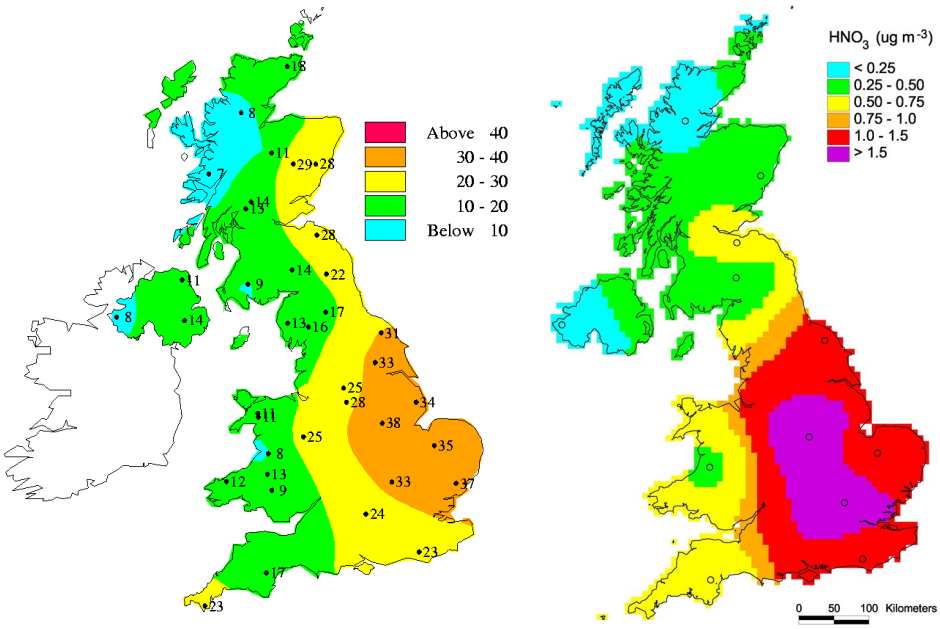
REPORT

Management and Operation of the UK Acid Deposition Monitoring Network: Data Summary for 2002

A report produced for the Department for Environment, Food and Rural Affairs, the Scottish Executive, the National Assembly for Wales and the Northern Ireland Department of the Environment



Maps of the Precipitation-weighted Concentration of Nitrate (in μeq l^{-1}) and of gaseous Nitric Acid (in μg m^{-3}) for 2002

AEAT/ENV/R/1696 Issue 1
March 2004

Management and Operation of the UK Acid Deposition Monitoring Network: Data Summary for 2002

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March 2004

Title	Management and Operation of the UK Acid Deposition Monitoring Network: Data Summary for 2002
Customer	Department for Environment, Food and Rural Affairs
Customer reference	EPG 1/3/193
Confidentiality, copyright and reproduction	
File reference	
Report number	AEAT/ENV/R/1343
Report status	ISSUE 1

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Executive Summary

This is the second 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 2002.

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 2002 Measurements

The key highlights from the 2002 Measurements are:

- 2002 was a relative wet year and hence the rainwater concentrations were, as expected, smaller than those measured in previous years. The 2002 measurements provided further confirmation of the spatial patterns in trends previously observed. Near-field sites show strong downward trends in acidity and non-seasalt sulphate.
- The annual mean sulphur dioxide concentration has decreased substantially at all sites over the period 1986 to 2002. For example, the annual mean at High Muffles has decreased from an annual mean concentration of 7.3 μg S m^{-3} in 1987 to 0.9 μg S m^{-3} in 2002 (although no correction has been made for changes to the sampler).
- Particulate sulphate concentrations do not obviously exhibit the same degree of decrease as that observed for sulphur dioxide. The highest concentrations were observed at Stoke Ferry and Barcombe Mills for the first half of the sampling period - since that time concentrations at both sites have decreased by about 25%. The lowest concentrations are consistently measured at Strathvaich Dam.
- The 2002 annual mean concentrations of nitrogen dioxide were generally comparable to those observed in 2000 and 2001 but higher than those determined in 1998 and 1999. The highest concentrations were observed in the Midlands and southern England with an annual mean concentration of 12.5 ppb determined at Woburn. Given the relatively poor precision of the passive sampler method at low concentrations, the fall in nitrogen dioxide concentrations can only be observed at the relatively high concentration sites such as High Muffles, Stoke Ferry and Barcombe Mills.

- 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.

Fortnightly vs. Weekly Rainwater Sampling

As part of the change to the monitoring programme in 2001, bulk rainwater samples are now collected on a fortnightly, rather than weekly, basis. Although an earlier study undertaken by this laboratory suggested that there should not be any reduction in sample integrity in moving to fortnightly sampling periods, it was considered good practice to undertake a limited period of overlap of the two sampling protocols at a few key sites. Following the trend analysis undertaken and reported by the National Expert Group on Transboundary Air Pollution (NEGTAP), the sites used for this comparison were Thorganby (a near field site with strong trends in acidity and sulphate in precipitation), Lough Navar (a remote site where the trends are smaller) and Eskdalemuir (an intermediate site).

The results obtained at Thorganby showed excellent agreement for the samples collected fortnightly and for the sum of the two weekly samples for non seasalt deposition, nitrate deposition and rainwater volume. The agreement between the samples was less good at Eskdalemuir and poorer for non seasalt deposition at Lough Navar. Although there have been concerns about sample integrity at Lough Navar, it is suggested that much of the scatter could be due to the difficulty in making accurate measurements at the low concentrations now being observed at Lough Navar.

EMEP Laboratory Intercomparisons

Harwell Scientifics, who undertake the analysis of the samples collected in the monitoring networks, have participated in the EMEP Laboratory Intercomparisons for a number of years. The results from the 20th and 21st Intercomparisons show that the UK analyses are mostly within 5% of the expected result providing evidence that the working procedures and quality control and quality assurance processes used in the UK monitoring programme are delivering data that are reliable and robust. The latest results show that a high standard is now being achieved for all relevant analytes.

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 UNECE Protocols for controlling the transboundary transport of acidifying pollutants.

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 NEGTAP. NEGTAP was established to advise defra 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.

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Appendices

1. Introduction

This is the second 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 2002.

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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]. In particular, 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:

- a description of the sampling networks and the sampling techniques employed are presented in Section 2, together with the changes made to the network in 2002;
- an overview of the results from the Acid Deposition Networks for 2002 and concentration maps for non-seasalt sulphate, nitrate, ammonium, hydrogen ion and nitrogen dioxide are presented in Section 3, together with the trends in all acidifying components measured as part of the acid rain monitoring programme;
- A description of the nitric acid monitoring network and the measurements are presented in Section 4.
- Section 5 presents the single week versus fortnightly rainwater sampling intercomparison
- A summary of the 20th and 21st EMEP intercomparisons is presented in Section 6.

Summary tables of the weekly bulk precipitation composition data for 2002 at the individual sites are presented in Appendix 1. Time series graphs for data collected since 1986 and seasonal variation plots are presented, along 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 made at the 8 daily sites are provided in Appendix 3, together with the monthly and annual mean concentrations calculated for each site. Appendix 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 2002. 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 the current 5 and 32 sites, respectively, in 1989. The spatial distribution of the sites is shown in Figure 2.1.

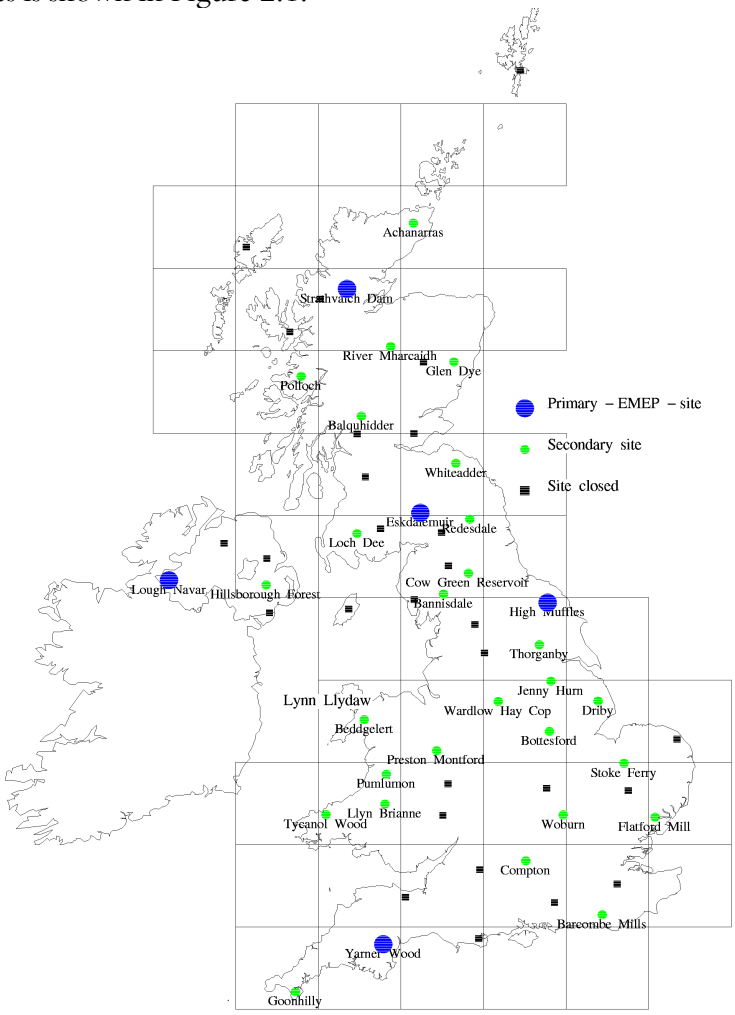


Figure 2.1: ***Location of the Current Primary and Secondary Sampling Sites (Also presented are the locations of the sites no longer operating. The 100 km squares show how the sampling site coverage meets the original coverage objective.)***

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. The monitoring programme in 2002 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 fortnightly basis at 8 sites
➢ Particulate Sulphate	–	Sampling on a daily basis at 8 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 2002.*

Measurement:	**Precipitation**				**NO_2**	**SO_2**	**Part. SO_4**	**Denuder HNO_3-NO_3**
***Frequency*:** **SITE:**	*daily wet*	*daily bulk*	*week bulk*	*fort. bulk*	*monthly*	*daily*	*daily*	*monthly*
Yarner Wood			★ - 1	★ - 1	★	★ - 2	★	★ - 3
Lough Navar			★ - 1	★ - 1	★	★ - 2, 4	★	★ - 3
High Muffles			★ - 1	★ - 1	★	★ - 2	★	★ - 3
Eskdalemuir	★ - 5	★	★ - 1	★ - 1	★	★ - 2	★	★ - 3
Strathvaich Dam			★ - 1	★ - 1	★	★ - 2, 4	★ - 6	★ - 3
Barcombe Mills			★ - 1	★ - 1	★	★	★	★ - 3
Stoke Ferry			★ - 1	★ - 1	★	★	★ - 6	★ - 3
Glen Dye			★ - 1	★ - 1	★	★	★ - 6	
Goonhilly			★ - 1	★ - 1	★			
Compton			★ - 1	★ - 1	★			
Flatford Mill			★ - 1	★ - 1	★			
Woburn			★ - 1	★ - 1	★			
Tycanol Wood			★ - 1	★ - 1	★			
Llyn Brianne			★ - 1	★ - 1	★			
Pumlumon			★ - 1	★ - 1	★			
Preston Montford			★ - 1	★ - 1	★			
Bottesford			★ - 1	★ - 1	★			
Llyn Llydaw			★ - 1	★ - 1	★			
Wardlow Hay Cop			★ - 1	★ - 1	★			
Driby			★ - 1	★ - 1	★			
Jenny Hurn - 7			★ - 1		★			
Thornganby			★ - 1	★ - 1	★			
Bannisdale			★ - 1	★ - 1	★			
Hillsborough Forest			★ - 1	★ - 1	★			
Cow Green Reservoir			★ - 1	★ - 1	★			
Loch Dee			★ - 1	★ - 1	★			
Redesdale			★ - 1	★ - 1	★			
Whiteadder			★ - 1	★ - 1	★			
Balquhidder			★ - 1	★ - 1	★			
Polloch			★ - 1	★ - 1	★			
Allt a' Mharcaidh			★ - 1	★ - 1	★			
Achanarras			★ - 1	★ - 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; (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: ***Precipitation Composition Monitoring Sites, 2002 (those in bold are EMEP sites with the daily measurements made - wet-only sampling, sulphur dioxide 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. 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	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	PowerGen (see note 1)
5117	Thorganby	SE 676428	8	Selby District Council
5009	**High Muffles**	**SE 776939**	**267**	**Forest Enterprise** (see note 2)
5111	Bannisdale	NY 515043	265	CEH Windermere (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	Freshwater Fisheries Laboratory
5152	Balquhidder 2	NN 545207	135	Mountain Environments
5151	Polloch	NM 792689	30	Forest Enterprise (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	Freshwater Fisheries Laboratory
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) David Rochelle 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 are presented in Section 5.

The previous measurements of precipitation composition at Eskdalemuir using a wet-only collector were discontinued in 2001.

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.

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 2002 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 NAMAS accredited methods. All samples with exception of diffusion tubes are analysed using ion chromatography.

The rapid analysis of a large number of rain water 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 Σc = sum of cation concentrations in equivalents (μeq l^{-1}) and Σa = 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 ($\mu eq\ l^{-1}$)	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.

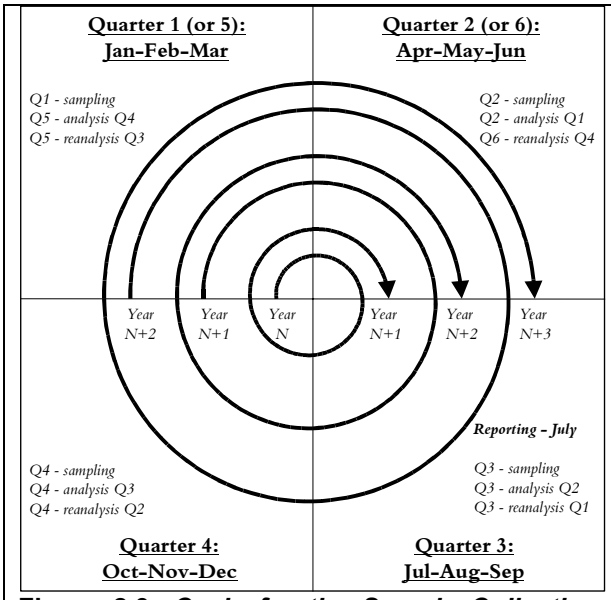


Figure 2.3: ***Cycle for the Sample Collection, Analysis, Reanalysis and Reporting of the Composition of Precipitation.***

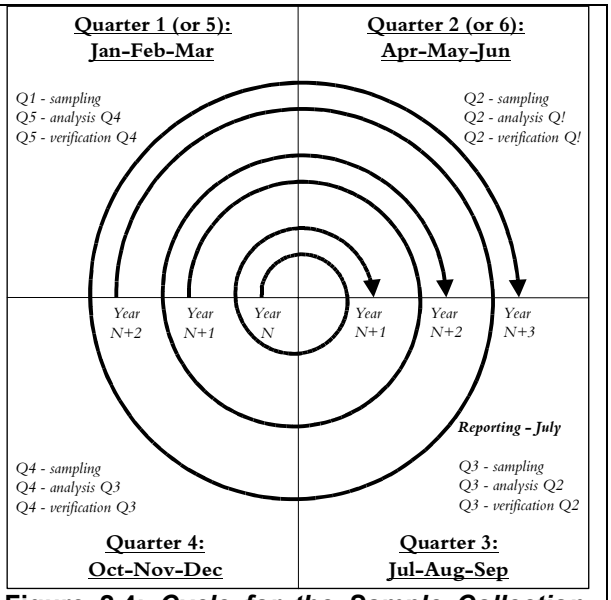


Figure 2.4: ***Cycle for the Sample Collection, Analysis and Verification and Reporting of the Other Measurements.***

3. 2002 Measurements and Trends

3.1 DATA SUMMARY

The complete set of precipitation measurements made in the Acid Deposition Monitoring Network during 2002 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

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 2002

High rainwater volumes measured by the bulk collectors indicated that 2002 was a relatively wet year compared to previous years. Rainwater statistics available from the Meteorological Office Web site[1] (http://www.metoffice.com/climate/uk/2003) confirms this. Average rainfall for England and Wales, Scotland and Northern Ireland were 22 %, 15 % and 27 % higher, respectively, than the long term mean (1961 to 2001).

Figure 3.1 shows how the monthly rainfall data for 2002 determined by the Meteorological Office compares with the average rainfall amount for the period 1961 to 2001. The monthly rainfall in February 2002 was twice that of the long term mean. England and Wales and Northern Ireland were wetter than usual in May, June, July, October and November. Scotland was wetter than usual in May, June and July.

With such high rainfall volumes it would be expected that the annual volume weighted concentrations were lower in 2002 than previous years.

[1] 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.

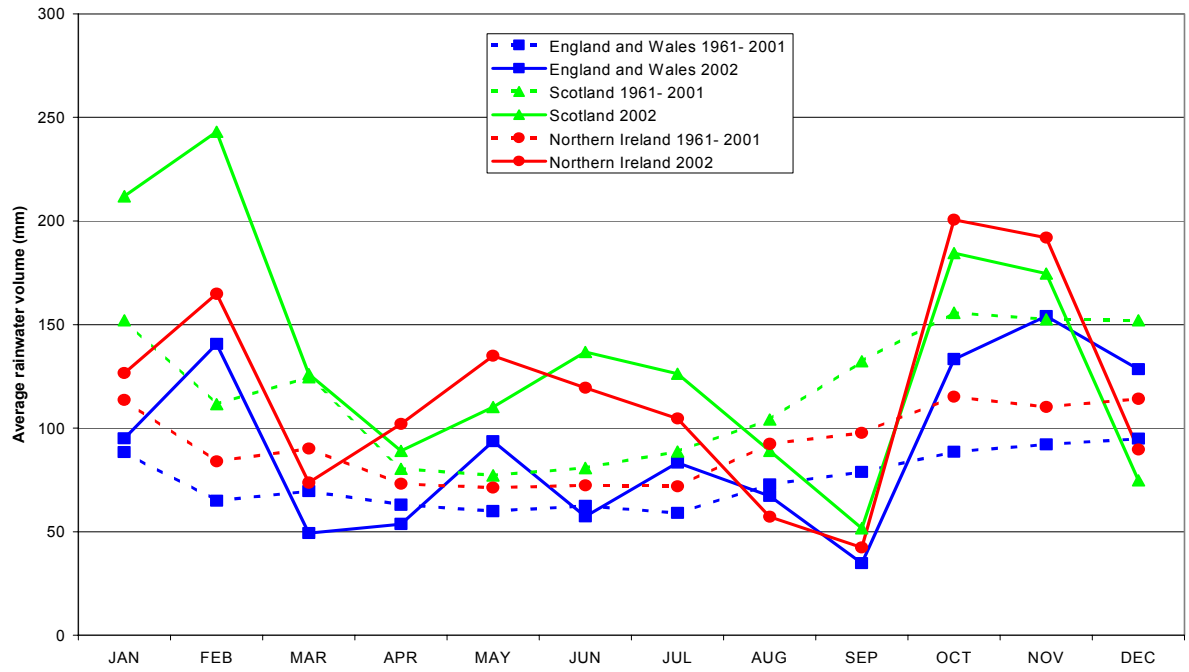


Figure 3.1: ***A comparison of Average Monthly Rainwater Volumes for 2002 and the Long-term Average (1961 to 2001) for England and Wales, Scotland and Northern Ireland.***

3.3 PRECIPITATION CHEMISTRY

3.3.1 The Measurements

The measurements of precipitation composition made using the weekly 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. The mean annual rainfall and the precipitation-weighted mean annual concentrations of all ions for the period from 1986 to 2002 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.

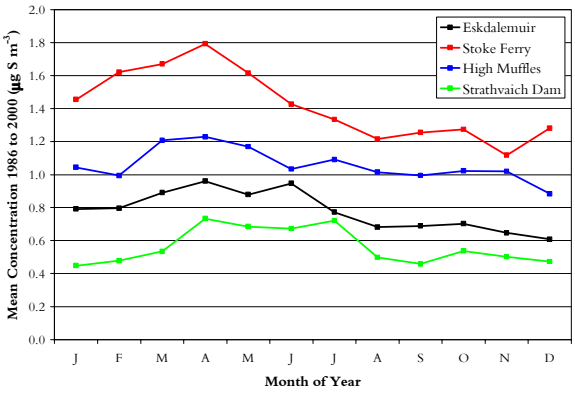


Figure 3.2: ***Seasonal Variation in the Particulate Sulphate Concentration at 4 of the 5 Primary Sites as Averages for the years 1986-2002.***

3.3.2 Concentration Maps for 2002

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 four most recent years. The parameters used in the interpolation are presented in Appendix 6. There are no hydrogen ion maps 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 non sea salt sulphate decreased significantly for sites in the source region. The highest concentration measured in 2002 was at Thorganby (41 µeq l^{-1}). The closure of the Jenny Hurn sampling site, which consistently had the highest nss concentrations in the network may have an influence on mapping the high concentration.
- The nitrate concentrations are remarkably consistent throughout the four 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.

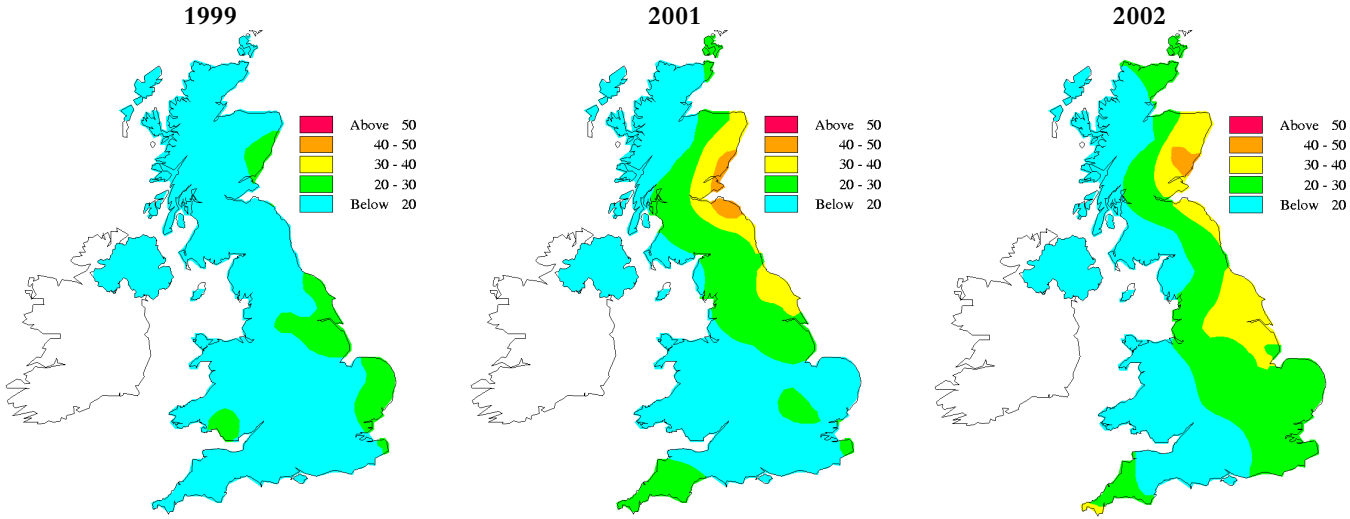


Figure 3.3: ***Precipitation-weighted concentration maps of Acidity (in μeq l^{-1}) for 1999-2002.***

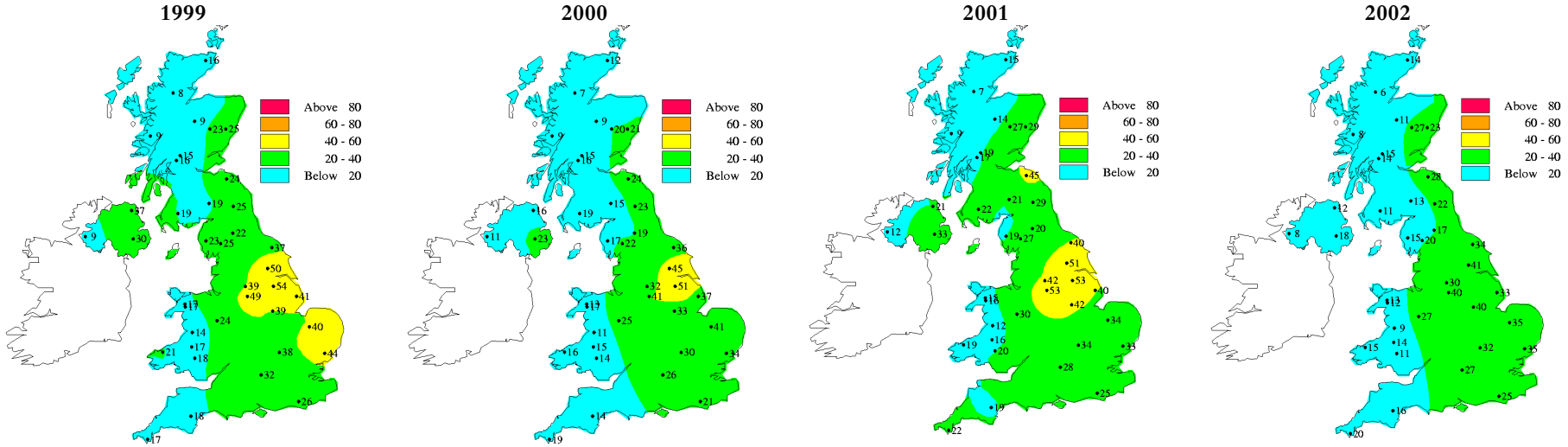


Figure 3.4: ***Precipitation-weighted Concentration Maps of Non Seasalt Sulphate (in μeq l^{-1}) for 1999-2002.***

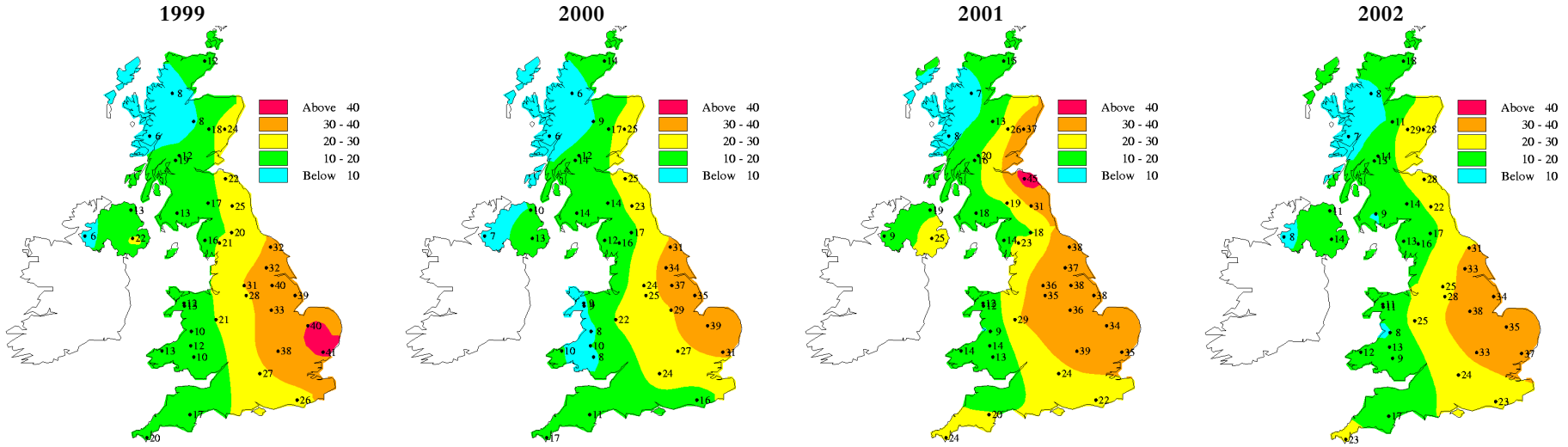


Figure 3.5: ***Precipitation-weighted Concentration Maps of Nitrate (in μeq l^{-1}) for 1999-2002.***

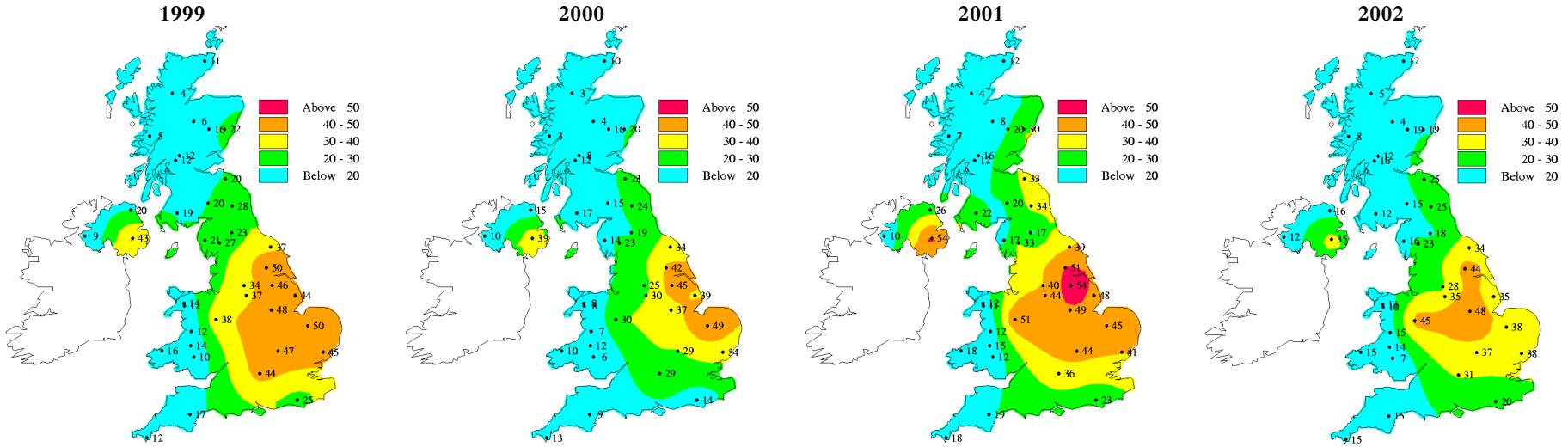


Figure 3.6: ***Precipitation-weighted Concentration Maps of Ammonium (in μeq l^{-1}) for 1999-2002.***

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 value 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.

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	-1.04	-3.48	+++	-0.39	-1.83	-
Allt a' Mharcaidh	5103	-0.73	-3.34	++	0.04	0.38	-
Balquhidder	5152	-0.72	-2.48	+	0.03	0.20	-
Bannisdale	5111	-1.14	-2.53	++	0.11	0.54	-
Barcombe Mills	5007	-1.70	-3.47	+++	-0.57	-1.92	+
Bottesford	5121	-4.30	-4.48	+++++	-0.86	-1.97	++
Compton	5129	-3.62	-4.44	++++	-0.99	-2.47	++
Cow Green Reservoir	5113	-1.24	-3.01	+++	-0.22	-0.96	-
Driby	5136	-2.83	-3.47	+++	-0.48	-1.03	-
Eskdalemuir	5002	-0.92	-2.77	+++	0.01	0.04	-
Flatford Mill	5024	-3.12	-3.98	++++	-0.65	-1.47	+
Glen Dye	5011	-1.46	-2.87	+	-0.07	-0.22	-
Goonhilly	5003	-0.70	-2.29	+	0.02	0.08	-
High Muffles	5009	-2.63	-3.33	+++	-0.61	-1.40	+
Hillsborough Forest	5149	-1.60	-3.14	++	-0.11	-0.49	-
Jenny Hurn	5118	-4.13	-3.77	++++	-0.54	-1.15	+
Llyn Brianne	5124	-0.82	-2.76	+++	-0.05	-0.32	-
Llyn Llydaw	5153	-1.48	-4.41	++	-0.23	-1.65	-
Loch Dee	5107	-0.91	-2.75	++	-0.05	-0.33	-
Lough Navar	5006	-0.40	-2.19	++	0.03	0.37	-
Polloch	5151	-0.93	-4.16	++	-0.38	-3.15	+
Preston Montford	5023	-2.15	-3.47	++	-0.25	-0.82	-
Pumlumon	5150	-0.87	-3.31	++	-0.23	-1.68	-
Redesdale	5109	-1.81	-3.33	+++	-0.18	-0.58	-
Stoke Ferry	5004	-3.23	-3.85	++++	-0.75	-1.58	++
Strathvaich Dam	5010	-0.49	-3.21	++	-0.06	-0.64	-
Thorganby	5117	-3.12	-3.23	++	-0.75	-1.64	++
Tycanol Wood	5123	-0.60	-2.18	++	-0.01	-0.10	-
Wardlow Hay Cop	5120	-2.54	-2.90	+++	-0.12	-0.38	-
Whiteadder	5106	-1.51	-2.89	++	-0.21	-0.63	-
Woburn	5127	-3.34	-4.16	+++++	-0.41	-1.00	-
Yarner Wood	5008	-0.68	-2.28	+	0.10	0.55	-

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 2002 Measurements

A summary of the measurements of sulphur dioxide and of particulate sulphate made at the eight daily sites is 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 which is covered by a separate DEFRA contract (EPG 1/3/166 *Acid Deposition Processes in the UK*, under 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.

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. As reported previously, the largest change in the concentration occurred between 1980 and 1990, during which time the average concentration decreased by a factor of three from around 4.5 ppb to 1.5 ppb. From 1990 to 2002, the concentration has decreased by a similar factor of two to three, to 0.4 ppb. The figure shows that the downward trend in the SO_2 concentrations follows the reduction in UK SO_2 emissions [Dore *et al.*, 2003], at least in the early years.

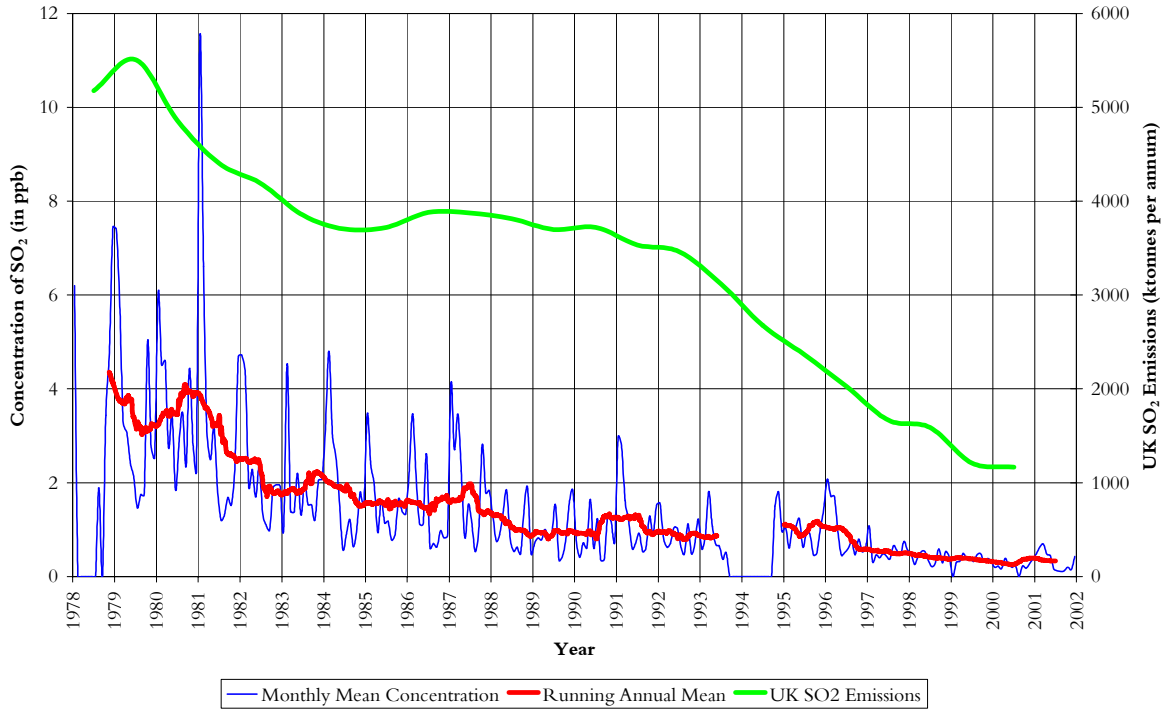


Figure 3.7: ***Trends in the concentration of sulphur dioxide observed at Eskdalemuir since 1978.***

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.

The monthly and running annual mean concentrations of sulphur dioxide measured at each of the 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 from an annual mean concentration of 7.3 μg S m^{-3} in 1987 to 1.2 μg S m^{-3} in 2000 and 1.5 μg S m^{-3} in 2002.

At the low concentrations now observed at some sites, only very careful quality assurance and control of sampling can deliver valid data.

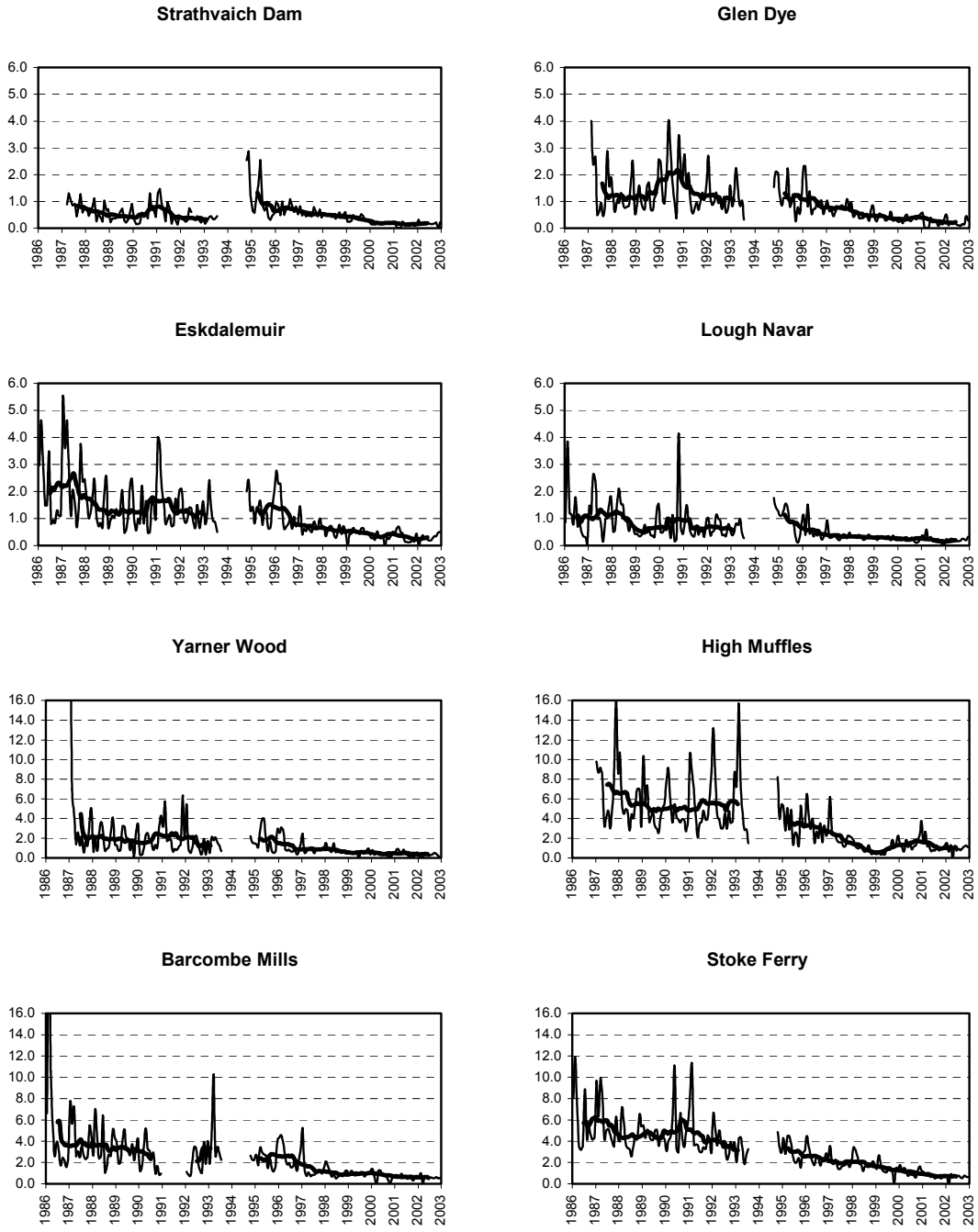


Figure 3.8: ***Monthly and Running Annual Mean Concentrations of Sulphur Dioxide at the Daily Sites, 1986 to 2002 (μg S m^{-3}).***

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 to 2002. Over the period from 1978 to 2002 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 2002. The high monthly mean concentration in March 1996, associated with a period of extended easterly flow, was one of the highest over the full time series and illustrates how the month-to-month variation is large relative to the long-term trend.

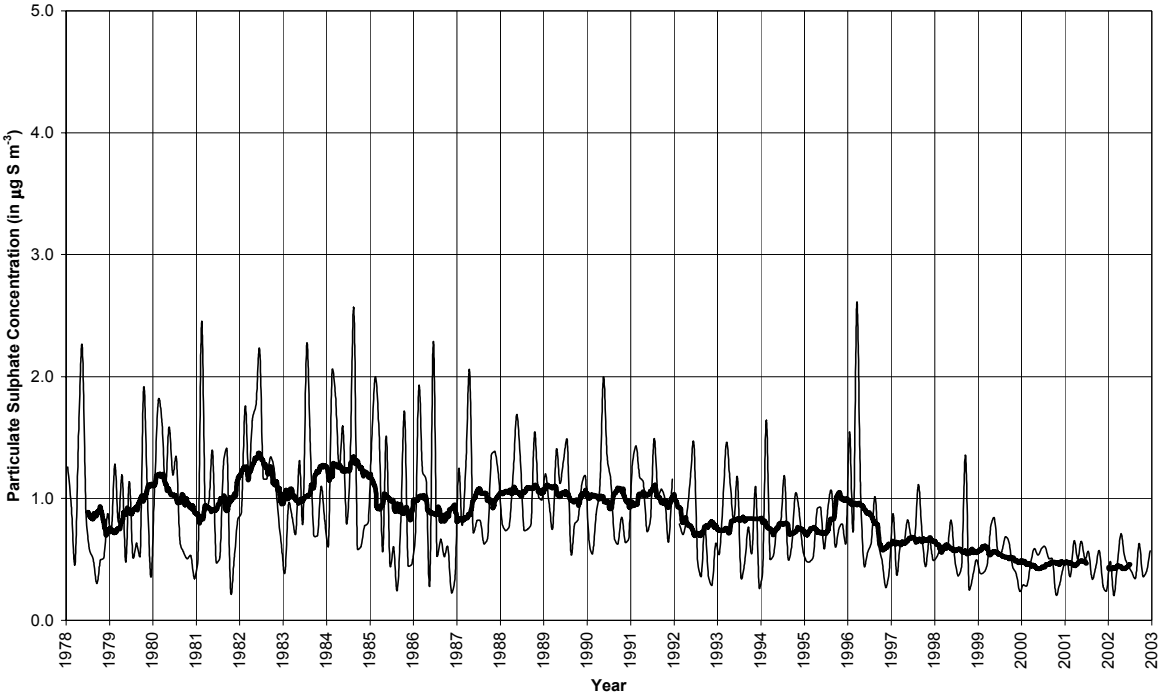


Figure 3.9: ***Trends in the particulate sulphate concentration observed at Eskdalemuir since 1978.***

In 2001, the particulate sulphate measurements made at Strathvaich Dam, Glen Dye and Stoke Ferry were discontinued. Sulphate concentrations at the other daily sites do not obviously exhibit the same degree of decrease as that observed for sulphur dioxide, as shown in Figure 3.10. The highest concentrations were observed at Stoke Ferry and Barcombe Mills for the first half of the sampling period - since that time concentrations at both sites decreased by about 25%. The lowest concentrations were consistently measured at Strathvaich Dam.

3.5 NITROGEN DIOXIDE

3.5.1 The 2002 Measurements

The nitrogen dioxide diffusion tube measurements made in 2002 are presented in Appendix 4. The determination of nitrogen dioxide at the rural locations in the acid rain network provides a

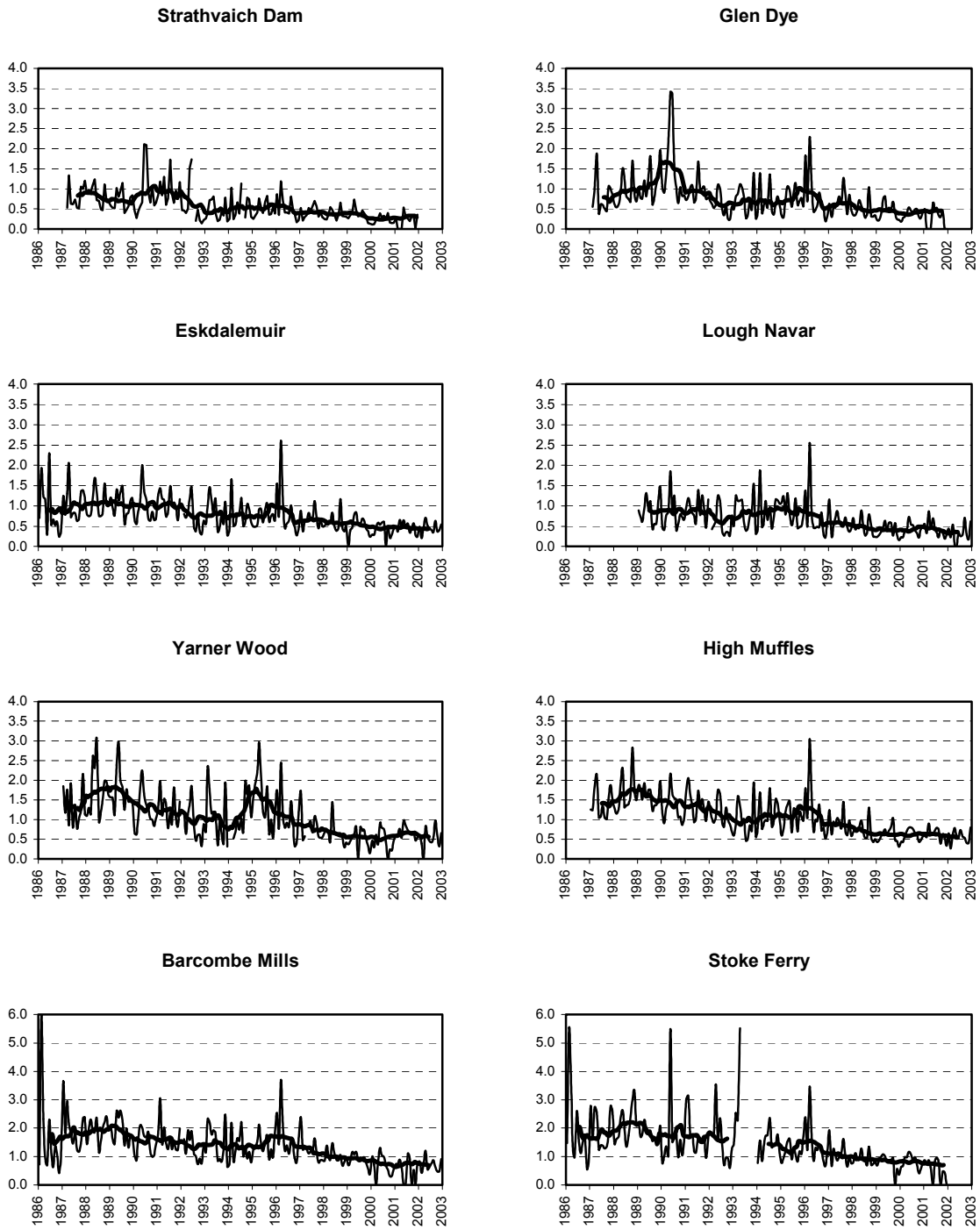


Figure 3.10: ***Monthly and Running Annual Mean Concentrations of Particulate Sulphate at the Daily Sites, 1986 to 2002 (µg S m^{-3}).***

key input to the mapping of nitrogen dioxide in the United Kingdom [Stedman, 1997].

3.5.2 Concentration Map

The diffusion tube measurements have been used to produce a map of the rural nitrogen dioxide concentrations in the UK for 2002, as shown in Figure 3.11 (bottom right-hand panel). The highest concentrations were observed in the Midlands and southern England with an annual mean concentration of 12.5 ppb determined at Woburn in 2002. 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, 2000 and 2001 maps for comparison. The maps show little difference in the spatial patterns between 1999 and 2002.

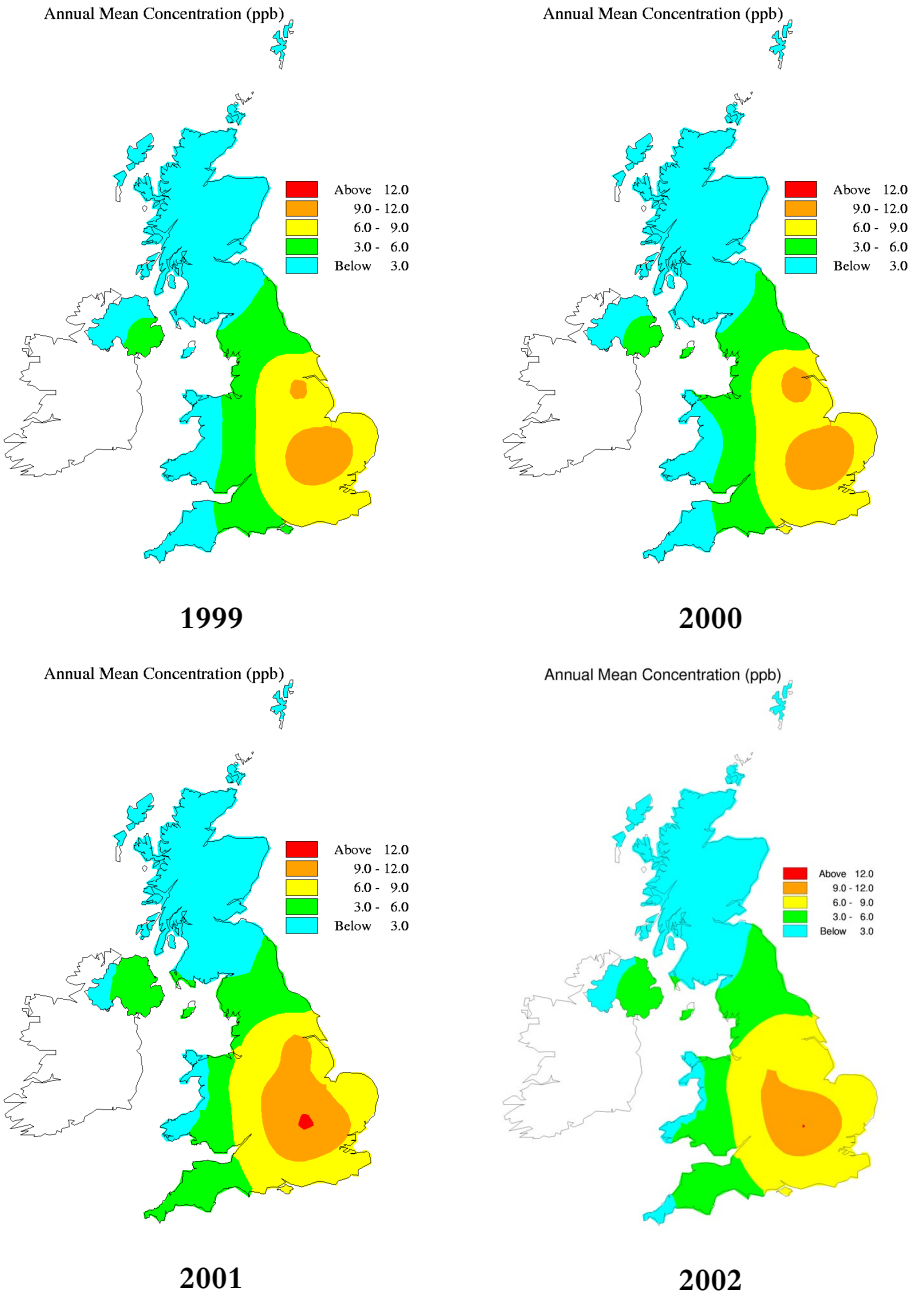


Figure 3.11: ***Interpolated concentration maps of nitrogen dioxide (in ppb) for 1999-2002.***

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. The annual mean concentrations in 2002 were generally comparable to those measured in 2001 but higher than those measured in 1998 and 1999. This is consistent with the generally higher concentrations measured for a range of pollutants in 2001. It is likely that the meteorological conditions led to poorer dispersion and dilution of emissions.

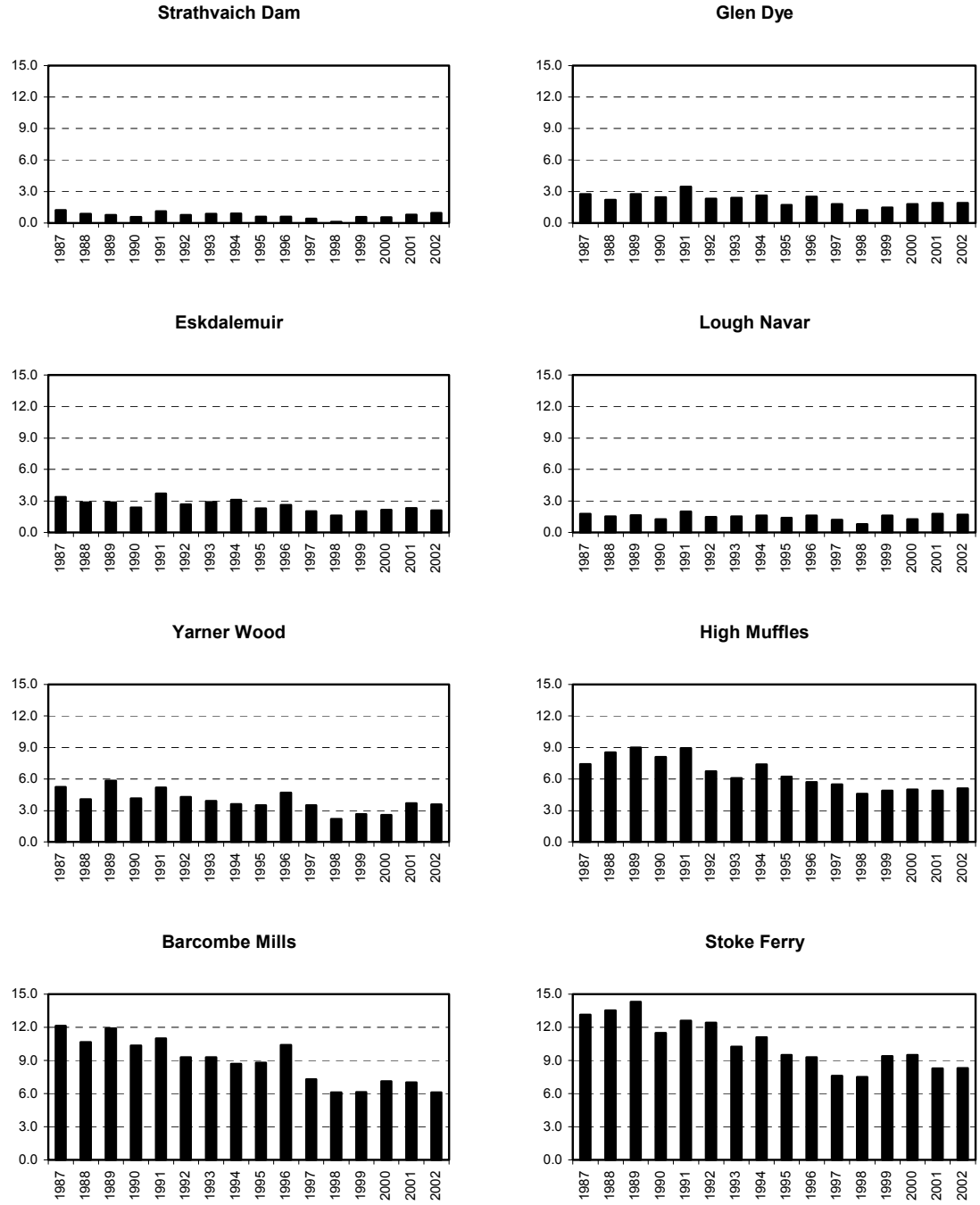


Figure 3.12: ***Annual average nitrogen dioxide concentration (ppb).***

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 can only be observed at the relatively high concentration sites such as High Muffles, Stoke Ferry and Barcombe Mills. This is in marked contrast to the lack of a general trend in NO_2 at UK urban diffusion tube monitoring sites where the mean concentration may be limited by availability of atmospheric oxidant rather than nitrogen oxides.

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 2002 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:

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

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 (χ_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:

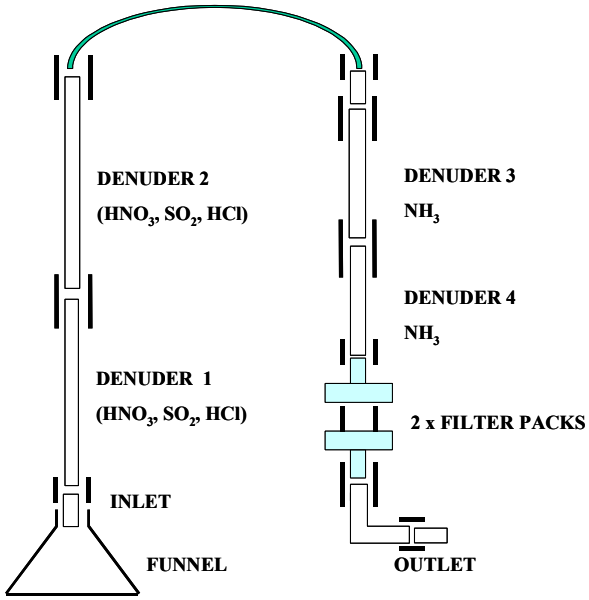


Figure 4.2: ***Sampling train for monthly air measurements.***

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

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:

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

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 becomes less certain. It is possible that there is some loss of the gas which is then collected on the filter pack. At a typical capture efficiency of 90% in the first denuder, the correction represent 1% of the corrected air concentration. At 80%, 75% and 70% capture, the correction amounts to 6%, 11% and 17% of the total, respectively. The absolute amount of the correction is added to the value for the acid gas, and subtracted from the aerosol value. 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 %).

