 | 66.3 |
| 25/08/04 | 08/09/04 | 5.1 | 14.6 | <1.4 | <0.7 | 49.9 | 11.6 | 19.5 | 64.8 | 2.4 | <1.0 | 8.6 | 8.7 | 14.0 | 28.4 |
| 08/09/04 | 22/09/04 | 5.0 | 9.6 | 5.8 | 6.4 | 17.9 | 3.9 | 1.5 | 24.4 | <0.2 | <1.0 | 7.4 | 9.3 | <10.0 | 200.4 |
| 22/09/04 | 06/10/04 | 5.2 | 15.3 | 10.8 | 2.0 | 63.2 | 13.1 | 3.6 | 61.9 | 1.3 | <1.0 | 7.7 | 5.9 | 12.8 | 172.2 |
| 06/10/04 | 20/10/04 | 4.6 | 15.4 | 20.2 | 9.5 | 25.3 | 7.3 | 5.3 | 27.1 | 0.8 | <1.0 | 12.4 | 24.0 | 15.1 | 20.6 |
| 20/10/04 | 03/11/04 | 4.7 | 14.3 | 17.4 | 6.0 | 33.3 | 8.2 | 3.9 | 37.4 | 1.0 | <1.0 | 10.3 | 19.5 | 16.0 | 81.9 |
| 03/11/04 | 17/11/04 | 5.0 | 19.5 | 4.9 | 1.5 | 74.0 | 13.3 | 3.4 | 86.5 | 1.6 | <1.0 | 10.5 | 11.0 | 15.0 | 62.0 |
| 17/11/04 | 01/12/04 | 4.6 | 24.5 | 14.5 | 10.2 | 82.7 | 18.6 | 6.1 | 94.6 | 2.0 | <1.0 | 14.6 | 23.4 | 22.0 | 47.2 |
| 01/12/04 | 15/12/04 | 4.8 | 27.1 | 30.5 | 19.8 | 58.7 | 11.8 | 5.0 | 68.2 | 1.0 | <1.0 | 20.0 | 17.0 | 19.0 | 86.1 |
| 15/12/04 | 29/12/04 | 5.2 | 25.2 | 3.2 | <1.4 | 175.1 | 37.4 | 9.2 | 221.1 | 3.9 | <1.0 | 4.1 | 7.1 | 32.0 | 122.5 |
| 29/12/04 | 12/01/05 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5156 | | 22.1 | 14.5 | 12.4 | 63.4 | 13.7 | 5.3 | 73.1 | 1.4 | - | 14.4 | 13.3 | 18.5 | 1706.4 |

# Balquhidder

**2004**

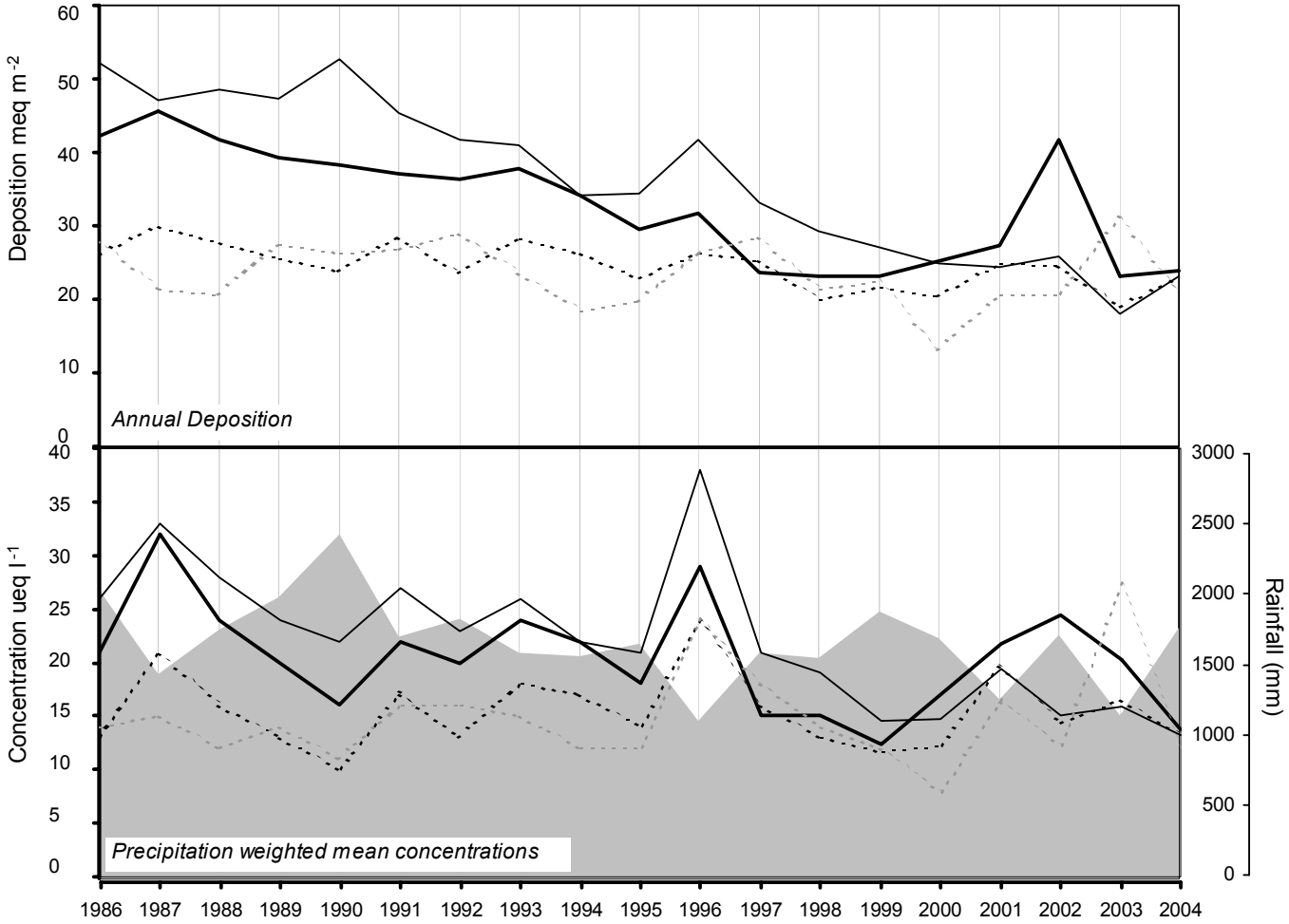
| | |
|---|---|
| *Site Code:* | **5152** |
| *Easting:* | **2521** |
| *Northing:* | **7206** |
| *Latitude:* | **56 21 17 N** |
| *Longitude:* | **04 23 38 W** |
| *Altitude (m):* | **135** |
| *Rainfall (mm):* | **2245** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open sheep pasture at loch-side**

*Other measurements:*
**DT, Met**

*Site Operator:*
**Institute of Hydrology**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.34 ueq/l (-1.46 %/year): 18 years' data
\- No significant trend detected

*non-marine sulphate*
-0.81 ueq/l (-2.74 %/year): 19 years' data
++ Moderately strong trend detected

*nitrate*
-0.02 ueq/l (-0.12 %/year): 19 years' data
\- No significant trend detected

*ammonium*
0.13 ueq/l (0.99 %/year): 19 years' data
\- No significant trend detected



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## 5152 Balquhidder 2

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/01/04 | 26/01/04 | 4.8 | 11.3 | 8.0 | 3.3 | 88.3 | 17.0 | 4.9 | 102.3 | 1.7 | <1.0 | 0.7 | 14.5 | 17.0 | 26.1 |
| 26/01/04 | 09/02/04 | 5.4 | 31.7 | 5.3 | 3.2 | 178.4 | 36.9 | 5.4 | 222.1 | 3.2 | <1.0 | 10.3 | 4.2 | 28.0 | 105.6 |
| 09/02/04 | 23/02/04 | 5.1 | 36.0 | 30.6 | 28.9 | 76.6 | 15.5 | 15.3 | 73.4 | 2.1 | <1.0 | 26.8 | 8.1 | 20.0 | 7.2 |
| 23/02/04 | 09/03/04 | 5.1 | 55.4 | 50.3 | 81.6 | 107.5 | 22.0 | 10.6 | 140.5 | 10.4 | <1.0 | 42.5 | 8.3 | 33.0 | 5.8 |
| 09/03/04 | 22/03/04 | 5.2 | 19.0 | 7.4 | 5.8 | 86.7 | 16.8 | 6.0 | 93.4 | 1.7 | <1.0 | 8.6 | 6.2 | 18.0 | 112.5 |
| 22/03/04 | 05/04/04 | 5.1 | 46.9 | 57.0 | 66.5 | 59.5 | 13.1 | 5.9 | 73.3 | 2.8 | <1.0 | 39.7 | 8.3 | 28.0 | 22.0 |
| 05/04/04 | 23/04/04 | 4.9 | 15.6 | 12.4 | 10.4 | 26.6 | 6.9 | 4.0 | 27.6 | 0.2 | <1.0 | 12.4 | 13.2 | <10.0 | 62.8 |
| 23/04/04 | 04/05/04 | 7.6 | 51.6 | 9.3 | 458.5 | 58.5 | 5.2 | 2.2 | 44.1 | 22.0 | 98.2 | 44.5 | 0.0 | 63.0 | 14.5 |
| 04/05/04 | 17/05/04 | 4.7 | 28.2 | 19.7 | 28.8 | 1.6 | 2.3 | 5.3 | 2.8 | 1.8 | <1.0 | 28.0 | 19.1 | 11.0 | 46.8 |
| 17/05/04 | 01/06/04 | 4.8 | 30.1 | 41.4 | 39.5 | 37.7 | 6.5 | 8.3 | 34.4 | 4.4 | <1.0 | 25.5 | 15.5 | 20.5 | 17.8 |
| 01/06/04 | 13/06/04 | 4.9 | 16.4 | 14.0 | 10.5 | 14.7 | 3.6 | 3.7 | 20.1 | <0.5 | <1.0 | 14.6 | 13.5 | <10.0 | 33.6 |
| 13/06/04 | 29/06/04 | 6.4 | 26.3 | 12.5 | 47.2 | 18.5 | 3.1 | <1.0 | 21.5 | 7.0 | 27.0 | 24.1 | 0.4 | 12.0 | 52.6 |
| 29/06/04 | 12/07/04 | 4.8 | 16.5 | 7.3 | 3.1 | 22.2 | 4.1 | 1.6 | 24.1 | 7.1 | <1.0 | 13.8 | 15.1 | 11.4 | 32.1 |
| 12/07/04 | 26/07/04 | 5.1 | 19.5 | 12.3 | 12.7 | 25.4 | 4.5 | 4.6 | 28.1 | 2.8 | <1.0 | 16.4 | 8.3 | 11.7 | 51.2 |
| 26/07/04 | 08/08/04 | 4.3 | 46.0 | 47.1 | 65.6 | 4.1 | 1.2 | 6.1 | 4.4 | 1.0 | <1.0 | 45.5 | 46.8 | 20.0 | 55.6 |
| 08/08/04 | 22/08/04 | 4.5 | 33.5 | 27.7 | 24.6 | 4.8 | 2.6 | 4.5 | 8.1 | 1.0 | <1.0 | 32.9 | 33.1 | 18.0 | 128.7 |
| 22/08/04 | 06/09/04 | 5.4 | 17.9 | 14.3 | 15.7 | 51.7 | 9.9 | 6.1 | 71.9 | 1.6 | <1.0 | 11.7 | 3.7 | <10.0 | 17.3 |
| 06/09/04 | 20/09/04 | 5.6 | 17.8 | 7.1 | <0.7 | 74.5 | 15.6 | 5.9 | 101.0 | 5.0 | 14.7 | 8.9 | 2.8 | 15.3 | 155.7 |
| 20/09/04 | 06/10/04 | 5.2 | 14.6 | <1.4 | <1.4 | 68.7 | 12.1 | 8.9 | 66.3 | 5.0 | <1.0 | 6.3 | 5.8 | 13.0 | 128.1 |
| 06/10/04 | 18/10/04 | 4.4 | 21.9 | 34.0 | 16.4 | 16.5 | 4.2 | 4.9 | 21.3 | 0.9 | <1.0 | 19.9 | 37.2 | 19.0 | 27.1 |
| 18/10/04 | 01/11/04 | 4.7 | 15.3 | 17.0 | 6.5 | 37.2 | 9.4 | 4.4 | 40.8 | 2.8 | <1.0 | 10.8 | 21.9 | 14.8 | 97.1 |
| 01/11/04 | 15/11/04 | 4.8 | 28.0 | 15.3 | 13.8 | 118.8 | 26.9 | 11.5 | 134.8 | 3.4 | <1.0 | 13.7 | 17.8 | 25.0 | 19.8 |
| 15/11/04 | 28/11/04 | 4.7 | 15.6 | 9.2 | 1.9 | 48.2 | 7.8 | 3.7 | 47.7 | <0.5 | <1.0 | 9.8 | 19.1 | 14.0 | 38.7 |
| 28/11/04 | 13/12/04 | 4.5 | 41.5 | 50.1 | 46.7 | 99.7 | 22.2 | 7.8 | 120.6 | 2.6 | <1.0 | 29.5 | 32.4 | 35.0 | 31.2 |
| 13/12/04 | 29/12/04 | 5.0 | 16.5 | 5.3 | 1.4 | 96.1 | 20.2 | 6.0 | 117.0 | 1.7 | <1.0 | 4.9 | 10.0 | 22.0 | 147.2 |
| 29/12/04 | 10/01/05 | 5.4 | 13.1 | 2.6 | 3.3 | 87.9 | 16.4 | 5.0 | 106.3 | 1.7 | <1.0 | 2.5 | 4.2 | 17.0 | 308.9 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5152 | | 21.2 | 13.2 | 12.1 | 66.7 | 13.5 | 5.6 | 78.0 | 2.2 | - | 13.2 | 13.7 | 17.7 | 1746.2 |

# Polloch

**2004**

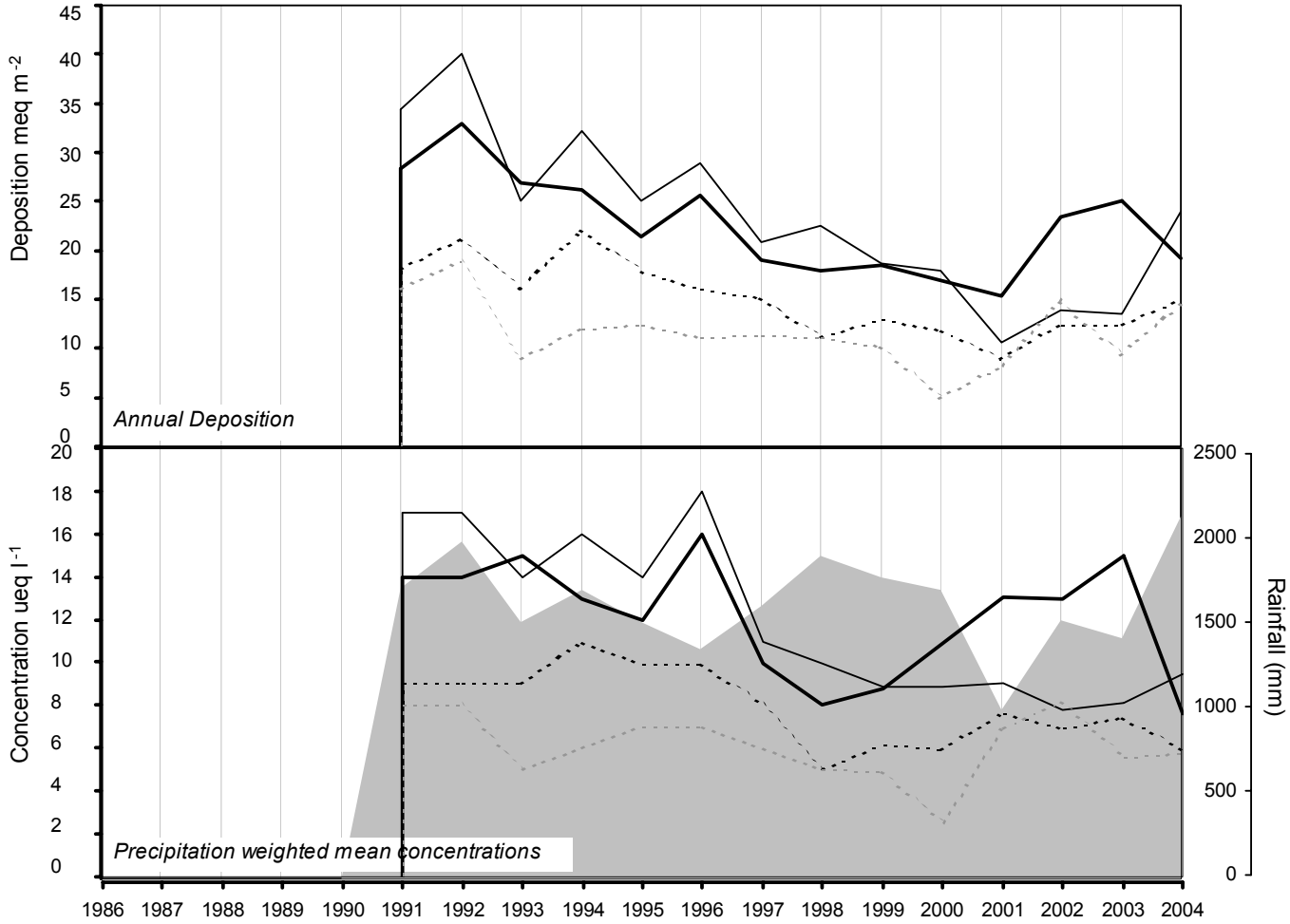
| | |
|---|---|
| *Site Code:* | **5151** |
| *Easting:* | **1792** |
| *Northing:* | **7689** |
| *Latitude:* | **56 45 34 N** |
| *Longitude:* | **05 36 46 W** |
| *Altitude (m):* | **30** |
| *Rainfall (mm):* | **2170** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland, in forest area**

*Other measurements:*
**DT, UKAWMN**

*Site Operator:*
**Mr. J Kirby**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.25 ueq/l (-1.68 %/year): 13 years' data
\- No significant trend detected

*non-marine sulphate*
-0.78 ueq/l (-3.70 %/year): 14 years' data
+++ Strong trend detected

*nitrate*
-0.29 ueq/l (-2.60 %/year): 14 years' data
++ Moderately strong trend detected

*ammonium*
-0.11 ueq/l (-1.46 %/year): 14 years' data
\- No significant trend detected



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## 5151 Polloch

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13/01/04 | 27/01/04 | 5.2 | 4.4 | <1.4 | <1.4 | 61.6 | 12.1 | 3.7 | 72.7 | 0.7 | <1.0 | - | 6.8 | 11.0 | 252.7 |
| 27/01/04 | 10/02/04 | 5.2 | 41.9 | 2.2 | <1.4 | 302.2 | 64.3 | 12.6 | 371.5 | 5.9 | <1.0 | 5.5 | 6.6 | 54.0 | 133.5 |
| 10/02/04 | 23/02/04 | 5.8 | 15.0 | 2.6 | 2.3 | 45.7 | 6.9 | 5.5 | 45.9 | 0.7 | <1.0 | 9.5 | 1.5 | <10.0 | 44.6 |
| 23/02/04 | 09/03/04 | 5.1 | 25.8 | 9.2 | 13.2 | 139.9 | 28.1 | 6.5 | 156.4 | 9.3 | <1.0 | 9.0 | 7.6 | 27.0 | 54.3 |
| 09/03/04 | 23/03/04 | 5.6 | 25.0 | 1.7 | 5.0 | 163.1 | 32.2 | 8.7 | 169.3 | 4.5 | <1.0 | 5.3 | 2.6 | 27.0 | 65.6 |
| 23/03/04 | 06/04/04 | 6.5 | 31.0 | 11.2 | 90.5 | 106.6 | 15.2 | 4.0 | 123.9 | 14.3 | <1.0 | 18.1 | 0.3 | 34.0 | 46.0 |
| 06/04/04 | 20/04/04 | 5.2 | 13.1 | 6.0 | 5.5 | 34.4 | 6.9 | 5.1 | 39.6 | 1.6 | <1.0 | 8.9 | 6.5 | <10.0 | 115.1 |
| 20/04/04 | 04/05/04 | 5.1 | 31.1 | 10.5 | 10.8 | 144.4 | 30.3 | 9.0 | 153.1 | 3.2 | <1.0 | 13.7 | 8.9 | 29.0 | 62.8 |
| 04/05/04 | 18/05/04 | 4.7 | 22.6 | 15.1 | 18.1 | 17.6 | 9.5 | 6.2 | 18.7 | 2.5 | <1.0 | 20.5 | 21.9 | 13.0 | 29.5 |
| 18/05/04 | 31/05/04 | 4.7 | 26.0 | 25.1 | 14.8 | 82.4 | 14.8 | 13.0 | 87.7 | 4.3 | <1.0 | 16.0 | 19.5 | 23.0 | 19.1 |
| 31/05/04 | 15/06/04 | 5.1 | 21.0 | 6.6 | 11.1 | 32.7 | 4.6 | 2.7 | 33.7 | 2.5 | <1.0 | 17.1 | 8.9 | 11.7 | 50.7 |
| 15/06/04 | 29/06/04 | 4.8 | 18.7 | 8.4 | 2.8 | 50.7 | 10.9 | 9.0 | 54.5 | 0.4 | <1.0 | 12.6 | 17.0 | 17.6 | 65.1 |
| 29/06/04 | 13/07/04 | 4.7 | 20.9 | 4.2 | <1.4 | 69.1 | 9.9 | 5.9 | 75.6 | 3.9 | <1.0 | 12.6 | 21.4 | 15.0 | 50.8 |
| 13/07/04 | 27/07/04 | 6.4 | 44.1 | 6.1 | 3.4 | 90.6 | 11.1 | 39.4 | 63.7 | 3.3 | <1.0 | 33.1 | 0.4 | 18.0 | 9.6 |
| 27/07/04 | 10/08/04 | 4.8 | 20.8 | 16.6 | 24.5 | 1.1 | 0.9 | 3.8 | 6.9 | 1.3 | <1.0 | 20.7 | 15.8 | 11.0 | 60.6 |
| 10/08/04 | 24/08/04 | 4.9 | 12.5 | 13.4 | 8.1 | 10.7 | 2.8 | 3.5 | 14.9 | 1.4 | <1.0 | 11.2 | 12.0 | <10.0 | 31.6 |
| 24/08/04 | 07/09/04 | 5.2 | 17.2 | <1.4 | <0.7 | 70.4 | 15.0 | 4.0 | 81.3 | 1.5 | <1.0 | 8.7 | 6.0 | 15.0 | 34.6 |
| 07/09/04 | 21/09/04 | 5.4 | 13.0 | 7.4 | 1.9 | 168.3 | 33.9 | 7.7 | 185.8 | 3.7 | <1.0 | - | 4.1 | 28.1 | 326.2 |
| 21/09/04 | 05/10/04 | 5.3 | 10.7 | 7.3 | 5.4 | 189.2 | 38.7 | 8.1 | 177.5 | 4.9 | <1.0 | - | 5.2 | 25.4 | 148.5 |
| 05/10/04 | 19/10/04 | 5.3 | 22.6 | 6.2 | 2.0 | 202.4 | 43.9 | 11.4 | 224.0 | 4.2 | <1.0 | - | 5.1 | 34.3 | 33.6 |
| 19/10/04 | 27/10/04 | 5.9 | 56.7 | 11.0 | <0.7 | 218.8 | 53.5 | 69.4 | 272.6 | 44.2 | 4.5 | 30.3 | 1.3 | 49.2 | 48.6 |
| 27/10/04 | 02/11/04 | 5.0 | 14.6 | 9.3 | 0.2 | 178.8 | 37.3 | 7.5 | 159.8 | 3.8 | <1.0 | - | 11.2 | 31.3 | 95.3 |
| 02/11/04 | 16/11/04 | 5.0 | 35.7 | 4.7 | 0.6 | 189.1 | 40.0 | 7.9 | 219.6 | 4.1 | <1.0 | 13.0 | 10.7 | 31.0 | 145.3 |
| 16/11/04 | 30/11/04 | 5.0 | 22.8 | 4.5 | 3.5 | 164.4 | 31.6 | 5.6 | 187.4 | 2.8 | <1.0 | 3.0 | 11.0 | 29.0 | 103.4 |
| 30/11/04 | 14/12/04 | 4.8 | 19.8 | 16.1 | 23.4 | 63.5 | 14.2 | 6.3 | 73.6 | 1.7 | <1.0 | 12.2 | 17.8 | 18.0 | 89.1 |
| 14/12/04 | 28/12/04 | 5.2 | 38.1 | 1.8 | 0.5 | 303.7 | 64.3 | 13.5 | 372.3 | 5.5 | <1.0 | 1.5 | 6.5 | 54.0 | 172.9 |
| 28/12/04 | 11/01/05 | 5.5 | 33.2 | 1.7 | 1.0 | 255.5 | 54.4 | 11.7 | 309.8 | 5.6 | <1.0 | 2.5 | 3.0 | 47.0 | 231.0 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5151 | | 22.5 | 6.0 | 6.0 | 153.8 | 31.8 | 9.1 | 175.3 | 4.5 | - | 9.5 | 7.6 | 28.6 | 2520.0 |

# Lochnagar

**2004**

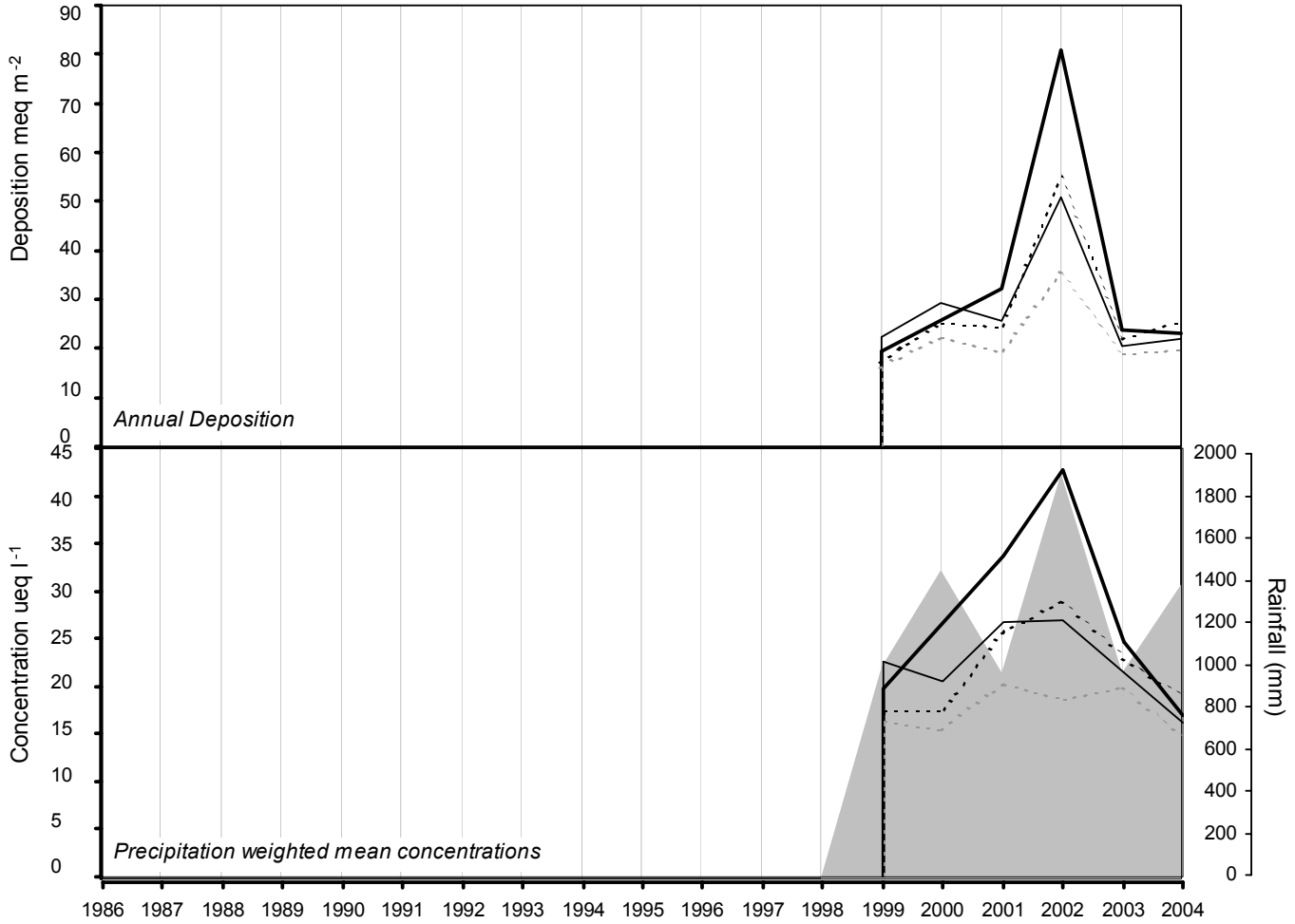
| | |
|---|---|
| *Site Code:* | **5157** |
| *Easting:* | **3252** |
| *Northing:* | **7859** |
| *Latitude:* | **56 57 29N** |
| *Longitude:* | **03 13 51 W** |
| *Altitude (m):* | **785** |
| *Rainfall (mm):* | **-** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Heathland 60% and bare ground 40%**

*Other measurements:*
**UKAWMN. Automatic weather station**

*Site Operator:*
**ENSIS**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
0.00 ueq/l (0.00 %/year): 4 years' data
n/a Insufficient Data

*non-marine sulphate*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data

*nitrate*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data

*ammonium*
0.00 ueq/l (0.00 %/year): 5 years' data
n/a Insufficient Data



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## 5157 Lochnagar

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/01/04 | 13/01/04 | 4.8 | 32.3 | 16.5 | 13.5 | 101.0 | 20.2 | 5.7 | 119.9 | 1.7 | <1.0 | 20.1 | 14.5 | 22.0 | 76.1 |
| 13/01/04 | 12/02/04 | 5.2 | 12.8 | 5.2 | <1.4 | 71.4 | 15.4 | 3.9 | 90.2 | 0.9 | <1.0 | 4.2 | 5.8 | 15.0 | 48.8 |
| 12/02/04 | 29/02/04 | 5.6 | - | - | - | - | - | - | - | - | - | - | 2.5 | - | 0.3 |
| 29/02/04 | 10/03/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.2 |
| 10/03/04 | 24/03/04 | 4.8 | 27.1 | 21.5 | 18.0 | 62.0 | 14.3 | 0.1 | 79.1 | 0.9 | <1.0 | 19.6 | 16.2 | 21.0 | 57.6 |
| 24/03/04 | 07/04/04 | 4.9 | 36.4 | 54.0 | 75.4 | 24.1 | 6.5 | 5.0 | 26.5 | 0.7 | <1.0 | 33.4 | 12.9 | 20.0 | 69.2 |
| 07/04/04 | 21/04/04 | 4.7 | 23.7 | 18.4 | 14.2 | 15.5 | 4.5 | 3.8 | 20.3 | 0.9 | <1.0 | 21.9 | 19.5 | 14.0 | 7.2 |
| 21/04/04 | 05/05/04 | 4.9 | 21.9 | 14.0 | 18.1 | 29.3 | 7.6 | 4.2 | 32.3 | 1.0 | <1.0 | 18.3 | 12.0 | 13.0 | 42.6 |
| 05/05/04 | 19/05/04 | 4.4 | 42.3 | 43.3 | 26.6 | 27.2 | 15.4 | 16.4 | 26.0 | 2.4 | <1.0 | 39.0 | 37.2 | 23.0 | 45.5 |
| 19/05/04 | 02/06/04 | 4.9 | 34.4 | 50.3 | 43.3 | 23.7 | 13.1 | 18.3 | 24.2 | 1.5 | <1.0 | 31.6 | 13.2 | 57.0 | 25.0 |
| 02/06/04 | 15/06/04 | 4.8 | 16.6 | 15.5 | 16.7 | 14.8 | 2.9 | 2.4 | 19.1 | 2.7 | <1.0 | 14.8 | 15.1 | <10.0 | 18.5 |
| 15/06/04 | 30/06/04 | 4.8 | 14.4 | 15.0 | 10.8 | 14.8 | 2.7 | 1.6 | 17.4 | <0.0 | <1.0 | 12.6 | 16.2 | 12.9 | 90.6 |
| 30/06/04 | 14/07/04 | 4.8 | 7.8 | 6.6 | <0.7 | 8.1 | 2.7 | 2.1 | 10.2 | <0.2 | <1.0 | 6.8 | 16.2 | <10.0 | 45.9 |
| 14/07/04 | 28/07/04 | 4.6 | 34.7 | 22.0 | 24.3 | 24.4 | 6.7 | 14.1 | 26.1 | 1.5 | <1.0 | 31.7 | 24.5 | 16.0 | 21.2 |
| 28/07/04 | 11/08/04 | 4.7 | 36.1 | 32.1 | 2.7 | 5.5 | 3.2 | 11.7 | 7.3 | 1.6 | 4.7 | 35.4 | 20.0 | 16.0 | 71.3 |
| 11/08/04 | 25/08/04 | 4.6 | 20.2 | 18.8 | 12.2 | 10.8 | 3.7 | 4.6 | 14.1 | 1.0 | <1.0 | 18.9 | 26.9 | 13.0 | 138.5 |
| 25/08/04 | 08/09/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 08/09/04 | 22/09/04 | 5.2 | 13.6 | 3.2 | <0.7 | 80.4 | 15.7 | 3.8 | 92.5 | 1.0 | <1.0 | 3.9 | 6.2 | 15.6 | 91.9 |
| 22/09/04 | 06/10/04 | 5.0 | 10.2 | 13.2 | 18.1 | 47.8 | 9.2 | 4.2 | 32.8 | 1.6 | <1.0 | 4.4 | 10.0 | 10.9 | 74.5 |
| 06/10/04 | 20/10/04 | 4.5 | 21.9 | 26.5 | 16.3 | 33.2 | 7.3 | 3.0 | 37.9 | 0.8 | <1.0 | 17.9 | 31.6 | 20.4 | 133.1 |
| 20/10/04 | 03/11/04 | 4.6 | 21.4 | 23.5 | 10.9 | 40.2 | 10.7 | 4.1 | 42.6 | 1.1 | <1.0 | 16.5 | 24.5 | 20.0 | 87.7 |
| 03/11/04 | 17/11/04 | 5.0 | 15.5 | 8.0 | 2.0 | 64.9 | 13.7 | 3.5 | 77.6 | 1.7 | <1.0 | 7.7 | 11.2 | 15.0 | 19.5 |
| 17/11/04 | 01/12/04 | 5.3 | 10.9 | 10.3 | 6.0 | 40.2 | 9.1 | 3.2 | 47.3 | 1.2 | <1.0 | 6.1 | 4.9 | <10.0 | 19.8 |
| 01/12/04 | 15/12/04 | 4.7 | 4.4 | 1.4 | 24.4 | 44.0 | 10.0 | 6.4 | 8.6 | 1.5 | <1.0 | - | 22.4 | 18.0 | 20.2 |
| 15/12/04 | 29/12/04 | 5.2 | 11.6 | 3.6 | <1.3 | 54.5 | 11.8 | 4.5 | 69.4 | 1.4 | <1.0 | 5.0 | 6.2 | 11.0 | 41.2 |
| 29/12/04 | 13/01/05 | 5.6 | 7.6 | 4.8 | 3.0 | 33.4 | 7.1 | 3.4 | 39.5 | 1.4 | <1.0 | 3.6 | 2.8 | <10.0 | 119.8 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5157 | | 19.6 | 18.1 | 15.2 | 39.9 | 9.3 | 4.5 | 44.9 | 1.1 | - | 15.0 | 16.7 | 16.5 | 1366.5 |

# Glen Dye

**2004**

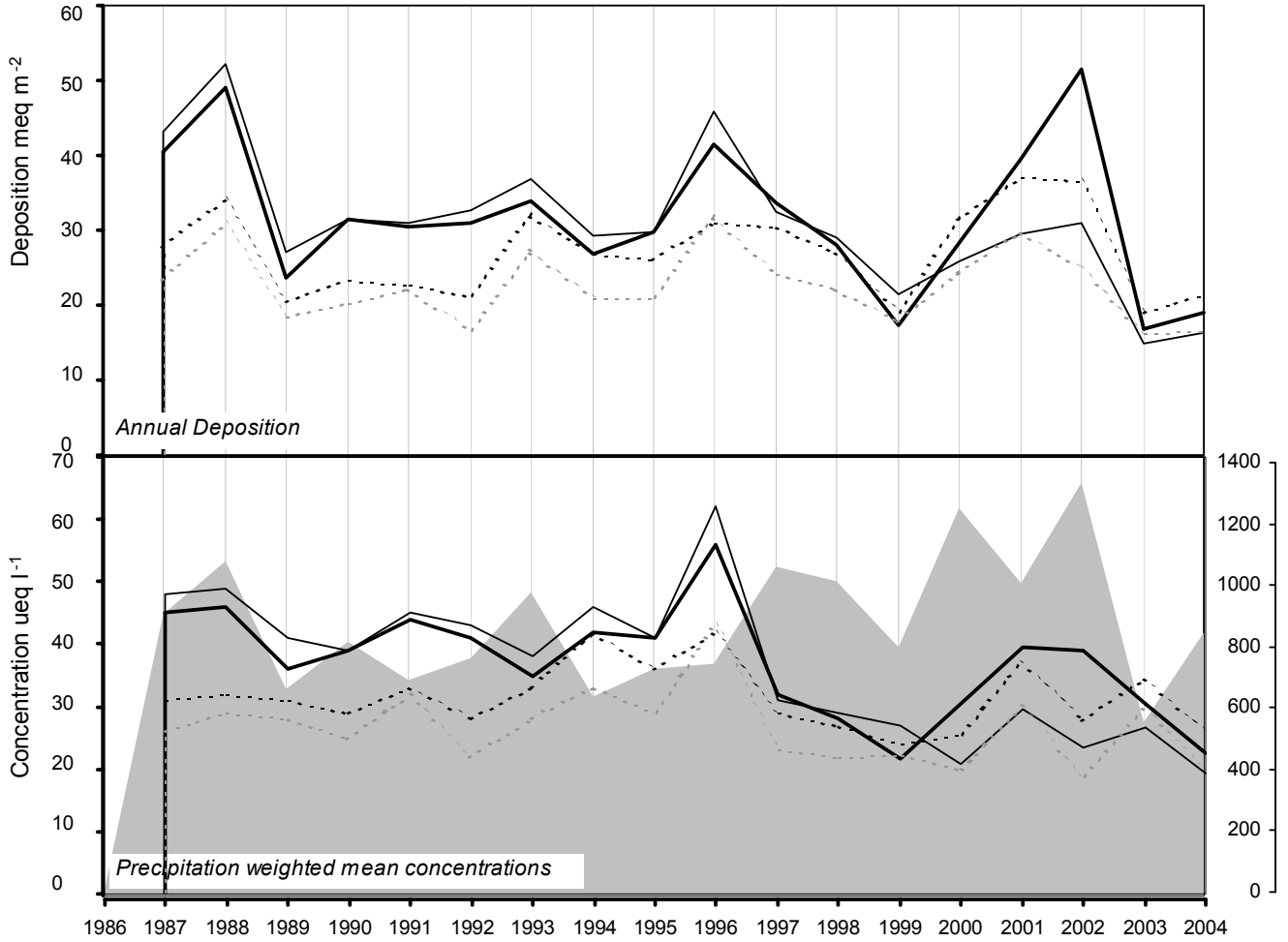
| | |
|---|---|
| *Site Code:* | **5011** |
| *Easting:* | **3642** |
| *Northing:* | **7864** |
| *Latitude:* | **56 58 03 N** |
| *Longitude:* | **02 35 20 W** |
| *Altitude (m):* | **185** |
| *Rainfall (mm):* | **1311** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland**

*Other measurements:*
**DT, SO2, Daily SO4, EMEP**

*Site Operator:*
**SEPA; North Region**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.88 ueq/l (-1.92 %/year): 17 years' data
\+ Significant trend detected

*non-marine sulphate*
-1.60 ueq/l (-3.09 %/year): 18 years' data
++ Moderately strong trend detected

*nitrate*
-0.17 ueq/l (-0.51 %/year): 18 years' data
\- No significant trend detected

*ammonium*
-0.32 ueq/l (-1.09 %/year): 18 years' data
\- No significant trend detected



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## 5011 Glen Dye

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/01/04 | 02/02/04 | 4.9 | 19.5 | 11.9 | 5.0 | 114.5 | 24.5 | 6.4 | 135.8 | 2.4 | <1.0 | 5.7 | 12.9 | 31.0 | 29.2 |
| 02/02/04 | 10/02/04 | 5.4 | 34.0 | 7.9 | 8.0 | 202.7 | 43.0 | 12.1 | 210.4 | 4.8 | <1.0 | 9.6 | 4.2 | 35.0 | 6.7 |
| 10/02/04 | 24/02/04 | 5.5 | 38.1 | 16.6 | 9.4 | 196.5 | 39.6 | 13.0 | 213.4 | 5.5 | <1.0 | 14.4 | 3.2 | 35.0 | 5.4 |
| 24/02/04 | 09/03/04 | 5.1 | 38.6 | 9.4 | 9.5 | 254.8 | 56.8 | 13.8 | 277.7 | 6.1 | <1.0 | 7.9 | 7.4 | 43.0 | 15.0 |
| 09/03/04 | 23/03/04 | 4.4 | 74.7 | 60.7 | 53.2 | 141.7 | 30.6 | 9.8 | 156.7 | 3.8 | <1.0 | 57.7 | 37.2 | 49.0 | 33.7 |
| 23/03/04 | 06/04/04 | 5.0 | 46.8 | 74.0 | 89.0 | 167.8 | 3.6 | 2.5 | 58.5 | 1.6 | 15.9 | 26.6 | 9.5 | 27.0 | 67.7 |
| 06/04/04 | 20/04/04 | 4.9 | 22.6 | 17.8 | 15.2 | 35.8 | 7.8 | 4.9 | 41.2 | 1.3 | <1.0 | 18.2 | 13.8 | 15.0 | 40.8 |
| 20/04/04 | 04/05/04 | 4.7 | 33.4 | 27.2 | 25.5 | 55.4 | 13.3 | 6.3 | 56.6 | 1.9 | <1.0 | 26.7 | 19.5 | 22.0 | 68.1 |
| 04/05/04 | 19/05/04 | 4.4 | 36.9 | 43.5 | 12.8 | 27.5 | 11.8 | 21.9 | 24.7 | 4.3 | <1.0 | 33.6 | 38.0 | 23.0 | 12.4 |
| 19/05/04 | 01/06/04 | 4.8 | 16.7 | 23.4 | 6.7 | 20.6 | 5.9 | 5.4 | 23.7 | 1.2 | <1.0 | 14.2 | 15.5 | 15.0 | 21.1 |
| 01/06/04 | 16/06/04 | 4.6 | 19.9 | 25.0 | 3.8 | 8.1 | 4.5 | 10.9 | 47.8 | 1.3 | <1.0 | 18.9 | 28.2 | 17.0 | 19.6 |
| 16/06/04 | 29/06/04 | 6.3 | 20.8 | 17.5 | 40.5 | 22.0 | 1.7 | <1.0 | 26.3 | 8.4 | 11.5 | 18.1 | 0.5 | 12.1 | 47.1 |
| 29/06/04 | 13/07/04 | 4.9 | 8.7 | 5.6 | 3.3 | 4.8 | 1.3 | 1.4 | 7.7 | <0.1 | <1.0 | 8.1 | 13.8 | <10.0 | 48.5 |
| 13/07/04 | 27/07/04 | 4.5 | 38.3 | 34.3 | 25.6 | 14.3 | 7.4 | 9.1 | 21.7 | 2.7 | <1.0 | 36.6 | 33.1 | 22.0 | 11.9 |
| 27/07/04 | 10/08/04 | 4.2 | 64.5 | 75.4 | 96.4 | 13.0 | 15.0 | 23.1 | 20.3 | 3.1 | <1.0 | 62.9 | 67.6 | 31.0 | 23.7 |
| 10/08/04 | 24/08/04 | 4.6 | 24.1 | 25.2 | 22.3 | 16.8 | 5.0 | 4.0 | 20.3 | 1.2 | <1.0 | 22.1 | 28.2 | 15.0 | 136.2 |
| 24/08/04 | 07/09/04 | 5.1 | 16.6 | 14.3 | 7.9 | 31.3 | 9.2 | 6.9 | 36.7 | 3.1 | <1.0 | 12.9 | 7.9 | 12.0 | 18.3 |
| 07/09/04 | 20/09/04 | 4.9 | 34.7 | 23.4 | 26.3 | 64.3 | 14.0 | 8.1 | 89.5 | 4.5 | <1.0 | 26.9 | 12.0 | 18.1 | 15.5 |
| 20/09/04 | 05/10/04 | 4.8 | 11.8 | 22.6 | 14.1 | 49.9 | 11.0 | 4.0 | 50.9 | 4.1 | <1.0 | 5.8 | 17.4 | 17.1 | 53.4 |
| 05/10/04 | 20/10/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 20/10/04 | 02/11/04 | 4.5 | 19.3 | 40.0 | 21.9 | 46.6 | 11.3 | 4.9 | 51.7 | 1.5 | <1.0 | 13.7 | 35.5 | 24.2 | 71.6 |
| 02/11/04 | 16/11/04 | 4.6 | 26.0 | 22.9 | 12.8 | 145.5 | 33.2 | 8.6 | 160.6 | 3.5 | <1.0 | 8.4 | 22.9 | 30.0 | 22.0 |
| 16/11/04 | 03/12/04 | 5.0 | 13.0 | 9.9 | 5.7 | 34.8 | 8.6 | 3.1 | 45.1 | 1.1 | <1.0 | 8.8 | 9.1 | 10.0 | 27.8 |
| 03/12/04 | 14/12/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 14/12/04 | 29/12/04 | 5.1 | 17.0 | 13.9 | 11.5 | 47.9 | 11.6 | 5.1 | 59.8 | 2.1 | <1.0 | 11.2 | 7.2 | 12.0 | 20.7 |
| 29/12/04 | 11/01/05 | 5.1 | 11.9 | 6.3 | 6.4 | 51.4 | 9.4 | 4.3 | 60.3 | 1.1 | <1.0 | 5.7 | 7.2 | 13.0 | 23.1 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5011 | | 25.7 | 25.6 | 19.9 | 51.7 | 12.5 | 6.4 | 59.4 | 2.1 | - | 19.4 | 22.6 | 20.5 | 839.8 |