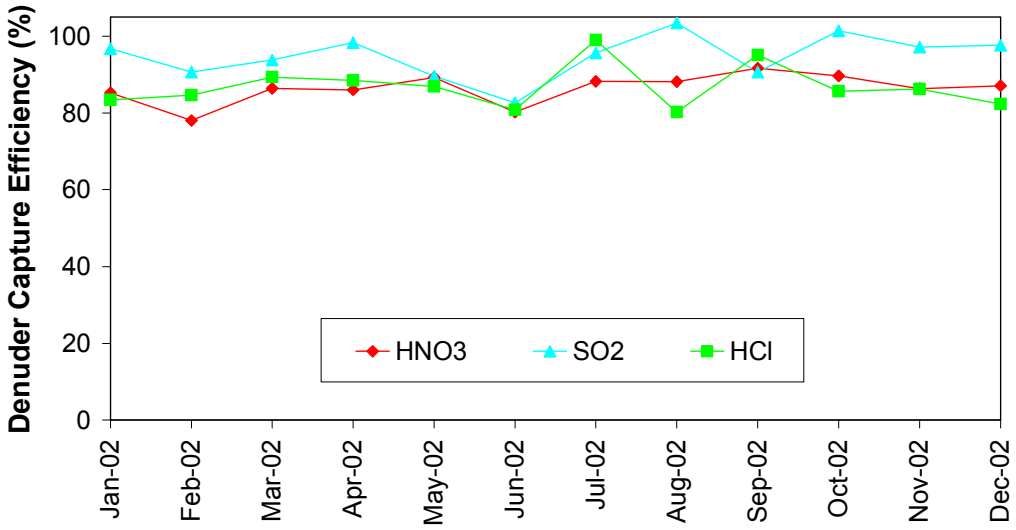


Figure 4.3 ***Monthly mean denuder capture efficiency for NH_3, HNO_3, SO_2 and HCl from the 12 monitoring sites (= amount in 1st Denuder / (Amounts captured in 1st + 2nd Denuders)*100 %).***

4.3.2 Monthly Measurements

The monthly measurements of acidic trace gases, acidic aerosol and base cations made in 2002 can be found in Appendix 5.1. Statistical summaries of the measurements made in 2002 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 2002 (Jan – Dec 2002).***

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	0.60	0.24	1.06	0.24	39.4	12	1.54	0.51	2.47	0.59	38.3	12	0.22	0.11	0.34	0.08	34.2	12
21	Glensaugh	0.41	0.15	0.74	0.22	53.8	10	0.63	0.11	1.54	0.44	70.0	10	0.32	0.08	0.58	0.20	62.1	10
24	Rothamsted	1.82	0.89	2.69	0.53	29.2	12	2.42	1.18	4.03	0.73	30.1	12	0.34	0.22	0.51	0.11	31.1	12
30	Strathvaich Dam	0.24	0.10	0.45	0.13	53.2	12	0.27	0.03	0.88	0.25	93.9	12	0.22	0.09	0.48	0.11	47.4	12
31	Eskdalemuir	0.41	0.13	0.69	0.19	46.6	12	0.73	0.12	1.49	0.51	69.5	12	0.19	0.08	0.34	0.07	37.6	12
32	High Muffles	1.04	0.48	2.69	0.62	60.1	12	3.16	1.42	5.35	1.28	40.4	12	0.36	0.15	0.95	0.24	65.9	12
33	Stoke Ferry	1.24	0.82	1.78	0.28	22.6	12	1.87	1.19	2.76	0.45	24.0	12	0.35	0.25	0.61	0.10	27.6	12
34	Yarner Wood	0.65	0.22	1.11	0.28	43.3	12	0.88	0.27	1.92	0.48	54.8	12	0.27	0.18	0.44	0.08	27.9	12
83	Barcombe Mills	1.27	0.65	1.92	0.39	30.6	12	1.76	0.68	2.86	0.53	29.9	12	0.33	0.20	0.46	0.07	21.2	12
40	Sutton Bonington	1.76	1.14	2.58	0.36	20.7	12	4.19	2.33	6.86	1.32	31.6	12	0.36	0.24	0.48	0.09	25.1	12
45	Lough Navar	0.23	0.04	0.50	0.13	59.0	12	0.33	0.03	0.90	0.27	82.0	12	0.13	0.05	0.25	0.06	46.6	12
70	Cwmystwyth	0.50	0.10	0.83	0.25	50.8	11	0.97	0.07	2.06	0.72	74.3	11	0.24	0.09	0.37	0.09	37.9	11

Table 4.2: ***Summary of Statistics for Monthly Measurements of Acidic Aerosols in 2002 (Jan – Dec 2002).***

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	1.55	0.30	3.28	0.94	60.8	12	1.25	0.56	2.18	0.43	34.6	12	1.02	0.31	1.86	0.46	45.4	12
21	Glensaugh	1.13	0.16	4.28	1.18	104.3	10	0.79	0.38	2.08	0.54	68.1	10	0.77	0.00	2.33	0.65	84.0	10
24	Rothamsted	3.36	1.84	6.00	1.36	40.3	12	1.98	1.24	2.93	0.52	26.3	12	1.45	0.28	2.80	0.78	53.7	12
30	Strathvaich Dam	0.48	0.03	1.76	0.44	91.1	12	0.64	0.32	1.54	0.31	48.2	12	0.89	0.28	1.84	0.42	47.5	12
31	Eskdalemuir	1.03	0.39	2.48	0.57	55.6	12	1.00	0.27	2.08	0.46	45.9	12	0.87	0.34	1.93	0.44	50.8	12
32	High Muffles	2.16	0.94	5.04	1.07	49.3	12	1.52	0.85	2.32	0.41	27.3	12	1.12	0.33	2.05	0.56	50.0	12
33	Stoke Ferry	3.52	1.88	8.14	1.69	47.8	12	1.96	1.24	3.39	0.69	35.4	12	1.30	0.29	2.56	0.70	53.7	12
34	Yarner Wood	1.78	0.75	4.65	1.06	59.2	12	1.37	0.97	2.33	0.44	32.1	12	1.95	0.20	3.95	1.15	59.0	12
83	Barcombe Mills	2.75	1.04	7.80	1.74	63.2	12	2.01	1.14	3.95	0.73	36.1	12	1.70	0.24	4.57	1.22	71.8	12
40	Sutton Bonington	3.38	1.33	5.97	1.55	46.1	12	1.92	0.78	2.76	0.56	29.0	12	1.39	0.31	2.60	0.85	61.3	12
45	Lough Navar	0.95	0.12	2.89	0.86	91.0	12	0.98	0.30	2.32	0.58	59.5	12	1.40	0.56	3.22	0.89	64.0	12
70	Cwmystwyth	1.76	0.37	3.98	1.10	62.3	11	1.43	0.71	2.93	0.74	51.5	11	1.71	0.28	3.86	0.97	56.7	11

Table 4.3: ***Summary of Statistics for Monthly Measurements of Base Cations in 2002 (Jan – Dec 2002).***

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	0.01	*-0.04*	0.08	0.04	521.0	12	0.04	-0.01	0.08	0.03	59.9	12	0.66	0.27	1.00	0.25	38.1	12
21	Glensaugh	-0.01	*-0.07*	0.07	0.05	803.8	11	0.06	0.02	0.13	0.03	61.9	10	0.53	0.19	1.46	0.36	68.1	10
24	Rothamsted	0.06	*-0.01*	0.12	0.04	61.5	12	0.07	0.01	0.13	0.04	56.5	12	0.83	0.12	1.49	0.44	53.1	12
30	Strathvaich Dam	0.03	0.00	0.10	0.03	104.4	12	0.05	0.02	0.10	0.03	47.2	12	0.62	0.21	1.07	0.22	36.0	12
31	Eskdalemuir	0.03	0.01	0.06	0.02	59.6	12	0.05	0.00	0.09	0.03	53.3	12	0.57	0.00	1.09	0.31	55.3	12
32	High Muffles	0.04	*-0.02*	0.07	0.02	66.4	12	0.06	0.01	0.10	0.03	50.9	12	0.74	0.27	1.27	0.30	41.1	12
33	Stoke Ferry	0.05	0.01	0.08	0.02	44.6	12	0.07	0.02	0.14	0.04	52.5	12	0.81	0.23	1.43	0.37	45.2	12
34	Yarner Wood	0.05	*-0.01*	0.10	0.03	67.3	12	0.11	0.03	0.21	0.06	58.5	12	1.16	0.05	2.25	0.64	55.7	12
83	Barcombe Mills	0.09	-0.05	0.61	0.17	189.3	12	0.13	0.02	0.45	0.12	94.7	12	1.19	0.23	2.72	0.71	59.5	12
40	Sutton Bonington	0.06	0.02	0.10	0.02	35.1	12	0.08	0.04	0.12	0.02	31.5	12	0.88	0.26	1.33	0.32	36.5	12
45	Lough Navar	0.04	0.02	0.14	0.03	77.1	12	0.06	0.01	0.15	0.04	65.6	12	0.82	0.21	1.74	0.47	57.8	12
70	Cwmystwyth	0.06	0.02	0.19	0.05	73.1	11	0.10	0.03	0.21	0.05	51.6	11	1.04	0.22	2.13	0.51	48.7	11

The monthly-averaged concentrations of gaseous nitric acid (HNO_3) and particulate nitrate (NO_3^-) determined at each site are shown in Figure 4.4. The individual plots illustrate that the concentrations of both species are reasonably stable at a monthly level, and have a weak seasonal variability. Although not apparent at all sites, concentrations of HNO_3 are often seen to be highest in summer (*e.g.*, linked to photochemical activity), while concentrations of NO_3^- were largest in Spring 2002.

The graphs shown in Figure 4.4 illustrate the trends for HNO_3 and NO_3^-. However, parallel measurements have been made for HCl and Cl^-, SO_2 and SO_4^{2-}, as well as base cations.

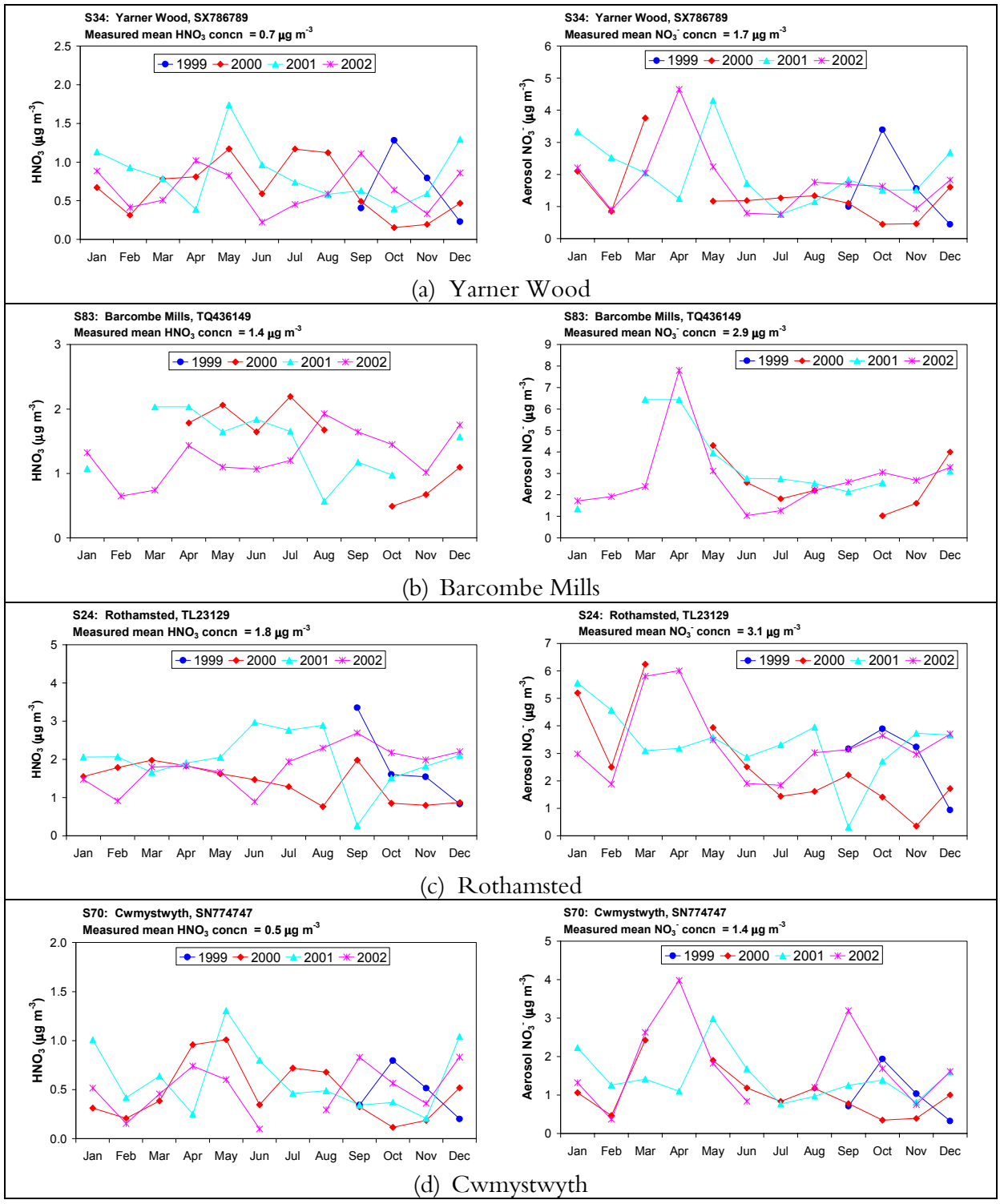


Figure 4.4: ***Measurements of Gaseous HNO_3 and aerosol NO_3^- made in the Nitric Acid Monitoring Network between September 1999 andJune 2002.***

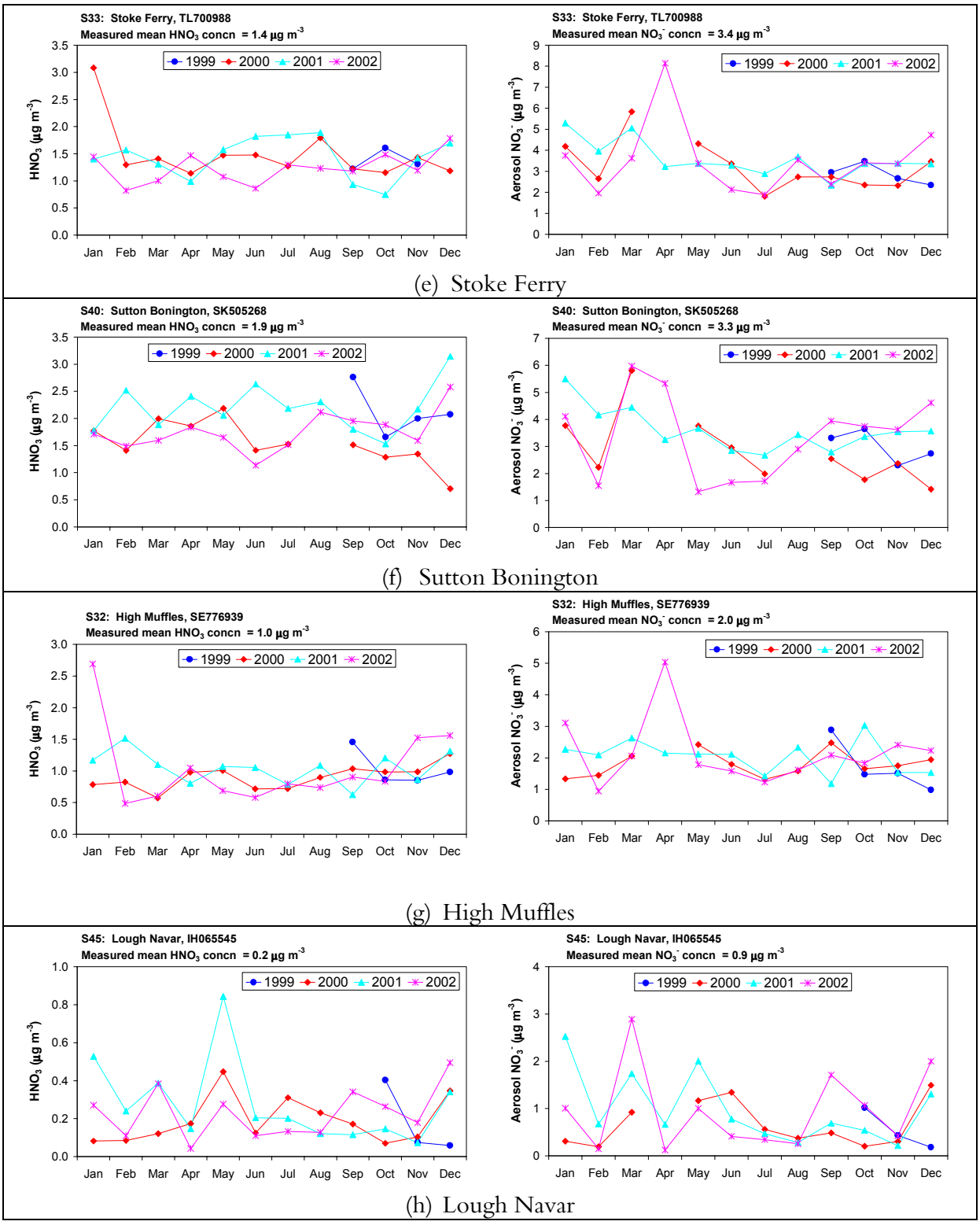


Figure 4.4: ***Measurements of Gaseous HNO3 and aerosol NO3- made in the Nitric Acid Monitoring Network between September 1999 andJune 2002.*** **(cont)**

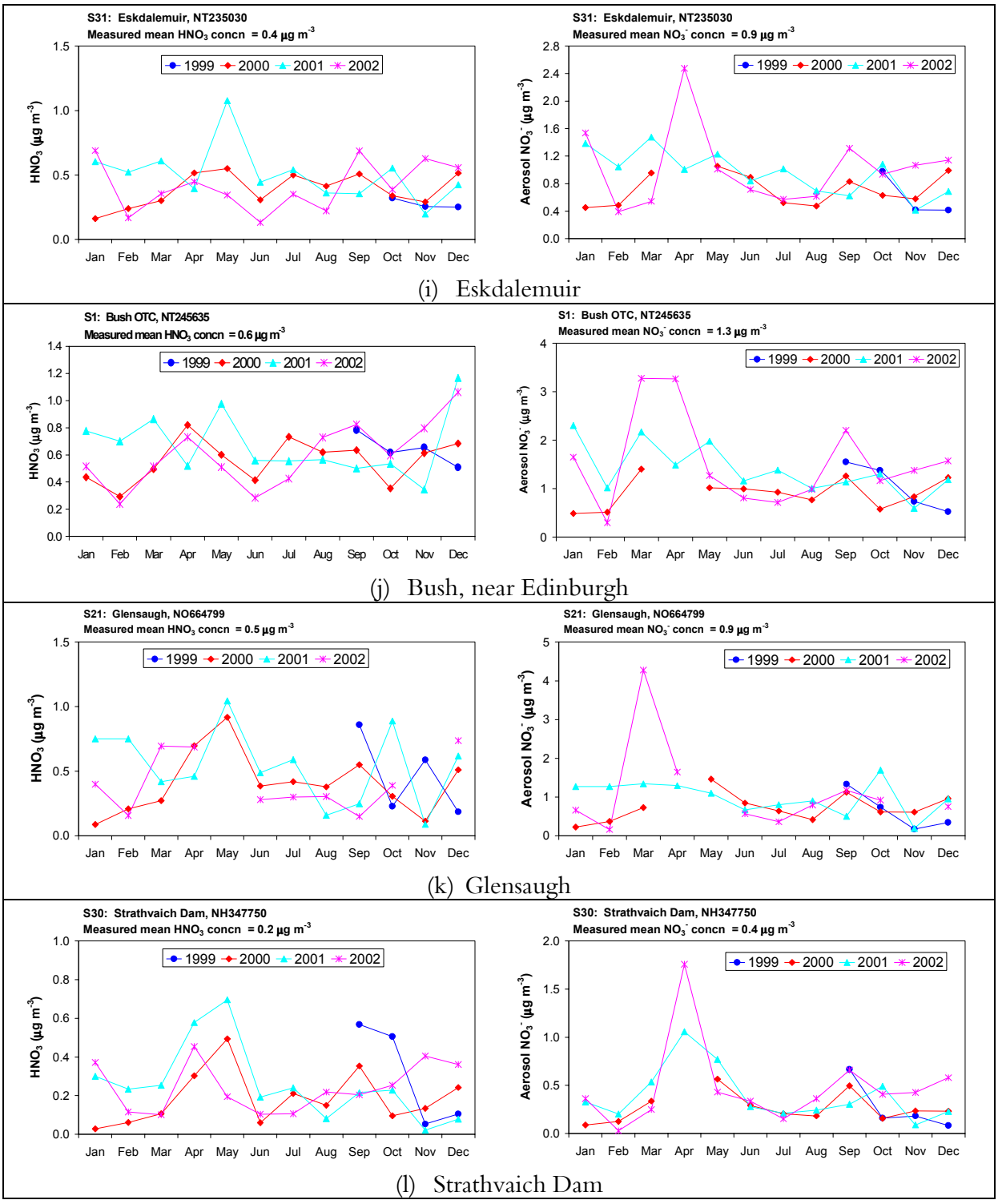


Figure 4.4: ***Measurements of Gaseous HNO3 and aerosol NO3- made in the Nitric Acid Monitoring Network between September 1999 andJune 2002.*** **(continued)**

Figure 4.5 shows the annual cycle in the concentrations of the 3 gas phase and the 6 aerosol components, based on an average of the measurements made at the 12 sites in 2002.

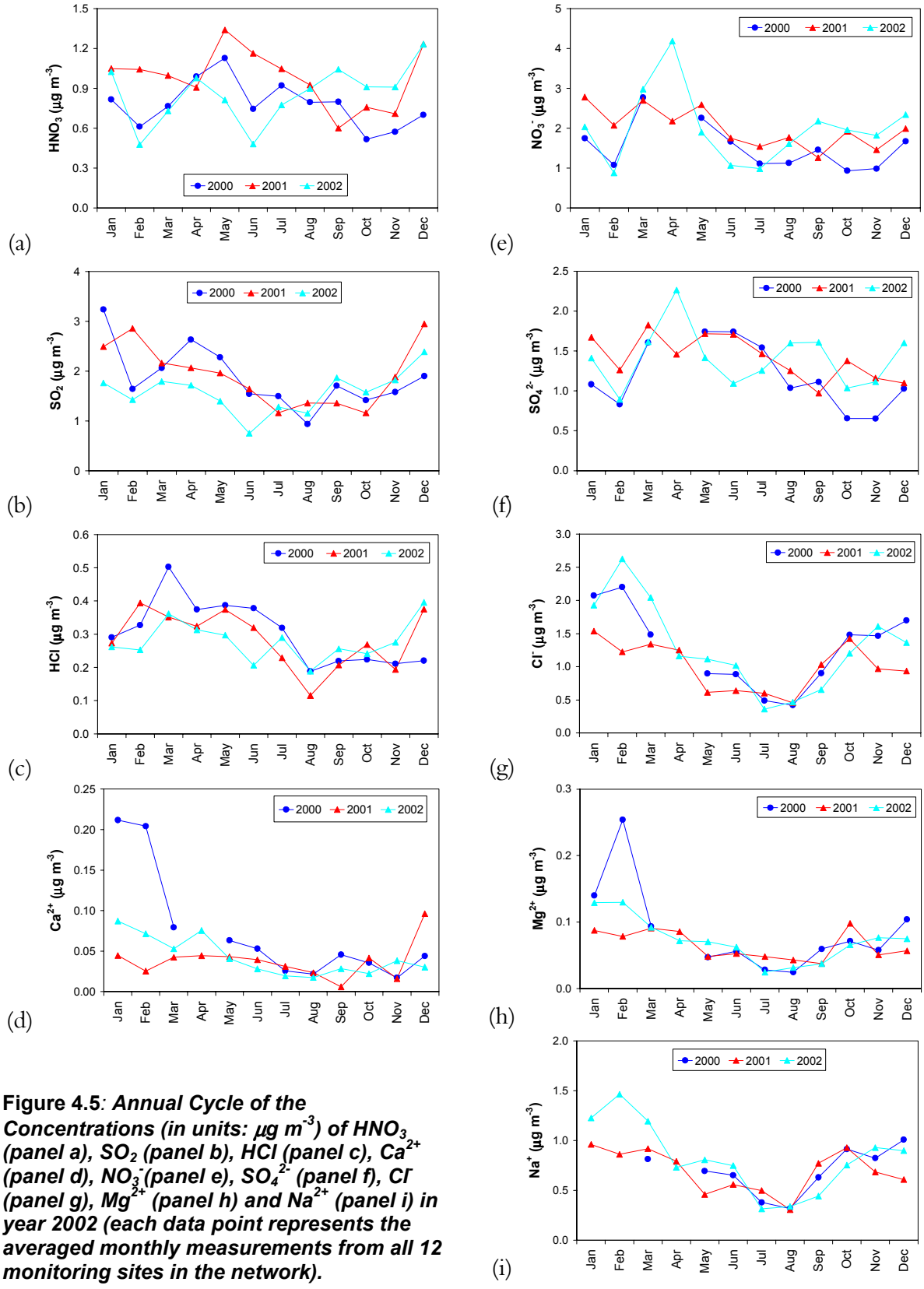


Figure 4.5: ***Annual Cycle of the Concentrations (in units: µg m^{-3}) of HNO_3 (panel a), SO_2 (panel b), HCl (panel c), Ca^{2+} (panel d), NO_3^- (panel e), SO_4^{2-} (panel f), Cl^- (panel g), Mg^{2+} (panel h) and Na^{2+} (panel i) in year 2002 (each data point represents the averaged monthly measurements from all 12 monitoring sites in the network).***

The results from the other measurements are illustrated by scatter plots of the concentration between gas and aerosol phases of the different components (Figure 4.6)[2]. There is some correlation between the concentrations of all the pollutants, and 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.

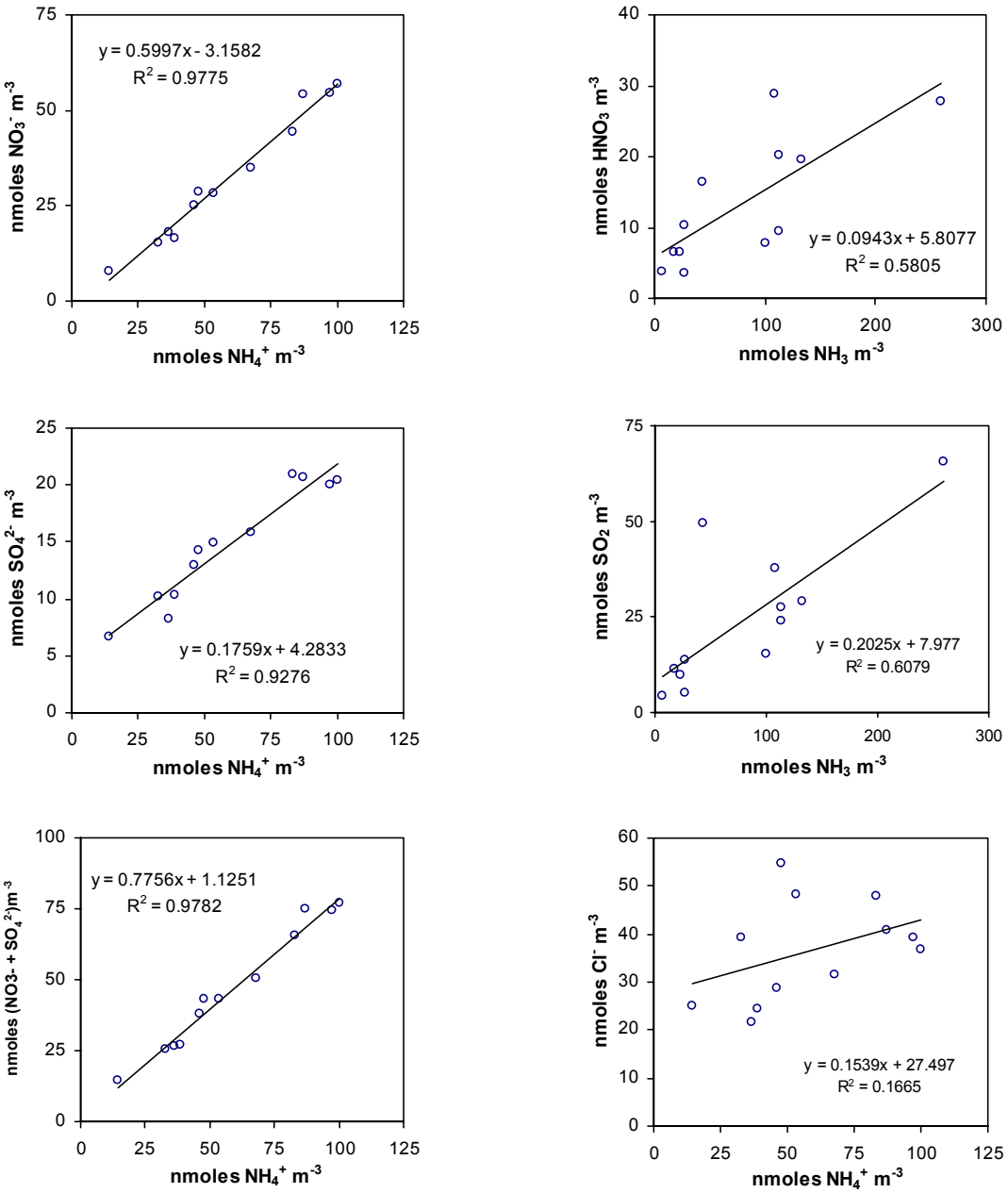


Figure 4.6: ***Scatter plots of showing the relationships between concentrations of HNO_3, SO_2, NH_3, NO_3^-, SO_4^{2-} and , NH_4^+ from the monthly measurements at 12 sites (units: nmol m^{-3}).***

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

[2] 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.

are highest for the aerosol components. This reflects 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^+.

Interpolated concentration fields for 2002 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.

Figure 4.7 shows the distribution of annual mean SO_2 concentrations for 2002. The largest annual concentrations of 4.2 μg 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. The DELTA system provides these estimates as an added benefit which is useful for the QA of the SO_2 network. SO_2 concentrations generally decreased towards the West and North of the UK, with the lowest concentrations of < 0.5 μg SO_2 m^{-3} in northern Scotland.

HCl and Cl^- concentrations are largest in the south east and south west of England (Barcombe Mills, Yarner Wood) and lowest in the west of the country (Lough Navar, Eskdalemuir and Cwmystwyth) and most of Scotland. The distribution may reflect the dual contribution to atmospheric Cl^- 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. 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.

It should be noted that the maps (Figure 4.7) of the acid gas and aerosol concentrations are constructed using bi-linear interpolation. This is because the number of sites is not sufficient to permit more sophisticated interpolation methods (*e.g.*, kriging). 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. For example, with the current UK dry deposition of HNO_3 at ~60 kt N yr^{-1}, there could easily be errors of 20 kt N yr^{-1} due to use of only 12 sites in the present network.

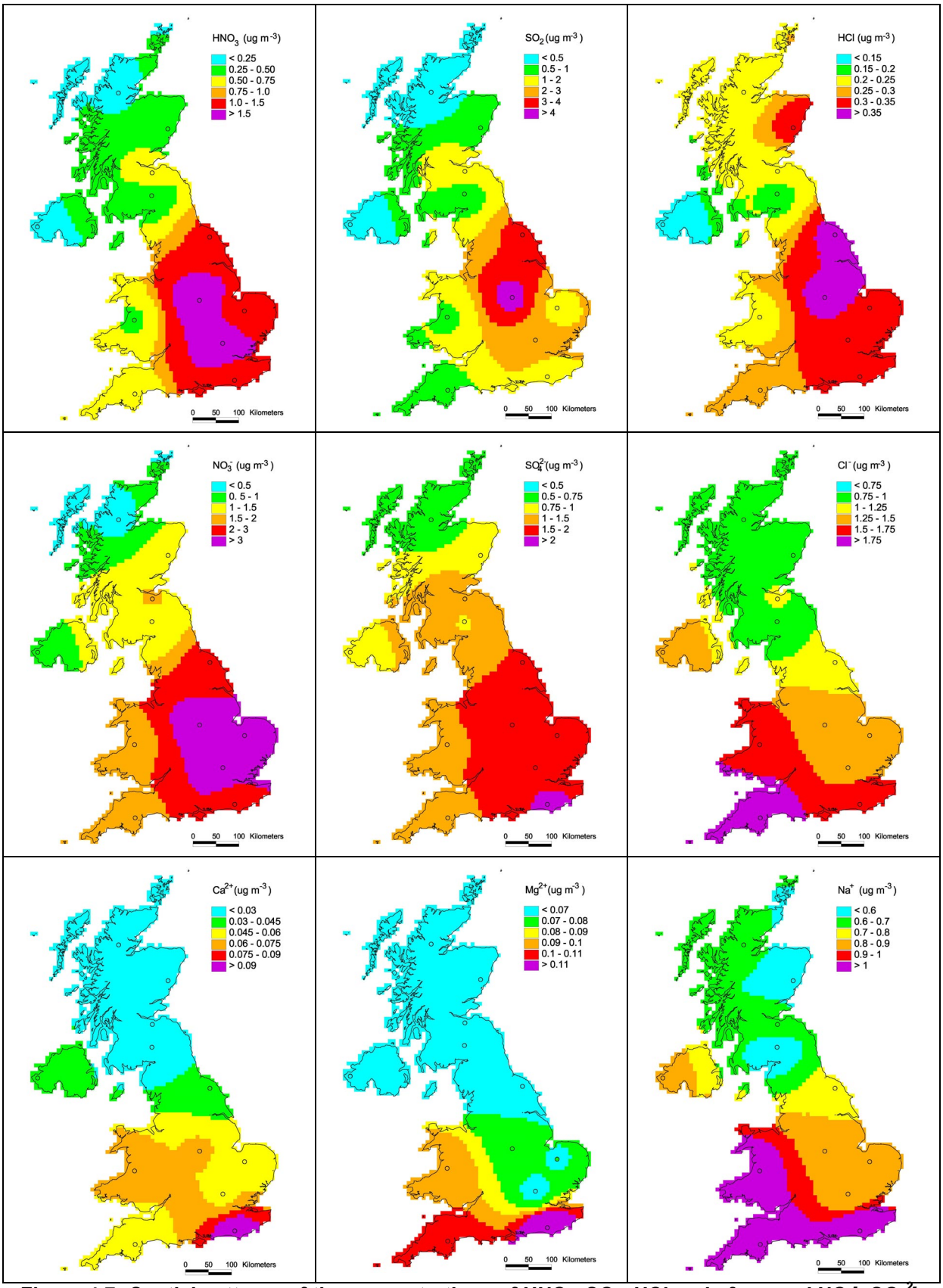


Figure 4.7: ***Spatial patterns of the concentrations of HNO_3, SO_2, HCl and of aerosol NO_3^-, SO_4^{2-}, Cl^-, Ca^{2+}, Mg^{2+} and Na^+ concentrations in the UK from the averaged monthly measurements (Jan-02 to Dec-02).***

Figure 4.4 illustrated the monthly changes at each site, and after three full years on monitoring, the seasonal trends are clearly distinctive and replicated for each site. Figure 4.5 shows the average seasonal changes for 2000 to 2002 for all pollutants averaged over the twelve sites, and indicate 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 Sampling frequency for rainwater collection switched from one week sampling to fortnightly sampling at the end of 2001. To assess the effect on sampler performance an intercomparison was conducted. This involved installing an extra bulk rain collector at each of three sampling sites. The sites at Eskdalemuir, Lough Navar and Thorganby were selected to provide a representative sub sample of sites from the main sampling network. Lough Navar was chosen because it is a characteristic remote site, Thorganby because it is typical of sites in the source region and Eskdalemuir because it is intermediate between both. The intercomparison began at the end of 2001 and is ongoing.

Figure 5.1 shows how the rainwater volume, non-sea salt sulphate and nitrate deposition compares at each site. The 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.

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 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 site at Lough Navar is surrounded by trees.

The non-sea salt sulphate depositions are typically less than 10 mg S m^{-2} at Lough Navar and are much less than the typical values at Thorganby. Possible reasons for the high degree of scatter in non-salt sulphate deposition measured at Lough Navar may be as follows:

- The site is relatively close to the sea and a significant proportion of the total sulphate collected will arise from seasalt. The uncertainty in non-sea salt sulphate deposition is expected to be higher when the sea salt contribution is higher.
- The relatively pristine environment at Lough Navar may allow other sources of sulphur, such as that which may be dry deposited to have a significant influence.
- Some of the variation may be random – may be the method detection limit is being approached.

Table 5.1 summarises the measurement campaign. The rainwater volume excludes samples that have been affected by bird strike and for which there was only one sample of the sample pair available.

The coefficient of determination between the rainwater volumes and depositions is shown to be excellent at Thorganby. Less good agreement was obtained for the samples from Eskdalemuir and Lough Navar.

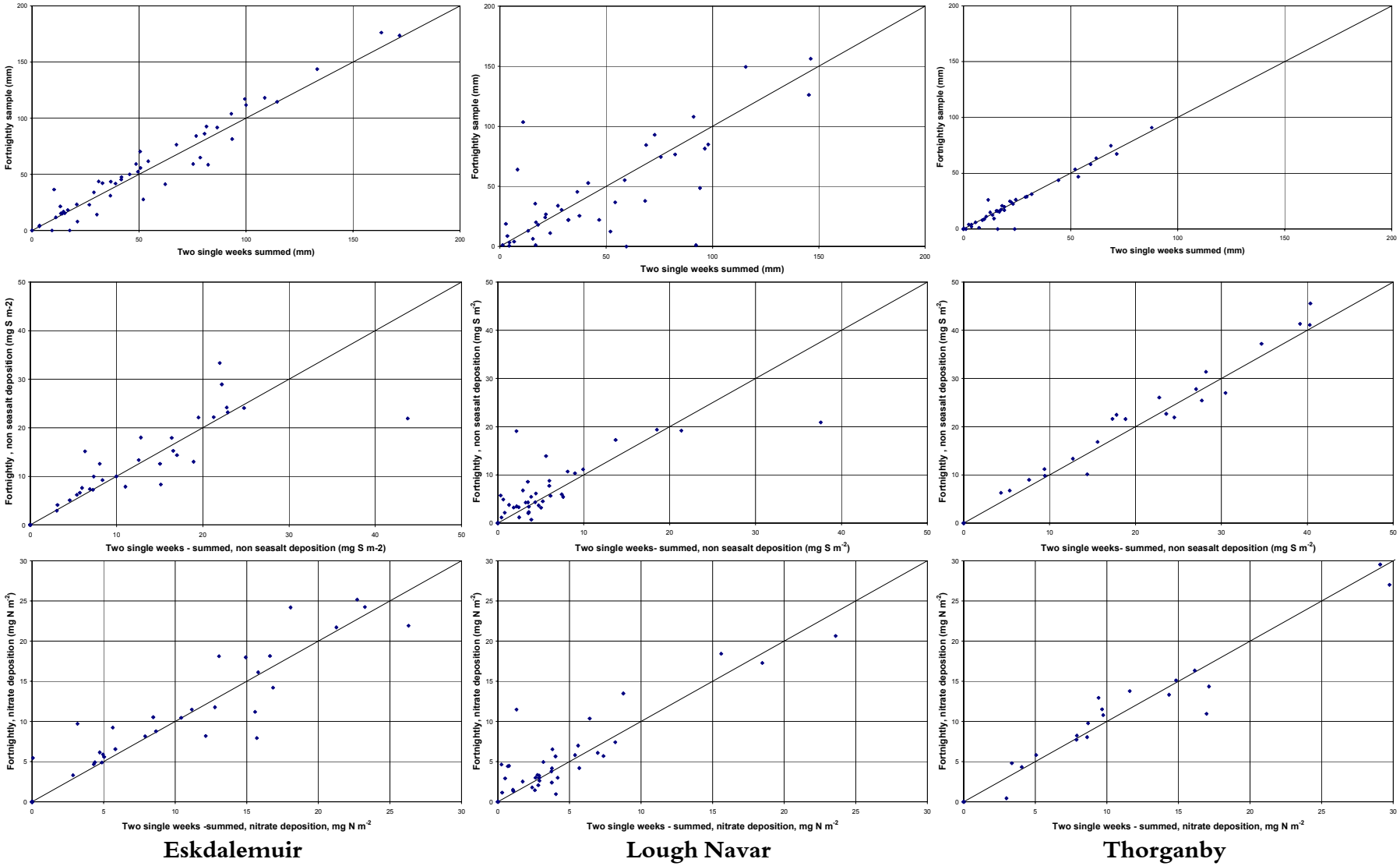


Figure 5.1: ***A Comparison of Rainwater Volume (top row), Sulphur Deposition (middle row) and Nitrate Deposition (bottom row) measured at Eskdalemuir, Lough Navar and Thorganby.***

The nitrate concentrations determined for samples collected by each collector agreed better than the non-sea salt sulphate concentrations for all sites. With the exception of the relatively large difference for non-sea salt sulphate concentration at Lough Navar, the differences could be regarded as insignificant. However, the investigation is preliminary and a more thorough investigation will be conducted when the data set is complete.

Table 5.1: ***Summary of Sampling Frequency Intercomparison***

Sampling site	**Eskdalemuir**		**Lough Navar**		**Thorganby**	
Start date for intercomparison	16/01/02		26/11/01		5/6/02	
Last results 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
Site code	5162	5002	5161	5006	5163	5117
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	

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.

In this report we will:

- compare measured and expected rainwater components sulphur dioxide, nitrogen dioxide as part of the 20th and 21st EMEP intercomparisons of analytical methods.
- assess our performance against other analytical laboratories in Europe.
- examine trends in systematic bias.

5.2.1 A Comparison of Measured and Expected Concentrations

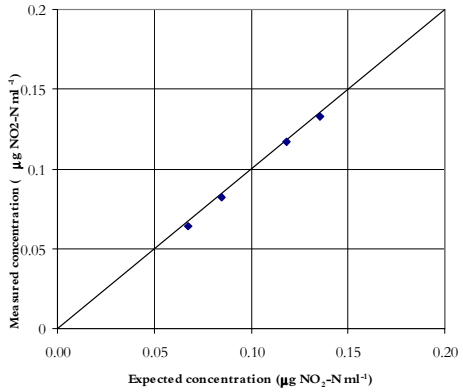
Since the preparation of the 2001 data report, we have received the results of the 20th and 21st EMEP intercomparisons. The results of the 20th Intercomparison are presented alongside the

performance of other European laboratories in Uggerud *et al.* [2003]. The assessment by NILU for the 21st Intercomparison is expected by summer 2004.

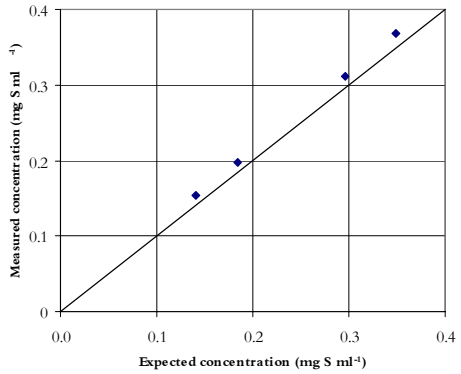
The intercomparison exercise involves analysing the following:

- Four synthetic rainwater samples. These samples consist of deionised water containing known amounts of sulphate, nitrate, ammonium, strong acid, magnesium, sodium, chloride, calcium and potassium.
- Four synthetic nitrogen dioxide samples. These are solutions of nitrite in deionised water.
- Four synthetic samples sulphur dioxide. These consist of 0.3 % hydrogen peroxide absorbing solution acidified with hydrochloric acid containing different amounts of sulphuric acid.

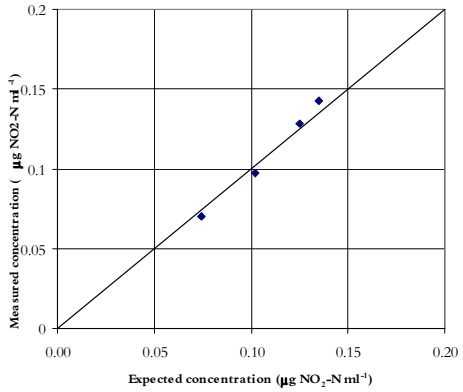
Figure 5.2 presents the corresponding plots for sulphur dioxide and nitrogen dioxide concentrations. The nitrite solution shows good agreement but the sulphur dioxide concentration appears to over read. This will be discussed further in the following section. Figure 5.3 shows that all analytes in the rainwater samples were analysed well for both intercomparisons.



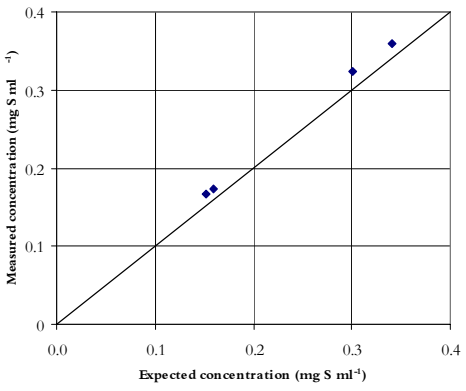
20th Intercomparison- Nitrogen dioxide



20th Intercomparison- Sulphur dioxide

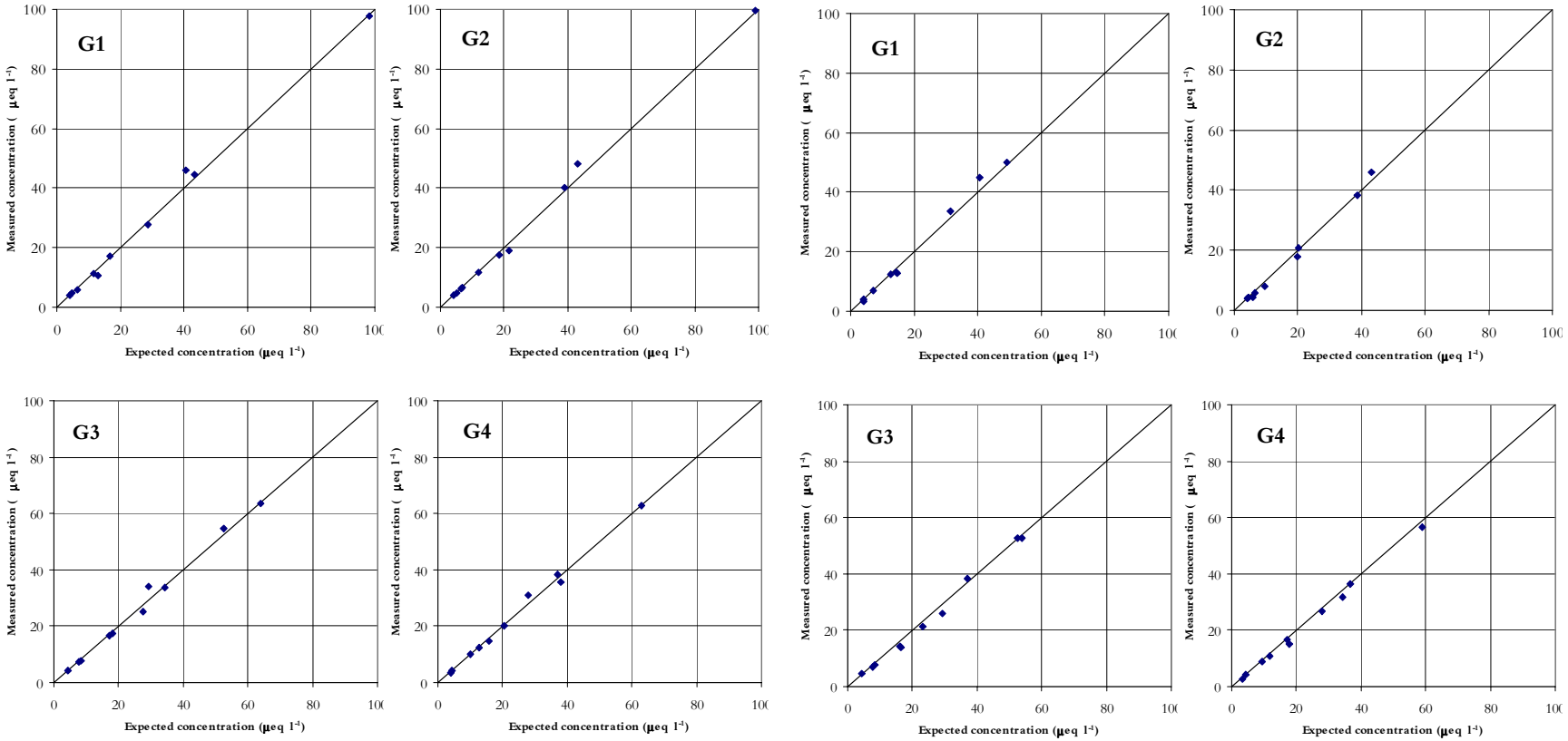


21st Intercomparison- Nitrogen dioxide



21st Intercomparison- Sulphur dioxide

Figure 5.2: ***A comparison of Measured and Expected Nitrogen Dioxide and Sulphur Dioxide as determined by the 20th and 21st EMEP Intercomparison of Samples.***



20th Intercomparison- Rainwater components

21st Intercomparison- Rainwater components.

Figure 5.3: ***A Comparison of Measured and Expected Rain Water Ion Concentrations, pH values, and Conductivity for the 20th and 21st EMEP Sample Intercomparisons.***

5.2.2 Overall Performance of UK in 20th Intercomparison

An assessment of the 20th intercomparison is also provided in Aas *et al.* [2003]. Table 5.2 (Table 14 in Aas *et al.*) shows that all the acidifying and base cation concentrations measured in the United Kingdom are within 5% of the expected concentration. Compared to the other countries involved in the intercomparisons the United Kingdom can be seen to perform well.

Table 5.2: ***Results from the 20th Laboratory Intercalibration of Precipitation; Absolute Value of the Average Percentage Error. 'pH diff' is the Average Deviation in pH unit from the Expected Value.***

Component / Laboratory	SO_4-S	NO_3-N	NH_4-N	Mg	Na	Cl	Ca	K	Cond.	pH diff	pH (H+)
1 AT	3.7	2.0	3.8	8.6	8.0	7.5	9.7	23.5	1.8	0.03	6.9
3 CS	0.9	2.6	18.1	1.4	3.3	6.0	1.7	2.0	2.5	0.01	1.9
4 DK	3.7	3.2	3.5	11.0	8.7	3.6	1.8	45.9	4.6	0.03	7.4
5 FI	1.7	1.9	3.3	2.3	0.9	1.4	8.3	1.4	0.5	0.03	6.4
6 FR	2.7	3.8	0.2	8.9	0.9	5.0	3.7	6.0	3.9	0.01	2.1
7 DE(Leip.)	4.9	1.4	1.8	13.0	0.3	3.5	6.5	1.4	11.5	0.03	5.8
8 DE(Schau.)	0.2	2.3	3.4	1.0	1.1	2.0	2.5	1.6	2.7	0.05	10.5
10 HU	2.8	0.5	5.2	2.5	16.9	24.0	10.9	7.5	0.6	0.04	9.4
11 IS	1.5	3.0		4.4		21.5	5.4	34.3	4.5	0.08	17.0
12 IE (MET)	0.3	0.5	4.0	1.2	1.1	1.5	5.6	5.3	4.4	0.01	2.5
13 IT-CNR	1.7	0.8	2.1	4.2	49.0	0.8	6.0	1.4	2.6	0.03	6.9
14 NL	11.0	0.8	1.7	7.1	8.1	2.8	7.7	3.9	4.4	0.10	19.8
15 NO	1.3	1.2	2.9	5.7	1.3	3.0	6.4	2.1	3.4	0.05	10.6
16 PL	1.6	3.0	4.8	4.9	1.8	2.7	1.3	4.4	1.4	0.01	3.3
17 PT	6.1	0.7	14.7	2.5	22.9	69.2	20.2		2.6	0.13	20.2
18 RO			15.0			10.7			5.2	0.11	29.3
19 ES	1.3	1.5	19.7	0.4	4.7	50.8	1.5	1.5	0.5	0.10	19.8
20 SE	0.3	1.0	2.6	13.2	2.7	4.3	4.4	12.6	11.1	0.09	18.4
21 CH	4.0	0.4	1.8	0.5	1.6	1.0	3.4	6.4	2.1	0.04	8.0
22 RU	10.5	5.4	4.8	7.2	26.9	29.5	15.3	16.0	5.5	0.06	13.0
23 GB	**0.5**	**3.2**	**4.6**	**3.3**	**11.3**	**3.2**	**2.8**	**8.1**	**13.0**	**0.02**	**4.9**
24 YU	27.0	31.5		31.5	3.2	31.9	36.1	1.8	35.5	0.07	14.1
26 CA	1.1	1.5	2.0	0.7	0.6	0.9	0.8	2.5		0.05	10.6
27 US-I	2.0	1.2	5.8	2.2	1.0	0.9	3.4	1.9	1.4	0.05	11.6
30 IT(ISP)											
31 SK	1.0	1.6	3.5	0.8	3.0	5.1	3.8	2.3	1.0	0.01	2.3
32 LT	8.2	1.1	5.0		11.1	8.3	40.2	4.3	2.6	0.05	11.6
33 LV	2.6	1.6	8.2	0.8	0.8	3.3	1.4	3.1	1.6	0.05	11.1
34 TR	0.5	3.4	3.1	1.8	7.0	5.5	6.7	17.6	3.3	0.04	9.6
35 CR	4.1	3.2	2.2	0.6	0.8	1.3	1.7	2.2	2.6		15.6
36 SI	2.3	0.8	3.2	3.2	1.7	2.0	0.9	2.5	6.3	0.05	10.5
37 IE (ESB)	2.2	1.8	11.3	25.7	2.2	10.1	16.0	22.7	3.8	0.14	39.1
38 EE	9.2	6.8	3.5	20.1	10.1	7.4	6.1	12.8	53.4	0.07	14.5
39 PL (Env.)	5.6	3.2	12.2	1.0	1.3	10.3	1.6	1.3	8.1	0.07	14.1
40 MK		55.1	79.2	9.0	8.2		8.9	25.6	32.1		

Performance criteria

<5% | 5-10% | 10-20% | >20%

Table 5.3 gives a corresponding overview of the result for the air components. The measured nitrogen dioxide concentrations are within 5 % of the expected concentration. The sulphur dioxide agreement for the sulphur dioxide is less good but is good compared to the other countries still using absorbing solution to collect the gas.

Table 5.3: ***Results from the 20th Laboratory Intercalibration of Main Components in Air; the Absolute Value of the Average Percentage Error.***

Component / Laboratory	SO_2 impr.	SO_2 abs.	HNO_3	NH_3	NO_2
3 CS	4.5		2.0		4.9
4 DK	5.2		1.9	17.1	4.4
5 FI	8.4		3.3	3.3	
6 FR		0.9			
8 DE	9.3		3.0	5.2	5.4
10 HU				36.2	3.5
11 IS	18.1		34.4	12.7	
12 IE					1.1
15 NO	2.4	12.7	4.6	6.1	9.6
16 PL	13.1		5.9	15.4	2.3
17 PT		20.3			
19 ES		17.4			8.2
20 SE	17.8			6.6	1.3
21 CH		2.4			
22 RU	38.2		24.1		6.1
23 UK		**6.9**			**3.0**
31 SK	4.5		3.4		21.3
32 LT					1.2
33 LV	17.6		3.5	9.6	2.8
34 TU	8.2		5.2		2.6
35 HR					2.8
36 SI	23.4				0.5
38 EE	24.0				0.7
39 PL Env.	2.4		1.8	10.8	6.4

Performance criteria

	<5%
	5-10%
	10-20%
	>20%

5.2.3 Estimating Systematic Errors from Laboratory Comparisons

Aas *et al.* [2003] presented the systematic error, or bias, for the first 19 intercomparison exercises. Since there were only four measurements in each intercomparison they used a coarse measure to quantify the relative bias. This value was calculated based upon the average expected concentration, T:

$$Relative\ Bias = \frac{4\ median\ [D]\ x\ 100}{(T_1+T_2+T_3+T_4)}\ \%$$

where:

D_i = median difference between each laboratories measured and expected value

T_1, T_2, T_3, T_4 = are the expected values for each sample

Table 5.4 shows systematic bias estimated for the United Kingdom for each measured species since the intercomparisons began. The results show for recent years:

- that the great majority of the analytes are determined with a systematic error of less than 15%.
- that the calcium concentrations were overestimated in 1997 and 1999. The magnesium concentration was also overestimated in 1999.

- The hydrogen ion concentration was overestimated in 2000, which was why the acidity measurements for 2000 were removed.

Table 5.4: ***The Systematic Error for Rainwater Components and Air Components for the UK EMEP laboratory.***

Year	1977	1978	1978	1979	1980	1981	1982	1984	1986	1987	1989	1991	1993	1994	1995	1997	1999	2000	2001
Intercomparison Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Component																			
Ammonium	1.7		-32	3.9	0.7	8.5	-1	-2.5	-20	0.2	1.1	4.4	9.3	0.6	7.7	-18	-3.1	-0.2	-1.6
Calcium								-6.2	-4	-3.9	-6.3	1	9.6	11.7	8.2	17.4	36.4	-1.3	-1.3
Chloride	7.6		11.1	6.9	0	15.7	1.1	2.5	-0.6	-0.7	1.2	-5	10.7	27	0.9	-2.4	25.5	19.6	0.2
Magnesium	-9		-21	-5.6	-18	2.4	5.1	-9.6	-5.9	-7.3	9.6	4	4.7	12.6	6	4.2	16.4	-3.2	-1.1
Nitrate	-6.7		-8.6	1.7	-1.5	-0.6	8.9	-2.6	0	0.2	2.6	1.6	3.1	3.3	6.5	-3.6	1.9	-1.1	-0.5
Hydrogen ion	4.3		4	8.4	52.8	-6.2	33.7	4.3	14.3	0	-1.6	9.4	-5.9	3.7	10.4	-2.9	-15	54.3	11.8
Potassium									17.2	-5.5	-15	11.1	-15	-17	2.9	0.2	-5.1	-3.5	-11
Sodium	-2.6		26.6	6.6	8.1	-5.4	-0.4	-2	-0.2	-1.7	-2.3	14.2	0.1	-0.6	2.7	-5.5	-2.9	-2.6	-3.4
Sulphate	-6.6		-5.1	-3.1	-4.7	-0.2	-2.5	2	1.5	1.1	1.7	3.9	4.7	3.6	2.8	-1.8	10.8	1.5	-0.4
Sulphur dioxide	-4.3	-4.5	-3.6	2.2	3.8	18.3	2.4	3	1.6	20.3	2.1	1	12.8	3.6	16.3	-1.1	10.3	-	6.6
Nitrogen dioxide														4.6	4	-0.9	-5.7	-	4.4

Colour coding to highlight systematic error values

Less than – 15 % **Greater than 15 %**

When all four samples either all have a negative or all have a positive relative bias then the outcome indicates a systematic error. This is indicated in the table by the blue shading adjacent to the value.

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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 adverse 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.

We would like to acknowledge the dedication and contribution of the network manager Sandra Hasler (AEA Technology) who was involved in the monitoring programme until March 2002.

Appendices

CONTENTS

Appendix 1
Bulk Precipitation Data, 2002

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Appendix 1.1: Bulk Precipitation Data, 2002 - 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 μeq 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 Appendix 2, Table 10 include all samples collected and are therefore sometimes higher than the totals presented in this section.

Goonhilly

2002

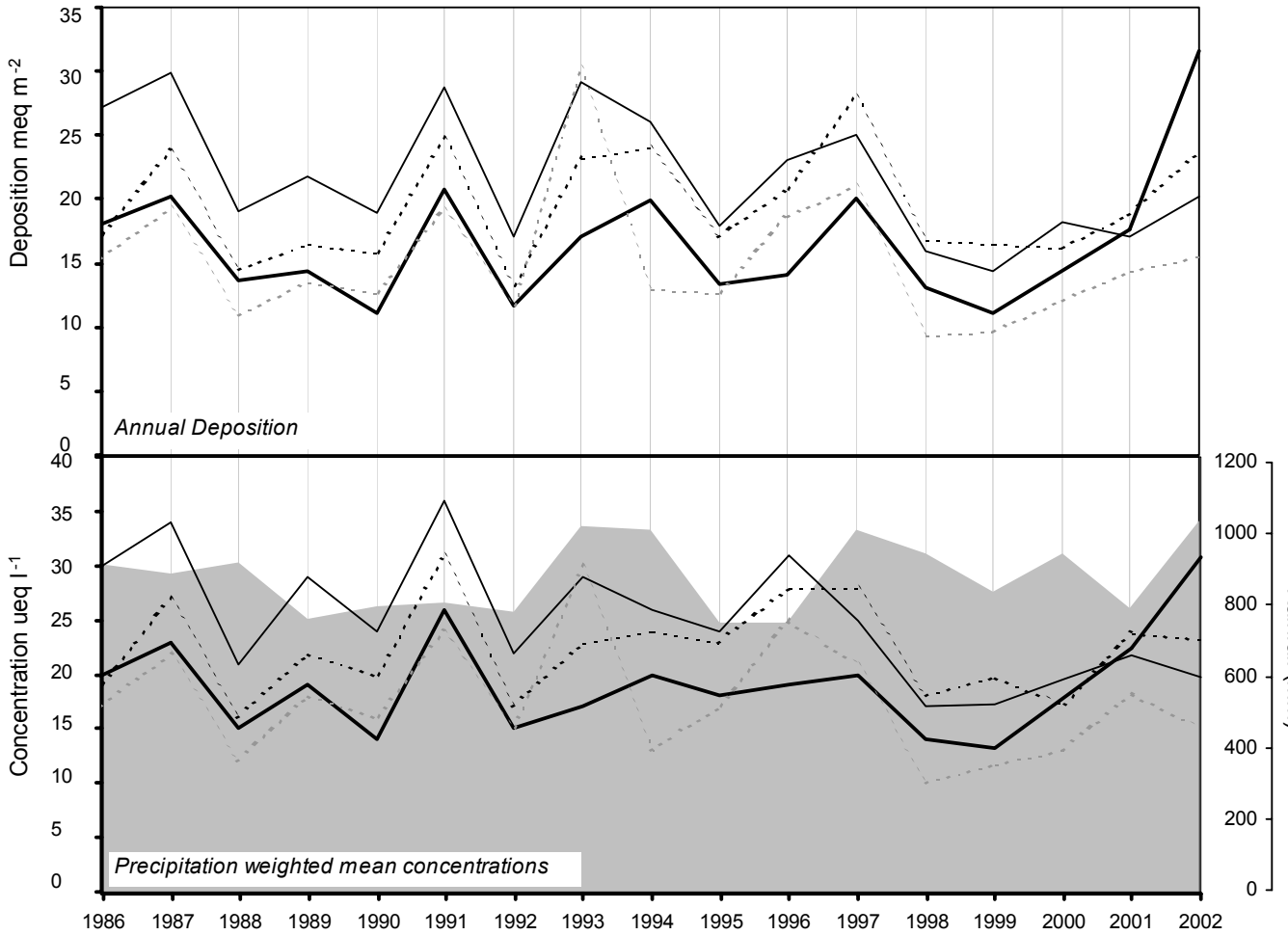
Site Code:	**5003**
Easting:	**1723**
Northing:	**214**
Latitude:	**50 02 54 N**
Longitude:	**05 10 52 W**
Altitude (m):	**108**
Rainfall (mm):	**973**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, Satellite tracking station

Other measurements:
DT

Site Operator:
British Telecom



long-term trends in concentration (+x = increase; -x = decrease)
hydrogen ion 0.16 ueq/l (0.91 %/year): 16 years' data - No significant trend detected
non-marine sulphate -0.68 ueq/l (-2.23 %/year): 17 years' data + Significant trend detected
nitrate 0.03 ueq/l (0.15 %/year): 17 years' data - No significant trend detected
ammonium -0.23 ueq/l (-1.18 %/year): 17 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 S/cm	rainfall (mm)
02/01/2002	16/01/2002	4.0	130.2	136.2	66.3	501.4	109.2	32.5	537.3	11.0	<1.0	69.8	97.7	123.0	11.6
16/01/2002	01/02/2002	5.0	65.5	8.6	2.8	462.6	102.9	20.0	546.7	9.7	<1.0	9.8	10.5	82.0	91.8
01/02/2002	13/02/2002	5.1	108.3	8.2	4.0	837.9	182.5	36.1	928.0	17.0	<1.0	7.4	8.9	133.0	45.5
13/02/2002	28/02/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
18/02/2002	28/02/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
28/02/2002	20/03/2002	4.7	64.7	28.4	16.9	376.8	83.8	21.3	403.7	8.9	<1.0	19.3	21.9	68.0	56.6
20/03/2002	28/03/2002	4.7	81.9	31.8	25.2	393.2	89.1	23.1	446.9	7.9	<1.0	34.5	20.4	78.0	3.5
28/03/2002	12/04/2002	4.5	70.1	58.8	45.0	181.7	41.7	20.6	197.3	4.3	<1.0	48.2	30.2	51.0	11.5
12/04/2002	26/04/2002	4.7	58.0	36.4	20.4	200.3	46.8	20.0	214.4	4.3	<1.0	33.9	20.9	47.0	16.1
26/04/2002	02/05/2002	6.2	78.5	6.7	9.4	478.2	117.9	39.8	595.5	10.9	<1.0	20.9	0.6	90.0	5.3
02/05/2002	15/05/2002	4.5	70.0	38.7	20.0	274.8	61.8	18.9	326.8	5.7	<1.0	36.9	30.2	65.0	15.0
15/05/2002	30/05/2002	4.8	57.1	16.6	12.0	333.0	71.3	20.2	377.0	7.0	<1.0	17.0	14.5	62.0	69.1
30/05/2002	26/06/2002	4.4	47.9	19.1	6.9	176.4	40.3	9.8	196.3	3.7	<1.0	26.7	36.3	44.0	23.8
20/06/2002	27/06/2002	4.8	29.2	15.0	5.0	69.2	15.3	5.2	73.7	1.7	<1.0	20.9	17.0	22.0	8.4
27/06/2002	03/07/2002	4.8	22.9	8.0	1.1	163.1	36.5	8.1	166.3	3.4	<1.0	3.2	16.2	34.0	25.6
03/07/2002	17/07/2002	4.6	23.9	12.8	5.2	60.4	13.1	4.6	68.1	1.5	<1.0	16.6	28.2	21.0	35.2
17/07/2002	01/08/2002	4.9	77.9	43.1	36.6	177.9	42.1	26.2	173.8	5.9	<1.0	56.5	13.2	43.0	6.9
01/08/2002	16/08/2002	5.3	43.3	17.9	33.9	187.9	40.0	12.2	199.3	4.0	6.2	20.6	5.1	38.0	14.9
16/08/2002	29/08/2002	6.2	22.9	13.7	59.4	25.4	4.0	2.4	28.0	6.6	11.9	19.8	0.6	16.0	35.8
29/08/2002	16/09/2002	4.9	93.8	69.2	50.6	348.7	85.2	39.3	384.9	9.1	<1.0	51.8	12.9	76.0	6.5
16/09/2002	25/09/2002	4.0	73.0	124.1	71.2	110.9	26.1	17.2	105.9	3.0	<1.0	59.6	107.2	63.0	29.9
25/09/2002	10/10/2002	4.3	59.5	46.8	53.3	90.5	20.3	9.4	94.6	2.0	<1.0	48.6	49.0	35.0	28.0
10/10/2002	23/10/2002	4.7	43.6	14.8	8.6	261.0	57.1	15.2	291.4	5.4	<1.0	12.2	20.9	50.0	101.1
23/10/2002	08/11/2002	4.3	62.4	18.1	2.6	391.9	89.4	18.8	456.7	8.0	<1.0	15.2	45.7	74.0	61.0
08/11/2002	22/11/2002	4.6	31.7	8.0	5.6	184.6	40.1	7.6	212.6	3.6	<1.0	9.5	28.2	38.0	119.4
22/11/2002	05/12/2002	4.5	68.8	12.9	2.4	450.6	101.1	19.7	516.9	9.2	<1.0	14.6	31.6	83.0	40.8
05/12/2002	18/12/2002	3.9	111.3	96.6	108.9	147.9	33.5	13.1	203.2	4.7	<1.0	93.4	138.0	89.0	30.4
18/12/2002	02/01/2003	4.6	23.4	9.1	3.1	132.7	28.2	6.2	144.2	2.9	<1.0	7.4	26.9	43.0	130.6
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5003			53.9	23.2	15.1	283.1	62.6	15.4	319.7	6.0	-	19.8	30.8	59.8	1024.6

Yarner Wood

2002

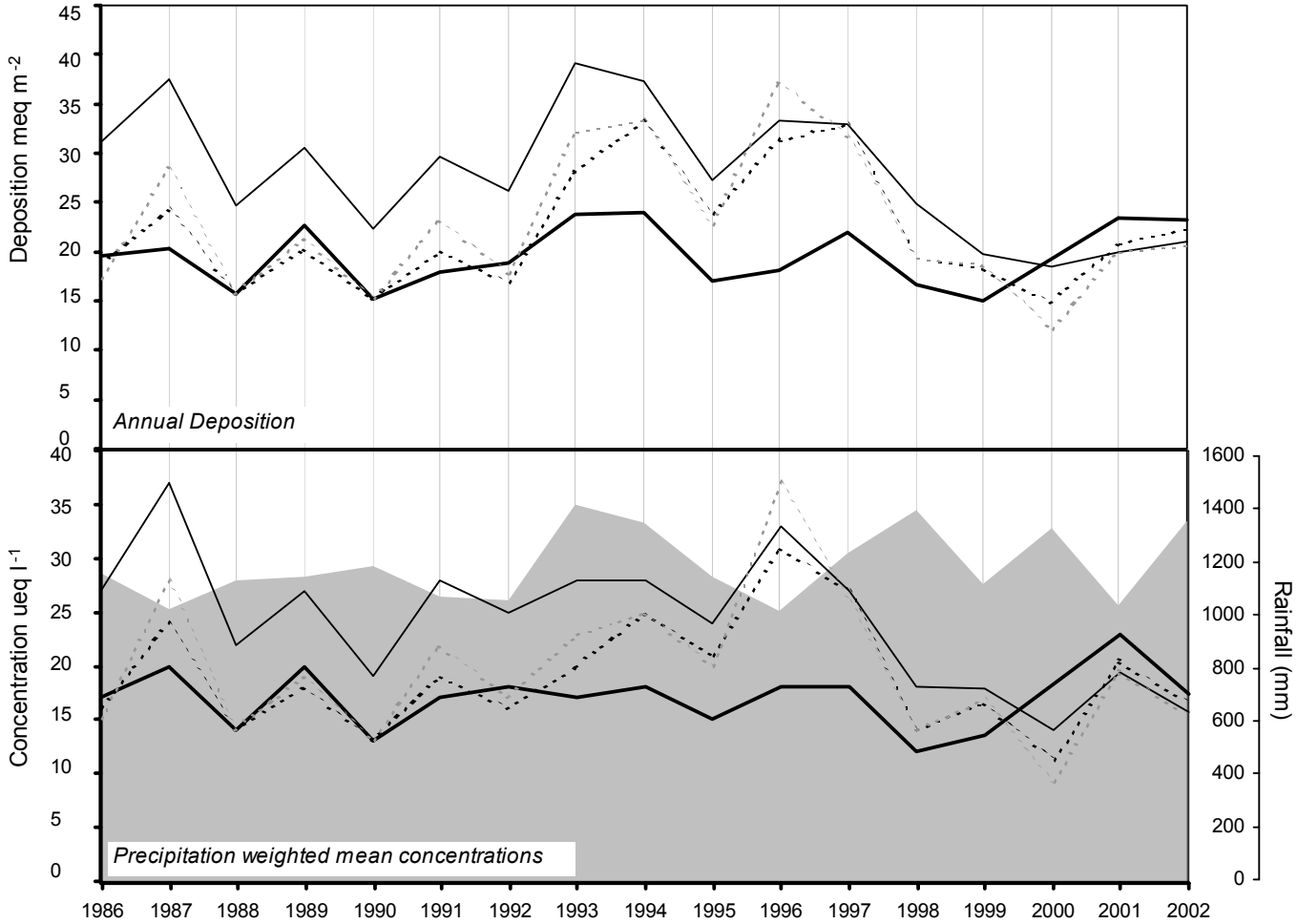
Site Code:	**5008**
Easting:	**2786**
Northing:	**789**
Latitude:	**50 35 48 N**
Longitude:	**03 42 56 W**
Altitude (m):	**119**
Rainfall (mm):	**1377**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, nature reserve

Other measurements:
DT, Daily 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
0.00 ueq/l (-0.02 %/year): 16 years' data
\- No significant trend detected

non-marine sulphate
-0.74 ueq/l (-2.46 %/year): 17 years' data
\+ Significant trend detected

nitrate
0.04 ueq/l (0.19 %/year): 17 years' data
\- No significant trend detected

ammonium
-0.11 ueq/l (-0.52 %/year): 17 years' data
\- No significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
02/01/2002	16/01/2002	4.6	63.4	73.0	56.7	137.3	32.9	14.2	163.1	3.8	<1.0	46.9	26.9	48.0	18.3
16/01/2002	30/01/2002	5.0	32.1	10.2	4.4	174.0	36.6	7.6	195.0	3.7	<1.0	11.1	11.2	35.0	151.7
30/01/2002	13/02/2002	4.8	64.8	8.6	2.8	471.1	102.9	20.8	521.0	9.7	<1.0	8.0	15.1	64.0	183.4
13/02/2002	27/02/2002	5.3	25.0	3.7	4.4	203.5	43.1	9.6	218.9	4.8	<1.0	0.4	4.9	29.0	62.9
27/02/2002	13/03/2002	4.8	44.8	25.2	30.4	197.4	44.6	11.7	219.3	4.6	<1.0	21.0	15.1	44.0	22.7
13/03/2002	27/03/2002	4.8	37.8	36.9	41.6	89.8	19.8	10.4	96.2	2.2	<1.0	27.0	17.8	29.0	49.7
27/03/2002	10/04/2002	4.7	293.3	286.8	313.6	236.0	62.9	113.3	227.2	8.4	<1.0	264.9	20.0	-	2.0
10/04/2002	24/04/2002	5.7	48.8	41.9	59.8	56.7	14.9	28.7	66.3	2.0	<1.0	42.0	2.1	25.0	8.5
24/04/2002	08/05/2002	5.4	66.4	25.6	29.3	335.5	78.4	33.8	391.1	9.1	<1.0	26.0	4.2	65.0	44.9
08/05/2002	21/05/2002	4.5	53.2	29.0	34.8	82.6	19.8	16.8	95.4	2.4	<1.0	43.3	31.6	30.0	89.6
21/05/2002	05/06/2002	5.0	30.7	8.7	8.2	180.8	39.4	10.1	204.2	4.7	<1.0	8.9	9.1	35.0	58.2
05/06/2002	19/06/2002	4.6	34.8	17.3	18.3	80.2	17.5	8.3	91.2	1.8	<1.0	25.2	24.5	26.0	25.7
19/06/2002	03/07/2002	5.3	16.4	8.8	9.3	70.1	13.5	8.6	76.3	4.5	<1.0	8.0	5.4	16.0	22.9
03/07/2002	17/07/2002	4.7	10.9	9.4	3.6	16.8	5.6	5.4	20.4	0.7	<1.0	8.9	19.1	11.0	26.1
17/07/2002	31/07/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
31/07/2002	14/08/2002	5.4	20.6	17.6	25.0	25.6	7.4	8.0	27.8	1.1	<1.0	17.5	3.8	13.0	22.0
14/08/2002	28/08/2002	5.4	13.3	15.4	28.8	2.8	1.5	6.8	4.8	1.0	<1.0	13.0	3.7	<10.0	22.6
28/08/2002	11/09/2002	4.3	50.8	83.8	57.9	40.5	12.7	26.8	40.6	3.2	<1.0	45.9	52.5	39.0	8.8
11/09/2002	24/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
24/09/2002	09/10/2002	5.6	56.8	69.0	68.1	48.7	13.5	39.9	43.3	4.3	<1.0	50.9	2.7	26.0	5.5
09/10/2002	23/10/2002	4.8	31.1	17.2	13.2	149.3	33.8	12.8	169.0	3.7	3.3	13.1	16.2	32.0	66.3
23/10/2002	06/11/2002	4.7	55.0	17.1	18.5	332.1	70.9	15.6	371.3	7.0	<1.0	15.0	20.9	59.0	77.1
06/11/2002	20/11/2002	4.5	27.5	18.1	13.3	117.0	25.3	6.3	146.8	2.7	<1.0	13.4	30.9	30.0	79.7
20/11/2002	04/12/2002	4.8	52.5	11.9	11.2	338.7	74.5	15.4	391.3	6.7	<1.0	11.7	17.8	63.0	90.2
04/12/2002	18/12/2002	4.9	70.0	72.4	112.8	58.0	16.9	9.3	67.6	12.4	22.0	63.0	12.6	34.0	54.0
18/12/2002	02/01/2003	4.6	17.4	9.6	8.1	73.9	16.1	3.8	84.2	1.8	<1.0	8.5	24.0	28.0	148.2
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5008			40.2	16.6	15.3	204.1	44.8	12.8	229.9	4.6	-	15.7	17.3	39.9	1341.8

Barcombe Mills

2002

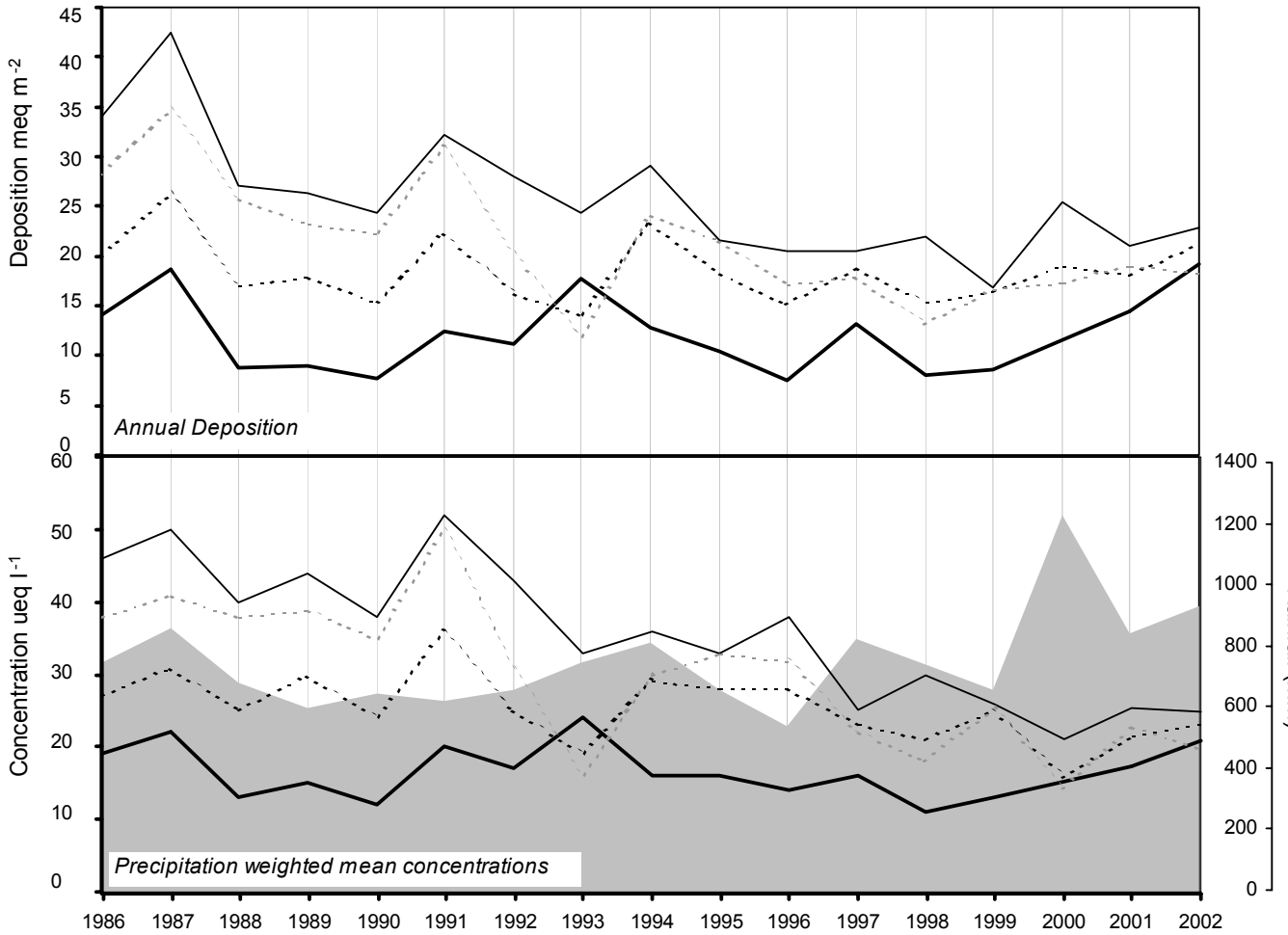
Site Code:	**5007**
Easting:	**5437**
Northing:	**1149**
Latitude:	**50 54 54 N**
Longitude:	**00 02 40 E**
Altitude (m):	**10**
Rainfall (mm):	**876**

[30 year mean 1940 - 1971]

Site Environment:
Water pumping site

Other measurements:
DT, Daily 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
-0.12 ueq/l (-0.68 %/year): 16 years' data
\- No significant trend detected

non-marine sulphate
-1.64 ueq/l (-3.37 %/year): 17 years' data
++++ Very strong trend detected

nitrate
-0.52 ueq/l (-1.77 %/year): 17 years' data
\+ Significant trend detected

ammonium
-1.51 ueq/l (-3.61 %/year): 17 years' data
++ Moderately strong trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
02/01/2002	18/01/2002	5.4	53.4	59.3	75.5	94.2	16.4	16.4	105.8	9.0	<1.0	42.1	3.8	34.0	29.9
18/01/2002	29/01/2002	4.8	58.7	13.1	4.7	366.3	76.5	25.4	419.1	12.1	<1.0	14.6	17.0	69.0	46.1
29/01/2002	12/02/2002	5.4	71.4	15.6	17.8	420.0	92.6	31.5	469.6	11.6	<1.0	20.8	4.2	74.0	55.8
12/02/2002	27/02/2002	5.2	36.1	9.9	10.2	202.9	45.3	16.4	229.1	8.7	<1.0	11.6	5.8	39.0	39.5
27/02/2002	12/03/2002	6.4	210.0	60.8	138.3	964.1	206.2	114.5	1111.8	40.2	6.4	93.9	0.4	180.0	2.4
12/03/2002	27/03/2002	4.8	59.0	42.4	67.7	115.8	27.4	19.6	134.0	5.5	<1.0	45.1	17.0	36.0	33.4
27/03/2002	09/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
09/04/2002	23/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
23/04/2002	07/05/2002	5.1	62.9	34.5	7.6	234.8	54.3	40.3	259.3	22.4	5.8	34.6	7.8	51.0	46.9
07/05/2002	21/05/2002	5.9	41.6	31.3	62.5	34.1	8.6	14.5	39.1	6.3	<9.7	37.5	1.4	18.0	29.7
21/05/2002	05/06/2002	4.6	35.8	16.2	7.3	117.6	27.9	16.3	133.4	5.5	<9.7	21.7	22.9	30.0	56.4
05/06/2002	18/06/2002	4.5	58.5	53.9	34.3	71.8	19.4	37.0	83.2	5.8	<1.0	49.8	33.1	35.0	36.3
18/06/2002	02/07/2002	6.5	68.9	31.3	41.3	189.0	43.3	58.9	212.1	31.6	16.2	46.1	0.3	48.0	6.7
02/07/2002	18/07/2002	4.7	21.5	13.1	8.5	49.0	12.7	10.0	57.4	3.6	<1.0	15.6	18.2	18.0	59.5
18/07/2002	30/07/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
30/07/2002	13/08/2002	4.3	34.3	37.2	19.1	9.6	3.6	10.3	14.5	2.4	<1.0	33.1	53.7	24.0	44.0
13/08/2002	29/08/2002	4.3	234.8	320.8	294.1	79.2	32.3	159.7	83.5	65.2	53.5	225.3	47.9	106.0	2.8
29/08/2002	10/09/2002	5.0	31.7	17.1	13.1	97.1	24.1	23.2	110.4	7.6	<1.0	20.0	10.7	25.0	55.9
10/09/2002	25/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/09/2002	08/10/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
08/10/2002	22/10/2002	5.6	222.1	49.0	35.0	1291.0	285.6	140.9	1548.9	60.4	6.1	66.6	2.7	218.0	31.3
22/10/2002	05/11/2002	4.5	65.7	13.5	1.9	344.3	81.5	32.1	411.8	14.7	<1.0	24.2	35.5	68.0	56.2
05/11/2002	22/11/2002	4.6	39.0	13.2	11.2	215.9	50.2	13.8	250.8	5.9	<1.0	12.9	26.9	45.0	115.9
22/11/2002	03/12/2002	5.0	41.2	19.8	23.3	195.6	42.9	13.9	220.7	5.0	<1.0	17.6	9.3	40.0	9.8
03/12/2002	17/12/2002	4.2	53.6	43.9	46.8	80.0	19.4	10.1	90.8	2.9	<1.0	44.0	58.9	34.0	36.2
17/12/2002	31/12/2002	4.6	17.2	11.7	10.2	49.9	10.1	3.6	56.3	1.4	<1.0	11.2	24.5	45.0	90.9
31/12/2002	14/01/2003	4.9	23.6	10.3	10.5	106.0	23.8	6.6	121.4	3.0	<1.0	10.8	13.5	25.0	36.7
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5007			49.3	23.0	19.9	203.2	46.0	22.8	235.3	9.2	-	24.8	20.8	47.6	922.6

Compton

2002

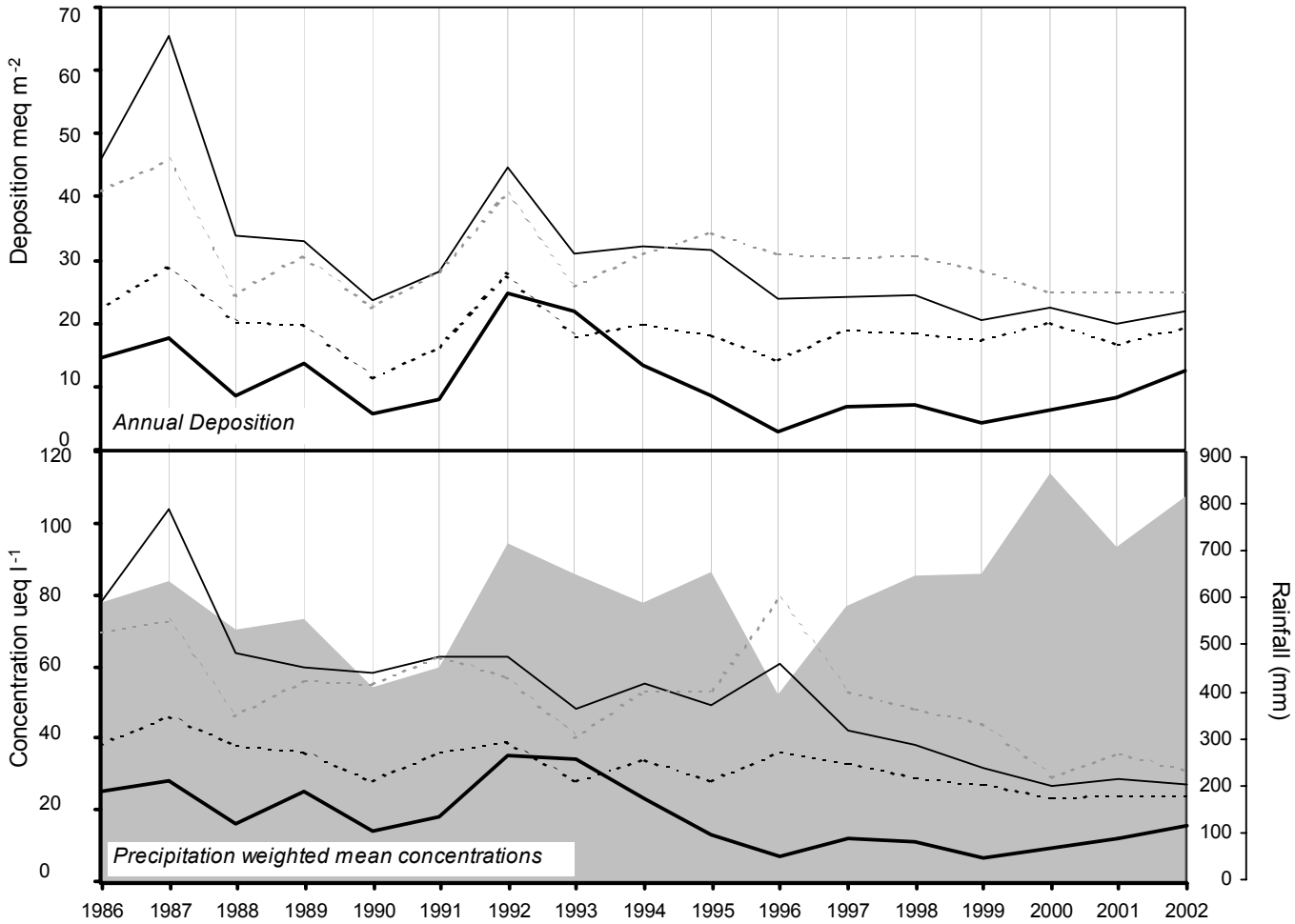
Site Code:	**5129**
Easting:	**4512**
Northing:	**1804**
Latitude:	**51 31 11 N**
Longitude:	**01 15 43 W**
Altitude (m):	**105**
Rainfall (mm):	**707**

[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): 16 years' data
\+ Significant trend detected

non-marine sulphate
-3.56 ueq/l (-4.39 %/year): 17 years' data
++++ Very strong trend detected

nitrate
-1.00 ueq/l (-2.48 %/year): 17 years' data
+++ Strong trend detected

ammonium
-1.80 ueq/l (-2.70 %/year): 17 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 S/cm	rainfall (mm)
02/01/2002	14/01/2002	4.3	136.3	132.6	211.9	48.7	11.4	21.7	54.7	3.9	<1.0	130.5	47.9	59.0	5.6
14/01/2002	28/01/2002	5.5	26.0	9.8	25.2	95.4	13.3	5.1	114.1	3.6	<1.0	14.5	3.1	23.0	43.7
28/01/2002	11/02/2002	5.2	37.9	13.4	17.9	200.8	42.4	15.4	236.6	16.0	<1.0	13.7	6.3	40.0	39.7
11/02/2002	24/02/2002	5.7	35.2	14.2	34.6	103.1	20.6	16.2	118.7	3.8	<1.0	22.8	2.0	21.0	24.0
24/02/2002	11/03/2002	5.8	30.8	8.8	19.2	146.0	28.9	16.5	163.2	3.6	<1.0	13.2	1.6	30.0	26.1
11/03/2002	25/03/2002	5.1	41.2	40.7	69.2	46.8	9.5	7.7	48.6	1.7	<1.0	35.5	7.6	22.0	31.5
25/03/2002	08/04/2002	5.3	394.9	212.0	495.5	91.9	29.8	223.1	88.2	19.2	<1.0	383.8	5.0	-	1.1
08/04/2002	23/04/2002	6.5	101.2	48.5	68.4	70.6	26.1	150.9	77.1	19.3	<1.0	92.7	0.3	44.0	5.0
23/04/2002	10/05/2002	5.0	29.5	22.9	6.2	53.8	13.7	22.2	65.6	19.8	<1.0	23.0	9.5	20.0	49.3
10/05/2002	20/05/2002	5.9	31.8	29.7	32.7	16.6	6.8	24.0	19.4	9.5	<1.0	29.8	1.3	15.0	14.7
20/05/2002	05/06/2002	5.5	30.7	17.1	24.7	83.0	18.5	15.8	96.7	7.2	<9.7	20.7	3.5	21.0	31.8
05/06/2002	17/06/2002	4.5	38.5	47.1	46.9	16.9	5.2	11.0	23.5	1.2	<1.0	36.5	31.6	23.0	33.1
17/06/2002	01/07/2002	6.3	56.9	60.1	43.7	51.6	19.4	86.6	61.2	21.0	5.1	50.7	0.5	31.0	2.5
01/07/2002	15/07/2002	4.8	16.0	9.8	8.9	8.0	2.8	5.5	19.0	13.7	<1.0	15.0	15.5	11.0	45.5
15/07/2002	29/07/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
29/07/2002	11/08/2002	4.9	27.7	31.5	37.9	4.2	2.7	12.8	9.2	2.3	<1.0	27.2	12.9	13.0	46.9
11/08/2002	27/08/2002	6.2	96.4	67.6	127.9	6.2	6.0	62.0	15.2	8.1	7.3	95.7	0.6	32.0	9.8
27/08/2002	10/09/2002	5.0	29.9	25.4	23.5	13.5	6.5	36.6	26.8	3.5	<1.0	28.2	9.1	15.0	21.2
10/09/2002	23/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
23/09/2002	07/10/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
07/10/2002	22/10/2002	4.7	29.2	28.3	23.6	41.4	9.9	13.6	52.0	2.3	<1.0	24.2	20.9	19.0	80.5
22/10/2002	04/11/2002	4.7	52.1	26.3	33.5	225.5	49.0	20.2	259.7	12.1	<1.0	25.0	18.6	47.0	35.6
04/11/2002	18/11/2002	4.7	30.3	17.5	16.8	31.5	6.8	3.5	37.1	1.5	<1.0	26.5	20.9	15.0	90.0
18/11/2002	02/12/2002	5.0	33.9	15.7	29.3	99.8	21.6	7.2	118.4	3.1	<1.0	21.8	10.7	26.0	44.5
02/12/2002	16/12/2002	4.2	95.5	73.5	122.3	63.0	15.3	14.5	87.3	3.4	<1.0	87.9	66.1	69.0	22.6
16/12/2002	30/12/2002	4.7	22.5	13.0	22.0	26.4	5.4	3.1	31.0	1.0	<1.0	19.4	18.2	13.0	51.1
30/12/2002	13/01/2003	4.6	17.6	12.1	13.9	20.4	4.5	3.5	25.2	1.0	<1.0	15.2	24.0	13.0	48.2
Precipitation-weighted annual mean for site (samples containing phosphate are excluded)															Total rainfall
5129			34.6	24.1	31.2	62.4	13.7	13.5	74.8	5.7	-	27.1	15.5	22.6	805.0

Crai Reservoir

2002

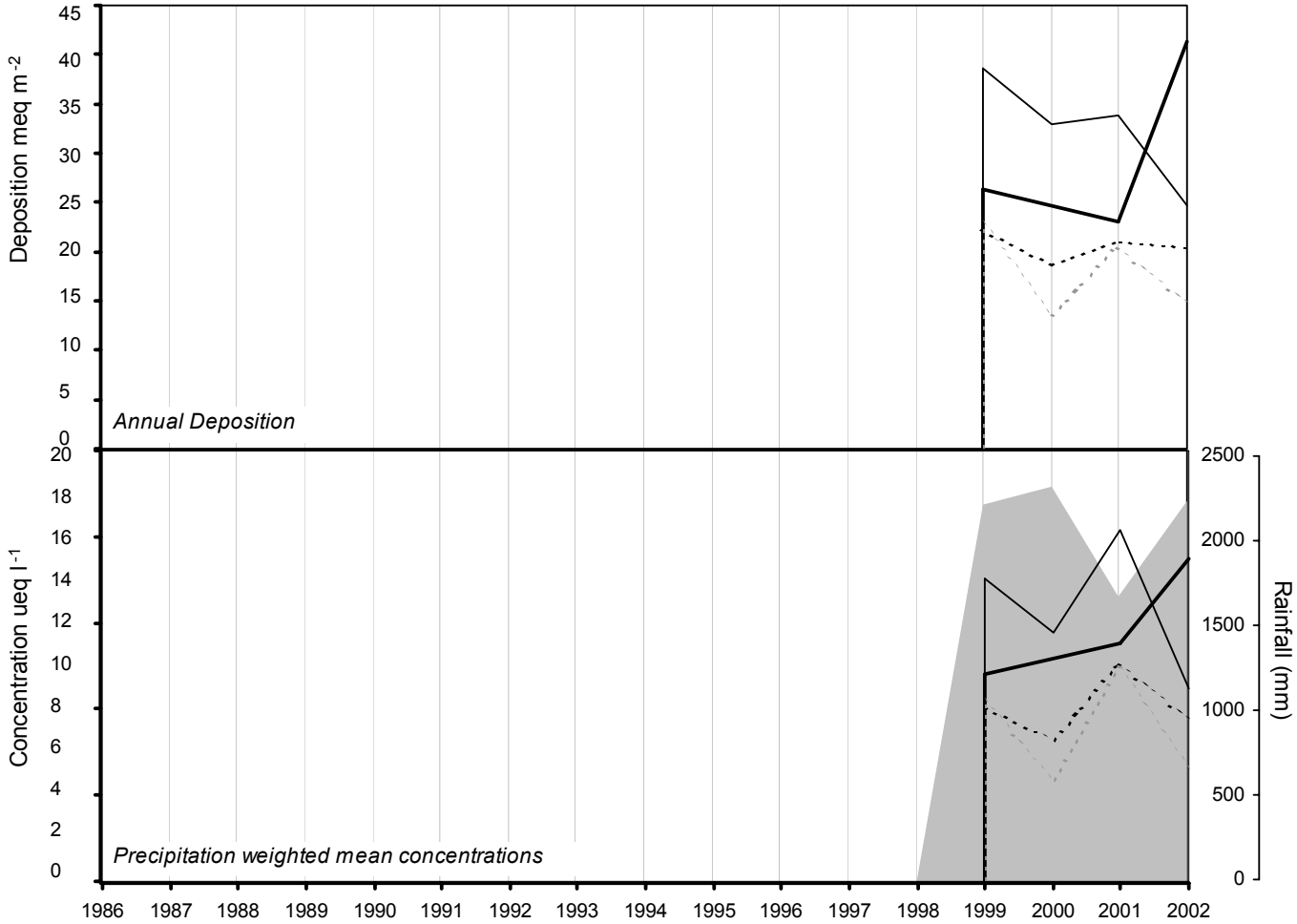
Site Code:	**5154**
Easting:	**2882**
Northing:	**2219**
Latitude:	**51 53 25 N**
Longitude:	**03 37 10 W**
Altitude (m):	**310**
Rainfall (mm):	**-**

[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): 3 years' data
n/a Insufficient Data

non-marine sulphate
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

nitrate
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

ammonium
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

ACID DEPOSITION DATA REPORT, 2002

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 S/cm	rainfall (mm)
11/01/2002	25/01/2002	4.8	25.5	5.6	3.1	137.9	29.5	6.8	154.7	3.0	<1.0	8.9	15.1	23.0	249.9
25/01/2002	08/02/2002	5.0	21.3	4.1	2.8	122.8	26.9	5.9	142.2	2.5	<1.0	6.5	10.7	24.0	244.9
08/02/2002	22/02/2002	5.2	15.0	3.2	2.8	93.8	19.7	4.6	105.8	2.0	<1.0	3.7	6.8	16.0	171.1
22/02/2002	08/03/2002	5.2	28.6	2.8	2.9	201.9	43.9	9.5	228.9	4.2	<1.0	4.2	5.9	36.0	127.6
08/03/2002	22/03/2002	4.7	30.5	12.4	12.8	128.2	29.5	10.2	149.7	2.8	<1.0	15.1	21.9	29.0	58.5
22/03/2002	05/04/2002	4.9	60.1	58.3	77.9	54.7	13.9	22.5	57.0	2.4	<1.0	53.5	11.5	28.0	21.7
05/04/2002	19/04/2002	4.9	52.0	28.9	31.2	57.7	16.5	36.0	62.7	2.1	<1.0	45.0	12.0	25.0	13.3
19/04/2002	03/05/2002	5.0	20.7	4.1	1.4	112.0	24.0	7.1	126.0	2.4	<1.0	7.2	10.0	24.0	115.6
03/05/2002	17/05/2002	4.7	39.1	19.3	24.6	76.9	18.6	9.6	91.1	2.3	<1.0	29.8	20.9	26.0	45.6
17/05/2002	31/05/2002	4.8	29.8	11.1	10.4	125.8	27.7	9.3	144.5	2.8	<1.0	14.7	15.5	28.0	190.8
31/05/2002	14/06/2002	4.5	33.3	15.9	11.6	118.8	26.6	8.7	134.6	3.6	<1.0	18.9	29.5	32.0	81.5
14/06/2002	01/07/2002	4.8	30.5	11.6	12.2	45.4	12.4	8.8	39.2	2.4	<1.0	25.0	17.4	17.0	20.5
01/07/2002	12/07/2002	5.7	18.4	4.9	34.1	31.3	4.1	3.0	43.9	20.8	13.0	14.6	2.1	15.0	70.3
12/07/2002	26/07/2002	5.1	42.1	19.2	33.4	31.5	10.2	16.6	32.7	4.5	<1.0	38.4	7.2	18.0	7.6
26/07/2002	13/08/2002	4.6	19.3	13.6	9.7	7.5	3.0	6.0	11.2	0.8	<1.0	18.4	23.4	12.0	30.0
13/08/2002	23/08/2002	4.7	23.7	12.7	2.1	9.3	3.3	11.1	9.2	<0.5	<1.0	22.6	21.4	13.0	15.5
23/08/2002	13/09/2002	4.4	23.3	21.8	6.4	35.7	7.9	7.1	42.8	1.1	<1.0	19.0	38.0	21.0	57.6
13/09/2002	27/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
27/09/2002	17/10/2002	4.5	18.2	17.6	6.5	6.1	2.7	4.0	9.0	0.6	<1.0	17.5	30.9	13.0	83.5
17/10/2002	01/11/2002	4.6	61.3	12.2	4.1	407.3	91.5	19.3	472.3	8.3	<1.0	12.2	26.9	70.0	104.2
01/11/2002	15/11/2002	4.8	12.9	3.5	<0.7	66.0	14.5	3.2	76.2	1.3	<1.0	5.0	17.0	16.0	183.4
15/11/2002	29/11/2002	4.3	29.0	19.3	8.6	82.6	18.8	5.8	95.2	1.8	<1.0	19.1	49.0	27.0	55.3
29/11/2002	13/12/2002	4.7	58.1	11.7	12.5	400.6	87.1	18.2	453.9	8.4	<1.0	9.8	19.1	69.0	46.9
13/12/2002	03/01/2003	4.5	16.2	10.3	7.0	60.1	11.9	3.0	66.8	1.1	<1.0	8.9	32.4	17.0	211.0
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5154			25.9	9.3	6.7	122.0	26.8	7.6	139.3	2.7	-	11.2	18.7	25.9	2206.9

Flatford Mill

2002

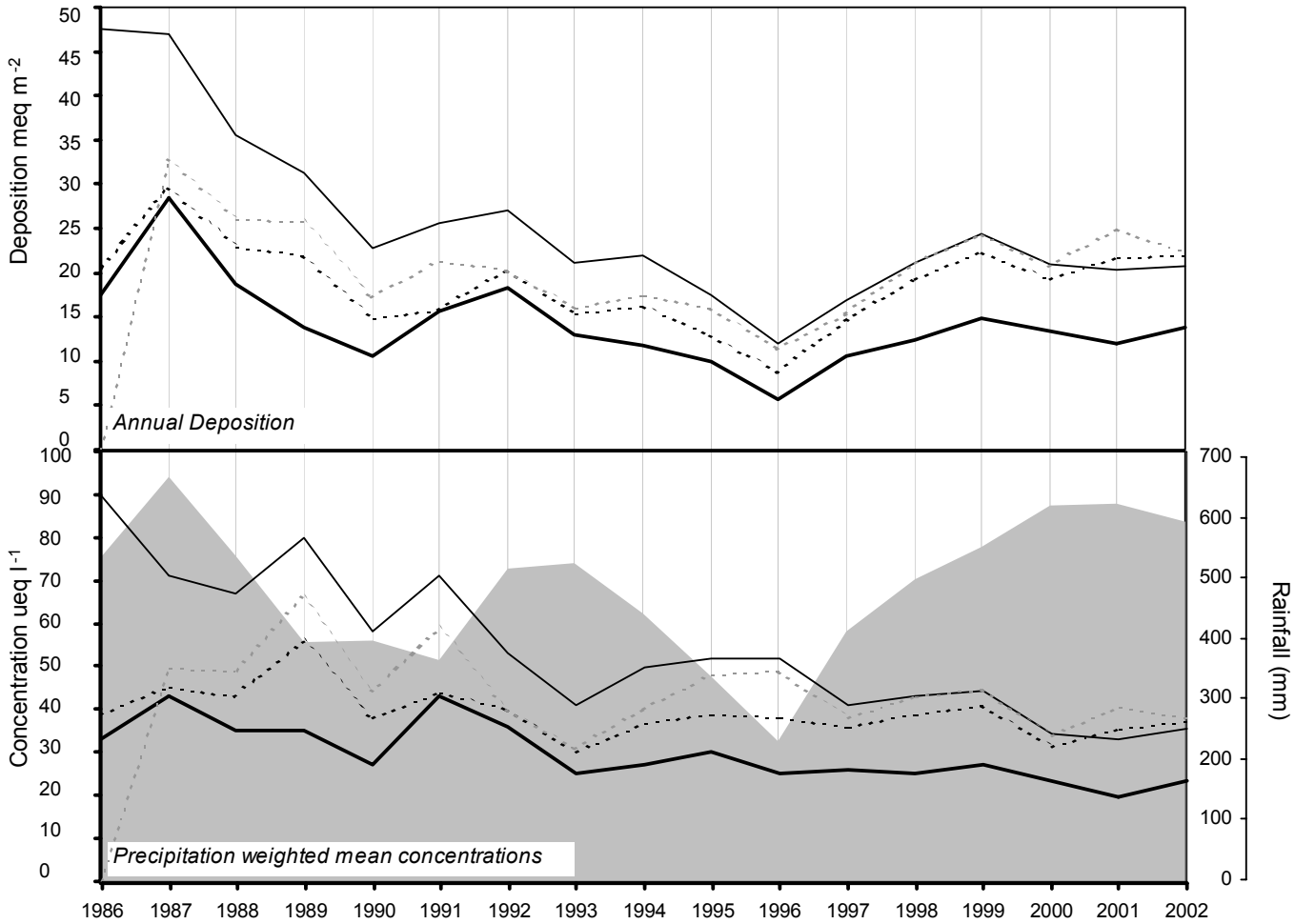
Site Code:	**5024**
Easting:	**6077**
Northing:	**2333**
Latitude:	**51 57 32 N**
Longitude:	**01 01 24 E**
Altitude (m):	**5**
Rainfall (mm):	**599**

[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
-1.08 ueq/l (-2.84 %/year): 16 years' data
++ Moderately strong trend detected

non-marine sulphate
-2.99 ueq/l (-3.84 %/year): 17 years' data
++++ Very strong trend detected

nitrate
-0.59 ueq/l (-1.33 %/year): 17 years' data
+ Significant trend detected

ammonium
-1.02 ueq/l (-1.91 %/year): 16 years' data
+ Significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
15/01/2002	29/01/2002	5.0	32.5	21.8	25.9	66.0	11.8	6.7	78.5	2.8	<1.0	24.5	10.5	22.0	27.8
29/01/2002	12/02/2002	4.8	43.7	25.2	28.9	125.1	28.4	15.5	144.3	4.1	<1.0	28.6	15.5	33.0	21.2
12/02/2002	26/02/2002	5.1	34.5	16.9	34.2	87.8	18.3	10.9	97.5	2.5	<1.0	23.9	7.2	19.0	22.9
26/02/2002	12/03/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9
12/03/2002	26/03/2002	4.7	75.7	65.0	93.2	172.5	39.0	16.2	196.9	4.8	<1.0	55.0	20.0	50.0	25.6
26/03/2002	16/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
16/04/2002	23/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
23/04/2002	07/05/2002	6.4	48.4	35.4	79.7	59.9	12.9	21.0	71.2	3.9	<1.0	41.2	0.4	26.0	30.1
07/05/2002	21/05/2002	4.4	74.8	77.9	81.8	26.8	10.6	33.4	31.5	7.1	<1.0	71.6	40.7	33.0	16.9
21/05/2002	18/06/2002	4.5	54.1	42.7	20.5	57.5	16.3	34.8	67.4	6.7	<1.0	47.2	30.2	30.0	53.2
18/06/2002	02/07/2002	5.5	64.2	62.0	63.2	37.8	15.9	60.8	43.7	11.0	<1.0	59.6	2.9	29.0	8.6
02/07/2002	16/07/2002	4.9	38.2	28.1	44.0	16.5	5.0	11.1	21.0	2.0	<1.0	36.2	12.6	17.0	25.0
16/07/2002	30/07/2002	6.1	91.8	116.5	154.3	17.9	13.1	78.2	21.4	14.7	7.4	89.7	0.8	37.0	5.8
30/07/2002	13/08/2002	4.8	31.6	37.1	32.8	6.1	2.5	5.3	8.7	1.3	<1.0	30.9	15.5	13.0	83.7
13/08/2002	27/08/2002	4.5	92.2	168.2	150.9	34.9	13.8	70.6	42.5	13.7	8.7	88.0	33.1	53.0	3.2
27/08/2002	10/09/2002	5.0	25.4	27.5	15.8	32.6	8.4	26.4	41.5	8.2	<1.0	21.4	9.5	16.0	20.4
10/09/2002	24/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
24/09/2002	08/10/2002	5.0	116.2	90.7	89.4	139.3	36.9	74.1	152.5	12.3	6.7	99.4	11.2	51.0	4.1
08/10/2002	22/10/2002	4.7	65.4	46.8	38.0	138.8	32.6	36.3	158.7	18.9	<1.0	48.6	21.4	41.0	43.5
22/10/2002	05/11/2002	4.8	29.0	24.0	21.3	67.8	16.3	14.5	81.1	6.2	<1.0	20.8	14.8	21.0	27.0
05/11/2002	19/11/2002	4.4	24.5	21.5	14.3	43.9	10.1	4.8	54.0	2.0	<1.0	19.2	40.7	22.0	58.4
19/11/2002	03/12/2002	4.6	54.9	45.9	44.7	153.4	35.5	19.2	181.9	7.3	<1.0	36.4	22.9	44.0	13.8
03/12/2002	17/12/2002	4.2	107.1	83.8	98.5	249.8	56.4	21.6	278.7	7.8	<1.0	77.0	63.1	73.0	18.5
17/12/2002	31/12/2002	4.3	19.9	17.0	14.0	26.8	4.9	2.7	28.6	1.3	<1.0	16.7	46.8	16.0	44.6
31/12/2002	14/01/2003	4.5	20.2	20.6	12.6	53.3	10.5	4.2	60.8	1.6	<1.0	13.8	30.9	22.0	30.4
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5024			43.5	37.3	38.2	66.6	15.8	17.3	77.3	5.1	-	35.5	23.6	26.7	586.3

Woburn

2002

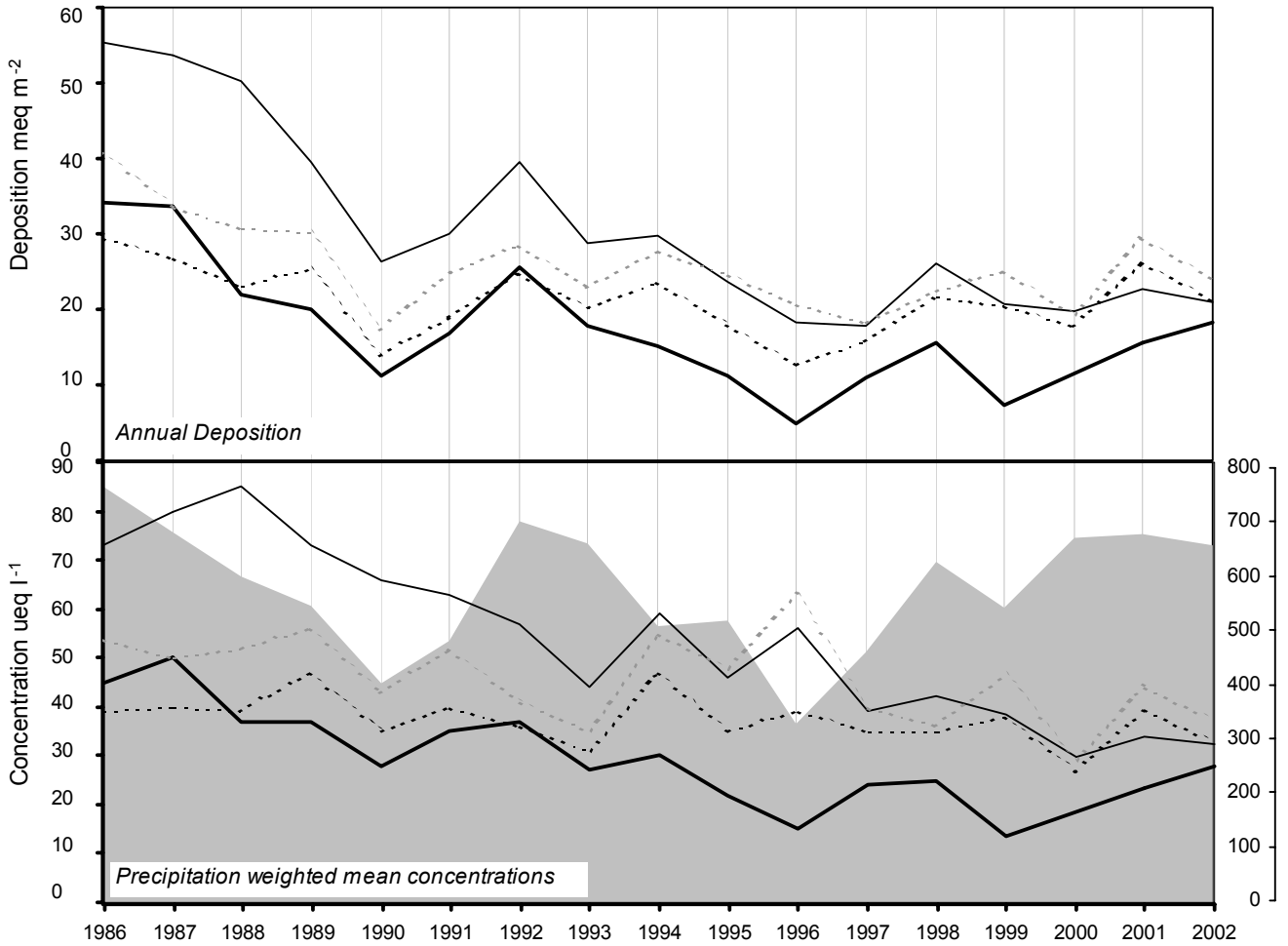
Site Code:	**5127**
Easting:	**4964**
Northing:	**2361**
Latitude:	**52 00 52 N**
Longitude:	**00 35 43 W**
Altitude (m):	**89**
Rainfall (mm):	**646**

[30 year mean 1940 - 1971]