# Allt a' Mharcaidh

**2004**

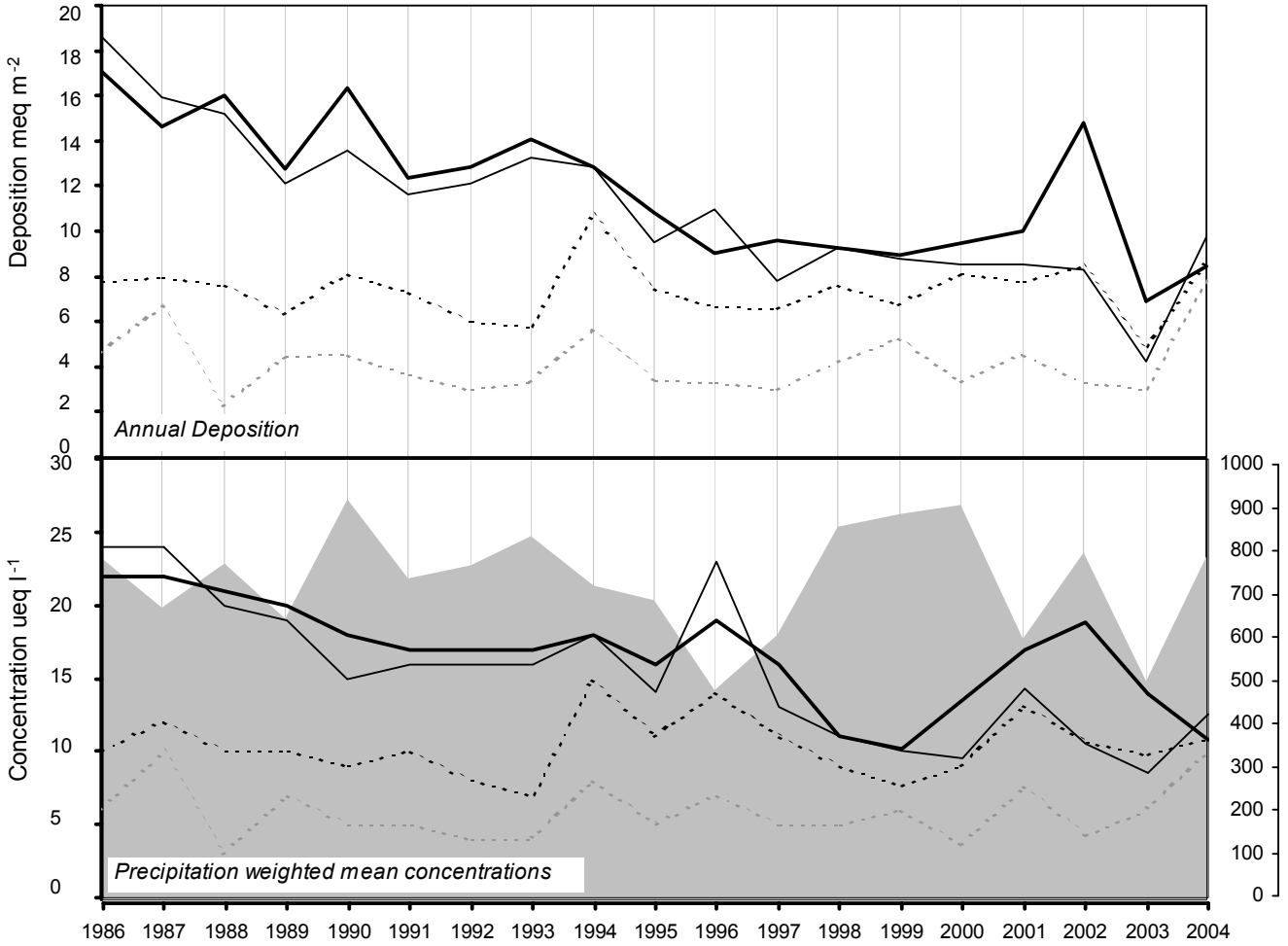
| | |
|---|---|
| *Site Code:* | **5103** |
| *Easting:* | **2876** |
| *Northing:* | **8052** |
| *Latitude:* | **57 07 27 N** |
| *Longitude:* | **03 51 24 W** |
| *Altitude (m):* | **274** |
| *Rainfall (mm):* | **1221** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Moorland, in forestry SW Cairngorms**

*Other measurements:*
**DT, UKAWMN**

*Site Operator:*
**Fisheries Research Services**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.46 ueq/l (-2.20 %/year): 18 years' data
++ Moderately strong trend detected

*non-marine sulphate*
-0.68 ueq/l (-3.14 %/year): 19 years' data
+++ Strong trend detected

*nitrate*
0.03 ueq/l (0.27 %/year): 19 years' data
- No significant trend detected

*ammonium*
0.03 ueq/l (0.58 %/year): 19 years' data
- No significant trend detected



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## 5103 Allt a ' Mharcaidh

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/01/04 | 26/01/04 | 5.1 | 3.1 | 0.3 | 0.4 | 23.2 | 4.8 | 2.2 | 30.1 | <0.3 | <1.0 | 0.3 | 8.9 | <10.0 | 23.8 |
| 26/01/04 | 10/02/04 | 5.4 | 16.7 | <1.4 | <1.4 | 132.1 | 19.7 | 8.2 | 143.6 | 5.6 | <1.0 | 0.8 | 3.8 | 21.0 | 29.2 |
| 10/02/04 | 24/02/04 | 5.3 | 46.1 | 30.5 | 16.4 | 187.6 | 39.0 | 26.7 | 199.8 | 4.8 | <1.0 | 23.6 | 5.0 | - | 3.6 |
| 24/02/04 | 09/03/04 | 5.4 | 29.8 | 11.7 | 0.3 | 196.2 | 46.7 | 22.3 | 226.7 | 3.5 | <1.0 | 6.2 | 3.8 | 33.0 | 8.3 |
| 09/03/04 | 23/03/04 | 5.0 | 37.9 | 16.8 | 11.7 | 143.2 | 30.2 | 2.9 | 158.0 | 2.3 | <1.0 | 20.7 | 10.0 | 30.0 | 26.4 |
| 23/03/04 | 06/04/04 | 5.1 | 28.9 | 33.7 | 30.3 | 56.1 | 11.8 | 11.2 | 67.5 | 1.8 | <1.0 | 22.2 | 7.8 | 20.0 | 11.7 |
| 06/04/04 | 20/04/04 | 7.2 | 47.1 | 8.8 | 558.1 | 27.8 | 6.1 | 1.0 | 37.0 | 41.5 | 111.7 | 43.7 | 0.1 | 72.0 | 38.3 |
| 20/04/04 | 03/05/04 | 5.1 | 25.7 | 14.5 | 25.0 | 38.8 | 9.5 | 4.9 | 42.0 | 1.6 | <1.0 | 21.0 | 7.2 | 13.0 | 35.4 |
| 03/05/04 | 18/05/04 | 6.2 | 87.7 | 25.8 | 226.2 | 21.5 | 3.8 | 2.3 | 24.1 | 39.0 | 160.4 | 85.1 | 0.6 | 40.0 | 23.4 |
| 18/05/04 | 01/06/04 | 5.8 | 21.5 | 24.4 | 35.8 | 23.3 | 10.5 | 2.9 | 26.7 | 3.1 | <1.0 | 18.6 | 1.5 | 45.0 | 17.5 |
| 01/06/04 | 14/06/04 | 8.0 | 181.5 | 17.1 | 2511.0 | 48.6 | 23.2 | 2.5 | 89.2 | 163.0 | 514.2 | 175.7 | 0.0 | 296.0 | 13.4 |
| 14/06/04 | 29/06/04 | 7.4 | 135.9 | 21.8 | 1413.8 | 30.2 | 16.4 | 3.2 | 49.6 | 71.3 | 356.1 | 132.3 | 0.0 | 214.0 | 48.4 |
| 29/06/04 | 13/07/04 | 6.8 | 23.1 | 4.4 | 240.1 | 29.1 | 0.8 | 0.0 | 19.0 | 14.5 | 29.4 | 19.6 | 0.1 | 32.0 | 45.2 |
| 13/07/04 | 27/07/04 | 5.2 | 41.0 | 18.7 | 14.1 | 96.8 | 18.6 | 22.8 | 73.9 | 6.7 | <1.0 | 29.3 | 7.1 | 19.0 | 3.8 |
| 27/07/04 | 10/08/04 | 4.6 | 33.4 | 29.7 | 41.7 | <3.1 | 1.8 | 7.1 | 14.9 | 0.4 | <1.0 | 33.8 | 25.7 | 18.0 | 43.2 |
| 10/08/04 | 23/08/04 | 6.5 | 24.5 | 11.7 | 139.6 | 14.5 | 1.7 | 0.6 | 16.8 | 12.5 | 34.8 | 22.8 | 0.3 | 21.0 | 57.0 |
| 23/08/04 | 07/09/04 | 6.7 | 27.8 | 10.0 | 153.2 | 46.6 | 5.9 | 3.0 | 49.5 | 30.2 | 43.1 | 22.2 | 0.2 | 33.0 | 20.8 |
| 07/09/04 | 21/09/04 | 6.3 | 12.5 | 3.3 | 33.5 | 31.2 | 6.0 | 0.2 | 54.1 | 5.9 | 20.7 | 8.8 | 0.5 | 11.2 | 39.8 |
| 21/09/04 | 05/10/04 | 7.7 | 84.8 | 10.9 | 1407.9 | 60.9 | 17.5 | 2.6 | 72.5 | 92.7 | 172.8 | 77.5 | 0.0 | 133.0 | 6.6 |
| 05/10/04 | 19/10/04 | 4.6 | 16.9 | 17.2 | 8.5 | 29.5 | 6.1 | 2.8 | 34.6 | 0.8 | <1.0 | 13.4 | 25.7 | 16.1 | 74.5 |
| 19/10/04 | 02/11/04 | 4.7 | 7.1 | 13.0 | <0.7 | 17.2 | 5.1 | 3.0 | 19.9 | <0.5 | <1.0 | 5.1 | 20.0 | <10.0 | 22.4 |
| 02/11/04 | 15/11/04 | 5.1 | 15.6 | 3.3 | <0.7 | 98.7 | 18.0 | 5.5 | 108.0 | 1.9 | <1.0 | 3.8 | 7.6 | 18.0 | 24.4 |
| 15/11/04 | 30/11/04 | 5.7 | 8.4 | 5.0 | <0.7 | 41.5 | 19.7 | 3.2 | 38.9 | 1.2 | <1.0 | 3.4 | 2.2 | <10.0 | 12.0 |
| 30/11/04 | 13/12/04 | 6.1 | 39.5 | 12.4 | 24.1 | 55.3 | 14.1 | 5.9 | 175.8 | 2.0 | 45.7 | 32.8 | 0.7 | 33.0 | 4.1 |
| 13/12/04 | 28/12/04 | 5.3 | 8.8 | <0.7 | <1.4 | 52.5 | 13.3 | 8.1 | 64.2 | 1.8 | <1.0 | 2.4 | 4.8 | 10.0 | 64.8 |
| 28/12/04 | 11/01/05 | 5.6 | 7.4 | 2.2 | <0.7 | 65.8 | 13.0 | 5.7 | 81.5 | 2.0 | <1.0 | - | 2.4 | 12.0 | 82.7 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5103 | | 17.1 | 11.0 | 10.3 | 57.4 | 12.4 | 5.9 | 66.9 | 1.8 | - | 12.4 | 10.8 | 16.4 | 780.6 |

# Strathvaich Dam

**2004**

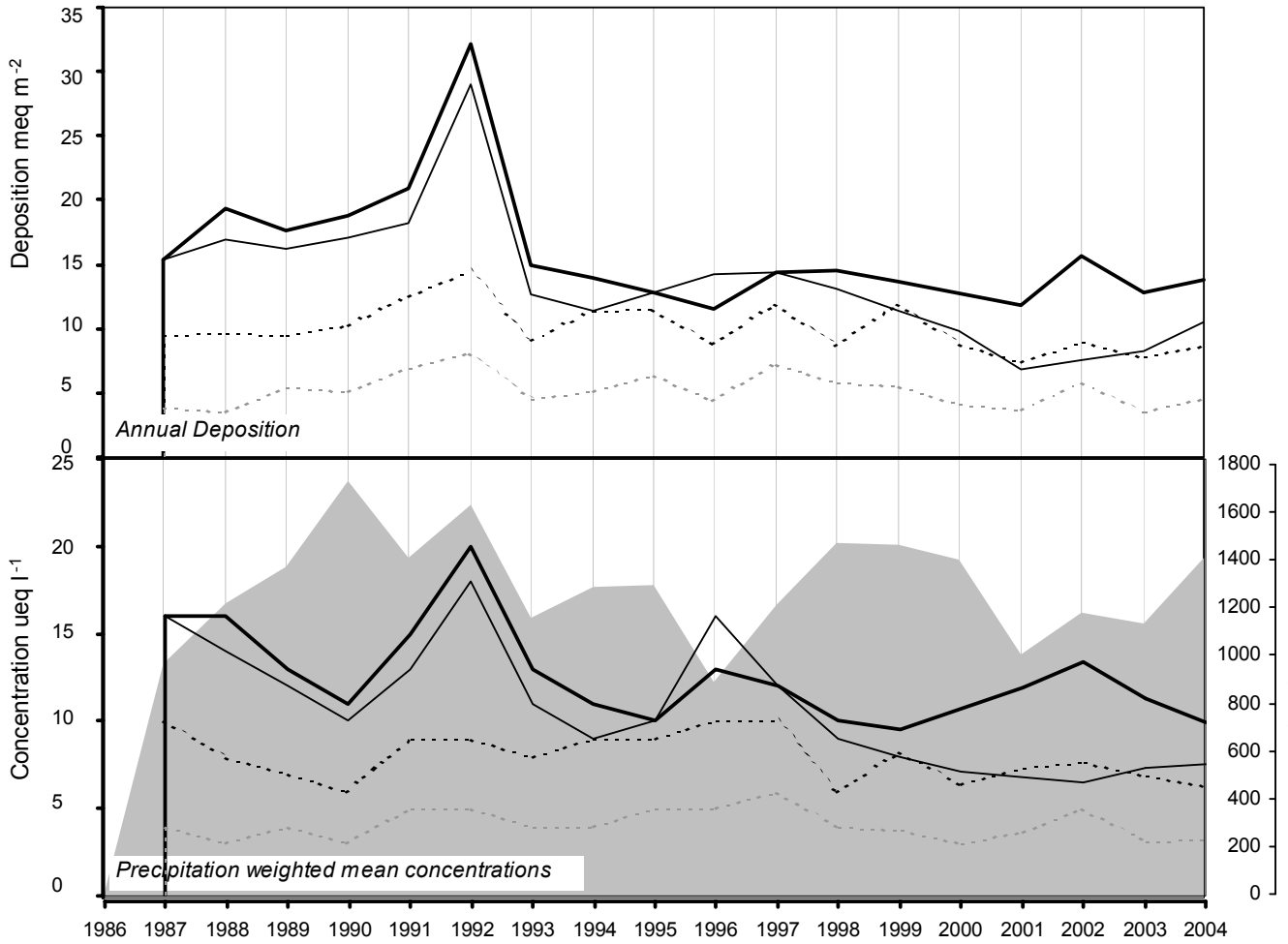
| | |
|---|---|
| *Site Code:* | **5010** |
| *Easting:* | **2347** |
| *Northing:* | **8750** |
| *Latitude:* | **57 44 04 N** |
| *Longitude:* | **04 46 36 W** |
| *Altitude (m):* | **270** |
| *Rainfall (mm):* | **1576** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland, deer**

*Other measurements:*
**DT, SO2, Daily SO4, HNO3 Denuder, NOx, SO2, ozone, EMEP**

*Site Operator:*
**CLOVA**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.28 ueq/l (-1.85 %/year): 17 years' data
\+ Significant trend detected

*non-marine sulphate*
-0.48 ueq/l (-3.12 %/year): 18 years' data
++ Moderately strong trend detected

*nitrate*
-0.09 ueq/l (-1.05 %/year): 18 years' data
\- No significant trend detected

*ammonium*
-0.01 ueq/l (-0.23 %/year): 18 years' data
\- No significant trend detected



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## 5010 Strathvaich Dam

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/01/04 | 24/01/04 | 5.6 | 4.0 | <1.4 | <1.4 | 23.8 | 3.8 | 2.4 | 29.0 | 0.9 | <1.0 | 1.1 | 2.7 | <10.0 | 111.9 |
| 24/01/04 | 09/02/04 | 5.4 | 16.1 | 0.5 | <1.4 | 120.5 | 24.1 | 4.5 | 151.5 | 1.8 | <1.0 | 1.6 | 4.0 | 23.0 | 120.2 |
| 09/02/04 | 23/02/04 | 5.4 | 19.3 | 3.1 | <0.7 | 90.6 | 15.5 | 4.5 | 88.9 | 1.8 | <1.0 | 8.4 | 4.3 | 15.0 | 29.1 |
| 23/02/04 | 06/03/04 | 5.4 | 40.8 | 4.1 | 2.2 | 319.2 | 66.9 | 12.3 | 345.9 | 5.4 | <1.0 | 2.4 | 4.3 | 52.0 | 11.8 |
| 06/03/04 | 23/03/04 | 5.2 | 27.5 | 3.1 | <1.4 | 203.2 | 42.3 | 4.8 | 231.8 | 3.1 | <1.0 | 3.1 | 7.1 | 35.0 | 65.4 |
| 23/03/04 | 05/04/04 | 5.0 | 27.5 | 11.1 | 3.6 | 154.5 | 32.3 | 6.6 | 179.4 | 2.4 | <1.0 | 8.8 | 10.0 | 31.0 | 7.5 |
| 05/04/04 | 17/04/04 | 5.1 | 13.4 | 2.0 | <1.4 | 80.2 | 14.8 | 6.5 | 90.5 | 1.4 | <1.0 | 3.7 | 7.4 | 16.0 | 32.7 |
| 17/04/04 | 03/05/04 | 4.7 | 20.9 | 11.2 | 5.1 | 60.1 | 13.5 | 5.1 | 65.2 | 1.1 | <1.0 | 13.7 | 19.1 | 18.0 | 42.1 |
| 03/05/04 | 16/05/04 | 4.6 | 22.7 | 20.5 | 7.5 | 31.7 | 5.9 | 3.9 | 24.0 | 0.7 | <1.0 | 18.9 | 26.3 | 17.0 | 17.9 |
| 16/05/04 | 31/05/04 | 4.9 | 28.6 | 23.9 | 14.4 | 105.1 | 20.7 | 9.6 | 118.9 | 2.0 | <1.0 | 15.9 | 13.2 | 26.0 | 25.4 |
| 31/05/04 | 08/06/04 | 4.8 | 24.4 | 18.9 | 6.3 | 42.7 | 6.3 | 6.3 | 46.7 | 3.2 | <1.0 | 19.2 | 14.8 | 16.0 | 10.8 |
| 08/06/04 | 20/06/04 | 4.9 | 13.7 | 5.2 | 3.2 | 29.8 | 5.2 | 1.5 | 36.4 | <0.2 | <1.0 | 10.1 | 12.0 | <10.0 | 51.9 |
| 20/06/04 | 05/07/04 | 4.6 | 19.8 | 13.3 | 1.5 | 49.4 | 15.6 | 5.6 | 53.0 | 0.7 | <1.0 | 13.9 | 24.5 | 24.0 | 38.0 |
| 05/07/04 | 11/07/04 | 5.3 | 40.4 | 8.6 | <1.4 | 52.7 | 13.6 | 16.8 | 42.1 | 1.4 | <1.0 | 34.0 | 4.6 | 16.0 | 1.9 |
| 11/07/04 | 27/07/04 | 4.8 | 24.3 | <0.7 | 1.4 | 372.0 | 77.1 | 43.8 | 92.8 | 3.4 | <1.0 | - | 15.1 | 21.0 | 23.0 |
| 27/07/04 | 06/08/04 | 4.6 | 29.3 | 26.3 | 29.9 | <0.9 | 0.8 | 3.0 | 7.7 | 2.5 | <1.0 | 29.4 | 25.1 | 13.0 | 9.6 |
| 06/08/04 | 22/08/04 | 4.8 | 18.5 | 19.3 | 15.7 | 24.4 | 6.1 | 4.2 | 30.0 | 0.9 | <1.0 | 15.6 | 17.0 | 14.0 | 81.7 |
| 22/08/04 | 03/09/04 | 5.0 | 17.7 | 4.4 | <0.1 | 92.3 | 19.7 | 6.0 | 108.2 | 1.9 | <1.0 | 6.6 | 10.2 | 18.0 | 46.2 |
| 03/09/04 | 18/09/04 | 5.1 | 8.7 | 6.0 | <0.7 | 43.1 | 8.8 | 3.2 | 64.7 | 0.9 | <1.0 | 3.5 | 7.2 | 9.8 | 59.2 |
| 18/09/04 | 03/10/04 | 5.2 | 14.5 | 1.6 | <1.4 | 138.6 | 28.5 | 6.9 | 153.4 | 2.8 | <1.0 | - | 6.9 | 22.7 | 116.2 |
| 03/10/04 | 13/10/04 | 5.4 | 10.7 | 2.9 | <0.7 | 64.5 | 11.5 | 10.4 | 62.4 | 1.2 | <1.0 | 3.0 | 3.7 | 11.2 | 77.5 |
| 13/10/04 | 31/10/04 | 4.4 | 29.2 | 31.4 | 8.0 | 69.0 | 15.6 | 8.9 | 75.8 | 3.5 | <1.0 | 20.9 | 37.2 | 23.2 | 65.6 |
| 31/10/04 | 17/11/04 | 5.6 | 49.6 | 2.7 | 9.4 | 355.4 | 76.2 | 13.8 | 413.4 | 7.8 | <1.0 | 6.8 | 2.6 | 56.0 | 82.0 |
| 17/11/04 | 03/12/04 | 5.0 | 16.5 | 3.9 | 2.8 | 133.9 | 27.2 | 6.2 | 156.5 | 2.9 | <1.0 | 0.4 | 9.5 | 23.0 | 48.7 |
| 03/12/04 | 22/12/04 | 5.1 | 26.0 | 3.7 | <0.7 | 160.0 | 34.8 | 8.9 | 212.5 | 3.7 | <1.0 | 6.8 | 8.3 | 30.0 | 83.3 |
| 22/12/04 | 05/01/05 | 5.2 | 35.6 | <0.7 | 0.7 | 234.9 | 50.5 | 12.8 | 283.7 | 4.4 | <1.0 | 7.3 | 7.1 | 43.0 | 135.1 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5010 | | 21.3 | 6.3 | 3.6 | 124.8 | 26.1 | 7.6 | 141.2 | 2.5 | - | 7.5 | 9.9 | 24.1 | 1394.8 |

# Achanarras

**2004**

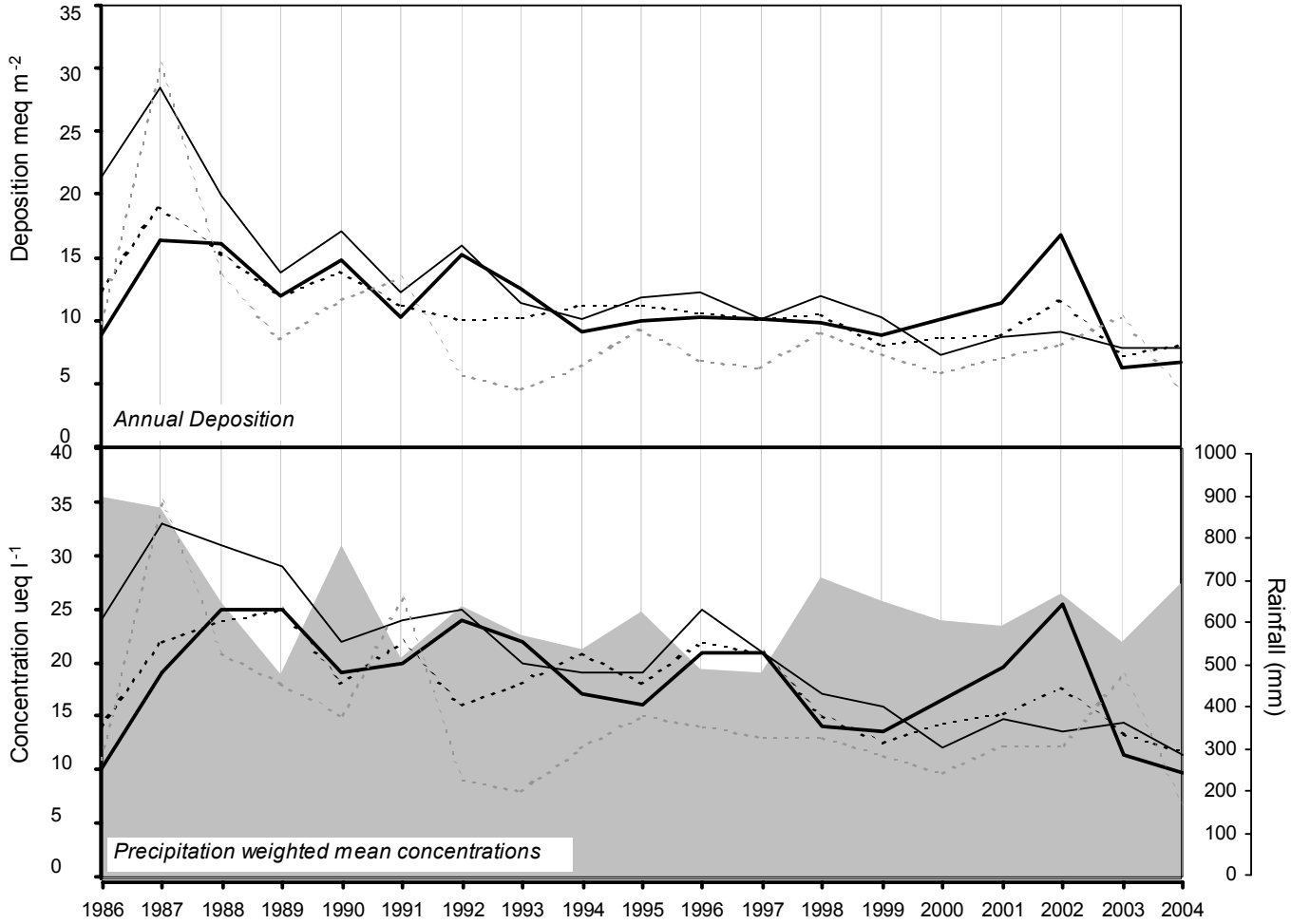
| | |
|---|---|
| *Site Code:* | **5140** |
| *Easting:* | **3151** |
| *Northing:* | **9550** |
| *Latitude:* | **58 28 31 N** |
| *Longitude:* | **03 27 21 W** |
| *Altitude (m):* | **98** |
| *Rainfall (mm):* | **973** |

*[30 year mean 1940 - 1971]*

*Site Environment:*
**Open moorland, farm pastures**

*Other measurements:*
**DT**

*Site Operator:*
**Mrs. J Erridge**




hydrogen ion
non-marine sulphate
nitrate
ammonium
rainfall (mm)

**long-term trends in concentration (+x = increase; -x = decrease)**

*hydrogen ion*
-0.28 ueq/l (-1.32 %/year): 18 years' data
\- No significant trend detected

*non-marine sulphate*
-1.00 ueq/l (-3.37 %/year): 19 years' data
++++ Very strong trend detected

*nitrate*
-0.43 ueq/l (-1.97 %/year): 19 years' data
++ Moderately strong trend detected

*ammonium*
-0.57 ueq/l (-2.88 %/year): 19 years' data
\+ Significant trend detected



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## 5140 Achanarras

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/01/04 | 04/02/04 | 5.4 | 13.3 | 0.9 | 1.8 | 92.3 | 17.4 | 4.4 | 109.7 | 1.9 | <1.0 | 2.1 | 3.8 | 18.0 | 73.9 |
| 04/02/04 | 11/02/04 | 5.4 | 52.2 | <1.4 | <1.4 | 414.9 | 84.0 | 16.9 | 477.0 | 8.2 | <1.0 | 2.2 | 3.6 | 67.0 | 27.1 |
| 11/02/04 | 25/02/04 | 6.5 | 195.7 | 15.4 | 91.1 | 1362.6 | 279.9 | 43.9 | 1568.2 | 34.9 | 31.2 | 31.6 | 0.4 | 186.0 | 3.6 |
| 25/02/04 | 10/03/04 | 4.6 | 74.5 | 49.5 | 21.6 | 463.7 | 96.2 | 23.7 | 506.0 | 10.0 | <1.0 | 18.6 | 26.9 | 95.0 | 3.2 |
| 10/03/04 | 24/03/04 | 5.2 | 39.7 | 4.9 | 1.8 | 282.4 | 61.7 | 22.8 | 329.7 | 5.7 | <1.0 | 5.7 | 6.2 | 48.0 | 12.5 |
| 24/03/04 | 07/04/04 | 4.9 | 64.1 | 53.8 | 39.5 | 273.4 | 61.2 | 21.6 | 319.2 | 5.1 | <1.0 | 31.1 | 12.6 | 59.0 | 18.7 |
| 07/04/04 | 21/04/04 | 4.6 | 27.8 | 24.0 | 13.1 | 103.7 | 21.4 | 6.4 | 106.6 | 1.8 | <1.0 | 15.3 | 24.0 | 27.0 | 24.5 |
| 21/04/04 | 05/05/04 | 4.8 | 33.6 | 16.4 | 13.3 | 115.5 | 23.0 | 10.4 | 120.9 | 8.9 | <1.0 | 19.7 | 17.8 | 26.0 | 34.1 |
| 05/05/04 | 19/05/04 | 4.8 | 86.3 | 51.1 | 24.3 | 232.6 | 59.8 | 48.0 | 245.2 | 7.0 | <1.0 | 58.3 | 17.0 | 54.0 | 6.7 |
| 19/05/04 | 02/06/04 | 4.8 | 25.1 | 21.1 | 2.9 | 60.8 | 8.9 | 15.5 | 65.6 | 2.2 | <1.0 | 17.8 | 14.8 | 19.0 | 38.7 |
| 02/06/04 | 16/06/04 | 4.8 | 21.4 | 7.3 | 1.0 | 90.7 | 17.4 | 3.5 | 111.8 | 1.5 | <1.0 | 10.5 | 15.8 | 21.0 | 54.2 |
| 16/06/04 | 30/06/04 | 4.9 | 26.2 | 11.1 | <1.4 | 102.5 | 21.0 | 5.4 | 123.4 | 2.2 | <1.0 | 13.8 | 12.9 | 23.0 | 53.4 |
| 30/06/04 | 14/07/04 | 7.0 | 79.8 | 15.8 | 411.4 | 174.3 | 23.8 | 6.7 | 205.7 | 49.0 | 102.0 | 58.8 | 0.1 | 79.0 | 10.3 |
| 14/07/04 | 28/07/04 | 5.9 | 29.8 | 11.1 | 19.6 | 87.2 | 17.5 | 17.2 | 104.2 | 16.2 | 3.9 | 19.3 | 1.4 | 22.0 | 11.5 |
| 28/07/04 | 11/08/04 | 6.9 | 68.7 | 40.8 | 282.8 | 53.0 | 6.6 | 3.6 | 64.0 | 22.2 | 44.4 | 62.3 | 0.1 | 48.0 | 27.7 |
| 11/08/04 | 25/08/04 | 4.9 | 36.1 | 21.0 | 8.9 | 149.8 | 33.7 | 12.0 | 229.0 | 4.4 | <1.0 | 18.1 | 12.0 | 35.0 | 47.6 |
| 25/08/04 | 08/09/04 | 6.1 | 42.4 | 22.0 | 55.2 | 174.2 | 39.6 | 19.5 | 234.9 | 13.9 | 38.8 | 21.4 | 0.8 | 38.3 | 4.5 |
| 08/09/04 | 22/09/04 | 5.4 | 22.8 | 3.9 | 1.7 | 190.4 | 39.4 | 9.3 | 221.6 | 4.1 | <1.0 | - | 3.6 | 31.5 | 71.7 |
| 22/09/04 | 06/10/04 | 5.3 | 25.5 | 7.6 | 6.2 | 203.9 | 37.4 | 30.7 | 235.3 | 4.3 | <1.0 | 1.0 | 4.6 | 35.8 | 63.4 |
| 06/10/04 | 20/10/04 | 4.5 | 31.8 | 38.6 | 26.7 | 127.4 | 28.6 | 8.4 | 140.0 | 3.4 | <1.0 | 16.4 | 29.5 | 36.6 | 18.7 |
| 20/10/04 | 03/11/04 | 4.9 | 23.0 | 23.9 | 11.4 | 126.2 | 27.4 | 9.2 | 147.7 | 3.1 | <1.0 | 7.8 | 13.8 | 27.0 | 2.9 |
| 03/11/04 | 17/11/04 | 5.6 | 69.1 | 2.8 | 7.6 | 529.9 | 116.3 | 25.5 | 624.3 | 12.2 | <1.0 | 5.3 | 2.8 | 81.0 | 24.0 |
| 17/11/04 | 01/12/04 | 5.1 | 35.0 | 5.1 | 3.8 | 180.2 | 36.6 | 13.5 | 199.2 | 3.9 | <1.0 | 13.3 | 8.5 | 33.0 | 14.2 |
| 01/12/04 | 15/12/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 15/12/04 | 05/01/05 | 5.7 | 81.3 | 2.2 | 2.6 | 615.4 | 137.9 | 26.7 | 667.1 | 12.2 | <1.0 | 7.2 | 2.0 | 108.0 | 38.5 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5140 | | 33.6 | 11.8 | 6.6 | 196.1 | 40.9 | 13.9 | 227.9 | 4.8 | - | 11.3 | 9.7 | 37.4 | 685.5 |

# Appendix 1.2:
# Bulk Precipitation Data, 2004
# - Weekly Measurements

Weekly measurements were continued at the following 3 sites:

- 5006 Lough Navar (designated as site 5161 for differentiation from the fortnightly measurements)
- 5002 Eskdalemuir (designated as site 5162 for differentiation from the fortnightly measurements)
- 5117 Thorganby (designated as site 5163 for differentiation from the fortnightly measurements)

# 5161 Lough Navar

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 05/01/04 | 12/01/04 | 5.6 | 35.5 | 1.6 | 2.1 | 253.4 | 50.6 | 17.2 | 252.4 | 5.1 | <1.0 | 5.0 | 2.7 | 37.0 | 59.5 |
| 12/01/04 | 19/01/04 | 5.5 | 27.5 | 0.7 | 0.1 | 238.2 | 46.3 | 9.3 | 245.4 | 7.0 | <1.0 | - | 3.2 | 31.0 | 27.2 |
| 19/01/04 | 26/01/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 26/01/04 | 02/02/04 | 5.3 | 10.1 | 6.6 | 2.9 | 27.1 | 4.8 | 3.1 | 31.0 | 0.9 | <1.0 | 6.8 | 4.6 | <10.0 | 84.8 |
| 02/02/04 | 09/02/04 | 5.5 | 75.4 | 1.9 | 1.4 | 595.7 | 128.0 | 27.9 | 625.3 | 15.2 | <1.0 | 3.7 | 2.9 | 92.0 | 28.2 |
| 09/02/04 | 16/02/04 | 4.7 | 63.6 | 29.2 | 49.7 | 138.2 | 25.7 | 25.7 | 166.4 | 11.6 | <1.0 | 47.0 | 20.0 | - | 2.6 |
| 16/02/04 | 23/02/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 23/02/04 | 01/03/04 | 5.0 | 39.5 | <1.4 | 2.9 | 267.9 | 60.0 | 2.1 | 344.6 | 2.8 | <1.0 | 7.2 | 10.0 | - | 2.1 |
| 01/03/04 | 08/03/04 | 5.8 | 15.8 | 9.2 | 11.7 | 79.0 | 11.0 | 10.6 | 74.9 | 9.8 | <1.0 | 6.3 | 1.6 | 17.0 | 11.2 |
| 08/03/04 | 15/03/04 | 5.2 | 39.9 | 38.4 | 48.3 | 72.0 | 14.9 | 14.1 | 77.4 | 1.9 | <1.0 | 31.2 | 6.5 | 23.0 | 51.5 |
| 15/03/04 | 22/03/04 | 5.3 | 34.1 | 1.9 | 2.1 | 255.9 | 52.3 | 12.1 | 278.6 | 5.5 | <1.0 | 3.3 | 4.8 | 42.0 | 69.0 |
| 22/03/04 | 29/03/04 | 4.7 | 40.8 | 6.6 | 1.3 | 350.4 | 34.9 | 15.5 | 302.8 | 6.1 | <1.0 | - | 20.0 | - | 2.2 |
| 29/03/04 | 19/04/04 | 5.6 | 24.4 | 6.3 | 6.2 | 144.7 | 31.6 | 10.9 | 160.7 | 2.9 | <1.0 | 7.0 | 2.5 | 25.0 | 89.9 |
| 19/04/04 | 26/04/04 | 5.9 | 27.1 | 6.6 | 17.2 | 116.2 | 20.7 | 10.9 | 123.2 | 5.8 | <1.0 | 13.1 | 1.2 | 23.0 | 17.7 |
| 26/04/04 | 03/05/04 | 5.6 | 97.6 | 15.7 | 31.2 | 609.1 | 125.5 | 54.8 | 719.2 | 17.7 | <1.0 | 24.3 | 2.6 | 103.0 | 2.8 |
| 03/05/04 | 10/05/04 | 5.2 | 22.7 | 6.7 | 2.8 | 142.2 | 27.8 | 10.1 | 158.0 | 3.5 | <1.0 | 5.6 | 6.2 | 27.0 | 59.4 |
| 10/05/04 | 24/05/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 24/05/04 | 31/05/04 | 6.7 | 19.1 | 17.6 | 20.3 | 48.4 | 4.7 | 45.8 | 54.6 | 10.7 | <1.0 | 13.3 | 0.2 | 22.0 | 10.6 |
| 31/05/04 | 07/06/04 | 5.7 | 21.1 | 12.6 | 13.8 | 25.2 | 5.2 | 15.0 | 22.8 | 5.9 | <1.0 | 18.0 | 1.9 | 10.7 | 7.5 |
| 07/06/04 | 14/06/04 | 5.6 | 20.9 | 5.7 | 32.2 | 65.1 | 11.5 | 3.4 | 76.6 | 6.0 | <1.0 | 13.1 | 2.8 | 14.0 | 27.0 |
| 14/06/04 | 21/06/04 | 5.6 | 29.8 | 3.4 | 8.9 | 96.7 | 18.0 | 10.7 | 110.7 | 2.3 | <1.0 | 18.2 | 2.5 | 20.0 | 18.0 |
| 21/06/04 | 28/06/04 | 5.2 | 17.2 | 12.8 | 11.9 | 29.4 | 6.6 | 6.0 | 36.3 | <0.5 | <1.0 | 13.6 | 5.8 | 10.0 | 75.0 |
| 28/06/04 | 05/07/04 | 5.0 | 24.8 | 2.5 | 1.4 | 98.8 | 20.4 | 9.2 | 115.3 | 2.8 | <1.0 | 12.9 | 9.5 | 20.0 | 39.3 |
| 05/07/04 | 12/07/04 | 4.9 | 22.9 | 8.0 | 6.1 | 22.3 | 6.2 | 11.0 | 22.7 | 2.4 | <1.0 | 20.2 | 11.7 | 15.2 | 13.0 |
| 12/07/04 | 19/07/04 | 5.1 | 19.1 | 6.9 | 6.4 | 28.8 | 6.1 | 5.4 | 33.0 | 1.3 | <1.0 | 15.6 | 7.4 | 10.9 | 35.2 |
| 19/07/04 | 26/07/04 | 5.5 | 13.2 | 3.2 | 3.5 | 25.3 | 4.9 | 6.6 | 33.2 | 1.5 | <1.0 | 10.1 | 3.1 | <10.0 | 29.1 |
| 26/07/04 | 02/08/04 | 5.2 | 25.6 | 15.7 | 22.3 | 15.9 | 2.7 | 5.1 | 22.2 | 3.8 | <1.0 | 23.7 | 7.1 | 10.0 | 12.1 |
| 02/08/04 | 09/08/04 | 6.3 | 33.4 | 29.0 | 20.2 | 48.7 | 11.1 | 31.4 | 55.2 | 3.5 | <1.0 | 27.5 | 0.5 | 18.0 | 9.8 |
| 09/08/04 | 16/08/04 | 5.6 | 30.3 | 33.1 | 34.2 | 38.3 | 9.6 | 12.4 | 20.5 | 4.5 | <1.0 | 25.6 | 2.8 | 13.0 | 14.2 |
| 16/08/04 | 23/08/04 | 5.3 | 18.3 | 13.3 | 17.0 | 23.9 | 5.1 | 5.2 | 28.3 | 1.9 | <1.0 | 15.5 | 5.6 | 10.0 | 37.2 |
| 23/08/04 | 30/08/04 | 5.0 | 21.0 | 9.2 | 4.7 | 90.6 | 17.7 | 6.4 | 103.7 | 3.3 | <1.0 | 10.1 | 10.7 | 20.0 | 23.8 |
| 30/08/04 | 06/09/04 | 5.6 | 13.4 | 10.4 | 19.9 | 10.5 | 3.3 | 7.2 | 15.0 | 0.1 | <1.0 | 12.1 | 2.4 | <10.0 | 7.2 |
| 06/09/04 | 13/09/04 | 5.7 | 28.1 | 8.9 | 6.2 | 166.0 | 33.7 | 18.7 | 183.0 | 3.5 | <1.0 | 8.1 | 1.9 | 31.0 | 35.1 |
| 13/09/04 | 20/09/04 | 5.7 | 27.4 | 1.8 | <0.7 | 227.4 | 44.5 | 14.7 | 233.9 | 9.5 | <1.0 | 0.0 | 2.1 | 34.9 | 38.7 |
| 20/09/04 | 27/09/04 | 5.4 | 26.2 | <1.4 | <0.7 | 218.1 | 44.8 | 10.3 | 255.5 | 5.4 | <1.0 | - | 4.5 | 35.4 | 58.2 |
| 27/09/04 | 04/10/04 | 5.6 | 4.9 | <1.4 | 5.6 | 134.9 | 26.3 | 9.2 | 91.8 | 4.9 | <1.0 | - | 2.3 | 14.3 | 39.0 |
| 04/10/04 | 11/10/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 11/10/04 | 18/10/04 | 5.4 | 19.8 | 14.1 | 12.4 | 98.1 | 17.7 | 11.7 | 106.1 | 3.4 | <1.0 | 8.0 | 4.0 | 20.6 | 15.5 |
| 18/10/04 | 25/10/04 | 5.2 | 6.0 | 6.5 | 2.1 | 24.9 | 4.9 | 2.4 | 28.8 | 0.6 | <1.0 | 3.0 | 6.5 | <10.0 | 51.4 |
| 25/10/04 | 01/11/04 | 4.7 | 14.8 | 25.7 | 2.9 | 55.7 | 14.5 | 8.5 | 63.2 | 1.0 | <1.0 | 8.1 | 19.5 | 19.6 | 24.2 |
| 01/11/04 | 08/11/04 | 5.7 | 31.2 | 6.8 | 7.7 | 214.2 | 42.9 | 13.6 | 229.9 | 9.8 | <1.0 | 5.4 | 1.9 | 34.0 | 12.1 |
| 08/11/04 | 15/11/04 | 5.3 | 39.1 | 2.8 | 2.5 | 295.3 | 61.5 | 16.6 | 320.7 | 9.9 | <1.0 | 3.6 | 4.9 | 46.0 | 18.3 |
| 15/11/04 | 22/11/04 | 5.2 | 8.8 | 3.8 | 5.3 | 33.6 | 5.1 | 0.6 | 34.6 | 2.2 | <1.0 | 4.7 | 6.8 | <10.0 | 52.7 |
| 22/11/04 | 29/11/04 | 5.4 | 13.1 | 4.8 | 7.9 | 44.6 | 6.0 | 2.8 | 50.3 | 2.4 | <1.0 | 7.7 | 3.7 | 11.0 | 12.9 |
| 29/11/04 | 06/12/04 | 5.3 | 18.5 | 7.5 | 9.8 | 63.1 | 10.9 | 11.5 | 74.5 | 2.3 | <1.0 | 10.9 | 4.8 | 13.0 | 10.5 |
| 06/12/04 | 13/12/04 | 6.0 | 18.7 | 20.4 | 32.4 | 38.1 | 7.5 | 14.5 | 49.4 | 14.6 | <1.0 | 14.1 | 1.0 | <10.0 | 2.4 |
| 13/12/04 | 20/12/04 | 5.3 | 63.5 | 3.3 | 182.3 | 137.8 | 28.5 | 60.2 | 266.2 | 18.0 | <1.0 | 46.9 | 5.4 | 71.0 | 38.5 |
| 20/12/04 | 27/12/04 | 5.2 | 56.2 | 2.5 | <1.4 | 392.2 | 86.7 | 22.5 | 531.6 | 8.7 | <1.0 | 8.9 | 5.9 | 67.0 | 58.1 |
| 27/12/04 | 03/01/05 | 5.4 | 56.8 | 0.8 | <0.7 | 449.0 | 99.2 | 19.5 | 564.9 | 9.0 | <1.0 | 2.7 | 4.4 | 80.0 | 47.0 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5161 | | 27.2 | 7.5 | 12.8 | 147.3 | 30.4 | 12.4 | 168.9 | 4.6 | - | 10.8 | 5.0 | 28.4 | 1381.7 |

## 5162 Eskdalemuir

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 07/01/04 | 14/01/04 | 5.3 | 20.6 | 8.0 | 9.6 | 66.2 | 11.6 | 3.8 | 73.2 | 0.7 | <1.0 | 12.7 | 4.7 | 13.0 | 55.6 |
| 14/01/04 | 21/01/04 | 5.3 | 10.3 | 12.0 | 7.5 | 51.2 | 9.7 | 5.0 | 46.4 | 2.4 | <1.0 | 4.1 | 4.8 | 13.0 | 19.3 |
| 21/01/04 | 28/01/04 | 5.2 | 20.8 | 17.3 | 21.8 | 55.2 | 12.7 | 6.8 | 56.2 | 3.1 | <1.0 | 14.2 | 6.5 | 15.0 | 14.4 |
| 28/01/04 | 04/02/04 | 5.2 | 9.4 | 3.4 | 2.9 | 33.6 | 5.2 | 3.0 | 40.5 | 1.5 | <1.0 | 5.4 | 6.0 | <10.0 | 106.1 |
| 04/02/04 | 11/02/04 | 5.5 | 47.5 | 14.8 | 18.8 | 269.0 | 55.4 | 14.6 | 303.6 | 5.8 | <1.0 | 15.1 | 3.0 | 46.0 | 22.3 |
| 11/02/04 | 18/02/04 | 4.4 | 58.3 | 64.9 | 44.5 | 28.3 | 9.4 | 16.9 | 33.1 | 1.5 | <1.0 | 54.9 | 38.9 | 32.0 | 4.1 |
| 18/02/04 | 25/02/04 | 5.7 | 56.2 | 30.2 | 41.8 | 198.6 | 33.3 | 12.2 | 214.3 | 6.1 | <1.0 | 32.3 | 1.9 | 40.0 | 2.4 |
| 25/02/04 | 03/03/04 | 5.1 | 67.8 | 83.6 | 94.2 | 126.3 | 25.0 | 10.8 | 135.3 | 7.6 | <1.0 | 52.5 | 7.4 | 39.0 | 10.0 |
| 03/03/04 | 10/03/04 | 5.0 | 34.2 | 45.7 | 49.6 | 28.8 | 5.5 | 1.2 | 42.2 | 0.3 | <1.0 | 30.8 | 9.5 | 19.0 | 11.9 |
| 10/03/04 | 17/03/04 | 5.3 | 17.9 | 10.2 | 15.5 | 45.9 | 8.9 | 3.1 | 47.4 | 0.8 | <1.0 | 12.4 | 5.4 | 11.0 | 41.1 |
| 17/03/04 | 24/03/04 | 5.4 | 14.0 | 3.1 | 1.6 | 63.6 | 12.1 | 4.9 | 66.7 | 1.1 | <1.0 | 6.3 | 4.4 | 12.0 | 56.4 |
| 24/03/04 | 31/03/04 | 6.1 | 51.1 | 28.3 | 66.3 | 184.8 | 5.6 | 4.2 | 97.3 | 6.5 | <1.0 | 28.9 | 0.9 | 28.0 | 2.0 |
| 31/03/04 | 07/04/04 | 6.5 | 37.1 | 23.9 | 204.4 | 48.9 | 3.4 | 0.6 | 49.2 | 9.6 | <1.0 | 31.2 | 0.3 | 32.0 | 32.3 |
| 07/04/04 | 14/04/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.6 |
| 14/04/04 | 21/04/04 | 5.3 | 15.0 | 12.4 | 14.8 | 30.3 | 6.7 | 3.1 | 36.1 | 0.4 | <1.0 | 11.4 | 4.7 | <10.0 | 82.2 |
| 21/04/04 | 28/04/04 | 5.7 | 38.0 | 22.5 | 35.2 | 139.3 | 27.7 | 10.8 | 148.0 | 3.1 | <1.0 | 21.2 | 2.0 | 30.0 | 10.7 |
| 28/04/04 | 05/05/04 | 5.6 | 14.5 | 7.7 | 13.4 | 37.0 | 6.3 | 3.5 | 36.5 | 1.1 | <1.0 | 10.0 | 2.7 | <10.0 | 17.6 |
| 05/05/04 | 12/05/04 | 4.4 | 56.2 | 38.9 | 40.5 | 5.3 | 6.3 | 16.5 | 6.8 | 3.4 | <1.0 | 55.5 | 37.2 | 25.0 | 14.8 |
| 12/05/04 | 19/05/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.6 |
| 19/05/04 | 26/05/04 | 5.7 | 64.5 | 41.0 | 77.1 | 95.4 | 16.3 | 16.2 | 105.4 | 9.7 | <1.0 | 53.0 | 1.8 | 30.0 | 1.7 |
| 26/05/04 | 02/06/04 | 6.5 | 42.7 | 53.5 | 89.3 | 19.1 | 6.2 | 6.0 | 18.1 | 2.8 | <1.0 | 40.4 | 0.3 | 73.0 | 13.9 |
| 02/06/04 | 09/06/04 | 5.9 | 13.0 | 14.5 | 25.8 | 15.1 | 0.5 | 1.2 | 15.4 | 3.0 | <1.0 | 11.2 | 1.2 | <10.0 | 13.2 |
| 09/06/04 | 16/06/04 | 5.8 | 57.3 | 35.0 | 58.9 | 103.9 | 21.5 | 15.6 | 112.1 | 3.1 | <1.0 | 44.8 | 1.5 | 30.0 | 3.4 |
| 16/06/04 | 23/06/04 | 6.9 | 50.4 | 14.1 | 423.9 | 75.3 | 10.4 | 4.6 | 84.2 | 22.6 | 75.5 | 41.3 | 0.1 | 66.0 | 51.1 |
| 23/06/04 | 30/06/04 | 7.5 | 76.3 | 9.5 | 825.9 | 190.2 | 26.4 | 36.1 | 215.6 | 49.9 | <1.0 | 53.4 | 0.0 | 133.0 | 14.8 |
| 30/06/04 | 07/07/04 | 7.2 | 37.7 | 8.4 | 284.8 | 30.8 | 7.1 | 5.5 | 47.6 | 13.6 | 153.6 | 34.0 | 0.1 | 45.0 | 8.7 |
| 07/07/04 | 14/07/04 | 5.8 | 47.2 | 37.2 | 34.0 | 39.0 | 17.7 | 20.6 | 44.9 | 0.8 | 22.7 | 42.5 | 1.5 | 21.0 | 3.2 |
| 14/07/04 | 21/07/04 | 5.1 | 41.0 | 45.0 | 72.5 | 41.0 | 12.1 | 10.9 | 43.6 | 15.3 | 33.3 | 36.1 | 7.6 | 1.0 | 12.4 |
| 21/07/04 | 28/07/04 | 4.9 | 29.2 | 21.9 | 27.1 | 21.3 | 5.3 | 5.8 | 21.3 | 2.9 | <1.0 | 26.7 | 13.2 | 16.1 | 16.9 |
| 28/07/04 | 04/08/04 | 4.8 | 32.9 | 34.6 | 51.4 | <0.9 | 0.5 | 1.5 | 10.1 | 2.8 | <1.0 | 33.0 | 15.5 | 14.0 | 63.9 |
| 04/08/04 | 11/08/04 | 4.7 | 24.6 | 25.2 | 28.9 | 3.9 | 1.8 | 5.6 | 5.5 | 2.8 | <1.0 | 24.1 | 20.4 | 12.0 | 129.8 |
| 11/08/04 | 18/08/04 | 4.7 | 13.2 | 14.5 | 6.4 | 6.9 | <0.8 | <1.0 | 10.0 | 1.0 | <1.0 | 12.4 | 20.4 | <10.0 | 51.7 |
| 18/08/04 | 25/08/04 | 4.7 | 16.4 | 17.8 | 5.3 | 7.4 | 2.3 | 3.5 | 10.3 | 0.7 | <1.0 | 15.6 | 22.4 | 12.0 | 25.8 |
| 25/08/04 | 01/09/04 | 5.1 | 16.4 | 7.8 | 5.7 | 58.8 | 12.7 | 4.4 | 67.7 | 1.3 | <1.0 | 9.3 | 7.4 | 14.0 | 19.2 |
| 01/09/04 | 08/09/04 | 5.2 | 70.6 | 58.8 | 74.0 | 169.2 | 40.1 | 20.0 | 223.3 | 5.1 | 5.5 | 50.2 | 6.0 | 47.0 | 3.6 |
| 08/09/04 | 15/09/04 | 5.2 | 22.2 | 12.1 | 8.5 | 104.5 | 21.5 | 8.4 | 138.5 | 3.0 | <1.0 | 9.6 | 5.9 | 20.4 | 61.2 |
| 15/09/04 | 22/09/04 | 5.4 | 12.0 | 3.1 | 5.8 | 76.9 | 14.7 | 2.3 | 88.3 | 1.1 | <1.0 | 2.8 | 4.3 | 14.3 | 73.6 |
| 22/09/04 | 29/09/04 | 5.9 | 28.0 | 11.7 | 42.1 | 91.5 | 15.8 | 9.2 | 97.8 | 7.5 | <1.0 | 17.0 | 1.3 | 21.1 | 7.7 |
| 29/09/04 | 06/10/04 | 5.2 | 11.1 | 12.9 | <1.4 | 73.6 | 15.6 | 4.5 | 73.6 | 2.1 | <1.0 | 2.2 | 5.8 | 14.8 | 71.1 |
| 06/10/04 | 13/10/04 | 4.3 | 53.5 | 61.7 | 25.6 | 99.6 | 21.8 | 14.4 | 126.9 | 5.2 | <1.0 | 41.5 | 52.5 | 21.0 | 7.1 |
| 13/10/04 | 20/10/04 | 4.7 | 15.7 | 22.0 | 18.4 | 17.5 | 3.8 | 2.8 | 21.8 | 0.4 | <1.0 | 13.6 | 20.0 | 13.9 | 34.1 |
| 20/10/04 | 27/10/04 | 4.9 | 11.4 | 8.2 | 2.6 | 33.7 | 6.5 | 2.2 | 35.9 | 1.0 | <1.0 | 7.3 | 13.8 | 10.7 | 74.4 |
| 27/10/04 | 03/11/04 | 4.2 | 41.2 | 66.9 | 23.7 | 53.6 | 12.7 | 5.8 | 99.1 | 1.3 | <1.0 | 34.8 | 70.8 | 39.5 | 16.2 |
| 03/11/04 | 10/11/04 | 5.4 | 18.5 | 28.1 | 14.0 | 79.7 | 14.6 | 6.6 | 91.5 | 5.1 | <1.0 | 8.9 | 4.0 | 18.0 | 13.6 |
| 10/11/04 | 17/11/04 | 5.8 | 9.9 | 7.3 | 23.5 | 29.3 | 3.2 | 1.4 | 31.9 | 1.5 | <1.0 | 6.3 | 1.8 | <10.0 | 12.6 |
| 17/11/04 | 24/11/04 | 4.8 | 25.5 | 17.6 | 18.7 | 79.6 | 14.0 | 3.6 | 88.7 | 1.3 | <1.0 | 15.9 | 14.8 | 21.0 | 2.6 |
| 24/11/04 | 01/12/04 | 4.9 | 27.9 | 24.9 | 28.2 | 60.9 | 11.4 | 4.4 | 67.0 | 2.0 | <1.0 | 20.6 | 12.9 | 18.0 | 28.9 |
| 01/12/04 | 08/12/04 | 5.6 | 35.0 | 32.2 | 61.6 | 109.5 | 20.0 | 7.0 | 132.5 | 2.7 | <1.0 | 21.8 | 2.5 | 27.0 | 6.8 |
| 08/12/04 | 15/12/04 | 4.5 | 63.1 | 69.6 | 79.2 | 107.9 | 22.3 | 15.6 | 126.9 | 2.6 | <1.0 | 50.1 | 29.5 | 39.0 | 13.1 |
| 15/12/04 | 22/12/04 | 5.1 | 19.3 | 5.4 | 6.5 | 98.2 | 20.8 | 6.4 | 119.9 | 1.8 | <1.0 | 7.5 | 7.4 | 19.0 | 31.3 |
| 22/12/04 | 29/12/04 | 5.3 | 20.8 | 4.6 | 11.2 | 103.5 | 21.3 | 5.7 | 129.3 | 2.9 | <1.0 | 8.3 | 5.0 | 20.0 | 42.9 |
| 29/12/04 | 05/01/05 | 5.6 | 26.1 | 5.6 | 15.4 | 155.3 | 32.3 | 8.6 | 185.5 | 3.0 | <1.0 | 7.4 | 2.3 | 31.0 | 51.5 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5162 | | 22.1 | 16.5 | 30.5 | 56.8 | 11.2 | 5.1 | 66.0 | 2.7 | - | 15.3 | 10.3 | 18.1 | 1488.2 |

# 5163 Thorganby

| Sampling Start Date | End Date | pH | SO4 (µeq/l) | NO3 (µeq/l) | NH4 (µeq/l) | Na (µeq/l) | Mg (µeq/l) | Ca (µeq/l) | Cl (µeq/l) | K (µeq/l) | PO4 (µeq/l) | nss-SO4 (µeq/l) | H (µeq/l) | conductivity (µS/cm) | rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 07/01/04 | 14/01/04 | 5.1 | 36.8 | 14.0 | 29.1 | 63.2 | 15.2 | 12.0 | 72.4 | 1.4 | <1.0 | 29.2 | 7.9 | 16.0 | 14.4 |
| 14/01/04 | 21/01/04 | 4.9 | 19.7 | 10.5 | 17.2 | 41.1 | 7.2 | 6.2 | 41.3 | 2.0 | <1.0 | 14.8 | 12.9 | 12.0 | 19.5 |
| 21/01/04 | 28/01/04 | 4.7 | 36.7 | 20.3 | 45.1 | 62.5 | 15.6 | 25.7 | 90.7 | 3.1 | <1.0 | 29.2 | 18.2 | 25.0 | 6.9 |
| 28/01/04 | 04/02/04 | 4.6 | 26.8 | 10.4 | 21.2 | 21.5 | 6.0 | 10.3 | 36.4 | 1.8 | <1.0 | 24.2 | 22.9 | 17.0 | 28.2 |
| 04/02/04 | 11/02/04 | 6.2 | 72.1 | 18.0 | 36.5 | 319.6 | 68.1 | 49.0 | 342.9 | 7.8 | <1.0 | 33.6 | 0.7 | 72.0 | 2.7 |
| 11/02/04 | 18/02/04 | 6.1 | 42.5 | 26.1 | 46.2 | 50.4 | 11.1 | 18.2 | 49.6 | 1.4 | <1.0 | 36.4 | 0.7 | 17.0 | 7.2 |
| 18/02/04 | 25/02/04 | 7.7 | 400.8 | 35.9 | 6607.8 | 439.0 | 199.4 | 64.0 | 386.3 | 276.3 | 4615.6 | 347.9 | 0.0 | 750.0 | 2.4 |
| 25/02/04 | 03/03/04 | 6.2 | 6.3 | 3.2 | 29.6 | 80.4 | 13.9 | 8.7 | 18.3 | 0.5 | <1.0 | - | 0.6 | 36.0 | 3.5 |
| 03/03/04 | 10/03/04 | 4.7 | 170.4 | 101.7 | 177.2 | 234.2 | 53.0 | 82.1 | 236.2 | 7.4 | <1.0 | 142.2 | 22.4 | 78.0 | 2.0 |
| 10/03/04 | 17/03/04 | 4.9 | 59.8 | 73.9 | 87.3 | 52.4 | 10.9 | 28.4 | 45.7 | 1.4 | <1.0 | 53.5 | 12.9 | 30.0 | 7.8 |
| 17/03/04 | 24/03/04 | 5.3 | 308.1 | 14.2 | 4136.1 | 135.8 | 30.0 | 19.9 | 137.9 | 66.8 | 811.1 | 291.8 | 5.4 | 326.0 | 12.2 |
| 24/03/04 | 31/03/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 31/03/04 | 21/04/04 | 6.4 | 56.9 | 62.5 | 173.3 | 17.9 | 2.7 | 7.9 | 31.1 | 47.7 | 59.5 | 54.7 | 0.4 | 35.0 | 64.6 |
| 21/04/04 | 28/04/04 | 4.2 | 103.2 | 117.7 | 130.3 | 6.5 | 10.1 | 38.6 | 20.6 | 1.0 | <1.0 | 102.4 | 64.6 | 53.0 | 34.2 |
| 28/04/04 | 05/05/04 | 6.2 | 39.4 | 25.0 | 33.7 | 24.7 | 13.4 | 32.8 | 30.0 | 1.2 | <1.0 | 36.5 | 0.6 | 16.0 | 11.9 |
| 05/05/04 | 12/05/04 | 4.7 | 65.4 | 47.0 | 28.4 | 7.9 | 11.0 | 67.6 | 14.4 | 1.7 | <1.0 | 64.5 | 18.2 | 22.0 | 5.4 |
| 12/05/04 | 19/05/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 19/05/04 | 26/05/04 | 6.2 | 41.7 | 38.9 | 75.7 | 63.5 | 18.7 | 85.8 | 97.6 | 25.5 | <1.0 | 34.1 | 0.6 | 40.0 | 3.8 |
| 26/05/04 | 02/06/04 | 6.1 | 82.4 | 69.1 | 76.6 | 34.5 | 12.1 | 55.5 | 45.2 | 3.7 | <1.0 | 78.2 | 0.8 | 28.0 | 10.3 |
| 02/06/04 | 09/06/04 | 7.1 | 247.1 | 38.7 | 1024.9 | 69.2 | 1.8 | 17.4 | 81.4 | 134.7 | 545.5 | 238.8 | 0.1 | 131.0 | 2.3 |
| 09/06/04 | 16/06/04 | 7.2 | 196.3 | 43.3 | 347.2 | 104.6 | 24.1 | 47.1 | 144.0 | 60.8 | 213.6 | 183.7 | 0.1 | 76.0 | 1.1 |
| 16/06/04 | 23/06/04 | 5.8 | 30.1 | 19.2 | 21.4 | 15.2 | 9.1 | 17.7 | 18.7 | 3.5 | <1.0 | 28.3 | 1.5 | 10.0 | 30.5 |
| 23/06/04 | 30/06/04 | 5.3 | 59.5 | 28.1 | 26.0 | 32.1 | 14.7 | 32.9 | 40.8 | 6.5 | 55.6 | 55.7 | 5.1 | 18.0 | 10.7 |
| 30/06/04 | 07/07/04 | 5.8 | 50.5 | 23.6 | 33.9 | 40.3 | 12.3 | 31.9 | 50.4 | 3.1 | <1.0 | 45.6 | 1.4 | 18.0 | 12.8 |
| 07/07/04 | 14/07/04 | 6.0 | 55.7 | <1.4 | 28.4 | 58.3 | 24.2 | 41.1 | 82.0 | 22.3 | 12.5 | 48.7 | 0.9 | 29.0 | 13.8 |
| 14/07/04 | 21/07/04 | 5.4 | 70.9 | 51.8 | 71.2 | 2.6 | 9.4 | 40.4 | 15.5 | 6.5 | 3.4 | 70.6 | 4.4 | 22.0 | 5.4 |
| 21/07/04 | 28/07/04 | 5.2 | 60.9 | 33.3 | 33.7 | 40.3 | 14.4 | 50.7 | 49.8 | 4.8 | <1.0 | 56.1 | 6.2 | 21.0 | 5.5 |
| 28/07/04 | 05/08/04 | 4.9 | 121.1 | 136.8 | 171.5 | 2.5 | 7.8 | 64.0 | 218.7 | 4.5 | <1.0 | 120.8 | 12.6 | 39.0 | 13.3 |
| 05/08/04 | 11/08/04 | 4.6 | 39.2 | 23.4 | 36.0 | <0.3 | 1.2 | 9.3 | 7.9 | 2.1 | <1.0 | 39.2 | 27.5 | 15.0 | 82.9 |
| 11/08/04 | 18/08/04 | 4.7 | 44.3 | 33.6 | 46.5 | 7.5 | 3.0 | 11.8 | 14.1 | 1.4 | <1.0 | 43.4 | 20.0 | 17.0 | 33.2 |
| 18/08/04 | 25/08/04 | 7.3 | 94.3 | 12.0 | 618.3 | 61.9 | 5.8 | 4.5 | 67.9 | 95.2 | 84.9 | 86.9 | 0.0 | 90.0 | 20.2 |
| 25/08/04 | 01/09/04 | 5.3 | 127.1 | 48.5 | 110.3 | 68.8 | 20.0 | 36.5 | 117.7 | 5.1 | <1.0 | 118.8 | 5.5 | 36.0 | 3.4 |
| 01/09/04 | 08/09/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 08/09/04 | 15/09/04 | 6.4 | 212.9 | 107.9 | 49.3 | 264.1 | 73.1 | 300.8 | 304.6 | 35.9 | <1.0 | 181.1 | 0.4 | 89.1 | 1.5 |
| 15/09/04 | 22/09/04 | 4.8 | 45.0 | 23.7 | 16.1 | 27.2 | 13.7 | 34.6 | 41.8 | 3.1 | <1.0 | 41.8 | 14.8 | 19.7 | 5.7 |
| 22/09/04 | 29/09/04 | 6.2 | 47.8 | 29.8 | 51.2 | 237.6 | 52.7 | 63.8 | 267.6 | 6.6 | <1.0 | 19.2 | 0.6 | 51.4 | 1.8 |
| 29/09/04 | 06/10/04 | 4.5 | 25.7 | 21.1 | 20.7 | 17.1 | 6.9 | 15.7 | 33.3 | 2.7 | <1.0 | 23.6 | 30.9 | 20.7 | 18.1 |
| 06/10/04 | 13/10/04 | 5.0 | 31.9 | 34.3 | 34.6 | 94.9 | 23.4 | 33.2 | 107.0 | 4.0 | <1.0 | 20.5 | 10.7 | 25.6 | 10.8 |
| 13/10/04 | 20/10/04 | 4.5 | 29.9 | 38.4 | 38.2 | 11.7 | 4.7 | 8.7 | 17.4 | 1.2 | <1.0 | 28.5 | 30.9 | 22.4 | 29.5 |
| 20/10/04 | 27/10/04 | 4.7 | 31.6 | 30.5 | 13.7 | 30.2 | 9.4 | 11.9 | 39.4 | 3.5 | <1.0 | 27.9 | 20.4 | 20.0 | 16.4 |
| 27/10/04 | 03/11/04 | 4.9 | 50.9 | 55.1 | 59.6 | 99.3 | 25.2 | 29.8 | 104.3 | 4.5 | <1.0 | 38.9 | 13.8 | 36.0 | 2.8 |
| 03/11/04 | 10/11/04 | 6.1 | 42.8 | 26.0 | 75.8 | 60.6 | 11.9 | 19.5 | 66.8 | 5.3 | <1.0 | 35.5 | 0.8 | 23.0 | 2.6 |
| 10/11/04 | 17/11/04 | 5.9 | 67.7 | 29.6 | 45.1 | 153.0 | 31.3 | 52.0 | 177.9 | 6.7 | <1.0 | 49.2 | 1.2 | 37.0 | 1.4 |
| 17/11/04 | 24/11/04 | 5.4 | 28.3 | 16.0 | 20.8 | 62.7 | 12.3 | 11.8 | 72.5 | 1.6 | <1.0 | 20.8 | 4.4 | 17.0 | 6.8 |
| 24/11/04 | 01/12/04 | 5.5 | 66.5 | 12.1 | 28.8 | 137.4 | 29.1 | 22.1 | 155.4 | 2.6 | <1.0 | 49.9 | 3.5 | 28.0 | 2.9 |
| 01/12/04 | 08/12/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 08/12/04 | 15/12/04 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.0 |
| 15/12/04 | 22/12/04 | 5.1 | 48.8 | 8.8 | 33.1 | 119.8 | 25.9 | 15.9 | 143.6 | 2.7 | <1.0 | 34.4 | 7.6 | 28.0 | 10.3 |
| 22/12/04 | 29/12/04 | 4.8 | 76.1 | 15.9 | 44.0 | 165.9 | 37.1 | 17.6 | 234.3 | 5.3 | <1.0 | 56.1 | 15.5 | 39.0 | 3.5 |
| 29/12/04 | 07/01/05 | 5.1 | 45.3 | 12.3 | 29.6 | 125.7 | 27.2 | 15.0 | 159.6 | 2.8 | <1.0 | 30.2 | 7.2 | 32.0 | 6.3 |
| Precipitation-weighted annual mean for site (samples containing phosphate are excluded) | | | | | | | | | | | | | | | Total rainfall |
| | 5163 | | 47.9 | 36.6 | 47.0 | 32.8 | 10.0 | 22.6 | 48.8 | 2.7 | - | 44.3 | 19.6 | 23.1 | 592.5 |

# Appendix 2
# Tables of Annual Mean Concentrations and Total Rainfall, 1986 to 2004

Notes to Tables A.2.1 to A.2.10:

(1) The monitoring programme in 2001 was severely affected by the outbreak of Foot and Mouth disease which prevented access to the sampling sites. The evaluation of the rainfall volumes indicates that the rainfall collected at the high rainfall sites is likely to be understated [see Hayman *et al.* (2003a)].

(2) Annual mean precipitation-weighted concentrations for 2001 have not been included for the Cow Green Reservoir (5113), Llyn Brianne (5124), Scoat Tarn (5159) and Whiteadder (5106) sites as sampling was suspended for more than 5 months of 2001.

## Table A.2.1 - Precipitation-weighted Annual Mean Acidity, 1986 to 2004 (μeq $l^{-1}$)

| | Precipitation-weighted Annual Mean Acidity (μeq $l^{-1}$) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| Goonhilly | 20 | 23 | 15 | 19 | 14 | 26 | 15 | 17 | 20 | 18 | 19 | 20 | 14 | 13 | - | 22 | 31 | 22 | 15 |
| Yarner Wood | 17 | 20 | 14 | 20 | 13 | 17 | 18 | 17 | 18 | 15 | 18 | 18 | 12 | 14 | - | 23 | 17 | 22 | 14 |
| Barcombe Mills | 19 | 22 | 13 | 15 | 12 | 20 | 17 | 24 | 16 | 16 | 14 | 16 | 11 | 13 | - | 17 | 21 | 17 | 10 |
| Compton | 25 | 28 | 16 | 25 | 14 | 18 | 35 | 34 | 23 | 13 | 7 | 12 | 11 | 7 | - | 12 | 15 | 7 | 6 |
| Crai Reservoir | - | - | - | - | - | - | - | - | - | - | - | - | - | 12 | - | 14 | 19 | 17 | 10 |
| Flatford Mill | 33 | 43 | 35 | 35 | 27 | 43 | 36 | 25 | 27 | 30 | 25 | 26 | 25 | 27 | - | 20 | 24 | 22 | 24 |
| Woburn | 45 | 50 | 37 | 37 | 28 | 35 | 37 | 27 | 30 | 22 | 15 | 24 | 25 | 14 | - | 23 | 28 | 20 | 13 |
| Tycanol Wood | 16 | 17 | 15 | 18 | 14 | 21 | 21 | 17 | 14 | 14 | 16 | 13 | 11 | 11 | - | 14 | 16 | 18 | 12 |
| Llyn Brianne | 16 | 21 | 18 | 19 | 17 | 24 | 20 | 19 | 16 | 12 | 14 | 15 | 12 | 11 | - | - | 16 | 24 | 8 |
| Pumlumon | - | - | - | 14 | 12 | 16 | 18 | 19 | 13 | 14 | 15 | 12 | 9 | 10 | - | 10 | 10 | 13 | 5 |
| Stoke Ferry | 35 | 36 | 30 | 40 | 18 | 22 | 30 | 27 | 18 | 24 | 16 | 19 | 18 | 17 | - | 15 | 28 | 19 | 12 |
| Preston Montford | 18 | 25 | 24 | 36 | 14 | 27 | 38 | 35 | 30 | 27 | 19 | 16 | 8 | 7 | - | 9 | 17 | 13 | 7 |
| Bottesford | 61 | 76 | 81 | 48 | 42 | 62 | 68 | 62 | 36 | 29 | 22 | 22 | 20 | 17 | - | 19 | 29 | 14 | 15 |
| Llyn Llagi | - | - | - | - | - | - | - | - | - | - | - | - | - | 13 | - | 15 | 13 | 16 | 9 |
| Beddgelert | 17 | 19 | 17 | 15 | 12 | 16 | 14 | 18 | 12 | 11 | 12 | - | - | - | - | - | - | - | - |
| Llyn Llydaw | - | - | - | - | - | - | - | - | - | - | - | 11 | 11 | 12 | - | 14 | 17 | 12 | 9 |
| Wardlow Hay Cop | 29 | 45 | 33 | 37 | 24 | 33 | 34 | 36 | 27 | 28 | 22 | 18 | 16 | 10 | - | 19 | 23 | 9 | 6 |
| Driby | 42 | 43 | 42 | 47 | 41 | 41 | 45 | 35 | 36 | 37 | 18 | 22 | 34 | 21 | - | 23 | 29 | 49 | 13 |
| Jenny Hurn | 89 | 100 | 85 | 63 | 53 | 80 | 81 | 67 | 39 | 58 | 54 | 55 | 45 | 33 | - | 31 | - | - | - |
| River Etherow | - | - | - | - | - | - | - | - | - | - | - | - | - | 25 | - | 29 | 34 | 28 | 14 |
| Thorganby | 75 | 73 | 88 | 84 | 64 | 55 | 82 | 80 | 44 | 51 | 44 | 29 | 43 | 16 | - | 26 | 30 | 17 | 15 |
| High Muffles | 58 | 63 | 72 | 55 | 55 | 58 | 59 | 47 | 42 | 41 | 40 | 33 | 35 | 22 | - | 38 | 36 | 22 | 17 |
| Bannisdale | 30 | 27 | 28 | 24 | 18 | 22 | 25 | 31 | 19 | 17 | 20 | 16 | 15 | 13 | - | 24 | 19 | 17 | 10 |
| Scoat Tarn | - | - | - | - | - | - | - | - | - | - | - | - | - | 14 | - | - | 18 | 19 | 10 |
| Hillsborough Forest | - | - | - | 13 | 7 | 12 | 12 | 17 | 12 | 8 | 13 | 6 | 7 | 9 | - | 7 | 4 | 3 | 3 |
| Lough Navar | 11 | 9 | 10 | 10 | 8 | 6 | 8 | 11 | 7 | 8 | 6 | 7 | 5 | 6 | - | 8 | 8 | 6 | 5 |
| Cow Green Reservoir | 27 | 31 | 34 | 23 | 21 | 24 | 28 | 33 | 21 | 17 | 24 | 11 | 16 | 13 | - | - | 20 | 15 | 11 |
| Loch Dee | 29 | 23 | 19 | 15 | 15 | 19 | 17 | 22 | 15 | 13 | 19 | 11 | 10 | 12 | - | 19 | 13 | 14 | 12 |
| Beaghs Burn | - | - | - | - | - | - | - | - | - | - | - | - | - | 9 | - | 14 | 15 | 5 | 5 |
| Redesdale | 41 | 44 | 52 | 32 | 30 | 33 | 42 | 31 | 31 | 25 | 33 | 27 | 25 | 16 | - | 26 | 25 | 20 | 16 |
| Eskdalemuir | 21 | 25 | 27 | 20 | 24 | 22 | 22 | 26 | 17 | 16 | 17 | 17 | 14 | 14 | - | 22 | 17 | 14 | 8 |
| Whiteadder | 40 | 36 | 47 | 35 | 31 | 36 | 45 | 34 | 33 | 32 | 31 | 32 | 23 | 19 | - | - | 35 | 21 | 20 |
| Loch Chon | - | - | - | - | - | - | - | - | - | - | - | - | - | 16 | - | 24 | 22 | 21 | 13 |
| Balquhidder | 21 | 32 | 24 | 20 | 16 | 22 | 20 | 24 | 22 | 18 | 29 | 15 | 15 | 12 | - | 22 | 24 | 20 | 14 |
| Polloch | - | - | - | - | - | 14 | 14 | 15 | 13 | 12 | 16 | 10 | 8 | 9 | - | 13 | 13 | 15 | 8 |
| Loch Nagar | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | - | 34 | 43 | 25 | 17 |
| Glen Dye | - | 45 | 46 | 36 | 39 | 44 | 41 | 35 | 42 | 41 | 56 | 32 | 28 | 22 | - | 40 | 39 | 30 | 23 |
| Allt a' Mharcaidh | 22 | 22 | 21 | 20 | 18 | 17 | 17 | 17 | 18 | 16 | 19 | 16 | 11 | 10 | - | 17 | 19 | 14 | 11 |
| Strathvaich Dam | - | 16 | 16 | 13 | 11 | 15 | 20 | 13 | 11 | 10 | 13 | 12 | 10 | 10 | - | 12 | 13 | 11 | 10 |
| Achanarras | 10 | 19 | 25 | 25 | 19 | 20 | 24 | 22 | 17 | 16 | 21 | 21 | 14 | 14 | - | 20 | 25 | 11 | 10 |

## Table A.2.2 - Precipitation-weighted Annual Mean Non-marine Sulphate, 1986 to 2004 (μeq $l^{-1}$)

| | Precipitation-weighted Annual Mean non-seasalt Sulphate Concentration (μeq $l^{-1}$) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| Goonhilly | 30 | 34 | 21 | 29 | 24 | 36 | 22 | 29 | 26 | 24 | 31 | 25 | 17 | 17 | 20 | 22 | 20 | 24 | 18 |
| Yarner Wood | 27 | 37 | 22 | 27 | 19 | 28 | 25 | 28 | 28 | 24 | 33 | 27 | 18 | 18 | 14 | 19 | 16 | 19 | 18 |
| Barcombe Mills | 46 | 50 | 40 | 44 | 38 | 52 | 43 | 33 | 36 | 33 | 38 | 25 | 30 | 26 | 21 | 25 | 25 | 35 | 36 |
| Compton | 78 | 104 | 64 | 60 | 58 | 63 | 63 | 48 | 55 | 49 | 61 | 42 | 38 | 32 | 26 | 28 | 27 | 29 | 32 |
| Crai Reservoir | - | - | - | - | - | - | - | - | - | - | - | - | - | 18 | 14 | 20 | 11 | 16 | 10 |
| Flatford Mill | 90 | 71 | 67 | 80 | 58 | 71 | 53 | 41 | 50 | 52 | 52 | 41 | 43 | 45 | 34 | 33 | 35 | 39 | 35 |
| Woburn | 73 | 80 | 85 | 73 | 66 | 63 | 57 | 44 | 59 | 46 | 56 | 39 | 42 | 38 | 30 | 34 | 32 | 33 | 34 |
| Tycanol Wood | 27 | 26 | 23 | 26 | 22 | 31 | 27 | 22 | 22 | 22 | 27 | 19 | 18 | 21 | 16 | 19 | 15 | 15 | 17 |
| Llyn Brianne | 24 | 29 | 26 | 27 | 27 | 30 | 28 | 26 | 26 | 22 | 26 | 20 | 19 | 17 | 15 | - | 14 | 17 | 11 |
| Pumlumon | - | - | - | 19 | 19 | 24 | 24 | 23 | 18 | 21 | 23 | 17 | 14 | 14 | 11 | 12 | 10 | 12 | 10 |
| Stoke Ferry | 80 | 76 | 66 | 84 | 81 | 77 | 67 | 54 | 61 | 50 | 52 | 49 | 43 | 40 | 41 | 34 | 35 | 41 | 37 |
| Preston Montford | 45 | 60 | 56 | 60 | 37 | 66 | 64 | 48 | 52 | 60 | 49 | 32 | 27 | 24 | 25 | 30 | 27 | 23 | 21 |
| Bottesford | 90 | 93 | 109 | 83 | 66 | 75 | 73 | 57 | 63 | 55 | 54 | 43 | 45 | 39 | 33 | 42 | 40 | 44 | 34 |
| Llyn Llagi | - | - | - | - | - | - | - | - | - | - | - | - | - | 17 | 17 | 16 | 12 | 15 | 12 |
| Beddgelert | 53 | 33 | 24 | 22 | 19 | 23 | 22 | 24 | 20 | 20 | 24 | - | - | - | - | - | - | - | - |
| Llyn Llydaw | - | - | - | - | - | - | - | - | - | - | - | 14 | 16 | 17 | 13 | 15 | 13 | 12 | 12 |
| Wardlow Hay Cop | 71 | 92 | 83 | 80 | 73 | 85 | 73 | 71 | 76 | 65 | 78 | 59 | 50 | 49 | 41 | 53 | 40 | 42 | 37 |
| Driby | 69 | 74 | 77 | 79 | 80 | 78 | 65 | 49 | 62 | 70 | 49 | 42 | 53 | 41 | 37 | 40 | 33 | 40 | 36 |
| Jenny Hurn | 110 | 106 | 121 | 98 | 89 | 83 | 77 | 60 | 80 | 65 | 81 | 58 | 70 | 54 | 51 | 53 | - | - | - |
| River Etherow | - | - | - | - | - | - | - | - | - | - | - | - | - | 39 | 32 | 42 | 30 | 29 | 30 |
| Thorganby | 85 | 80 | 88 | 87 | 82 | 119 | 88 | 79 | 72 | 56 | 69 | 62 | 60 | 50 | 45 | 51 | 41 | 50 | 40 |
| High Muffles | 63 | 74 | 82 | 73 | 67 | 75 | 71 | 56 | 60 | 51 | 65 | 47 | 49 | 37 | 36 | 40 | 34 | 39 | 32 |
| Bannisdale | 41 | 38 | 45 | 40 | 41 | 38 | 42 | 45 | 37 | 37 | 44 | 31 | 30 | 27 | 22 | 27 | 20 | 25 | 19 |
| Scoat Tarn | - | - | - | - | - | - | - | - | - | - | - | - | - | 23 | 17 | - | 15 | 17 | 15 |
| Hillsborough Forest | - | - | - | 52 | 36 | 42 | 41 | 40 | 45 | 33 | 45 | 26 | 29 | 31 | 23 | 33 | 18 | 17 | 17 |
| Lough Navar | 19 | 16 | 14 | 18 | 14 | 18 | 17 | 18 | 16 | 16 | 17 | 15 | 12 | 10 | 11 | 12 | 8 | 10 | 10 |
| Cow Green Reservoir | 35 | 39 | 44 | 35 | 33 | 34 | 38 | 40 | 31 | 31 | 37 | 26 | 26 | 25 | 19 | - | 17 | 18 | 16 |
| Loch Dee | 32 | 35 | 36 | 24 | 26 | 28 | 27 | 28 | 25 | 24 | 36 | 18 | 19 | 19 | 19 | 22 | 11 | 15 | 18 |
| Beaghs Burn | - | - | - | - | - | - | - | - | - | - | - | - | - | 37 | 16 | 21 | 12 | 12 | 10 |
| Redesdale | 58 | 46 | 62 | 47 | 36 | 43 | 46 | 35 | 42 | 37 | 51 | 37 | 34 | 25 | 23 | 29 | 22 | 24 | 26 |
| Eskdalemuir | 31 | 30 | 33 | 28 | 31 | 30 | 28 | 29 | 28 | 28 | 28 | 24 | 20 | 20 | 15 | 21 | 13 | 19 | 14 |
| Whiteadder | 53 | 48 | 61 | 46 | 33 | 45 | 50 | 37 | 40 | 43 | 44 | 33 | 27 | 24 | 24 | - | 28 | 19 | 23 |
| Loch Chon | - | - | - | - | - | - | - | - | - | - | - | - | - | 16 | 16 | 17 | 14 | 13 | 14 |
| Balquhidder | 26 | 33 | 28 | 24 | 22 | 27 | 23 | 26 | 22 | 21 | 38 | 21 | 19 | 15 | 15 | 19 | 15 | 16 | 13 |
| Polloch | - | - | - | - | - | 17 | 17 | 14 | 16 | 14 | 18 | 11 | 10 | 9 | 9 | 9 | 8 | 8 | 9 |
| Loch Nagar | - | - | - | - | - | - | - | - | - | - | - | - | - | 23 | 20 | 27 | 27 | 21 | 16 |
| Glen Dye | - | 48 | 49 | 41 | 39 | 45 | 43 | 38 | 46 | 41 | 62 | 31 | 29 | 27 | 21 | 29 | 23 | 27 | 19 |
| Allt a' Mharcaidh | 24 | 24 | 20 | 19 | 15 | 16 | 16 | 16 | 18 | 14 | 23 | 13 | 11 | 10 | 10 | 14 | 11 | 9 | 13 |
| Strathvaich Dam | - | 16 | 14 | 12 | 10 | 13 | 18 | 11 | 9 | 10 | 16 | 12 | 9 | 8 | 7 | 7 | 7 | 7 | 8 |
| Achanarras | 24 | 33 | 31 | 29 | 22 | 24 | 25 | 20 | 19 | 19 | 25 | 21 | 17 | 16 | 12 | 15 | 14 | 14 | 11 |