Site Environment:
Pasture

Other measurements:
DT, Weekly 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
-1.68 ueq/l (-3.96 %/year): 16 years' data
+++ Strong trend detected

non-marine sulphate
-3.24 ueq/l (-4.06 %/year): 17 years' data
++++ Very strong trend detected

nitrate
-0.44 ueq/l (-1.07 %/year): 17 years' data
- No significant trend detected

ammonium
-0.90 ueq/l (-1.70 %/year): 17 years' data
+ Significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
02/01/2002	15/01/2002	4.3	110.4	140.0	137.9	95.1	19.0	23.9	100.4	2.8	<1.0	98.9	55.0	65.0	4.3
15/01/2002	30/01/2002	5.0	25.8	14.4	24.6	71.8	11.7	3.7	80.0	1.8	<1.0	17.2	10.2	20.0	27.5
30/01/2002	13/02/2002	4.9	33.8	16.2	<0.7	105.5	22.8	8.4	119.2	2.7	<1.0	21.1	13.2	23.0	27.6
13/02/2002	26/02/2002	5.2	29.4	14.1	27.1	83.7	16.9	10.7	91.2	1.9	<1.0	19.3	6.0	22.0	25.6
26/02/2002	14/03/2002	5.2	112.4	86.4	130.9	212.2	47.6	39.7	238.3	7.8	<1.0	86.9	6.9	61.0	7.8
14/03/2002	28/03/2002	4.9	38.4	37.6	59.4	45.7	10.2	10.6	51.8	1.6	<1.0	32.9	12.9	21.0	26.5
28/03/2002	12/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
12/04/2002	24/04/2002	6.1	96.3	49.0	98.4	47.6	15.4	67.1	56.2	3.5	<1.0	90.6	0.7	34.0	6.0
24/04/2002	07/05/2002	5.3	32.3	24.6	47.2	47.9	10.5	12.4	56.8	1.8	<1.0	26.5	5.1	18.0	29.1
07/05/2002	21/05/2002	5.3	53.7	64.0	73.6	21.3	8.8	34.3	20.8	3.1	<1.0	51.1	5.6	23.0	16.1
21/05/2002	08/06/2002	4.5	48.6	39.4	48.5	37.6	12.2	14.0	45.7	1.9	<1.0	44.1	29.5	27.0	44.7
08/06/2002	19/06/2002	5.8	51.8	50.1	63.2	65.0	15.5	28.2	75.3	5.6	<1.0	44.0	1.7	27.0	5.4
19/06/2002	01/07/2002	6.4	78.0	78.0	54.9	66.7	24.6	86.5	72.2	17.7	<1.0	70.0	0.4	34.0	2.8
01/07/2002	17/07/2002	4.4	41.8	20.7	24.8	7.3	4.4	10.9	13.2	1.0	<1.0	40.9	42.7	22.0	35.6
17/07/2002	30/07/2002	4.6	93.6	117.5	108.1	7.5	8.5	77.3	9.1	5.6	<1.0	92.7	26.9	40.0	11.9
30/07/2002	13/08/2002	4.2	69.9	68.0	78.8	3.4	3.3	18.2	9.1	2.3	<1.0	69.5	58.9	35.0	31.2
13/08/2002	27/08/2002	4.2	85.9	87.0	95.7	2.6	4.7	33.3	12.2	4.7	<1.0	85.6	64.6	40.0	16.9
27/08/2002	11/09/2002	5.6	41.5	41.2	45.9	30.5	9.6	40.3	32.6	4.6	<1.0	37.8	2.6	20.0	16.4
11/09/2002	30/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
30/09/2002	09/10/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
09/10/2002	24/10/2002	4.6	24.2	24.7	20.1	34.7	9.0	8.9	40.6	1.1	<1.0	20.1	27.5	19.0	79.1
24/10/2002	07/11/2002	4.6	20.1	19.0	17.8	43.8	10.1	5.4	53.5	1.3	<1.0	14.8	26.3	17.0	50.3
07/11/2002	21/11/2002	4.5	18.5	20.9	13.6	26.5	5.9	4.1	31.4	0.9	<1.0	15.3	28.8	16.0	46.0
21/11/2002	03/12/2002	4.9	21.7	18.0	22.1	59.0	13.4	6.6	70.6	1.4	<1.0	14.6	13.8	19.0	27.5
03/12/2002	18/12/2002	4.0	88.7	79.3	94.9	78.0	16.7	12.3	90.2	3.0	<1.0	79.3	109.6	52.0	21.5
18/12/2002	02/01/2003	4.5	13.2	11.0	11.0	15.0	3.1	1.8	17.8	0.5	<1.0	11.4	30.9	10.0	90.6
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5127			37.2	32.7	37.1	40.5	9.9	13.1	47.5	1.9	-	32.3	28.0	22.5	651.3

Tycanol Wood

2002

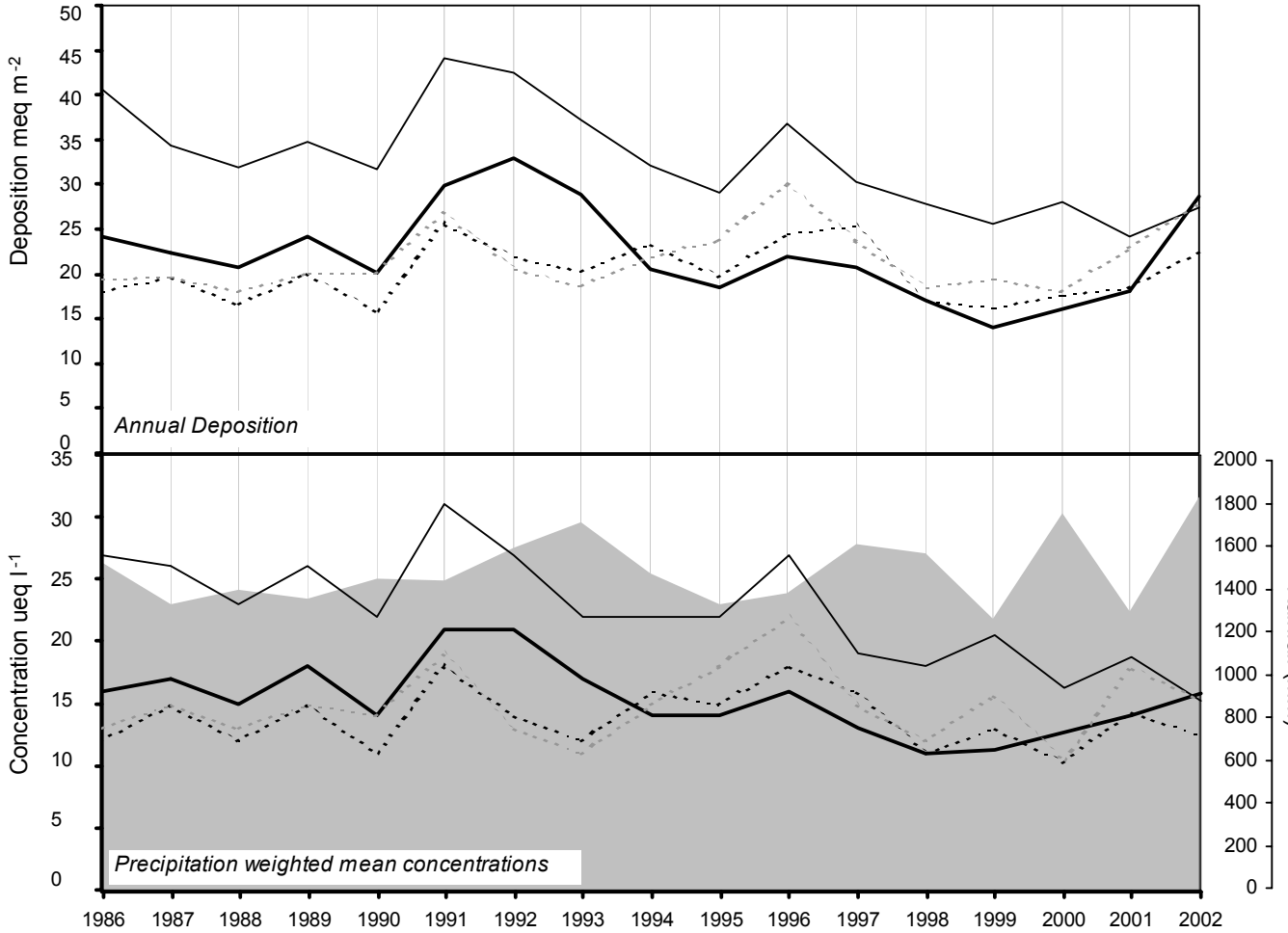
Site Code:	**5123**
Easting:	**2093**
Northing:	**2364**
Latitude:	**51 59 34 N**
Longitude:	**04 46 41 W**
Altitude (m):	**205**
Rainfall (mm):	**1847**

[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
-0.29 ueq/l (-1.66 %/year): 16 years' data
\- No significant trend detected

non-marine sulphate
-0.65 ueq/l (-2.34 %/year): 17 years' data
++ Moderately strong trend detected

nitrate
-0.04 ueq/l (-0.28 %/year): 17 years' data
\- No significant trend detected

ammonium
0.08 ueq/l (0.55 %/year): 17 years' data
\- No significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
03/01/2002	16/01/2002	4.8	52.2	44.9	42.7	189.8	37.3	11.7	214.6	4.2	<1.0	29.4	17.0	46.0	24.7
16/01/2002	30/01/2002	4.9	36.5	6.3	3.1	208.9	45.5	9.4	230.1	4.0	<1.0	11.3	13.5	39.0	174.6
30/01/2002	13/02/2002	5.0	44.0	4.6	3.9	301.7	65.0	12.6	339.2	6.5	<1.0	7.7	9.8	43.0	177.5
13/02/2002	27/02/2002	5.5	32.6	3.8	10.8	205.7	45.4	10.3	234.7	4.1	<1.0	7.8	2.9	37.0	60.1
27/02/2002	13/03/2002	5.6	138.7	10.5	18.6	1020.2	218.3	48.0	1157.9	21.2	<1.0	15.8	2.5	163.0	20.7
13/03/2002	27/03/2002	5.0	23.7	13.2	20.0	67.8	14.2	5.1	72.9	1.5	<1.0	15.6	9.3	19.0	50.5
27/03/2002	10/04/2002	4.5	51.4	29.1	31.2	54.6	14.9	20.6	64.5	1.7	<1.0	44.9	30.2	26.0	26.6
10/04/2002	24/04/2002	6.6	94.0	36.9	231.6	118.3	24.1	12.1	130.4	24.3	91.7	79.8	0.3	56.0	21.6
24/04/2002	08/05/2002	6.7	98.9	10.9	282.0	119.2	25.7	9.3	140.9	46.9	175.5	84.6	0.2	70.0	53.6
08/05/2002	22/05/2002	5.7	35.4	15.0	36.9	85.2	17.9	7.3	98.6	6.5	6.3	25.1	2.2	23.0	180.0
22/05/2002	05/06/2002	6.4	54.7	5.4	227.9	138.4	27.4	5.8	164.8	65.3	143.7	38.0	0.4	62.0	84.8
05/06/2002	19/06/2002	6.3	69.3	18.7	227.0	95.0	13.3	3.3	104.4	27.1	90.3	57.9	0.5	50.0	61.8
19/06/2002	03/07/2002	6.6	75.2	9.1	199.3	87.2	13.3	3.8	87.4	56.2	118.7	64.7	0.2	52.0	30.8
03/07/2002	17/07/2002	7.2	93.2	8.0	395.4	33.5	8.2	2.1	51.1	58.5	215.4	89.2	0.1	61.0	54.5
17/07/2002	31/07/2002	7.7	112.3	24.5	1053.3	121.8	65.6	26.2	103.9	157.6	218.0	97.6	0.0	183.0	12.7
31/07/2002	14/08/2002	4.5	32.2	19.7	13.7	63.5	14.3	6.3	74.1	1.7	<1.0	24.5	33.1	25.0	22.2
14/08/2002	28/08/2002	4.9	30.5	35.6	33.6	39.8	9.9	26.0	42.5	2.1	<1.0	25.7	12.0	19.0	19.0
28/08/2002	11/09/2002	4.4	43.3	28.4	30.6	68.7	16.3	10.5	77.7	1.9	<1.0	35.0	38.9	30.0	29.9
11/09/2002	25/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/09/2002	08/10/2002	7.2	117.2	41.0	386.1	70.5	10.0	7.1	78.3	26.0	116.2	108.7	0.1	62.0	11.8
08/10/2002	23/10/2002	4.6	21.1	20.3	13.2	70.1	15.4	5.9	79.3	1.5	<1.0	12.7	24.0	22.0	138.9
23/10/2002	06/11/2002	4.5	41.1	11.8	14.1	228.1	49.5	10.8	257.9	4.5	<1.0	13.6	32.4	44.0	110.6
06/11/2002	20/11/2002	4.9	27.5	11.4	14.4	115.7	25.4	6.3	130.8	4.4	9.4	13.6	13.5	27.0	120.4
20/11/2002	04/12/2002	4.7	36.4	10.4	10.7	173.5	38.5	8.0	198.7	3.5	<1.0	15.5	22.4	37.0	178.5
04/12/2002	18/12/2002	4.5	53.7	61.5	63.5	101.3	22.9	12.8	114.8	2.7	<1.0	41.5	34.7	38.0	8.5
18/12/2002	01/01/2003	4.8	17.1	7.2	10.7	84.5	16.4	3.4	92.9	1.6	<1.0	6.9	15.1	19.0	134.3
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5123			35.1	12.5	15.3	165.7	35.8	9.2	186.8	4.2	-	15.2	15.8	33.5	1808.5

Llyn Brianne

2002

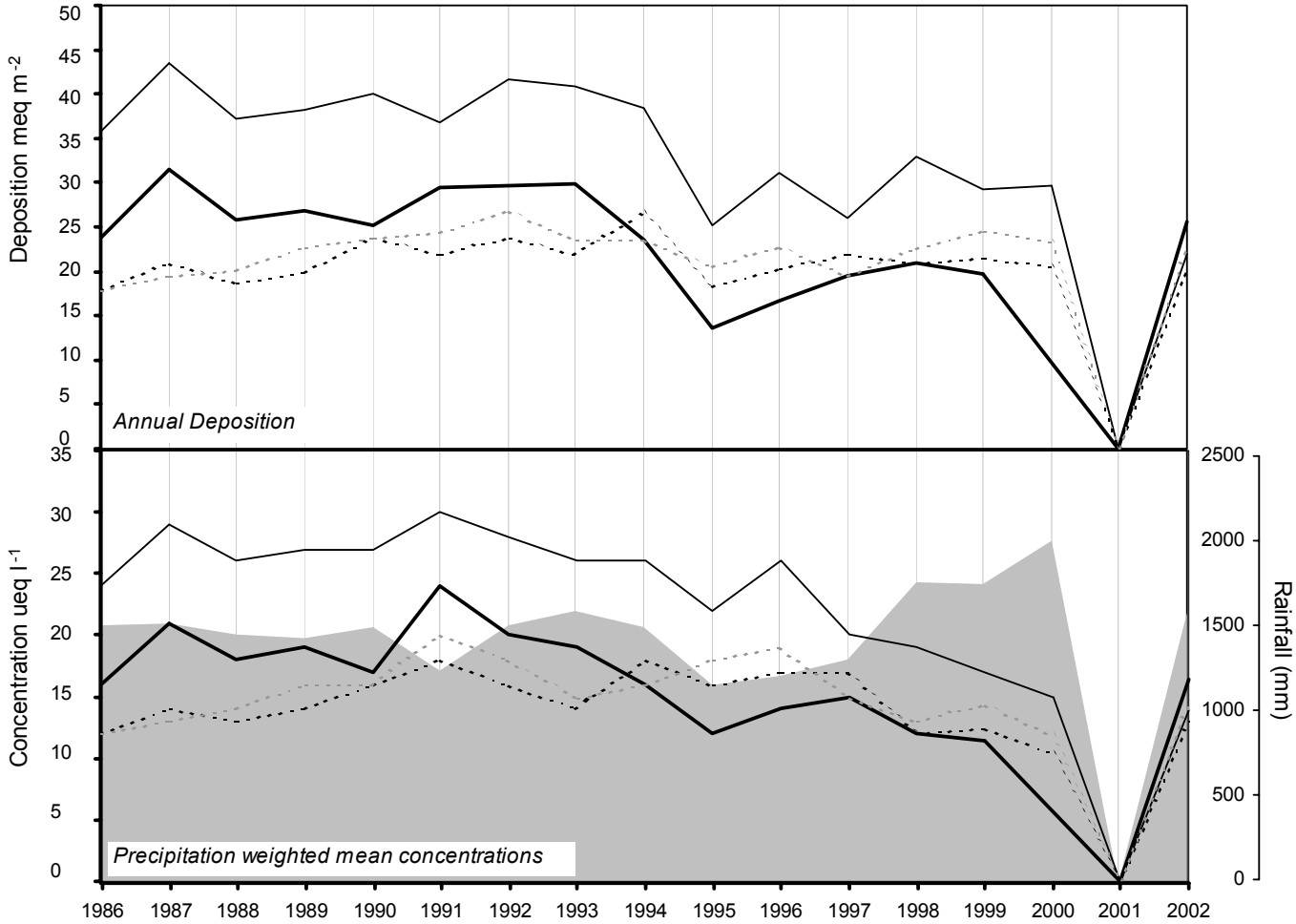
Site Code:	**5124**
Easting:	**2807**
Northing:	**2492**
Latitude:	**52 07 32 N**
Longitude:	**03 44 34 W**
Altitude (m):	**372**
Rainfall (mm):	**1774**

[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
-0.46 ueq/l (-2.32 %/year): 16 years' data
\+ Significant trend detected

non-marine sulphate
-0.88 ueq/l (-2.91 %/year): 17 years' data
+++ Strong trend detected

nitrate
-0.07 ueq/l (-0.49 %/year): 17 years' data
\- No significant trend detected

ammonium
-0.02 ueq/l (-0.14 %/year): 17 years' data
\- No significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
15/01/2002	04/03/2002	5.4	24.5	4.5	7.4	160.0	32.6	6.6	174.9	3.2	<1.0	5.3	4.2	28.0	322.3
04/03/2002	13/03/2002	5.7	84.6	14.5	29.3	521.9	109.6	26.5	564.3	14.8	<1.0	21.7	2.1	88.0	17.3
13/03/2002	27/03/2002	4.7	37.9	32.6	32.7	61.1	14.0	8.0	73.3	1.3	<1.0	30.5	19.1	25.0	36.4
27/03/2002	10/04/2002	5.4	84.0	74.4	109.8	79.4	19.6	26.1	90.9	3.0	<1.0	74.4	4.0	36.0	15.4
10/04/2002	24/04/2002	5.1	89.5	66.5	73.6	113.0	28.7	49.0	120.7	3.4	<1.0	75.9	7.6	40.0	11.3
24/04/2002	08/05/2002	5.0	26.9	7.9	10.9	118.1	25.2	8.2	132.0	2.4	<1.0	12.7	10.2	25.0	79.9
08/05/2002	22/05/2002	4.7	35.5	25.1	27.0	53.1	13.2	13.6	61.6	1.6	<1.0	29.1	20.0	22.0	80.9
22/05/2002	05/06/2002	5.0	25.2	6.4	8.0	143.9	30.9	7.6	163.5	3.1	<1.0	7.9	9.1	29.0	91.0
05/06/2002	19/06/2002	4.6	31.7	18.6	21.0	70.8	17.5	6.6	82.5	1.7	<1.0	23.2	25.7	25.0	72.1
19/06/2002	03/07/2002	5.0	29.4	12.1	14.4	66.4	14.4	7.8	71.7	1.8	<1.0	21.4	11.2	20.0	27.6
03/07/2002	17/07/2002	4.9	23.3	7.7	16.1	18.8	4.5	3.0	23.8	0.8	<1.0	21.0	12.3	12.0	51.5
17/07/2002	31/07/2002	8.6	689.1	30.1	4702.2	166.1	10.2	7.9	144.8	658.5	1887.4	669.1	0.0	700.0	15.8
31/07/2002	14/08/2002	6.7	23.8	20.3	116.3	12.9	1.5	1.5	15.9	2.4	<1.0	22.2	0.2	19.0	25.4
14/08/2002	28/08/2002	4.6	27.8	26.8	32.9	6.1	1.9	4.4	8.3	0.6	<1.0	27.1	26.3	15.0	28.4
28/08/2002	11/09/2002	4.7	24.2	15.5	17.9	31.9	7.3	6.7	38.2	0.9	<1.0	20.3	20.0	15.0	55.5
11/09/2002	24/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
24/09/2002	11/10/2002	4.5	95.1	79.2	70.2	101.4	26.5	34.4	95.5	4.4	<1.0	82.9	35.5	43.0	9.0
11/10/2002	06/11/2002	4.6	27.6	12.2	5.4	141.1	31.6	7.3	168.4	2.9	<1.0	10.6	24.5	30.0	218.9
06/11/2002	21/11/2002	4.5	17.2	9.5	3.9	76.0	16.7	4.3	88.7	1.5	<1.0	8.1	29.5	21.0	129.9
21/11/2002	04/12/2002	4.9	37.8	7.8	5.1	258.3	56.5	11.4	291.9	5.1	<1.0	6.7	14.1	47.0	93.0
04/12/2002	06/01/2003	4.6	17.3	13.1	8.3	62.6	12.7	3.5	70.6	1.4	<1.0	9.8	23.4	18.0	185.6
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5124			27.9	12.9	14.4	115.8	25.0	7.6	131.1	2.6	-	13.9	16.3	26.4	1567.3

Pumlumon

2002

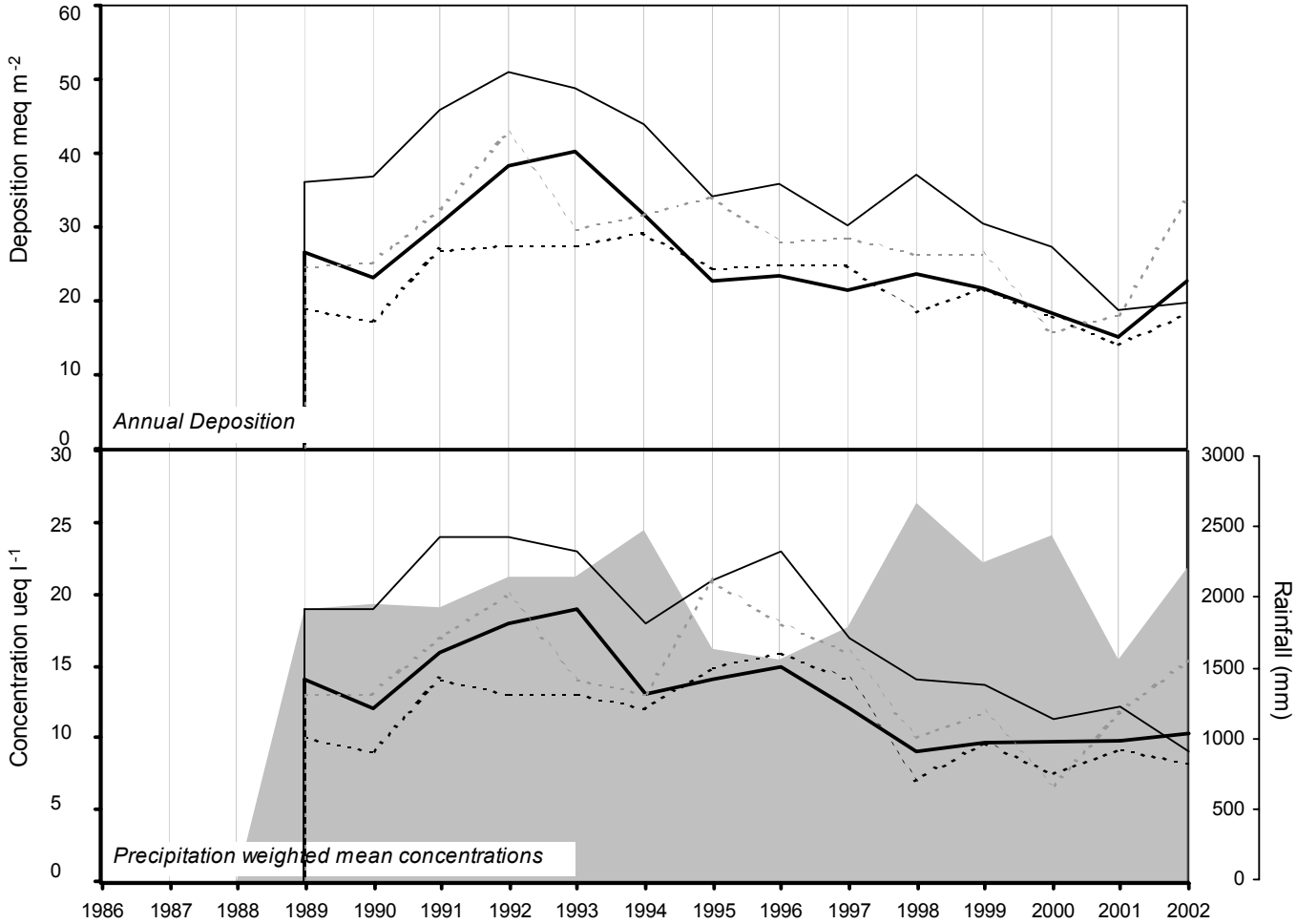
Site Code:	**5150**
Easting:	**2823**
Northing:	**2854**
Latitude:	**52 27 13 N**
Longitude:	**03 43 56 W**
Altitude (m):	**390**
Rainfall (mm):	**2182**

[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
-0.54 ueq/l (-2.97 %/year): 13 years' data
\+ Significant trend detected

non-marine sulphate
-0.97 ueq/l (-3.59 %/year): 14 years' data
++ Moderately strong trend detected

nitrate
-0.27 ueq/l (-1.97 %/year): 14 years' data
\- No significant trend detected

ammonium
-0.32 ueq/l (-1.86 %/year): 14 years' data
\- No significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
03/01/2002	15/01/2002	4.6	23.5	17.0	14.0	47.8	9.3	2.9	59.8	1.3	<1.0	17.8	22.9	19.0	27.3
15/01/2002	29/01/2002	5.1	18.6	3.4	4.7	100.2	19.8	3.5	113.4	2.0	<1.0	6.5	8.7	22.0	170.0
29/01/2002	12/02/2002	5.1	15.1	3.0	3.6	85.3	18.4	4.1	95.7	1.9	<1.0	4.9	7.2	17.0	271.4
12/02/2002	26/02/2002	5.5	19.2	3.2	9.2	124.2	24.5	5.3	137.1	2.9	<1.0	4.2	2.9	23.0	293.3
26/02/2002	12/03/2002	5.5	93.6	6.8	16.5	656.9	146.3	29.1	755.0	13.8	<1.0	14.5	3.5	113.0	79.9
12/03/2002	26/03/2002	4.7	27.2	26.9	32.4	45.7	9.5	4.7	49.9	1.1	<1.0	21.7	21.9	21.0	26.7
26/03/2002	09/04/2002	5.1	43.2	40.3	63.9	26.8	7.3	12.2	30.0	1.1	<1.0	40.0	8.5	19.0	24.5
09/04/2002	23/04/2002	5.1	46.8	28.4	37.6	89.5	21.2	22.5	98.0	2.2	<1.0	36.0	7.2	26.0	27.3
23/04/2002	07/05/2002	5.1	24.1	8.1	10.1	120.8	25.5	8.3	136.5	2.4	<1.0	9.6	8.5	26.0	112.7
07/05/2002	21/05/2002	6.4	59.5	39.7	237.7	40.9	15.5	16.2	46.5	34.2	72.6	54.5	0.4	52.0	41.9
21/05/2002	05/06/2002	5.8	28.6	6.1	77.2	105.4	16.9	3.1	117.7	12.3	17.8	16.0	1.4	29.0	104.0
05/06/2002	18/06/2002	6.3	58.7	17.8	130.3	123.7	22.3	5.4	148.3	22.0	89.9	43.8	0.5	43.0	64.9
18/06/2002	02/07/2002	6.8	48.3	8.2	278.7	66.8	10.5	3.2	70.6	21.2	79.6	40.3	0.1	52.0	54.4
02/07/2002	16/07/2002	6.5	52.7	6.6	204.3	97.7	16.1	5.4	61.6	14.1	11.3	41.0	0.3	44.0	70.9
16/07/2002	30/07/2002	7.2	59.1	19.7	300.3	37.7	6.3	3.4	41.5	34.4	86.5	54.5	0.1	63.0	33.2
30/07/2002	13/08/2002	4.3	40.8	23.7	83.5	14.6	3.8	3.6	16.4	11.8	41.2	39.1	49.0	26.0	36.0
13/08/2002	27/08/2002	4.7	15.3	9.7	10.4	4.7	1.8	4.1	7.6	<0.5	<1.0	14.7	21.9	10.0	31.9
27/08/2002	10/09/2002	5.9	4.5	1.9	90.1	43.6	7.8	4.3	5.8	7.8	<1.0	<0.8	1.2	21.0	101.5
10/09/2002	24/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
24/09/2002	08/10/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6
08/10/2002	22/10/2002	4.5	20.1	24.2	13.6	12.9	3.7	4.6	17.1	0.6	<1.0	18.5	31.6	16.0	94.7
22/10/2002	05/11/2002	5.6	78.5	2.4	6.6	577.6	123.0	53.8	679.1	11.7	10.0	8.9	2.7	96.0	191.1
05/11/2002	20/11/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
20/11/2002	03/12/2002	5.0	55.4	8.7	6.1	398.3	88.6	17.5	456.5	7.9	<1.0	7.4	10.5	69.0	132.8
03/12/2002	17/12/2002	4.3	53.0	42.6	43.7	146.6	32.8	11.5	164.8	3.2	<1.0	35.3	51.3	44.0	37.4
17/12/2002	07/01/2003	4.9	9.1	5.8	4.2	28.7	5.9	2.9	31.4	0.6	<1.0	5.6	13.5	10.0	163.6
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5150			25.4	8.3	15.5	136.2	29.2	7.4	151.7	3.4	-	9.1	10.3	28.7	2193.0

Stoke Ferry

2002

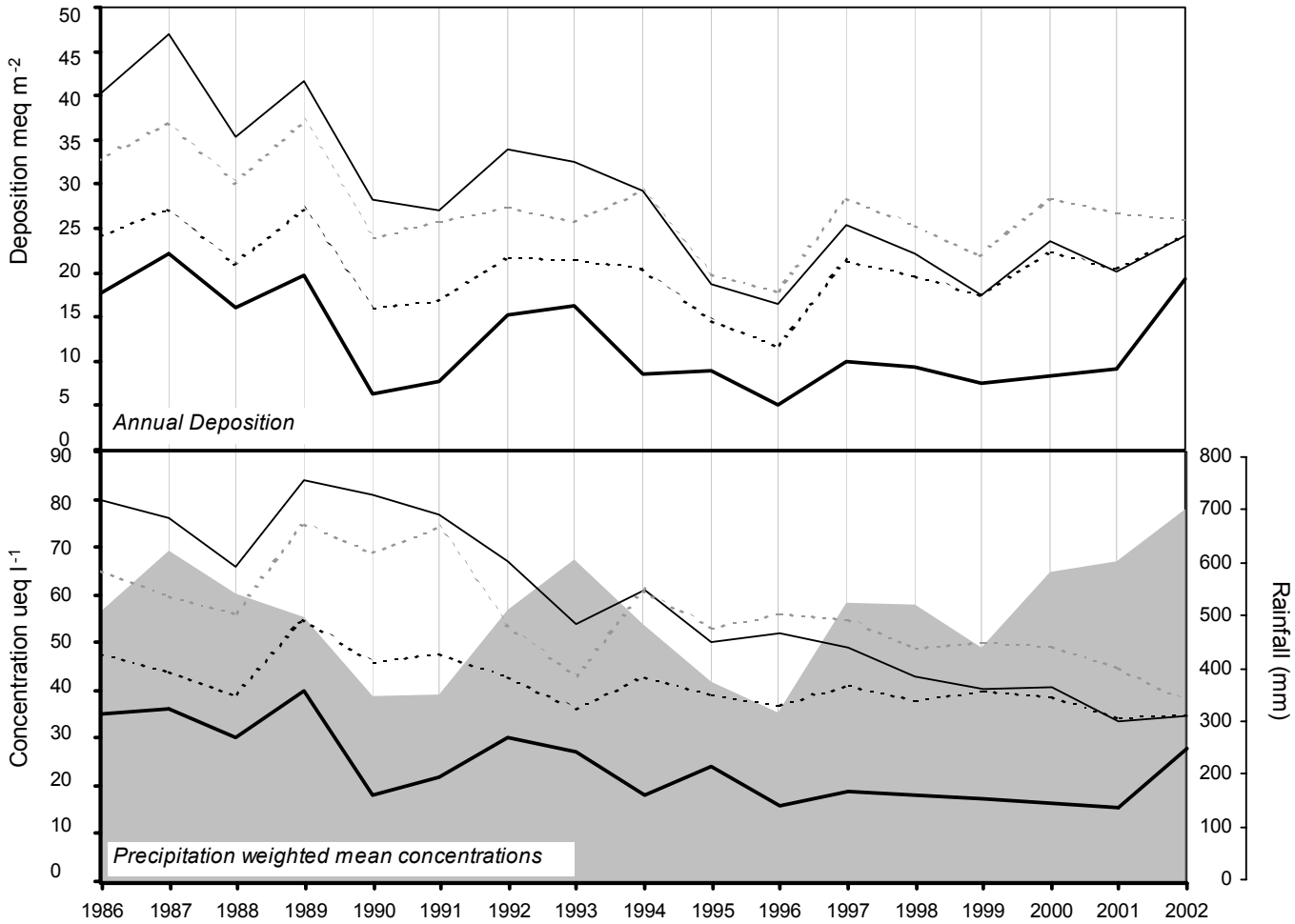
Site Code:	**5004**
Easting:	**5700**
Northing:	**2988**
Latitude:	**52 33 36 N**
Longitude:	**00 30 29 E**
Altitude (m):	**15**
Rainfall (mm):	**629**

[30 year mean 1940 - 1971]

Site Environment:
Grassed land at water treatment works

Other measurements:
DT, Daily 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
-1.12 ueq/l (-3.40 %/year): 16 years' data
++ Moderately strong trend detected

non-marine sulphate
-3.17 ueq/l (-3.79 %/year): 17 years' data
++++ Very strong trend detected

nitrate
-0.76 ueq/l (-1.60 %/year): 17 years' data
++ Moderately strong trend detected

ammonium
-1.50 ueq/l (-2.21 %/year): 17 years' data
++ Moderately strong trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
02/01/2002	15/01/2002	4.4	113.4	95.1	127.5	65.5	17.7	18.1	85.9	4.9	<1.0	105.5	36.3	50.0	3.7
15/01/2002	29/01/2002	5.3	24.6	15.0	25.2	42.2	8.2	5.9	46.2	1.3	<1.0	19.5	5.5	15.0	27.5
29/01/2002	12/02/2002	4.8	38.3	22.9	26.5	99.4	22.1	15.3	112.4	3.1	<1.0	26.4	15.5	28.0	20.9
12/02/2002	26/02/2002	5.2	46.8	23.4	40.0	113.2	24.2	19.0	125.3	3.5	<1.0	33.2	7.1	30.0	12.5
26/02/2002	12/03/2002	5.7	223.0	105.6	133.5	437.4	89.4	185.8	513.7	19.3	<1.0	170.4	1.9	114.0	2.1
12/03/2002	26/03/2002	4.8	42.4	38.7	56.6	48.5	11.0	19.3	56.2	1.3	<1.0	36.5	16.6	24.0	27.7
26/03/2002	09/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
09/04/2002	23/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
23/04/2002	07/05/2002	5.9	26.5	20.2	29.9	47.7	10.5	19.5	57.7	1.2	<1.0	20.7	1.3	17.0	27.4
07/05/2002	21/05/2002	4.3	74.6	82.8	66.6	26.5	10.4	53.4	30.4	1.0	<1.0	71.4	49.0	34.0	15.5
21/05/2002	05/06/2002	4.5	30.2	26.9	9.2	35.9	8.7	23.4	41.3	<0.5	<9.7	25.9	30.9	20.0	37.7
05/06/2002	19/06/2002	4.5	57.4	49.0	37.0	22.0	7.5	37.7	26.0	0.7	<1.0	54.8	35.5	28.0	20.1
19/06/2002	16/07/2002	4.6	31.6	22.4	13.3	7.5	3.3	14.1	12.8	<0.5	<1.0	30.7	24.0	17.0	76.9
16/07/2002	30/07/2002	4.6	68.7	62.9	22.6	30.5	11.2	72.2	35.5	1.5	<1.0	65.0	26.9	31.0	5.2
30/07/2002	13/08/2002	4.3	51.4	55.6	65.8	<0.9	1.5	6.6	4.6	<0.5	<1.0	51.5	49.0	26.0	117.6
13/08/2002	28/08/2002	4.4	71.8	86.0	80.3	60.2	15.9	55.4	68.9	3.2	<1.0	64.6	42.7	41.0	13.9
28/08/2002	10/09/2002	5.7	25.8	34.6	31.4	32.8	7.4	35.2	38.1	4.7	<1.0	21.8	1.9	18.0	16.0
10/09/2002	24/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
24/09/2002	08/10/2002	4.9	110.6	53.9	74.0	104.3	24.6	80.0	126.8	3.8	<1.0	98.0	11.5	43.0	8.5
08/10/2002	21/10/2002	4.5	36.1	31.8	30.2	69.4	15.5	13.0	81.3	2.0	<1.0	27.7	30.9	26.0	58.4
21/10/2002	05/11/2002	4.7	26.5	25.5	21.3	56.1	12.1	13.9	62.4	1.8	<1.0	19.8	18.2	21.0	28.6
05/11/2002	19/11/2002	4.7	18.7	19.2	22.9	19.6	4.7	3.2	25.6	0.7	<1.0	16.3	20.9	14.0	56.1
19/11/2002	03/12/2002	4.5	46.2	35.9	53.2	60.5	14.5	10.9	73.3	2.7	<1.0	38.9	28.8	28.0	25.4
03/12/2002	17/12/2002	4.2	81.4	68.6	90.7	144.3	33.1	14.1	165.4	3.8	<1.0	64.0	61.7	51.0	19.9
17/12/2002	02/01/2003	4.7	13.8	10.7	15.4	13.6	2.3	1.4	15.2	0.5	<1.0	12.2	20.4	<10.0	71.1
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5004			39.2	34.9	37.6	37.4	9.0	15.8	44.5	1.4	-	34.8	27.7	22.9	693.7

Preston Montford

2002

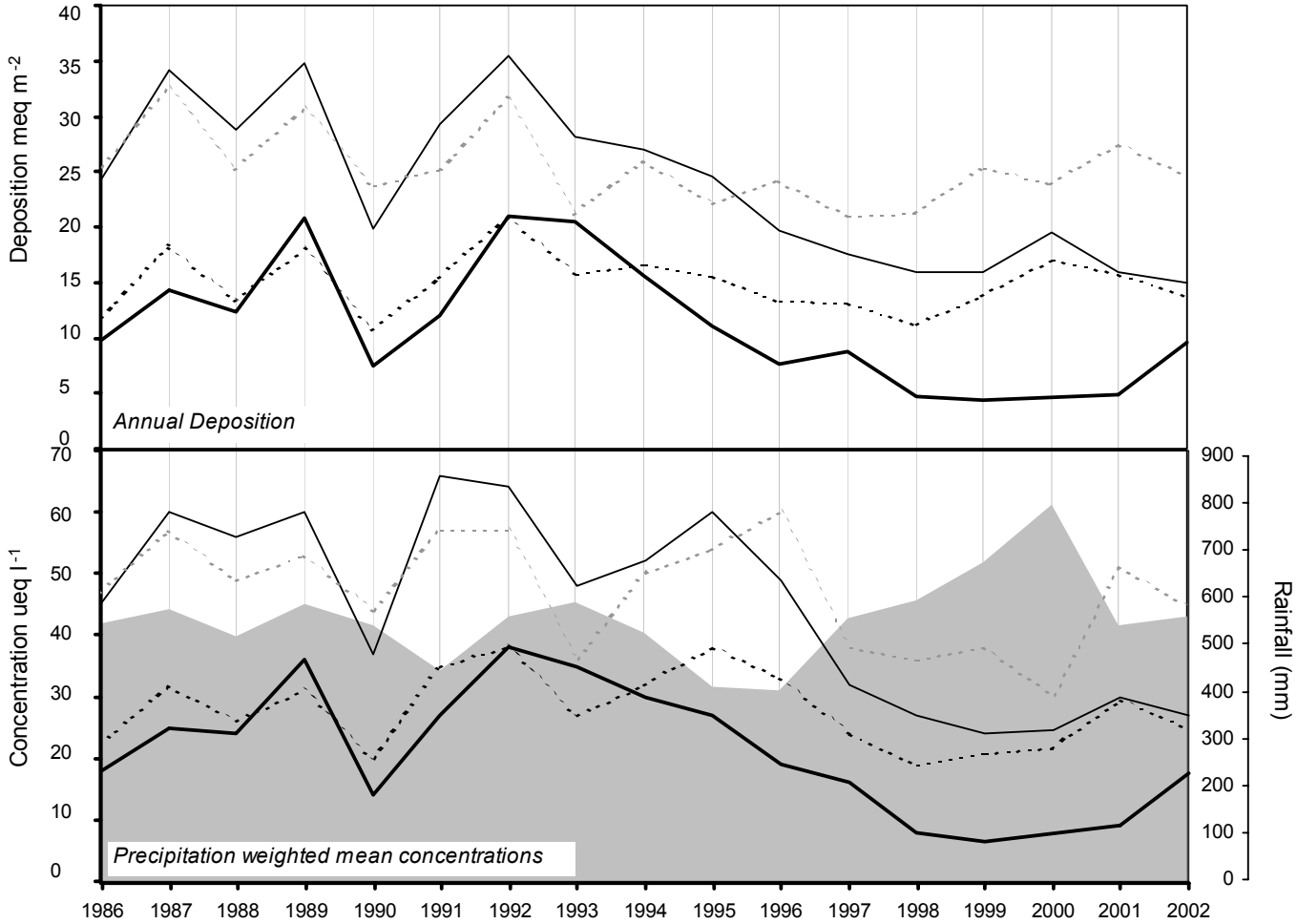
Site Code:	**5023**
Easting:	**3432**
Northing:	**3143**
Latitude:	**52 43 23 N**
Longitude:	**02 50 17 W**
Altitude (m):	**70**
Rainfall (mm):	**695**

[30 year mean 1940 - 1971]

Site Environment:
Field adjacent to Study Centre

Other measurements:
DT, Weekly 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
-1.06 ueq/l (-3.56 %/year): 16 years' data
\+ Significant trend detected

non-marine sulphate
-2.16 ueq/l (-3.47 %/year): 17 years' data
++ Moderately strong trend detected

nitrate
-0.27 ueq/l (-0.88 %/year): 17 years' data
\- No significant trend detected

ammonium
-0.76 ueq/l (-1.43 %/year): 17 years' data
\- No 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 S/cm	rainfall (mm)
02/01/2002	09/01/2002	6.0	35.2	18.6	51.2	45.7	2.4	5.4	51.9	2.1	<1.0	29.6	1.0	17.0	3.0
09/01/2002	16/01/2002	6.1	93.2	57.5	143.3	83.3	17.1	12.7	98.5	3.9	<1.0	83.2	0.8	37.0	1.9
16/01/2002	23/01/2002	6.2	63.2	15.5	71.2	255.9	49.1	16.2	300.3	11.1	<1.0	32.4	0.7	52.0	3.6
23/01/2002	30/01/2002	5.3	19.2	5.1	18.3	94.1	15.6	4.6	109.2	4.8	<1.0	7.9	4.9	23.0	20.0
30/01/2002	13/02/2002	5.7	15.5	3.5	16.6	92.1	16.6	4.7	105.7	3.5	<1.0	4.4	1.9	19.0	43.5
13/02/2002	27/02/2002	5.8	37.6	4.9	29.6	228.3	45.9	12.8	260.0	7.7	<1.0	10.1	1.7	44.0	29.8
27/02/2002	13/03/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1
13/03/2002	27/03/2002	4.8	54.0	40.6	68.0	48.6	11.9	11.8	65.0	2.3	<1.0	48.2	17.0	26.0	10.8
27/03/2002	10/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
10/04/2002	24/04/2002	6.7	97.8	50.7	119.4	98.2	27.4	85.4	115.1	15.7	<1.0	86.0	0.2	48.0	4.4
24/04/2002	08/05/2002	6.1	19.3	7.2	11.2	93.6	20.9	12.3	112.8	9.7	<1.0	8.0	0.9	22.0	6.4
08/05/2002	22/05/2002	5.2	45.7	34.4	55.2	21.8	8.2	22.2	28.3	4.4	<9.7	43.0	6.6	17.0	29.9
22/05/2002	05/06/2002	6.5	20.0	12.2	55.3	73.3	9.5	4.6	83.7	8.8	<1.0	11.2	0.3	21.0	13.4
05/06/2002	19/06/2002	5.7	30.6	30.0	56.7	17.0	5.6	8.1	22.0	6.8	<1.0	28.6	1.9	15.0	48.7
19/06/2002	03/07/2002	6.8	22.7	2.3	308.8	33.9	14.6	13.4	42.1	52.4	54.1	18.6	0.2	57.0	7.7
03/07/2002	17/07/2002	6.4	32.4	8.5	400.3	26.3	6.4	9.2	24.1	30.0	<1.0	29.2	0.4	58.0	20.3
17/07/2002	31/07/2002	6.6	35.2	40.0	90.2	7.6	4.3	14.8	9.5	8.2	<1.0	34.3	0.2	20.0	19.5
31/07/2002	14/08/2002	5.1	32.3	27.7	54.6	2.1	1.1	4.0	4.6	2.0	<1.0	32.1	8.5	12.0	45.5
14/08/2002	28/08/2002	6.5	23.6	41.5	96.5	17.1	6.8	33.3	20.8	14.2	3.9	21.5	0.4	22.0	2.1
28/08/2002	11/09/2002	5.4	24.4	14.9	45.2	17.8	4.6	11.7	21.3	11.5	<1.0	22.3	4.1	14.0	15.4
11/09/2002	25/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/09/2002	09/10/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	1.9
09/10/2002	23/10/2002	4.3	32.1	42.4	26.7	11.1	3.7	6.8	17.3	0.9	<1.0	30.8	50.1	24.0	64.9
23/10/2002	06/11/2002	7.6	142.9	6.4	1296.8	157.6	36.6	21.9	184.9	238.6	551.8	124.0	0.0	236.0	54.2
06/11/2002	20/11/2002	6.0	169.2	1.6	413.6	188.5	42.6	30.8	148.8	11.1	5.4	146.5	0.9	97.0	21.2
20/11/2002	04/12/2002	5.3	26.0	12.4	28.3	105.5	21.2	8.7	122.8	3.7	<1.0	13.3	5.2	25.0	17.7
04/12/2002	18/12/2002	4.0	113.9	80.8	148.8	114.0	24.8	15.6	161.5	3.8	<1.0	100.2	107.2	66.0	15.6
18/12/2002	01/01/2003	4.5	20.4	11.0	21.5	17.7	3.5	2.3	23.6	0.7	<1.0	18.3	31.6	12.0	49.7
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5023			39.2	23.3	75.5	58.0	12.5	10.2	66.3	5.7	-	32.2	16.0	26.9	553.7

Bottesford

2002

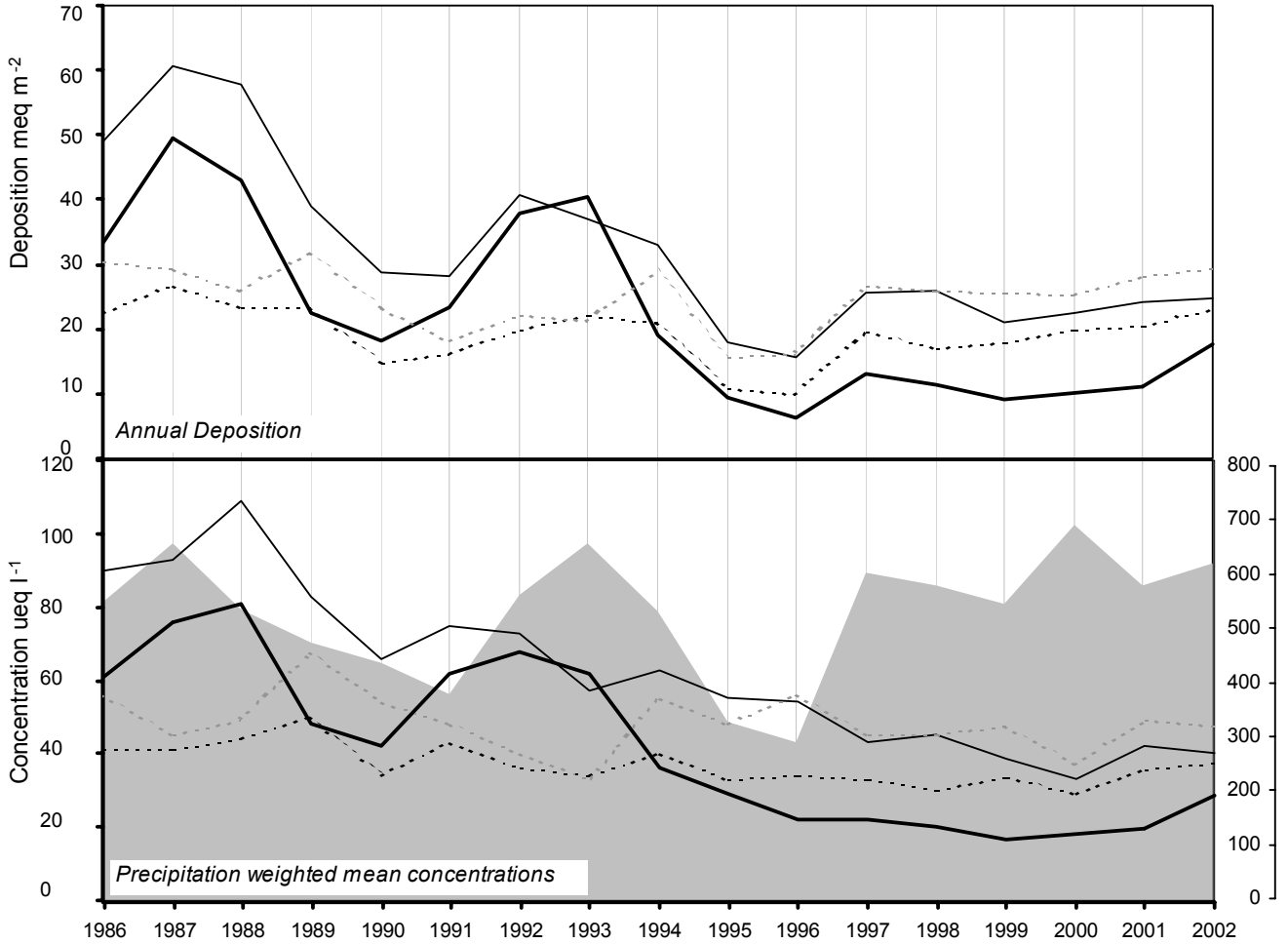
Site Code:	**5121**
Easting:	**4797**
Northing:	**3376**
Latitude:	**52 55 46 N**
Longitude:	**00 48 51 W**
Altitude (m):	**32**
Rainfall (mm):	**561**

[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
-3.92 ueq/l (-5.38 %/year): 16 years' data
+++ Strong trend detected

non-marine sulphate
-4.05 ueq/l (-4.28 %/year): 17 years' data
++++ Very strong trend detected

nitrate
-0.70 ueq/l (-1.64 %/year): 17 years' data
++ Moderately strong trend detected

ammonium
-0.51 ueq/l (-0.97 %/year): 17 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 S/cm	rainfall (mm)
02/01/2002	15/01/2002	4.2	185.1	189.7	269.6	78.5	20.9	28.4	111.2	3.7	<1.0	175.6	57.5	84.0	2.6
15/01/2002	29/01/2002	4.8	37.9	12.1	26.9	58.4	14.2	7.0	72.8	2.2	<1.0	30.9	17.0	20.0	23.4
29/01/2002	12/02/2002	5.2	29.4	11.7	24.5	82.1	18.8	10.0	97.3	3.2	<1.0	19.5	5.9	21.0	19.9
12/02/2002	26/02/2002	5.0	49.6	15.7	37.2	140.3	30.5	14.3	160.9	3.5	<1.0	32.7	11.0	35.0	35.8
26/02/2002	12/03/2002	4.8	204.7	80.8	123.4	464.4	107.3	101.5	533.8	12.4	<1.0	148.8	17.8	115.0	2.3
12/03/2002	26/03/2002	5.8	50.4	37.7	81.4	67.7	12.7	11.2	88.5	1.9	<1.0	42.3	1.6	25.0	16.8
26/03/2002	09/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
09/04/2002	23/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
23/04/2002	07/05/2002	5.9	35.9	19.3	55.2	32.8	7.2	11.9	40.3	2.0	<1.0	31.9	1.2	17.0	30.2
07/05/2002	21/05/2002	5.6	74.3	90.0	121.5	27.1	11.0	41.0	30.8	5.4	<1.0	71.0	2.3	31.0	17.4
21/05/2002	05/06/2002	5.1	30.3	29.3	26.4	33.2	11.3	16.6	40.4	8.0	<9.7	26.3	8.7	16.0	19.7
05/06/2002	18/06/2002	4.2	74.6	48.6	51.1	9.4	7.4	14.1	25.5	6.2	<1.0	73.5	61.7	37.0	21.9
18/06/2002	02/07/2002	6.3	64.0	44.3	77.7	26.0	12.8	44.1	32.4	8.3	<1.0	60.9	0.6	26.0	8.5
02/07/2002	16/07/2002	4.8	27.6	19.1	26.9	3.4	3.2	12.4	9.3	2.1	<1.0	27.2	15.5	13.0	48.6
16/07/2002	30/07/2002	4.5	60.5	63.1	68.9	2.3	3.2	23.1	6.0	3.0	<1.0	60.2	35.5	29.0	53.7
30/07/2002	13/08/2002	4.2	62.3	61.0	75.1	<0.9	2.4	11.9	8.8	1.6	<1.0	62.4	60.3	33.0	59.6
13/08/2002	27/08/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
27/08/2002	10/09/2002	5.5	27.9	20.8	37.4	12.7	4.3	13.1	16.3	1.5	<1.0	26.4	3.2	11.0	32.7
10/09/2002	24/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
24/09/2002	22/10/2002	4.5	38.5	39.1	30.7	46.3	11.9	16.7	57.3	1.6	<1.0	32.9	33.1	26.0	68.7
22/10/2002	05/11/2002	4.5	40.3	28.6	32.4	75.5	18.2	15.8	91.9	4.9	<1.0	31.2	30.2	27.0	23.9
05/11/2002	19/11/2002	4.6	18.7	21.1	15.5	19.0	4.2	5.2	22.8	0.9	<1.0	16.4	22.9	15.0	43.7
19/11/2002	02/12/2002	4.6	31.2	33.6	37.9	33.1	8.8	10.6	43.2	1.4	<1.0	27.2	24.5	21.0	15.6
02/12/2002	18/12/2002	4.0	102.8	94.1	108.1	173.5	40.2	14.7	209.0	5.2	<1.0	81.9	104.7	71.0	24.7
18/12/2002	03/01/2003	4.5	19.3	18.3	16.7	16.8	3.4	2.8	21.1	0.7	<1.0	17.2	34.7	15.0	43.5
Precipitation-weighted annual mean for site (samples containing phosphate are excluded)															Total rainfall
5121			45.2	37.7	47.5	40.9	10.7	14.4	51.4	2.7	-	40.3	28.6	25.7	613.9

Llyn Llagi

2002

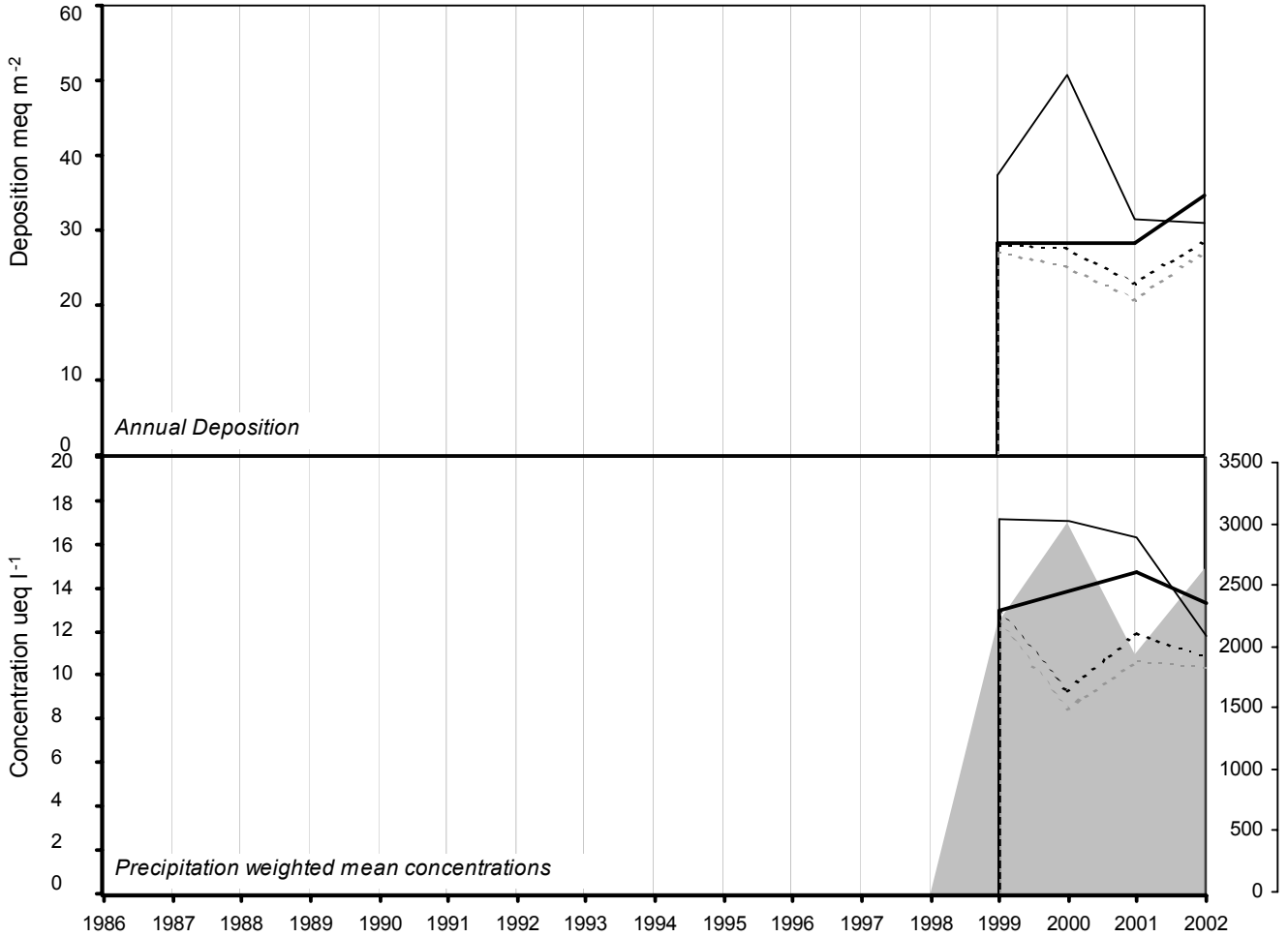
Site Code:	**5160**
Easting:	**2647**
Northing:	**3483**
Latitude:	**53 01 48 N**
Longitude:	**04 01 82 W**
Altitude (m):	**380**
Rainfall (mm):	**-**