## Table A.2.3 – Precipitation-weighted Annual Mean Nitrate, 1986 to 2004 (μeq $l^{-1}$)

| | Precipitation-weighted Annual Mean Nitrate Concentration (μeq $l^{-1}$) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| Goonhilly | 19 | 27 | 16 | 22 | 20 | 31 | 17 | 23 | 24 | 23 | 28 | 28 | 18 | 20 | 17 | 24 | 23 | 28 | 20 |
| Yarner Wood | 16 | 24 | 14 | 18 | 13 | 19 | 16 | 20 | 25 | 21 | 31 | 27 | 14 | 17 | 11 | 20 | 17 | 18 | 20 |
| Barcombe Mills | 27 | 31 | 25 | 30 | 24 | 36 | 25 | 19 | 29 | 28 | 28 | 23 | 21 | 25 | 16 | 22 | 23 | 31 | 25 |
| Compton | 38 | 46 | 38 | 36 | 28 | 36 | 39 | 28 | 34 | 28 | 36 | 33 | 29 | 27 | 24 | 24 | 24 | 27 | 33 |
| Crai Reservoir | - | - | - | - | - | - | - | - | - | - | - | - | - | 10 | 8 | 13 | 9 | 15 | 9 |
| Flatford Mill | 39 | 45 | 43 | 56 | 38 | 44 | 40 | 30 | 37 | 39 | 38 | 36 | 39 | 41 | 32 | 35 | 37 | 43 | 44 |
| Woburn | 39 | 40 | 39 | 47 | 35 | 40 | 36 | 31 | 47 | 35 | 39 | 35 | 35 | 38 | 27 | 39 | 33 | 34 | 38 |
| Tycanol Wood | 12 | 15 | 12 | 15 | 11 | 18 | 14 | 12 | 16 | 15 | 18 | 16 | 11 | 13 | 10 | 14 | 12 | 15 | 13 |
| Llyn Brianne | 12 | 14 | 13 | 14 | 16 | 18 | 16 | 14 | 18 | 16 | 17 | 17 | 12 | 13 | 10 | - | 13 | 18 | 11 |
| Pumlumon | - | - | - | 10 | 9 | 14 | 13 | 13 | 12 | 15 | 16 | 14 | 7 | 10 | 8 | 9 | 8 | 10 | 9 |
| Stoke Ferry | 48 | 44 | 39 | 55 | 46 | 48 | 43 | 36 | 43 | 39 | 37 | 41 | 38 | 40 | 39 | 34 | 35 | 41 | 40 |
| Preston Montford | 22 | 32 | 26 | 31 | 20 | 35 | 38 | 27 | 32 | 38 | 33 | 24 | 19 | 21 | 22 | 29 | 25 | 20 | 23 |
| Bottesford | 41 | 41 | 44 | 50 | 34 | 43 | 36 | 34 | 40 | 33 | 34 | 33 | 30 | 33 | 29 | 36 | 38 | 37 | 31 |
| Llyn Llagi | - | - | - | - | - | - | - | - | - | - | - | - | - | 13 | 9 | 12 | 11 | 13 | 10 |
| Beddgelert | 17 | 16 | 13 | 11 | 10 | 12 | 10 | 14 | 13 | 15 | 15 | - | - | - | - | - | - | - | - |
| Llyn Llydaw | - | - | - | - | - | - | - | - | - | - | - | 11 | 10 | 12 | 9 | 12 | 11 | 11 | 10 |
| Wardlow Hay Cop | 25 | 36 | 31 | 36 | 26 | 38 | 29 | 33 | 35 | 33 | 40 | 30 | 24 | 28 | 25 | 35 | 28 | 29 | 30 |
| Driby | 39 | 44 | 47 | 48 | 46 | 50 | 46 | 38 | 49 | 50 | 39 | 40 | 45 | 39 | 35 | 38 | 34 | 38 | 35 |
| Jenny Hurn | 44 | 48 | 44 | 51 | 43 | 45 | 42 | 33 | 47 | 42 | 45 | 38 | 45 | 40 | 37 | 38 | - | - | - |
| River Etherow | - | - | - | - | - | - | - | - | - | - | - | - | - | 31 | 24 | 36 | 25 | 28 | 29 |
| Thorganby | 41 | 43 | 42 | 49 | 40 | 50 | 42 | 46 | 40 | 37 | 38 | 38 | 34 | 32 | 34 | 37 | 33 | 31 | 31 |
| High Muffles | 37 | 43 | 47 | 45 | 38 | 47 | 37 | 36 | 42 | 38 | 43 | 35 | 36 | 32 | 31 | 38 | 31 | 34 | 31 |
| Bannisdale | 20 | 18 | 21 | 19 | 17 | 21 | 19 | 23 | 22 | 21 | 25 | 22 | 18 | 21 | 16 | 23 | 16 | 20 | 17 |
| Scoat Tarn | - | - | - | - | - | - | - | - | - | - | - | - | - | 16 | 12 | - | 13 | 16 | 15 |
| Hillsborough Forest | - | - | - | 26 | 16 | 23 | 16 | 21 | 23 | 21 | 29 | 19 | 16 | 22 | 13 | 25 | 14 | 13 | 17 |
| Lough Navar | 8 | 8 | 7 | 9 | 7 | 9 | 9 | 10 | 15 | 12 | 10 | 12 | 6 | 7 | 7 | 9 | 8 | 6 | 8 |
| Cow Green Reservoir | 19 | 21 | 25 | 20 | 20 | 21 | 23 | 25 | 21 | 22 | 24 | 18 | 18 | 20 | 17 | - | 17 | 21 | 17 |
| Loch Dee | 14 | 19 | 18 | 14 | 14 | 16 | 15 | 19 | 18 | 16 | 22 | 14 | 13 | 13 | 14 | 18 | 9 | 14 | 12 |
| Beaghs Burn | - | - | - | - | - | - | - | - | - | - | - | - | - | 13 | 10 | 19 | 11 | 11 | 9 |
| Redesdale | 34 | 26 | 33 | 31 | 26 | 31 | 36 | 26 | 32 | 27 | 33 | 35 | 30 | 25 | 23 | 31 | 22 | 31 | 25 |
| Eskdalemuir | 15 | 18 | 19 | 18 | 15 | 19 | 16 | 19 | 19 | 19 | 20 | 20 | 15 | 17 | 14 | 19 | 14 | 18 | 14 |
| Whiteadder | 34 | 29 | 42 | 34 | 23 | 32 | 35 | 29 | 34 | 31 | 35 | 30 | 24 | 22 | 25 | - | 28 | 22 | 24 |
| Loch Chon | - | - | - | - | - | - | - | - | - | - | - | - | - | 19 | 14 | 16 | 13 | 14 | 14 |
| Balquhidder | 13 | 21 | 16 | 13 | 10 | 17 | 13 | 18 | 17 | 14 | 24 | 16 | 13 | 12 | 12 | 20 | 14 | 17 | 13 |
| Polloch | - | - | - | - | - | 9 | 9 | 9 | 11 | 10 | 10 | 8 | 5 | 6 | 6 | 8 | 7 | 7 | 6 |
| Loch Nagar | - | - | - | - | - | - | - | - | - | - | - | - | - | 18 | 17 | 26 | 29 | 23 | 19 |
| Glen Dye | - | 31 | 32 | 31 | 29 | 33 | 28 | 33 | 42 | 36 | 42 | 29 | 27 | 24 | 26 | 37 | 28 | 34 | 26 |
| Allt a' Mharcaidh | 10 | 12 | 10 | 10 | 9 | 10 | 8 | 7 | 15 | 11 | 14 | 11 | 9 | 8 | 9 | 13 | 11 | 10 | 11 |
| Strathvaich Dam | - | 10 | 8 | 7 | 6 | 9 | 9 | 8 | 9 | 9 | 10 | 10 | 6 | 8 | 6 | 7 | 8 | 7 | 6 |
| Achanarras | 14 | 22 | 24 | 25 | 18 | 22 | 16 | 18 | 21 | 18 | 22 | 21 | 15 | 13 | 14 | 15 | 18 | 13 | 12 |

## Table A.2.4 - Precipitation-weighted Annual Mean Ammonium, 1986 to 2004 (μeq $l^{-1}$)

| | Precipitation-weighted Annual Mean Ammonium Concentration (μeq $l^{-1}$) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| Goonhilly | 17 | 22 | 12 | 18 | 16 | 24 | 15 | 30 | 13 | 17 | 25 | 21 | 10 | 12 | 13 | 18 | 15 | 20 | 16 |
| Yarner Wood | 15 | 28 | 14 | 19 | 13 | 22 | 17 | 23 | 25 | 20 | 37 | 26 | 14 | 17 | 9 | 19 | 15 | 16 | 20 |
| Barcombe Mills | 38 | 41 | 38 | 39 | 35 | 50 | 31 | 16 | 30 | 33 | 32 | 22 | 18 | 25 | 14 | 23 | 20 | 25 | 22 |
| Compton | 70 | 73 | 46 | 56 | 55 | 63 | 57 | 40 | 53 | 53 | 79 | 53 | 48 | 44 | 29 | 36 | 31 | 32 | 44 |
| Crai Reservoir | - | - | - | - | - | - | - | - | - | - | - | - | - | 10 | 6 | 12 | 7 | 14 | 8 |
| Flatford Mill | - | 50 | 49 | 66 | 44 | 59 | 40 | 31 | 40 | 48 | 49 | 38 | 43 | 45 | 34 | 41 | 38 | 39 | 37 |
| Woburn | 54 | 50 | 52 | 56 | 43 | 52 | 41 | 35 | 55 | 48 | 63 | 40 | 36 | 47 | 29 | 44 | 37 | 28 | 44 |
| Tycanol Wood | 13 | 15 | 13 | 15 | 14 | 19 | 13 | 11 | 15 | 18 | 22 | 15 | 12 | 16 | 10 | 18 | 15 | 16 | 13 |
| Llyn Brianne | 12 | 13 | 14 | 16 | 16 | 20 | 18 | 15 | 16 | 18 | 19 | 15 | 13 | 14 | 12 | - | 14 | 15 | 11 |
| Pumlumon | - | - | - | 13 | 13 | 17 | 20 | 14 | 13 | 21 | 18 | 16 | 10 | 12 | 7 | 12 | 15 | 11 | 11 |
| Stoke Ferry | 65 | 60 | 56 | 75 | 69 | 74 | 54 | 43 | 61 | 53 | 56 | 55 | 49 | 50 | 49 | 45 | 38 | 50 | 48 |
| Preston Montford | 47 | 57 | 49 | 53 | 44 | 57 | 57 | 36 | 50 | 54 | 60 | 38 | 36 | 38 | 30 | 51 | 45 | 37 | 34 |
| Bottesford | 56 | 45 | 49 | 68 | 54 | 48 | 40 | 33 | 55 | 48 | 56 | 45 | 45 | 48 | 37 | 49 | 48 | 47 | 39 |
| Llyn Llagi | - | - | - | - | - | - | - | - | - | - | - | - | - | 12 | 8 | 11 | 10 | 12 | 10 |
| Beddgelert | 14 | 11 | 12 | 15 | 14 | 13 | 15 | 14 | 11 | 14 | 17 | - | - | - | - | - | - | - | - |
| Llyn Llydaw | - | - | - | - | - | - | - | - | - | - | - | 10 | 11 | 14 | 8 | 12 | 11 | 11 | 10 |
| Wardlow Hay Cop | 34 | 40 | 39 | 39 | 40 | 57 | 45 | 39 | 47 | 46 | 58 | 38 | 33 | 37 | 30 | 44 | 35 | 35 | 40 |
| Driby | 53 | 60 | 64 | 53 | 67 | 76 | 55 | 42 | 48 | 64 | 54 | 49 | 49 | 44 | 39 | 48 | 35 | 41 | 42 |
| Jenny Hurn | 64 | 51 | 53 | 64 | 64 | 65 | 45 | 28 | 55 | 50 | 66 | 53 | 61 | 46 | 45 | 55 | - | - | - |
| River Etherow | - | - | - | - | - | - | - | - | - | - | - | - | - | 34 | 25 | 40 | 28 | 28 | 32 |
| Thorganby | 59 | 56 | 61 | 65 | 80 | 124 | 82 | - | 57 | 60 | 57 | 59 | 53 | 50 | 42 | 51 | 44 | 41 | 39 |
| High Muffles | 40 | 46 | 54 | 53 | 48 | 64 | 44 | 40 | 50 | 48 | 61 | 44 | 45 | 37 | 34 | 39 | 34 | 41 | 36 |
| Bannisdale | 35 | 27 | 30 | 30 | 32 | 34 | 27 | 31 | 32 | 36 | 40 | 33 | 27 | 27 | 23 | 33 | 23 | 27 | 23 |
| Scoat Tarn | - | - | - | - | - | - | - | - | - | - | - | - | - | 21 | 14 | - | 16 | 18 | 18 |
| Hillsborough Forest | - | - | - | 60 | 45 | 48 | 40 | 43 | 49 | 43 | 62 | 40 | 38 | 43 | 39 | 54 | 35 | 33 | 35 |
| Lough Navar | 11 | 9 | 8 | 11 | 8 | 9 | 12 | 11 | 11 | 16 | 14 | 14 | 9 | 9 | 10 | 10 | 12 | 7 | 10 |
| Cow Green Reservoir | 20 | 19 | 25 | 23 | 24 | 26 | 25 | 28 | 21 | 30 | 26 | 27 | 20 | 23 | 19 | - | 18 | 21 | 18 |
| Loch Dee | 21 | 34 | 21 | 20 | 21 | 24 | 28 | 21 | 23 | 19 | 27 | 17 | 17 | 19 | 17 | 22 | 12 | 19 | 13 |
| Beaghs Burn | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | 15 | 26 | 16 | 17 | 15 |
| Redesdale | 41 | 15 | 23 | 34 | 24 | 32 | 30 | 21 | 30 | 33 | 44 | 37 | 32 | 28 | 24 | 34 | 25 | 37 | 43 |
| Eskdalemuir | 20 | 16 | 19 | 22 | 18 | 26 | 17 | 18 | 21 | 26 | 24 | 24 | 18 | 20 | 15 | 20 | 15 | 30 | 25 |
| Whiteadder | 30 | 20 | 35 | 32 | 17 | 30 | 27 | 22 | 24 | 28 | 33 | 24 | 21 | 20 | 23 | - | 25 | 19 | 22 |
| Loch Chon | - | - | - | - | - | - | - | - | - | - | - | - | - | 12 | 12 | 12 | 16 | 12 | 12 |
| Balquhidder | 14 | 15 | 12 | 14 | 11 | 16 | 16 | 15 | 12 | 12 | 24 | 18 | 14 | 12 | 8 | 16 | 12 | 27 | 12 |
| Polloch | - | - | - | - | - | 8 | 8 | 5 | 6 | 7 | 7 | 6 | 5 | 5 | 3 | 7 | 8 | 6 | 6 |
| Loch Nagar | - | - | - | - | - | - | - | - | - | - | - | - | - | 16 | 16 | 20 | 19 | 20 | 14 |
| Glen Dye | - | 26 | 29 | 28 | 25 | 32 | 22 | 28 | 33 | 29 | 43 | 23 | 22 | 22 | 20 | 30 | 19 | 30 | 20 |
| Allt a' Mharcaidh | 6 | 10 | 3 | 7 | 5 | 5 | 4 | 4 | 8 | 5 | 7 | 5 | 5 | 6 | 4 | 8 | 4 | 6 | 10 |
| Strathvaich Dam | - | 4 | 3 | 4 | 3 | 5 | 5 | 4 | 4 | 5 | 5 | 6 | 4 | 4 | 3 | 4 | 5 | 3 | 3 |
| Achanarras | 11 | 35 | 21 | 18 | 15 | 26 | 9 | 8 | 12 | 15 | 14 | 13 | 13 | 11 | 10 | 12 | 12 | 19 | 6 |

## Table A.2.5 – Precipitation-weighted Annual Mean Sodium, 1986 to 2004 (μeq $l^{-1}$)

| | Precipitation-weighted Annual Mean Sodium Concentration (μeq $l^{-1}$) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| Goonhilly | 264 | 206 | 212 | 276 | 506 | 327 | 238 | 227 | 265 | 270 | 313 | 284 | 292 | 292 | 299 | 226 | 283 | 223 | 298 |
| Yarner Wood | 98 | 125 | 150 | 166 | 245 | 140 | 104 | 101 | 123 | 128 | 127 | 118 | 127 | 88 | 104 | 91 | 204 | 111 | 131 |
| Barcombe Mills | 186 | 255 | 153 | 204 | 359 | 137 | 128 | 98 | 147 | 176 | 195 | 164 | 154 | 173 | 199 | 91 | 203 | 131 | 153 |
| Compton | 54 | 67 | 70 | 84 | 129 | 71 | 40 | 55 | 64 | 64 | 76 | 77 | 58 | 55 | 45 | 37 | 62 | 43 | 45 |
| Crai Reservoir | - | - | - | - | - | - | - | - | - | - | - | - | - | 96 | 103 | 79 | 122 | 101 | 106 |
| Flatford Mill | 99 | 60 | 54 | 79 | 79 | 70 | 57 | 54 | 73 | 79 | 76 | 60 | 59 | 49 | 63 | 49 | 67 | 60 | 51 |
| Woburn | 71 | 65 | 50 | 60 | 87 | 54 | 28 | 41 | 56 | 51 | 61 | 58 | 36 | 46 | 34 | 31 | 41 | 48 | 43 |
| Tycanol Wood | 116 | 90 | 104 | 232 | 232 | 163 | 120 | 119 | 164 | 157 | 146 | 159 | 145 | 151 | 144 | 103 | 166 | 146 | 146 |
| Llyn Brianne | 94 | 68 | 83 | 112 | 152 | 111 | 72 | 97 | 90 | 84 | 94 | 96 | 90 | 103 | 90 | - | 116 | 111 | 106 |
| Pumlumon | - | - | - | 104 | 141 | 102 | 72 | 69 | 73 | 79 | 81 | 113 | 95 | 85 | 93 | 69 | 136 | 96 | 82 |
| Stoke Ferry | 74 | 49 | 50 | 58 | 84 | 75 | 57 | 53 | 54 | 46 | 71 | 55 | 56 | 55 | 44 | 60 | 37 | 53 | 49 |
| Preston Montford | 86 | 38 | 86 | 39 | 100 | 164 | 38 | 66 | 58 | 64 | 35 | 80 | 40 | 54 | 33 | 31 | 53 | 44 | 48 |
| Bottesford | 82 | 35 | 59 | 47 | 62 | 54 | 35 | 35 | 39 | 49 | 58 | 27 | 33 | 39 | 25 | 29 | 41 | 39 | 40 |
| Llyn Llagi | - | - | - | - | - | - | - | - | - | - | - | - | - | 110 | 90 | 75 | 116 | 99 | 133 |
| Beddgelert | 126 | 75 | 122 | 134 | 193 | 162 | 95 | 111 | 98 | 129 | 97 | - | - | - | - | - | - | - | - |
| Llyn Llydaw | - | - | - | - | - | - | - | - | - | - | - | 107 | 88 | 104 | 70 | 72 | 82 | 67 | 90 |
| Wardlow Hay Cop | 71 | 52 | 90 | 57 | 140 | 131 | 57 | 95 | 94 | 66 | 82 | 60 | 65 | 70 | 40 | 50 | 58 | 67 | 91 |
| Driby | 95 | 53 | 64 | 98 | 91 | 103 | 67 | 70 | 83 | 100 | 121 | 58 | 77 | 65 | 62 | 74 | 79 | 68 | 60 |
| Jenny Hurn | 97 | 47 | 80 | 68 | 104 | 55 | 37 | 47 | 53 | 54 | 73 | 36 | 61 | 51 | 30 | 39 | - | - | - |
| River Etherow | - | - | - | - | - | - | - | - | - | - | - | - | - | 60 | 46 | 47 | 65 | 64 | 102 |
| Thorganby | 74 | 50 | 52 | 69 | 90 | 96 | 50 | 51 | 52 | 51 | 59 | 45 | 67 | 53 | 33 | 43 | 35 | 40 | 30 |
| High Muffles | 61 | 63 | 67 | 95 | 83 | 103 | 78 | 111 | 88 | 113 | 153 | 82 | 106 | 76 | 61 | 76 | 57 | 98 | 55 |
| Bannisdale | 122 | 62 | 133 | 116 | 161 | 182 | 91 | 106 | 95 | 129 | 95 | 156 | 101 | 131 | 76 | 73 | 88 | 78 | 127 |
| Scoat Tarn | - | - | - | - | - | - | - | - | - | - | - | - | - | 85 | 71 | - | 76 | 71 | 80 |
| Hillsborough Forest | - | - | - | 89 | 140 | 107 | 72 | 87 | 125 | 108 | 107 | 78 | 97 | 90 | 90 | 70 | 65 | 74 | 99 |
| Lough Navar | 248 | 102 | 317 | 139 | 261 | 192 | 133 | 187 | 174 | 125 | 116 | 131 | 136 | 171 | 152 | 98 | 151 | 173 | 125 |
| Cow Green Reservoir | 74 | 40 | 69 | 76 | 90 | 84 | 74 | 72 | 77 | 93 | 91 | 99 | 89 | 100 | 55 | - | 73 | 71 | 70 |
| Loch Dee | 116 | 54 | 136 | 132 | 147 | 123 | 86 | 79 | 92 | 106 | 91 | 109 | 91 | 124 | 101 | 56 | 103 | 92 | 94 |
| Beaghs Burn | - | - | - | - | - | - | - | - | - | - | - | - | - | 171 | 150 | 128 | 139 | 172 | 161 |
| Redesdale | 114 | 44 | 66 | 91 | 67 | 80 | 59 | 73 | 76 | 75 | 93 | 55 | 65 | 65 | 50 | 45 | 59 | 62 | 73 |
| Eskdalemuir | 86 | 37 | 62 | 81 | 86 | 2 | 53 | 63 | 77 | 88 | 63 | 66 | 76 | 102 | 61 | 85 | 63 | 66 | 73 |
| Whiteadder | 112 | 53 | 83 | 92 | 78 | 59 | 79 | 103 | 120 | 100 | 121 | 93 | 80 | 86 | 93 | - | 81 | 119 | 49 |
| Loch Chon | - | - | - | - | - | - | - | - | - | - | - | - | - | 112 | 69 | 71 | 128 | 88 | 63 |
| Balquhidder | 122 | 45 | 59 | 110 | 100 | 89 | 61 | 145 | 120 | 71 | 122 | 87 | 81 | 123 | 83 | 59 | 84 | 95 | 67 |
| Polloch | - | - | - | - | - | 213 | 118 | 204 | 155 | 168 | 148 | 127 | 161 | 195 | 150 | 139 | 234 | 159 | 154 |
| Loch Nagar | - | - | - | - | - | - | - | - | - | - | - | - | - | 39 | 33 | 35 | 76 | 45 | 38 |
| Glen Dye | - | 52 | 73 | 83 | 81 | 78 | 65 | 86 | 108 | 98 | 121 | 112 | 91 | 83 | 71 | 77 | 89 | 72 | 52 |
| Allt a' Mharcaidh | 90 | 37 | 45 | 88 | 62 | 46 | 57 | 143 | 92 | 57 | 66 | 70 | 65 | 83 | 63 | 40 | 44 | 75 | 57 |
| Strathvaich Dam | - | 83 | 109 | 126 | 174 | 147 | 121 | 212 | 154 | 102 | 130 | 116 | 122 | 180 | 153 | 95 | 105 | 235 | 125 |
| Achanarras | 231 | 145 | 217 | 277 | 212 | 235 | 186 | 224 | 217 | 169 | 219 | 167 | 202 | 249 | 251 | 186 | 216 | 340 | 196 |

## Table A.2.6 – Precipitation-weighted Annual Mean Magnesium, 1986 to 2004 (μeq $l^{-1}$)

| | Precipitation-weighted Annual Mean Magnesium Concentration (μeq $l^{-1}$) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| Goonhilly | 61 | 48 | 49 | 63 | 19 | 77 | 57 | 54 | 64 | 73 | 86 | 82 | 87 | 93 | 73 | 50 | 63 | 48 | 57 |
| Yarner Wood | 23 | 30 | 35 | 38 | 58 | 32 | 26 | 28 | 33 | 38 | 37 | 35 | 41 | 37 | 24 | 20 | 45 | 24 | 28 |
| Barcombe Mills | 44 | 62 | 35 | 49 | 85 | 34 | 33 | 28 | 40 | 48 | 58 | 48 | 48 | 57 | 47 | 21 | 46 | 30 | 38 |
| Compton | 13 | 19 | 21 | 21 | 31 | 18 | 11 | 15 | 18 | 20 | 25 | 26 | 26 | 27 | 11 | 8 | 14 | 10 | 11 |
| Crai Reservoir | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | 24 | 19 | 27 | 23 | 21 |
| Flatford Mill | 32 | 17 | 16 | 23 | 22 | 19 | 15 | 15 | 18 | 20 | 21 | 17 | 20 | 18 | 16 | 12 | 16 | 14 | 12 |
| Woburn | 9 | 11 | 13 | 18 | 24 | 14 | 9 | 12 | 15 | 15 | 18 | 18 | 13 | 19 | 8 | 8 | 10 | 11 | 10 |
| Tycanol Wood | 27 | 21 | 24 | 53 | 54 | 39 | 29 | 31 | 43 | 45 | 43 | 45 | 48 | 54 | 32 | 22 | 36 | 30 | 31 |
| Llyn Brianne | 21 | 16 | 20 | 27 | 36 | 27 | 19 | 26 | 25 | 24 | 29 | 27 | 32 | 41 | 20 | - | 25 | 24 | 21 |
| Pumlumon | - | - | - | 24 | 32 | 23 | 19 | 20 | 23 | 25 | 25 | 33 | 35 | 37 | 21 | 15 | 29 | 20 | 17 |
| Stoke Ferry | 20 | 12 | 13 | 16 | 23 | 18 | 16 | 15 | 16 | 12 | 21 | 16 | 19 | 22 | 11 | 14 | 9 | 13 | 11 |
| Preston Montford | 21 | 11 | 22 | 11 | 24 | 43 | 11 | 18 | 20 | 42 | 15 | 25 | 25 | 27 | 9 | 7 | 11 | 9 | 9 |
| Bottesford | 26 | 11 | 18 | 16 | 18 | 16 | 11 | 10 | 12 | 14 | 16 | 10 | 14 | 17 | 6 | 8 | 11 | 11 | 11 |
| Llyn Llagi | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | 21 | 16 | 25 | 21 | 28 |
| Beddgelert | 29 | 18 | 26 | 31 | 44 | 37 | 24 | 29 | 28 | 37 | 31 | - | - | - | - | - | - | - | - |
| Llyn Llydaw | - | - | - | - | - | - | - | - | - | - | - | 32 | 33 | 41 | 16 | 16 | 18 | 14 | 18 |
| Wardlow Hay Cop | 18 | 15 | 25 | 17 | 35 | 32 | 15 | 25 | 27 | 18 | 24 | 18 | 23 | 27 | 9 | 12 | 14 | 15 | 20 |
| Driby | 24 | 14 | 18 | 27 | 27 | 26 | 18 | 22 | 22 | 26 | 34 | 18 | 23 | 24 | 15 | 17 | 19 | 17 | 14 |
| Jenny Hurn | 36 | 16 | 30 | 25 | 35 | 21 | 14 | 16 | 22 | 19 | 24 | 13 | 22 | 20 | 10 | 13 | - | - | - |
| River Etherow | - | - | - | - | - | - | - | - | - | - | - | - | - | 21 | 11 | 11 | 15 | 14 | 23 |
| Thorganby | 22 | 16 | 17 | 23 | 27 | 31 | 16 | 15 | 19 | 15 | 19 | 16 | 23 | 27 | 10 | 13 | 12 | 14 | 9 |
| High Muffles | 15 | 17 | 19 | 23 | 29 | 27 | 19 | 30 | 23 | 29 | 39 | 21 | 30 | 26 | 15 | 18 | 13 | 23 | 13 |
| Bannisdale | 29 | 15 | 33 | 27 | 38 | 43 | 23 | 27 | 27 | 35 | 27 | 41 | 32 | 48 | 18 | 16 | 18 | 18 | 27 |
| Scoat Tarn | - | - | - | - | - | - | - | - | - | - | - | - | - | 32 | 16 | - | 16 | 15 | 16 |
| Hillsborough Forest | - | - | - | 21 | 31 | 24 | 20 | 25 | 36 | 34 | 29 | 27 | 42 | 38 | 21 | 15 | 14 | 14 | 20 |
| Lough Navar | 57 | 24 | 80 | 32 | 60 | 47 | 34 | 48 | 48 | 38 | 37 | 40 | 53 | 63 | 43 | 21 | 32 | 37 | 25 |
| Cow Green Reservoir | 17 | 10 | 17 | 18 | 22 | 20 | 19 | 19 | 22 | 25 | 25 | 29 | 29 | 41 | 13 | - | 16 | 16 | 14 |
| Loch Dee | 29 | 12 | 31 | 31 | 35 | 29 | 22 | 22 | 25 | 31 | 28 | 34 | 35 | 48 | 27 | 12 | 22 | 19 | 20 |
| Beaghs Burn | - | - | - | - | - | - | - | - | - | - | - | - | - | 64 | 46 | 28 | 30 | 35 | 33 |
| Redesdale | 26 | 12 | 19 | 23 | 18 | 19 | 15 | 20 | 21 | 21 | 27 | 17 | 21 | 27 | 13 | 10 | 13 | 13 | 16 |
| Eskdalemuir | 20 | 9 | 15 | 20 | 21 | 25 | 14 | 17 | 22 | 26 | 20 | 20 | 30 | 41 | 16 | 14 | 13 | 14 | 15 |
| Whiteadder | 26 | 13 | 22 | 23 | 20 | 15 | 19 | 26 | 33 | 26 | 31 | 26 | 25 | 33 | 22 | - | 18 | 25 | 11 |
| Loch Chon | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | 16 | 16 | 28 | 19 | 14 |
| Balquhidder | 29 | 11 | 14 | 26 | 24 | 21 | 16 | 37 | 31 | 22 | 33 | 24 | 28 | 52 | 18 | 13 | 18 | 19 | 14 |
| Polloch | - | - | - | - | - | 48 | 30 | 52 | 40 | 46 | 41 | 37 | 54 | 68 | 35 | 29 | 50 | 34 | 32 |
| Loch Nagar | - | - | - | - | - | - | - | - | - | - | - | - | - | 17 | 8 | 8 | 17 | 10 | 9 |
| Glen Dye | - | 12 | 18 | 21 | 21 | 19 | 16 | 22 | 26 | 25 | 30 | 28 | 26 | 29 | 16 | 18 | 20 | 16 | 13 |
| Allt a' Mharcaidh | 21 | 8 | 12 | 20 | 15 | 11 | 14 | 35 | 24 | 16 | 20 | 19 | 23 | 36 | 17 | 9 | 10 | 16 | 12 |
| Strathvaich Dam | - | 20 | 25 | 28 | 39 | 32 | 31 | 51 | 42 | 31 | 40 | 33 | 42 | 69 | 40 | 20 | 22 | 44 | 26 |
| Achanarras | 55 | 37 | 46 | 64 | 49 | 54 | 46 | 56 | 58 | 45 | 59 | 43 | 61 | 83 | 57 | 41 | 47 | 71 | 41 |

## Table A.2.7 - Precipitation-weighted Annual Mean Calcium, 1986 to 2004 (μeq $l^{-1}$)

| | Precipitation-weighted Annual Mean Calcium Concentration (μeq $l^{-1}$) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| Goonhilly | 16 | 15 | 14 | 18 | 31 | 22 | 18 | 18 | 19 | 24 | 23 | 21 | 27 | 31 | 20 | 14 | 15 | 19 | 17 |
| Yarner Wood | 11 | 15 | 12 | 13 | 17 | 15 | 12 | 13 | 18 | 18 | 16 | 16 | 20 | 22 | 10 | 8 | 13 | 9 | 12 |
| Barcombe Mills | 20 | 29 | 22 | 30 | 33 | 32 | 22 | 20 | 28 | 29 | 37 | 25 | 49 | 43 | 20 | 16 | 23 | 21 | 39 |
| Compton | 23 | 51 | 33 | 22 | 32 | 30 | 23 | 20 | 34 | 41 | 55 | 34 | 61 | 36 | 15 | 13 | 14 | 26 | 20 |
| Crai Reservoir | - | - | - | - | - | - | - | - | - | - | - | - | - | 18 | 8 | 17 | 8 | 10 | 8 |
| Flatford Mill | 33 | 21 | 27 | 37 | 29 | 24 | 18 | 21 | 25 | 21 | 22 | 18 | 26 | 26 | 16 | 13 | 17 | 23 | 17 |
| Woburn | 23 | 30 | 38 | 28 | 32 | 24 | 19 | 18 | 24 | 21 | 34 | 23 | 28 | 33 | 11 | 12 | 13 | 21 | 16 |
| Tycanol Wood | 12 | 9 | 9 | 31 | 17 | 13 | 11 | 10 | 14 | 17 | 16 | 15 | 19 | 26 | 10 | 9 | 9 | 10 | 10 |
| Llyn Brianne | 7 | 8 | 9 | 10 | 15 | 10 | 10 | 10 | 12 | 12 | 12 | 11 | 17 | 19 | 7 | - | 8 | 11 | 8 |
| Pumlumon | - | - | - | 7 | 11 | 11 | 9 | 7 | 9 | 12 | 10 | 12 | 14 | 17 | 7 | 6 | 7 | 7 | 6 |
| Stoke Ferry | 31 | 22 | 24 | 28 | 45 | 33 | 32 | 25 | 30 | 22 | 35 | 34 | 33 | 39 | 16 | 16 | 16 | 27 | 19 |
| Preston Montford | 14 | 19 | 19 | 14 | 14 | 37 | 18 | 17 | 24 | 76 | 28 | 18 | 34 | 28 | 9 | 10 | 9 | 11 | 10 |
| Bottesford | 36 | 33 | 50 | 33 | 23 | 29 | 19 | 17 | 23 | 29 | 25 | 21 | 31 | 31 | 10 | 14 | 14 | 28 | 18 |
| Llyn Llagi | - | - | - | - | - | - | - | - | - | - | - | - | - | 16 | 9 | 6 | 7 | 7 | 11 |
| Beddgelert | 9 | 10 | 13 | 9 | 12 | 11 | 11 | 11 | 14 | 18 | 13 | - | - | - | - | - | - | - | - |
| Llyn Llydaw | - | - | - | - | - | - | - | - | - | - | - | 11 | 14 | 16 | 6 | 6 | 6 | 6 | 6 |
| Wardlow Hay Cop | 47 | 59 | 56 | 55 | 75 | 57 | 55 | 52 | 64 | 55 | 69 | 64 | 89 | 92 | 28 | 39 | 27 | 40 | 31 |
| Driby | 18 | 19 | 27 | 34 | 33 | 27 | 18 | 19 | 28 | 35 | 30 | 21 | 26 | 26 | 12 | 14 | 17 | 23 | 15 |
| Jenny Hurn | 56 | 45 | 73 | 48 | 50 | 39 | 27 | 26 | 60 | 31 | 35 | 23 | 44 | 38 | 19 | 21 | - | - | - |
| River Etherow | - | - | - | - | - | - | - | - | - | - | - | - | - | 22 | 10 | 14 | 9 | 12 | 14 |
| Thorganby | 25 | 25 | 30 | 37 | 35 | 67 | 27 | 24 | 67 | 29 | 32 | 33 | 53 | 57 | 18 | 29 | 18 | 37 | 22 |
| High Muffles | 13 | 21 | 23 | 27 | 20 | 23 | 21 | 19 | 25 | 26 | 23 | 21 | 20 | 28 | 10 | 14 | 12 | 19 | 13 |
| Bannisdale | 13 | 12 | 14 | 13 | 15 | 16 | 15 | 14 | 16 | 17 | 16 | 17 | 20 | 28 | 8 | 8 | 8 | 11 | 11 |
| Scoat Tarn | - | - | - | - | - | - | - | - | - | - | - | - | - | 16 | 7 | - | 5 | 6 | 6 |
| Hillsborough Forest | - | - | - | 13 | 14 | 17 | 16 | 15 | 24 | 25 | 24 | 21 | 36 | 34 | 11 | 11 | 8 | 8 | 9 |
| Lough Navar | 17 | 10 | 21 | 12 | 18 | 25 | 19 | 24 | 27 | 26 | 25 | 23 | 29 | 33 | 15 | 11 | 10 | 13 | 9 |
| Cow Green Reservoir | 7 | 8 | 12 | 12 | 13 | 11 | 13 | 12 | 13 | 16 | 14 | 13 | 16 | 23 | 7 | - | 7 | 11 | 7 |
| Loch Dee | 10 | 9 | 11 | 9 | 11 | 10 | 11 | 9 | 11 | 14 | 10 | 12 | 23 | 19 | 10 | 5 | 5 | 6 | 7 |
| Beaghs Burn | - | - | - | - | - | - | - | - | - | - | - | - | - | 61 | 37 | 8 | 7 | 17 | 8 |
| Redesdale | 12 | 10 | 20 | 18 | 11 | 14 | 13 | 10 | 18 | 13 | 16 | 13 | 13 | 19 | 8 | 7 | 6 | 9 | 16 |
| Eskdalemuir | 7 | 5 | 8 | 21 | 8 | 10 | 8 | 9 | 14 | 13 | 8 | 10 | 17 | 17 | 6 | 6 | 4 | 6 | 7 |
| Whiteadder | 14 | 14 | 20 | 16 | 11 | 13 | 12 | 12 | 18 | 19 | 15 | 13 | 14 | 19 | 9 | - | 8 | 9 | 7 |
| Loch Chon | - | - | - | - | - | - | - | - | - | - | - | - | - | 13 | 5 | 6 | 7 | 7 | 5 |
| Balquhidder | 8 | 5 | 6 | 9 | 8 | 11 | 8 | 11 | 10 | 9 | 10 | 9 | 16 | 19 | 7 | 6 | 6 | 7 | 6 |
| Polloch | - | - | - | - | - | 16 | 13 | 13 | 14 | 13 | 12 | 11 | 20 | 24 | 9 | 7 | 11 | 9 | 9 |
| Loch Nagar | - | - | - | - | - | - | - | - | - | - | - | - | - | 10 | 4 | 5 | 5 | 6 | 5 |
| Glen Dye | - | 7 | 10 | 11 | 9 | 9 | 10 | 10 | 12 | 10 | 10 | 10 | 10 | 15 | 6 | 6 | 6 | 11 | 6 |
| Allt a' Mharcaidh | 10 | 8 | 7 | 8 | 7 | 6 | 9 | 11 | 12 | 7 | 11 | 9 | 13 | 17 | 6 | 5 | 4 | 6 | 6 |
| Strathvaich Dam | - | 7 | 7 | 8 | 13 | 9 | 10 | 13 | 14 | 11 | 15 | 11 | 16 | 20 | 11 | 6 | 5 | 10 | 8 |
| Achanarras | 16 | 15 | 20 | 20 | 21 | 17 | 17 | 18 | 18 | 17 | 18 | 15 | 20 | 28 | 14 | 11 | 12 | 18 | 14 |

## Table A.2.8 - Precipitation-weighted Annual Mean Chloride, 1986 to 2004 (μeq $l^{-1}$)

| | Precipitation-weighted Annual Mean Chloride Concentration (μeq $l^{-1}$) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| Goonhilly | 311 | 242 | 253 | 322 | 595 | 373 | 265 | 255 | 296 | 313 | 368 | 320 | 324 | 325 | 353 | 266 | 320 | 222 | 332 |
| Yarner Wood | 118 | 152 | 180 | 190 | 291 | 160 | 122 | 116 | 139 | 147 | 149 | 133 | 143 | 98 | 124 | 108 | 230 | 123 | 142 |
| Barcombe Mills | 226 | 310 | 186 | 252 | 427 | 161 | 156 | 115 | 166 | 202 | 230 | 187 | 180 | 195 | 237 | 111 | 235 | 157 | 184 |
| Compton | 54 | 92 | 94 | 110 | 159 | 89 | 54 | 73 | 74 | 81 | 91 | 89 | 68 | 64 | 55 | 45 | 75 | 51 | 52 |
| Crai Reservoir | - | - | - | - | - | - | - | - | - | - | - | - | - | 116 | 125 | 94 | 139 | 115 | 115 |
| Flatford Mill | 109 | 80 | 70 | 99 | 95 | 88 | 71 | 67 | 79 | 95 | 90 | 68 | 69 | 57 | 76 | 58 | 77 | 68 | 59 |
| Woburn | 82 | 82 | 61 | 75 | 109 | 69 | 38 | 50 | 64 | 61 | 66 | 64 | 41 | 52 | 40 | 36 | 48 | 51 | 49 |
| Tycanol Wood | 141 | 109 | 123 | 266 | 268 | 190 | 135 | 135 | 178 | 184 | 171 | 178 | 162 | 170 | 173 | 121 | 187 | 167 | 167 |
| Llyn Brianne | 107 | 83 | 99 | 131 | 178 | 129 | 81 | 109 | 100 | 95 | 107 | 106 | 101 | 117 | 106 | - | 131 | 125 | 119 |
| Pumlumon | - | - | - | 124 | 165 | 118 | 83 | 76 | 83 | 91 | 95 | 127 | 108 | 97 | 110 | 80 | 152 | 108 | 92 |
| Stoke Ferry | 95 | 65 | 66 | 73 | 101 | 90 | 72 | 63 | 62 | 57 | 86 | 62 | 63 | 62 | 52 | 71 | 44 | 58 | 54 |
| Preston Montford | 109 | 56 | 114 | 59 | 123 | 203 | 50 | 83 | 72 | 84 | 46 | 94 | 47 | 63 | 42 | 37 | 64 | 53 | 58 |
| Bottesford | 115 | 58 | 100 | 78 | 97 | 85 | 62 | 63 | 55 | 67 | 74 | 37 | 42 | 43 | 32 | 37 | 51 | 47 | 47 |
| Llyn Llagi | - | - | - | - | - | - | - | - | - | - | - | - | - | 124 | 106 | 87 | 132 | 113 | 149 |
| Beddgelert | 154 | 83 | 137 | 156 | 225 | 185 | 107 | 128 | 105 | 149 | 112 | - | - | - | - | - | - | - | - |
| Llyn Llydaw | - | - | - | - | - | - | - | - | - | - | - | 120 | 99 | 120 | 85 | 84 | 95 | 74 | 94 |
| Wardlow Hay Cop | 99 | 85 | 131 | 84 | 183 | 163 | 78 | 121 | 113 | 87 | 104 | 74 | 78 | 80 | 50 | 59 | 69 | 72 | 104 |
| Driby | 128 | 76 | 90 | 126 | 135 | 123 | 88 | 84 | 98 | 125 | 144 | 69 | 90 | 78 | 75 | 87 | 91 | 80 | 68 |
| Jenny Hurn | 169 | 99 | 151 | 123 | 170 | 124 | 86 | 84 | 83 | 99 | 111 | 72 | 89 | 68 | 47 | 57 | - | - | - |
| River Etherow | - | - | - | - | - | - | - | - | - | - | - | - | - | 69 | 57 | 55 | 76 | 73 | 76 |
| Thorganby | 140 | 102 | 121 | 139 | 166 | 180 | 123 | 106 | 96 | 96 | 90 | 64 | 107 | 73 | 49 | 59 | 49 | 51 | 41 |
| High Muffles | 89 | 96 | 106 | 131 | 146 | 140 | 110 | 139 | 108 | 146 | 187 | 98 | 126 | 88 | 73 | 92 | 68 | 110 | 63 |
| Bannisdale | 148 | 75 | 168 | 141 | 193 | 213 | 107 | 124 | 109 | 151 | 113 | 178 | 114 | 149 | 88 | 85 | 100 | 90 | 145 |
| Scoat Tarn | - | - | - | - | - | - | - | - | - | - | - | - | - | 95 | 83 | - | 87 | 80 | 88 |
| Hillsborough Forest | - | - | - | 106 | 165 | 123 | 84 | 102 | 140 | 130 | 123 | 89 | 110 | 102 | 106 | 83 | 78 | 85 | 105 |
| Lough Navar | 293 | 125 | 409 | 166 | 298 | 222 | 153 | 215 | 191 | 144 | 135 | 150 | 155 | 188 | 179 | 118 | 172 | 197 | 139 |
| Cow Green Reservoir | 91 | 52 | 85 | 91 | 107 | 98 | 86 | 84 | 89 | 108 | 105 | 117 | 100 | 113 | 66 | - | 83 | 76 | 82 |
| Loch Dee | 152 | 66 | 159 | 159 | 173 | 144 | 96 | 89 | 106 | 121 | 106 | 123 | 102 | 138 | 120 | 65 | 121 | 104 | 102 |
| Beaghs Burn | - | - | - | - | - | - | - | - | - | - | - | - | - | 194 | 178 | 151 | 158 | 207 | 163 |
| Redesdale | 133 | 54 | 84 | 112 | 83 | 97 | 72 | 92 | 86 | 89 | 108 | 62 | 74 | 73 | 60 | 54 | 69 | 64 | 83 |
| Eskdalemuir | 105 | 47 | 76 | 97 | 103 | 118 | 65 | 71 | 85 | 101 | 74 | 74 | 87 | 113 | 73 | 98 | 73 | 76 | 85 |
| Whiteadder | 129 | 64 | 100 | 110 | 93 | 69 | 93 | 117 | 132 | 115 | 139 | 104 | 91 | 97 | 112 | - | 93 | 128 | 54 |
| Loch Chon | - | - | - | - | - | - | - | - | - | - | - | - | - | 129 | 82 | 82 | 146 | 100 | 73 |
| Balquhidder | 146 | 58 | 70 | 131 | 125 | 104 | 70 | 166 | 135 | 83 | 146 | 100 | 92 | 140 | 98 | 69 | 97 | 105 | 78 |
| Polloch | - | - | - | - | - | 249 | 135 | 226 | 169 | 191 | 176 | 143 | 183 | 226 | 180 | 163 | 275 | 174 | 175 |
| Loch Nagar | - | - | - | - | - | - | - | - | - | - | - | - | - | 43 | 39 | 41 | 85 | 50 | 43 |
| Glen Dye | - | 64 | 86 | 98 | 98 | 91 | 78 | 102 | 124 | 115 | 146 | 124 | 103 | 93 | 83 | 94 | 102 | 77 | 59 |
| Allt a' Mharcaidh | 104 | 39 | 52 | 104 | 72 | 53 | 65 | 158 | 99 | 66 | 76 | 82 | 75 | 93 | 73 | 46 | 51 | 87 | 67 |
| Strathvaich Dam | - | 101 | 129 | 148 | 207 | 168 | 138 | 227 | 169 | 116 | 149 | 131 | 138 | 202 | 179 | 114 | 118 | 265 | 141 |
| Achanarras | 280 | 174 | 253 | 317 | 251 | 272 | 209 | 255 | 245 | 195 | 246 | 189 | 225 | 280 | 302 | 220 | 244 | 381 | 228 |

## Table A.2.9 - Precipitation-weighted Annual Mean Sulphate, 1986 to 2004 (μeq $l^{-1}$)

| | Precipitation-weighted Annual Mean Sulphate Concentration (μeq $l^{-1}$) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| Goonhilly | 61 | 59 | 47 | 63 | 85 | 75 | 50 | 57 | 58 | 56 | 69 | 59 | 53 | 51 | 56 | 49 | 54 | 47 | 51 |
| Yarner Wood | 39 | 52 | 40 | 47 | 49 | 44 | 38 | 40 | 43 | 39 | 48 | 41 | 34 | 28 | 27 | 30 | 40 | 33 | 32 |
| Barcombe Mills | 68 | 80 | 58 | 68 | 82 | 68 | 58 | 45 | 54 | 54 | 61 | 45 | 48 | 47 | 45 | 36 | 49 | 51 | 54 |
| Compton | 84 | 112 | 72 | 70 | 73 | 71 | 67 | 55 | 63 | 57 | 70 | 51 | 45 | 38 | 32 | 33 | 35 | 34 | 37 |
| Crai Reservoir | - | - | - | - | - | - | - | - | - | - | - | - | - | 29 | 27 | 30 | 26 | 28 | 22 |
| Flatford Mill | 102 | 78 | 73 | 89 | 67 | 79 | 59 | 48 | 58 | 62 | 61 | 48 | 50 | 50 | 42 | 39 | 43 | 46 | 41 |
| Woburn | 82 | 86 | 91 | 81 | 76 | 70 | 60 | 49 | 66 | 52 | 63 | 46 | 46 | 44 | 34 | 38 | 37 | 39 | 39 |
| Tycanol Wood | 41 | 37 | 36 | 54 | 50 | 51 | 41 | 37 | 42 | 40 | 45 | 38 | 36 | 39 | 34 | 31 | 35 | 33 | 35 |
| Llyn Brianne | 36 | 37 | 36 | 40 | 46 | 43 | 36 | 38 | 37 | 32 | 38 | 31 | 30 | 29 | 26 | - | 28 | 30 | 24 |
| Pumlumon | - | - | - | 32 | 35 | 34 | 32 | 31 | 27 | 30 | 33 | 31 | 26 | 23 | 22 | 20 | 25 | 23 | 19 |
| Stoke Ferry | 89 | 82 | 72 | 91 | 91 | 86 | 74 | 60 | 68 | 56 | 61 | 55 | 49 | 47 | 46 | 41 | 39 | 47 | 43 |
| Preston Montford | 56 | 65 | 66 | 65 | 49 | 85 | 69 | 56 | 59 | 68 | 53 | 42 | 31 | 31 | 29 | 33 | 33 | 28 | 27 |
| Bottesford | 100 | 98 | 116 | 89 | 73 | 82 | 77 | 62 | 67 | 61 | 61 | 47 | 49 | 43 | 36 | 46 | 45 | 48 | 39 |
| Llyn Llagi | - | - | - | - | - | - | - | - | - | - | - | - | - | 30 | 28 | 25 | 26 | 27 | 26 |
| Beddgelert | 61 | 39 | 39 | 38 | 42 | 43 | 34 | 38 | 32 | 35 | 35 | - | - | - | - | - | - | - | - |
| Llyn Llydaw | - | - | - | - | - | - | - | - | - | - | - | 27 | 27 | 30 | 21 | 23 | 23 | 20 | 21 |
| Wardlow Hay Cop | 80 | 98 | 94 | 86 | 90 | 100 | 80 | 83 | 87 | 73 | 88 | 66 | 58 | 58 | 45 | 59 | 47 | 50 | 48 |
| Driby | 80 | 80 | 85 | 91 | 91 | 90 | 73 | 58 | 72 | 82 | 64 | 49 | 62 | 49 | 45 | 49 | 43 | 48 | 43 |
| Jenny Hurn | 121 | 112 | 130 | 107 | 101 | 90 | 81 | 66 | 86 | 72 | 90 | 62 | 78 | 60 | 55 | 57 | - | - | - |
| River Etherow | - | - | - | - | - | - | - | - | - | - | - | - | - | 46 | 38 | 47 | 38 | 37 | 36 |
| Thorganby | 94 | 86 | 94 | 96 | 93 | 126 | 94 | 85 | 78 | 62 | 76 | 68 | 69 | 56 | 49 | 56 | 46 | 54 | 44 |
| High Muffles | 70 | 82 | 90 | 85 | 77 | 87 | 80 | 69 | 70 | 65 | 83 | 57 | 62 | 46 | 44 | 50 | 41 | 51 | 39 |
| Bannisdale | 56 | 45 | 61 | 54 | 60 | 60 | 53 | 57 | 48 | 53 | 55 | 50 | 42 | 39 | 31 | 36 | 31 | 34 | 34 |
| Scoat Tarn | - | - | - | - | - | - | - | - | - | - | - | - | - | 33 | 26 | - | 24 | 26 | 25 |
| Hillsborough Forest | - | - | - | 62 | 53 | 55 | 50 | 51 | 60 | 46 | 58 | 36 | 41 | 41 | 34 | 41 | 26 | 26 | 29 |
| Lough Navar | 48 | 28 | 34 | 34 | 46 | 41 | 33 | 40 | 37 | 31 | 31 | 31 | 28 | 30 | 29 | 24 | 26 | 30 | 24 |
| Cow Green Reservoir | 44 | 43 | 53 | 44 | 44 | 44 | 47 | 49 | 40 | 43 | 48 | 38 | 36 | 34 | 26 | - | 26 | 26 | 24 |
| Loch Dee | 47 | 41 | 52 | 39 | 43 | 42 | 37 | 38 | 36 | 37 | 47 | 31 | 29 | 34 | 31 | 29 | 23 | 26 | 26 |
| Beaghs Burn | - | - | - | - | - | - | - | - | - | - | - | - | - | 58 | 34 | 36 | 28 | 33 | 26 |
| Redesdale | 72 | 51 | 70 | 58 | 44 | 52 | 53 | 44 | 51 | 46 | 63 | 44 | 42 | 33 | 28 | 35 | 29 | 31 | 34 |
| Eskdalemuir | 41 | 35 | 41 | 38 | 42 | 43 | 34 | 37 | 38 | 38 | 36 | 32 | 30 | 31 | 23 | 28 | 21 | 27 | 22 |
| Whiteadder | 66 | 55 | 72 | 58 | 42 | 52 | 59 | 49 | 54 | 55 | 58 | 44 | 37 | 35 | 35 | - | 38 | 34 | 29 |
| Loch Chon | - | - | - | - | - | - | - | - | - | - | - | - | - | 26 | 24 | 26 | 29 | 24 | 22 |
| Balquhidder | 41 | 39 | 35 | 37 | 34 | 38 | 31 | 43 | 38 | 30 | 52 | 31 | 29 | 29 | 25 | 26 | 25 | 27 | 21 |
| Polloch | - | - | - | - | - | 42 | 31 | 39 | 34 | 33 | 36 | 26 | 30 | 32 | 27 | 26 | 36 | 26 | 23 |
| Loch Nagar | - | - | - | - | - | - | - | - | - | - | - | - | - | 27 | 24 | 31 | 36 | 27 | 20 |
| Glen Dye | - | 54 | 58 | 51 | 49 | 54 | 51 | 48 | 60 | 53 | 76 | 44 | 40 | 35 | 30 | 39 | 34 | 35 | 26 |
| Allt a' Mharcaidh | 35 | 29 | 26 | 29 | 23 | 22 | 23 | 32 | 29 | 21 | 31 | 22 | 19 | 19 | 17 | 19 | 16 | 17 | 17 |
| Strathvaich Dam | - | 26 | 27 | 27 | 31 | 30 | 33 | 35 | 28 | 22 | 32 | 26 | 24 | 26 | 26 | 18 | 19 | 30 | 21 |
| Achanarras | 52 | 50 | 57 | 63 | 48 | 52 | 47 | 47 | 45 | 40 | 51 | 41 | 41 | 46 | 42 | 37 | 40 | 52 | 34 |

**Table A.2.10 - Annual volume of Rain Samples collected in the Acid Deposition Monitoring Network*, 1986 to 2004 (mm)**

| | Annual Rainfall (mm) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 † | 2002 | 2003 | 2004 |
| Goonhilly | 907 | 879 | 910 | 753 | 790 | 800 | 776 | 1008 | 999 | 744 | 743 | 1000 | 936 | 831 | 935 | *787* | 1025 | 743 | 819 |
| Yarner Wood | 1150 | 1015 | 1123 | 1131 | 1174 | 1058 | 1049 | 1398 | 1333 | 1135 | 1007 | 1218 | 1383 | 1106 | 1315 | *1026* | 1342 | 668 | 1012 |
| Barcombe Mills | 740 | 849 | 678 | 597 | 639 | 620 | 653 | 738 | 806 | 652 | 539 | 818 | 733 | 655 | 1215 | *834* | 923 | 506 | 588 |
| Compton | 586 | 629 | 530 | 550 | 407 | 449 | 709 | 644 | 586 | 647 | 392 | 576 | 642 | 644 | 856 | *701* | 805 | 466 | 671 |
| Crai Reservoir | - | - | - | - | - | - | - | - | - | - | - | - | - | 2190 | 2292 | *1659* | 2207 | 1305 | 2187 |
| Flatford Mill | 528 | 660 | 532 | 392 | 393 | 362 | 510 | 518 | 438 | 335 | 231 | 409 | 493 | 546 | 613 | *615* | 586 | 372 | 465 |
| Woburn | 758 | 672 | 592 | 540 | 400 | 478 | 694 | 655 | 505 | 515 | 328 | 456 | 620 | 537 | 663 | *670* | 651 | 448 | 595 |
| Tycanol Wood | 1508 | 1318 | 1385 | 1340 | 1437 | 1422 | 1572 | 1692 | 1460 | 1320 | 1366 | 1589 | 1547 | 1246 | 1735 | *1287* | 1808 | 1246 | 1324 |
| Llyn Brianne | 1491 | 1497 | 1434 | 1417 | 1483 | 1224 | 1488 | 1573 | 1474 | 1143 | 1195 | 1296 | 1737 | 1725 | 1984 | - | 1567 | 1303 | 1709 |
| Pumlumon | - | - | - | 1896 | 1936 | 1908 | 2129 | 2123 | 2445 | 1622 | 1554 | 1780 | 2641 | 2230 | 2411 | *1547* | 2193 | 1752 | 2204 |
| Stoke Ferry | 503 | 617 | 537 | 495 | 348 | 350 | 508 | 601 | 479 | 375 | 318 | 519 | 517 | 435 | 577 | *597* | 694 | 440 | 539 |
| Preston Montford | 539 | 570 | 514 | 580 | 538 | 443 | 554 | 585 | 520 | 409 | 403 | 550 | 590 | 666 | 789 | *536* | 554 | 534 | 560 |
| Bottesford | 545 | 651 | 531 | 469 | 434 | 377 | 557 | 651 | 526 | 327 | 289 | 596 | 573 | 540 | 682 | *572* | 614 | 400 | 461 |
| Llyn Llagi | - | - | - | - | - | - | - | - | - | - | - | - | - | 2177 | 2979 | *1925* | 2608 | 2431 | 2239 |
| Beddgelert | 2758 | 2231 | 2794 | 2480 | 2394 | 2028 | 3013 | 2152 | 2375 | 2097 | 747 | - | - | - | - | - | - | - | - |
| Llyn Llydaw | - | - | - | - | - | - | - | - | - | - | 827 | 2068 | 2777 | 2313 | 3086 | *1831* | 1916 | 2238 | 2610 |
| Wardlow Hay Cop | 928 | 889 | 837 | 708 | 711 | 617 | 849 | 852 | 977 | 581 | 530 | 853 | 1018 | 860 | 1068 | *786* | 1066 | 665 | 793 |
| Driby | 702 | 685 | 605 | 457 | 473 | 398 | 676 | 636 | 513 | 375 | 415 | 578 | 620 | 598 | 616 | *597* | 568 | 483 | 617 |
| Jenny Hurn | 518 | 652 | 409 | 443 | 351 | 354 | 505 | 546 | 452 | 460 | 301 | 423 | 530 | 554 | 610 | *511* | - | - | - |
| River Etherow | - | - | - | - | - | - | - | - | - | - | - | - | - | 876 | 1205 | *914* | 1261 | 758 | 1002 |
| Thorganby | 503 | 625 | 516 | 364 | 434 | 329 | 511 | 485 | 496 | 395 | 348 | 477 | 448 | 597 | 703 | *542* | 609 | 441 | 511 |
| High Muffles | 711 | 875 | 855 | 599 | 806 | 626 | 836 | 947 | 740 | 670 | 693 | 827 | 980 | 936 | 1160 | *861* | 879 | 670 | 826 |
| Bannisdale | 2249 | 2101 | 2091 | 1699 | 2270 | 1857 | 2027 | 1794 | 2290 | 1690 | 1328 | 1771 | 2167 | 1798 | 2552 | *1606* | 2082 | 1756 | 2247 |
| Scoat Tarn | - | - | - | - | - | - | - | - | - | - | - | - | - | 2110 | 2727 | - | 2618 | 1980 | 2467 |
| Hillsborough Forest | - | - | - | 642 | 909 | 668 | 635 | 802 | 614 | 742 | 662 | 824 | 777 | 730 | 900 | *515* | 894 | 532 | 709 |
| Lough Navar | 1439 | 1144 | 1492 | 1242 | 1617 | 1459 | 1977 | 1517 | 1631 | 1521 | 1373 | 1395 | 1686 | 1383 | 1297 | *1004* | 1358 | 941 | 1237 |
| Cow Green Reservoir | 1129 | 1216 | 1138 | 858 | 1165 | 957 | 1073 | 1118 | 1293 | 807 | 1149 | 1058 | 1353 | 1275 | 1633 | - | 1411 | 1033 | 1627 |
| Loch Dee | 2373 | 2311 | 2619 | 2001 | 2574 | 2196 | 2659 | 1950 | 2393 | 2036 | 1928 | 2269 | 2473 | 2373 | | *1266* | 2055 | 1646 | 1990 |
| Beaghs Burn | - | - | - | - | - | - | - | - | - | - | - | - | - | 1417 | 1695 | *1148* | 1494 | 1044 | 1458 |
| Redesdale | 745 | 828 | 832 | 499 | 724 | 581 | 662 | 585 | 541 | 507 | 444 | 437 | 843 | 632 | 842 | *553* | 1002 | 509 | 874 |
| Eskdalemuir | 1523 | 1275 | 1396 | 1236 | 1528 | 1248 | 1609 | 1330 | 1631 | 1202 | 1211 | 1487 | 1700 | 1479 | 1628 | *1180* | 1780 | 1070 | 1381 |
| Whiteadder | 584 | 718 | 712 | 489 | 721 | 569 | 665 | 722 | 566 | 473 | 395 | 546 | 750 | 583 | 817 | - | 722 | 416 | 544 |
| Loch Chon | - | - | - | - | - | - | - | - | - | - | - | - | - | 2123 | 1838 | *1399* | 2278 | 1696 | 1706 |
| Balquhidder | 2008 | 1428 | 1736 | 1967 | 2398 | 1683 | 1814 | 1575 | 1547 | 1637 | 1096 | 1579 | 1540 | 1863 | 1674 | *1254* | 1704 | 1138 | 1746 |
| Polloch | - | - | - | - | - | 2021 | 2355 | 1790 | 2012 | 1788 | 1606 | 1904 | 2250 | 2099 | 2011 | *1171* | 1800 | 1675 | 2520 |
| Loch Nagar | - | - | - | - | - | - | - | - | - | - | - | - | - | 987 | 1436 | *956* | 1885 | 959 | 1367 |
| Glen Dye | - | 898 | 1067 | 659 | 809 | 691 | 758 | 969 | 637 | 724 | 740 | 1049 | 1005 | 792 | 1238 | *998* | 1320 | 554 | 840 |
| Allt a' Mharcaidh | 777 | 664 | 761 | 638 | 907 | 729 | 757 | 826 | 714 | 678 | 477 | 601 | 846 | 874 | 895 | *593* | 786 | 496 | 781 |
| Strathvaich Dam | - | 959 | 1205 | 1357 | 1713 | 1396 | 1609 | 1147 | 1272 | 1282 | 885 | 1200 | 1458 | 1444 | 1384 | *997* | 1173 | 1129 | 1395 |
| Achanarras | 889 | 864 | 642 | 476 | 776 | 512 | 635 | 567 | 535 | 622 | 488 | 478 | 700 | 646 | 598 | *586* | 663 | 548 | 686 |

* All samples including those with phosphate contamination; † The sampling programme at many of the sites in 2001 was interrupted by the outbreak of Foot and Mouth disease.

# Appendix 3
# Sulphur Data, 2004



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# Appendix 3.1
# Sulphur Dioxide Data, 2004

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Monthly and Annual Mean Concentrations of Sulphur Dioxide in 2004
Concentration in Air (μg $SO_2$ [as S] $m^{-3}$)

| Site | Jan -*1* | Feb -*1* | Mar -*1* | Apr -*1* | May -*1* | Jun -*1* | Jul -*1* | Aug -*1* | Sep -*1* | Oct -*1* | Nov -*1* | Dec -*1* | Annual Mean -*1* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eskdalemuir -*2* | 0.24 | 0.35 | 0.48 | 0.24 | 0.16 | 0.16 | 0.18 | 0.18 | 0.13 | 0.22 | 0.13 | 0.20 | 0.22 |
| Stoke Ferry -*2* | - | 0.66 | 1.64 | 1.14 | 0.78 | 0.75 | 0.67 | 0.38 | 0.52 | 0.60 | 0.67 | 0.71 | 0.77 |
| Lough Navar -*2* | - | - | - | 0.10 | 0.05 | 0.04 | 0.06 | 0.05 | - | 0.08 | 0.05 | 0.05 | - |
| Barcombe Mills -*2* | 0.78 | - | 1.02 | 0.97 | 1.08 | 0.69 | 0.55 | 0.60 | 0.56 | 0.45 | 0.39 | 0.46 | 0.69 |
| Yarner Wood -*2* | 0.45 | 0.42 | 0.40 | 0.53 | 0.44 | 0.20 | 0.22 | - | - | 0.27 | 0.18 | 0.63 | 0.37 |
| High Muffles -*2* | 0.54 | 1.44 | 1.16 | 0.81 | 0.64 | 0.57 | 0.70 | 0.79 | 0.76 | 0.66 | 0.56 | 0.67 | 0.77 |
| Strathvaich Dam -*2* | 0.03 | 0.04 | 0.09 | 0.09 | 0.06 | 0.03 | 0.11 | 0.05 | 0.06 | 0.06 | 0.04 | 0.03 | 0.06 |
| Glen Dye –*2* | 0.19 | 0.09 | 0.18 | 0.14 | 0.18 | 0.09 | 0.18 | 0.18 | 0.25 | 0.18 | 0.12 | 0.18 | 0.16 |

Notes: - indicates that no average was determined as the data capture was less than 75%; (1) The monthly and annual mean concentrations have been calculated as time-weighted averages of the monthly filter-pack measurements. No correction has been made to the filter-pack measurements although the measurement overlap programme suggests that the filter-pack sampler has an offset of about -0.13 μg $SO_2$ [as S] $m^{-3}$; compared to the $H_2O_2$ bubbler; (2) The filter-pack samplers were installed on the following dates:

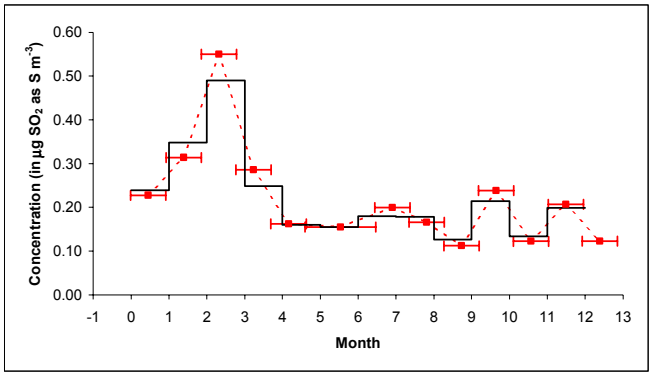
| Site | Installation Date | Site | Installation Date | Site | Installation Date | Installation Date | Date |
|---|---|---|---|---|---|---|---|
| – Eskdalemuir | 24th May 2001 | – Stoke Ferry | 10th May 2001 | – Lough Navar | 24th April 2001 | – Barcombe Mills | 10th May 2001 |
| – Yarner Wood | 16th July 2001 | – High Muffles | 21st May 2001 | – Strathvaich Dam | 19th June 2001 | – Glen Dye | 20th June 2001 |

National Environmental Technology Centre
Sulphur Dioxide Concentration in Air (µg $SO_2$ as S $m^{-3}$)

**Site: 5002 Eskdalemuir**

Fortnightly measurements, collection-day - non standard
Summary for January 2004 to December 2004

| Start Date | | End Date | Duration | Concentration |
|---|---|---|---|---|
| 31-Dec-2003 | - | 28-Jan-2004 | 28 | 0.23 |
| 28-Jan-2004 | - | 25-Feb-2004 | 28 | 0.31 |
| 25-Feb-2004 | - | 24-Mar-2004 | 28 | 0.55 |
| 24-Mar-2004 | - | 21-Apr-2004 | 28 | 0.29 |
| 21-Apr-2004 | - | 19-May-2004 | 28 | 0.16 |
| 19-May-2004 | - | 14-Jul-2004 | 56 | 0.16 |
| 14-Jul-2004 | - | 11-Aug-2004 | 28 | 0.20 |
| 11-Aug-2004 | - | 08-Sep-2004 | 28 | 0.17 |
| 08-Sep-2004 | - | 06-Oct-2004 | 28 | 0.11 |
| 06-Oct-2004 | - | 03-Nov-2004 | 28 | 0.24 |
| 03-Nov-2004 | - | 01-Dec-2004 | 28 | 0.12 |
| 01-Dec-2004 | - | 29-Dec-2004 | 28 | 0.21 |
| 29-Dec-2004 | - | 26-Jan-2005 | 28 | 0.12 |




| | | |
|---|---|---|
| Annual Mean Concentration | = | 0.22 |
| Data Capture | = | 100.0% |

Notes:

(1) N = no or non valid measurement;

(2) Measurements preceded by < are below the Limit of Detection.
included in the calculation of the statistical parameters at 50% of its value

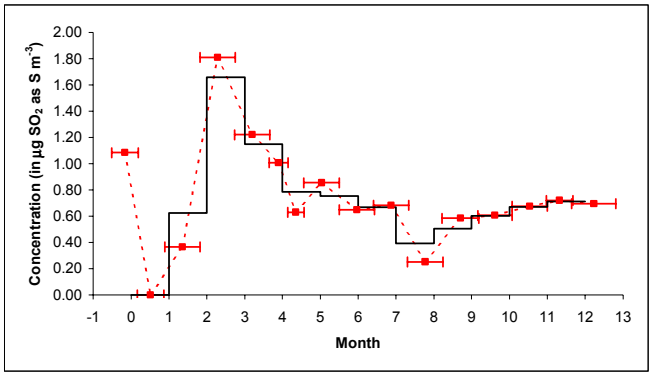
(3) Statistical parameters calculated only if data capture is greater than 75%.

National Environmental Technology Centre
Sulphur Dioxide Concentration in Air (µg $SO_2$ as S $m^{-3}$)

**Site: 5004 Stoke Ferry**

Fortnightly measurements, collection-day - non standard
Summary for January 2004 to December 2004

| Start Date | | End Date | Duration | Concentration |
|---|---|---|---|---|
| 16-Dec-2003 | - | 06-Jan-2004 | 21 | 1.08 |
| 06-Jan-2004 | - | 27-Jan-2004 | 21 | N |
| 27-Jan-2004 | - | 24-Feb-2004 | 28 | 0.37 |
| 24-Feb-2004 | - | 23-Mar-2004 | 28 | 1.81 |
| 23-Mar-2004 | - | 20-Apr-2004 | 28 | 1.22 |
| 20-Apr-2004 | - | 05-May-2004 | 15 | 1.01 |
| 05-May-2004 | - | 18-May-2004 | 13 | 0.63 |
| 18-May-2004 | - | 15-Jun-2004 | 28 | 0.86 |
| 15-Jun-2004 | - | 13-Jul-2004 | 28 | 0.65 |
| 13-Jul-2004 | - | 10-Aug-2004 | 28 | 0.68 |
| 10-Aug-2004 | - | 07-Sep-2004 | 28 | 0.25 |
| 07-Sep-2004 | - | 06-Oct-2004 | 29 | 0.58 |
| 06-Oct-2004 | - | 02-Nov-2004 | 27 | 0.61 |
| 02-Nov-2004 | - | 30-Nov-2004 | 28 | 0.68 |
| 30-Nov-2004 | - | 21-Dec-2004 | 21 | 0.72 |
| 21-Dec-2004 | - | 25-Jan-2005 | 35 | 0.69 |




| | | |
|---|---|---|
| Annual Mean Concentration | = | 0.77 |
| Data Capture | = | 94.3% |

Notes:

(1) N = no or non valid measurement;

(2) Measurements preceded by < are below the Limit of Detection.
included in the calculation of the statistical parameters at 50% of its value

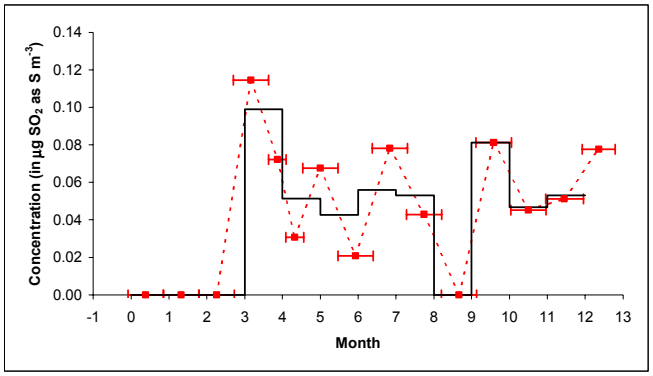
(3) Statistical parameters calculated only if data capture is greater than 75%.

National Environmental Technology Centre
Sulphur Dioxide Concentration in Air (µg $SO_2$ as S $m^{-3}$)

**Site: 5006 Lough Navar**

Fortnightly measurements, collection-day - non standard
Summary for January 2004 to December 2004

| Start Date | | End Date | Duration | Concentration |
|---|---|---|---|---|
| 29-Dec-2003 | - | 26-Jan-2004 | 28 | N |
| 26-Jan-2004 | - | 23-Feb-2004 | 28 | N |
| 23-Feb-2004 | - | 22-Mar-2004 | 28 | N |
| 22-Mar-2004 | - | 19-Apr-2004 | 28 | 0.11 |
| 19-Apr-2004 | - | 03-May-2004 | 14 | 0.07 |
| 03-May-2004 | - | 17-May-2004 | 14 | 0.03 |
| 17-May-2004 | - | 14-Jun-2004 | 28 | 0.07 |
| 14-Jun-2004 | - | 12-Jul-2004 | 28 | 0.02 |
| 12-Jul-2004 | - | 09-Aug-2004 | 28 | 0.08 |
| 09-Aug-2004 | - | 06-Sep-2004 | 28 | 0.04 |
| 06-Sep-2004 | - | 04-Oct-2004 | 28 | N |
| 04-Oct-2004 | - | 01-Nov-2004 | 28 | 0.08 |
| 01-Nov-2004 | - | 29-Nov-2004 | 28 | 0.05 |
| 29-Nov-2004 | - | 29-Dec-2004 | 30 | 0.05 |
| 29-Dec-2004 | - | 24-Jan-2005 | 26 | 0.08 |




| | | |
|---|---|---|
| Annual Mean Concentration | = | - |
| Data Capture | = | 70.2% |

Notes:

(1) N = no or non valid measurement;

(2) Measurements preceded by < are below the Limit of Detection.
included in the calculation of the statistical parameters at 50% of its value

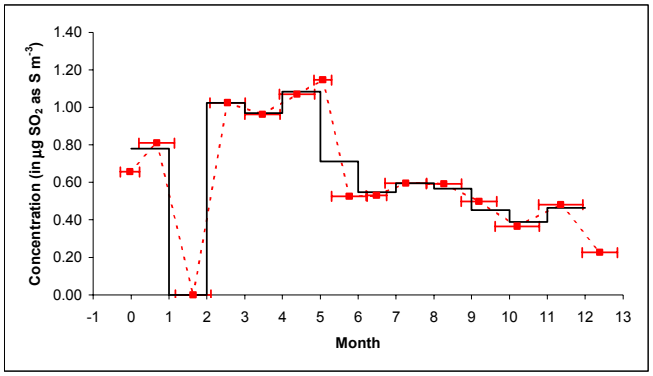
(3) Statistical parameters calculated only if data capture is greater than 75%.

National Environmental Technology Centre
Sulphur Dioxide Concentration in Air (µg $SO_2$ as S $m^{-3}$)

**Site: 5007 Barcombe Mills**

Fortnightly measurements, collection-day - non standard
Summary for January 2004 to December 2004

| Start Date | | End Date | Duration | Concentration |
|---|---|---|---|---|
| 23-Dec-2003 | - | 07-Jan-2004 | 15 | 0.66 |
| 07-Jan-2004 | - | 04-Feb-2004 | 28 | 0.81 |
| 04-Feb-2004 | - | 03-Mar-2004 | 28 | N |
| 03-Mar-2004 | - | 31-Mar-2004 | 28 | 1.02 |
| 31-Mar-2004 | - | 28-Apr-2004 | 28 | 0.96 |
| 28-Apr-2004 | - | 26-May-2004 | 28 | 1.07 |
| 26-May-2004 | - | 09-Jun-2004 | 14 | 1.15 |
| 09-Jun-2004 | - | 07-Jul-2004 | 28 | 0.53 |
| 07-Jul-2004 | - | 23-Jul-2004 | 16 | 0.53 |
| 23-Jul-2004 | - | 25-Aug-2004 | 33 | 0.60 |
| 25-Aug-2004 | - | 22-Sep-2004 | 28 | 0.59 |
| 22-Sep-2004 | - | 20-Oct-2004 | 28 | 0.50 |
| 20-Oct-2004 | - | 24-Nov-2004 | 35 | 0.37 |
| 24-Nov-2004 | - | 29-Dec-2004 | 35 | 0.48 |
| 29-Dec-2004 | - | 26-Jan-2005 | 28 | 0.23 |




| | | |
|---|---|---|
| Annual Mean Concentration | = | 0.69 |
| Data Capture | = | 92.3% |

Notes:

(1) N = no or non valid measurement;

(2) Measurements preceded by < are below the Limit of Detection.
included in the calculation of the statistical parameters at 50% of its value

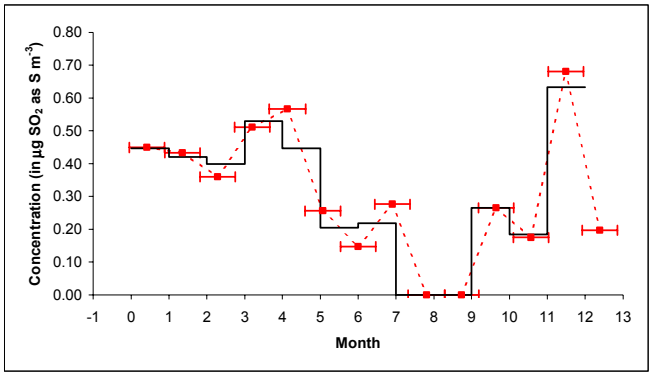
(3) Statistical parameters calculated only if data capture is greater than 75%.

National Environmental Technology Centre
Sulphur Dioxide Concentration in Air (µg $SO_2$ as S $m^{-3}$)

**Site: 5008 Yarner Wood**

Fortnightly measurements, collection-day - non standard
Summary for January 2004 to December 2004

| Start Date | | End Date | Duration | Concentration |
|---|---|---|---|---|
| 30-Dec-2003 | - | 27-Jan-2004 | 28 | 0.45 |
| 27-Jan-2004 | - | 24-Feb-2004 | 28 | 0.43 |
| 24-Feb-2004 | - | 23-Mar-2004 | 28 | 0.36 |
| 23-Mar-2004 | - | 20-Apr-2004 | 28 | 0.51 |
| 20-Apr-2004 | - | 19-May-2004 | 29 | 0.57 |
| 19-May-2004 | - | 16-Jun-2004 | 28 | 0.26 |
| 16-Jun-2004 | - | 14-Jul-2004 | 28 | 0.15 |
| 14-Jul-2004 | - | 11-Aug-2004 | 28 | 0.28 |
| 11-Aug-2004 | - | 09-Sep-2004 | 29 | N |
| 09-Sep-2004 | - | 06-Oct-2004 | 27 | N |
| 06-Oct-2004 | - | 03-Nov-2004 | 28 | 0.27 |
| 03-Nov-2004 | - | 01-Dec-2004 | 28 | 0.17 |
| 01-Dec-2004 | - | 29-Dec-2004 | 28 | 0.68 |
| 29-Dec-2004 | - | 26-Jan-2005 | 28 | 0.20 |




| | | |
|---|---|---|
| Annual Mean Concentration | = | 0.37 |
| Data Capture | = | 84.7% |

Notes:

(1) N = no or non valid measurement;

(2) Measurements preceded by < are below the Limit of Detection.
included in the calculation of the statistical parameters at 50% of its value

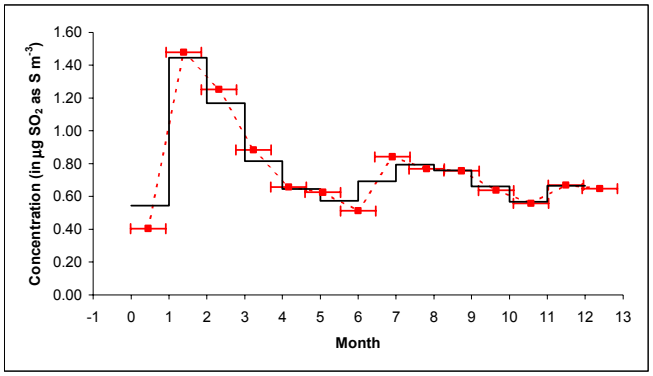
(3) Statistical parameters calculated only if data capture is greater than 75%.

National Environmental Technology Centre
Sulphur Dioxide Concentration in Air (µg $SO_2$ as S $m^{-3}$)

**Site: 5009 High Muffles**

Fortnightly measurements, collection-day - non standard
Summary for January 2004 to December 2004

| Start Date | | End Date | Duration | Concentration |
|---|---|---|---|---|
| 31-Dec-2003 | - | 28-Jan-2004 | 28 | 0.41 |
| 28-Jan-2004 | - | 25-Feb-2004 | 28 | 1.48 |
| 25-Feb-2004 | - | 24-Mar-2004 | 28 | 1.25 |
| 24-Mar-2004 | - | 21-Apr-2004 | 28 | 0.88 |
| 21-Apr-2004 | - | 19-May-2004 | 28 | 0.66 |
| 19-May-2004 | - | 16-Jun-2004 | 28 | 0.63 |
| 16-Jun-2004 | - | 14-Jul-2004 | 28 | 0.51 |
| 14-Jul-2004 | - | 11-Aug-2004 | 28 | 0.84 |
| 11-Aug-2004 | - | 08-Sep-2004 | 28 | 0.77 |
| 08-Sep-2004 | - | 06-Oct-2004 | 28 | 0.76 |
| 06-Oct-2004 | - | 03-Nov-2004 | 28 | 0.64 |
| 03-Nov-2004 | - | 01-Dec-2004 | 28 | 0.56 |
| 01-Dec-2004 | - | 29-Dec-2004 | 28 | 0.67 |
| 29-Dec-2004 | - | 26-Jan-2005 | 28 | 0.65 |




| | | |
|---|---|---|
| Annual Mean Concentration | = | 0.77 |
| Data Capture | = | 100.0% |

Notes:

(1) N = no or non valid measurement;

(2) Measurements preceded by < are below the Limit of Detection.
included in the calculation of the statistical parameters at 50% of its value

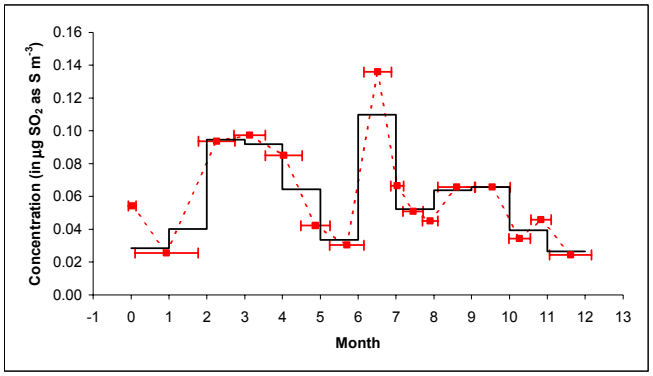
(3) Statistical parameters calculated only if data capture is greater than 75%.

National Environmental Technology Centre
Sulphur Dioxide Concentration in Air (µg $SO_2$ as S $m^{-3}$)

**Site: 5010 Strathvaich Dam**

Fortnightly measurements, collection-day - non standard
Summary for January 2004 to December 2004

| Start Date | | End Date | Duration | Concentration |
|---|---|---|---|---|
| 29-Dec-2003 | - | 04-Jan-2004 | 6 | 0.05 |
| 04-Jan-2004 | - | 23-Feb-2004 | 50 | 0.03 |
| 23-Feb-2004 | - | 23-Mar-2004 | 29 | 0.09 |
| 23-Mar-2004 | - | 17-Apr-2004 | 25 | 0.10 |
| 17-Apr-2004 | - | 16-May-2004 | 29 | 0.08 |
| 16-May-2004 | - | 08-Jun-2004 | 23 | 0.04 |
| 08-Jun-2004 | - | 05-Jul-2004 | 27 | 0.03 |
| 05-Jul-2004 | - | 27-Jul-2004 | 22 | 0.14 |
| 27-Jul-2004 | - | 06-Aug-2004 | 10 | 0.07 |
| 06-Aug-2004 | - | 22-Aug-2004 | 16 | 0.05 |
| 22-Aug-2004 | - | 03-Sep-2004 | 12 | 0.05 |
| 03-Sep-2004 | - | 03-Oct-2004 | 30 | 0.07 |
| 03-Oct-2004 | - | 31-Oct-2004 | 28 | 0.07 |
| 31-Oct-2004 | - | 17-Nov-2004 | 17 | 0.03 |
| 17-Nov-2004 | - | 03-Dec-2004 | 16 | 0.05 |
| 03-Dec-2004 | - | 05-Jan-2005 | 33 | 0.02 |




| | | |
|---|---|---|
| Annual Mean Concentration | = | 0.06 |
| Data Capture | = | 100.0% |

Notes:

(1) N = no or non valid measurement;

(2) Measurements preceded by < are below the Limit of Detection.
included in the calculation of the statistical parameters at 50% of its value

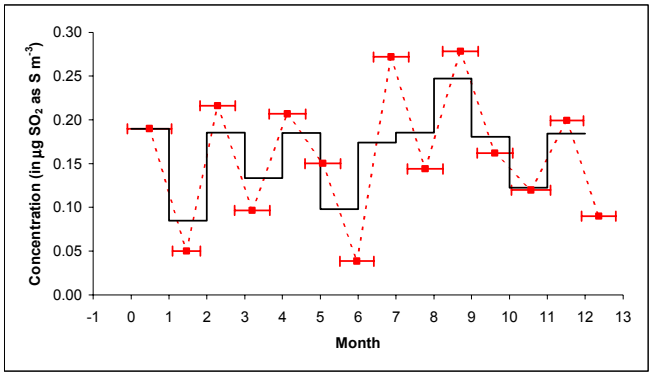
(3) Statistical parameters calculated only if data capture is greater than 75%.