[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): 3 years' data
n/a Insufficient Data

non-marine sulphate
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

nitrate
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

ammonium
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

ACID DEPOSITION DATA REPORT, 2002

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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 S/cm	rainfall (mm)
02/01/2002	14/01/2002	4.4	58.3	57.8	43.0	127.5	28.8	7.6	131.2	2.6	<1.0	42.9	44.7	43.0	24.8
14/01/2002	28/01/2002	5.0	27.1	4.6	4.4	166.8	34.8	5.5	187.4	3.5	<1.0	7.0	10.2	33.0	243.1
28/01/2002	13/02/2002	5.3	25.2	3.7	1.6	170.8	35.5	7.0	196.5	3.4	<1.0	4.6	5.6	27.0	318.1
13/02/2002	27/02/2002	5.6	26.0	3.2	8.9	184.3	39.1	9.7	217.0	3.8	<1.0	3.8	2.8	33.0	221.6
27/02/2002	11/03/2002	5.5	89.2	10.9	21.3	621.1	135.4	28.2	688.5	12.8	<1.0	14.4	3.0	104.0	44.4
11/03/2002	25/03/2002	4.6	42.4	30.6	25.9	110.9	25.8	13.4	124.9	2.4	<1.0	29.0	24.0	33.0	25.1
25/03/2002	08/04/2002	4.9	30.4	22.0	34.9	48.8	10.3	6.8	52.0	1.5	<1.0	24.6	11.5	18.0	56.9
08/04/2002	22/04/2002	4.7	29.3	15.0	18.2	27.7	7.2	6.7	33.8	0.9	<1.0	26.0	20.4	16.0	79.1
22/04/2002	02/05/2002	5.2	19.9	5.2	5.2	108.0	22.7	5.7	120.3	2.1	<1.0	6.9	6.2	22.0	132.8
02/05/2002	20/05/2002	4.7	33.4	20.1	19.6	75.4	17.4	8.4	88.5	1.5	<9.7	24.3	18.6	22.0	142.7
20/05/2002	03/06/2002	5.0	30.8	12.4	13.9	152.0	32.9	9.5	169.6	3.2	<1.0	12.5	10.7	32.0	106.5
03/06/2002	20/06/2002	4.8	25.0	9.3	8.3	79.4	17.2	4.4	89.7	1.7	<1.0	15.5	16.2	22.0	113.7
20/06/2002	01/07/2002	4.9	23.6	10.1	12.2	69.4	15.0	5.5	78.7	1.6	<1.0	15.2	13.8	19.0	70.7
01/07/2002	15/07/2002	4.9	14.7	5.2	6.1	38.4	8.4	4.6	47.4	0.8	<1.0	10.1	12.6	12.0	70.1
15/07/2002	29/07/2002	5.6	49.0	31.1	62.0	53.0	13.1	11.2	54.4	1.8	<1.0	42.6	2.6	22.0	23.2
29/07/2002	12/08/2002	6.1	24.6	26.0	17.8	9.2	3.1	3.4	12.1	0.6	<1.0	23.5	0.8	20.0	72.4
12/08/2002	26/08/2002	4.8	13.6	8.0	7.4	19.5	4.7	5.0	22.8	0.7	<1.0	11.2	14.8	10.0	86.9
26/08/2002	09/09/2002	4.9	21.6	11.3	14.2	42.9	10.2	5.4	48.8	1.4	<1.0	16.5	14.1	16.0	78.3
09/09/2002	23/09/2002	4.4	26.7	21.7	8.8	2.8	1.2	2.1	7.0	<0.5	<1.0	26.4	42.7	20.0	11.4
23/09/2002	07/10/2002	4.7	50.3	33.5	41.3	75.6	16.7	17.5	84.1	2.6	<1.0	41.2	18.6	29.0	19.4
07/10/2002	22/10/2002	4.4	23.7	33.7	14.9	36.4	8.3	5.1	42.8	1.1	<1.0	19.3	42.7	23.0	94.3
22/10/2002	05/11/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
05/11/2002	18/11/2002	4.9	10.2	3.6	0.8	59.1	12.1	2.9	68.9	1.2	<1.0	3.1	11.7	14.0	202.4
18/11/2002	02/12/2002	4.7	37.2	9.5	5.0	238.4	52.8	10.6	265.5	4.6	<1.0	8.5	19.1	45.0	104.2
02/12/2002	17/12/2002	4.3	50.7	33.5	30.9	208.0	45.4	14.3	227.9	4.5	<1.0	25.6	46.8	49.0	42.1
17/12/2002	30/12/2002	4.8	9.1	5.7	3.7	41.3	7.9	2.2	45.9	1.1	<1.0	4.1	17.8	11.0	176.7
30/12/2002	14/01/2003	4.9	28.0	19.8	15.0	139.3	29.4	7.9	146.9	2.9	<1.0	11.3	11.7	39.0	47.3
Precipitation-weighted annual mean for site (samples containing phosphate are excluded)															Total rainfall
5160			25.9	10.9	10.3	116.3	24.9	6.8	132.1	2.5	-	11.8	13.3	25.8	2608.1

Llyn Llydaw

2002

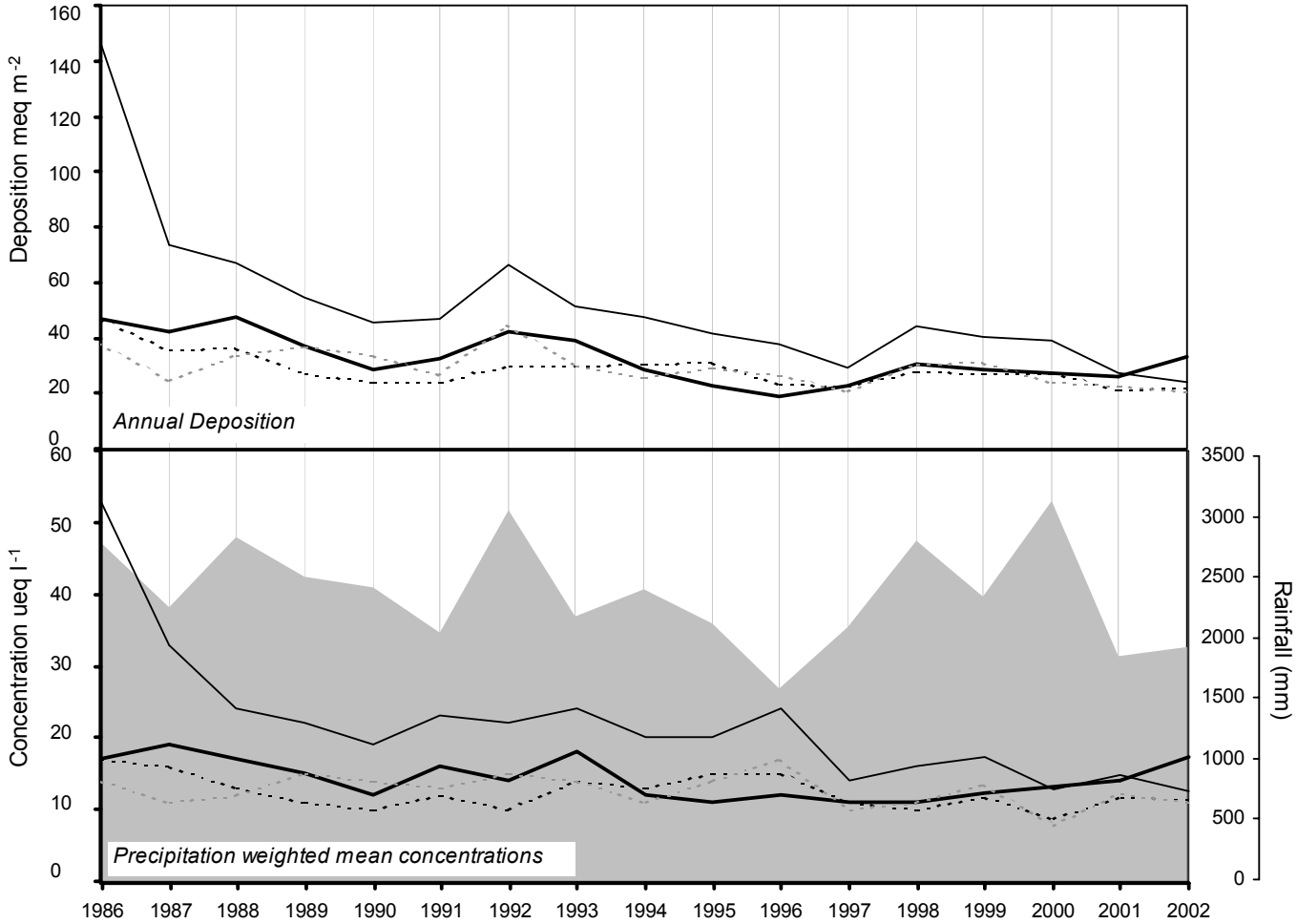
Site Code:	**5153**
Easting:	**2638**
Northing:	**3549**
Latitude:	**53 04 35 N**
Longitude:	**04 01 42 W**
Altitude (m):	**490**
Rainfall (mm):	**2417**

[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
-0.28 ueq/l (-1.71 %/year): 16 years' data
\- No significant trend detected

non-marine sulphate
-1.41 ueq/l (-4.26 %/year): 17 years' data
++ Moderately strong trend detected

nitrate
-0.22 ueq/l (-1.53 %/year): 17 years' data
\- No significant trend detected

ammonium
-0.16 ueq/l (-1.13 %/year): 17 years' data
\- No significant trend detected

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National Environmental Technology Centre

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 S/cm	rainfall (mm)
02/01/2002	16/01/2002	4.6	35.7	26.4	21.1	85.2	16.8	4.4	104.4	2.1	<1.0	25.4	26.9	28.0	34.1
16/01/2002	30/01/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
30/01/2002	13/02/2002	5.1	17.2	3.2	1.3	108.1	22.6	4.7	121.9	2.1	<1.0	4.1	8.1	18.0	251.4
13/02/2002	27/02/2002	5.4	26.4	3.2	8.0	190.2	39.2	7.6	217.5	3.8	<1.0	3.5	3.7	33.0	218.5
27/02/2002	13/03/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
13/03/2002	27/03/2002	4.7	56.1	38.4	54.7	91.9	21.0	14.0	104.0	2.0	<1.0	45.0	21.9	35.0	12.7
27/03/2002	10/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1
10/04/2002	24/04/2002	4.8	21.8	12.2	12.1	25.1	6.4	5.7	30.7	1.4	<1.0	18.8	17.0	14.0	87.1
24/04/2002	08/05/2002	5.1	18.3	5.8	7.5	80.1	17.8	5.8	99.6	1.5	<1.0	8.6	7.6	18.0	108.6
08/05/2002	22/05/2002	4.9	28.3	19.6	21.4	37.3	8.9	6.7	44.8	1.3	<1.0	23.8	14.1	19.0	125.9
22/05/2002	05/06/2002	5.1	26.0	8.0	10.0	140.3	31.3	8.4	161.5	2.8	<1.0	9.1	7.9	28.0	117.7
05/06/2002	19/06/2002	4.7	20.7	10.2	10.5	48.2	10.4	3.5	55.7	1.1	<1.0	14.9	21.9	18.0	122.5
19/06/2002	03/07/2002	5.0	20.0	7.8	15.6	43.4	9.1	4.3	50.3	1.1	<1.0	14.8	10.5	14.0	67.4
03/07/2002	17/07/2002	4.8	13.4	5.7	4.6	21.6	4.6	<1.0	25.9	<0.5	<1.0	10.8	15.5	10.0	37.6
17/07/2002	31/07/2002	6.4	45.6	38.1	46.1	63.1	9.4	19.5	44.5	12.1	<1.0	38.0	0.4	22.0	5.4
31/07/2002	14/08/2002	4.4	26.0	25.1	17.8	12.3	3.6	4.0	16.3	0.5	<1.0	24.5	42.7	18.0	68.1
14/08/2002	28/08/2002	4.4	41.0	27.3	33.7	6.2	2.2	4.9	8.8	0.7	<1.0	40.2	38.9	20.0	39.0
28/08/2002	11/09/2002	4.7	20.2	12.8	10.1	32.0	8.2	6.7	39.4	1.2	<1.0	16.4	21.9	15.0	66.6
11/09/2002	25/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/09/2002	09/10/2002	4.6	53.7	33.4	50.5	60.0	13.3	11.9	66.9	1.8	<1.0	46.4	23.4	26.0	12.9
09/10/2002	23/10/2002	4.4	23.3	25.6	16.9	36.1	8.4	4.6	43.1	1.0	<1.0	19.0	38.0	22.0	132.9
23/10/2002	06/11/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
06/11/2002	20/11/2002	4.8	12.6	7.6	3.4	51.5	11.4	3.1	61.7	1.3	<1.0	6.4	17.4	15.0	156.5
20/11/2002	04/12/2002	4.8	29.8	7.0	4.7	196.3	41.4	8.8	218.4	3.9	<1.0	6.2	17.0	38.0	69.2
04/12/2002	18/12/2002	3.9	235.4	198.3	191.1	748.1	169.7	89.7	856.0	21.0	<1.0	145.3	125.9	193.0	7.9
18/12/2002	01/01/2003	4.7	9.0	5.6	3.3	37.8	6.6	1.6	42.1	0.7	<1.0	4.4	21.9	11.0	172.3
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5153			22.5	11.4	11.0	82.4	17.6	5.6	95.1	1.9	-	12.6	17.2	21.1	1916.4

River Etherow

2002

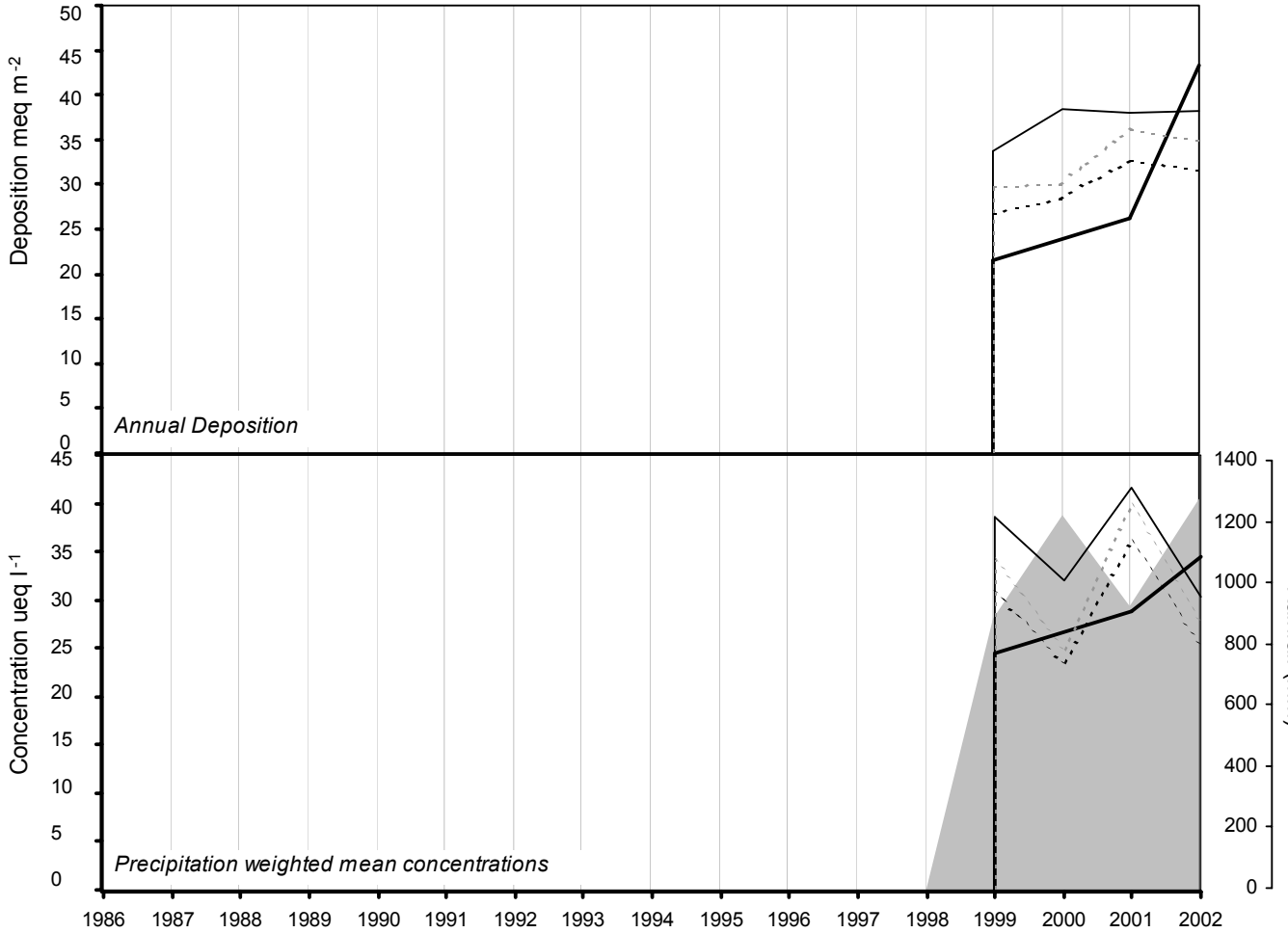
Site Code:	**5158**
Easting:	**4125**
Northing:	**3986**
Latitude:	**53 48 39 N**
Longitude:	**01 81 31 W**
Altitude (m):	**485**
Rainfall (mm):	**-**

[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): 3 years' data
n/a Insufficient Data

non-marine sulphate
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

nitrate
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

ammonium
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
10/01/2002	16/01/2002	4.6	63.7	49.2	50.4	119.0	26.1	19.2	137.6	2.5	<1.0	49.4	26.3	41.0	4.6
16/01/2002	31/01/2002	5.1	25.8	10.3	20.6	79.8	16.3	6.1	91.3	2.2	<1.0	16.2	8.1	21.0	57.4
31/01/2002	13/02/2002	5.3	18.2	7.9	14.8	64.1	12.6	4.6	77.3	2.3	<1.0	10.5	4.8	14.0	88.1
13/02/2002	26/02/2002	5.1	20.4	6.5	13.0	65.0	13.2	4.5	71.2	1.3	<1.0	12.6	8.3	17.0	93.3
26/02/2002	12/03/2002	5.4	65.2	22.1	48.3	245.7	52.3	21.1	262.7	5.3	<1.0	35.6	4.1	51.0	22.3
12/03/2002	26/03/2002	4.5	83.8	56.9	84.8	102.7	25.2	28.9	126.3	2.5	<1.0	71.5	30.9	41.0	21.0
26/03/2002	09/04/2002	6.3	70.8	83.1	82.5	42.4	12.7	76.4	48.5	1.8	<1.0	65.7	0.5	31.0	4.9
09/04/2002	23/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
23/04/2002	08/05/2002	5.2	28.7	9.1	21.2	80.4	17.3	9.0	92.4	1.7	<1.0	19.0	6.8	21.0	68.7
08/05/2002	20/05/2002	4.5	66.0	64.3	67.9	34.6	11.1	27.8	36.6	1.5	<1.0	61.8	29.5	31.0	24.6
20/05/2002	06/06/2002	4.8	33.9	28.9	32.0	33.9	9.1	13.9	42.0	1.1	<1.0	29.8	17.4	19.0	63.4
06/06/2002	17/06/2002	4.3	60.2	54.9	52.6	37.3	9.2	13.9	44.8	1.2	<1.0	55.7	50.1	35.0	18.1
17/06/2002	04/07/2002	5.3	39.2	18.4	40.9	45.9	10.1	18.8	52.5	1.4	<1.0	33.7	5.0	18.0	32.9
04/07/2002	16/07/2002	4.5	32.8	15.9	18.0	8.8	5.1	8.5	13.8	<0.5	<1.0	31.8	28.8	17.0	33.0
16/07/2002	30/07/2002	7.5	410.9	71.0	1633.7	69.9	27.1	22.3	17.7	175.3	633.0	402.5	0.0	255.0	48.5
30/07/2002	12/08/2002	4.2	49.7	33.6	36.5	<0.9	1.1	2.7	6.1	0.9	<1.0	49.9	61.7	27.0	150.6
12/08/2002	02/09/2002	4.7	71.7	77.4	61.2	22.1	8.4	63.6	16.2	1.7	<1.0	69.0	18.6	27.0	7.8
02/09/2002	10/09/2002	4.5	36.6	23.8	30.8	9.0	3.7	6.8	13.8	0.9	<1.0	35.5	29.5	18.0	45.9
10/09/2002	24/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
24/09/2002	08/10/2002	5.9	86.1	79.4	77.4	118.5	30.2	63.0	117.8	3.4	<1.0	71.8	1.2	39.0	9.4
08/10/2002	22/10/2002	4.3	41.5	33.9	25.3	38.5	9.7	7.0	49.6	1.0	<1.0	36.8	53.7	29.0	76.7
22/10/2002	06/11/2002	4.7	26.5	12.4	12.8	103.1	22.0	6.6	120.4	2.2	<1.0	14.1	18.6	23.0	108.3
06/11/2002	18/11/2002	4.3	27.8	18.3	6.3	61.7	13.6	5.4	81.1	1.4	<1.0	20.4	56.2	28.0	58.4
18/11/2002	08/12/2002	4.2	48.3	42.3	35.4	101.7	23.9	13.5	122.8	2.6	<1.0	36.1	60.3	40.0	69.2
08/12/2002	17/12/2002	4.0	98.8	77.7	61.6	383.3	85.2	22.1	419.9	8.5	<1.0	52.7	95.5	100.0	38.7
17/12/2002	02/01/2003	4.2	24.4	14.7	14.2	18.9	4.0	2.5	22.4	1.0	<1.0	22.1	58.9	16.0	115.3
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5158			38.1	25.2	27.6	65.4	14.7	9.5	76.4	1.8	-	30.3	34.4	26.3	1261.2

Wardlow Hay Cop

2002

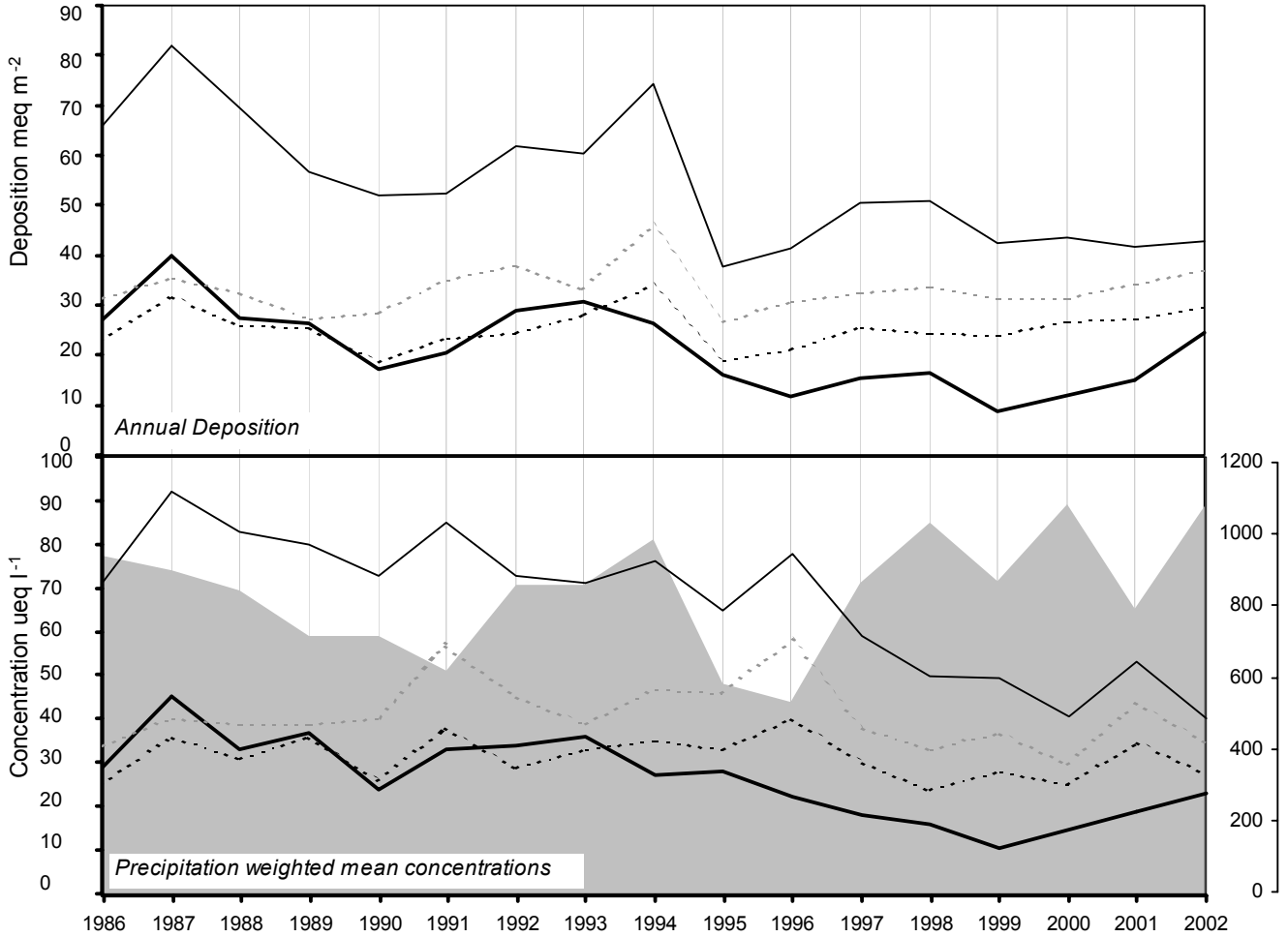
Site Code:	**5120**
Easting:	**4177**
Northing:	**3739**
Latitude:	**53 55 41 N**
Longitude:	**01 44 05 W**
Altitude (m):	**350**
Rainfall (mm):	**1081**

[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
-1.46 ueq/l (-3.83 %/year): 16 years' data
++ Moderately strong trend detected

non-marine sulphate
-2.68 ueq/l (-3.03 %/year): 17 years' data
+++ Strong trend detected

nitrate
-0.18 ueq/l (-0.54 %/year): 17 years' data
- No significant trend detected

ammonium
-0.21 ueq/l (-0.49 %/year): 17 years' data
- No significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
13/01/2002	27/01/2002	5.3	48.2	18.1	31.2	80.2	19.3	22.0	93.2	2.1	<1.0	38.5	5.5	24.0	40.6
27/01/2002	10/02/2002	5.4	33.7	8.8	22.3	106.4	22.1	14.0	121.7	2.3	<1.0	20.9	4.0	24.0	63.0
10/02/2002	24/02/2002	5.9	45.6	5.6	22.0	191.0	39.0	27.0	223.9	4.6	<1.0	22.6	1.2	39.0	63.3
24/02/2002	10/03/2002	6.2	40.1	9.5	21.4	94.6	18.6	42.5	104.6	2.5	<1.0	28.7	0.6	25.0	47.0
10/03/2002	24/03/2002	5.6	83.5	44.5	88.9	92.2	23.6	43.4	112.6	2.3	<1.0	72.3	2.7	35.0	31.7
24/03/2002	07/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9
07/04/2002	21/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
21/04/2002	05/05/2002	6.1	45.0	14.9	30.2	72.8	15.7	42.0	84.7	2.3	<1.0	36.2	0.9	24.0	59.2
05/05/2002	19/05/2002	5.3	80.3	56.3	60.6	29.7	12.0	67.6	37.2	2.3	<1.0	76.7	5.5	26.0	20.5
19/05/2002	03/06/2002	5.2	29.8	17.9	25.4	40.9	9.8	19.7	47.8	1.6	<1.0	24.9	6.0	15.0	55.4
03/06/2002	16/06/2002	4.5	55.0	52.6	50.3	20.4	6.4	22.9	28.0	0.8	<1.0	52.5	34.7	29.0	37.0
16/06/2002	30/06/2002	6.8	61.6	22.2	45.4	60.7	17.6	171.7	74.9	8.6	<1.0	54.2	0.2	44.0	9.6
30/06/2002	14/07/2002	5.3	35.4	20.9	26.7	12.0	4.0	27.2	17.6	1.1	<1.0	34.0	5.4	13.0	42.6
14/07/2002	28/07/2002	4.6	63.1	55.2	52.7	5.6	3.7	49.5	11.8	1.5	<1.0	62.4	24.0	24.0	28.0
28/07/2002	11/08/2002	4.3	53.8	39.4	44.1	<0.9	1.7	10.5	4.9	0.8	<1.0	53.9	53.7	26.0	148.1
11/08/2002	25/08/2002	6.5	112.7	76.0	51.0	35.7	13.3	183.7	38.5	5.0	<1.0	108.4	0.3	37.0	3.8
25/08/2002	08/09/2002	6.1	70.0	26.2	56.5	40.3	10.6	94.0	47.9	3.6	<1.0	65.2	0.7	28.0	13.3
08/09/2002	23/09/2002	4.3	47.4	23.4	21.2	6.2	3.1	18.8	12.6	1.6	<1.0	46.6	47.9	22.0	17.3
23/09/2002	06/10/2002	6.6	172.0	76.2	79.1	96.4	28.8	257.6	115.1	10.1	<1.0	160.4	0.2	65.0	6.2
06/10/2002	20/10/2002	4.5	57.5	50.6	41.3	41.8	10.3	44.9	55.2	3.8	<1.0	52.5	30.9	29.0	34.5
20/10/2002	03/11/2002	4.8	32.5	21.0	21.0	72.5	16.0	13.1	83.2	1.8	<1.0	23.8	17.8	23.0	62.1
03/11/2002	17/11/2002	4.7	27.7	15.3	17.8	61.7	14.7	12.0	76.0	1.7	<1.0	20.3	21.9	21.0	72.8
17/11/2002	01/12/2002	4.3	54.5	60.1	64.6	37.7	9.3	16.2	47.1	1.4	<1.0	49.9	49.0	33.0	24.8
01/12/2002	18/12/2002	4.3	83.5	55.0	58.9	137.3	32.4	43.0	165.9	3.8	<1.0	67.0	56.2	50.0	56.8
18/12/2002	29/12/2002	4.4	26.1	18.5	21.3	12.3	3.1	6.6	16.9	0.9	<1.0	24.6	36.3	24.0	67.2
29/12/2002	12/01/2003	4.6	26.8	17.1	18.4	24.4	5.7	7.1	30.1	1.7	<1.0	23.9	26.3	19.0	60.6
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5120			47.0	27.7	34.8	57.8	13.5	27.5	69.4	2.1	-	40.0	22.8	26.5	1066.2

Driby

2002

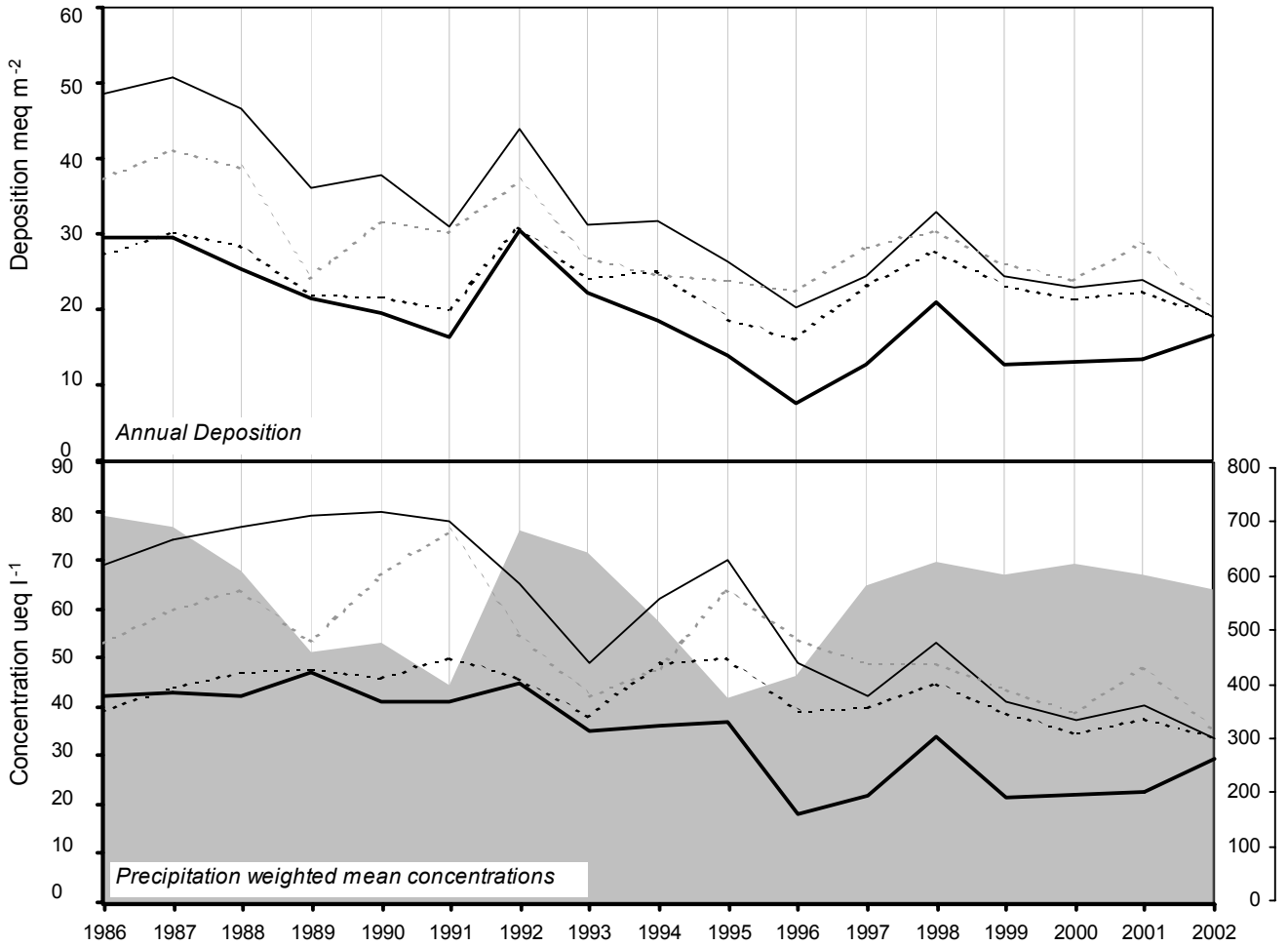
Site Code:	**5136**
Easting:	**5386**
Northing:	**3744**
Latitude:	**53 14 54 N**
Longitude:	**00 04 39 E**
Altitude (m):	**47**
Rainfall (mm):	**737**

[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
-1.58 ueq/l (-3.39 %/year): 16 years' data
+++ Strong trend detected

non-marine sulphate
-2.90 ueq/l (-3.54 %/year): 17 years' data
++++ Very strong trend detected

nitrate
-0.59 ueq/l (-1.24 %/year): 17 years' data
+ Significant trend detected

ammonium
-1.37 ueq/l (-2.15 %/year): 17 years' data
++ Moderately strong trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
02/01/2002	16/01/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
16/01/2002	30/01/2002	4.9	34.4	20.4	35.0	68.2	14.8	11.0	76.5	1.8	<1.0	26.2	13.2	18.0	17.7
30/01/2002	13/02/2002	5.0	40.9	23.1	37.8	123.6	26.9	14.0	139.9	3.1	<1.0	26.0	9.5	25.0	18.4
13/02/2002	20/02/2002	5.0	75.1	26.0	60.6	178.1	37.5	28.5	208.8	7.2	<1.0	53.6	10.5	36.0	4.7
20/02/2002	27/02/2002	5.0	32.9	15.6	27.8	109.8	24.1	11.4	127.0	3.4	<1.0	19.7	9.8	28.0	17.5
27/02/2002	13/03/2002	5.1	185.3	76.0	93.6	652.7	147.0	96.2	730.3	15.8	<1.0	106.7	8.3	130.0	4.0
13/03/2002	27/03/2002	5.9	64.4	50.1	91.4	196.9	40.3	18.6	220.2	4.6	<1.0	40.7	1.2	46.0	15.6
27/03/2002	10/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
10/04/2002	08/05/2002	6.2	52.6	29.6	48.3	99.5	23.8	29.9	113.6	3.4	<1.0	40.6	0.7	29.0	30.1
08/05/2002	22/05/2002	4.8	53.2	58.9	78.2	29.7	8.7	19.9	32.2	1.5	<9.7	49.6	15.1	24.0	27.8
22/05/2002	05/06/2002	4.6	31.5	27.9	22.3	41.2	10.9	13.1	47.4	1.2	<9.7	26.5	27.5	20.0	24.9
05/06/2002	19/06/2002	4.7	48.1	44.5	36.9	48.7	13.7	29.0	51.8	4.5	<1.0	42.2	19.5	27.0	12.9
19/06/2002	03/07/2002	6.0	52.5	41.2	51.4	27.0	16.1	47.3	43.2	14.3	<1.0	49.3	1.0	22.0	15.9
03/07/2002	17/07/2002	4.4	32.7	21.6	16.5	2.8	2.5	6.0	10.3	1.0	<1.0	32.4	39.8	20.0	54.9
17/07/2002	31/07/2002	4.3	57.5	60.0	67.6	4.8	3.8	18.6	10.0	1.2	<1.0	56.9	53.7	31.0	31.3
31/07/2002	14/08/2002	4.2	55.7	57.6	53.3	8.2	3.0	11.7	12.8	2.8	<1.0	54.8	61.7	30.0	11.0
14/08/2002	28/08/2002	4.8	109.2	112.0	114.6	66.5	23.3	98.5	79.8	10.2	<1.0	101.2	14.5	48.0	7.8
28/08/2002	11/09/2002	4.9	31.2	22.6	21.5	21.0	6.6	25.1	26.1	2.1	<1.0	28.6	12.3	15.0	25.4
11/09/2002	25/09/2002	5.3	123.9	90.0	70.5	397.4	91.6	73.3	425.0	15.1	<1.0	76.0	5.2	88.0	3.0
25/09/2002	09/10/2002	4.5	134.9	96.6	37.2	165.0	47.0	118.9	176.3	6.3	<1.0	115.0	33.1	62.0	3.3
09/10/2002	06/11/2002	4.3	37.3	29.3	17.7	126.4	28.3	11.4	147.2	2.5	<1.0	22.1	45.7	36.0	142.2
06/11/2002	20/11/2002	4.6	19.9	17.6	13.0	34.8	7.5	3.9	40.5	1.0	<1.0	15.7	26.3	17.0	39.5
20/11/2002	04/12/2002	4.8	49.1	37.5	70.8	58.8	13.0	9.9	65.6	2.3	<1.0	42.0	14.5	25.0	11.9
04/12/2002	18/12/2002	4.1	115.1	98.4	83.6	302.1	68.5	22.8	328.2	8.0	<1.0	78.8	74.1	91.0	8.5
18/12/2002	01/01/2003	4.6	18.8	15.9	12.4	27.2	5.5	2.3	30.4	<0.5	<1.0	15.6	27.5	16.0	39.6
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5136			43.0	33.9	34.9	78.7	18.6	16.9	91.2	2.8	-	33.5	29.2	29.1	568.5

Jenny Hurn

2002

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
-4.01 ueq/l (-4.44 %/year): 15 years' data
+++ Strong trend detected

non-marine sulphate
-4.12 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

2002

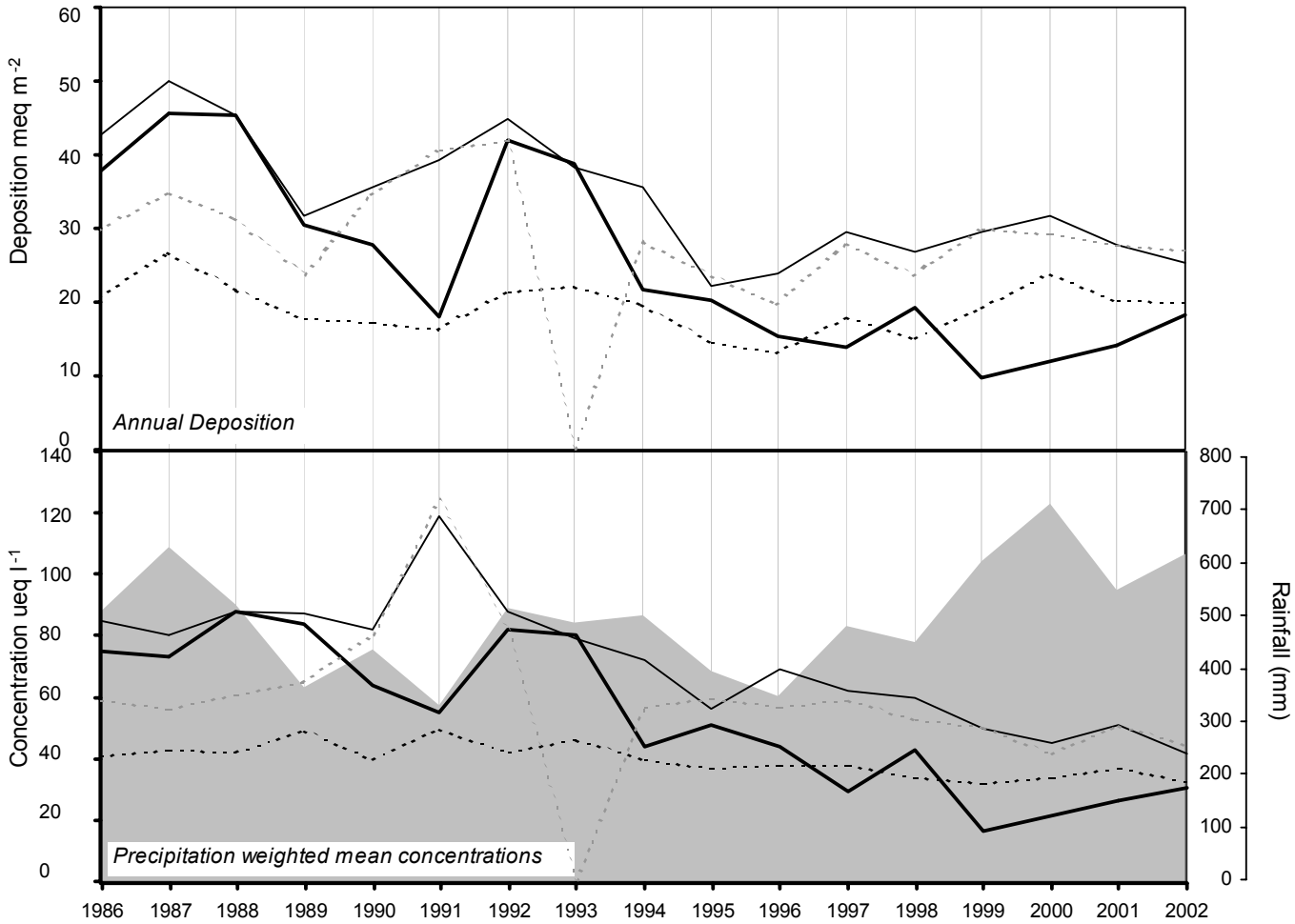
Site Code:	**5117**
Easting:	**4676**
Northing:	**4428**
Latitude:	**53 52 36 N**
Longitude:	**00 58 19 W**
Altitude (m):	**8**
Rainfall (mm):	**565**

[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
-4.22 ueq/l (-4.85 %/year): 16 years' data
+++ Strong trend detected

non-marine sulphate
-3.23 ueq/l (-3.32 %/year): 17 years' data
+++ Strong trend detected

nitrate
-0.77 ueq/l (-1.67 %/year): 17 years' data
++ Moderately strong trend detected

ammonium
-1.78 ueq/l (-2.35 %/year): 16 years' data
- No significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
02/01/2002	16/01/2002	4.6	193.8	65.6	237.7	108.5	28.2	29.9	162.9	3.6	<1.0	180.8	26.9	71.0	8.5
16/01/2002	30/01/2002	4.8	78.9	19.9	45.8	141.1	35.3	27.2	175.3	3.4	<1.0	61.9	15.8	42.0	22.6
19/02/2002	27/02/2002	4.8	54.4	14.7	29.2	161.2	36.4	20.7	185.1	4.0	<1.0	35.0	16.6	39.0	22.8
27/02/2002	13/03/2002	5.7	338.1	44.5	1853.7	520.1	86.3	76.7	496.5	431.1	1205.6	275.4	1.8	298.0	6.3
13/03/2002	27/03/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1
27/03/2002	10/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
10/04/2002	24/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
24/04/2002	08/05/2002	6.0	44.2	19.1	58.0	42.5	14.3	29.6	57.1	1.5	<1.0	39.0	1.0	21.0	5.2
08/05/2002	22/05/2002	5.0	78.4	69.4	102.7	25.2	14.8	38.6	37.1	3.0	<1.0	75.4	10.2	30.0	22.8
22/05/2002	05/06/2002	4.7	55.0	33.2	36.6	30.7	12.2	31.1	49.2	10.6	6.1	51.3	19.1	23.0	28.3
05/06/2002	19/06/2002	5.8	52.6	29.3	51.2	11.6	9.3	38.9	22.6	12.1	<1.0	51.2	1.6	20.0	26.3
19/06/2002	03/07/2002	6.1	58.3	27.6	60.1	30.9	18.7	52.2	58.1	5.7	<1.0	54.6	0.7	24.0	11.2
03/07/2002	17/07/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
17/07/2002	31/07/2002	4.8	36.7	43.8	59.1	1.5	3.8	16.8	6.2	1.2	<1.0	36.6	15.8	17.0	53.5
31/07/2002	14/08/2002	4.4	28.3	34.1	30.9	<0.9	1.2	4.4	4.8	<0.5	<1.0	28.4	38.9	19.0	90.8
14/08/2002	28/08/2002	5.6	91.6	62.0	137.8	8.6	8.8	42.3	17.0	4.8	<1.0	90.5	2.3	32.0	14.9
28/08/2002	11/09/2002	5.8	34.2	19.7	34.8	16.7	10.2	31.6	21.6	2.8	<1.0	32.1	1.6	14.0	17.4
11/09/2002	25/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
25/09/2002	09/10/2002	6.5	110.6	62.7	109.1	81.8	27.9	80.3	94.1	7.3	<1.0	100.7	0.4	40.0	4.1
09/10/2002	23/10/2002	4.4	43.8	41.1	36.6	65.2	20.0	16.1	86.3	1.9	<1.0	35.9	39.8	32.0	46.9
23/10/2002	06/11/2002	4.6	28.6	16.4	17.9	34.5	13.1	12.0	54.5	1.5	<1.0	24.4	25.7	19.0	58.0
06/11/2002	20/11/2002	4.2	40.3	33.8	24.9	18.5	7.2	13.3	35.5	1.1	<1.0	38.1	67.6	29.0	74.6
20/11/2002	04/12/2002	4.5	54.4	32.6	49.7	41.7	12.8	21.0	65.7	1.4	<1.0	49.3	33.1	30.0	16.9
04/12/2002	18/12/2002	5.6	93.4	83.1	129.2	217.3	48.1	23.6	237.6	17.7	7.5	67.2	2.8	56.0	9.4
18/12/2002	02/01/2003	4.4	25.7	15.5	22.8	13.5	3.2	3.3	18.0	<0.5	<1.0	24.0	43.7	15.0	66.1
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5117			45.7	32.9	44.4	35.1	11.5	18.2	49.2	2.8	-	41.5	30.2	25.0	609.0

High Muffles

2002

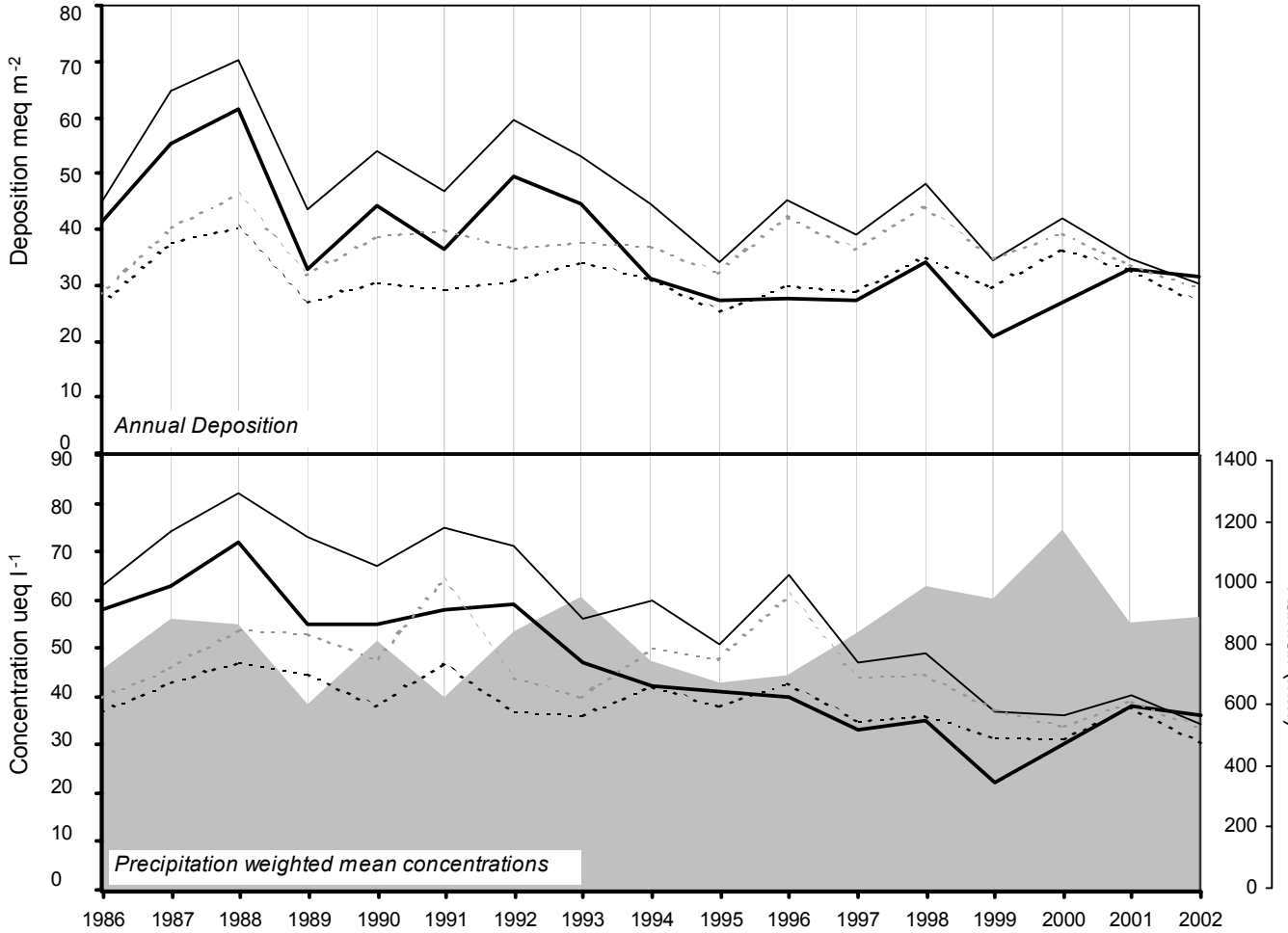
Site Code:	**5009**
Easting:	**4776**
Northing:	**4939**
Latitude:	**54 20 05 N**
Longitude:	**00 48 23 W**
Altitude (m):	**267**
Rainfall (mm):	**897**

[30 year mean 1940 - 1971]

Site Environment:
Forestry plantation

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

Site Operator:
Forest Enterprise



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

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

hydrogen ion
-2.48 ueq/l (-3.77 %/year): 16 years' data
++++ Very strong trend detected

non-marine sulphate
-2.69 ueq/l (-3.40 %/year): 17 years' data
++++ Very strong trend detected

nitrate
-0.68 ueq/l (-1.54 %/year): 17 years' data
++ Moderately strong trend detected

ammonium
-0.80 ueq/l (-1.54 %/year): 17 years' data
- No significant trend detected

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 S/cm	rainfall (mm)
09/01/2002	23/01/2002	4.3	90.9	55.6	97.1	101.0	19.8	11.6	131.7	3.0	<1.0	78.8	46.8	51.0	19.4
23/01/2002	30/01/2002	4.8	46.0	29.4	35.9	120.6	24.6	10.5	146.6	3.3	<1.0	31.5	17.8	35.0	2.5
30/01/2002	13/02/2002	4.7	41.9	20.0	37.2	68.0	15.5	8.4	83.1	1.8	<1.0	33.7	22.4	22.0	54.3
13/02/2002	27/02/2002	4.7	30.0	14.8	22.9	78.0	16.8	6.8	88.5	1.9	<1.0	20.6	19.1	20.0	43.4
27/02/2002	13/03/2002	5.2	63.2	16.2	48.2	177.9	39.3	18.7	202.7	4.4	<1.0	41.8	6.5	40.0	19.0
13/03/2002	27/03/2002	4.9	89.4	60.9	75.7	321.9	72.7	32.0	350.9	7.5	<1.0	50.6	13.5	70.0	18.1
27/03/2002	10/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
10/04/2002	24/04/2002	6.5	103.0	41.2	42.3	365.2	78.4	94.8	416.3	8.8	<1.0	59.0	0.4	75.0	1.6
24/04/2002	08/05/2002	5.5	27.3	13.8	30.2	28.9	7.0	10.3	37.5	1.6	<1.0	23.9	3.3	14.0	36.2
08/05/2002	22/05/2002	5.0	58.9	49.3	69.6	15.6	6.0	24.1	19.5	2.1	<1.0	57.0	9.3	22.0	33.3
22/05/2002	05/06/2002	5.0	35.9	25.4	34.7	29.2	7.9	13.0	35.0	2.0	<1.0	32.4	9.1	17.0	45.5
05/06/2002	19/06/2002	4.3	59.2	27.3	33.8	18.9	6.0	12.8	26.4	1.7	<1.0	56.9	45.7	27.0	26.8
19/06/2002	03/07/2002	6.0	31.2	16.7	48.5	19.7	6.5	20.5	25.9	1.9	<1.0	28.8	0.9	15.0	19.6
03/07/2002	17/07/2002	4.6	41.7	32.3	27.2	9.6	5.1	19.3	12.7	3.8	<1.0	40.6	27.5	20.0	19.9
17/07/2002	31/07/2002	4.4	49.6	46.2	44.7	49.7	12.4	17.9	55.4	5.6	<1.0	43.6	44.7	33.0	28.8
31/07/2002	14/08/2002	4.6	19.0	17.2	20.9	1.8	1.4	2.7	5.0	1.2	<1.0	18.7	22.9	11.0	115.4
14/08/2002	28/08/2002	5.1	32.3	32.5	39.6	3.7	3.2	24.2	6.8	2.5	<1.0	31.8	7.4	14.0	9.7
28/08/2002	11/09/2002	4.8	44.7	23.0	31.0	6.9	3.7	30.9	13.3	1.1	<1.0	43.9	15.1	15.0	33.4
11/09/2002	25/09/2002	5.7	84.0	34.0	42.2	328.2	69.0	39.5	357.1	14.0	<1.0	44.4	2.2	63.0	4.3
25/09/2002	09/10/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
09/10/2002	23/10/2002	4.3	48.0	49.7	38.7	118.4	26.7	15.5	136.6	3.1	<1.0	33.7	56.2	43.0	62.4
23/10/2002	06/11/2002	4.4	28.4	19.8	3.9	31.2	8.1	11.9	44.7	2.3	<1.0	24.7	41.7	22.0	58.3
06/11/2002	20/11/2002	4.2	32.1	27.8	13.5	39.1	9.1	3.9	51.5	1.1	<1.0	27.4	64.6	29.0	71.8
20/11/2002	04/12/2002	4.3	46.6	55.0	52.9	42.3	10.8	7.4	56.2	1.3	<1.0	41.5	51.3	35.0	53.8
04/12/2002	18/12/2002	3.9	113.5	84.4	57.9	293.4	68.1	18.7	330.2	7.6	<1.0	78.1	138.0	95.0	22.4
18/12/2002	01/01/2003	4.2	29.6	23.0	23.1	32.0	6.7	2.7	38.9	1.1	<1.0	25.7	60.3	22.0	78.3
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5009			41.2	30.5	33.7	56.7	13.4	11.6	68.0	2.3	-	34.3	36.0	26.9	879.0