National Environmental Technology Centre
Sulphur Dioxide Concentration in Air (µg $SO_2$ as S $m^{-3}$)

**Site: 5011 Glen Dye**

Fortnightly measurements, collection-day - non standard
Summary for January 2004 to December 2004

| Start Date | | End Date | Duration | Concentration |
|---|---|---|---|---|
| 29-Dec-2003 | - | 02-Feb-2004 | 35 | 0.19 |
| 02-Feb-2004 | - | 24-Feb-2004 | 22 | 0.05 |
| 24-Feb-2004 | - | 23-Mar-2004 | 28 | 0.22 |
| 23-Mar-2004 | - | 20-Apr-2004 | 28 | 0.10 |
| 20-Apr-2004 | - | 19-May-2004 | 29 | 0.21 |
| 19-May-2004 | - | 16-Jun-2004 | 28 | 0.15 |
| 16-Jun-2004 | - | 13-Jul-2004 | 27 | 0.04 |
| 13-Jul-2004 | - | 10-Aug-2004 | 28 | 0.27 |
| 10-Aug-2004 | - | 07-Sep-2004 | 28 | 0.14 |
| 07-Sep-2004 | - | 05-Oct-2004 | 28 | 0.28 |
| 05-Oct-2004 | - | 02-Nov-2004 | 28 | 0.16 |
| 02-Nov-2004 | - | 03-Dec-2004 | 31 | 0.12 |
| 03-Dec-2004 | - | 29-Dec-2004 | 26 | 0.20 |
| 29-Dec-2004 | - | 25-Jan-2005 | 27 | 0.09 |




| | | |
|---|---|---|
| Annual Mean Concentration | = | 0.16 |
| Data Capture | = | 100.0% |

Notes:
(1) N = no or non valid measurement;
(2) Measurements preceded by < are below the Limit of Detection.
included in the calculation of the statistical parameters at 50% of its value
(3) Statistical parameters calculated only if data capture is greater than 75%.

# Appendix 3.2
# Particulate Sulphate Data, 2004

AEA Technology
National Environmental Technology Centre

Monthly and Annual Mean Concentrations of Particulate Sulphate in 2004
Concentration in Air (μg $SO_4$ [as S] $m^{-3}$)

| Site | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eskdalemuir | 0.33 | 0.21 | 0.48 | 0.38 | 0.50 | 0.36 | 0.35 | 0.58 | 0.28 | 0.25 | 0.21 | 0.38 | 0.36 |
| Lough Navar | 0.17 | 0.25 | 0.48 | - | 0.41 | 0.27 | 0.24 | 0.43 | 0.23 | 0.21 | 0.26 | 0.34 | 0.29 |
| Barcombe Mills | 0.53 | 0.81 | 1.08 | 0.91 | 1.11 | 0.75 | 0.77 | 0.86 | 0.72 | 0.40 | 0.48 | 0.93 | 0.78 |
| Yarner Wood | 0.32 | 0.64 | 0.58 | 0.69 | 1.00 | 0.43 | 0.48 | 0.28 | 0.34 | 0.17 | 0.26 | 0.57 | 0.48 |
| High Muffles | 0.34 | 0.36 | 0.72 | 0.68 | 0.59 | 0.48 | 0.69 | 0.78 | 0.32 | 0.35 | 0.32 | 0.47 | 0.51 |

Note: - indicates that no average was determined as the data capture was less than 75%.

National Environmental Technology Centre
Site: 5002 Eskdalemuir - Sulphate as S (SO4 - S)
Concentration in air (µg S $m^{-3}$)

Daily measurements - Summary for January 2004 to December 2004

| MONTH | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE | | | | | | | | | | | | |
| 1 - 2 | 0.24 | 0.10 | 0.40 | 2.40 | 1.36 | 1.42 | 0.23 | 1.38 | 0.26 | 0.27 | 0.37 | 0.45 |
| 2 - 3 | 0.10 | 0.05 | 0.87 | 1.43 | 0.73 | 0.25 | 0.27 | 1.91 | 0.56 | 0.13 | 0.50 | 0.06 |
| 3 - 4 | 0.36 | 0.09 | 1.03 | 0.52 | 0.24 | 0.21 | 0.20 | N | 0.26 | 0.15 | 0.64 | 0.23 |
| 4 - 5 | 0.23 | 0.26 | 0.43 | 0.19 | 0.12 | 0.25 | 0.22 | N | 0.35 | 0.15 | 0.14 | 0.35 |
| 5 - 6 | 0.21 | 0.26 | 0.23 | 0.09 | 0.19 | 0.20 | 0.11 | N | 0.43 | 0.14 | 0.22 | 0.27 |
| 6 - 7 | 0.16 | 0.23 | 0.09 | 0.11 | 0.34 | 0.44 | 0.26 | N | 0.24 | 0.08 | 0.03 | 0.25 |
| 7 - 8 | 0.38 | 0.09 | 0.13 | 0.14 | 0.77 | 0.36 | 0.28 | 1.35 | 0.31 | 0.10 | 0.05 | 0.22 |
| 8 - 9 | 0.47 | 0.06 | 0.21 | 0.24 | 0.71 | 0.96 | 0.32 | 1.91 | 0.19 | 0.14 | 0.20 | 0.77 |
| 9 - 10 | 0.27 | 0.09 | 0.48 | 0.19 | 0.79 | 1.25 | 0.33 | N | 0.92 | 0.11 | 0.14 | 1.79 |
| 10 - 11 | 0.25 | 0.32 | 0.33 | 0.13 | 0.92 | 0.38 | 0.19 | 1.01 | 1.05 | 0.16 | 0.19 | 0.79 |
| 11 - 12 | 0.17 | 0.18 | 1.23 | 0.25 | 0.46 | 0.27 | 0.29 | 1.06 | 0.18 | 0.27 | 0.28 | 0.65 |
| 12 - 13 | 0.19 | 0.26 | 2.02 | 0.14 | 0.69 | 0.23 | 0.17 | 0.60 | 0.14 | 0.68 | 0.10 | 1.15 |
| 13 - 14 | 0.12 | 0.66 | 2.07 | 0.25 | 0.51 | 0.26 | 0.18 | 0.78 | 0.14 | 0.59 | 0.13 | 1.50 |
| 14 - 15 | 0.13 | 0.28 | 0.18 | 0.33 | 0.19 | 0.31 | 0.20 | 0.82 | 0.11 | 0.17 | 0.37 | 0.70 |
| 15 - 16 | 0.18 | 0.31 | 0.30 | 0.48 | 0.31 | 0.27 | 0.25 | 0.16 | 0.11 | 0.31 | 0.09 | 0.19 |
| 16 - 17 | 0.12 | 0.66 | 0.18 | 0.27 | 0.44 | 0.22 | 0.23 | 0.35 | 0.16 | 0.28 | 0.08 | 0.20 |
| 17 - 18 | 0.14 | 0.22 | 0.53 | 0.25 | 1.06 | 0.33 | 0.30 | 0.32 | 0.23 | 0.21 | 0.15 | 0.13 |
| 18 - 19 | 0.29 | 0.35 | 0.38 | 0.09 | 0.25 | 0.14 | 0.25 | 0.38 | 0.16 | 0.21 | 0.11 | 0.09 |
| 19 - 20 | 0.12 | 0.14 | 0.18 | 0.09 | 0.19 | 0.09 | 0.29 | 0.19 | 0.15 | 0.19 | 0.09 | 0.09 |
| 20 - 21 | 0.04 | 0.16 | 0.18 | 0.23 | 0.13 | 0.26 | 0.58 | 0.17 | 0.13 | 0.09 | 0.11 | 0.45 |
| 21 - 22 | 0.40 | 0.23 | 0.13 | 0.55 | 0.22 | 0.21 | 0.33 | 0.20 | 0.17 | 0.12 | 0.18 | 0.24 |
| 22 - 23 | 1.41 | 0.15 | 0.10 | 0.27 | 0.22 | 0.23 | 0.35 | 0.39 | 0.21 | 0.11 | 0.09 | 0.06 |
| 23 - 24 | 0.81 | 0.12 | 0.14 | 0.34 | 0.30 | 0.40 | 0.03 | 0.52 | 0.09 | 0.09 | 0.16 | 0.16 |
| 24 - 25 | 0.25 | 0.15 | 0.11 | 0.43 | 0.45 | 0.14 | 0.22 | 0.50 | 0.19 | 0.17 | 0.32 | 0.08 |
| 25 - 26 | 0.31 | 0.10 | 0.18 | 0.50 | 0.23 | 0.19 | 0.11 | 0.14 | 0.19 | 0.15 | 0.44 | 0.07 |
| 26 - 27 | 0.23 | 0.18 | 0.20 | 0.28 | 0.34 | 0.30 | 0.25 | 0.13 | 0.16 | 0.27 | 0.08 | 0.08 |
| 27 - 28 | 1.08 | 0.13 | 0.13 | 0.36 | 0.49 | 0.40 | 0.47 | 0.17 | 0.47 | 0.58 | 0.16 | <0.00 |
| 28 - 29 | 1.04 | 0.09 | 0.25 | 0.27 | 1.08 | 0.18 | 0.77 | 0.20 | 0.13 | 0.54 | 0.09 | 0.09 |
| 29 - 30 | 0.19 | 0.14 | 0.32 | 0.18 | 1.28 | 0.26 | 1.09 | 0.20 | 0.62 | 0.41 | 0.21 | 0.15 |
| 30 - 31 | 0.39 | | 0.56 | 0.39 | 0.35 | 0.27 | 0.66 | 0.14 | 0.21 | 0.61 | 0.66 | 0.14 |
| 31 - 1 | 0.05 | | 1.35 | | 0.26 | | 1.37 | 0.16 | | 0.26 | | 0.24 |
| Arithmetic Mean (3) | 0.33 | 0.21 | 0.48 | 0.38 | 0.50 | 0.36 | 0.35 | 0.58 | 0.28 | 0.25 | 0.21 | 0.38 |
| Standard Deviation (3) | 0.32 | 0.15 | 0.53 | 0.46 | 0.35 | 0.31 | 0.28 | 0.54 | 0.23 | 0.17 | 0.17 | 0.43 |
| Sample Size | 31 | 29 | 31 | 30 | 31 | 30 | 31 | 26 | 30 | 31 | 30 | 31 |

Notes (1) N = no measurement; (2) Measurements preceded by < are below the Limit of Detection. The measurement has been included in the calculation of the statistical parameters at 50% of its value; (3) Statistical parameters calculated only if data capture is greater than 75%.

National Environmental Technology Centre
Site: 5006 Lough Navar - Sulphate as S (SO4 - S)
Concentration in air (µg S $m^{-3}$)

Daily measurements - Summary for January 2004 to December 2004

| MONTH | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE | | | | | | | | | | | | |
| 1 - 2 | 0.21 | 0.11 | 0.56 | 1.53 | 1.03 | 0.47 | 0.15 | 0.56 | 0.20 | 0.16 | 0.80 | 0.12 |
| 2 - 3 | 0.11 | 0.21 | 0.92 | 0.38 | 0.21 | 0.16 | 0.22 | 1.55 | 0.14 | 0.14 | 1.05 | 0.10 |
| 3 - 4 | 0.29 | 0.23 | 0.15 | 0.11 | 0.23 | 0.20 | 0.24 | 0.17 | 0.16 | 0.11 | 0.39 | 0.26 |
| 4 - 5 | 0.25 | 0.27 | 0.11 | 0.10 | 0.07 | 0.03 | 0.11 | 0.27 | 0.12 | 0.11 | 0.41 | 0.17 |
| 5 - 6 | 0.19 | 0.17 | 0.08 | 0.19 | 0.04 | 0.04 | 0.13 | 0.70 | 0.12 | 0.11 | 0.23 | 0.13 |
| 6 - 7 | 0.18 | 0.14 | 0.08 | 0.15 | 0.17 | 0.04 | 0.16 | 0.26 | 0.52 | 0.10 | 0.15 | 0.14 |
| 7 - 8 | 0.19 | 0.17 | 0.12 | 0.11 | 0.14 | 1.45 | 0.26 | 0.51 | 0.47 | 0.10 | 0.12 | 0.28 |
| 8 - 9 | 0.13 | 0.12 | 0.84 | 0.04 | 0.16 | 0.18 | 0.28 | 0.50 | 0.67 | 0.11 | 0.22 | 0.74 |
| 9 - 10 | 0.20 | 0.28 | 1.57 | 0.02 | 0.56 | 0.02 | 0.21 | 0.72 | 0.98 | 0.21 | 0.32 | 0.93 |
| 10 - 11 | 0.24 | 0.27 | 0.98 | 0.02 | 0.78 | 0.71 | 0.24 | 0.50 | 0.86 | 0.24 | 0.21 | 0.10 |
| 11 - 12 | 0.09 | 0.35 | 1.16 | 0.02 | 0.71 | 0.24 | 0.20 | 1.20 | 0.14 | 0.58 | 0.14 | 0.89 |
| 12 - 13 | 0.14 | 0.76 | 0.54 | 0.12 | 0.53 | 0.28 | 0.17 | 0.31 | 0.11 | 0.66 | 0.19 | 1.76 |
| 13 - 14 | 0.11 | 0.12 | 0.19 | 0.18 | 0.23 | 0.03 | 0.44 | 1.00 | 0.12 | 0.29 | 0.18 | 1.21 |
| 14 - 15 | 0.10 | 0.44 | 0.16 | 0.10 | 0.20 | 0.22 | 0.31 | 0.79 | 0.14 | 0.07 | 0.23 | 0.22 |
| 15 - 16 | 0.13 | 0.71 | 0.24 | 0.04 | 0.22 | 0.15 | 0.15 | 0.25 | 0.11 | 0.11 | 0.15 | 0.22 |
| 16 - 17 | 0.08 | 0.24 | 0.19 | 0.03 | 0.79 | 0.40 | 0.33 | 0.33 | 0.15 | 0.22 | 0.05 | 0.19 |
| 17 - 18 | 0.13 | 0.17 | 0.26 | 0.05 | 0.19 | 0.18 | 0.15 | 0.32 | 0.14 | 0.14 | 0.16 | 0.16 |
| 18 - 19 | 0.18 | 0.33 | 0.17 | 0.03 | 0.20 | 0.18 | 0.12 | 0.33 | 0.12 | 0.07 | 0.07 | 0.20 |
| 19 - 20 | 0.08 | 0.37 | 0.13 | N | 0.17 | 0.06 | 0.16 | 0.23 | 0.10 | 0.09 | 0.10 | 0.22 |
| 20 - 21 | 0.11 | 0.58 | 0.17 | N | 0.14 | 0.21 | 0.32 | 0.13 | 0.23 | 0.14 | 0.18 | 0.18 |
| 21 - 22 | 0.38 | 0.34 | 0.12 | N | 0.14 | 0.63 | 0.20 | 0.11 | 0.21 | 0.10 | 0.28 | 0.09 |
| 22 - 23 | 0.20 | 0.17 | 0.15 | N | 0.04 | 0.40 | 0.25 | 0.29 | 0.04 | 0.13 | 0.21 | 0.20 |
| 23 - 24 | 0.20 | 0.12 | 0.10 | N | 1.06 | 0.18 | 0.26 | 0.43 | 0.09 | 0.08 | 0.30 | 0.27 |
| 24 - 25 | 0.11 | 0.14 | 0.16 | N | 0.62 | 0.29 | 0.23 | 0.30 | 0.13 | 0.20 | 0.43 | 0.11 |
| 25 - 26 | 0.12 | 0.19 | 0.63 | N | 0.05 | 0.20 | 0.14 | 0.40 | 0.16 | 0.11 | 0.53 | 0.13 |
| 26 - 27 | 0.23 | 0.09 | 0.58 | N | 2.97 | 0.04 | 0.13 | 0.13 | 0.05 | 0.30 | 0.09 | 0.23 |
| 27 - 28 | 0.20 | 0.07 | 0.09 | N | 0.42 | 0.17 | 0.28 | 0.13 | 0.17 | 0.45 | 0.12 | 0.62 |
| 28 - 29 | 0.15 | 0.09 | 0.24 | N | 0.19 | 0.31 | 0.54 | 0.22 | 0.10 | 0.25 | 0.11 | 0.19 |
| 29 - 30 | 0.27 | 0.09 | 0.33 | N | 0.04 | 0.32 | 0.56 | 0.21 | 0.27 | 0.35 | 0.18 | 0.20 |
| 30 - 31 | 0.20 | | 1.42 | N | 0.33 | 0.18 | 0.22 | 0.16 | 0.14 | 0.36 | 0.17 | 0.10 |
| 31 - 1 | 0.12 | | 2.29 | | 0.16 | | 0.37 | 0.16 | | 0.57 | | 0.17 |
| Arithmetic Mean (3) | 0.17 | 0.25 | 0.48 | - | 0.41 | 0.27 | 0.24 | 0.43 | 0.23 | 0.21 | 0.26 | 0.34 |
| Standard Deviation (3) | 0.07 | 0.18 | 0.53 | - | 0.56 | 0.28 | 0.11 | 0.34 | 0.23 | 0.16 | 0.22 | 0.38 |
| Sample Size | 31 | 29 | 31 | 18 | 31 | 30 | 31 | 31 | 30 | 31 | 30 | 31 |

Notes (1) N = no measurement; (2) Measurements preceded by < are below the Limit of Detection. The measurement has been included in the calculation of the statistical parameters at 50% of its value; (3) Statistical parameters calculated only if data capture is greater than 75%.

National Environmental Technology Centre
Site: 5007 Barcombe Mills - Sulphate as S (SO4 - S)
Concentration in air (µg S $m^{-3}$)

Daily measurements - Summary for January 2004 to December 2004

| MONTH | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE | | | | | | | | | | | | |
| 1 - 2 | 0.33 | 0.72 | 1.25 | 1.03 | 2.31 | 0.67 | 0.69 | 2.65 | 0.64 | 0.33 | 0.62 | 1.01 |
| 2 - 3 | 1.17 | 0.90 | 1.22 | 0.58 | 0.73 | 1.21 | 0.46 | 3.07 | 1.21 | 0.83 | 0.88 | 1.07 |
| 3 - 4 | 1.38 | 0.81 | 1.07 | 0.55 | 0.92 | N | 0.32 | 2.64 | 0.94 | 0.41 | 0.84 | 0.85 |
| 4 - 5 | 0.69 | 0.80 | 1.23 | 0.41 | 0.46 | 1.12 | 0.42 | 0.84 | 0.68 | 0.50 | 0.48 | 0.63 |
| 5 - 6 | 0.48 | 1.19 | 1.31 | 0.32 | 0.56 | 0.76 | 0.39 | 1.44 | 1.70 | 0.22 | 0.36 | 0.46 |
| 6 - 7 | 0.47 | 1.14 | 1.75 | 0.30 | 0.32 | 1.18 | 0.69 | 0.87 | 2.56 | 0.14 | 0.69 | 0.44 |
| 7 - 8 | 0.89 | 0.25 | 0.65 | 0.65 | 0.51 | 0.98 | 0.76 | 0.52 | 1.43 | 0.36 | 0.67 | 0.82 |
| 8 - 9 | 0.52 | 0.28 | 0.67 | 0.65 | 0.89 | 1.42 | 0.49 | 1.43 | 0.60 | 0.53 | 0.49 | 1.29 |
| 9 - 10 | 0.26 | 0.27 | 0.48 | 0.68 | 1.75 | 3.07 | 0.67 | 1.11 | 0.71 | N | 0.59 | 2.36 |
| 10 - 11 | 0.71 | 0.73 | 1.94 | 0.61 | 2.38 | 0.03 | 0.40 | 0.85 | 1.34 | 0.47 | 0.42 | 1.87 |
| 11 - 12 | 0.28 | 0.84 | 2.88 | 0.40 | 2.75 | 0.51 | 0.49 | 0.72 | 0.67 | 0.55 | 0.34 | 1.58 |
| 12 - 13 | 0.27 | 0.81 | 1.89 | 1.61 | 1.68 | 0.45 | 0.69 | 0.34 | 0.36 | 0.47 | 0.57 | 4.18 |
| 13 - 14 | 0.21 | 0.70 | 0.42 | N | 0.64 | 0.75 | 0.59 | 0.62 | 0.26 | 0.24 | 0.26 | 1.96 |
| 14 - 15 | 0.17 | 0.95 | 0.82 | 0.61 | N | 0.61 | 1.96 | 1.27 | 0.30 | 0.26 | 0.40 | 1.33 |
| 15 - 16 | 0.30 | 0.87 | 1.05 | 1.78 | 1.87 | 0.51 | 1.05 | 0.84 | 0.33 | 0.34 | 0.36 | 1.63 |
| 16 - 17 | 0.26 | 1.07 | N | 1.43 | 1.65 | 0.65 | 0.87 | 0.50 | 0.36 | 0.25 | 0.49 | 0.91 |
| 17 - 18 | 0.36 | 1.32 | 1.46 | 0.95 | 1.37 | 0.49 | 1.03 | 0.75 | 0.47 | 0.57 | 0.49 | 0.56 |
| 18 - 19 | 0.42 | 0.53 | 0.92 | 0.26 | 2.14 | 0.45 | 0.67 | 0.57 | 0.42 | 0.47 | 0.27 | 0.56 |
| 19 - 20 | 0.42 | 0.52 | 0.66 | 0.27 | 1.31 | 0.37 | 0.31 | 0.39 | 0.21 | 0.53 | 0.37 | 0.29 |
| 20 - 21 | 0.52 | 1.74 | 0.66 | 0.45 | 1.45 | 0.35 | 0.91 | 0.41 | 0.40 | 0.50 | 0.37 | 0.42 |
| 21 - 22 | 0.58 | 1.52 | 0.38 | 0.90 | 0.44 | 0.37 | 1.49 | 0.42 | 0.39 | 0.18 | 0.52 | 1.02 |
| 22 - 23 | 1.03 | 0.58 | 0.26 | 0.66 | 0.40 | N | 0.01 | 0.54 | 0.60 | 0.46 | 0.35 | 0.64 |
| 23 - 24 | 0.64 | 0.53 | 0.44 | 0.72 | 0.52 | N | 0.31 | 0.61 | 0.68 | 0.43 | 0.51 | 0.48 |
| 24 - 25 | 0.37 | 0.60 | 0.40 | 1.04 | 0.85 | N | 0.67 | 0.46 | 0.29 | 0.38 | 0.46 | 0.29 |
| 25 - 26 | 0.38 | 0.39 | 0.46 | 1.71 | 1.54 | 0.35 | 0.87 | 0.40 | 0.62 | 0.20 | 0.48 | 0.30 |
| 26 - 27 | 1.01 | 0.44 | 0.60 | 1.88 | 0.74 | 0.44 | 0.82 | 0.52 | 0.50 | 0.20 | 0.59 | 0.52 |
| 27 - 28 | 0.77 | 0.69 | 1.43 | 1.75 | 0.51 | 0.81 | 0.67 | 0.41 | 0.82 | 0.46 | 0.59 | 0.30 |
| 28 - 29 | 0.33 | 1.35 | 1.60 | 0.71 | 0.71 | 0.66 | 1.17 | 0.32 | 0.44 | 0.42 | 0.27 | 0.19 |
| 29 - 30 | 0.23 | 1.00 | 1.83 | 1.19 | 1.11 | 0.53 | 1.83 | 0.35 | 0.58 | 0.33 | 0.40 | 0.38 |
| 30 - 31 | 0.34 | | 1.66 | 2.23 | 0.53 | 0.69 | 1.21 | 0.27 | 1.15 | 0.38 | 0.42 | 0.18 |
| 31 - 1 | 0.77 | | 0.92 | | 0.40 | | 0.96 | 0.66 | | 0.74 | | 0.34 |
| Arithmetric Mean (3) | 0.53 | 0.81 | 1.08 | 0.91 | 1.11 | 0.75 | 0.77 | 0.86 | 0.72 | 0.40 | 0.48 | 0.93 |
| Standard Deviation (3) | 0.31 | 0.37 | 0.61 | 0.56 | 0.69 | 0.57 | 0.43 | 0.71 | 0.51 | 0.16 | 0.15 | 0.83 |
| Sample Size | 31 | 29 | 30 | 29 | 30 | 26 | 31 | 31 | 30 | 30 | 30 | 31 |

Notes (1) N = no measurement; (2) Measurements preceded by < are below the Limit of Detection. The measurement has been included in the calculation of the statistical parameters at 50% of its value; (3) Statistical parameters calculated only if data capture is greater than 75%.

National Environmental Technology Centre
Site: 5007 Barcombe Mills - Sulphate as S (SO4 - S)
Concentration in air (µg S $m^{-3}$)

Daily measurements - Summary for January 2002 to December 2002

| MONTH | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE | | | | | | | | | | | | |
| 1 - 2 | 1.27 | 0.49 | 0.28 | 2.30 | 0.30 | 0.75 | 0.31 | 0.60 | 0.50 | 0.79 | 1.10 | 0.26 |
| 2 - 3 | 0.97 | 0.70 | 0.40 | 1.63 | 0.49 | 1.55 | 0.28 | 0.29 | 0.64 | 1.02 | 0.29 | 0.24 |
| 3 - 4 | 0.91 | 0.46 | 0.87 | 2.18 | 0.68 | 0.96 | <0.03 | 0.44 | 0.85 | 0.59 | 0.29 | 0.28 |
| 4 - 5 | 1.00 | 0.38 | 1.42 | 1.56 | 0.55 | 0.48 | <0.03 | 0.42 | 1.17 | 0.24 | 0.59 | 0.33 |
| 5 - 6 | 0.78 | 0.25 | 1.00 | 2.27 | 0.55 | 0.64 | 0.58 | 0.92 | 1.06 | 0.39 | 0.62 | 0.38 |
| 6 - 7 | 1.05 | 0.23 | 0.83 | 1.99 | 1.40 | 0.94 | 1.29 | 1.33 | 0.52 | 0.30 | 0.33 | 1.42 |
| 7 - 8 | 2.24 | 0.38 | 0.53 | 0.90 | 0.57 | <0.03 | 0.61 | 0.95 | 0.24 | 0.31 | 0.20 | 1.49 |
| 8 - 9 | 1.62 | 0.66 | 0.81 | 1.08 | 0.55 | <0.03 | 0.41 | 0.52 | 0.33 | N | 0.23 | 2.55 |
| 9 - 10 | 1.44 | 0.22 | 0.22 | 1.02 | 0.79 | <0.03 | 0.30 | 0.48 | 0.30 | N | 0.36 | 1.49 |
| 10 - 11 | 0.89 | 0.48 | 0.46 | 0.93 | 0.61 | <0.03 | 0.45 | 0.12 | 0.74 | N | 0.32 | 1.97 |
| 11 - 12 | 0.87 | 0.45 | 0.79 | 0.42 | 1.37 | 0.33 | 0.56 | 0.75 | 1.15 | N | 0.34 | 1.84 |
| 12 - 13 | 1.59 | 0.45 | 1.23 | 1.64 | 0.72 | 0.33 | 0.97 | 0.46 | 1.17 | N | 0.30 | 1.67 |
| 13 - 14 | 1.46 | 0.43 | 0.36 | 2.42 | 0.97 | 0.84 | 1.29 | 0.71 | 0.61 | N | 0.22 | 0.98 |
| 14 - 15 | 0.73 | 0.32 | 1.20 | 2.43 | 0.83 | 1.16 | 1.37 | 1.26 | 1.15 | N | 0.23 | 1.38 |
| 15 - 16 | 0.56 | 0.44 | 0.92 | 1.92 | 0.38 | 0.68 | <0.03 | 1.44 | 0.35 | 0.24 | 0.38 | 0.82 |
| 16 - 17 | 0.47 | 0.71 | 0.68 | 0.74 | 0.44 | 1.22 | 1.11 | 1.28 | 0.49 | 0.55 | 0.74 | 1.15 |
| 17 - 18 | 0.62 | 1.64 | 0.74 | 0.77 | 0.34 | 1.26 | 1.05 | 1.41 | 0.46 | 0.51 | 0.88 | 2.14 |
| 18 - 19 | 0.45 | 0.51 | 0.41 | 0.28 | 0.34 | 0.60 | 0.59 | 1.24 | 0.15 | 0.44 | 0.91 | 0.62 |
| 19 - 20 | 0.34 | 0.50 | 0.29 | 0.60 | 0.20 | 0.42 | 0.49 | 1.05 | 0.60 | 0.55 | 0.25 | 0.65 |
| 20 - 21 | 0.55 | 0.29 | 0.61 | 1.28 | 0.38 | 0.48 | 1.01 | 1.41 | 1.15 | 0.73 | 1.02 | 0.97 |
| 21 - 22 | 0.85 | 0.28 | 0.57 | 1.65 | 0.39 | 0.75 | 0.50 | 0.78 | 1.15 | 0.57 | 0.45 | 0.59 |
| 22 - 23 | 0.33 | 0.35 | 0.80 | 1.29 | 0.34 | 0.59 | 0.66 | 0.23 | 0.49 | 0.32 | 0.25 | 0.54 |
| 23 - 24 | 0.50 | 0.27 | 0.03 | 0.85 | 0.25 | 0.41 | 0.68 | 0.91 | 0.27 | 0.18 | 0.29 | 0.66 |
| 24 - 25 | 0.24 | 0.37 | 0.03 | 1.44 | 0.22 | 0.53 | 0.67 | 1.15 | 0.32 | 0.22 | 0.27 | 0.46 |
| 25 - 26 | 0.49 | 0.21 | 0.03 | 0.77 | 0.19 | 0.62 | 1.24 | 0.91 | 0.65 | 0.29 | 0.78 | 0.34 |
| 26 - 27 | 0.24 | 0.23 | 0.22 | 0.26 | 0.15 | 0.85 | 1.13 | 0.81 | 0.78 | 0.25 | 0.52 | 0.37 |
| 27 - 28 | 0.49 | 0.17 | 1.03 | 0.40 | 0.56 | 0.53 | 0.84 | 1.35 | 0.54 | 0.27 | 0.75 | 0.39 |
| 28 - 29 | 0.42 | 0.16 | 1.51 | 0.38 | 0.60 | 0.64 | 1.49 | 1.56 | 0.41 | 0.23 | 0.47 | 0.38 |
| 29 - 30 | 0.92 | | 1.18 | 0.36 | 0.46 | 0.76 | 1.43 | 0.91 | 0.41 | 0.42 | 0.25 | 0.32 |
| 30 - 31 | 0.82 | | 1.50 | 0.40 | 0.83 | 0.52 | 1.89 | 0.57 | 0.42 | 0.80 | 0.85 | 0.31 |
| 31 - 1 | 0.44 | | 1.49 | | 0.47 | | 0.61 | 0.52 | | 1.34 | | 0.95 |
| Arithmetic Mean (3) | 0.82 | 0.43 | 0.72 | 1.20 | 0.55 | 0.63 | 0.77 | 0.86 | 0.63 | 0.48 | 0.48 | 0.90 |
| Standard Deviation (3) | 0.47 | 0.28 | 0.45 | 0.71 | 0.30 | 0.38 | 0.47 | 0.40 | 0.33 | 0.29 | 0.27 | 0.64 |
| Sample Size | 31 | 28 | 31 | 30 | 31 | 30 | 31 | 31 | 30 | 24 | 30 | 31 |

Notes (1) N = no measurement; (2) Measurements preceded by < are below the Limit of Detection. The measurement has been included in the calculation of the statistical parameters at 50% of its value; (3) Statistical parameters calculated only if data capture is greater than 75%.

National Environmental Technology Centre
Site: 5008 Yarner Wood - Sulphate as S (SO4 - S)
Concentration in air (µg S $m^{-3}$)

Daily measurements - Summary for January 2004 to December 2004

| MONTH | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE | | | | | | | | | | | | |
| 1 - 2 | 0.31 | 0.35 | 1.36 | 0.73 | 2.55 | 0.45 | 0.25 | 1.46 | 0.29 | 0.13 | 0.71 | 0.39 |
| 2 - 3 | 0.64 | 0.51 | 1.06 | 0.56 | 0.69 | 0.45 | 0.19 | N | 0.97 | 0.10 | 0.22 | 0.27 |
| 3 - 4 | 0.59 | 0.65 | 0.42 | 0.37 | 0.49 | 0.32 | 0.27 | N | 0.35 | 0.14 | 0.37 | 0.13 |
| 4 - 5 | 0.44 | 0.76 | 0.30 | 0.24 | 0.20 | 0.39 | 0.40 | 0.69 | 0.25 | 0.07 | 0.41 | 0.11 |
| 5 - 6 | 0.12 | 0.23 | 0.01 | 0.26 | 0.97 | 0.60 | 0.26 | N | 0.97 | 0.05 | 0.20 | 0.13 |
| 6 - 7 | 0.58 | 0.13 | 0.42 | 0.31 | 0.20 | 1.18 | 0.70 | 0.49 | 1.45 | 0.06 | 0.19 | 0.30 |
| 7 - 8 | 0.67 | 0.18 | 0.49 | 0.30 | 0.33 | N | 0.68 | 0.64 | 0.81 | 0.12 | 0.15 | 0.20 |
| 8 - 9 | 0.17 | 0.25 | 0.68 | 0.57 | 0.24 | N | 0.38 | 0.60 | 0.65 | 0.38 | 0.19 | 1.52 |
| 9 - 10 | 0.31 | 0.37 | 0.58 | 0.78 | 0.61 | 1.21 | 0.42 | 0.36 | 0.64 | 0.21 | 0.11 | 2.01 |
| 10 - 11 | 0.27 | 0.65 | 1.20 | 0.63 | 1.23 | N | 0.54 | 0.49 | 0.80 | 0.32 | 0.14 | 1.40 |
| 11 - 12 | 0.18 | 0.73 | 0.97 | 1.02 | 1.57 | 0.29 | 0.43 | 0.17 | 0.09 | 0.59 | 0.64 | 1.71 |
| 12 - 13 | 0.20 | 1.02 | 0.18 | 0.75 | 3.83 | 0.36 | 0.46 | 0.19 | 0.13 | 0.13 | 0.29 | 2.08 |
| 13 - 14 | 0.14 | 1.46 | 0.16 | 0.25 | 1.07 | 0.38 | N | 0.38 | 0.06 | 0.11 | 0.40 | 1.19 |
| 14 - 15 | 0.13 | 0.94 | 0.38 | 0.96 | 1.05 | 0.25 | N | 0.02 | 0.08 | 0.09 | 0.18 | 1.50 |
| 15 - 16 | 0.14 | 1.15 | 0.66 | 0.70 | 1.36 | 0.40 | N | 0.41 | 0.09 | 0.09 | 0.10 | 1.14 |
| 16 - 17 | 0.10 | 0.87 | 0.03 | 0.53 | 1.38 | 0.12 | N | 0.04 | 0.21 | 0.32 | 0.41 | 0.32 |
| 17 - 18 | 0.29 | 0.95 | 0.33 | 0.18 | 1.86 | 0.80 | N | 0.01 | 0.12 | 0.27 | 0.11 | 0.14 |
| 18 - 19 | 0.22 | 0.75 | 0.51 | 0.21 | 0.79 | 0.37 | N | 0.34 | 0.10 | 0.14 | 0.32 | 0.10 |
| 19 - 20 | 0.24 | 0.46 | 0.15 | 0.16 | 0.94 | 0.28 | N | 0.16 | 0.08 | 0.27 | 0.19 | 0.15 |
| 20 - 21 | 0.43 | 1.48 | 0.32 | N | 0.27 | 0.23 | N | 0.19 | 0.07 | 0.15 | 0.22 | 0.16 |
| 21 - 22 | 0.58 | 1.85 | 0.25 | N | 0.66 | 0.28 | 0.41 | 0.02 | 0.11 | 0.08 | 0.22 | 0.86 |
| 22 - 23 | 0.22 | 0.57 | 0.02 | 2.17 | 0.37 | 0.43 | 0.83 | 0.03 | 0.15 | 0.03 | 0.15 | 0.16 |
| 23 - 24 | 0.32 | 0.25 | 0.67 | 0.30 | 0.84 | 0.31 | 0.19 | 0.05 | 0.08 | 0.30 | 0.08 | 0.41 |
| 24 - 25 | 0.14 | 0.31 | 0.38 | 0.03 | 1.04 | 0.25 | 0.39 | N | 0.14 | 0.09 | 0.31 | 0.16 |
| 25 - 26 | 0.20 | 0.23 | 0.49 | 2.09 | 1.38 | 0.33 | 0.40 | 0.25 | 0.21 | 0.02 | 0.46 | 0.09 |
| 26 - 27 | 0.95 | 0.24 | 0.80 | 1.42 | 1.64 | 0.40 | 0.54 | 0.22 | 0.10 | 0.13 | 0.32 | 0.09 |
| 27 - 28 | 0.39 | 0.21 | 0.69 | N | 1.22 | 0.32 | 0.81 | 0.12 | 0.10 | 0.14 | 0.18 | 0.19 |
| 28 - 29 | 0.18 | 0.34 | 0.96 | N | 1.19 | 0.34 | 0.77 | 0.14 | 0.13 | 0.11 | 0.20 | 0.16 |
| 29 - 30 | 0.17 | 0.68 | 1.30 | 1.87 | 0.42 | 0.48 | 0.71 | 0.11 | 0.70 | 0.04 | 0.18 | 0.19 |
| 30 - 31 | 0.30 | | 1.41 | 0.69 | 0.24 | 0.35 | 0.58 | 0.02 | 0.19 | 0.04 | 0.29 | 0.21 |
| 31 - 1 | 0.29 | | 0.93 | | 0.21 | | 0.33 | 0.04 | | 0.62 | | 0.16 |
| Arithmetic Mean (3) | 0.32 | 0.64 | 0.58 | 0.69 | 1.00 | 0.43 | - | 0.28 | 0.34 | 0.17 | 0.26 | 0.57 |
| Standard Deviation (3) | 0.20 | 0.44 | 0.40 | 0.59 | 0.77 | 0.26 | - | 0.31 | 0.36 | 0.15 | 0.15 | 0.64 |
| Sample Size | 31 | 29 | 31 | 26 | 31 | 27 | 23 | 27 | 30 | 31 | 30 | 31 |

Notes (1) N = no measurement; (2) Measurements preceded by < are below the Limit of Detection. The measurement has been included in the calculation of the statistical parameters at 50% of its value; (3) Statistical parameters calculated only if data capture is greater than 75%.

National Environmental Technology Centre
Site: 5009 High Muffles - Sulphate as S (SO4 - S)
Concentration in air (µg S $m^{-3}$)

Daily measurements - Summary for January 2004 to December 2004

| MONTH | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE | | | | | | | | | | | | |
| 1 - 2 | 0.33 | 0.23 | 0.67 | 1.67 | 0.78 | 0.75 | 0.29 | 1.74 | 0.31 | 0.35 | 0.47 | 0.73 |
| 2 - 3 | 0.84 | 0.36 | 1.23 | 0.78 | 0.71 | 0.44 | 0.38 | N | 0.79 | 0.25 | 0.41 | 0.46 |
| 3 - 4 | 0.58 | 0.22 | 0.98 | 0.53 | 0.22 | 0.55 | 0.25 | 1.54 | 0.72 | 0.37 | 0.97 | 0.33 |
| 4 - 5 | 0.44 | 0.39 | 1.27 | 0.15 | 0.35 | 0.42 | 0.35 | 1.01 | 0.46 | 0.18 | 0.32 | 0.32 |
| 5 - 6 | 0.49 | 0.37 | 1.94 | 0.12 | 0.53 | 0.25 | 0.41 | 1.02 | 0.26 | 0.23 | 0.34 | 0.27 |
| 6 - 7 | 0.25 | 0.16 | 0.55 | 0.19 | 1.08 | 0.48 | 0.26 | 1.89 | 0.42 | 0.13 | 0.32 | 0.37 |
| 7 - 8 | 0.91 | 0.11 | 0.38 | 0.22 | 0.99 | 0.91 | 0.44 | 1.32 | 0.20 | 0.15 | 0.21 | 0.18 |
| 8 - 9 | 0.45 | 0.16 | 0.28 | 0.31 | 0.55 | 1.80 | 0.30 | 1.58 | 0.19 | 0.14 | 0.23 | 0.57 |
| 9 - 10 | 0.24 | 0.40 | 0.26 | 0.34 | 1.07 | 0.73 | 0.28 | 1.12 | 0.48 | 0.09 | 0.37 | 1.31 |
| 10 - 11 | 0.55 | 0.39 | 1.24 | 0.12 | 0.86 | 0.42 | 0.79 | 0.95 | 0.78 | 0.21 | 0.21 | 0.88 |
| 11 - 12 | 0.18 | 0.36 | 2.19 | 0.58 | 0.67 | 0.27 | 0.72 | 1.01 | 0.59 | 0.29 | 0.25 | 0.83 |
| 12 - 13 | 0.27 | 1.48 | 2.76 | 0.32 | 0.37 | 0.29 | 0.48 | 0.94 | 0.19 | 0.77 | 0.21 | 0.57 |
| 13 - 14 | 0.12 | 0.82 | 0.70 | 0.47 | 0.90 | 0.29 | 0.63 | 1.06 | 0.18 | 0.68 | 0.20 | 1.92 |
| 14 - 15 | 0.20 | 0.25 | 0.35 | 1.26 | 0.47 | 0.66 | 0.48 | 0.59 | 0.16 | 0.35 | 0.12 | 1.05 |
| 15 - 16 | 0.23 | 0.29 | 0.69 | 1.10 | 0.32 | 0.26 | 0.43 | 1.30 | 0.19 | 0.32 | 0.19 | 0.71 |
| 16 - 17 | 0.44 | 0.75 | 0.65 | 0.88 | 0.77 | 0.38 | 0.53 | 0.45 | 0.46 | 0.41 | 0.11 | 0.38 |
| 17 - 18 | 0.30 | 0.21 | 0.34 | 0.64 | 0.98 | 0.15 | 0.39 | 0.68 | 0.41 | 0.37 | 0.15 | 0.12 |
| 18 - 19 | 0.24 | 0.15 | 0.51 | 0.30 | 0.42 | 0.16 | 0.52 | 0.96 | 0.20 | 0.38 | 0.19 | 0.12 |
| 19 - 20 | 0.09 | 0.15 | 0.31 | 0.31 | 0.22 | 0.21 | 0.53 | 0.52 | 0.15 | 0.39 | 0.13 | 0.17 |
| 20 - 21 | 0.15 | 0.57 | 0.24 | 0.59 | 0.14 | 0.35 | 0.92 | 0.23 | 0.16 | 0.42 | 0.22 | 0.49 |
| 21 - 22 | 0.28 | 0.89 | 0.13 | 0.50 | 0.17 | 0.46 | 0.81 | 0.34 | 0.14 | 0.15 | 0.43 | 0.51 |
| 22 - 23 | 0.55 | 0.16 | 0.16 | 0.32 | 0.33 | 0.62 | 0.67 | 0.40 | 0.18 | 0.20 | 0.16 | 0.15 |
| 23 - 24 | 0.41 | 0.29 | 0.14 | 0.47 | 0.47 | 0.79 | 0.40 | 0.46 | 0.12 | 0.20 | 0.32 | 0.13 |
| 24 - 25 | 0.20 | 0.17 | 0.21 | 1.84 | 0.42 | 0.10 | 0.37 | 0.44 | 0.20 | 0.31 | 0.59 | 0.21 |
| 25 - 26 | 0.25 | 0.20 | 0.28 | 1.81 | 0.23 | 0.29 | 0.88 | 0.53 | 0.15 | 0.16 | 0.84 | 0.08 |
| 26 - 27 | 0.19 | 0.22 | 0.46 | 1.72 | 0.46 | 0.58 | 0.39 | 0.25 | 0.18 | 0.20 | 0.42 | 0.20 |
| 27 - 28 | 0.38 | 0.25 | 0.28 | 1.04 | 0.56 | 0.47 | 0.19 | 0.18 | 0.14 | 0.56 | 0.26 | 0.34 |
| 28 - 29 | 0.20 | 0.16 | 0.29 | 0.31 | 0.89 | 0.28 | 1.59 | 0.19 | 0.21 | 0.64 | 0.17 | 0.13 |
| 29 - 30 | 0.26 | 0.38 | 0.51 | 0.61 | 0.75 | 0.50 | 2.18 | 0.29 | 0.33 | 0.37 | 0.30 | 0.29 |
| 30 - 31 | 0.41 | | 0.71 | 1.04 | 0.53 | 0.55 | 1.76 | 0.21 | 0.62 | 0.61 | 0.60 | 0.38 |
| 31 - 1 | 0.18 | | 1.69 | | 1.08 | | 2.67 | 0.27 | | 0.87 | | 0.28 |
| Arithmetic Mean (3) | 0.34 | 0.36 | 0.72 | 0.68 | 0.59 | 0.48 | 0.69 | 0.78 | 0.32 | 0.35 | 0.32 | 0.47 |
| Standard Deviation (3) | 0.19 | 0.30 | 0.66 | 0.52 | 0.29 | 0.32 | 0.59 | 0.50 | 0.21 | 0.20 | 0.20 | 0.40 |
| Sample Size | 31 | 29 | 31 | 30 | 31 | 30 | 31 | 30 | 30 | 31 | 30 | 31 |

Notes (1) N = no measurement; (2) Measurements preceded by < are below the Limit of Detection. The measurement has been included in the calculation of the statistical parameters at 50% of its value; (3) Statistical parameters calculated only if data capture is greater than 75%.