Bannisdale

2002

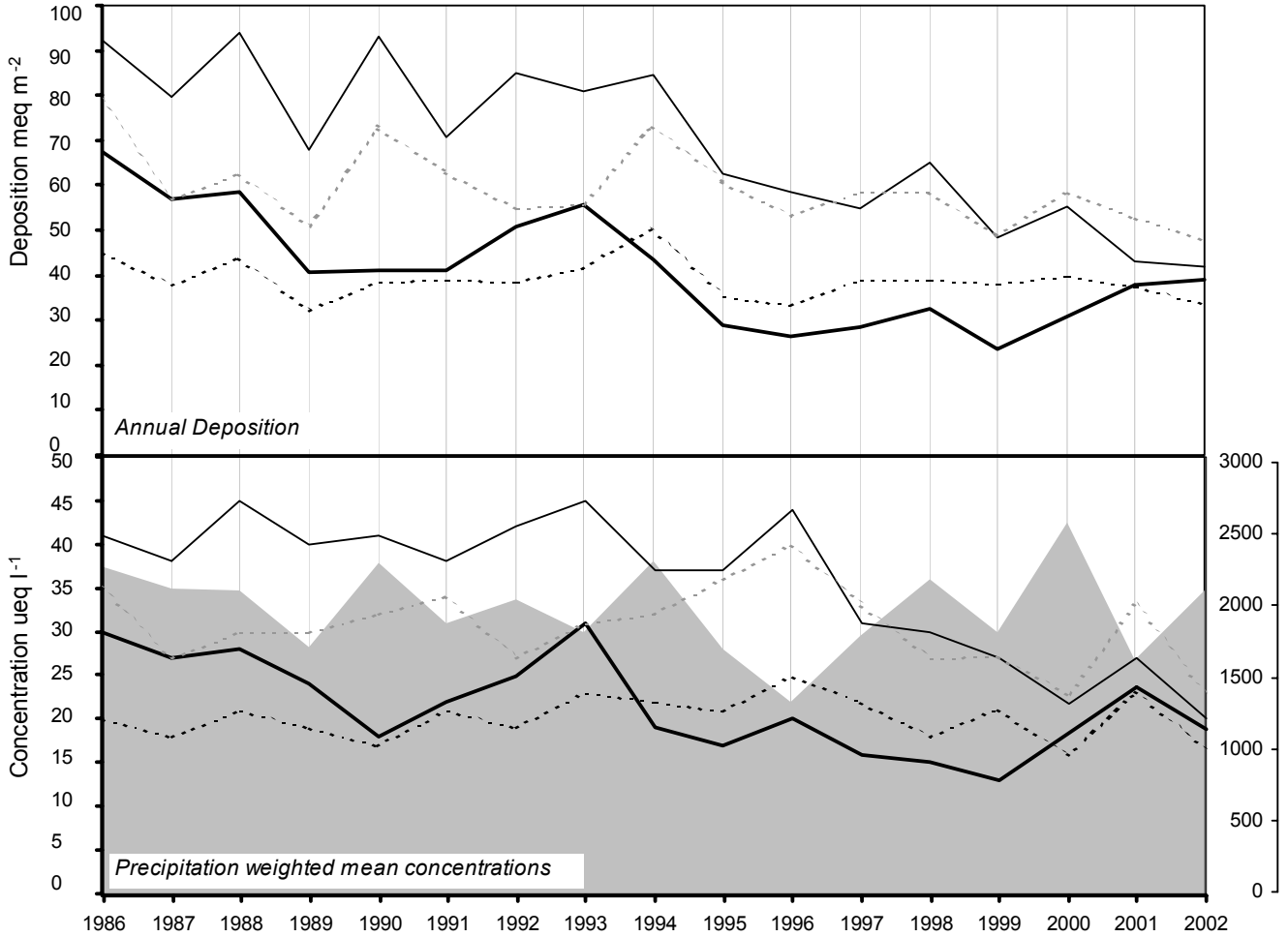
Site Code:	**5111**
Easting:	**3515**
Northing:	**5043**
Latitude:	**54 25 54 N**
Longitude:	**02 44 52 W**
Altitude (m):	**265**
Rainfall (mm):	**1972**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, sheep grazing

Other measurements:
DT

Site Operator:
CEH Windermere



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

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

hydrogen ion
-0.76 ueq/l (-2.78 %/year): 16 years' data
++ Moderately strong trend detected

non-marine sulphate
-1.27 ueq/l (-2.77 %/year): 17 years' data
+++ Strong trend detected

nitrate
0.01 ueq/l (0.04 %/year): 17 years' data
- No significant trend detected

ammonium
-0.25 ueq/l (-0.78 %/year): 17 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 S/cm	rainfall (mm)
16/01/2002	30/01/2002	4.9	35.2	11.6	19.0	140.0	23.1	4.2	163.4	3.0	<1.0	18.3	11.7	32.0	199.9
30/01/2002	13/02/2002	5.1	25.5	6.1	10.0	140.2	29.7	7.0	157.3	2.9	<1.0	8.6	8.5	22.0	219.4
13/02/2002	02/03/2002	4.9	25.3	1.6	9.2	157.3	32.6	7.0	172.5	3.1	<1.0	6.4	13.5	29.0	189.3
02/03/2002	13/03/2002	5.4	53.8	12.0	36.3	226.1	46.4	11.8	236.7	4.6	<1.0	26.6	4.1	41.0	74.6
13/03/2002	24/03/2002	4.7	39.1	34.8	48.3	45.6	10.4	6.3	52.8	1.3	<1.0	33.6	21.4	25.0	28.3
24/03/2002	10/04/2002	5.2	81.6	87.4	137.0	56.3	13.6	23.3	62.8	1.8	<1.0	74.9	5.8	33.0	32.8
10/04/2002	24/04/2002	5.1	48.9	28.1	57.6	27.6	6.8	14.0	32.7	0.8	<1.0	45.6	7.6	19.0	33.7
24/04/2002	08/05/2002	5.1	21.5	7.9	11.4	87.2	18.2	7.0	97.7	1.7	<1.0	11.0	8.7	20.0	55.8
08/05/2002	19/05/2002	5.1	38.5	35.9	48.3	35.0	8.2	16.1	40.8	2.6	<1.0	34.3	7.4	19.0	13.1
19/05/2002	05/06/2002	4.7	41.2	22.6	28.1	108.1	24.5	11.2	121.7	2.4	<1.0	28.2	21.4	30.0	176.3
05/06/2002	19/06/2002	4.8	28.8	14.8	22.7	51.7	11.0	5.0	58.9	0.7	<1.0	22.6	15.8	18.0	92.6
19/06/2002	03/07/2002	5.1	28.0	14.3	32.6	34.5	7.2	5.1	40.8	0.9	<1.0	23.8	8.9	15.0	55.3
03/07/2002	17/07/2002	4.7	25.3	16.8	22.5	18.5	4.6	4.8	20.2	2.0	<1.0	23.1	19.1	14.0	46.3
17/07/2002	31/07/2002	6.1	48.0	49.7	101.9	18.1	4.6	13.5	15.7	10.1	<1.0	45.8	0.8	23.0	45.1
31/07/2002	14/08/2002	4.8	22.6	19.3	26.8	9.7	2.4	5.0	13.8	1.2	<1.0	21.5	17.4	12.0	116.3
14/08/2002	28/08/2002	4.6	21.9	23.2	37.0	5.7	2.0	10.5	8.6	1.0	<1.0	21.2	22.9	14.0	25.2
28/08/2002	11/09/2002	5.3	20.4	<0.7	3.2	41.3	9.0	16.9	49.6	5.1	<1.0	15.4	4.7	12.0	113.7
11/09/2002	25/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/09/2002	09/10/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	1.9
09/10/2002	23/10/2002	4.4	36.0	28.7	21.9	27.9	7.1	7.6	36.5	1.4	<1.0	32.6	43.7	24.0	78.4
23/10/2002	06/11/2002	4.6	21.9	14.3	12.5	77.6	16.6	6.6	90.2	2.3	<1.0	12.5	26.3	21.0	197.6
06/11/2002	20/11/2002	4.4	27.4	19.6	14.4	86.6	19.2	7.7	101.7	2.1	<1.0	17.0	39.8	26.0	72.5
20/11/2002	04/12/2002	4.5	29.5	25.0	23.2	87.7	19.6	6.5	98.7	2.1	<1.0	19.0	35.5	27.0	70.2
04/12/2002	18/12/2002	4.1	51.8	54.7	32.1	79.8	18.7	9.8	93.2	2.2	<1.0	42.1	79.4	45.0	24.5
18/12/2002	01/01/2003	4.4	21.4	13.8	14.2	26.6	5.4	2.3	30.8	0.8	<1.0	18.2	38.9	15.0	119.0
Precipitation-weighted annual mean for site (samples containing phosphate are excluded)															Total rainfall
5111			30.7	16.3	23.0	88.1	18.3	7.8	99.7	2.5	-	20.1	18.8	23.5	2082.0

Hillsborough Forest

2002

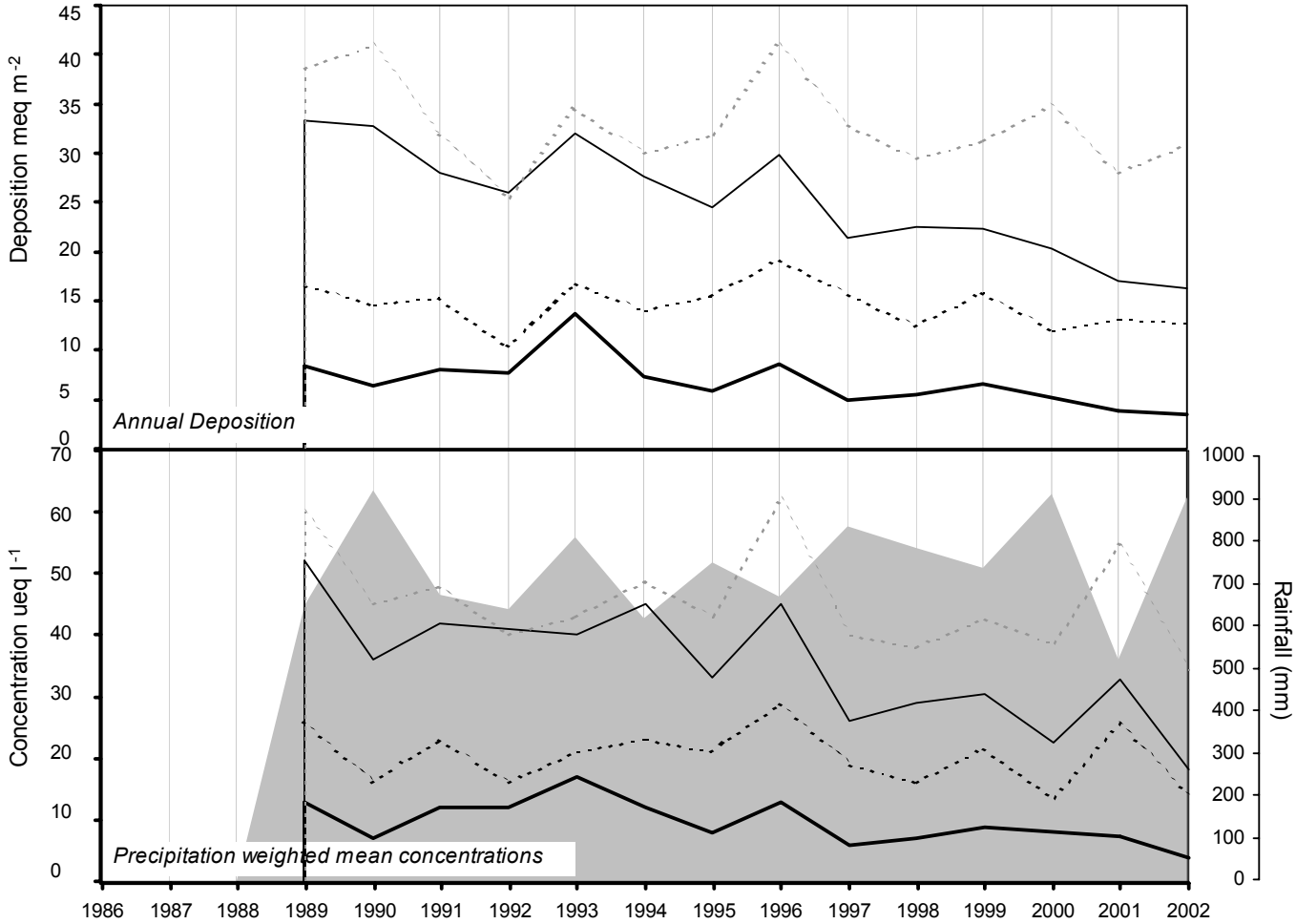
Site Code:	**5149**
Easting:	**1349**
Northing:	**5156**
Latitude:	**54 27 09 N**
Longitude:	**06 05 03 W**
Altitude (m):	**120**
Rainfall (mm):	**863**

[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
-0.55 ueq/l (-3.75 %/year): 13 years' data
\+ Significant trend detected

non-marine sulphate
-1.79 ueq/l (-3.43 %/year): 14 years' data
++ Moderately strong trend detected

nitrate
-0.27 ueq/l (-1.19 %/year): 14 years' data
\- No significant trend detected

ammonium
-0.71 ueq/l (-1.36 %/year): 14 years' data
\- No significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
02/01/2002	16/01/2002	6.4	58.7	40.0	65.1	215.3	35.7	16.0	248.9	7.6	<1.0	32.8	0.4	49.0	6.7
16/01/2002	31/01/2002	5.7	15.7	3.7	8.7	85.3	14.1	3.8	101.6	2.2	<1.0	5.4	2.2	19.0	61.6
31/01/2002	13/02/2002	6.0	19.8	2.9	15.3	105.8	20.8	5.9	122.2	2.2	<1.0	7.0	1.0	18.0	44.1
13/02/2002	27/02/2002	5.2	39.2	3.2	21.4	231.4	48.1	11.5	266.8	4.7	<1.0	11.4	6.6	41.0	28.1
27/02/2002	13/03/2002	5.9	34.1	4.8	30.3	157.9	29.4	8.1	180.2	3.2	<1.0	15.1	1.4	33.0	23.6
13/03/2002	27/03/2002	5.4	62.7	34.5	72.0	140.8	32.6	15.8	161.7	3.2	<1.0	45.7	4.4	37.0	48.8
27/03/2002	10/04/2002	6.6	75.6	82.3	182.5	92.3	19.0	25.5	109.5	3.6	<1.0	64.5	0.2	42.0	4.2
10/04/2002	25/04/2002	5.6	20.1	13.1	27.9	18.6	4.4	6.9	27.4	0.8	<1.0	17.9	2.6	10.0	19.3
25/04/2002	08/05/2002	5.8	23.4	6.8	33.1	80.7	15.1	7.5	96.1	2.0	<1.0	13.6	1.6	20.0	34.0
08/05/2002	22/05/2002	5.1	35.0	25.0	36.4	69.4	20.2	12.0	84.4	1.8	<9.7	26.6	7.4	21.0	62.7
22/05/2002	06/06/2002	5.8	15.1	9.8	26.7	36.6	6.9	5.2	43.9	1.2	<9.7	10.7	1.6	12.0	58.0
06/06/2002	20/06/2002	5.8	15.5	11.5	34.7	22.1	2.5	2.4	26.3	1.7	<1.0	12.8	1.6	11.0	48.3
20/06/2002	04/07/2002	5.9	10.4	4.4	31.1	14.0	2.4	2.7	19.3	1.8	<1.0	8.8	1.2	<10.0	48.0
04/07/2002	18/07/2002	5.8	16.8	10.8	40.6	15.0	2.0	<1.0	19.3	1.7	<1.0	15.0	1.5	11.0	39.6
18/07/2002	31/07/2002	5.7	14.6	10.6	34.6	4.7	1.4	3.9	6.8	2.2	<1.0	14.0	2.2	<10.0	52.4
31/07/2002	14/08/2002	5.9	34.9	24.2	67.3	7.0	2.5	5.2	10.3	1.6	<1.0	34.1	1.4	13.0	23.7
14/08/2002	28/08/2002	6.8	51.5	10.2	274.7	96.2	25.3	26.7	122.0	78.4	94.4	39.9	0.2	65.0	5.0
28/08/2002	11/09/2002	5.1	25.2	26.0	34.4	25.8	7.5	13.4	31.3	1.2	<1.0	22.1	7.8	15.0	41.2
11/09/2002	25/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/09/2002	09/10/2002	7.0	50.1	19.8	692.8	51.7	25.6	20.7	63.1	64.8	73.4	43.9	0.1	98.0	17.3
09/10/2002	23/10/2002	5.7	32.2	19.6	55.6	63.1	17.4	8.0	86.9	23.0	<1.0	24.6	2.0	24.0	56.5
23/10/2002	06/11/2002	5.1	11.6	4.3	13.7	36.8	5.8	2.7	46.1	2.3	<1.0	7.1	8.5	10.0	75.8
06/11/2002	20/11/2002	4.6	25.3	21.3	23.5	69.7	15.5	5.4	82.5	1.9	<1.0	16.9	26.3	25.0	10.3
20/11/2002	03/12/2002	5.0	31.3	11.4	15.5	163.5	35.0	7.8	185.2	3.2	<1.0	11.6	9.8	33.0	3.6
03/12/2002	18/12/2002	4.8	101.7	61.7	108.3	257.8	56.8	18.3	286.6	6.2	<1.0	70.7	14.5	62.0	14.8
18/12/2002	08/01/2003	5.5	29.0	14.4	26.4	48.6	8.5	19.7	52.3	3.8	<1.0	23.2	3.1	18.0	65.8
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5149			26.2	14.3	34.6	65.3	13.6	7.9	77.5	3.7	-	18.3	3.9	19.0	893.5

Lough Navar

2002

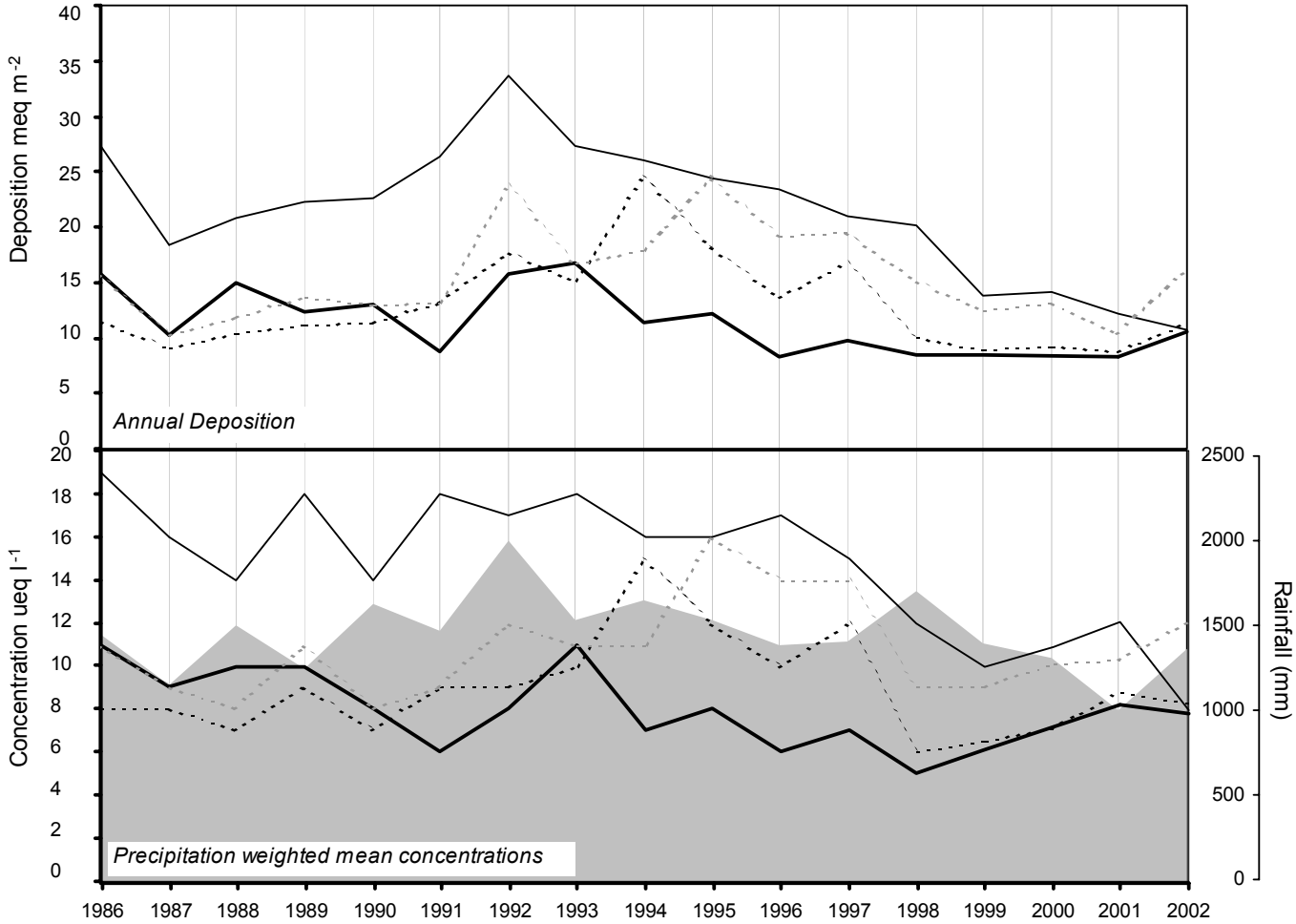
Site Code:	**5006**
Easting:	**192**
Northing:	**5212**
Latitude:	**54 26 20 N**
Longitude:	**07 54 00 W**
Altitude (m):	**130**
Rainfall (mm):	**1412**

[30 year mean 1940 - 1971]

Site Environment:
Clearing near Forestry Offices

Other measurements:
DT, Daily 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
-0.23 ueq/l (-2.38 %/year): 16 years' data
\+ Significant trend detected

non-marine sulphate
-0.47 ueq/l (-2.55 %/year): 17 years' data
++ Moderately strong trend detected

nitrate
0.01 ueq/l (0.15 %/year): 17 years' data
\- No significant trend detected

ammonium
0.12 ueq/l (1.18 %/year): 17 years' data
\- No significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
14/01/2002	28/01/2002	5.5	31.3	4.8	3.2	211.7	43.5	10.2	243.0	4.6	<1.0	5.8	3.5	37.0	48.6
28/01/2002	11/02/2002	5.3	13.8	1.9	1.8	100.5	21.2	5.3	115.9	2.1	<1.0	1.7	5.0	19.0	156.2
11/02/2002	25/02/2002	5.9	77.2	2.0	3.2	661.8	143.3	27.5	740.3	13.9	<1.0	<2.6	1.2	86.0	103.5
25/02/2002	11/03/2002	5.5	33.6	2.2	3.5	258.6	56.2	11.8	290.2	5.6	<1.0	2.5	3.5	45.0	84.9
11/03/2002	25/03/2002	4.9	56.0	46.0	73.5	90.4	20.3	14.3	102.4	3.4	<1.0	45.1	12.3	32.0	26.8
25/03/2002	08/04/2002	6.2	47.3	36.2	69.0	99.9	21.7	61.8	114.3	3.2	<1.0	35.2	0.6	34.0	8.7
08/04/2002	22/04/2002	5.8	12.7	6.7	18.6	40.3	7.6	13.3	47.5	0.9	<1.0	7.8	1.4	12.0	25.5
22/04/2002	06/05/2002	5.8	25.4	3.2	3.0	180.5	39.2	13.0	204.2	3.8	<1.0	3.6	1.7	33.0	74.5
06/05/2002	20/05/2002	4.9	36.3	39.3	46.2	15.6	5.6	17.3	21.9	1.5	<1.0	34.4	14.1	17.0	37.9
20/05/2002	03/06/2002	5.6	11.4	8.8	14.9	34.9	6.8	4.4	41.4	1.4	<9.7	7.2	2.8	10.0	149.4
03/06/2002	17/06/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	1.1
17/06/2002	01/07/2002	5.1	13.4	4.0	3.3	35.1	7.5	6.3	42.5	1.1	<1.0	9.2	7.2	11.0	36.8
01/07/2002	15/07/2002	5.2	16.0	4.7	6.3	44.1	9.6	6.6	50.4	1.6	<1.0	10.6	7.1	12.0	45.5
15/07/2002	29/07/2002	5.9	13.3	9.2	28.9	13.6	3.2	9.7	15.0	3.3	<1.0	11.6	1.3	10.0	11.1
29/07/2002	12/08/2002	6.4	26.8	20.1	60.8	35.7	5.1	9.3	34.9	4.4	<1.0	22.5	0.4	16.0	6.3
12/08/2002	26/08/2002	5.4	9.8	3.9	10.8	10.9	2.7	6.4	14.6	1.2	<1.0	8.5	4.0	<10.0	24.2
26/08/2002	09/09/2002	5.7	12.6	3.4	12.9	70.8	12.8	5.2	81.2	1.9	<1.0	4.1	2.2	16.0	52.8
09/09/2002	23/09/2002	6.4	25.1	24.6	60.6	24.6	4.5	20.9	25.5	3.2	<1.0	22.1	0.4	16.0	3.3
23/09/2002	07/10/2002	5.7	16.2	11.9	23.5	40.5	7.3	6.5	45.7	0.8	<1.0	11.3	2.1	12.0	33.9
07/10/2002	21/10/2002	4.7	16.2	18.1	18.3	12.7	3.5	2.9	16.8	0.7	<1.0	14.7	20.4	13.0	81.4
21/10/2002	04/11/2002	4.8	15.8	4.2	3.2	107.7	22.9	4.9	125.2	2.4	<1.0	2.8	17.4	21.0	126.1
04/11/2002	18/11/2002	4.8	20.9	5.3	5.3	148.2	31.9	6.7	171.0	3.2	<1.0	3.0	17.0	29.0	76.6
18/11/2002	25/11/2002	4.8	29.5	25.4	39.4	68.5	14.8	6.8	80.4	1.8	<1.0	21.2	15.1	22.0	22.1
25/11/2002	02/12/2002	5.2	34.8	2.9	2.2	277.7	60.7	12.3	316.9	5.9	<1.0	1.3	6.6	48.0	61.3
02/12/2002	16/12/2002	4.7	69.6	15.9	18.0	481.3	105.4	24.3	539.3	10.2	<1.0	11.7	20.4	79.0	20.1
23/12/2002	30/12/2002	4.9	27.3	19.6	30.5	31.6	5.6	4.5	34.1	1.7	<1.0	23.5	12.0	16.0	18.0
30/12/2002	13/01/2003	4.9	32.1	21.1	34.2	65.3	12.8	10.5	73.3	2.7	<1.0	24.2	14.1	19.0	22.1
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5006			25.8	8.3	12.0	151.3	32.5	9.7	171.9	3.5	-	8.0	7.8	27.9	1358.4

Cow Green Reservoir

2002

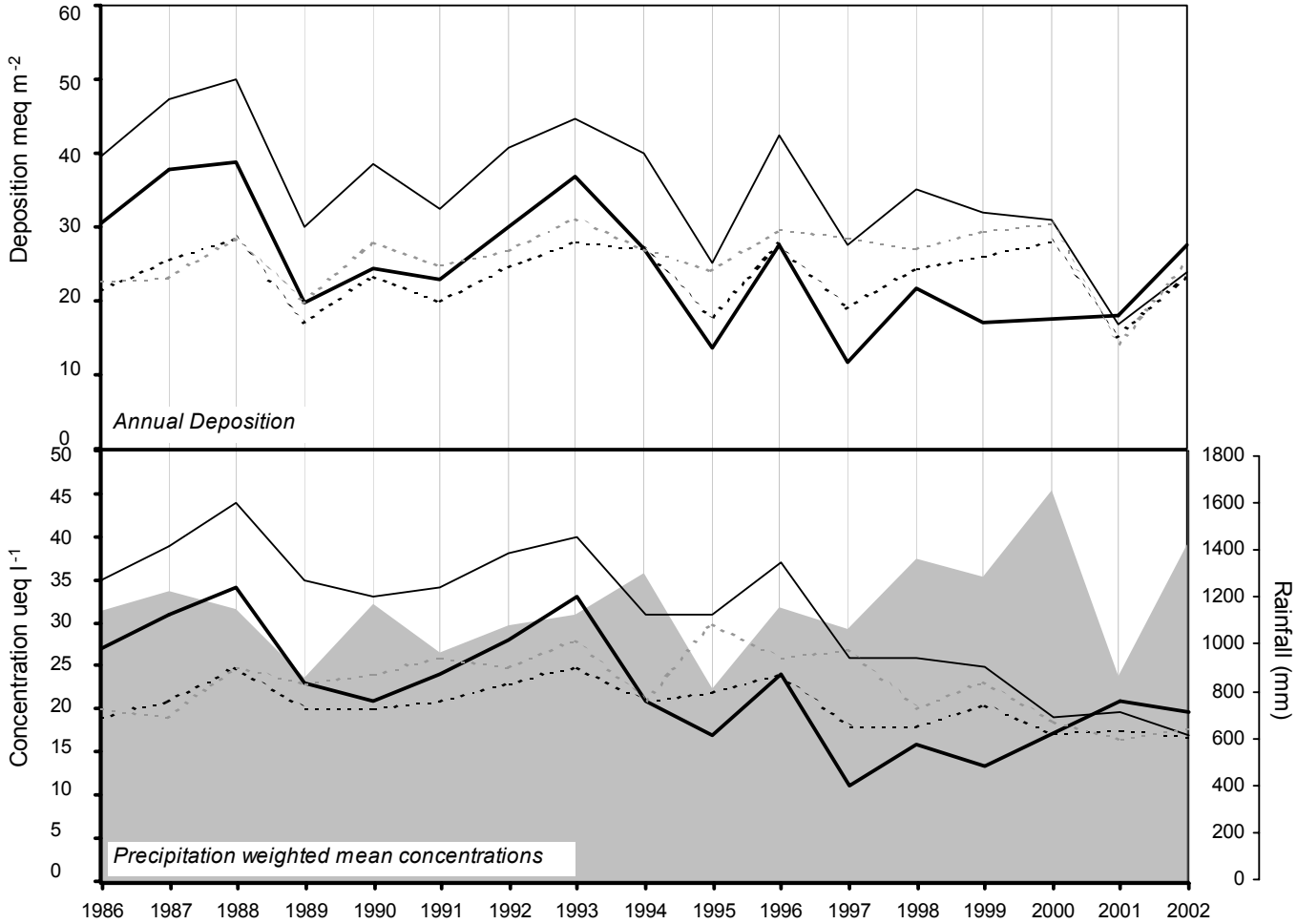
Site Code:	**5113**
Easting:	**3817**
Northing:	**5298**
Latitude:	**54 39 46 N**
Longitude:	**02 17 01 W**
Altitude (m):	**510**
Rainfall (mm):	**2175**

[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
-0.95 ueq/l (-3.18 %/year): 16 years' data
++ Moderately strong trend detected

non-marine sulphate
-1.32 ueq/l (-3.17 %/year): 17 years' data
+++ Strong trend detected

nitrate
-0.26 ueq/l (-1.15 %/year): 17 years' data
+ Significant trend detected

ammonium
-0.20 ueq/l (-0.82 %/year): 17 years' data
- No significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
02/01/2002	16/01/2002	4.5	53.5	55.5	50.7	81.9	17.6	9.7	105.5	2.3	<1.0	43.6	32.4	36.0	10.6
16/01/2002	30/01/2002	5.1	32.9	9.0	11.3	185.6	39.5	9.6	205.9	3.9	<1.0	10.5	7.9	29.0	124.3
30/01/2002	13/02/2002	5.0	15.3	4.8	5.2	84.3	17.6	4.5	94.3	1.7	<1.0	5.1	9.1	14.0	223.4
13/02/2002	27/02/2002	5.6	12.6	4.2	7.5	65.9	11.9	4.6	70.2	1.9	<1.0	4.7	2.6	14.0	91.1
27/02/2002	13/03/2002	5.6	34.4	9.0	24.8	153.4	32.1	9.2	172.1	3.3	<1.0	15.9	2.3	31.0	54.2
13/03/2002	27/03/2002	4.8	51.0	39.9	56.3	80.5	18.5	13.3	94.9	1.8	<1.0	41.3	16.6	29.0	12.8
27/03/2002	09/04/2002	6.0	54.7	49.2	76.9	49.5	11.2	23.6	53.4	1.9	<1.0	48.8	1.0	23.0	5.0
09/04/2002	23/04/2002	5.5	36.4	33.0	34.6	24.8	8.5	26.6	26.5	1.0	<1.0	33.4	3.1	16.0	12.8
23/04/2002	09/05/2002	5.3	22.9	10.8	20.4	72.8	14.8	8.4	81.0	1.6	<1.0	14.1	5.2	18.0	52.5
09/05/2002	20/05/2002	4.7	55.8	49.1	52.9	71.4	17.6	16.4	75.5	1.9	<1.0	47.2	18.2	30.0	16.9
20/05/2002	10/06/2002	4.8	27.9	20.3	25.9	50.8	13.6	9.8	58.4	1.3	<1.0	21.7	17.0	19.0	134.2
10/06/2002	19/06/2002	5.1	19.8	11.3	16.0	54.8	11.8	5.6	63.6	0.9	<1.0	13.2	8.9	16.0	43.1
19/06/2002	10/07/2002	4.9	24.8	16.5	21.5	33.5	8.3	11.2	38.3	1.3	<1.0	20.8	11.5	15.0	67.2
10/07/2002	17/07/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	2.2
17/07/2002	30/07/2002	4.3	51.9	61.5	49.5	9.0	3.5	12.0	14.6	1.0	<1.0	50.8	47.9	34.0	21.9
30/07/2002	13/08/2002	4.2	20.3	21.1	25.9	1.0	1.4	4.9	2.8	1.0	<1.0	20.2	60.3	23.0	67.8
13/08/2002	30/08/2002	4.9	24.8	26.2	32.9	7.9	3.0	9.7	8.9	0.7	<1.0	23.8	14.1	12.0	28.0
30/08/2002	10/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	1.1
10/09/2002	25/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/09/2002	08/10/2002	5.8	56.5	52.2	76.6	113.2	22.5	24.5	120.5	2.5	<1.0	42.9	1.4	31.0	8.3
08/10/2002	25/10/2002	4.4	34.5	27.3	19.7	48.1	10.7	5.1	56.8	1.2	<1.0	28.7	41.7	25.0	78.6
25/10/2002	14/11/2002	4.7	19.5	9.6	6.0	84.4	19.3	5.9	97.2	1.8	<1.0	9.3	18.6	21.0	154.9
14/11/2002	25/11/2002	4.2	40.5	45.8	33.4	24.6	5.6	6.9	31.9	0.9	<1.0	37.5	60.3	31.0	34.5
25/11/2002	06/12/2002	4.7	16.6	15.4	9.7	64.7	14.7	5.2	74.2	1.4	<1.0	8.8	19.5	19.0	59.2
06/12/2002	17/12/2002	3.8	117.9	110.4	81.9	208.2	49.2	18.2	234.4	6.0	<1.0	92.8	144.5	90.0	12.0
17/12/2002	06/01/2003	4.5	23.0	15.9	11.9	26.2	5.6	2.3	30.0	0.6	<1.0	19.8	30.9	18.0	94.8
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5113			25.8	16.7	17.7	73.2	16.1	7.3	82.7	1.7	-	16.9	19.6	21.0	1411.4

Scoat Tarn

2002

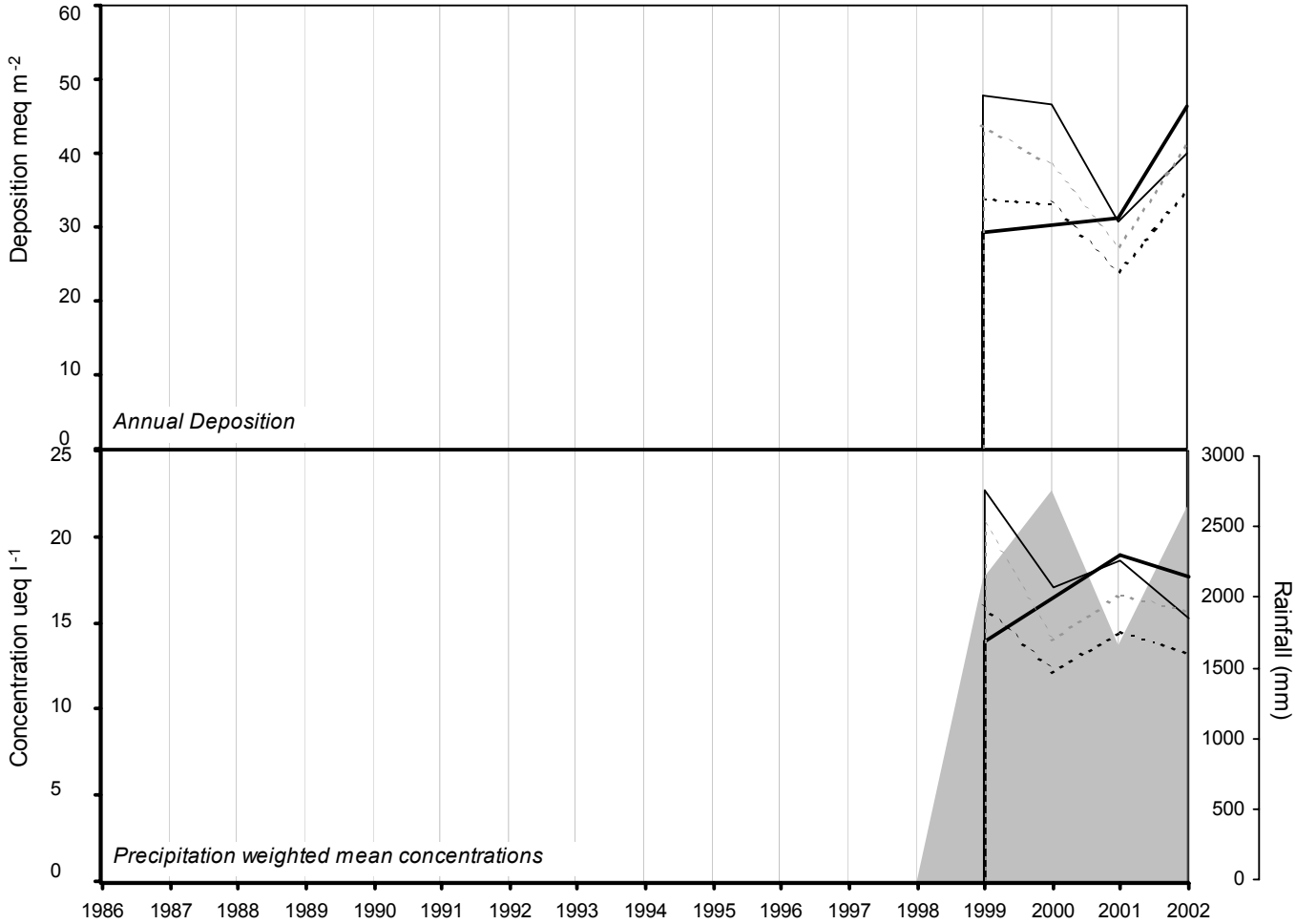
Site Code:	**5159**
Easting:	**3158**
Northing:	**5103**
Latitude:	**54 48 10 N**
Longitude:	**03 30 10 W**
Altitude (m):	**595**
Rainfall (mm):	**-**

[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): 3 years' data
n/a Insufficient Data

non-marine sulphate
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

nitrate
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

ammonium
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
09/01/2002	17/01/2002	4.8	19.3	12.1	14.3	40.1	7.8	2.7	49.6	1.2	<1.0	14.5	14.8	15.0	135.4
17/01/2002	31/01/2002	4.9	31.2	8.7	11.5	148.5	33.0	7.3	171.4	3.2	<1.0	13.3	12.6	31.0	168.3
31/01/2002	12/02/2002	5.2	21.4	4.6	5.3	137.0	28.7	6.2	151.2	2.9	<1.0	4.9	6.8	24.0	162.0
12/02/2002	28/02/2002	5.3	20.3	4.9	11.8	112.8	22.5	4.9	122.0	2.2	<1.0	6.7	4.9	22.0	184.2
28/02/2002	13/03/2002	5.8	54.8	11.5	46.5	205.9	42.0	10.5	227.1	4.3	<1.0	30.0	1.7	42.0	50.8
13/03/2002	27/03/2002	4.6	49.1	61.7	75.8	41.8	11.0	12.3	49.5	1.2	<1.0	44.0	24.0	29.0	67.8
27/03/2002	10/04/2002	5.2	22.5	18.4	28.2	21.9	5.3	4.9	27.9	0.7	<1.0	19.9	6.3	13.0	77.3
10/04/2002	24/04/2002	4.9	29.8	18.4	36.4	13.1	3.6	6.4	16.4	0.6	<1.0	28.2	12.6	13.0	64.6
24/04/2002	09/05/2002	5.0	26.3	12.6	17.1	96.9	23.1	9.2	112.0	2.0	<1.0	14.6	10.5	23.0	91.8
09/05/2002	21/05/2002	4.7	29.5	17.1	22.3	30.2	7.2	4.4	36.4	0.8	<1.0	25.9	21.9	17.0	107.0
21/05/2002	07/06/2002	4.9	26.9	12.7	15.8	93.3	20.4	7.5	104.5	2.1	<1.0	15.6	13.2	24.0	150.4
07/06/2002	18/06/2002	5.8	26.0	11.8	38.3	41.8	5.8	2.2	48.7	8.0	10.7	21.0	1.8	15.0	118.5
18/06/2002	03/07/2002	4.9	20.3	8.5	16.3	48.2	9.9	4.8	54.8	1.0	<1.0	14.5	12.3	15.0	84.0
03/07/2002	17/07/2002	4.6	26.5	17.7	18.1	29.2	6.9	4.4	32.9	1.3	<1.0	23.0	27.5	19.0	47.7
17/07/2002	30/07/2002	6.6	50.7	38.5	245.5	20.7	5.3	4.3	27.9	34.6	35.5	48.2	0.3	45.0	86.2
30/07/2002	15/08/2002	7.0	41.7	17.4	238.5	21.3	2.9	1.4	24.1	22.2	65.6	39.1	0.1	45.0	124.6
15/08/2002	02/09/2002	4.5	13.2	8.7	1.5	14.9	3.7	4.4	19.4	0.3	<1.0	11.4	29.5	12.0	67.1
02/09/2002	11/09/2002	4.8	19.0	11.0	8.7	48.1	10.2	4.4	56.3	1.3	<1.0	13.2	17.8	15.0	85.0
11/09/2002	24/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
24/09/2002	09/10/2002	4.9	41.2	31.5	45.7	56.9	13.2	13.8	64.8	1.0	<1.0	34.3	12.0	22.0	31.6
09/10/2002	23/10/2002	4.4	26.8	19.2	11.4	26.2	6.0	2.6	32.4	0.8	<1.0	23.6	39.8	20.0	113.1
23/10/2002	07/11/2002	4.6	19.6	8.8	6.8	91.5	19.2	4.2	107.0	2.2	<1.0	8.6	22.9	22.0	187.1
07/11/2002	21/11/2002	4.6	16.4	13.1	4.3	50.8	10.8	3.0	58.3	1.0	<1.0	10.3	25.1	18.0	131.6
21/11/2002	05/12/2002	4.7	27.6	15.7	13.9	123.6	27.3	6.0	141.6	2.4	<1.0	12.7	20.4	29.0	136.9
05/12/2002	18/12/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	3.4
18/12/2002	04/01/2003	4.5	14.2	10.8	7.0	21.5	4.0	1.4	23.6	0.5	<1.0	11.6	34.7	12.0	141.7
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5159			24.4	13.3	15.7	76.3	16.4	5.4	87.0	1.7	-	15.2	17.7	21.0	2618.1

Loch Dee

2002

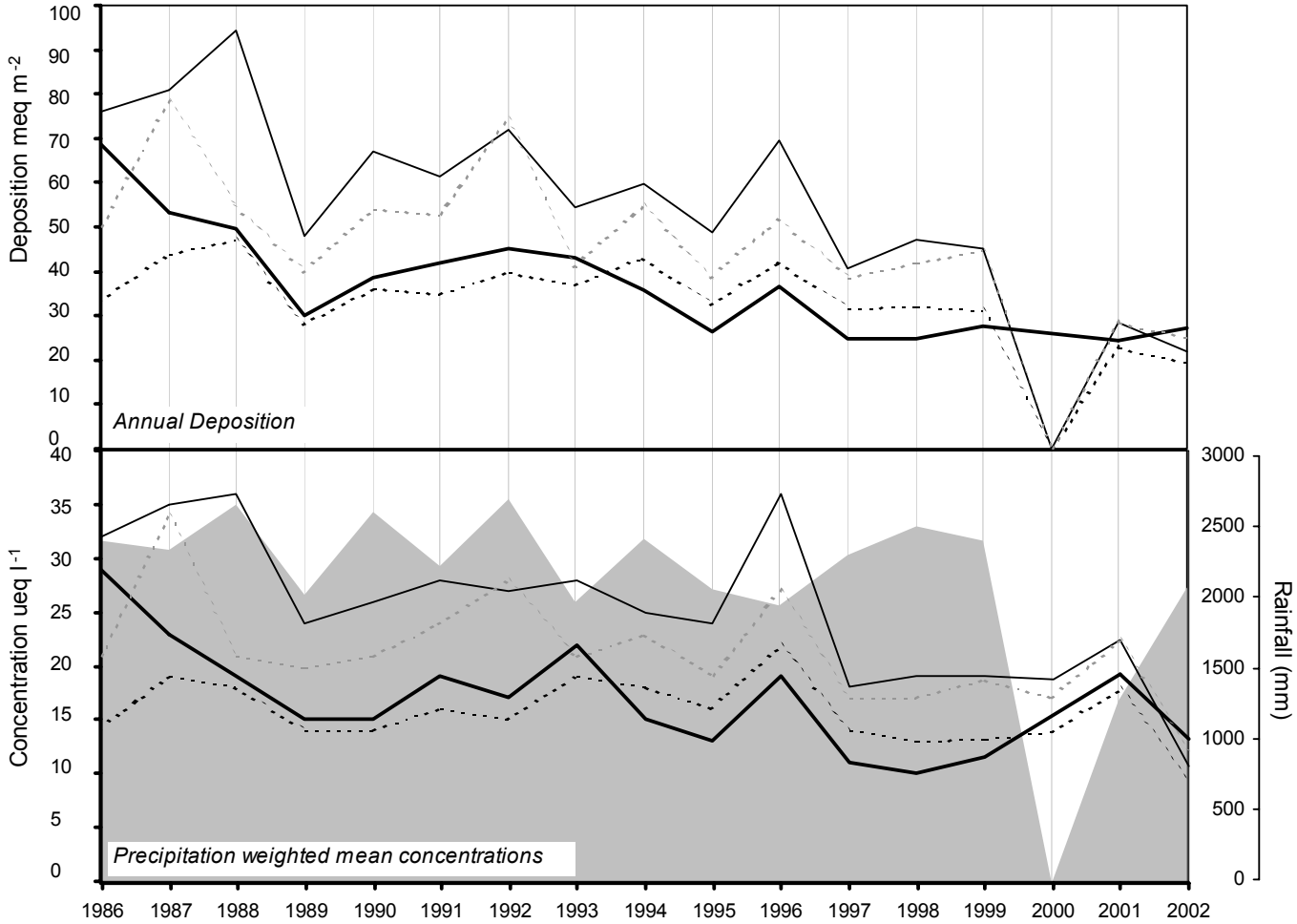
Site Code:	**5107**
Easting:	**2468**
Northing:	**5779**
Latitude:	**55 04 19 N**
Longitude:	**04 23 59 W**
Altitude (m):	**230**
Rainfall (mm):	**1949**

[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
-0.68 ueq/l (-3.07 %/year): 16 years' data
++ Moderately strong trend detected

non-marine sulphate
-1.05 ueq/l (-3.13 %/year): 17 years' data
++ Moderately strong trend detected

nitrate
-0.18 ueq/l (-1.03 %/year): 17 years' data
- No significant trend detected

ammonium
-0.54 ueq/l (-2.10 %/year): 17 years' data
+ Significant 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 S/cm	rainfall (mm)
02/01/2002	08/01/2002	5.0	55.0	9.9	12.8	373.4	81.0	14.8	472.6	8.4	<1.0	10.0	9.1	69.0	77.9
08/01/2002	29/01/2002	5.0	29.0	9.8	10.7	144.6	30.8	5.4	163.9	3.1	<1.0	11.6	10.7	31.0	182.5
29/01/2002	12/02/2002	5.1	21.2	4.2	3.0	133.4	29.0	6.2	151.0	2.7	<1.0	5.1	7.4	26.0	196.9
12/02/2002	27/02/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
27/02/2002	13/03/2002	5.3	34.7	5.1	16.5	170.3	36.2	8.2	187.9	3.5	<1.0	14.2	5.5	33.0	76.3
13/03/2002	27/03/2002	5.1	86.9	54.2	232.3	131.6	22.5	7.7	166.8	53.0	111.1	71.1	7.2	70.0	30.2
27/03/2002	10/04/2002	7.3	121.1	37.1	842.9	71.3	23.7	8.9	105.5	105.1	231.6	112.5	0.1	151.0	46.0
10/04/2002	24/04/2002	7.0	155.5	6.5	1911.2	78.7	39.3	25.0	87.1	144.1	446.8	146.0	0.1	255.0	91.6
24/04/2002	08/05/2002	7.0	169.2	5.1	2468.8	141.5	56.2	22.7	168.1	157.8	468.4	152.2	0.1	323.0	108.4
08/05/2002	29/05/2002	6.9	120.1	6.9	1403.3	89.0	40.3	17.8	97.5	131.4	305.5	109.4	0.1	192.0	146.4
29/05/2002	11/06/2002	7.0	289.4	<0.7	5318.7	104.2	100.3	48.0	133.8	337.7	944.1	276.9	0.1	632.0	120.9
11/06/2002	25/06/2002	7.3	277.1	<0.7	4316.2	68.5	89.0	44.7	94.8	284.9	874.4	268.9	0.1	535.0	135.9
25/06/2002	17/07/2002	8.5	321.5	1.9	3554.6	60.6	77.0	43.8	85.5	290.1	985.5	314.2	0.0	420.0	97.8
17/07/2002	30/07/2002	5.7	21.0	9.2	67.3	6.3	1.7	1.1	12.1	9.0	14.8	20.2	1.9	12.0	72.4
30/07/2002	13/08/2002	4.5	20.0	17.3	16.9	10.0	3.9	6.1	12.3	1.3	<1.0	18.8	30.9	14.0	44.6
13/08/2002	11/09/2002	5.6	13.3	8.2	28.8	20.9	2.8	1.0	25.8	2.4	<1.0	10.7	2.5	10.0	183.4
11/09/2002	25/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/09/2002	09/10/2002	6.2	42.2	21.3	140.1	53.9	6.0	1.7	60.1	11.9	34.1	35.8	0.6	27.0	29.8
09/10/2002	29/10/2002	4.5	23.2	19.5	17.4	5.9	1.8	1.2	10.9	<0.5	<1.0	22.5	28.8	16.0	112.1
29/10/2002	04/11/2002	4.8	12.1	7.3	3.9	44.4	9.0	1.8	52.5	1.0	<1.0	6.8	17.0	14.0	183.0
04/11/2002	20/11/2002	4.6	21.4	12.7	8.3	107.0	25.3	8.0	125.7	2.2	<1.0	8.5	24.0	26.0	116.3
20/11/2002	04/12/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
04/12/2002	11/12/2002	4.8	40.6	3.7	4.5	233.3	50.8	13.1	275.9	5.5	<1.0	12.5	17.8	44.0	2.7
11/12/2002	08/01/2003	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
Precipitation-weighted annual mean for site (samples containing phosphate are excluded)															Total rainfall
5107			23.1	9.4	12.3	102.8	22.1	5.0	121.0	2.6	-	10.7	13.2	24.3	2055.2

Beaghs Burn

2002

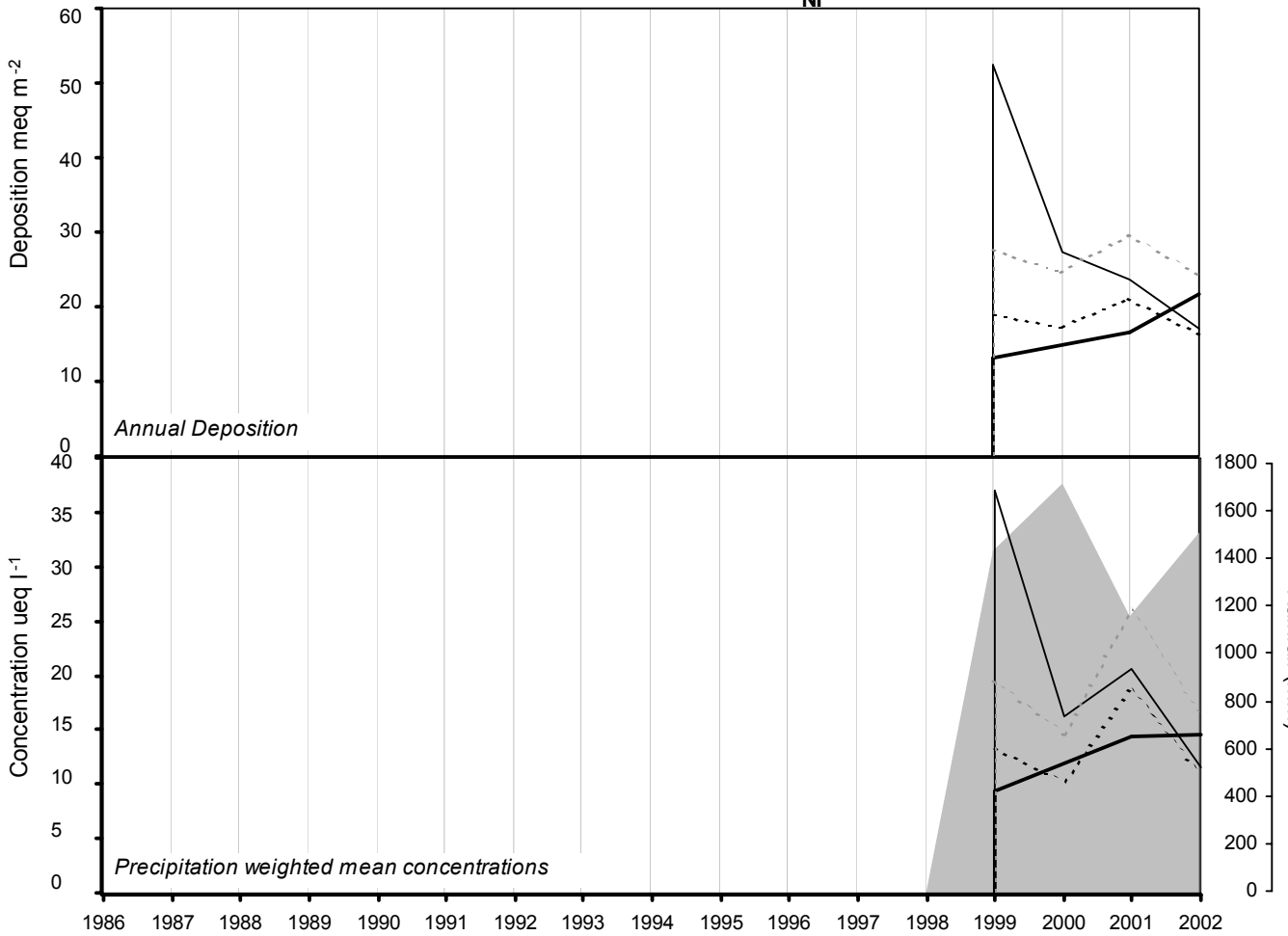
Site Code:	**5155**
Easting:	**1345**
Northing:	**5865**
Latitude:	**55 05 00 N**
Longitude:	**00 06 11 W**
Altitude (m):	**250**
Rainfall (mm):	**-**

[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): 3 years' data
n/a Insufficient Data

non-marine sulphate
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

nitrate
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

ammonium
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
15/01/2002	29/01/2002	5.7	29.5	5.2	10.9	171.8	29.6	5.2	207.8	3.6	<1.0	8.8	1.9	33.0	69.6
29/01/2002	12/02/2002	5.6	17.9	2.8	7.5	108.2	20.8	6.1	118.0	2.2	<1.0	4.9	2.6	20.0	12.2
12/02/2002	26/02/2002	5.7	63.7	2.6	10.2	492.3	106.6	20.0	556.5	10.1	<1.0	4.4	2.1	81.0	94.1
26/02/2002	12/03/2002	5.7	21.3	2.9	12.4	130.6	26.6	4.9	147.6	2.6	<1.0	5.5	2.0	25.0	85.1
12/03/2002	26/03/2002	5.6	42.9	30.9	53.9	118.8	24.1	14.6	127.0	2.7	<1.0	28.6	2.3	30.0	27.4
26/03/2002	09/04/2002	6.3	67.7	74.7	160.4	73.4	14.1	18.2	87.7	2.7	<1.0	58.8	0.6	38.0	7.0
09/04/2002	23/04/2002	5.1	24.9	20.3	34.7	32.8	7.6	4.9	40.3	1.0	<1.0	20.9	8.9	15.0	41.7
23/04/2002	07/05/2002	5.6	23.0	3.9	10.1	149.3	30.6	7.9	170.7	2.9	<1.0	5.1	2.3	28.0	69.4
07/05/2002	21/05/2002	4.4	50.1	36.5	43.9	73.6	18.3	17.0	83.3	2.6	<1.0	41.3	39.8	30.0	33.7
21/05/2002	05/06/2002	5.1	14.4	8.1	15.4	37.7	7.7	3.7	44.1	1.5	<1.0	9.9	7.9	11.0	102.6
05/06/2002	18/06/2002	5.5	11.4	7.6	17.2	18.2	3.7	1.8	21.9	0.9	<1.0	9.2	3.5	<10.0	75.8
18/06/2002	02/07/2002	5.7	14.2	4.4	24.4	26.7	4.7	2.9	33.3	0.9	<1.0	11.0	2.1	<10.0	108.7
02/07/2002	16/07/2002	5.3	21.8	11.6	38.8	29.0	5.4	6.0	32.9	2.3	<1.0	18.3	5.0	13.0	29.4
16/07/2002	30/07/2002	6.0	18.2	10.7	53.8	18.0	4.6	<1.0	22.3	5.5	19.4	16.0	1.0	14.0	44.1
30/07/2002	12/08/2002	5.0	22.7	18.5	29.2	15.7	4.2	4.3	18.6	1.4	<1.0	20.8	9.8	11.0	30.7
12/08/2002	27/08/2002	5.8	13.5	8.6	31.3	27.2	4.1	4.9	30.3	2.4	<1.0	10.2	1.7	10.0	17.5
27/08/2002	10/09/2002	5.0	16.3	11.9	15.2	36.5	8.3	3.6	44.3	1.3	<1.0	11.9	10.2	14.0	81.3
10/09/2002	24/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2
24/09/2002	08/10/2002	5.5	17.0	9.1	24.7	43.7	8.9	4.5	50.7	0.7	<1.0	11.7	3.2	12.0	30.6
08/10/2002	22/10/2002	4.4	30.4	15.7	6.7	120.1	26.1	6.3	138.3	2.5	<1.0	15.9	36.3	31.0	62.8
22/10/2002	05/11/2002	4.6	22.9	5.5	1.9	153.8	33.2	6.7	177.2	3.7	<1.0	4.4	22.9	29.0	183.1
05/11/2002	19/11/2002	4.5	24.2	12.5	5.9	140.9	31.9	6.4	165.0	2.8	<1.0	7.2	30.2	32.0	74.8
19/11/2002	02/12/2002	4.6	52.0	17.4	12.7	337.3	74.1	14.9	369.9	6.8	<1.0	11.4	24.0	62.0	97.2
02/12/2002	17/12/2002	4.6	58.8	24.0	22.0	385.0	83.6	17.8	417.4	7.6	<1.0	12.4	28.2	65.0	18.3
17/12/2002	07/01/2003	4.3	36.5	21.2	17.5	127.4	28.8	6.3	146.2	2.9	<1.0	21.2	45.7	35.0	96.0
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5155			28.2	11.0	16.4	138.9	29.6	7.4	158.3	3.2	-	11.5	14.6	29.4	1494.1