# Appendix 4
# Nitrogen Dioxide Data

AEA Technology
National Environmental Technology Centre

National Environmental Technology Centre

Nitrogen Dioxide
Concentration in air (ppb)

Monthly measurements, collection-day - non standard
Summary for January 2004 to December 2004

| Site | Sampling Period | Start Date | End Date | | Concentration (in ppb) |
|---|---|---|---|---|---|
| Goonhilly | 1 | 31-Dec-2003 | 28-Jan-2004 | | 1.98 |
| | 2 | 28-Jan-2004 | 25-Feb-2004 | | 4.08 |
| | 3 | 25-Feb-2004 | 07-Apr-2004 | * | 2.59 |
| | 4 | 07-Apr-2004 | 21-Apr-2004 | | 2.28 |
| | 5 | 21-Apr-2004 | 17-Jun-2004 | * | 1.14 |
| | 6 | 17-Jun-2004 | 27-Jul-2004 | | 1.42 |
| | 7 | 27-Jul-2004 | 06-Oct-2004 | * | 1.27 |
| | 8 | 06-Oct-2004 | 04-Nov-2004 | | 3.41 |
| | 9 | 04-Nov-2004 | 06-Dec-2004 | | 2.59 |
| | 10 | 06-Dec-2004 | 13-Jan-2005 | | 2.18 |
| | 11 | | | | |
| | 12 | | | | |
| | 13 | | | | |
| | 14 | | | | |
| | | Annual Mean Concentration = | | | 2.07 |
| Yarner Wood | 1 | 23-Dec-2003 | 27-Jan-2004 | | 2.86 |
| | 2 | 27-Jan-2004 | 24-Feb-2004 | | 3.95 |
| | 3 | 24-Feb-2004 | 23-Mar-2004 | | 2.37 |
| | 4 | 23-Mar-2004 | 20-Apr-2004 | | 2.38 |
| | 5 | 20-Apr-2004 | 19-May-2004 | | 2.17 |
| | 6 | 19-May-2004 | 16-Jun-2004 | | 1.35 |
| | 7 | 16-Jun-2004 | 14-Jul-2004 | | 1.60 |
| | 8 | 14-Jul-2004 | 11-Aug-2004 | | 0.76 |
| | 9 | 11-Aug-2004 | 09-Sep-2004 | | 0.75 |
| | 10 | 09-Sep-2004 | 06-Oct-2004 | | 0.46 |
| | 11 | 06-Oct-2004 | 03-Nov-2004 | | 5.24 |
| | 12 | 03-Nov-2004 | 01-Dec-2004 | | 2.21 |
| | 13 | 01-Dec-2004 | 29-Dec-2004 | | 6.36 |
| | 14 | 29-Dec-2004 | 26-Jan-2005 | | 8.72 |
| | | Annual Mean Concentration = | | | 2.51 |
| Barcombe Mills | 1 | 29-Dec-2003 | 28-Jan-2004 | | 3.76 |
| | 2 | 28-Jan-2004 | 25-Feb-2004 | | 7.41 |
| | 3 | 25-Feb-2004 | 24-Mar-2004 | | 9.27 |
| | 4 | 24-Mar-2004 | 21-Apr-2004 | | 4.47 |
| | 5 | 21-Apr-2004 | 17-May-2004 | | 5.81 |
| | 6 | 17-May-2004 | 14-Jun-2004 | | 5.16 |
| | 7 | 14-Jun-2004 | 12-Jul-2004 | | 2.37 |
| | 8 | 12-Jul-2004 | 04-Aug-2004 | | 2.67 |
| | 9 | 04-Aug-2004 | 08-Sep-2004 | | 3.02 |
| | 10 | 08-Sep-2004 | 11-Oct-2004 | | 3.80 |
| | 11 | 11-Oct-2004 | 03-Nov-2004 | | 6.03 |
| | 12 | 03-Nov-2004 | 01-Dec-2004 | | 9.13 |
| | 13 | 01-Dec-2004 | 30-Dec-2004 | | 12.16 |
| | 14 | 30-Dec-2004 | 26-Jan-2005 | | 5.11 |
| | | Annual Mean Concentration = | | | 5.75 |

| Site | Sampling Period | Start Date/Time | End Date/Time | | Concentration (in ppb) |
|---|---|---|---|---|---|
| Compton | 1 | 04-Dec-2003 | 02-Jan-2004 | | 9.47 |
| | 2 | 02-Jan-2004 | 28-Jan-2004 | | 9.11 |
| | 3 | 28-Jan-2004 | 25-Feb-2004 | | 9.09 |
| | 4 | 25-Feb-2004 | 24-Mar-2004 | | 8.71 |
| | 5 | 24-Mar-2004 | 17-May-2004 | * | 2.65 |
| | 6 | 17-May-2004 | 14-Jun-2004 | | 3.61 |
| | 7 | 14-Jun-2004 | 12-Jul-2004 | | 3.97 |
| | 8 | 12-Jul-2004 | 21-Sep-2004 | * | 2.17 |
| | 9 | 21-Sep-2004 | 06-Oct-2004 | | 4.57 |
| | 10 | 06-Oct-2004 | 01-Nov-2004 | | 7.61 |
| | 11 | 01-Nov-2004 | 21-Dec-2004 | * | 12.53 |
| | 12 | 21-Dec-2004 | 24-Jan-2005 | | 4.29 |
| | 13 | | | | |
| | 14 | | | | |
| | | Annual Mean Concentration = | | | 6.01 |
| Flatford Mill | 1 | 30-Dec-2003 | 27-Jan-2004 | | 9.02 |
| | 2 | 27-Jan-2004 | 24-Feb-2004 | | 10.73 |
| | 3 | 24-Feb-2004 | 23-Mar-2004 | | 7.76 |
| | 4 | 23-Mar-2004 | 21-Apr-2004 | | 7.40 |
| | 5 | 21-Apr-2004 | 18-May-2004 | | 4.48 |
| | 6 | 18-May-2004 | 29-Jun-2004 | * | 2.89 |
| | 7 | 29-Jun-2004 | 15-Jul-2004 | | 5.43 |
| | 8 | 15-Jul-2004 | 10-Aug-2004 | | 5.78 |
| | 9 | 10-Aug-2004 | 07-Sep-2004 | | 3.43 |
| | 10 | 07-Sep-2004 | 05-Oct-2004 | | 5.36 |
| | 11 | 05-Oct-2004 | 03-Nov-2004 | | 7.96 |
| | 12 | 03-Nov-2004 | 30-Nov-2004 | | 10.70 |
| | 13 | 30-Nov-2004 | 29-Dec-2004 | | 14.30 |
| | 14 | 29-Dec-2004 | 25-Jan-2005 | | 9.21 |
| | | Annual Mean Concentration = | | | 7.25 |
| Woburn | 1 | 04-Dec-2003 | 05-Jan-2004 | | 10.51 |
| | 2 | 05-Jan-2004 | 02-Feb-2004 | | 10.91 |
| | 3 | 02-Feb-2004 | 29-Feb-2004 | | 14.75 |
| | 4 | 29-Feb-2004 | 28-Mar-2004 | | 8.82 |
| | 5 | 28-Mar-2004 | 23-Apr-2004 | | 9.53 |
| | 6 | 23-Apr-2004 | 18-May-2004 | | 9.70 |
| | 7 | 18-May-2004 | 18-Jun-2004 | | 5.86 |
| | 8 | 18-Jun-2004 | 16-Jul-2004 | | 6.60 |
| | 9 | 16-Jul-2004 | 13-Aug-2004 | | 3.41 |
| | 10 | 13-Aug-2004 | 13-Sep-2004 | | 5.33 |
| | 11 | 13-Sep-2004 | 14-Oct-2004 | | 9.27 |
| | 12 | 14-Oct-2004 | 04-Nov-2004 | | 9.61 |
| | 13 | 04-Nov-2004 | 08-Dec-2004 | | 16.92 |
| | 14 | 08-Dec-2004 | 11-Jan-2005 | | 12.18 |
| | | Annual Mean Concentration = | | | 9.46 |

Notes: * denotes extended sampling period (greater than the expected 4 or 5 week period). N denotes missing or excluded sample. Annual mean concentration only give if the data capture is greater than 75%.

National Environmental Technology Centre

Nitrogen Dioxide
Concentration in air (ppb)

Monthly measurements, collection-day - non standard
Summary for January 2004 to December 2004

| Site | Sampling Period | Start Date | End Date | | Concentration (in ppb) |
|---|---|---|---|---|---|
| Tycanol Wood | 1 | 03-Dec-2003 | 05-Jan-2004 | | 4.81 |
| | 2 | 05-Jan-2004 | 28-Jan-2004 | | 0.94 |
| | 3 | 28-Jan-2004 | 26-Mar-2004 | * | 0.83 |
| | 4 | 26-Mar-2004 | 21-Apr-2004 | | 1.66 |
| | 5 | 21-Apr-2004 | 19-May-2004 | | 1.95 |
| | 6 | 19-May-2004 | 16-Jun-2004 | | < 0.33 |
| | 7 | 16-Jun-2004 | 19-Jul-2004 | | 0.86 |
| | 8 | 19-Jul-2004 | 11-Aug-2004 | | 0.50 |
| | 9 | 11-Aug-2004 | 08-Sep-2004 | | 0.56 |
| | 10 | 08-Sep-2004 | 06-Oct-2004 | | N |
| | 11 | 06-Oct-2004 | 03-Nov-2004 | | 2.43 |
| | 12 | 03-Nov-2004 | 01-Dec-2004 | | 1.86 |
| | 13 | 01-Dec-2004 | 29-Dec-2004 | | 5.46 |
| | 14 | 29-Dec-2004 | 26-Jan-2005 | | 1.68 |
| | | Annual Mean Concentration = | | | 1.56 |
| Llyn Brianne | 1 | 04-Dec-2003 | 05-Jan-2004 | | 3.25 |
| | 2 | 05-Jan-2004 | 02-Feb-2004 | | 1.64 |
| | 3 | 02-Feb-2004 | 25-Feb-2004 | | 3.14 |
| | 4 | 25-Feb-2004 | 23-Mar-2004 | | 2.83 |
| | 5 | 23-Mar-2004 | 22-Apr-2004 | | 1.77 |
| | 6 | 22-Apr-2004 | 19-May-2004 | | 1.39 |
| | 7 | 19-May-2004 | 16-Jun-2004 | | 1.24 |
| | 8 | 16-Jun-2004 | 17-Jul-2004 | | 1.38 |
| | 9 | 17-Jul-2004 | 08-Sep-2004 | * | 1.04 |
| | 10 | 08-Sep-2004 | 11-Oct-2004 | | 1.14 |
| | 11 | 11-Oct-2004 | 02-Nov-2004 | | 3.36 |
| | 12 | 02-Nov-2004 | 02-Dec-2004 | | 2.07 |
| | 13 | 02-Dec-2004 | 29-Dec-2004 | | 4.61 |
| | 14 | 29-Dec-2004 | 26-Jan-2005 | | 2.76 |
| | | Annual Mean Concentration = | | | 2.01 |
| Pumlumon | 1 | 30-Dec-2003 | 27-Jan-2004 | | 1.92 |
| | 2 | 27-Jan-2004 | 25-Feb-2004 | | 2.45 |
| | 3 | 25-Feb-2004 | 23-Mar-2004 | | 2.68 |
| | 4 | 23-Mar-2004 | 20-Apr-2004 | | 1.68 |
| | 5 | 20-Apr-2004 | 18-May-2004 | | 1.01 |
| | 6 | 18-May-2004 | 16-Jun-2004 | | 0.96 |
| | 7 | 16-Jun-2004 | 13-Jul-2004 | | 0.73 |
| | 8 | 13-Jul-2004 | 10-Aug-2004 | | 0.48 |
| | 9 | 10-Aug-2004 | 07-Sep-2004 | | < 0.33 |
| | 10 | 07-Sep-2004 | 05-Oct-2004 | | 1.20 |
| | 11 | 05-Oct-2004 | 02-Nov-2004 | | 3.64 |
| | 12 | 02-Nov-2004 | 30-Nov-2004 | | 1.49 |
| | 13 | 30-Nov-2004 | 28-Dec-2004 | | 3.83 |
| | 14 | 28-Dec-2004 | 25-Jan-2005 | | 1.49 |
| | | Annual Mean Concentration = | | | 1.71 |

| Site | Sampling Period | Start Date/Time | End Date/Time | | Concentration (in ppb) |
|---|---|---|---|---|---|
| Stoke Ferry | 1 | 02-Dec-2003 | 06-Jan-2004 | | 7.86 |
| | 2 | 06-Jan-2004 | 27-Jan-2004 | | 11.91 |
| | 3 | 27-Jan-2004 | 24-Feb-2004 | | 10.19 |
| | 4 | 24-Feb-2004 | 23-Mar-2004 | | 8.21 |
| | 5 | 23-Mar-2004 | 20-Apr-2004 | | 5.93 |
| | 6 | 20-Apr-2004 | 18-May-2004 | | 4.04 |
| | 7 | 18-May-2004 | 15-Jun-2004 | | 3.16 |
| | 8 | 15-Jun-2004 | 13-Jul-2004 | | 3.10 |
| | 9 | 13-Jul-2004 | 10-Aug-2004 | | 3.21 |
| | 10 | 10-Aug-2004 | 07-Sep-2004 | | 4.39 |
| | 11 | 07-Sep-2004 | 06-Oct-2004 | | 6.17 |
| | 12 | 06-Oct-2004 | 02-Nov-2004 | | 6.67 |
| | 13 | 02-Nov-2004 | 30-Nov-2004 | | 12.84 |
| | 14 | 30-Nov-2004 | 21-Dec-2004 | | 17.40 |
| | | Annual Mean Concentration = | | | 7.25 |
| Preston Montford | 1 | 31-Dec-2003 | 28-Jan-2004 | | 4.74 |
| | 2 | 28-Jan-2004 | 22-Feb-2004 | | 5.96 |
| | 3 | 22-Feb-2004 | 24-Apr-2004 | * | 5.04 |
| | 4 | 24-Apr-2004 | 18-May-2004 | | 4.49 |
| | 5 | 18-May-2004 | 21-Jun-2004 | | 2.54 |
| | 6 | 21-Jun-2004 | 14-Jul-2004 | | 2.74 |
| | 7 | 14-Jul-2004 | 08-Aug-2004 | | 4.50 |
| | 8 | 08-Aug-2004 | 10-Sep-2004 | | 0.34 |
| | 9 | 10-Sep-2004 | 04-Oct-2004 | | 1.04 |
| | 10 | 04-Oct-2004 | 01-Nov-2004 | | 6.76 |
| | 11 | 01-Nov-2004 | 03-Dec-2004 | | N |
| | 12 | 03-Dec-2004 | 31-Dec-2004 | | N |
| | 13 | | | | |
| | 14 | | | | |
| | | Annual Mean Concentration = | | | 3.88 |
| Bottesford | 1 | 23-Dec-2003 | 03-Feb-2004 | * | 8.59 |
| | 2 | 03-Feb-2004 | 08-Mar-2004 | | 11.69 |
| | 3 | 08-Mar-2004 | 22-Mar-2004 | | 9.32 |
| | 4 | 22-Mar-2004 | 26-Apr-2004 | | 8.99 |
| | 5 | 26-Apr-2004 | 18-May-2004 | | 6.88 |
| | 6 | 18-May-2004 | 17-Jun-2004 | | 2.80 |
| | 7 | 17-Jun-2004 | 15-Jul-2004 | | 3.70 |
| | 8 | 15-Jul-2004 | 02-Aug-2004 | | 3.62 |
| | 9 | 02-Aug-2004 | 04-Oct-2004 | * | 4.85 |
| | 10 | 04-Oct-2004 | 08-Nov-2004 | | 9.00 |
| | 11 | 08-Nov-2004 | 09-Dec-2004 | | 13.48 |
| | 12 | 09-Dec-2004 | 20-Jan-2005 | * | 10.20 |
| | 13 | | | | |
| | 14 | | | | |
| | | Annual Mean Concentration = | | | 7.65 |

Notes: * denotes extended sampling period (greater than the expected 4 or 5 week period). N denotes missing or excluded sample. Annual mean concentration only give if the data capture is greater than 75%.

National Environmental Technology Centre

Nitrogen Dioxide
Concentration in air (ppb)

Monthly measurements, collection-day - non standard
Summary for January 2004 to December 2004

| Site | Sampling Period | Start Date | End Date | | Concentration (in ppb) |
|---|---|---|---|---|---|
| Llyn Llydaw | 1 | 31-Dec-2003 | 28-Jan-2004 | | 1.75 |
| | 2 | 28-Jan-2004 | 25-Feb-2004 | | 1.96 |
| | 3 | 25-Feb-2004 | 24-Mar-2004 | | 2.03 |
| | 4 | 24-Mar-2004 | 21-Apr-2004 | | 1.62 |
| | 5 | 21-Apr-2004 | 19-May-2004 | | 0.69 |
| | 6 | 19-May-2004 | 16-Jun-2004 | | 0.89 |
| | 7 | 16-Jun-2004 | 14-Jul-2004 | | 0.98 |
| | 8 | 14-Jul-2004 | 11-Aug-2004 | | < 0.33 |
| | 9 | 11-Aug-2004 | 08-Sep-2004 | | 0.44 |
| | 10 | 08-Sep-2004 | 06-Oct-2004 | | < 0.33 |
| | 11 | 06-Oct-2004 | 01-Dec-2004 | * | 2.05 |
| | 12 | 01-Dec-2004 | 12-Jan-2005 | * | 1.11 |
| | 13 | | | | |
| | 14 | | | | |
| | | Annual Mean Concentration = | | | 1.22 |
| Wardlow Hay Cop | 1 | 28-Dec-2003 | 25-Jan-2004 | | 9.28 |
| | 2 | 25-Jan-2004 | 07-Mar-2004 | * | 8.45 |
| | 3 | 07-Mar-2004 | 23-Mar-2004 | | 6.62 |
| | 4 | 23-Mar-2004 | 20-Apr-2004 | | 6.48 |
| | 5 | 20-Apr-2004 | 30-May-2004 | * | 4.20 |
| | 6 | 30-May-2004 | 13-Jun-2004 | | 3.68 |
| | 7 | 13-Jun-2004 | 11-Jul-2004 | | 3.40 |
| | 8 | 11-Jul-2004 | 08-Aug-2004 | | 2.98 |
| | 9 | 08-Aug-2004 | 05-Sep-2004 | | 3.13 |
| | 10 | 05-Sep-2004 | 10-Oct-2004 | | 4.96 |
| | 11 | 10-Oct-2004 | 31-Oct-2004 | | 8.95 |
| | 12 | 31-Oct-2004 | 28-Nov-2004 | | 11.53 |
| | 13 | 28-Nov-2004 | 31-Dec-2004 | | 12.49 |
| | 14 | 31-Dec-2004 | 30-Jan-2005 | | 6.31 |
| | | Annual Mean Concentration = | | | 6.70 |
| Driby | 1 | 31-Dec-2003 | 28-Jan-2004 | | 8.93 |
| | 2 | 28-Jan-2004 | 25-Feb-2004 | | 6.51 |
| | 3 | 25-Feb-2004 | 24-Mar-2004 | | 5.15 |
| | 4 | 24-Mar-2004 | 23-Apr-2004 | | 6.92 |
| | 5 | 23-Apr-2004 | 19-May-2004 | | 4.11 |
| | 6 | 19-May-2004 | 16-Jun-2004 | | 2.30 |
| | 7 | 16-Jun-2004 | 14-Jul-2004 | | < 0.33 |
| | 8 | 14-Jul-2004 | 15-Aug-2004 | | 2.61 |
| | 9 | 15-Aug-2004 | 06-Oct-2004 | * | N |
| | 10 | 06-Oct-2004 | 03-Nov-2004 | | 5.01 |
| | 11 | 03-Nov-2004 | 01-Dec-2004 | | 11.55 |
| | 12 | 01-Dec-2004 | 04-Jan-2005 | | 3.06 |
| | 13 | | | | |
| | 14 | | | | |
| | | Annual Mean Concentration = | | | 5.10 |

| Site | Sampling Period | Start Date/Time | End Date/Time | Concentration (in ppb) |
|---|---|---|---|---|
| Jenny Hurn | 1 | | | |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |
| | 5 | | | |
| | 6 | | | |
| | 7 | | | |
| | 8 | | | |
| | 9 | | | |
| | 10 | | | |
| | 11 | | | |
| | 12 | | | |
| | 13 | | | |
| | 14 | | | |
| | | Annual Mean Concentration = | | 6.89 |
| Thorganby | 1 | 31-Dec-2003 | 28-Jan-2004 | 9.54 |
| | 2 | 28-Jan-2004 | 25-Feb-2004 | 8.31 |
| | 3 | 25-Feb-2004 | 24-Mar-2004 | 8.17 |
| | 4 | 24-Mar-2004 | 21-Apr-2004 | 7.17 |
| | 5 | 21-Apr-2004 | 19-May-2004 | 3.90 |
| | 6 | 19-May-2004 | 22-Jun-2004 | 3.01 |
| | 7 | 22-Jun-2004 | 14-Jul-2004 | 4.47 |
| | 8 | 14-Jul-2004 | 05-Aug-2004 | 3.31 |
| | 9 | 05-Aug-2004 | 08-Sep-2004 | 5.17 |
| | 10 | 08-Sep-2004 | 06-Oct-2004 | 6.02 |
| | 11 | 06-Oct-2004 | 03-Nov-2004 | 8.78 |
| | 12 | 03-Nov-2004 | 01-Dec-2004 | 9.91 |
| | 13 | 01-Dec-2004 | 29-Dec-2004 | 11.82 |
| | 14 | 29-Dec-2004 | 26-Jan-2005 | 5.82 |
| | | Annual Mean Concentration = | | 6.89 |
| High Muffles | 1 | 31-Dec-2003 | 28-Jan-2004 | 6.99 |
| | 2 | 28-Jan-2004 | 25-Feb-2004 | 4.78 |
| | 3 | 25-Feb-2004 | 24-Mar-2004 | 1.51 |
| | 4 | 24-Mar-2004 | 21-Apr-2004 | 3.80 |
| | 5 | 21-Apr-2004 | 19-May-2004 | 1.88 |
| | 6 | 19-May-2004 | 16-Jun-2004 | 1.58 |
| | 7 | 16-Jun-2004 | 14-Jul-2004 | 1.93 |
| | 8 | 14-Jul-2004 | 11-Aug-2004 | 2.27 |
| | 9 | 11-Aug-2004 | 08-Sep-2004 | 1.55 |
| | 10 | 08-Sep-2004 | 06-Oct-2004 | 3.35 |
| | 11 | 06-Oct-2004 | 03-Nov-2004 | 5.67 |
| | 12 | 03-Nov-2004 | 01-Dec-2004 | 6.07 |
| | 13 | 01-Dec-2004 | 29-Dec-2004 | 8.66 |
| | 14 | 29-Dec-2004 | 26-Jan-2005 | 4.92 |
| | | Annual Mean Concentration = | | 3.85 |

Notes: * denotes extended sampling period (greater than the expected 4 or 5 week period). N denotes missing or excluded sample. Annual mean concentration only give if the data capture is greater than 75%.

National Environmental Technology Centre

Nitrogen Dioxide
Concentration in air (ppb)

Monthly measurements, collection-day - non standard
Summary for January 2004 to December 2004

| Site | Sampling Period | Start Date | End Date | | Concentration (in ppb) |
|---|---|---|---|---|---|
| Bannisdale | 1 | 28-Dec-2003 | 25-Jan-2004 | | 3.62 |
| | 2 | 25-Jan-2004 | 22-Feb-2004 | | 2.92 |
| | 3 | 22-Feb-2004 | 21-Mar-2004 | | 3.42 |
| | 4 | 21-Mar-2004 | 18-Apr-2004 | | 3.10 |
| | 5 | 18-Apr-2004 | 16-May-2004 | | 0.40 |
| | 6 | 16-May-2004 | 14-Jun-2004 | | 1.21 |
| | 7 | 14-Jun-2004 | 11-Jul-2004 | | 0.71 |
| | 8 | 11-Jul-2004 | 08-Aug-2004 | | 1.21 |
| | 9 | 08-Aug-2004 | 06-Sep-2004 | | 1.85 |
| | 10 | 06-Sep-2004 | 06-Sep-2004 | | N |
| | 11 | 06-Sep-2004 | 04-Oct-2004 | | 2.89 |
| | 12 | 04-Oct-2004 | 06-Nov-2004 | | 3.45 |
| | 13 | 06-Nov-2004 | 28-Nov-2004 | | 5.11 |
| | 14 | 28-Nov-2004 | 31-Dec-2004 | | 8.35 |
| | | Annual Mean Concentration = | | | 2.96 |
| Hillsborough Forest | 1 | 31-Dec-2003 | 28-Jan-2004 | | 4.40 |
| | 2 | 28-Jan-2004 | 03-Mar-2004 | | 5.18 |
| | 3 | 03-Mar-2004 | 14-Apr-2004 | * | 5.26 |
| | 4 | 14-Apr-2004 | 21-Apr-2004 | | 2.86 |
| | 5 | 21-Apr-2004 | 20-May-2004 | | 2.83 |
| | 6 | 20-May-2004 | 16-Jun-2004 | | 2.10 |
| | 7 | 16-Jun-2004 | 28-Jul-2004 | * | N |
| | 8 | 28-Jul-2004 | 11-Aug-2004 | | 3.64 |
| | 9 | 11-Aug-2004 | 08-Sep-2004 | | 2.86 |
| | 10 | 08-Sep-2004 | 06-Oct-2004 | | 2.52 |
| | 11 | 06-Oct-2004 | 03-Nov-2004 | | 4.95 |
| | 12 | 03-Nov-2004 | 01-Dec-2004 | | 5.74 |
| | 13 | 01-Dec-2004 | 05-Jan-2005 | | 4.77 |
| | 14 | | | | |
| | | Annual Mean Concentration = | | | 4.10 |
| Lough Navar | 1 | 29-Dec-2003 | 26-Jan-2004 | | 1.25 |
| | 2 | 26-Jan-2004 | 24-Feb-2004 | | 1.44 |
| | 3 | 24-Feb-2004 | 22-Mar-2004 | | 1.82 |
| | 4 | 22-Mar-2004 | 19-Apr-2004 | | 1.63 |
| | 5 | 19-Apr-2004 | 17-May-2004 | | 0.36 |
| | 6 | 17-May-2004 | 14-Jun-2004 | | 0.62 |
| | 7 | 14-Jun-2004 | 12-Jul-2004 | | 0.40 |
| | 8 | 12-Jul-2004 | 02-Aug-2004 | | < 0.44 |
| | 9 | 02-Aug-2004 | 06-Sep-2004 | | 0.31 |
| | 10 | 06-Sep-2004 | 07-Oct-2004 | | 0.99 |
| | 11 | 07-Oct-2004 | 01-Nov-2004 | | 1.54 |
| | 12 | 01-Nov-2004 | 29-Nov-2004 | | 0.81 |
| | 13 | 29-Nov-2004 | 27-Dec-2004 | | 1.36 |
| | 14 | 27-Dec-2004 | 24-Jan-2005 | | 0.72 |
| | | Annual Mean Concentration = | | | 0.97 |

| Site | Sampling Period | Start Date/Time | End Date/Time | | Concentration (in ppb) |
|---|---|---|---|---|---|
| Cow Green Reservoir | 1 | 05-Dec-2003 | 05-Jan-2004 | | 5.41 |
| | 2 | 05-Jan-2004 | 30-Jan-2004 | | 2.59 |
| | 3 | 30-Jan-2004 | 01-Mar-2004 | | 1.54 |
| | 4 | 01-Mar-2004 | 23-Mar-2004 | | 3.46 |
| | 5 | 23-Mar-2004 | 20-Apr-2004 | | 1.69 |
| | 6 | 20-Apr-2004 | 18-May-2004 | | 1.22 |
| | 7 | 18-May-2004 | 14-Jun-2004 | | 1.86 |
| | 8 | 14-Jun-2004 | 20-Jul-2004 | | 1.28 |
| | 9 | 20-Jul-2004 | 11-Aug-2004 | | 3.12 |
| | 10 | 11-Aug-2004 | 07-Sep-2004 | | 0.90 |
| | 11 | 07-Sep-2004 | 05-Oct-2004 | | 1.83 |
| | 12 | 05-Oct-2004 | 01-Nov-2004 | | 5.17 |
| | 13 | 01-Nov-2004 | 29-Nov-2004 | | 2.99 |
| | 14 | 29-Nov-2004 | 23-Dec-2004 | | 6.57 |
| | | Annual Mean Concentration = | | | 2.55 |
| Loch Dee | 1 | 03-Nov-2003 | 06-Jan-2004 | * | 3.79 |
| | 2 | 06-Jan-2004 | 05-Feb-2004 | | 1.73 |
| | 3 | 05-Feb-2004 | 01-Mar-2004 | | 1.05 |
| | 4 | 01-Mar-2004 | 01-Apr-2004 | | 1.97 |
| | 5 | 01-Apr-2004 | 04-May-2004 | | 1.15 |
| | 6 | 04-May-2004 | 02-Aug-2004 | * | N |
| | 7 | 02-Aug-2004 | 01-Oct-2004 | * | 0.27 |
| | 8 | 01-Oct-2004 | 05-Nov-2004 | | 1.73 |
| | 9 | 05-Nov-2004 | 01-Dec-2004 | | 1.13 |
| | 10 | 01-Dec-2004 | 05-Jan-2005 | | 2.62 |
| | 11 | | | | |
| | 12 | | | | |
| | 13 | | | | |
| | 14 | | | | |
| | | Annual Mean Concentration = | | | 1.39 |
| Redesdale | 1 | 31-Dec-2003 | 27-Jan-2004 | | 2.73 |
| | 2 | 27-Jan-2004 | 24-Feb-2004 | | 2.57 |
| | 3 | 24-Feb-2004 | 23-Mar-2004 | | 1.28 |
| | 4 | 23-Mar-2004 | 20-Apr-2004 | | 1.73 |
| | 5 | 20-Apr-2004 | 18-May-2004 | | 1.62 |
| | 6 | 18-May-2004 | 15-Jun-2004 | | 0.97 |
| | 7 | 15-Jun-2004 | 13-Jul-2004 | | 1.60 |
| | 8 | 13-Jul-2004 | 11-Aug-2004 | | 0.85 |
| | 9 | 11-Aug-2004 | 07-Sep-2004 | | 0.70 |
| | 10 | 07-Sep-2004 | 05-Oct-2004 | | 1.81 |
| | 11 | 05-Oct-2004 | 03-Nov-2004 | | 3.76 |
| | 12 | 03-Nov-2004 | 30-Nov-2004 | | 2.60 |
| | 13 | 30-Nov-2004 | 27-Dec-2004 | | 4.97 |
| | 14 | 27-Dec-2004 | 24-Jan-2005 | | 1.25 |
| | | Annual Mean Concentration = | | | 2.08 |

Notes: * denotes extended sampling period (greater than the expected 4 or 5 week period). N denotes missing or excluded sample. Annual mean concentration only give if the data capture is greater than 75%.

National Environmental Technology Centre

Nitrogen Dioxide
Concentration in air (ppb)

Monthly measurements, collection-day - non standard
Summary for January 2004 to December 2004

| Site | Sampling Period | Start Date | End Date | | Concentration (in ppb) |
|---|---|---|---|---|---|
| Eskdalemuir | 1 | 31-Dec-2003 | 29-Jan-2004 | | 1.96 |
| | 2 | 29-Jan-2004 | 25-Feb-2004 | | 1.57 |
| | 3 | 25-Feb-2004 | 24-Mar-2004 | | 2.45 |
| | 4 | 24-Mar-2004 | 21-Apr-2004 | | 1.73 |
| | 5 | 21-Apr-2004 | 19-May-2004 | | 0.73 |
| | 6 | 19-May-2004 | 16-Jun-2004 | | 0.52 |
| | 7 | 16-Jun-2004 | 14-Jul-2004 | | 0.75 |
| | 8 | 14-Jul-2004 | 11-Aug-2004 | | 1.19 |
| | 9 | 11-Aug-2004 | 08-Sep-2004 | | < 0.33 |
| | 10 | 08-Sep-2004 | 06-Oct-2004 | | 0.80 |
| | 11 | 06-Oct-2004 | 03-Nov-2004 | | 2.15 |
| | 12 | 03-Nov-2004 | 01-Dec-2004 | | 2.23 |
| | 13 | 01-Dec-2004 | 29-Dec-2004 | | 3.64 |
| | 14 | 29-Dec-2004 | 24-Jan-2005 | | 1.91 |
| | | Annual Mean Concentration = | | | 1.53 |
| Whiteadder | 1 | 29-Dec-2003 | 08-Mar-2004 | * | 2.82 |
| | 2 | 08-Mar-2004 | 22-Mar-2004 | | 3.63 |
| | 3 | 22-Mar-2004 | 17-May-2004 | * | 1.38 |
| | 4 | 17-May-2004 | 31-May-2004 | | 1.64 |
| | 5 | 31-May-2004 | 13-Jun-2004 | | 1.27 |
| | 6 | 13-Jun-2004 | 12-Jul-2004 | | 1.86 |
| | 7 | 12-Jul-2004 | 28-Jul-2004 | | N |
| | 8 | 28-Jul-2004 | 04-Oct-2004 | * | 1.17 |
| | 9 | 04-Oct-2004 | 01-Nov-2004 | | 3.50 |
| | 10 | 01-Nov-2004 | 06-Dec-2004 | | 3.22 |
| | 11 | 06-Dec-2004 | 31-Dec-2004 | | N |
| | 12 | 31-Dec-2004 | 25-Jan-2005 | | 5.52 |
| | 13 | | | | |
| | 14 | | | | |
| | | Annual Mean Concentration = | | | 2.16 |
| Balquhidder 2 | 1 | 28-Dec-2003 | 26-Jan-2004 | | 2.70 |
| | 2 | 26-Jan-2004 | 09-Mar-2004 | * | 1.00 |
| | 3 | 09-Mar-2004 | 22-Mar-2004 | | 2.47 |
| | 4 | 22-Mar-2004 | 23-Apr-2004 | | 0.70 |
| | 5 | 23-Apr-2004 | 17-May-2004 | | 0.66 |
| | 6 | 17-May-2004 | 13-Jun-2004 | | 0.53 |
| | 7 | 13-Jun-2004 | 12-Jul-2004 | | 0.56 |
| | 8 | 12-Jul-2004 | 08-Aug-2004 | | 1.67 |
| | 9 | 08-Aug-2004 | 06-Sep-2004 | | < 0.32 |
| | 10 | 06-Sep-2004 | 06-Oct-2004 | | 0.39 |
| | 11 | 06-Oct-2004 | 01-Nov-2004 | | 1.60 |
| | 12 | 01-Nov-2004 | 28-Nov-2004 | | 1.02 |
| | 13 | 28-Nov-2004 | 29-Dec-2004 | | 2.14 |
| | 14 | 29-Dec-2004 | 28-Jan-2005 | | 0.89 |
| | | Annual Mean Concentration = | | | 1.13 |

| Site | Sampling Period | Start Date/Time | End Date/Time | | Concentration (in ppb) |
|---|---|---|---|---|---|
| Polloch | 1 | 30-Dec-2003 | 27-Jan-2004 | | 0.75 |
| | 2 | 27-Jan-2004 | 23-Feb-2004 | | 0.53 |
| | 3 | 23-Feb-2004 | 23-Mar-2004 | | 0.94 |
| | 4 | 23-Mar-2004 | 20-Apr-2004 | | 0.59 |
| | 5 | 20-Apr-2004 | 18-May-2004 | | 0.33 |
| | 6 | 18-May-2004 | 15-Jun-2004 | | < 0.33 |
| | 7 | 15-Jun-2004 | 13-Jul-2004 | | < 0.32 |
| | 8 | 13-Jul-2004 | 10-Aug-2004 | | < 0.33 |
| | 9 | 10-Aug-2004 | 07-Sep-2004 | | < 0.33 |
| | 10 | 07-Sep-2004 | 05-Oct-2004 | | 0.48 |
| | 11 | 05-Oct-2004 | 02-Nov-2004 | | 0.59 |
| | 12 | 02-Nov-2004 | 30-Nov-2004 | | < 0.33 |
| | 13 | 30-Nov-2004 | 28-Dec-2004 | | 0.82 |
| | 14 | 28-Dec-2004 | 25-Jan-2005 | | 0.44 |
| | | Annual Mean Concentration = | | | 0.45 |
| Glen Dye | 1 | 29-Dec-2003 | 02-Feb-2004 | | 0.84 |
| | 2 | 02-Feb-2004 | 24-Feb-2004 | | 0.74 |
| | 3 | 24-Feb-2004 | 23-Mar-2004 | | 1.67 |
| | 4 | 23-Mar-2004 | 20-Apr-2004 | | 0.64 |
| | 5 | 20-Apr-2004 | 19-May-2004 | | 0.86 |
| | 6 | 19-May-2004 | 16-Jun-2004 | | 0.43 |
| | 7 | 16-Jun-2004 | 13-Jul-2004 | | < 0.34 |
| | 8 | 13-Jul-2004 | 10-Aug-2004 | | 0.56 |
| | 9 | 10-Aug-2004 | 07-Sep-2004 | | < 0.33 |
| | 10 | 07-Sep-2004 | 05-Oct-2004 | | 0.94 |
| | 11 | 05-Oct-2004 | 02-Nov-2004 | | 1.50 |
| | 12 | 02-Nov-2004 | 03-Dec-2004 | | 1.07 |
| | 13 | 03-Dec-2004 | 29-Dec-2004 | | 2.99 |
| | 14 | 29-Dec-2004 | 25-Jan-2005 | | 1.17 |
| | | Annual Mean Concentration = | | | 0.96 |
| Allt a´ Mharcaidh | 1 | 18-Nov-2003 | 14-Jan-2004 | * | 0.90 |
| | 2 | 14-Jan-2004 | 10-Feb-2004 | | 0.53 |
| | 3 | 10-Feb-2004 | 09-Mar-2004 | | 1.36 |
| | 4 | 09-Mar-2004 | 06-Apr-2004 | | 1.57 |
| | 5 | 06-Apr-2004 | 20-Apr-2004 | | 1.17 |
| | 6 | 20-Apr-2004 | 18-May-2004 | | 0.49 |
| | 7 | 18-May-2004 | 14-Jun-2004 | | 0.89 |
| | 8 | 14-Jun-2004 | 13-Jul-2004 | | 0.36 |
| | 9 | 13-Jul-2004 | 10-Aug-2004 | | < 0.33 |
| | 10 | 10-Aug-2004 | 07-Sep-2004 | | < 0.33 |
| | 11 | 07-Sep-2004 | 19-Oct-2004 | * | 0.52 |
| | 12 | 19-Oct-2004 | 02-Nov-2004 | | 0.64 |
| | 13 | 02-Nov-2004 | 30-Nov-2004 | | 0.40 |
| | 14 | 30-Nov-2004 | 28-Dec-2004 | | 1.15 |
| | | Annual Mean Concentration = | | | 0.71 |

Notes: * denotes extended sampling period (greater than the expected 4 or 5 week period). N denotes missing or excluded sample. Annual mean concentration only give if the data capture is greater than 75%.