Redesdale

2002

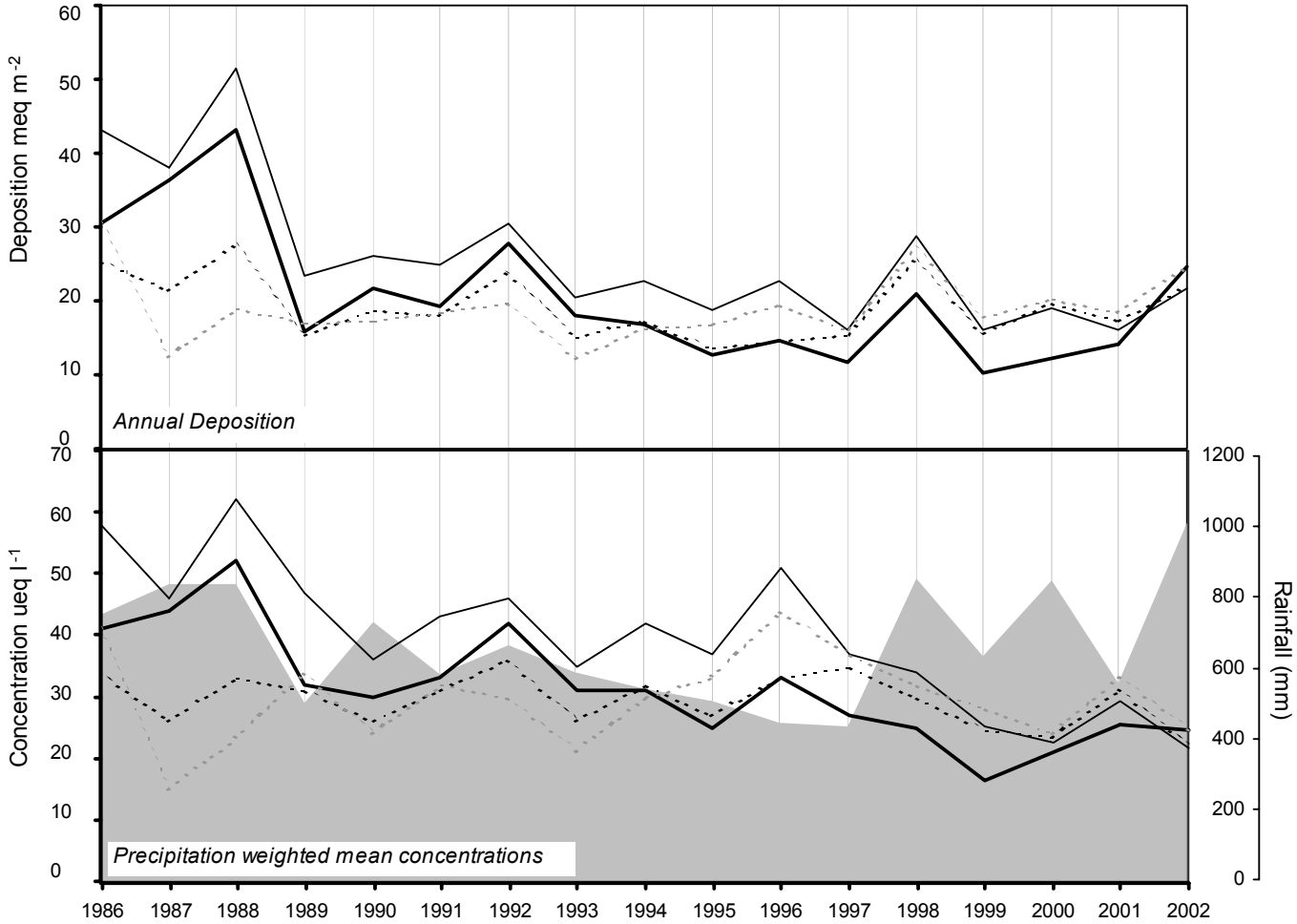
Site Code:	**5109**
Easting:	**3833**
Northing:	**5954**
Latitude:	**55 14 59 N**
Longitude:	**02 15 46 W**
Altitude (m):	**240**
Rainfall (mm):	**875**

[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
-1.49 ueq/l (-3.45 %/year): 16 years' data
+++ Strong trend detected

non-marine sulphate
-1.88 ueq/l (-3.43 %/year): 17 years' data
+++ Strong trend detected

nitrate
-0.31 ueq/l (-0.96 %/year): 17 years' data
- No significant trend detected

ammonium
0.15 ueq/l (0.53 %/year): 17 years' data
- No significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
15/01/2002	29/01/2002	5.2	28.9	10.6	13.7	135.1	25.4	5.6	158.7	3.0	<1.0	12.6	7.1	29.0	49.5
29/01/2002	11/02/2002	5.1	16.4	5.9	6.8	84.3	18.4	5.9	100.1	7.1	<1.0	6.2	7.2	19.0	103.6
11/02/2002	26/02/2002	5.1	15.7	5.7	6.4	82.6	16.6	4.5	90.8	1.9	<1.0	5.7	7.2	18.0	65.1
26/02/2002	12/03/2002	5.3	34.7	8.9	16.5	201.6	43.9	10.5	229.5	4.7	<1.0	10.4	5.2	39.0	30.2
12/03/2002	25/03/2002	4.8	49.2	35.3	46.7	132.6	30.1	10.2	152.4	3.3	<1.0	33.2	17.4	37.0	28.9
25/03/2002	09/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
09/04/2002	23/04/2002	6.2	86.7	100.7	160.9	48.2	14.5	33.1	51.8	1.3	<1.0	80.8	0.6	38.0	9.6
23/04/2002	07/05/2002	5.6	18.1	11.7	22.6	45.6	9.8	5.6	55.4	0.9	<1.0	12.6	2.8	14.0	34.7
07/05/2002	21/05/2002	4.8	86.0	57.0	91.0	64.5	17.9	21.4	71.8	3.4	<1.0	78.2	16.6	34.0	8.4
21/05/2002	05/06/2002	4.4	30.5	25.8	18.1	37.3	9.7	9.2	45.7	0.9	<9.7	26.0	40.7	23.0	67.1
05/06/2002	18/06/2002	5.0	18.3	12.5	20.7	28.6	5.6	4.7	33.9	1.0	<1.0	14.9	9.3	12.0	49.9
18/06/2002	02/07/2002	5.4	25.8	14.3	23.0	56.8	13.5	8.6	63.1	1.9	<1.0	18.9	4.1	17.0	21.1
02/07/2002	16/07/2002	5.1	27.2	24.1	37.8	19.8	6.1	9.2	22.2	1.3	<1.0	24.8	7.2	14.0	20.1
16/07/2002	30/07/2002	4.5	37.8	36.4	42.3	3.9	2.8	4.9	7.7	1.8	<1.0	37.3	31.6	20.0	30.4
30/07/2002	13/08/2002	4.6	29.6	25.4	37.9	<0.9	1.5	4.5	3.2	0.9	<1.0	29.7	23.4	15.0	127.3
13/08/2002	27/08/2002	5.3	50.5	50.2	79.0	12.6	5.3	14.0	13.1	2.6	<1.0	49.0	4.7	20.0	9.9
27/08/2002	10/09/2002	5.1	20.5	18.8	26.6	24.0	6.1	5.0	28.7	1.5	<1.0	17.6	8.9	14.0	29.1
10/09/2002	24/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
24/09/2002	08/10/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
08/10/2002	22/10/2002	4.4	34.6	26.2	23.1	84.5	19.1	7.4	96.2	2.2	<1.0	24.4	44.7	30.0	66.8
22/10/2002	05/11/2002	4.6	18.1	14.4	10.0	38.4	7.9	2.9	45.3	0.9	<1.0	13.4	25.7	17.0	80.3
05/11/2002	19/11/2002	4.6	15.7	11.2	9.1	52.1	11.6	3.9	63.3	1.2	<1.0	9.4	25.7	18.0	39.7
19/11/2002	03/12/2002	4.3	33.2	55.7	36.1	39.1	9.7	6.2	47.4	1.0	<1.0	28.5	52.5	32.0	38.2
03/12/2002	17/12/2002	3.9	96.4	80.5	55.7	229.6	51.2	13.5	254.6	6.6	<1.0	68.7	141.3	80.0	23.9
17/12/2002	02/01/2003	4.4	27.6	21.5	18.6	24.4	5.1	2.1	29.6	0.7	<1.0	24.7	43.7	20.0	66.6
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5109			28.7	22.0	24.6	59.3	13.2	6.3	69.0	2.2	-	21.5	24.5	22.4	1002.4

Eskdalemuir

2002

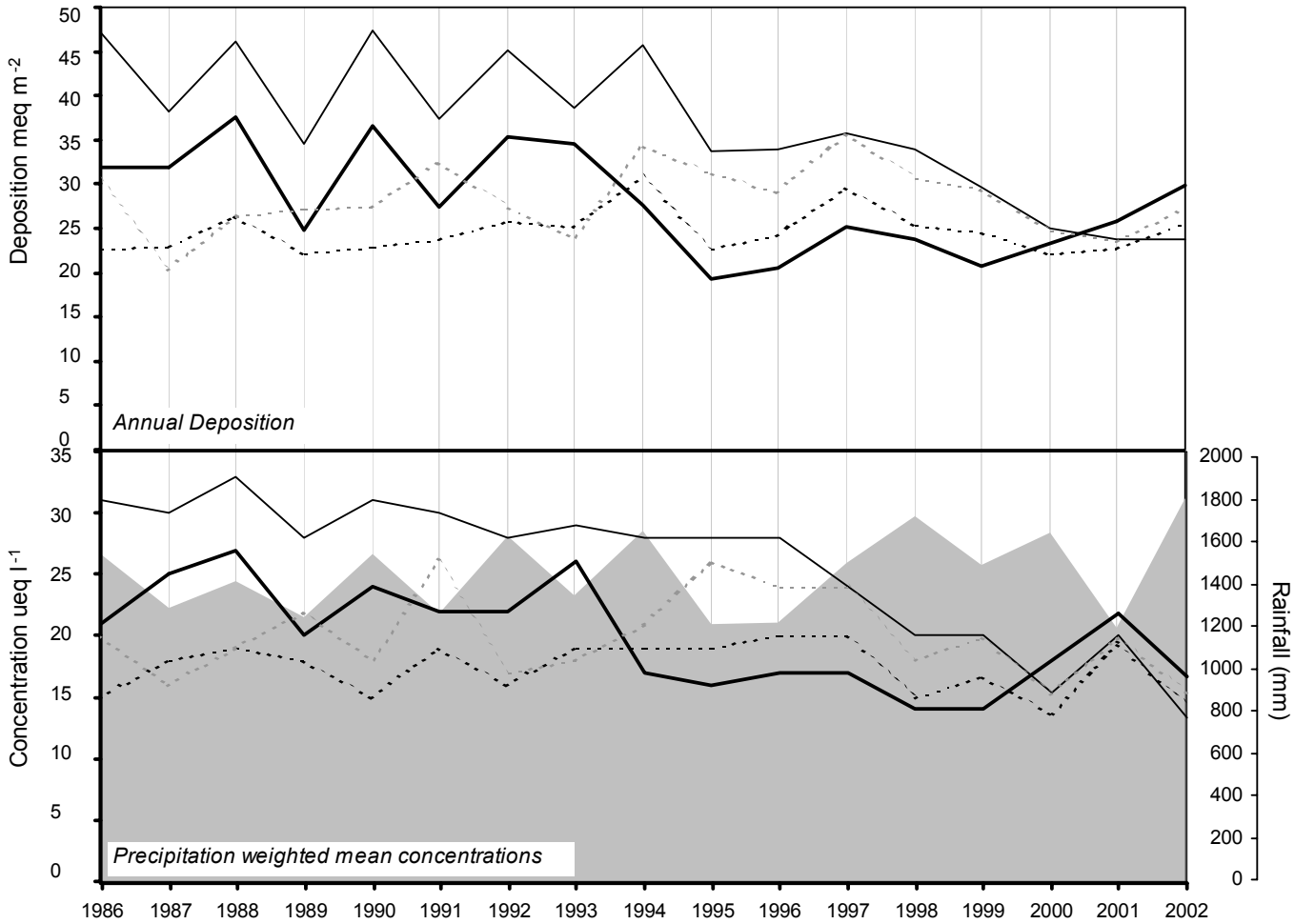
Site Code:	**5002**
Easting:	**3235**
Northing:	**6030**
Latitude:	**55 18 54 N**
Longitude:	**03 12 20 W**
Altitude (mm):	**259**
Rainfall (mm):	**1745**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, Met Office Observatory

Other measurements:
WOC, DT, Daily 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
-0.59 ueq/l (-2.42 %/year): 16 years' data
++ Moderately strong trend detected

non-marine sulphate
-1.04 ueq/l (-3.07 %/year): 17 years' data
++++ Very strong trend detected

nitrate
-0.06 ueq/l (-0.32 %/year): 17 years' data
- No significant trend detected

ammonium
-0.07 ueq/l (-0.32 %/year): 17 years' data
- No significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
02/01/2002	16/01/2002	4.4	58.4	64.8	70.1	84.7	20.1	6.7	105.3	2.3	<1.0	48.2	41.7	40.0	23.1
16/01/2002	30/01/2002	5.1	25.1	9.8	6.8	110.8	22.1	4.7	124.7	2.2	<1.0	11.8	7.4	24.0	176.2
30/01/2002	13/02/2002	5.2	16.6	4.3	6.8	98.5	20.9	4.4	110.4	2.0	<1.0	4.8	6.6	18.0	173.6
13/02/2002	27/02/2002	5.3	13.5	3.4	4.6	84.7	16.7	3.7	94.2	1.8	<1.0	3.3	4.8	17.0	117.1
27/02/2002	13/03/2002	5.3	31.4	7.1	14.0	173.4	36.8	8.3	199.8	3.7	<1.0	10.5	5.6	34.0	59.2
13/03/2002	27/03/2002	4.7	35.7	32.7	38.3	86.8	19.0	7.0	94.0	2.1	<1.0	25.3	20.0	28.0	31.0
27/03/2002	10/04/2002	6.9	41.1	31.6	190.2	46.4	8.2	5.2	54.3	19.0	<1.0	35.5	0.1	40.0	7.9
10/04/2002	24/04/2002	5.1	44.0	29.6	54.4	23.0	5.9	8.2	27.6	2.5	<1.0	41.3	7.6	17.0	43.7
24/04/2002	08/05/2002	5.9	28.3	10.9	97.2	52.4	9.8	5.7	60.7	10.7	24.6	22.0	1.2	24.0	70.3
08/05/2002	22/05/2002	6.2	36.5	22.3	70.0	28.5	5.1	2.5	32.4	8.5	19.4	33.1	0.7	18.0	76.4
22/05/2002	05/06/2002	5.7	32.9	16.2	53.1	83.1	15.2	7.7	99.9	9.6	15.7	22.9	2.0	24.0	92.6
05/06/2002	19/06/2002	6.7	53.1	11.5	411.4	42.9	9.8	2.3	51.3	37.9	123.4	47.9	0.2	68.0	118.1
19/06/2002	03/07/2002	6.4	24.5	7.7	100.3	22.5	2.4	0.8	29.7	15.4	51.0	21.8	0.4	21.0	55.7
03/07/2002	17/07/2002	7.3	29.4	17.8	150.7	23.4	3.7	1.2	26.2	13.4	38.5	26.6	0.0	28.0	42.2
17/07/2002	31/07/2002	4.5	20.6	24.3	20.3	3.1	1.8	2.1	6.3	0.8	<1.0	20.2	28.8	15.0	52.3
31/07/2002	14/08/2002	4.9	20.4	19.4	26.6	6.5	2.6	3.9	8.2	1.1	<1.0	19.7	12.6	11.0	41.2
14/08/2002	28/08/2002	5.1	20.6	20.5	30.7	15.1	3.1	5.0	17.2	2.4	<1.0	18.8	8.9	11.0	27.6
28/08/2002	11/09/2002	4.8	17.7	14.0	20.8	21.5	4.6	3.6	26.7	0.8	<1.0	15.1	15.1	12.0	91.7
11/09/2002	25/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/09/2002	09/10/2002	4.5	44.3	50.2	55.8	39.8	9.2	10.9	40.3	0.9	<1.0	39.6	32.4	27.0	11.6
09/10/2002	23/10/2002	4.6	15.0	15.1	6.9	15.5	3.9	2.6	20.7	1.0	<1.0	13.1	26.9	13.0	114.6
23/10/2002	06/11/2002	4.6	13.7	12.5	7.4	34.5	7.3	1.9	44.3	0.9	<1.0	9.6	27.5	14.0	143.7
06/11/2002	20/11/2002	4.5	16.0	13.3	8.4	48.8	10.5	2.9	59.0	1.1	<1.0	10.1	31.6	18.0	61.6
20/11/2002	04/12/2002	4.5	23.9	24.1	16.9	83.2	18.9	5.3	96.9	1.7	<1.0	13.8	28.8	26.0	64.9
04/12/2002	18/12/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
18/12/2002	01/01/2003	4.6	17.0	15.4	9.9	30.6	6.1	2.3	35.1	1.2	<1.0	13.3	24.0	15.0	84.1
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5002			20.9	14.4	15.3	63.2	13.4	4.1	72.9	1.8	-	13.3	16.7	18.7	1780.5

Whiteadder

2002

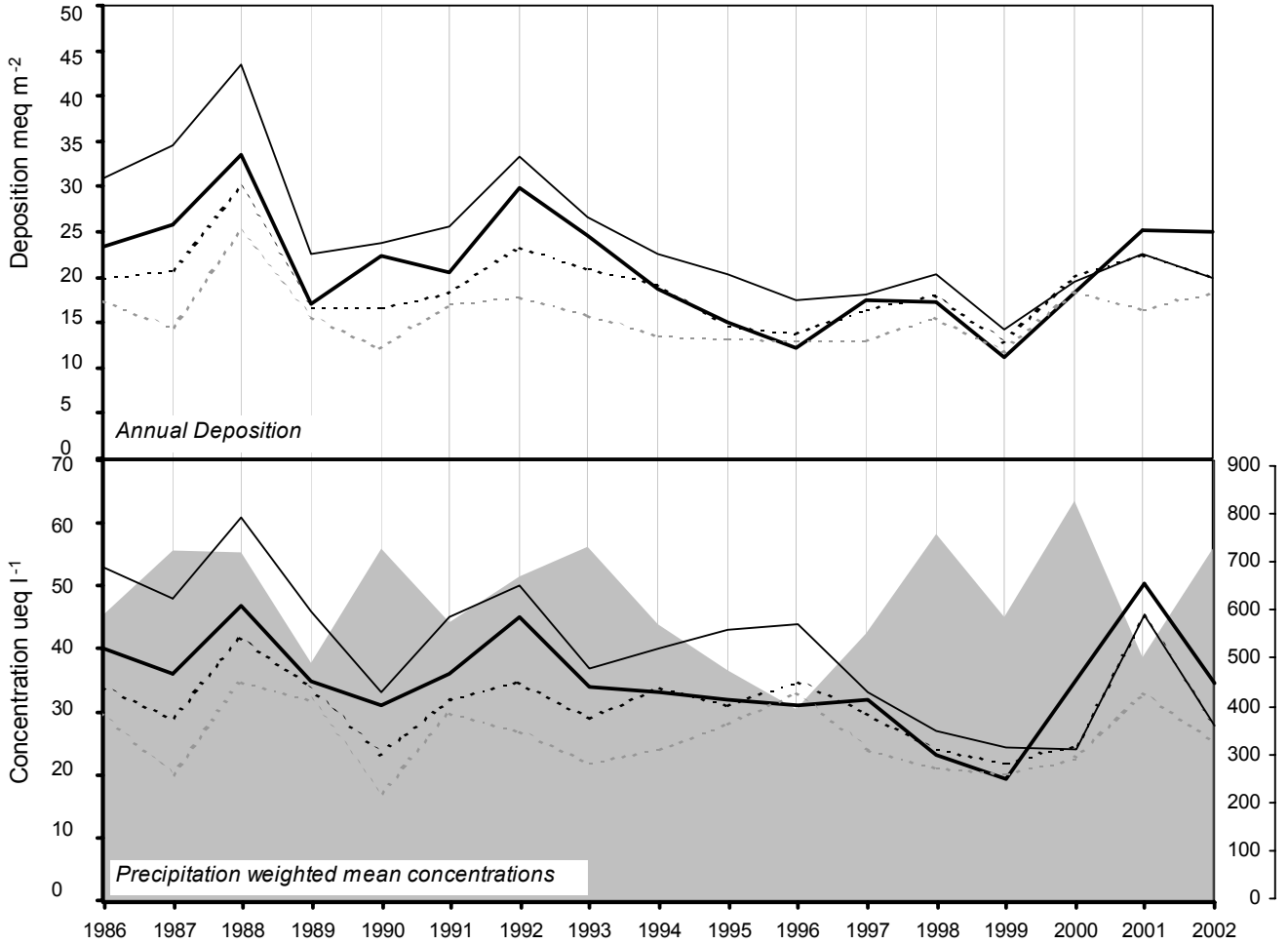
Site Code:	**5106**
Easting:	**3664**
Northing:	**6633**
Latitude:	**55 51 42 N**
Longitude:	**03 32 13 W**
Altitude (m):	**250**
Rainfall (mm):	**1050**

[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
-0.54 ueq/l (-1.38 %/year): 16 years' data
\- No significant trend detected

non-marine sulphate
-1.52 ueq/l (-2.91 %/year): 17 years' data
++ Moderately strong trend detected

nitrate
-0.25 ueq/l (-0.74 %/year): 17 years' data
\- No significant trend detected

ammonium
-0.16 ueq/l (-0.57 %/year): 17 years' data
\- No significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
07/01/2002	21/01/2002	5.2	25.0	28.5	27.6	95.1	18.6	8.2	111.7	3.5	<1.0	13.6	5.8	25.0	9.7
21/01/2002	28/01/2002	5.3	23.1	10.8	8.7	99.1	21.4	6.8	113.8	3.1	<1.0	11.1	5.2	20.0	5.8
28/01/2002	11/02/2002	5.2	13.8	6.2	6.2	67.2	14.6	4.7	74.7	1.6	<1.0	5.7	7.1	13.0	27.3
11/02/2002	25/02/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/02/2002	18/03/2002	4.8	57.4	23.7	27.0	310.2	67.4	15.3	334.3	6.6	<1.0	20.0	14.8	61.0	14.2
18/03/2002	25/03/2002	4.8	17.5	16.1	21.0	22.1	4.8	3.3	24.0	0.9	<1.0	14.8	14.5	14.0	15.2
25/03/2002	08/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
08/04/2002	22/04/2002	6.8	86.4	76.9	136.0	141.5	24.6	38.5	129.9	19.0	<1.0	69.4	0.2	48.0	4.5
22/04/2002	06/05/2002	4.8	24.8	14.3	14.7	45.4	10.2	7.4	52.4	1.2	<1.0	19.3	15.8	17.0	17.9
06/05/2002	20/05/2002	4.4	168.3	124.8	166.4	112.3	31.1	45.5	114.7	5.7	<1.0	154.8	41.7	63.0	5.4
20/05/2002	04/06/2002	4.3	52.3	44.9	43.0	43.2	11.2	10.8	53.0	1.9	<9.7	47.1	46.8	30.0	30.9
04/06/2002	17/06/2002	4.7	29.6	21.6	26.4	18.5	5.0	5.4	21.6	0.6	<1.0	27.4	20.9	17.0	37.9
17/06/2002	15/07/2002	4.6	40.7	34.4	34.8	57.8	13.4	11.2	57.6	2.0	<1.0	33.7	27.5	28.0	14.7
15/07/2002	22/07/2002	4.5	52.2	19.4	15.7	31.2	7.7	7.1	35.5	1.4	<1.0	48.4	34.7	27.0	16.0
22/07/2002	29/07/2002	5.1	14.2	8.9	10.7	4.7	1.7	4.5	5.5	0.7	<1.0	13.6	8.9	<10.0	15.0
29/07/2002	05/08/2002	4.2	54.0	49.9	50.1	16.0	5.0	8.3	22.7	1.5	<1.0	52.1	63.1	31.0	50.3
05/08/2002	15/08/2002	5.0	19.6	22.1	18.9	17.4	3.9	9.2	17.5	3.0	<1.0	17.5	10.0	12.0	6.6
15/08/2002	26/08/2002	4.9	44.6	36.7	32.6	15.7	6.6	24.5	16.4	3.2	<1.0	42.7	13.5	19.0	5.3
26/08/2002	09/09/2002	5.8	23.2	25.2	40.0	37.0	7.3	8.6	36.9	2.6	<1.0	18.7	1.5	14.0	24.2
09/09/2002	23/09/2002	4.5	65.2	56.8	80.1	41.1	9.7	9.9	47.7	4.2	<1.0	60.2	30.2	31.0	24.6
23/09/2002	30/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
30/09/2002	07/10/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
07/10/2002	21/10/2002	4.6	39.5	24.6	20.6	119.6	26.2	7.9	137.7	2.7	<1.0	25.1	28.2	35.0	72.4
21/10/2002	18/11/2002	4.5	22.3	12.2	3.7	104.9	22.7	4.9	120.2	2.2	<1.0	9.7	29.5	26.0	175.8
18/11/2002	25/11/2002	4.1	49.1	72.0	50.7	52.5	13.2	7.0	62.0	1.8	<1.0	42.8	74.1	43.0	19.1
25/11/2002	02/12/2002	4.8	15.3	15.7	13.1	46.4	9.8	4.1	55.2	1.0	<1.0	9.7	16.2	16.0	16.7
02/12/2002	16/12/2002	4.0	76.2	51.1	31.1	182.8	42.0	9.7	209.6	4.5	<1.0	54.2	109.6	64.0	47.8
16/12/2002	30/12/2002	4.5	28.2	23.8	14.4	47.4	10.0	4.7	54.3	2.4	<1.0	22.5	29.5	47.0	19.8
30/12/2002	13/01/2003	5.5	43.4	15.9	39.0	175.5	36.4	7.4	193.9	11.6	11.5	22.3	3.0	37.0	43.4
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5106			37.5	27.8	25.2	81.3	18.2	7.7	92.6	2.4	-	27.7	34.5	29.9	721.8

Loch Chon

2002

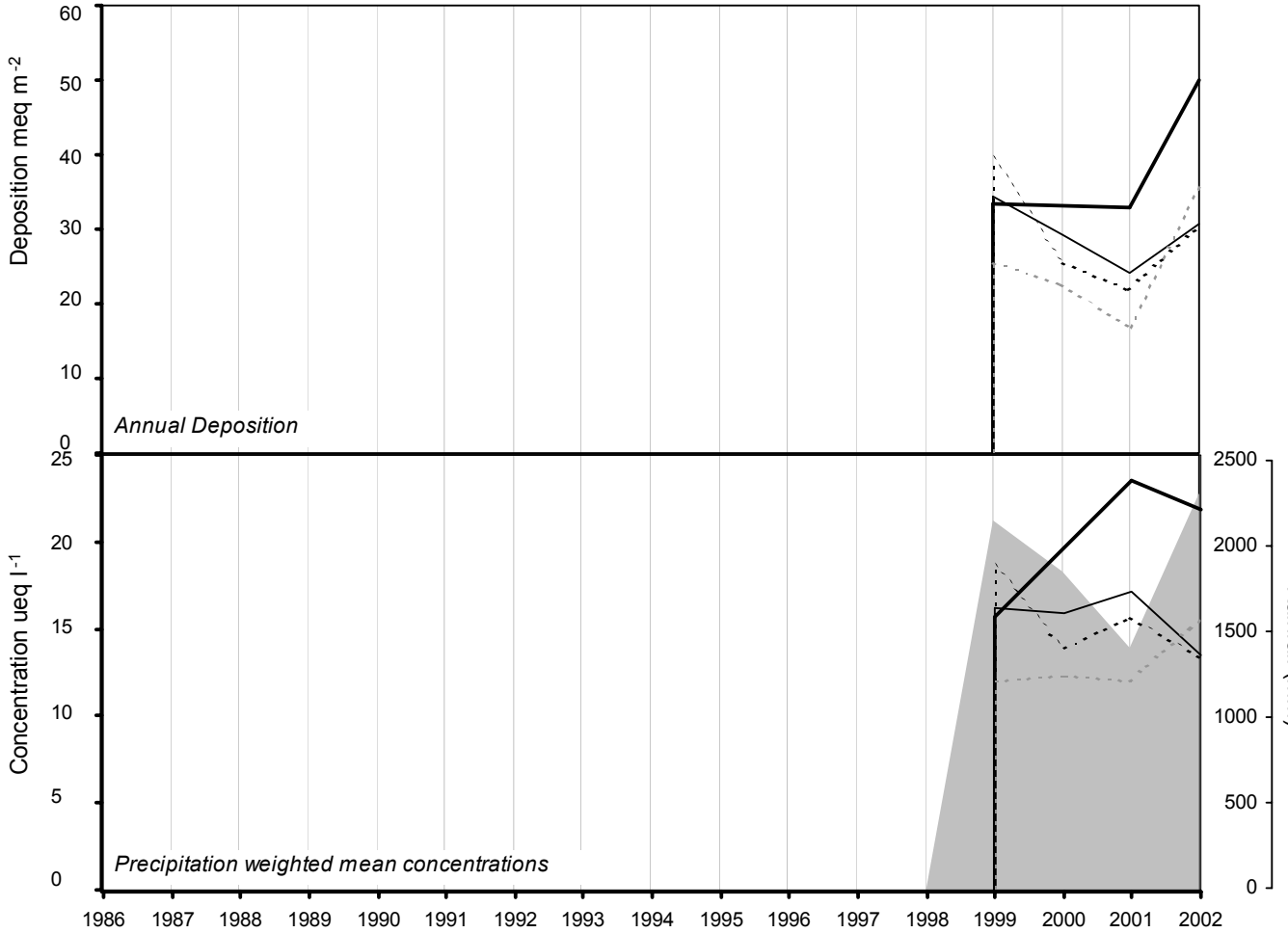
Site Code:	**5156**
Easting:	**2429**
Northing:	**7084**
Latitude:	**56 14 52 N**
Longitude:	**04 32 09 W**
Altitude (m):	**150**
Rainfall (mm):	**-**

[30 year mean 1940 - 1971]

Site Environment:
Moorland overlooking Loch Katrine

Other measurements:
UKAWMN

Site Operator:
Freshwater Fisheries Laboratory



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): 3 years' data
n/a Insufficient Data

non-marine sulphate
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

nitrate
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

ammonium
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
03/01/2002	16/01/2002	4.5	31.7	29.8	20.5	82.3	17.8	5.1	105.2	2.0	<1.0	21.8	31.6	30.0	39.2
16/01/2002	30/01/2002	4.9	58.3	3.8	0.4	415.4	92.4	17.9	466.4	7.9	<1.0	8.3	12.6	69.0	284.3
30/01/2002	13/02/2002	5.2	16.2	3.0	1.7	123.5	25.4	5.2	139.7	2.5	<1.0	1.3	6.8	23.0	245.3
13/02/2002	27/02/2002	5.1	19.2	2.8	1.9	131.7	27.3	6.1	145.8	2.7	<1.0	3.3	8.1	25.0	156.5
27/02/2002	13/03/2002	5.1	18.2	2.2	0.7	125.1	26.5	5.4	140.9	2.5	<1.0	3.1	7.2	24.0	79.5
13/03/2002	27/03/2002	4.5	26.1	21.6	15.8	37.7	8.2	3.8	41.7	1.0	<1.0	21.5	33.1	22.0	54.4
27/03/2002	10/04/2002	5.9	63.6	80.5	138.7	51.3	10.0	9.6	57.4	2.4	<1.0	57.4	1.3	30.0	20.0
10/04/2002	24/04/2002	6.5	47.1	29.4	236.5	31.9	5.0	2.4	37.4	19.1	59.2	43.3	0.3	44.0	57.7
24/04/2002	08/05/2002	7.2	136.0	11.0	1639.6	98.1	36.5	9.6	91.8	131.1	311.2	124.1	0.1	220.0	57.5
08/05/2002	23/05/2002	7.0	84.9	21.8	864.0	44.7	22.0	5.7	47.7	73.3	165.1	79.5	0.1	132.0	121.9
23/05/2002	05/06/2002	6.0	26.1	17.9	87.7	30.6	6.1	2.9	37.7	7.5	22.4	22.4	1.0	19.0	124.3
05/06/2002	19/06/2002	6.8	42.2	8.7	415.2	29.9	6.0	4.0	35.4	29.7	92.6	38.6	0.1	70.0	168.2
19/06/2002	03/07/2002	6.7	69.5	9.2	577.5	47.9	12.2	3.9	54.4	61.9	118.2	63.7	0.2	90.0	58.9
03/07/2002	18/07/2002	6.5	36.7	14.0	273.0	21.8	6.4	1.1	23.5	21.5	<1.0	34.0	0.3	42.0	35.8
18/07/2002	31/07/2002	4.6	17.1	15.1	17.9	<0.9	5.2	4.8	4.9	0.5	<1.0	17.2	25.1	10.0	98.4
31/07/2002	14/08/2002	4.6	18.6	15.7	15.3	<0.9	1.5	3.0	3.8	0.5	<1.0	18.7	26.3	11.0	38.2
14/08/2002	28/08/2002	4.8	14.4	15.0	18.8	17.6	4.5	4.8	20.9	0.7	<1.0	12.3	17.4	11.0	32.2
28/08/2002	11/09/2002	4.7	24.4	20.9	25.1	35.4	8.4	3.6	42.8	1.1	<1.0	20.1	21.4	19.0	89.4
11/09/2002	25/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/09/2002	09/10/2002	4.5	25.6	25.1	19.3	49.3	10.9	5.7	54.5	1.5	<1.0	19.7	29.5	21.0	28.5
09/10/2002	05/11/2002	4.5	23.7	15.9	8.7	43.2	10.1	2.3	53.1	1.0	<1.0	18.5	33.1	20.0	186.7
05/11/2002	20/11/2002	4.3	28.2	20.8	9.5	96.7	21.0	4.9	111.1	2.2	<1.0	16.5	51.3	30.0	75.5
20/11/2002	04/12/2002	4.4	22.8	23.3	13.0	35.8	7.6	2.5	42.4	0.7	<1.0	18.5	42.7	21.0	146.8
04/12/2002	18/12/2002	3.7	270.0	217.1	106.6	854.7	193.7	62.2	907.2	21.1	7.8	167.0	208.9	225.0	3.1
18/12/2002	03/01/2003	4.4	28.7	24.7	13.0	31.0	7.0	2.6	34.3	0.8	<1.0	24.9	40.7	23.0	75.7
Precipitation-weighted annual mean for site (samples containing phosphate are excluded)															Total rainfall
5156			29.0	13.3	15.6	128.4	28.4	6.6	145.6	3.1	-	13.5	21.9	30.3	2278.0

Balquhidder

2002

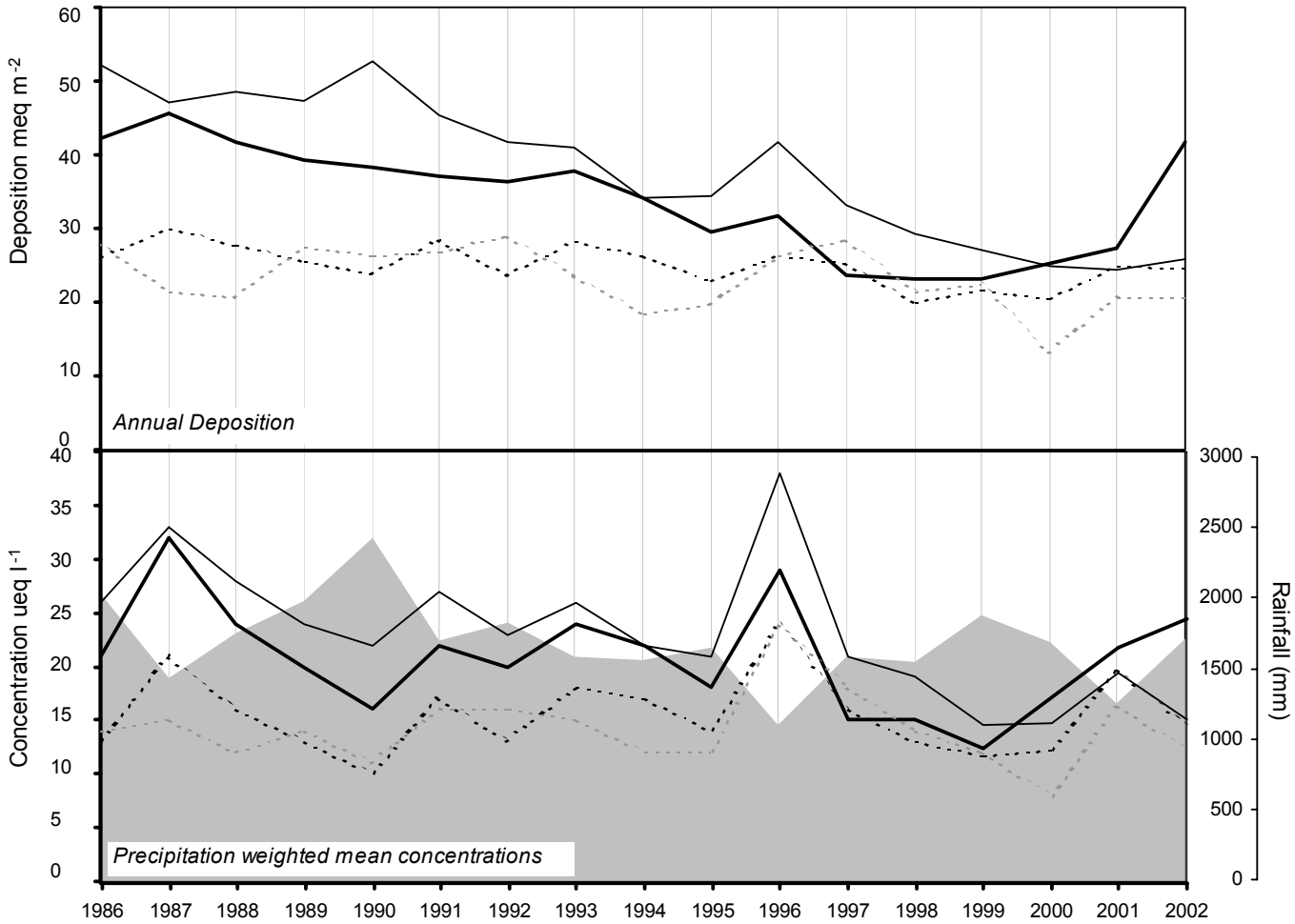
Site Code:	**5152**
Easting:	**2521**
Northing:	**7206**
Latitude:	**56 21 17 N**
Longitude:	**04 23 38 W**
Altitude (m):	**135**
Rainfall (mm):	**2245**

[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 (-1.45 %/year): 16 years' data
\- No significant trend detected

non-marine sulphate
-0.77 ueq/l (-2.62 %/year): 17 years' data
++ Moderately strong trend detected

nitrate
0.00 ueq/l (0.02 %/year): 17 years' data
\- No significant trend detected

ammonium
-0.02 ueq/l (-0.13 %/year): 17 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 S/cm	rainfall (mm)
13/01/2002	26/01/2002	5.0	19.0	7.1	4.4	87.6	17.8	3.5	101.6	1.8	<1.0	8.4	11.0	20.0	160.6
26/01/2002	10/02/2002	5.1	33.3	4.2	<0.7	246.2	49.0	13.4	289.8	23.7	<1.0	3.6	8.5	45.0	232.8
10/02/2002	25/02/2002	5.1	18.4	2.7	<0.7	138.9	29.0	5.9	150.7	2.5	<1.0	1.7	7.9	26.0	147.1
25/02/2002	11/03/2002	5.2	22.9	2.2	2.3	168.3	36.1	7.6	191.9	3.4	<1.0	2.6	6.2	30.0	90.1
11/03/2002	24/03/2002	4.7	31.6	26.6	23.4	74.2	16.1	6.7	84.5	1.9	<1.0	22.6	21.4	27.0	5.6
24/03/2002	08/04/2002	5.7	86.5	101.9	176.6	33.1	7.9	13.4	40.0	1.8	<1.0	82.5	2.0	35.0	15.3
08/04/2002	20/04/2002	4.5	94.7	133.5	125.8	49.9	15.9	34.8	45.4	2.3	<1.0	88.7	33.9	48.0	8.4
20/04/2002	08/05/2002	4.9	20.0	9.5	14.7	24.3	6.0	4.3	29.0	0.6	<1.0	17.1	12.9	12.0	87.2
08/05/2002	18/05/2002	4.6	41.9	27.9	31.3	18.9	5.2	5.4	24.5	0.8	<1.0	39.6	25.7	22.0	58.0
18/05/2002	06/06/2002	4.7	21.2	15.8	14.4	19.2	5.2	3.3	24.7	0.6	<1.0	18.9	22.4	15.0	156.4
06/06/2002	16/06/2002	4.6	17.7	13.7	13.3	8.3	2.4	1.6	12.1	<0.5	<1.0	16.7	25.1	12.0	96.6
16/06/2002	02/07/2002	4.7	20.2	10.7	12.0	34.9	7.6	8.7	40.7	1.4	<1.0	16.0	18.2	14.0	60.6
02/07/2002	15/07/2002	4.7	19.0	13.0	11.2	11.6	4.0	3.9	15.4	1.8	<1.0	17.6	21.4	14.0	45.1
15/07/2002	29/07/2002	4.9	17.7	6.6	7.8	13.4	2.8	9.5	14.5	5.8	<1.0	16.1	13.2	10.0	36.0
29/07/2002	12/08/2002	4.7	16.1	14.1	9.3	<0.9	1.0	2.8	4.3	0.7	<1.0	16.3	21.9	10.0	60.6
12/08/2002	27/08/2002	7.0	31.0	10.2	295.6	13.7	5.8	2.4	14.6	29.0	65.7	29.4	0.1	48.0	46.7
27/08/2002	16/09/2002	4.7	23.4	20.2	24.5	34.1	7.5	3.5	43.9	1.4	<1.0	19.3	20.4	17.0	57.2
16/09/2002	23/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
23/09/2002	06/10/2002	5.0	23.5	21.3	28.5	27.7	6.7	5.8	32.4	0.7	<1.0	20.2	10.2	14.0	16.4
06/10/2002	21/10/2002	4.2	25.8	23.7	18.2	29.3	6.2	3.5	35.4	2.3	<1.0	22.2	63.1	19.0	56.9
21/10/2002	03/11/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
03/11/2002	17/11/2002	4.6	18.6	10.0	3.0	84.9	18.4	3.9	98.9	1.9	<1.0	8.4	26.9	23.0	73.8
17/11/2002	03/12/2002	4.1	29.8	34.8	16.7	34.6	7.3	3.0	40.2	0.9	<1.0	25.6	79.4	28.0	105.7
03/12/2002	16/12/2002	4.2	104.6	66.9	63.8	409.9	91.7	21.5	462.6	9.4	<1.0	55.3	67.6	93.0	9.4
16/12/2002	29/12/2002	4.0	33.4	27.6	14.2	24.0	5.2	2.5	30.3	0.9	<1.0	30.6	100.0	27.0	59.6
29/12/2002	13/01/2003	4.8	14.6	14.2	8.6	43.1	9.4	3.5	48.5	1.0	<1.0	9.4	17.4	16.0	18.1
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5152			25.2	14.4	12.2	83.6	17.6	5.9	97.3	4.7	-	15.1	24.4	23.7	1704.5

Polloch

2002

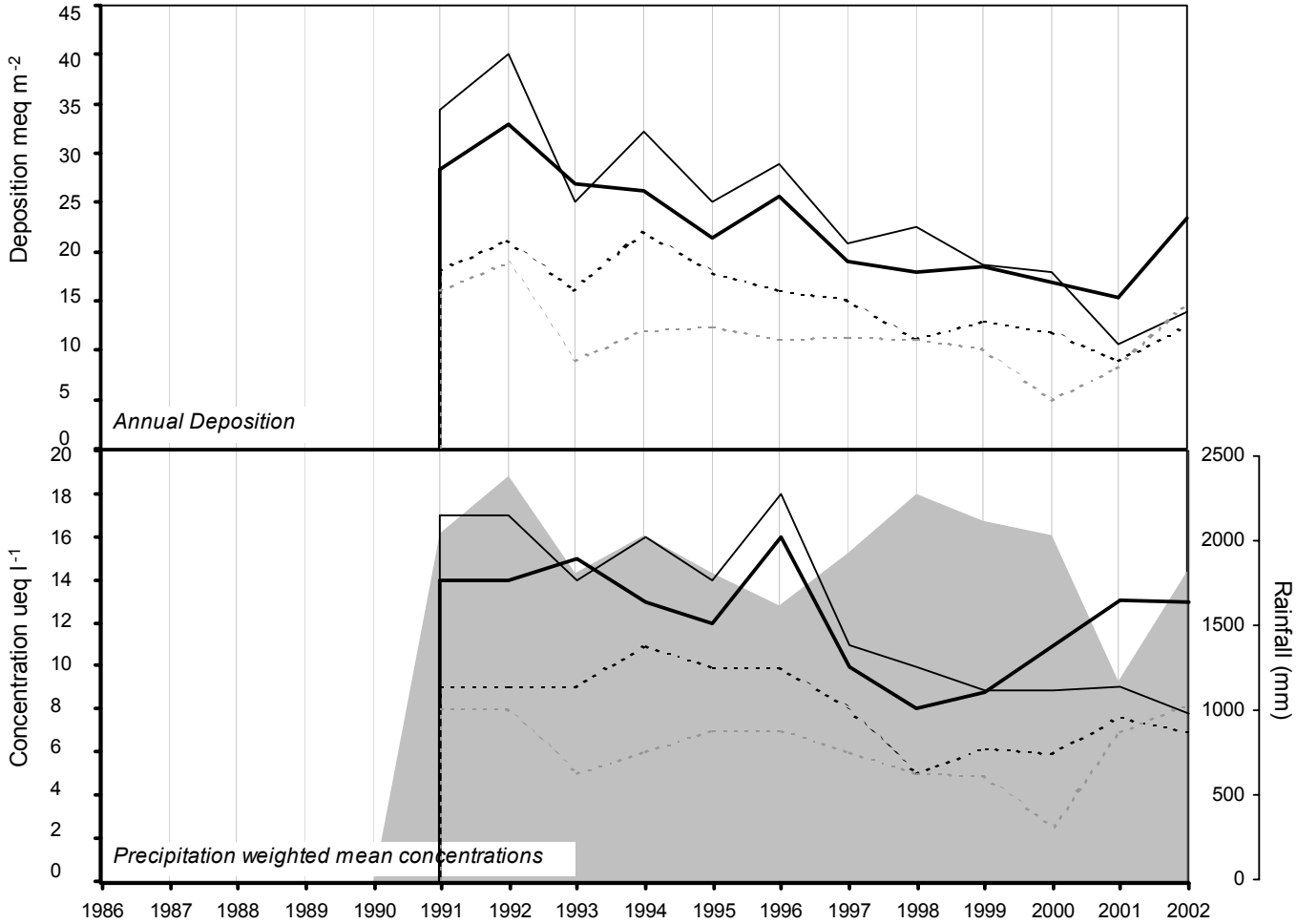
Site Code:	**5151**
Easting:	**1792**
Northing:	**7689**
Latitude:	**56 45 34 N**
Longitude:	**05 36 46 W**
Altitude (m):	**30**
Rainfall (mm):	**2170**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, in forest area

Other measurements:
DT, UKAWMN

Site Operator:
Forest Enterprise



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

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

hydrogen ion
-0.36 ueq/l (-2.24 %/year): 11 years' data
\- No significant trend detected

non-marine sulphate
-0.91 ueq/l (-4.09 %/year): 12 years' data
+++ Strong trend detected

nitrate
-0.34 ueq/l (-2.92 %/year): 12 years' data
\+ Significant trend detected

ammonium
-0.13 ueq/l (-1.70 %/year): 12 years' data
\- No significant trend detected

AEA Technology
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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 S/cm	rainfall (mm)
01/01/2002	15/01/2002	4.8	24.6	14.4	11.5	102.3	19.8	4.5	116.1	2.1	<1.0	12.3	14.8	25.0	33.7
15/01/2002	29/01/2002	5.4	79.0	1.9	<0.7	630.2	131.0	24.1	777.4	13.2	<1.0	3.1	4.5	106.0	200.1
29/01/2002	12/02/2002	5.2	16.7	2.7	<0.7	131.4	27.8	5.7	150.5	2.7	<1.0	0.9	7.1	21.0	197.5
12/02/2002	26/02/2002	5.2	46.5	2.2	<0.7	370.8	80.6	15.4	413.9	7.6	<1.0	1.8	6.0	63.0	117.3
26/02/2002	12/03/2002	5.3	87.0	1.9	<0.7	682.3	152.3	28.9	780.4	14.3	<1.0	4.8	4.7	113.0	160.7
12/03/2002	26/03/2002	6.4	26.0	13.6	46.3	41.4	9.3	4.5	46.7	8.8	16.5	21.0	0.4	19.0	48.0
26/03/2002	09/04/2002	6.0	67.1	67.7	124.6	39.4	8.1	10.9	48.3	1.7	<1.0	62.4	1.0	28.0	18.2
09/04/2002	24/04/2002	6.6	45.6	12.1	121.2	81.3	13.4	7.0	91.7	16.8	42.9	35.9	0.3	36.0	45.0
24/04/2002	07/05/2002	6.3	43.6	4.0	135.0	121.0	21.0	4.6	139.3	22.1	62.8	29.0	0.5	42.0	84.3
07/05/2002	21/05/2002	4.5	28.3	15.1	16.1	37.4	8.9	5.2	46.4	1.4	<1.0	23.8	34.7	19.0	56.0
21/05/2002	04/06/2002	4.8	15.6	12.2	11.4	31.5	6.7	3.6	36.5	1.3	<9.7	11.8	17.4	13.0	84.8
04/06/2002	18/06/2002	6.9	42.6	8.3	260.5	34.5	4.6	1.3	41.6	29.7	68.0	38.4	0.1	45.0	9.4
18/06/2002	02/07/2002	4.8	17.1	4.1	1.0	59.5	12.3	5.4	70.0	1.1	<1.0	9.9	15.1	16.0	115.0
02/07/2002	16/07/2002	6.4	24.2	4.4	49.1	42.8	6.7	2.2	47.6	9.0	<1.0	19.0	0.4	17.0	12.3
16/07/2002	25/07/2002	6.6	14.7	4.2	43.0	14.3	2.1	<1.0	20.4	14.8	30.2	13.0	0.2	16.0	24.0
25/07/2002	13/08/2002	5.8	20.0	10.8	61.3	12.1	1.3	1.6	15.8	7.3	7.5	18.5	1.7	<10.0	90.3
13/08/2002	27/08/2002	4.6	14.4	10.0	<0.7	34.1	7.7	5.2	41.6	<0.5	<1.0	10.3	26.9	14.0	35.5
27/08/2002	10/09/2002	5.0	15.6	5.9	7.6	80.6	17.0	4.9	93.3	1.7	<1.0	5.9	9.1	19.0	84.7
10/09/2002	24/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
24/09/2002	08/10/2002	4.6	26.8	12.3	11.2	75.2	16.5	5.2	86.7	1.4	<1.0	17.7	25.7	22.0	33.1
08/10/2002	22/10/2002	5.3	8.8	13.4	23.2	9.7	1.7	1.8	13.8	2.0	<1.0	7.6	5.6	<10.0	10.0
22/10/2002	04/11/2002	4.6	21.6	5.1	<0.7	155.2	34.1	6.8	178.2	3.0	<1.0	2.9	28.2	29.0	100.7
04/11/2002	19/11/2002	4.9	25.6	3.6	<0.7	200.8	44.3	8.2	227.1	3.8	<1.0	1.5	11.7	37.0	77.5
19/11/2002	03/12/2002	4.5	17.6	18.8	6.0	38.2	8.8	2.1	46.2	0.7	<1.0	13.0	35.5	20.0	100.7
03/12/2002	16/12/2002	4.7	28.5	9.1	5.2	147.0	30.7	10.1	172.5	3.5	<1.0	10.8	20.0	-	5.7
16/12/2002	31/12/2002	4.6	24.7	15.0	10.1	49.6	9.8	4.0	52.9	1.5	<1.0	18.7	24.0	18.0	7.3
31/12/2002	14/01/2003	4.8	10.5	4.5	<0.7	57.3	11.4	3.3	65.9	1.6	<1.0	3.6	15.8	14.0	48.2
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5151			36.0	6.9	8.4	234.2	50.3	10.5	274.9	5.4	-	7.8	13.0	43.5	1800.2

Lochnagar

2002

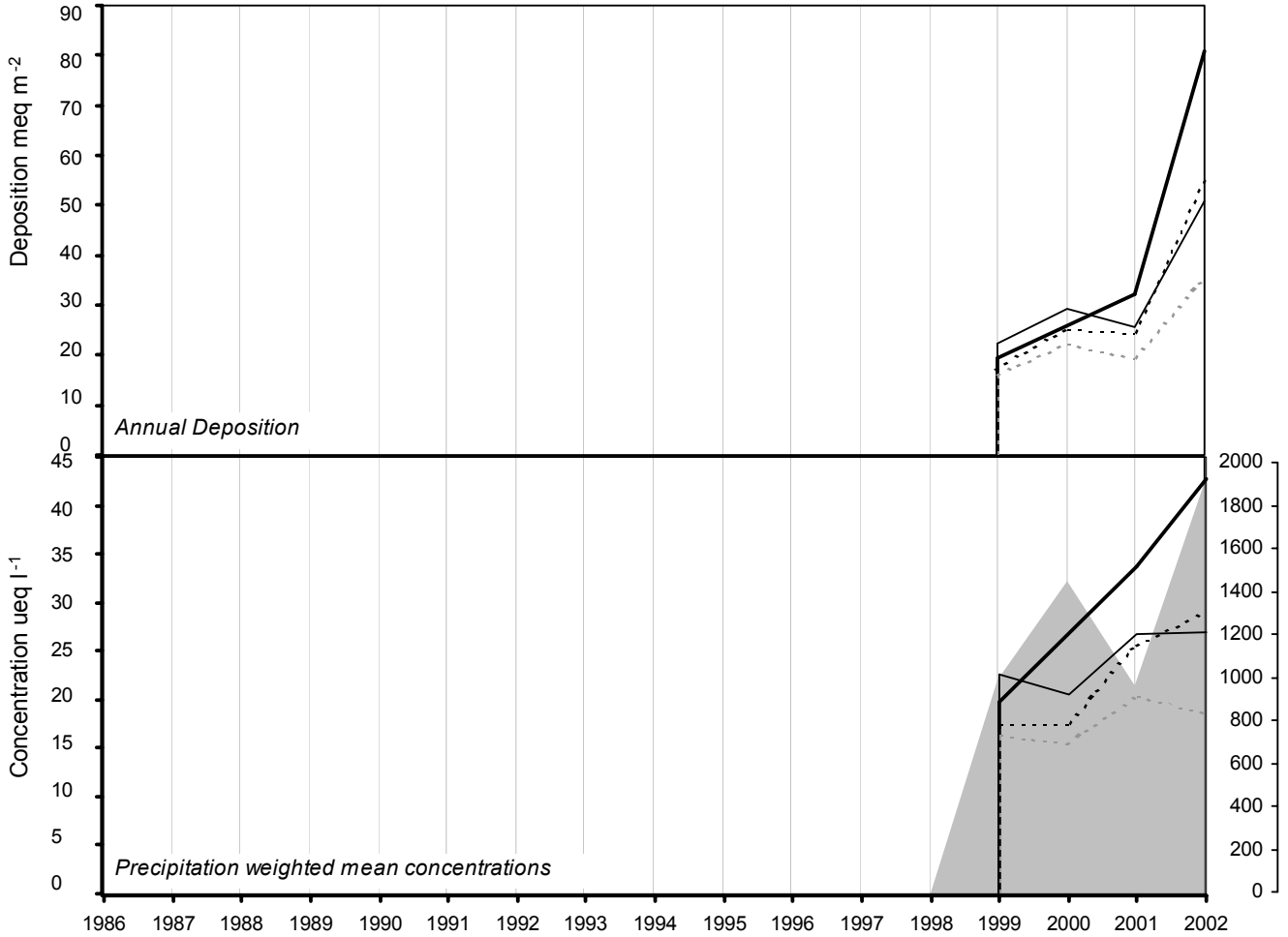
Site Code:	**5157**
Easting:	**3252**
Northing:	**7859**
Latitude:	**56 57 29N**
Longitude:	**03 13 51 W**
Altitude (m):	**785**
Rainfall (mm):	**-**