National Environmental Technology Centre

Nitrogen Dioxide
Concentration in air (ppb)

Monthly measurements, collection-day - non standard
Summary for January 2004 to December 2004

| Site | Sampling Period | Start Date | End Date | | Concentration (in ppb) | Site | Sampling Period | Start Date/Time | End Date/Time | Concentration (in ppb) |
|---|---|---|---|---|---|---|---|---|---|---|
| Strathvaich Dam | 1 | 29-Dec-2003 | 24-Jan-2004 | | 0.59 | | 1 | | | |
| | 2 | 24-Jan-2004 | 23-Feb-2004 | | 0.13 | | 2 | | | |
| | 3 | 23-Feb-2004 | 23-Mar-2004 | | 0.58 | | 3 | | | |
| | 4 | 23-Mar-2004 | 17-Apr-2004 | | 0.59 | | 4 | | | |
| | 5 | 17-Apr-2004 | 31-May-2004 | * | 0.23 | | 5 | | | |
| | 6 | 31-May-2004 | 20-Jun-2004 | | 0.29 | | 6 | | | |
| | 7 | 20-Jun-2004 | 11-Jul-2004 | | 0.36 | | 7 | | | |
| | 8 | 11-Jul-2004 | 02-Aug-2004 | | N | | 8 | | | |
| | 9 | 02-Aug-2004 | 18-Sep-2004 | * | < 0.19 | | 9 | | | |
| | 10 | 18-Sep-2004 | 13-Oct-2004 | | 0.54 | | 10 | | | |
| | 11 | 13-Oct-2004 | 31-Oct-2004 | | 1.79 | | 11 | | | |
| | 12 | 31-Oct-2004 | 03-Dec-2004 | | < 0.33 | | 12 | | | |
| | 13 | 03-Dec-2004 | 05-Jan-2005 | | < 0.28 | | 13 | | | |
| | 14 | | | | | | 14 | | | |
| | | Annual Mean Concentration = | | | 0.39 | | | Annual Mean Concentration = | | |
| Achanarras | 1 | 31-Dec-2003 | 04-Feb-2004 | | 1.14 | | 1 | | | |
| | 2 | 04-Feb-2004 | 25-Feb-2004 | | 2.75 | | 2 | | | |
| | 3 | 25-Feb-2004 | 24-Mar-2004 | | 1.08 | | 3 | | | |
| | 4 | 24-Mar-2004 | 21-Apr-2004 | | 1.33 | | 4 | | | |
| | 5 | 21-Apr-2004 | 19-May-2004 | | 0.49 | | 5 | | | |
| | 6 | 19-May-2004 | 16-Jun-2004 | | 0.55 | | 6 | | | |
| | 7 | 16-Jun-2004 | 14-Jul-2004 | | < 0.33 | | 7 | | | |
| | 8 | 14-Jul-2004 | 11-Aug-2004 | | < 0.33 | | 8 | | | |
| | 9 | 11-Aug-2004 | 08-Sep-2004 | | < 0.33 | | 9 | | | |
| | 10 | 08-Sep-2004 | 06-Oct-2004 | | < 0.32 | | 10 | | | |
| | 11 | 06-Oct-2004 | 03-Nov-2004 | | 2.11 | | 11 | | | |
| | 12 | 03-Nov-2004 | 01-Dec-2004 | | 0.44 | | 12 | | | |
| | 13 | 01-Dec-2004 | 05-Jan-2005 | | 0.79 | | 13 | | | |
| | 14 | | | | | | 14 | | | |
| | | Annual Mean Concentration = | | | 0.84 | | | Annual Mean Concentration = | | |
| Forsinard | 1 | 28-Dec-2003 | 26-Jan-2004 | | 0.89 | | 1 | | | |
| | 2 | 26-Jan-2004 | 23-Feb-2004 | | 0.59 | | 2 | | | |
| | 3 | 23-Feb-2004 | 22-Mar-2004 | | 0.82 | | 3 | | | |
| | 4 | 22-Mar-2004 | 19-Apr-2004 | | 1.06 | | 4 | | | |
| | 5 | 19-Apr-2004 | 16-May-2004 | | 0.50 | | 5 | | | |
| | 6 | 16-May-2004 | 13-Jun-2004 | | < 0.33 | | 6 | | | |
| | 7 | 13-Jun-2004 | 11-Jul-2004 | | < 0.32 | | 7 | | | |
| | 8 | 11-Jul-2004 | 08-Aug-2004 | | < 0.33 | | 8 | | | |
| | 9 | 08-Aug-2004 | 05-Sep-2004 | | < 0.32 | | 9 | | | |
| | 10 | 05-Sep-2004 | 04-Oct-2004 | | < 0.32 | | 10 | | | |
| | 11 | 04-Oct-2004 | 01-Nov-2004 | | 1.40 | | 11 | | | |
| | 12 | 01-Nov-2004 | 28-Nov-2004 | | 0.35 | | 12 | | | |
| | 13 | 28-Nov-2004 | 27-Dec-2004 | | 0.90 | | 13 | | | |
| | 14 | 27-Dec-2004 | 24-Jan-2005 | | 0.45 | | 14 | | | |
| | | Annual Mean Concentration = | | | 0.56 | | | Annual Mean Concentration = | | |

Notes: * denotes extended sampling period (greater than the expected 4 or 5 week period). N denotes missing or excluded sample. Annual mean concentration only give if the data capture is greater than 75%.

# Appendix 5
# Denuder Measurements

Table A5.1 provides a listing of the measurements and the summary statistics of the monthly concentrations of $HNO_3$, $SO_2$ and HCl in the gas phase and of $NO_3^-$, $SO_4^{2-}$, $Cl^-$, $Na^+$, $Mg^{2+}$ and $Ca^{2+}$ in the aerosol phase.

The 12 sites which comprise the network are listed below:

| Site Number | Site Name | Grid Ref |
|---|---|---|
| 1 | Bush OTC | NT245635 |
| 21 | Glensaugh | NO664799 |
| 24 | Rothamstead | TL123129 |
| 30 | Strathvaich Dam | NH347750 |
| 31 | Eskdalemuir | NT235030 |
| 32 | High Muffles | SE776939 |
| 33 | Stoke Ferry | TL700988 |
| 34 | Yarner Wood | SX786789 |
| 83 | Barcombe Mills | TQ438149 |
| 40 | Sutton Bonington | SK505268 |
| 45 | Lough Navar | IH065545 |
| 70 | Cwmystwyth | SN771742 |

**Table A5.1a** ***Monthly Concentrations of $HNO_3$ and of Aerosol $NO_3^-$ Measured at the 12 Monitoring Sites in the Nitric Acid Monitoring Network in 2004.***

## $HNO_3$ (µg $m^{-3}$)

| Month | Site 1 | Site 21 | Site 24 | Site 30 | Site 31 | Site 32 | Site 33 | Site 34 | Site 83 | Site 40 | Site 45 | Site 70 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jan-04** | 0.15 | 0.09 | 1.21 | 0.0 [8] | ND [4] | 0.75 | 0.98 | 0.34 | 0.85 | 1.19 | 0.0 [8] | 0.32 |
| **Feb-04** | 0.71 | 0.27 | **0.93** | **0.17** | ***0.10*** [2] | 0.54 | 1.23 | 0.84 | 1.27 | 1.83 | 0.12 | 0.56 |
| **Mar-04** | 0.69 | 0.37 | 1.64 | 0.25 | 0.37 | 0.83 | 1.10 | 0.60 | 1.25 | 1.40 | 0.33 | 0.36 |
| **Apr-04** | 0.45 | 0.47 | *2.00* [2] | 0.13 | 0.29 | 0.91 | 1.38 | 0.38 | *1.02* [2] | 1.83 | 0.09 | 0.51 |
| **May-04** | 0.56 | 0.36 | 0.57 | 0.25 | 0.35 | 0.49 | 1.16 | 1.07 | *3.51* [2] | 1.23 | 0.23 | 0.48 |
| **Jun-04** | **0.72** | 0.24 | 1.47 | 0.09 | 0.27 | 0.46 | 1.46 | 0.79 | 1.22 | 1.11 | 0.11 | 0.25 |
| **Jul-04** | 0.70 | 0.41 | *3.86* [2] | 0.16 | 0.33 | 0.50 | 1.04 | 0.39 | 0.92 | 1.34 | 0.10 | 0.34 |
| **Aug-04** | 0.81 | *0.84* [2] | 2.14 | 0.69 | 0.94 | 1.33 | 2.09 | ND [4] | 1.80 | 1.77 | 0.32 | 0.43 |
| **Sep-04** | 0.42 | **0.12** | 1.81 | 0.13 | 0.24 | 0.64 | 1.00 | 0.75 | *1.71* [2] | 1.56 | 0.17 | 0.44 |
| **Oct-04** | 0.62 | 0.60 | 1.31 | **0.21** | ***0.30*** [2] | 0.92 | 1.16 | 0.39 | 0.80 | 1.59 | 0.20 | 0.40 |
| **Nov-04** | **0.53** | 0.19 | 1.61 | **0.07** | *0.26* [2] | 0.78 | 1.47 | 0.45 | 1.40 | 1.86 | 0.10 | 0.27 |
| **Dec-04** | 0.50 | 0.41 | 2.77 | **0.12** | ***0.14*** [2] | 1.42 | 1.53 | 1.02 | 1.45 | 2.46 | 0.19 | *0.65* [2] |
| | | | | | | | | | | | | |
| **Mean** | 0.57 | 0.36 | 1.78 | 0.19 | 0.33 | 0.80 | 1.30 | 0.64 | 1.43 | 1.60 | 0.16 | 0.42 |
| **Min** | 0.15 | 0.09 | 0.57 | 0.00 | 0.10 | 0.46 | 0.98 | 0.34 | 0.80 | 1.11 | 0.00 | 0.25 |
| **Max** | 0.81 | 0.84 | 3.86 | 0.69 | 0.94 | 1.42 | 2.09 | 1.07 | 3.51 | 2.46 | 0.33 | 0.65 |
| **SD** | 0.18 | 0.21 | 0.87 | 0.17 | 0.22 | 0.31 | 0.31 | 0.27 | 0.73 | 0.38 | 0.10 | 0.12 |
| **CV (%)** | 31.5 | 57.6 | 49.1 | 91.9 | 67.8 | 39.3 | 24.1 | 42.2 | 50.6 | 23.7 | 59.0 | 28.2 |

## $NO_3^-$ (µg $m^{-3}$)

| Month | Site 1 | Site 21 | Site 24 | Site 30 | Site 31 | Site 32 | Site 33 | Site 34 | Site 83 | Site 40 | Site 45 | Site 70 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jan-04** | 0.58 | 0.49 | 2.31 | 0.11 | 0.56 | 0.99 | 2.77 | 0.93 | 2.59 | 2.10 | 0.31 | 0.65 |
| **Feb-04** | 0.93 | 0.52 | 3.94 | 0.37 | 0.81 | 1.83 | 1.21 | 3.35 | 3.81 | 0.64 | 0.67 | 1.99 |
| **Mar-04** | 2.28 | 1.18 | 6.36 | 0.78 | 1.62 | 3.12 | 4.92 | 2.57 | 4.73 | 6.00 | 2.30 | 1.74 |
| **Apr-04** | 1.02 | 1.62 | 3.71 | 0.33 | 0.97 | 3.71 | 6.41 | 2.07 | 2.38 | 5.52 | 0.25 | 2.75 |
| **May-04** | 1.73 | 0.78 | 2.17 | 0.44 | 1.21 | 1.93 | 3.46 | 2.36 | 7.24 | 3.50 | 0.89 | 1.99 |
| **Jun-04** | 0.89 | 0.97 | ND [9] | 0.33 | 0.77 | 1.45 | 2.18 | 1.56 | ND [9] | ND [9] | 0.54 | 1.17 |
| **Jul-04** | 1.17 | 0.87 | 5.99 | 0.24 | 0.67 | 1.18 | 1.88 | 0.66 | 1.78 | 3.16 | 0.34 | 0.96 |
| **Aug-04** | 1.53 | 1.87 | 3.29 | 0.75 | 1.04 | 2.86 | 3.51 | 1.37 | 2.66 | 1.33 | 1.65 | 1.08 |
| **Sep-04** | 0.98 | 0.72 | 2.91 | 0.24 | 0.77 | 1.73 | 1.98 | 1.68 | 2.79 | 2.20 | 0.82 | 1.48 |
| **Oct-04** | 1.46 | 1.25 | 3.72 | 0.50 | 0.76 | 2.07 | 3.04 | 1.38 | 2.50 | 3.71 | 0.75 | 1.38 |
| **Nov-04** | 0.70 | 0.37 | 3.68 | 0.14 | 0.59 | 1.71 | 3.93 | 1.55 | 3.38 | 3.87 | 0.48 | 0.87 |
| **Dec-04** | 1.20 | 0.81 | 4.86 | 0.13 | 0.80 | 2.88 | 6.01 | 2.64 | 3.89 | 4.10 | 0.72 | 1.49 |
| | | | | | | | | | | | | |
| **Mean** | 1.21 | 0.95 | 3.90 | 0.36 | 0.88 | 2.12 | 3.44 | 1.84 | 3.43 | 3.28 | 0.81 | 1.46 |
| **Min** | 0.58 | 0.37 | 2.17 | 0.11 | 0.56 | 0.99 | 1.21 | 0.66 | 1.78 | 0.64 | 0.25 | 0.65 |
| **Max** | 2.28 | 1.87 | 6.36 | 0.78 | 1.62 | 3.71 | 6.41 | 3.35 | 7.24 | 6.00 | 2.30 | 2.75 |
| **SD** | 0.48 | 0.45 | 1.35 | 0.22 | 0.30 | 0.84 | 1.64 | 0.78 | 1.52 | 1.64 | 0.60 | 0.59 |
| **CV (%)** | 39.7 | 47.6 | 34.7 | 61.1 | 33.7 | 39.4 | 47.6 | 42.2 | 44.2 | 50.1 | 73.7 | 40.2 |

Notes:

ND [1]: Power off during sampling period.
*Data* [2] = Flow < 0.2 l /min (pump not working properly, or intermittent power cuts).
*Data* [3] = Samples exposed for more than one month.
ND [4] = Samples lost.
ND [5] = Problems with Aerosol Sampling.
ND [6] = Water in sampling train.
ND [7] = Possible contamination because sampling train returned separated.
0.0 [8] = < limit of detection: same as blanks
**Numbers in bold**: Capture = < 75% in the first of the 2 glass denuders.

**Table A5.1b** ***Monthly Concentrations of $SO_2$ and of Aerosol $SO_4^{2-}$ Measured at the 12 Monitoring Sites in the Nitric Acid Monitoring Network in 2004.***

**$SO_2$ (µg $m^{-3}$)**

| Month | Site 1 | Site 21 | Site 24 | Site 30 | Site 31 | Site 32 | Site 33 | Site 34 | Site 83 | Site 40 | Site 45 | Site 70 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jan-04** | 0.35 | 0.21 | 1.79 | 0.03 | ND [4] | 2.44 | 2.02 | 0.49 | 1.54 | 2.86 | 0.0 [8] | 0.47 |
| **Feb-04** | 1.89 | 0.27 | 4.49 | 0.03 | *0.02* [2] | 1.90 | 2.94 | 1.35 | 2.08 | 6.82 | 0.17 | 1.44 |
| **Mar-04** | 1.28 | 0.41 | 1.87 | 0.17 | 0.50 | 1.39 | 1.50 | 0.67 | 1.48 | 3.28 | 0.43 | 0.81 |
| **Apr-04** | 0.95 | 0.31 | *2.48* [2] | 0.07 | 0.42 | 2.25 | 1.99 | 0.38 | *1.47* [2] | 3.84 | 0.11 | 0.53 |
| **May-04** | 1.89 | 0.09 | 0.93 | 0.08 | 0.38 | 0.70 | 0.61 | 1.03 | *3.15* [2] | 1.83 | 0.09 | 0.33 |
| **Jun-04** | 4.01 | 0.30 | 0.97 | 0.05 | 0.13 | 0.73 | 1.51 | 0.47 | 1.26 | 1.14 | ND [9] | 0.18 |
| **Jul-04** | 1.57 | 0.45 | *2.20* [2] | 0.10 | 0.26 | 1.41 | 1.46 | 0.22 | 0.99 | 1.17 | 0.13 | 0.37 |
| **Aug-04** | 1.27 | *0.54* [2] | 1.46 | 0.25 | 0.60 | 1.90 | 1.61 | ND [4] | 1.43 | 1.67 | 0.20 | 0.26 |
| **Sep-04** | 0.80 | **0.24** | 1.44 | 0.14 | 0.30 | 1.56 | 1.49 | 0.55 | *1.41* [2] | 2.49 | 0.11 | 1.05 |
| **Oct-04** | 0.85 | 0.47 | 1.60 | 0.0 [8] | *0.08* [2] | 1.60 | 1.50 | 0.39 | 1.23 | 1.81 | 0.10 | 0.57 |
| **Nov-04** | 0.56 | 0.23 | 2.34 | 0.02 | ***0.94*** [2] | 1.62 | 1.94 | 0.41 | 1.66 | 2.89 | 0.03 | 0.13 |
| **Dec-04** | 0.51 | 0.38 | 2.89 | **0.16** | *0.08* [2] | 2.34 | 1.68 | 0.96 | 1.80 | 2.58 | 1.22 | *0.80* [2] |
| | | | | | | | | | | | | |
| **Mean** | 1.33 | 0.33 | 2.04 | 0.09 | 0.34 | 1.66 | 1.69 | 0.63 | 1.63 | 2.70 | 0.24 | 0.58 |
| **Min** | 0.35 | 0.09 | 0.93 | 0.00 | 0.02 | 0.70 | 0.61 | 0.22 | 0.99 | 1.14 | 0.00 | 0.13 |
| **Max** | 4.01 | 0.54 | 4.49 | 0.25 | 0.94 | 2.44 | 2.94 | 1.35 | 3.15 | 6.82 | 1.22 | 1.44 |
| **SD** | 0.99 | 0.13 | 0.97 | 0.08 | 0.27 | 0.56 | 0.54 | 0.34 | 0.56 | 1.54 | 0.34 | 0.39 |
| **CV (%)** | 74.4 | 39.2 | 47.7 | 82.8 | 81.4 | 33.9 | 31.9 | 54.4 | 34.2 | 57.1 | 146.6 | 66.8 |

**$SO_4^{2-}$ (µg $m^{-3}$)**

| Month | Site 1 | Site 21 | Site 24 | Site 30 | Site 31 | Site 32 | Site 33 | Site 34 | Site 83 | Site 40 | Site 45 | Site 70 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jan-04** | 0.50 | 0.22 | 0.98 | 0.23 | 0.54 | 0.40 | 1.05 | 0.79 | 1.38 | 0.90 | 0.45 | 0.63 |
| **Feb-04** | 0.63 | 0.29 | 2.54 | 0.44 | 0.61 | 0.91 | 0.42 | 1.48 | 2.04 | 0.90 | ND [9] | 1.07 |
| **Mar-04** | 1.29 | 0.83 | 2.54 | 0.79 | 0.96 | 1.86 | 2.01 | 1.85 | 2.18 | 2.52 | 1.08 | 1.33 |
| **Apr-04** | 0.70 | 0.87 | 1.56 | 0.53 | 0.70 | 1.51 | 2.41 | 1.15 | 1.06 | 2.49 | 0.71 | 1.69 |
| **May-04** | 1.65 | 0.86 | 1.72 | 0.62 | 1.41 | 1.67 | 2.57 | 2.96 | 4.76 | 3.03 | 1.13 | 1.68 |
| **Jun-04** | 0.72 | 0.52 | 1.26 | 0.46 | 0.77 | 1.13 | 1.43 | 1.05 | 1.54 | 1.25 | 0.73 | 1.20 |
| **Jul-04** | 1.46 | 0.77 | 3.79 | 0.60 | 0.69 | 0.91 | 1.27 | 0.78 | 1.48 | 2.52 | 0.45 | 0.92 |
| **Aug-04** | 1.74 | 1.96 | 2.13 | 1.51 | 1.51 | 2.37 | 2.14 | 1.37 | 2.37 | 1.59 | 1.39 | 1.22 |
| **Sep-04** | 0.88 | 0.51 | 1.62 | 0.49 | 0.80 | 0.98 | 1.23 | 1.49 | 1.81 | 1.45 | 0.71 | 1.28 |
| **Oct-04** | 0.82 | 0.74 | 1.94 | 0.41 | 0.63 | 1.11 | 1.25 | 0.92 | 1.58 | 1.54 | 0.54 | 0.89 |
| **Nov-04** | 0.59 | 0.26 | 1.56 | 0.37 | 0.05 | 1.03 | 1.64 | 0.96 | 1.53 | 1.97 | 0.63 | 0.86 |
| **Dec-04** | 1.08 | 0.72 | 3.07 | 0.50 | 0.62 | 2.04 | 3.83 | 2.12 | 2.65 | 2.72 | 1.00 | 1.66 |
| | | | | | | | | | | | | |
| **Mean** | 1.01 | 0.71 | 2.06 | 0.58 | 0.77 | 1.33 | 1.77 | 1.41 | 2.03 | 1.91 | 0.80 | 1.20 |
| **Min** | 0.50 | 0.22 | 0.98 | 0.23 | 0.05 | 0.40 | 0.42 | 0.78 | 1.06 | 0.90 | 0.45 | 0.63 |
| **Max** | 1.74 | 1.96 | 3.79 | 1.51 | 1.51 | 2.37 | 3.83 | 2.96 | 4.76 | 3.03 | 1.39 | 1.69 |
| **SD** | 0.43 | 0.46 | 0.80 | 0.32 | 0.39 | 0.57 | 0.89 | 0.64 | 0.97 | 0.73 | 0.31 | 0.35 |
| **CV (%)** | 43.0 | 64.3 | 39.0 | 56.0 | 50.3 | 42.8 | 50.5 | 45.6 | 47.7 | 38.5 | 38.4 | 28.9 |

Notes:

ND [1]: Power off during sampling period.
*Data* [2] = Flow < 0.2 l /min (pump not working properly, or intermittent power cuts).
*Data* [3] = Samples exposed for more than one month.
ND [4] = Samples lost.
ND [5] = Problems with Aerosol Sampling.
ND [6] = Water in sampling train.
ND [7] = Possible contamination because sampling train returned separated.
0.0 [8] = < limit of detection: same as blanks
**Numbers in bold**: Capture = < 75% in the first of the 2 glass denuders.

**Table A5.1c** ***Monthly Concentrations of HCl and of Aerosol Cl⁻***
***Measured at the 12 Monitoring Sites in the Nitric Acid Monitoring Network in 2004.***

## HCl (µg m$^{-3}$)

| Month | Site 1 | Site 21 | Site 24 | Site 30 | Site 31 | Site 32 | Site 33 | Site 34 | Site 83 | Site 40 | Site 45 | Site 70 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jan-04** | 0.0 [8] | 0.0 [8] | 0.12 | 0.01 | ND [4] | 0.07 | 0.13 | 0.13 | 0.19 | 0.24 | 0.02 | 0.10 |
| **Feb-04** | 0.24 | 0.13 | 0.71 | 0.08 | 0.0 [8] | 0.24 | 0.31 | 0.50 | 0.37 | 0.39 | 0.04 | 0.28 |
| **Mar-04** | 0.39 | **0.37** | 0.40 | 0.26 | **0.19** | 0.34 | 0.41 | 0.28 | 0.43 | 0.31 | **0.32** | **0.25** |
| **Apr-04** | 0.27 | 0.53 | *0.42* [2] | 0.19 | 0.20 | 0.32 | 0.48 | 0.15 | *0.46* [2] | 0.49 | 0.50 | 0.30 |
| **May-04** | 0.35 | 0.43 | 0.17 | 0.28 | 0.21 | 0.38 | 0.63 | 0.40 | *1.12* [2] | 0.58 | 0.20 | 0.28 |
| **Jun-04** | **0.42** | 0.23 | 0.33 | 0.20 | 0.14 | 0.30 | 0.59 | 0.28 | 0.29 | 0.62 | 0.10 | 0.21 |
| **Jul-04** | 0.20 | 0.22 | *0.47* [2] | **0.25** | 0.19 | 0.24 | 0.33 | 0.19 | 0.37 | 0.33 | 0.09 | 0.18 |
| **Aug-04** | 0.27 | *0.55* [2] | 0.30 | 0.31 | 0.25 | 0.31 | 0.53 | ND [4] | 0.32 | 0.65 | 0.20 | 0.23 |
| **Sep-04** | 0.15 | **0.10** | 0.36 | 0.17 | 0.17 | 0.27 | 0.31 | 0.27 | *0.64* [2] | 0.47 | 0.06 | **0.47** |
| **Oct-04** | 0.19 | 0.35 | **0.32** | **0.32** | 0.04 [2] | 0.22 | 0.23 | 0.12 | 0.26 | 0.18 | 0.03 | 0.17 |
| **Nov-04** | **0.25** | 0.69 | **0.37** | 0.12 | 0.08 [2] | 0.15 | 0.30 | 0.16 | 0.22 | 0.22 | 0.07 | 0.19 |
| **Dec-04** | 0.24 | **0.27** | 0.23 | 0.51 | **0.04** [2] | 0.16 | **0.20** | 0.33 | 0.27 | 0.20 | 0.08 | *0.66* [2] |
| | | | | | | | | | | | | |
| **Mean** | 0.25 | 0.32 | 0.35 | 0.22 | 0.14 | 0.25 | 0.37 | 0.26 | 0.41 | 0.39 | 0.14 | 0.28 |
| **Min** | 0.00 | 0.00 | 0.12 | 0.01 | 0.00 | 0.07 | 0.13 | 0.12 | 0.19 | 0.18 | 0.02 | 0.10 |
| **Max** | 0.42 | 0.69 | 0.71 | 0.51 | 0.25 | 0.38 | 0.63 | 0.50 | 1.12 | 0.65 | 0.50 | 0.66 |
| **SD** | 0.11 | 0.20 | 0.15 | 0.13 | 0.08 | 0.09 | 0.16 | 0.12 | 0.25 | 0.17 | 0.14 | 0.15 |
| **CV (%)** | 45.5 | 63.1 | 43.6 | 57.2 | 60.4 | 35.1 | 42.7 | 47.1 | 62.0 | 43.6 | 100.6 | 54.4 |

## Cl$^-$ (µg m$^{-3}$)

| Month | Site 1 | Site 21 | Site 24 | Site 30 | Site 31 | Site 32 | Site 33 | Site 34 | Site 83 | Site 40 | Site 45 | Site 70 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jan-04** | 1.50 | 0.84 | 1.28 | 0.95 | 1.31 | 0.92 | 1.89 | 0.36 | 2.35 | 1.26 | 1.37 | 1.81 |
| **Feb-04** | 1.57 | 0.73 | 1.92 | 1.01 | 1.09 | 1.88 | 0.20 | 1.47 | 2.39 | 2.33 | 1.95 | 2.09 |
| **Mar-04** | 1.44 | 1.08 | 1.59 | 1.40 | 1.00 | 1.64 | 1.62 | 2.21 | 2.06 | 2.11 | 1.90 | 2.44 |
| **Apr-04** | 0.66 | 1.01 | 0.84 | 0.68 | 0.72 | 0.87 | 1.34 | 1.01 | 1.82 | 0.97 | 1.34 | 1.23 |
| **May-04** | 0.79 | 0.56 | 0.53 | 0.73 | 0.66 | 0.75 | 0.76 | 0.81 | 0.87 | 0.47 | 1.07 | 0.69 |
| **Jun-04** | 0.83 | 0.58 | 0.92 | 1.00 | 0.89 | 0.58 | 0.69 | 1.25 | 1.11 | 0.94 | 1.38 | 1.91 |
| **Jul-04** | 0.54 | 0.51 | 0.18 | 0.62 | 0.44 | 0.52 | 0.53 | 0.74 | 1.14 | 0.43 | 0.76 | 0.70 |
| **Aug-04** | 0.85 | 0.98 | 0.97 | 1.18 | 0.57 | 0.88 | 0.75 | 1.41 | 1.14 | 1.71 | 0.60 | 0.82 |
| **Sep-04** | 1.67 | 1.13 | 1.68 | 1.63 | 1.45 | 1.48 | 1.65 | 2.51 | 0.88 | 1.66 | 1.51 | 2.09 |
| **Oct-04** | 1.21 | 1.13 | 2.56 | 0.62 | 1.26 | 1.15 | 1.52 | 2.61 | 2.78 | 1.34 | 0.88 | 2.15 |
| **Nov-04** | 1.22 | 0.62 | 1.58 | 1.31 | 1.14 | 1.44 | 1.48 | 1.72 | 1.34 | 1.84 | 1.86 | 1.64 |
| **Dec-04** | 1.54 | 0.79 | 2.03 | 1.32 | 0.48 | 1.82 | 1.35 | 1.80 | 2.42 | 2.37 | 1.79 | 2.33 |
| | | | | | | | | | | | | |
| **Mean** | 1.15 | 0.83 | 1.34 | 1.04 | 0.92 | 1.16 | 1.15 | 1.49 | 1.69 | 1.45 | 1.37 | 1.66 |
| **Min** | 0.54 | 0.51 | 0.18 | 0.62 | 0.44 | 0.52 | 0.20 | 0.36 | 0.87 | 0.43 | 0.60 | 0.69 |
| **Max** | 1.67 | 1.13 | 2.56 | 1.63 | 1.45 | 1.88 | 1.89 | 2.61 | 2.78 | 2.37 | 1.95 | 2.44 |
| **SD** | 0.40 | 0.23 | 0.68 | 0.33 | 0.34 | 0.48 | 0.54 | 0.71 | 0.69 | 0.66 | 0.46 | 0.64 |
| **CV (%)** | 34.6 | 28.0 | 50.9 | 32.3 | 37.4 | 41.0 | 46.6 | 47.7 | 40.5 | 45.7 | 33.8 | 38.6 |

Notes:

ND [1]: Power off during sampling period.
*Data* [2] = Flow < 0.2 l /min (pump not working properly, or intermittent power cuts).
*Data* [3] = Samples exposed for more than one month.
ND [4] = Samples lost.
ND [5] = Problems with Aerosol Sampling.
ND [6] = Water in sampling train.
ND [7] = Possible contamination because sampling train returned separated.
0.0 [8] = < limit of detection: same as blanks
**Numbers in bold**: Capture = < 75% in the first of the 2 glass denuders.

**Table A5.1d** ***Monthly Concentrations of Aerosol $Ca^{2+}$ and $Mg^{2+}$ Measured at the 12 Monitoring Sites in the Nitric Acid Monitoring Network in 2004.***

## $Ca^{2+}$ (µg $m^{-3}$)

| Month | Site 1 | Site 21 | Site 24 | Site 30 | Site 31 | Site 32 | Site 33 | Site 34 | Site 83 | Site 40 | Site 45 | Site 70 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jan-04** | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.0 [8] | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 |
| **Feb-04** | 0.0 [8] | 0.0 [8] | 0.12 | 0.04 | 0.0 [8] | 0.06 | 0.05 | 0.06 | 0.07 | 0.09 | 0.04 | 0.06 |
| **Mar-04** | 0.0 [8] | 0.00 | 0.05 | 0.03 | 0.04 | 0.10 | 0.07 | 0.12 | 0.11 | 0.03 | 0.04 | 0.04 |
| **Apr-04** | 0.0 [8] | 0.00 | 0.0 [8] | 0.00 | 0.01 | 0.0 [8] | 0.05 | 0.03 | 0.07 | 0.06 | 0.04 | 0.05 |
| **May-04** | 0.0 [8] | 0.0 [8] | 0.0 [8] | 0.00 | 0.01 | 0.06 | 0.03 | 0.06 | 0.11 | 0.08 | 0.04 | 0.04 |
| **Jun-04** | 0.0 [8] | 0.01 | 0.04 | 0.00 | 0.00 | 0.02 | 0.09 | 0.04 | 0.07 | 0.04 | 0.02 | 0.06 |
| **Jul-04** | 0.03 | 0.07 | 0.18 | 0.06 | 0.06 | 0.07 | 0.09 | 0.08 | 0.13 | 0.11 | 0.08 | 0.00 |
| **Aug-04** | 0.0 [8] | 0.0 [8] | 0.0 [8] | 0.0 [8] | 0.00 | 0.02 | 0.03 | 0.03 | 0.03 | 0.01 | 0.03 | 0.0 [8] |
| **Sep-04** | 0.0 [8] | 0.0 [8] | 0.02 | 0.01 | 0.0 [8] | 0.00 | 0.01 | 0.03 | 0.05 | 0.03 | 0.02 | 0.03 |
| **Oct-04** | 0.0 [8] | 0.01 | 0.0 [8] | 0.01 | 0.02 | 0.01 | 0.05 | 0.06 | 0.10 | 0.06 | 0.05 | 0.05 |
| **Nov-04** | 0.0 [8] | 0.0 [8] | 0.00 | 0.02 | 0.0 [8] | 0.00 | 0.04 | 0.03 | 0.08 | 0.07 | 0.06 | 0.04 |
| **Dec-04** | 0.0 [8] | 0.0 [8] | 0.0 [8] | 0.0 [8] | 0.0 [8] | 0.0 [8] | 0.0 [8] | 0.03 | 0.10 | 0.05 | 0.04 | 0.0 [8] |
| | | | | | | | | | | | | |
| **Mean** | 0.00 | 0.01 | 0.04 | 0.01 | 0.01 | 0.03 | 0.04 | 0.05 | 0.08 | 0.05 | 0.04 | 0.03 |
| **Min** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 |
| **Max** | 0.03 | 0.07 | 0.18 | 0.06 | 0.06 | 0.10 | 0.09 | 0.12 | 0.13 | 0.11 | 0.08 | 0.06 |
| **SD** | 0.01 | 0.02 | 0.06 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | 0.02 | 0.02 |
| **CV (%)** | 277.3 | 242.2 | 162.6 | 140.8 | 153.5 | 123.7 | 71.6 | 64.6 | 47.9 | 58.2 | 50.8 | 77.3 |

## $Mg^{2+}$ (µg $m^{-3}$)

| Month | Site 1 | Site 21 | Site 24 | Site 30 | Site 31 | Site 32 | Site 33 | Site 34 | Site 83 | Site 40 | Site 45 | Site 70 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jan-04** | 0.02 | 0.04 | 0.04 | 0.02 | 0.02 | 0.00 | 0.01 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 |
| **Feb-04** | 0.01 | 0.02 | 0.07 | 0.04 | 0.0 [8] | 0.08 | 0.07 | 0.08 | 0.12 | 0.09 | 0.09 | 0.11 |
| **Mar-04** | 0.01 | 0.04 | 0.06 | 0.06 | 0.05 | 0.08 | 0.07 | 0.12 | 0.12 | 0.04 | 0.06 | 0.09 |
| **Apr-04** | 0.00 | 0.03 | 0.02 | 0.02 | 0.03 | 0.01 | 0.05 | 0.05 | 0.08 | 0.04 | 0.06 | 0.07 |
| **May-04** | 0.01 | 0.02 | 0.01 | 0.03 | 0.03 | 0.04 | 0.03 | 0.05 | 0.07 | 0.04 | 0.05 | 0.04 |
| **Jun-04** | 0.00 | 0.05 | 0.06 | 0.04 | 0.04 | 0.04 | 0.02 | 0.07 | 0.07 | 0.04 | 0.05 | 0.09 |
| **Jul-04** | 0.02 | 0.04 | 0.06 | 0.03 | 0.03 | 0.04 | 0.05 | 0.05 | 0.08 | 0.05 | 0.05 | 0.00 |
| **Aug-04** | 0.00 | 0.02 | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.07 | 0.07 | 0.07 | 0.04 | 0.03 |
| **Sep-04** | 0.01 | 0.04 | 0.07 | 0.07 | 0.06 | 0.07 | 0.07 | 0.11 | 0.03 | 0.07 | 0.07 | 0.10 |
| **Oct-04** | 0.01 | 0.05 | 0.06 | 0.03 | 0.06 | 0.04 | 0.08 | 0.12 | 0.14 | 0.08 | 0.06 | 0.10 |
| **Nov-04** | 0.0 [8] | 0.0 [8] | 0.05 | 0.06 | 0.02 | 0.03 | 0.06 | 0.07 | 0.14 | 0.08 | 0.10 | 0.09 |
| **Dec-04** | 0.00 | 0.02 | 0.03 | 0.03 | 0.03 | 0.02 | 0.0 [8] | 0.07 | 0.14 | 0.07 | 0.08 | 0.07 |
| | | | | | | | | | | | | |
| **Mean** | 0.01 | 0.03 | 0.05 | 0.04 | 0.03 | 0.04 | 0.05 | 0.07 | 0.09 | 0.06 | 0.06 | 0.07 |
| **Min** | 0.00 | 0.00 | 0.01 | 0.02 | 0.00 | 0.00 | 0.00 | 0.03 | 0.02 | 0.02 | 0.02 | 0.00 |
| **Max** | 0.02 | 0.05 | 0.07 | 0.07 | 0.06 | 0.08 | 0.08 | 0.12 | 0.14 | 0.09 | 0.10 | 0.11 |
| **SD** | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.04 | 0.02 | 0.02 | 0.04 |
| **CV (%)** | 102.3 | 49.8 | 46.2 | 39.6 | 49.9 | 65.8 | 55.4 | 40.9 | 46.1 | 38.6 | 38.0 | 52.6 |

Notes:

ND [1]: Power off during sampling period.
*Data* [2] = Flow < 0.2 l /min (pump not working properly, or intermittent power cuts).
*Data* [3] = Samples exposed for more than one month.
ND [4] = Samples lost.
ND [5] = Problems with Aerosol Sampling.
ND [6] = Water in sampling train.
ND [7] = Possible contamination because sampling train returned separated.
0.0 [8] = < limit of detection: same as blanks
**Numbers in bold**: Capture = < 75% in the first of the 2 glass denuders.

**Table A5.1e** ***Monthly Concentrations of Aerosol $Na^+$***
***Measured at the 12 Monitoring Sites in the Nitric Acid Monitoring Network in 2004.***

**$Na^+$ ($\mu g\ m^{-3}$)**

| Month | Site 1 | Site 21 | Site 24 | Site 30 | Site 31 | Site 32 | Site 33 | Site 34 | Site 83 | Site 40 | Site 45 | Site 70 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jan-04** | 0.21 | 0.11 | 0.34 | 0.17 | 0.17 | 0.16 | 0.27 | 0.39 | 0.32 | 0.28 | 0.20 | 0.30 |
| **Feb-04** | 0.99 | 0.50 | 1.13 | 0.83 | 0.45 | 1.13 | 0.98 | 1.03 | 1.42 | 1.19 | 1.14 | 1.24 |
| **Mar-04** | 0.81 | 0.76 | 1.00 | 0.92 | 0.62 | 0.94 | 0.87 | 1.30 | 1.37 | 0.98 | 1.03 | 1.26 |
| **Apr-04** | 0.37 | 0.71 | 0.45 | 0.40 | 0.53 | 0.45 | 0.76 | 0.69 | 1.29 | 0.55 | 0.77 | 0.72 |
| **May-04** | 0.48 | 0.42 | 0.30 | 0.47 | 0.42 | 0.50 | 0.45 | 0.42 | 0.90 | 0.31 | 0.60 | 0.49 |
| **Jun-04** | 0.35 | 0.30 | 0.60 | 0.49 | 0.45 | 0.34 | 0.46 | 0.70 | 0.73 | 0.47 | 0.65 | 1.00 |
| **Jul-04** | 0.41 | 0.44 | 0.27 | 0.47 | 0.32 | 0.40 | 0.38 | 0.49 | 0.87 | 0.35 | 0.48 | 0.45 |
| **Aug-04** | 0.58 | 0.78 | 0.59 | 0.69 | 0.39 | 0.54 | 0.50 | 0.85 | 0.78 | 1.03 | 0.45 | 0.53 |
| **Sep-04** | 0.97 | 0.65 | 1.01 | 0.88 | 0.86 | 0.89 | 1.06 | 1.28 | 0.79 | 0.97 | 0.86 | 1.31 |
| **Oct-04** | 0.62 | 0.55 | 1.20 | 0.40 | 0.65 | 0.61 | 0.81 | 1.26 | 1.35 | 0.71 | 0.47 | 1.00 |
| **Nov-04** | 0.62 | 0.33 | 1.10 | 0.73 | 0.23 | 0.66 | 0.81 | 1.00 | 1.58 | 0.88 | 1.04 | 0.92 |
| **Dec-04** | 0.73 | 0.34 | 0.85 | 0.69 | 0.28 | 0.65 | 0.44 | 0.96 | 1.61 | 1.03 | 0.89 | 1.23 |
| | | | | | | | | | | | | |
| **Mean** | 0.59 | 0.49 | 0.74 | 0.60 | 0.45 | 0.61 | 0.65 | 0.87 | 1.08 | 0.73 | 0.71 | 0.87 |
| **Min** | 0.21 | 0.11 | 0.27 | 0.17 | 0.17 | 0.16 | 0.27 | 0.39 | 0.32 | 0.28 | 0.20 | 0.30 |
| **Max** | 0.99 | 0.78 | 1.20 | 0.92 | 0.86 | 1.13 | 1.06 | 1.30 | 1.61 | 1.19 | 1.14 | 1.31 |
| **SD** | 0.25 | 0.21 | 0.35 | 0.23 | 0.20 | 0.27 | 0.26 | 0.33 | 0.40 | 0.32 | 0.29 | 0.36 |
| **CV (%)** | 41.6 | 42.4 | 47.6 | 38.6 | 43.3 | 45.2 | 40.3 | 38.1 | 37.2 | 44.4 | 40.2 | 41.4 |

Note:

ND [1]: Power off during sampling period.
*Data* [2] = Flow < 0.2 l /min (pump not working properly, or intermittent power cuts).
*Data* [3] = Samples exposed for more than one month.
ND [4] = Samples lost.
ND [5] = Problems with Aerosol Sampling.
ND [6] = Water in sampling train.
ND [7] = Possible contamination because sampling train returned separated.
0.0 [8] = < limit of detection: same as blanks
**Numbers in bold**: Capture = < 75% in the first of the 2 glass denuders.

# Appendix 6
# Geostatistics

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# GEOSTATISTICS

The use of geostatistics in the analysis of United Kingdom precipitation composition was described by Webster *et al*. (1991). A brief discussion is reproduced here. In a geostatistical treatment of spatial variability the concentration of an ion in precipitation, averaged over a time period of one year, is treated as a regionalised random variable. It is assumed that the values at the sites are drawn from the distribution of a random variable with a constant mean. The variance, however, depends on the separation of the sites. For example, within one 20 km x 20 km grid square the variance would probably be smaller than within a 200 km x 200 km square. The dependence of the variance on separation (usually termed the lag) is described by a quantity known as the semi-variance:

$$\gamma(h) = \frac{\sum(z_1-z_2)^2}{2n} \qquad 1$$

Where there are n pairs of data $z_1$, $z_2$ separated by a distance h. A plot of the semi-variance against lag is called a **variogram**.

It can be shown that the variogram function (usually termed the variogram model) must be selected from one of a few allowed forms, each of which has one or more variable parameters which must be fitted to the experimental data. Models that are allowed are:

Exponential

$$\gamma(h) = c_0 + c_1 (1-e^{-h\backslash a}) \qquad 2$$

Spherical

$$\gamma(h) = c_0 + \frac{c_1}{2}\left\{ \frac{3h}{a} - \left(\frac{h}{a}\right)^3 \right\} \qquad 3$$

Linear

$$\gamma(h) = c_0 + \omega h^{\theta} \qquad 4$$

The parameter $c_0$, known as the “nugget”, is the residual variance for collocated measurements and is a result of measurement error or variability on a scale smaller than the separation of the measurement sites. The “range”, a, is a measure of the separation beyond which the measurements are uncorrelated, and the “sill”, $c_0+c_1$, is the maximum semi-variance. The linear model applies when the regionalised varia has an unlimited capacity for spatial dispersion. There is no sill and the parameter $\omega$ is called the factor and $\theta$ the exponent.

Once a variogram model has been found it can be used in an interpolation procedure known as kriging to produce contour maps from irregularly spaced data. In the kriging process the interpolated value is expressed as a linear combination of the measured data $l_1 z_1 + l_2 z_2 + \ldots$ . Using the variogram model the variance of the interpolated estimate can be expressed in terms of the $l_i$ and this variance is then minimised subject to the constraint that the $l_i$ sum to 1. The result is the best unbiased linear estimate in that it has the smallest error in the statistical sense. A further advantage of using kriging is that the interpolation variance is known for each interpolated estimate and this can be mapped along with the concentration to provide a measure of the reliability of the map.

The models fitted to the experimental points in the variogram for $\log_e$ [acidity], non-marine sulphate, nitrate and ammonium are listed in Table A.6.1.

**Table A.6.1** - Variogram Models fitted to 2004 Annual Mean Concentrations of the Major Ions

| Ion | Model | Nugget ($\mu eq\ l^{-1}$) | Sill $(\mu eq\ l^{-1})^2$ | Range (km) |
|---|---|---|---|---|
| acidity ($log_e$ transformed) | exponential | 0 | 0.45 | 200 |
| non-marine sulphate | exponential | 20 | 170 | 200 |
| nitrate | exponential | 0 | 160 | 150 |
| ammonium | exponential | 10 | 310 | 220 |