[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): 3 years' data
n/a Insufficient Data

non-marine sulphate
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

nitrate
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

ammonium
0.00 ueq/l (0.00 %/year): 3 years' data
n/a Insufficient Data

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
08/01/2002	23/01/2002	5.0	12.7	8.5	8.1	35.8	10.1	2.6	43.5	0.8	<1.0	8.4	10.0	12.0	83.4
23/01/2002	30/01/2002	5.1	14.1	3.2	1.1	103.8	22.4	4.7	118.3	2.3	<1.0	1.6	8.7	21.0	93.3
30/01/2002	13/02/2002	4.7	17.2	5.9	1.3	77.1	17.0	4.0	90.9	1.7	<1.0	8.0	18.2	16.0	66.6
13/02/2002	27/02/2002	5.1	24.2	4.6	2.5	168.1	35.2	8.4	186.2	3.4	<1.0	4.0	7.4	31.0	15.3
27/02/2002	13/03/2002	5.2	21.5	3.4	4.1	148.6	31.0	7.4	164.6	3.1	<1.0	3.6	7.1	28.0	26.4
13/03/2002	27/03/2002	4.4	51.7	43.7	40.8	104.2	22.8	12.1	110.3	3.3	<1.0	39.1	38.0	38.0	20.8
27/03/2002	10/04/2002	4.8	81.4	83.6	102.9	47.1	13.3	25.9	52.2	5.5	<1.0	75.8	17.8	35.0	17.9
10/04/2002	24/04/2002	4.8	24.4	14.7	16.9	10.2	3.1	4.5	12.2	<0.5	<1.0	23.2	16.6	14.0	16.2
24/04/2002	08/05/2002	4.9	17.1	10.6	11.6	14.3	5.6	5.0	17.7	<0.5	<1.0	15.3	12.9	10.0	35.8
08/05/2002	22/05/2002	4.4	40.0	28.9	36.2	6.2	2.7	3.4	12.1	0.6	<1.0	39.2	37.2	21.0	125.5
22/05/2002	05/06/2002	4.4	26.0	24.1	18.1	19.7	6.0	4.2	24.6	0.7	<9.7	23.6	37.2	19.0	109.9
05/06/2002	19/06/2002	4.5	31.2	23.7	20.7	13.8	4.0	3.4	19.4	0.8	<1.0	29.5	33.9	20.0	90.8
19/06/2002	03/07/2002	4.7	16.0	6.5	4.8	16.6	4.2	2.2	19.8	<0.5	<1.0	14.0	20.0	11.0	44.7
03/07/2002	17/07/2002	4.5	20.0	10.1	7.1	7.1	2.4	1.4	9.3	0.6	<1.0	19.2	30.9	13.0	49.2
17/07/2002	31/07/2002	4.9	14.0	9.9	7.7	5.3	<0.8	2.4	5.0	2.4	<1.0	13.3	13.8	<10.0	152.8
31/07/2002	14/08/2002	4.7	11.0	10.3	5.9	0.9	1.0	1.5	4.9	<0.5	<1.0	10.9	20.4	<10.0	95.4
14/08/2002	28/08/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
28/08/2002	11/09/2002	4.5	29.0	32.5	28.7	60.2	14.3	7.0	68.0	1.7	<1.0	21.8	30.9	25.0	55.7
11/09/2002	25/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
25/09/2002	09/10/2002	4.2	53.5	63.6	42.1	100.8	22.9	10.2	115.7	2.2	<1.0	41.4	64.6	46.0	32.0
09/10/2002	24/10/2002	4.5	28.6	16.3	11.4	102.9	22.7	5.0	118.7	2.1	<1.0	16.2	30.9	28.0	97.5
24/10/2002	06/11/2002	4.5	19.1	15.0	6.3	31.4	7.5	3.3	36.1	1.2	<1.0	15.3	29.5	17.0	19.1
06/11/2002	19/11/2002	4.5	16.1	13.0	3.0	50.1	11.6	2.8	58.6	1.1	<1.0	10.1	30.9	19.0	87.0
19/11/2002	04/12/2002	4.3	27.1	28.4	17.0	38.0	8.2	2.5	44.2	0.8	<1.0	22.6	46.8	24.0	272.4
04/12/2002	18/12/2002	3.8	152.1	124.5	56.1	429.9	96.7	22.3	464.6	10.5	<1.0	100.4	154.9	133.0	174.9
18/12/2002	01/01/2003	4.1	25.7	20.3	11.6	16.5	3.2	1.6	18.8	<0.5	<1.0	23.7	74.1	20.0	101.6
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5157			36.1	29.0	18.7	75.9	17.3	5.5	85.3	2.1	-	27.0	42.8	30.1	1884.5

Glen Dye

2002

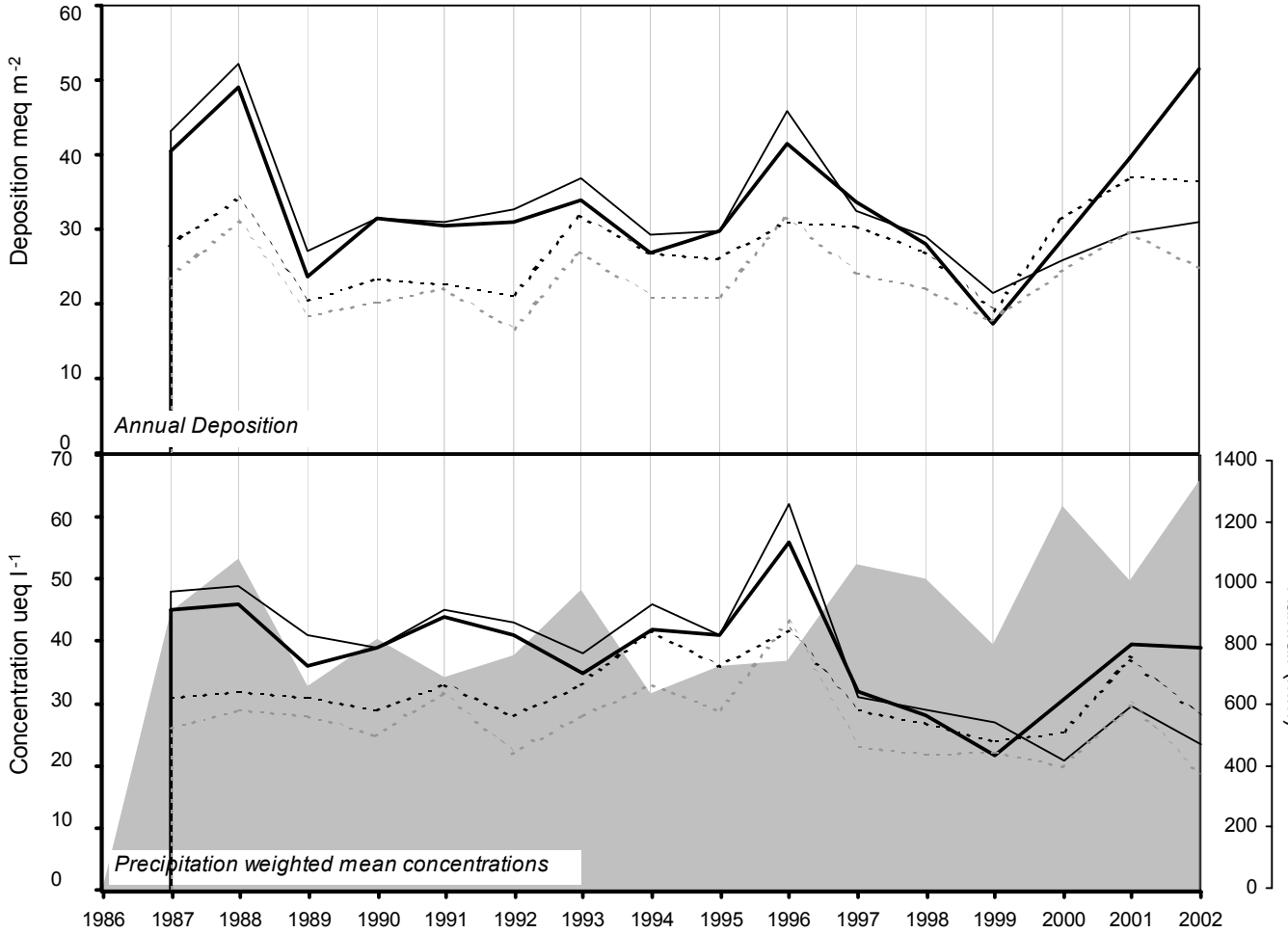
Site Code:	**5011**
Easting:	**3642**
Northing:	**7864**
Latitude:	**56 58 03 N**
Longitude:	**02 35 20 W**
Altitude (m):	**185**
Rainfall (mm):	**1311**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland

Other measurements:
DT, Daily 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
-0.70 ueq/l (-1.57 %/year): 15 years' data
\- No significant trend detected

non-marine sulphate
-1.57 ueq/l (-3.04 %/year): 16 years' data
++ Moderately strong trend detected

nitrate
-0.15 ueq/l (-0.46 %/year): 16 years' data
\- No significant trend detected

ammonium
-0.35 ueq/l (-1.16 %/year): 16 years' data
\- No significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
15/01/2002	29/01/2002	4.8	16.8	10.2	4.2	41.1	9.3	2.6	51.4	1.6	<1.0	11.8	15.8	16.0	76.2
29/01/2002	12/02/2002	4.9	20.1	7.9	4.1	98.5	21.6	5.1	112.4	2.0	<1.0	8.2	14.1	22.0	69.1
12/02/2002	25/02/2002	5.2	23.3	6.5	4.4	82.0	18.6	12.0	89.0	5.0	<1.0	13.5	7.1	19.0	29.3
25/02/2002	12/03/2002	5.2	34.2	3.9	4.8	252.3	54.7	11.7	284.4	5.1	<1.0	3.8	6.3	45.0	24.6
12/03/2002	26/03/2002	4.5	36.4	35.8	35.0	107.9	23.9	6.3	121.0	2.6	<1.0	23.4	29.5	33.0	21.2
26/03/2002	09/04/2002	4.7	141.3	103.3	143.8	106.6	28.7	37.7	113.0	6.1	<1.0	128.5	20.0	54.0	8.1
09/04/2002	23/04/2002	5.5	28.3	26.4	39.9	21.6	5.6	7.7	24.6	1.5	<1.0	25.7	3.4	14.0	13.3
23/04/2002	07/05/2002	4.9	14.5	10.8	13.4	15.1	3.9	2.8	19.3	0.8	<1.0	12.7	12.0	10.0	22.9
07/05/2002	21/05/2002	4.3	65.3	56.6	61.1	27.2	7.9	8.8	34.5	2.2	<1.0	62.0	51.3	32.0	42.7
21/05/2002	04/06/2002	4.4	37.5	36.8	26.5	42.6	10.2	5.4	47.0	1.5	<9.7	32.3	44.7	26.0	68.9
04/06/2002	18/06/2002	4.4	41.6	42.1	30.2	27.1	7.9	8.8	30.7	2.6	<1.0	38.3	43.7	27.0	32.3
18/06/2002	02/07/2002	4.8	13.1	6.2	2.9	22.2	5.7	3.3	25.5	0.8	<1.0	10.4	17.8	11.0	19.7
02/07/2002	16/07/2002	4.6	27.3	19.8	16.1	7.6	2.9	3.9	10.1	0.9	<1.0	26.4	26.9	16.0	31.7
16/07/2002	30/07/2002	4.7	12.5	11.0	5.8	1.1	2.2	2.3	4.6	0.5	<1.0	12.4	20.0	10.0	83.3
30/07/2002	13/08/2002	4.5	25.6	25.2	20.4	4.0	2.0	4.1	7.9	1.0	<1.0	25.1	30.9	17.0	60.1
13/08/2002	27/08/2002	4.9	36.9	38.6	63.5	8.7	3.1	8.2	11.9	1.8	<1.0	35.8	12.9	17.0	25.3
27/08/2002	10/09/2002	4.5	24.3	24.3	22.0	20.1	4.7	4.2	21.4	1.2	<1.0	21.9	28.8	17.0	14.9
10/09/2002	24/09/2002	5.3	70.2	48.6	82.9	43.2	7.9	13.0	36.3	6.0	<1.0	65.0	4.9	25.0	1.3
24/09/2002	08/10/2002	4.1	84.0	126.7	84.0	100.2	25.2	19.9	113.8	10.4	<1.0	72.0	85.1	68.0	7.7
08/10/2002	25/10/2002	4.6	36.0	15.6	15.9	166.2	36.5	7.9	185.0	3.6	<1.0	16.0	26.3	37.0	182.6
25/10/2002	05/11/2002	4.2	23.6	23.2	0.9	67.2	15.7	5.1	88.1	1.5	<1.0	15.5	61.7	26.0	69.5
05/11/2002	20/11/2002	4.4	21.1	17.1	3.5	82.9	18.1	4.1	96.4	1.7	<1.0	11.1	36.3	25.0	93.2
20/11/2002	03/12/2002	4.2	41.4	43.5	22.1	122.6	27.5	6.3	142.1	2.6	<1.0	26.6	58.9	43.0	183.3
03/12/2002	17/12/2002	4.0	84.4	74.7	38.9	275.3	63.1	13.4	304.0	6.5	<1.0	51.3	107.2	81.0	57.5
17/12/2002	04/01/2003	4.2	38.4	31.8	15.4	76.2	16.2	4.0	88.3	1.6	<1.0	29.3	69.2	34.0	81.3
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5011			34.1	27.7	18.8	88.6	20.2	6.3	101.6	2.4	-	23.4	39.0	30.3	1319.8

Allt a' Mharcaidh

2002

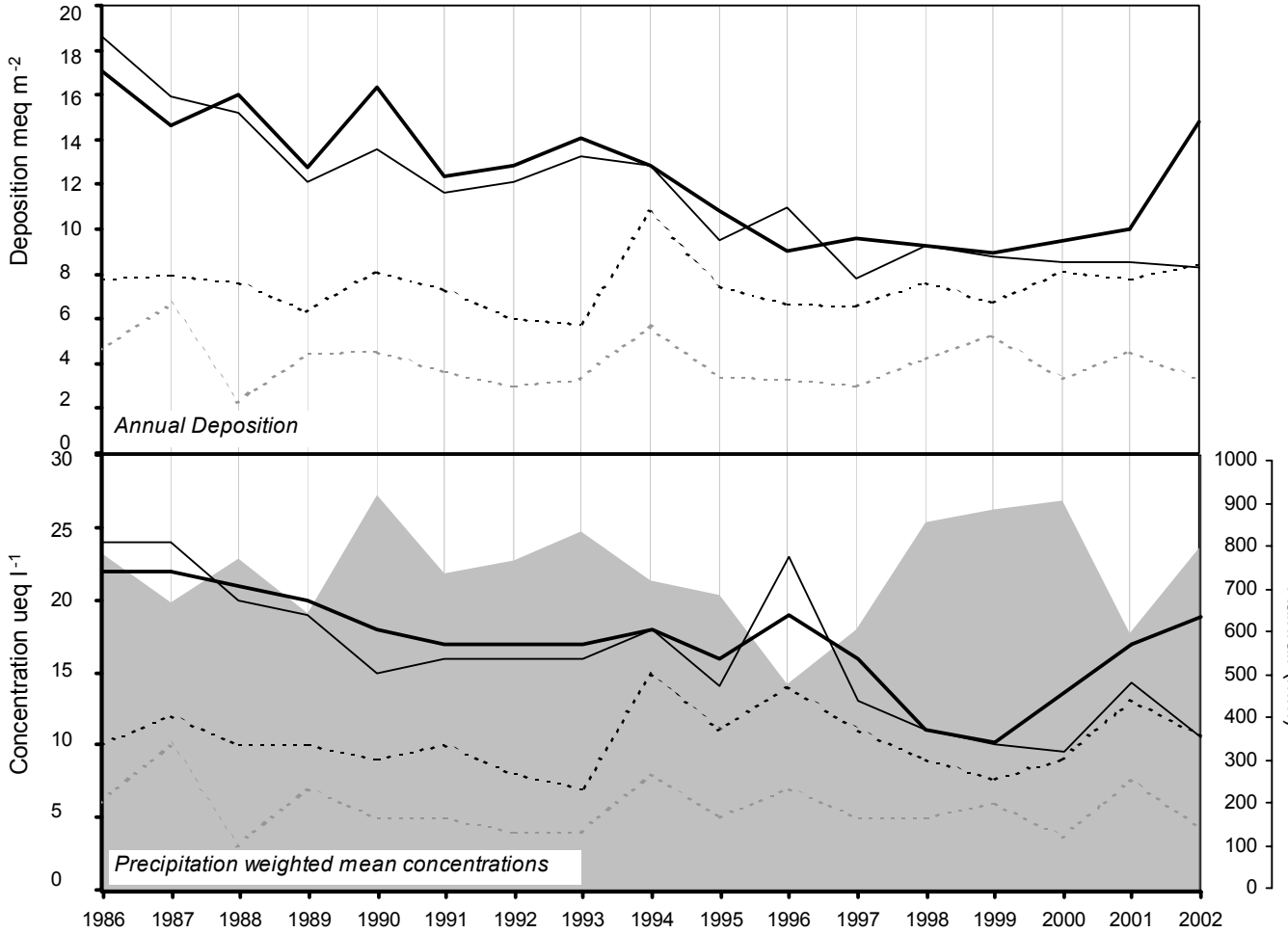
Site Code:	**5103**
Easting:	**2876**
Northing:	**8052**
Latitude:	**57 07 27 N**
Longitude:	**03 51 24 W**
Altitude (m):	**274**
Rainfall (mm):	**1221**

[30 year mean 1940 - 1971]

Site Environment:
Moorland, in forestry SW Cairngorms

Other measurements:
DT, UKAWMN

Site Operator:
Freshwater Fisheries Laboratory



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

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

hydrogen ion
-0.47 ueq/l (-2.24 %/year): 16 years' data
++ Moderately strong trend detected

non-marine sulphate
-0.72 ueq/l (-3.28 %/year): 17 years' data
++ Moderately strong trend detected

nitrate
0.04 ueq/l (0.38 %/year): 17 years' data
- No significant trend detected

ammonium
-0.06 ueq/l (-0.99 %/year): 17 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 S/cm	rainfall (mm)
14/01/2002	28/01/2002	4.9	15.4	5.7	<0.7	86.2	18.6	3.2	100.1	1.6	<1.0	5.0	12.9	18.0	67.3
28/01/2002	11/02/2002	5.2	9.6	<0.7	<0.7	59.5	12.0	2.9	71.1	0.9	<1.0	2.4	5.9	12.0	88.7
11/02/2002	26/02/2002	5.1	15.2	2.3	<0.7	115.7	24.1	5.1	130.1	2.3	<1.0	1.3	8.1	18.0	55.5
26/02/2002	13/03/2002	5.3	38.6	2.1	0.5	326.2	69.8	13.3	359.9	6.4	<1.0	<0.7	5.6	54.0	16.7
13/03/2002	25/03/2002	4.8	24.1	17.0	8.6	92.4	21.0	6.3	110.8	2.0	<1.0	13.0	16.2	23.0	11.8
25/03/2002	08/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2
08/04/2002	22/04/2002	5.1	15.4	13.2	12.6	21.1	5.2	5.9	22.8	<0.5	<1.0	12.9	8.9	10.0	17.7
22/04/2002	06/05/2002	5.1	9.6	5.6	<0.7	29.1	6.1	6.2	34.1	<0.5	<1.0	6.1	7.4	10.0	20.8
06/05/2002	20/05/2002	4.5	48.3	31.1	37.7	7.4	3.9	10.4	13.1	0.6	<1.0	47.4	32.4	22.0	15.9
20/05/2002	03/06/2002	4.6	23.4	20.5	6.9	10.7	3.8	3.3	14.4	1.0	<1.0	22.1	28.2	18.0	42.3
03/06/2002	17/06/2002	4.5	16.5	11.9	2.3	7.2	2.8	3.2	10.0	<0.5	<1.0	15.6	32.4	13.0	33.4
17/06/2002	01/07/2002	4.8	11.6	5.1	<0.7	27.6	6.6	3.6	32.6	0.5	<1.0	8.3	14.5	10.0	22.0
01/07/2002	15/07/2002	4.7	20.1	11.5	4.5	13.1	3.6	2.9	15.5	0.6	<1.0	18.5	18.6	14.0	22.4
15/07/2002	29/07/2002	4.7	10.6	7.9	1.9	2.8	1.5	1.1	5.4	0.5	<1.0	10.3	19.5	<10.0	56.5
29/07/2002	12/08/2002	4.6	19.5	18.5	14.0	1.2	1.4	2.7	5.5	0.5	<1.0	19.3	26.3	12.0	31.0
12/08/2002	26/08/2002	4.7	15.0	12.4	11.6	2.7	1.4	3.1	4.7	0.6	<1.0	14.6	20.9	<10.0	34.3
26/08/2002	09/09/2002	4.5	13.0	14.7	<0.7	17.9	4.5	4.1	23.4	0.6	<1.0	10.9	31.6	14.0	35.0
09/09/2002	23/09/2002	4.6	74.1	65.9	74.1	46.6	13.0	14.6	38.5	2.1	<1.0	68.5	28.2	32.0	3.1
23/09/2002	07/10/2002	4.9	21.4	19.9	12.6	33.5	6.7	6.3	28.5	0.7	<1.0	17.4	13.2	13.0	4.6
07/10/2002	21/10/2002	4.4	19.7	16.3	3.4	68.0	14.7	4.1	76.4	1.2	<1.0	11.5	37.2	21.0	24.7
21/10/2002	04/11/2002	4.8	6.2	6.4	<0.7	7.9	1.9	1.3	9.7	<0.5	<1.0	5.2	15.1	<10.0	81.1
04/11/2002	18/11/2002	4.7	11.4	8.0	<0.7	56.0	12.1	2.9	64.8	1.0	<1.0	4.6	19.1	16.0	32.3
18/11/2002	02/12/2002	4.5	21.2	29.0	7.1	15.0	3.7	1.9	19.6	0.7	<1.0	19.4	34.7	22.0	42.0
02/12/2002	16/12/2002	4.5	23.2	24.1	6.6	69.6	16.5	5.6	74.0	1.7	<1.0	14.8	30.9	25.0	5.7
16/12/2002	30/12/2002	4.5	20.0	25.0	7.2	29.0	6.5	5.6	26.6	1.3	<1.0	16.5	33.1	29.0	10.4
30/12/2002	13/01/2003	4.8	21.2	11.9	4.7	108.6	22.8	8.8	120.9	6.1	<1.0	8.1	16.6	26.0	9.9
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5103			15.8	10.8	4.4	43.9	9.8	3.6	51.1	1.1	-	10.6	18.8	15.7	786.3

Strathvaich Dam

2002

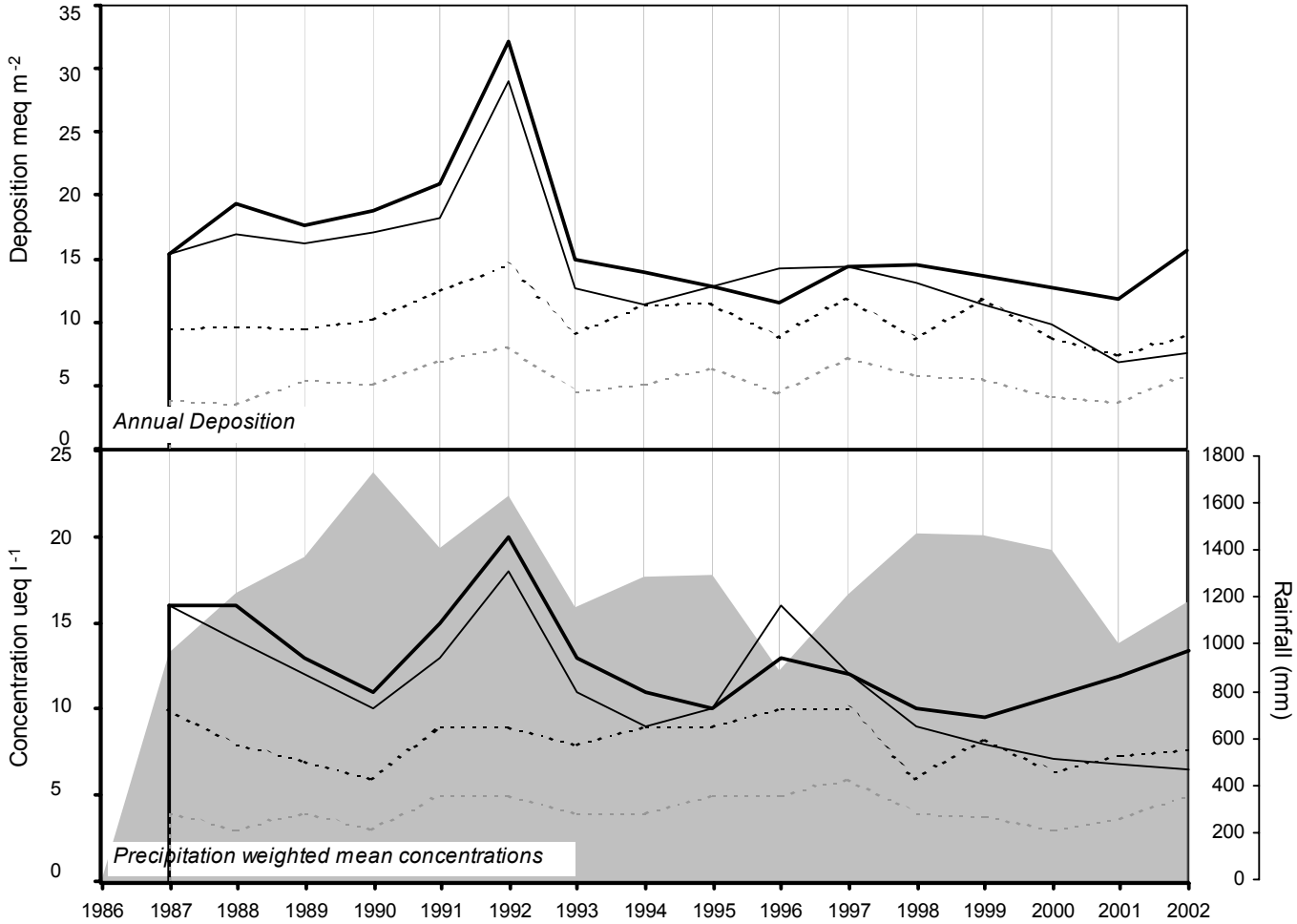
Site Code:	**5010**
Easting:	**2347**
Northing:	**8750**
Latitude:	**57 44 04 N**
Longitude:	**04 46 36 W**
Altitude (m):	**270**
Rainfall (mm):	**1576**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, deer

Other measurements:
DT, Daily SO2, Daily SO4, HNO3 Denuder, NOx, SO2, ozone, 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
-0.32 ueq/l (-2.07 %/year): 15 years' data
\- No significant trend detected

non-marine sulphate
-0.52 ueq/l (-3.36 %/year): 16 years' data
++ Moderately strong trend detected

nitrate
-0.06 ueq/l (-0.66 %/year): 16 years' data
\- No significant trend detected

ammonium
0.03 ueq/l (0.85 %/year): 16 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 S/cm	rainfall (mm)
01/01/2002	14/01/2002	5.0	17.0	20.0	6.4	70.7	11.6	5.0	71.0	1.5	<1.0	8.5	10.7	17.0	8.6
14/01/2002	29/01/2002	5.2	15.9	3.7	<0.7	101.7	19.2	3.0	115.7	2.1	<1.0	3.6	5.8	20.0	155.0
29/01/2002	12/02/2002	5.4	14.5	2.1	<0.7	124.1	25.8	5.4	140.3	2.3	<1.0	<0.4	4.5	19.0	128.8
12/02/2002	27/02/2002	5.2	17.1	1.8	<0.7	132.6	28.5	6.0	148.7	2.6	<1.0	1.1	6.0	25.0	116.9
27/02/2002	13/03/2002	5.2	31.4	2.1	0.6	253.4	54.1	10.5	285.6	4.9	<1.0	0.8	5.9	44.0	125.4
13/03/2002	25/03/2002	4.8	17.9	17.9	7.3	60.3	13.7	7.8	67.3	1.2	<1.0	10.7	16.2	20.0	11.9
25/03/2002	09/04/2002	4.7	124.8	154.1	179.5	198.6	45.7	45.5	222.8	5.5	<1.0	100.9	20.0	-	3.2
09/04/2002	22/04/2002	4.4	88.0	86.6	100.4	51.0	13.5	17.4	52.7	1.6	<1.0	81.8	37.2	43.0	8.7
22/04/2002	06/05/2002	5.1	12.6	3.1	<0.7	83.2	16.9	3.9	94.7	1.5	<1.0	2.6	7.6	17.0	91.3
06/05/2002	19/05/2002	4.5	39.7	22.0	27.5	45.1	11.1	7.7	55.6	1.2	<1.0	34.3	31.6	23.0	22.3
19/05/2002	03/06/2002	4.3	34.9	32.5	16.7	35.7	9.3	6.9	41.1	1.3	<9.7	30.6	49.0	26.0	23.7
03/06/2002	16/06/2002	4.6	19.8	16.1	11.7	10.9	3.5	4.5	13.4	<0.5	<1.0	18.4	23.4	14.0	20.7
16/06/2002	01/07/2002	4.9	15.1	3.8	0.8	98.6	20.5	4.9	88.5	1.6	<1.0	3.2	12.0	21.0	49.8
01/07/2002	14/07/2002	4.6	16.6	7.1	2.4	26.6	6.6	4.7	28.0	<0.5	<1.0	13.4	23.4	14.0	18.5
14/07/2002	31/07/2002	4.7	10.3	4.7	<0.7	2.1	1.3	1.3	6.0	<0.5	<1.0	10.0	21.9	<10.0	62.0
31/07/2002	11/08/2002	4.8	23.8	26.8	37.8	3.0	1.8	3.6	4.6	0.9	<1.0	23.4	17.0	12.0	19.5
11/08/2002	25/08/2002	4.7	13.5	11.9	4.8	27.1	6.5	4.9	32.1	0.6	<1.0	10.2	20.0	13.0	16.4
25/08/2002	08/09/2002	4.9	18.2	6.4	3.2	107.7	22.7	6.2	122.7	2.1	<1.0	5.2	11.5	23.0	29.9
08/09/2002	25/09/2002	6.7	27.5	29.1	118.6	43.1	3.6	1.8	41.3	17.8	<1.0	22.3	0.2	26.0	11.1
25/09/2002	06/10/2002	4.9	21.5	11.8	9.5	70.4	15.4	6.0	80.8	1.6	<1.0	13.0	12.9	20.0	15.3
06/10/2002	20/10/2002	4.6	15.0	12.0	2.6	58.9	12.5	3.6	71.4	1.3	<1.0	8.0	22.9	18.0	31.7
20/10/2002	04/11/2002	4.7	10.0	4.6	<0.7	58.3	12.3	2.9	68.6	1.1	<1.0	3.0	21.4	14.0	100.7
04/11/2002	19/11/2002	4.6	19.4	8.3	<0.7	134.9	29.4	5.8	153.7	2.6	<1.0	3.2	22.9	28.0	80.9
19/11/2002	01/12/2002	4.4	22.4	32.5	7.6	44.7	9.8	4.9	47.4	1.4	<1.0	17.0	39.8	23.0	7.2
01/12/2002	14/12/2002	4.5	37.8	30.1	10.5	201.7	44.4	14.0	226.0	4.7	<1.0	13.5	29.5	45.0	3.2
14/12/2002	31/12/2002	4.4	26.0	38.4	9.7	52.0	11.1	6.0	49.8	1.1	<1.0	19.8	41.7	26.0	4.5
31/12/2002	12/01/2003	4.5	42.0	25.6	9.2	218.5	49.1	14.1	241.4	4.7	<1.0	15.7	30.9	48.0	5.6
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5010			19.0	7.7	5.2	104.9	22.1	5.4	118.0	2.3	-	6.5	13.4	22.5	1172.8

Achanarras

2002

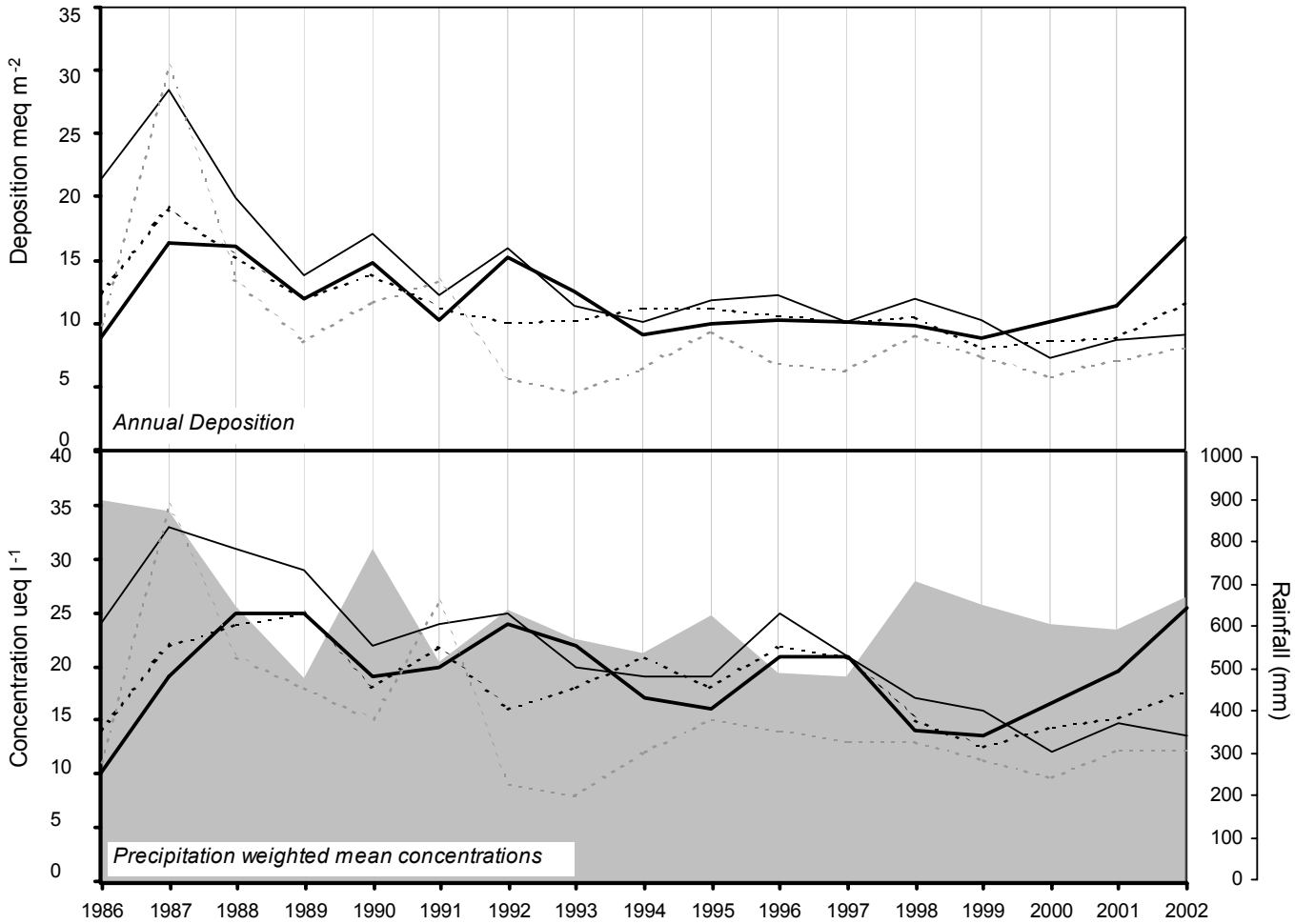
Site Code:	**5140**
Easting:	**3151**
Northing:	**9550**
Latitude:	**58 28 31 N**
Longitude:	**03 27 21 W**
Altitude (m):	**98**
Rainfall (mm):	**973**

[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
0.00 ueq/l (0.03 %/year): 16 years' data
\- No significant trend detected

non-marine sulphate
-1.02 ueq/l (-3.43 %/year): 17 years' data
+++ Strong trend detected

nitrate
-0.35 ueq/l (-1.63 %/year): 17 years' data
\- No significant trend detected

ammonium
-0.69 ueq/l (-3.35 %/year): 17 years' data
\+ Significant trend detected

AEA Technology
National Environmental Technology Centre

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 S/cm	rainfall (mm)
02/01/2002	16/01/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
16/01/2002	30/01/2002	5.1	26.2	1.6	<0.7	210.3	37.1	6.0	250.8	3.8	<1.0	0.9	8.1	39.0	48.3
30/01/2002	13/02/2002	7.8	120.3	3.0	1608.2	143.1	10.4	2.8	122.9	180.8	221.3	103.0	0.0	170.0	48.7
13/02/2002	27/02/2002	7.3	38.8	4.2	503.8	260.1	58.8	39.0	272.1	14.3	13.1	7.4	0.0	111.0	23.3
27/02/2002	13/03/2002	6.4	54.9	1.8	21.2	432.3	92.2	29.4	484.5	7.4	<1.0	2.9	0.4	77.0	34.1
13/03/2002	27/03/2002	4.4	77.3	51.3	51.3	213.8	50.2	20.7	249.5	5.6	<1.0	51.6	36.3	59.0	11.3
27/03/2002	10/04/2002	4.7	179.6	224.8	133.2	753.8	176.0	117.0	768.4	25.1	<1.0	88.8	20.0	-	1.5
10/04/2002	27/04/2002	5.6	55.6	19.7	13.6	389.6	86.0	27.3	442.2	4.1	<1.0	8.7	2.8	69.0	7.9
27/04/2002	08/05/2002	5.0	13.5	5.7	3.6	54.9	12.4	5.7	63.0	1.0	<1.0	6.9	10.7	15.0	32.8
08/05/2002	22/05/2002	4.5	98.1	64.3	57.3	151.6	38.4	28.1	148.7	5.0	<1.0	79.8	28.8	50.0	7.6
22/05/2002	05/06/2002	4.8	32.1	27.4	16.7	77.4	17.9	8.6	79.3	2.1	<1.0	22.7	17.0	25.0	18.6
05/06/2002	19/06/2002	5.3	28.0	37.8	19.0	91.9	22.1	13.3	83.1	3.1	<1.0	16.9	5.0	21.0	10.6
19/06/2002	08/07/2002	5.0	20.3	4.5	2.9	108.0	23.7	8.0	119.2	2.7	<1.0	7.3	11.0	23.0	71.2
08/07/2002	17/07/2002	7.6	123.5	25.7	569.0	61.4	39.0	5.9	70.1	66.1	323.6	116.1	0.0	100.0	7.8
17/07/2002	31/07/2002	4.6	17.0	15.2	9.8	14.3	4.0	2.0	19.7	1.1	<1.0	15.3	28.2	13.0	45.2
31/07/2002	14/08/2002	4.5	69.7	52.2	41.2	221.6	50.6	19.0	243.5	7.3	<1.0	43.0	32.4	58.0	4.2
14/08/2002	28/08/2002	4.9	54.5	48.0	74.7	57.0	14.3	16.5	57.9	3.5	<1.0	47.6	13.8	27.0	7.6
28/08/2002	11/09/2002	4.9	10.9	7.1	4.5	57.0	12.0	4.2	65.8	1.3	<1.0	4.1	12.3	15.0	28.1
11/09/2002	25/09/2002	5.5	36.7	18.1	32.7	147.9	29.9	10.7	166.8	6.3	<1.0	18.9	3.5	32.0	10.6
25/09/2002	09/10/2002	4.9	43.1	33.8	27.7	191.6	41.3	18.7	217.5	5.5	<1.0	20.0	12.6	39.0	3.6
09/10/2002	23/10/2002	4.4	52.9	16.3	11.1	342.8	76.4	14.0	393.4	7.0	<1.0	11.6	38.9	61.0	77.9
23/10/2002	06/11/2002	4.4	47.7	11.5	1.7	309.5	69.3	13.5	352.7	5.9	<1.0	10.4	37.2	61.0	52.7
06/11/2002	20/11/2002	4.6	30.7	9.6	2.4	215.5	46.2	9.2	246.7	4.1	<1.0	4.8	25.7	41.0	58.7
20/11/2002	04/12/2002	4.1	70.1	52.0	19.2	414.1	93.2	19.1	458.2	8.4	<1.0	20.2	72.4	86.0	32.7
04/12/2002	18/12/2002	4.1	102.0	72.2	41.9	344.6	78.6	16.9	394.4	8.0	<1.0	60.5	81.3	93.0	17.1
18/12/2002	01/01/2003	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5140			39.6	17.7	12.2	215.6	47.1	12.1	244.4	4.5	-	13.6	25.4	44.1	663.0

Appendix 1.2: Bulk Precipitation Data, 2002 - 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 S/cm	rainfall (mm)
07/01/2002	14/01/2002	5.2	43.0	25.5	32.6	79.9	16.8	13.2	98.0	2.8	<1.0	33.3	7.1	25.0	5.8
14/01/2002	21/01/2002	5.3	29.2	1.9	1.9	202.2	42.9	9.0	235.7	4.0	<1.0	4.9	5.2	35.0	40.2
21/01/2002	28/01/2002	5.3	26.9	2.4	3.2	203.4	43.4	10.8	237.2	4.3	<1.0	2.4	5.4	37.0	53.9
28/01/2002	04/02/2002	5.4	11.0	1.9	1.2	77.7	11.4	2.3	89.8	1.8	<1.0	1.6	4.0	16.0	65.3
04/02/2002	11/02/2002	5.4	14.9	1.8	<0.7	113.9	23.1	5.3	129.1	2.2	<1.0	1.2	4.5	21.0	80.9
11/02/2002	18/02/2002	5.7	37.1	3.5	5.9	268.1	54.9	14.4	294.2	6.4	<1.0	4.8	1.9	38.0	10.4
18/02/2002	25/02/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
25/02/2002	04/03/2002	5.5	32.9	1.9	2.9	265.6	56.6	12.2	296.7	5.8	<1.0	0.9	3.3	45.0	45.4
04/03/2002	11/03/2002	5.4	28.6	2.3	3.1	208.6	44.4	10.3	237.1	4.8	<1.0	3.5	4.4	37.0	52.6
11/03/2002	18/03/2002	4.7	67.0	63.7	97.6	92.6	21.9	13.6	104.9	2.5	<1.0	55.8	18.6	41.0	20.7
18/03/2002	25/03/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9
25/03/2002	01/04/2002	4.7	29.5	26.2	45.8	73.4	15.2	54.0	82.3	5.2	<1.0	20.7	20.0	-	1.9
01/04/2002	08/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6
08/04/2002	15/04/2002	6.5	17.0	18.5	19.5	26.2	6.8	34.2	33.0	2.1	<1.0	13.8	0.4	14.0	7.6
15/04/2002	22/04/2002	5.9	11.7	4.3	9.7	38.9	6.6	8.9	51.7	2.4	<1.0	7.0	1.3	12.0	29.8
22/04/2002	29/04/2002	5.7	32.1	2.6	4.3	238.9	50.5	16.2	263.8	5.3	<1.0	3.3	2.1	41.0	37.3
29/04/2002	06/05/2002	5.5	16.6	2.6	3.3	117.0	24.0	6.5	131.5	2.4	<1.0	2.5	3.0	22.0	38.4
06/05/2002	13/05/2002	6.4	58.8	58.0	80.1	33.6	11.7	57.3	39.1	4.7	<1.0	54.7	0.4	26.0	7.0
13/05/2002	20/05/2002	4.6	33.6	34.2	40.4	13.6	4.3	8.2	19.4	1.2	<1.0	32.0	24.0	17.0	61.3
20/05/2002	27/05/2002	5.3	6.9	2.8	3.1	28.5	7.8	4.1	34.7	0.7	<1.0	3.5	5.0	<10.0	60.0
27/05/2002	03/06/2002	5.1	16.8	17.0	24.9	42.9	8.9	5.1	48.5	1.5	<1.0	11.6	8.3	14.0	55.6
03/06/2002	10/06/2002	4.5	30.3	31.2	33.1	32.5	8.0	7.8	39.3	1.3	<1.0	26.3	29.5	21.0	31.5
10/06/2002	17/06/2002	5.2	13.3	5.2	3.8	41.9	9.0	4.0	49.4	1.1	<1.0	8.2	5.9	11.0	60.7
17/06/2002	24/06/2002	5.2	12.3	3.8	2.1	22.6	5.4	5.8	28.3	0.8	<1.0	9.6	6.3	<10.0	31.1
24/06/2002	01/07/2002	6.1	13.2	3.6	17.5	46.5	7.3	3.6	54.4	1.6	<1.0	7.6	0.7	12.0	23.1
01/07/2002	08/07/2002	4.8	17.4	6.2	7.7	51.0	10.9	6.3	58.6	1.5	<1.0	11.2	15.5	16.0	33.3
08/07/2002	15/07/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	3.1
15/07/2002	22/07/2002	5.7	9.6	8.2	19.4	10.4	2.7	6.4	13.3	2.2	<1.0	8.3	2.0	<10.0	16.8
22/07/2002	29/07/2002	5.1	12.9	6.8	8.7	8.6	2.6	4.5	11.9	1.3	<1.0	11.9	7.8	<10.0	6.9
29/07/2002	05/08/2002	5.5	34.1	34.0	51.3	18.3	6.3	13.9	19.9	4.1	<1.0	31.9	3.0	14.0	3.3
05/08/2002	12/08/2002	5.5	13.9	4.8	6.3	34.1	6.9	7.4	37.2	1.8	<1.0	9.8	3.3	10.0	12.2
12/08/2002	19/08/2002	5.1	7.9	3.8	0.1	8.2	2.7	6.2	11.2	0.9	<1.0	6.9	7.2	<10.0	17.0
19/08/2002	26/08/2002	5.2	10.0	2.9	<0.7	15.7	4.2	14.0	19.8	2.3	<1.0	8.1	6.0	<10.0	4.3
26/08/2002	02/09/2002	5.3	5.7	2.7	<0.4	7.4	2.0	3.8	11.3	0.6	<1.0	4.8	5.4	<10.0	13.1
02/09/2002	09/09/2002	5.4	16.1	3.1	3.8	112.4	23.2	8.0	127.2	2.3	<1.0	2.6	3.9	22.0	28.4
09/09/2002	16/09/2002	6.1	7.1	4.7	24.5	10.0	<0.8	1.6	13.9	3.8	<1.0	5.9	0.7	<10.0	4.5
16/09/2002	23/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
23/09/2002	30/09/2002	5.9	34.8	35.1	36.5	92.1	14.7	23.9	89.9	6.9	<1.0	23.7	1.3	23.0	4.4
30/09/2002	07/10/2002	5.3	10.8	5.8	12.4	27.4	4.7	3.0	33.8	<0.5	<1.0	7.5	5.4	<10.0	22.9
07/10/2002	14/10/2002	4.7	18.4	26.3	30.5	18.5	3.8	4.3	22.4	0.7	<1.0	16.2	20.0	13.0	40.4
14/10/2002	21/10/2002	4.6	12.9	11.1	3.7	7.2	2.1	2.0	11.1	<0.5	<1.0	12.1	28.2	11.0	56.0
21/10/2002	28/10/2002	4.6	13.7	4.0	1.2	93.5	20.0	4.4	110.8	1.9	<1.0	2.5	23.4	19.0	106.7
28/10/2002	04/11/2002	5.0	20.1	4.1	7.4	141.6	29.5	7.0	160.0	3.4	<1.0	3.0	9.3	25.0	38.6
04/11/2002	11/11/2002	5.0	21.0	2.8	<0.7	165.2	35.2	7.3	189.7	3.4	<1.0	1.1	9.3	29.0	65.0
11/11/2002	18/11/2002	4.6	20.5	19.8	15.1	62.5	14.0	7.2	75.3	3.2	<1.0	12.9	23.4	22.0	17.4
18/11/2002	02/12/2002	5.2	35.5	9.8	13.3	229.0	49.7	11.6	258.9	4.8	<1.0	8.0	6.5	42.0	46.7
02/12/2002	09/12/2002	5.2	56.9	3.3	<0.7	432.0	96.9	19.1	496.1	9.4	<1.0	4.8	6.6	73.0	16.8
09/12/2002	16/12/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
16/12/2002	23/12/2002	5.1	16.5	21.6	37.6	7.3	1.5	2.2	15.8	<0.5	<1.0	15.6	8.1	<10.0	25.3
23/12/2002	30/12/2002	5.2	12.1	12.6	20.5	16.4	2.8	1.7	18.6	0.6	<1.0	10.1	5.9	<10.0	18.0
30/12/2002	06/01/2003	4.9	9.8	9.0	9.7	21.7	4.1	2.3	25.1	0.8	<1.0	7.2	12.6	10.0	30.2
Precipitation-weighted annual mean for site (samples containing phosphate are excluded)															Total rainfall
5161			20.3	9.1	11.1	97.7	20.7	7.3	112.5	2.4	-	8.5	10.0	21.8	1455.1

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 S/cm	rainfall (mm)
16/01/2002	23/01/2002	5.1	19.8	8.3	12.0	87.0	18.1	3.5	103.0	1.9	<1.0	9.3	7.9	20.0	81.3
23/01/2002	30/01/2002	5.1	21.8	7.5	8.3	118.7	23.9	4.9	133.4	2.4	<1.0	7.5	8.7	25.0	81.9
30/01/2002	06/02/2002	5.1	16.6	4.2	5.1	104.6	22.1	4.7	117.3	2.1	<1.0	4.0	7.9	21.0	96.9
06/02/2002	13/02/2002	5.3	14.8	4.5	10.0	78.8	15.3	3.5	86.5	1.7	<1.0	5.3	5.2	15.0	74.8
13/02/2002	20/02/2002	5.4	15.2	3.2	5.8	95.9	18.4	4.4	108.6	2.0	<1.0	3.6	4.1	16.0	30.4
20/02/2002	27/02/2002	5.3	11.8	3.8	6.2	70.4	12.9	2.9	76.3	1.4	<1.0	3.3	5.1	15.0	69.0
27/02/2002	06/03/2002	5.1	19.0	8.4	15.3	64.8	12.9	4.3	69.6	1.6	<1.0	11.2	8.1	17.0	23.6
06/03/2002	13/03/2002	5.4	44.3	6.2	12.9	302.9	64.5	14.0	333.2	6.2	<1.0	7.8	3.9	53.0	25.0
13/03/2002	20/03/2002	4.5	44.7	38.4	39.4	115.9	25.8	7.3	129.8	2.6	<1.0	30.7	35.5	39.0	18.4
20/03/2002	27/03/2002	5.0	28.9	27.2	35.7	69.4	14.6	7.4	72.3	1.8	<1.0	20.5	11.0	22.0	18.2
27/03/2002	03/04/2002	5.0	25.7	31.3	42.7	32.7	8.0	6.9	40.4	1.3	55.2	21.7	9.1	15.0	21.2
03/04/2002	10/04/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
10/04/2002	17/04/2002	4.7	74.1	70.3	81.6	84.1	22.7	36.7	81.6	3.7	<1.0	63.9	20.4	39.0	2.0
17/04/2002	24/04/2002	6.1	45.4	27.2	81.1	18.4	4.6	3.3	21.8	8.7	14.2	43.2	0.8	18.0	29.1
24/04/2002	01/05/2002	5.6	18.2	8.5	19.3	70.0	10.1	5.4	73.1	10.4	7.0	9.8	2.4	19.0	43.1
01/05/2002	08/05/2002	4.8	52.6	32.1	50.5	10.6	5.6	15.1	14.7	1.1	<9.7	51.3	15.1	19.0	7.4
08/05/2002	15/05/2002	5.7	57.7	30.5	88.2	53.7	7.2	6.4	49.9	9.0	16.3	51.2	1.9	24.0	19.7
15/05/2002	22/05/2002	4.6	25.9	22.2	22.1	21.4	6.0	6.1	26.4	1.1	<9.7	23.3	25.1	16.0	47.8
22/05/2002	29/05/2002	5.2	27.0	11.9	41.6	94.9	16.9	8.7	113.0	9.1	16.6	15.6	6.8	24.0	45.5
29/05/2002	05/06/2002	6.1	47.2	22.9	84.1	36.3	5.0	4.3	44.2	16.4	17.5	42.8	0.8	22.0	36.0
05/06/2002	12/06/2002	6.5	53.3	13.5	387.7	41.0	15.1	4.4	49.8	44.7	119.0	48.4	0.3	66.0	57.2
12/06/2002	19/06/2002	7.5	125.4	9.1	1196.3	57.1	14.6	3.3	71.8	91.0	105.8	118.5	0.0	170.0	51.5
19/06/2002	26/06/2002	6.5	87.4	18.0	205.0	43.5	11.0	3.2	58.8	48.1	135.9	82.2	0.4	46.0	15.3
26/06/2002	03/07/2002	6.3	13.4	4.2	93.3	11.8	3.8	1.1	14.8	20.3	45.3	12.0	0.5	18.0	35.4
03/07/2002	10/07/2002	6.2	21.4	21.9	63.3	17.9	3.2	2.6	22.4	2.6	<1.0	19.2	0.6	14.0	23.3
10/07/2002	17/07/2002	6.8	38.7	9.8	107.8	15.9	2.6	<1.2	24.0	34.1	98.6	36.7	0.1	29.0	9.6
17/07/2002	24/07/2002	6.3	25.2	33.3	124.8	6.7	1.4	<1.0	14.3	21.1	20.5	24.4	0.5	29.0	20.2
24/07/2002	31/07/2002	4.9	18.3	19.9	27.3	4.4	1.9	2.6	7.9	1.0	<1.0	17.8	12.0	11.0	29.3
31/07/2002	07/08/2002	4.5	20.5	21.8	24.1	<0.9	1.4	3.5	1.9	1.1	<1.0	20.6	34.7	14.0	39.8
07/08/2002	14/08/2002	5.1	17.9	10.9	21.0	15.5	3.2	3.2	19.6	0.9	<1.0	16.1	8.9	10.0	22.4
14/08/2002	21/08/2002	4.6	19.6	18.1	16.7	11.7	2.9	4.4	15.2	<0.5	<1.0	18.2	23.4	13.0	24.4
21/08/2002	28/08/2002	4.8	18.4	24.6	20.9	2.8	2.4	9.2	5.1	0.8	<1.0	18.1	17.0	13.0	27.6
28/08/2002	04/09/2002	5.0	9.9	7.8	11.7	6.4	1.7	1.8	9.8	<0.5	<1.0	9.1	10.7	<10.0	31.5
04/09/2002	11/09/2002	4.8	22.3	14.9	19.4	28.4	7.1	3.3	35.5	0.8	<1.0	18.9	17.4	16.0	55.0
11/09/2002	18/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
18/09/2002	25/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/09/2002	02/10/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
02/10/2002	09/10/2002	4.5	44.1	51.7	53.2	38.0	9.5	12.0	41.4	1.3	<1.0	39.5	30.2	27.0	10.9
09/10/2002	16/10/2002	4.2	35.1	40.3	24.6	41.4	9.4	6.3	50.5	1.1	<1.0	30.1	64.6	28.0	31.5
16/10/2002	23/10/2002	4.9	7.6	4.7	1.4	3.1	1.1	1.2	6.5	0.9	<1.0	7.2	13.2	<10.0	83.0
23/10/2002	30/10/2002	4.9	11.2	6.3	3.7	46.9	9.2	3.0	51.1	1.1	<1.0	5.5	13.2	12.0	78.9
30/10/2002	06/11/2002	4.4	17.3	20.7	11.0	23.7	5.6	2.2	33.9	0.8	<1.0	14.4	37.2	16.0	54.3
06/11/2002	13/11/2002	4.7	15.1	9.1	6.7	66.5	14.5	3.7	77.9	1.5	<1.0	7.1	21.4	19.0	29.9
13/11/2002	20/11/2002	4.5	19.2	21.5	6.9	20.3	4.5	2.6	25.7	<0.5	<1.0	16.8	35.5	18.0	24.4
20/11/2002	27/11/2002	4.2	31.1	43.5	23.4	36.6	8.0	4.7	41.1	0.8	<1.0	26.7	57.5	29.0	21.9
27/11/2002	04/12/2002	4.8	20.8	16.3	13.5	102.9	23.3	5.8	116.0	2.4	<1.0	8.4	17.8	25.0	56.7
04/12/2002	11/12/2002	4.7	106.2	109.1	45.3	183.8	40.8	29.1	223.2	7.2	<1.0	84.0	20.0	-	0.9
11/12/2002	18/12/2002	4.1	47.8	40.7	26.5	130.1	28.1	7.7	154.8	4.6	<1.0	32.2	72.4	43.0	8.4
18/12/2002	25/12/2002	4.7	16.8	15.5	9.2	33.1	6.6	2.0	37.5	1.1	<1.0	12.8	21.9	18.0	51.3
25/12/2002	01/01/2003	4.2	16.5	15.4	5.9	17.2	3.6	1.6	20.4	0.5	<1.0	14.4	66.1	16.0	25.4
Precipitation-weighted annual mean for site (samples containing phosphate are excluded)															Total rainfall
5162			19.4	13.5	14.1	59.2	12.4	4.2	67.3	1.8	-	12.3	17.5	18.4	1691.5

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 S/cm	rainfall (mm)
23/05/2002	29/05/2002	4.4	47.3	26.9	27.1	19.8	8.3	19.4	36.1	1.4	<1.0	44.9	39.8	26.0	27.4
29/05/2002	05/06/2002	5.9	86.7	49.4	59.0	43.1	19.0	71.9	54.1	10.4	<9.7	81.5	1.3	28.0	4.0
05/06/2002	12/06/2002	6.2	56.6	39.0	80.0	14.6	9.4	46.2	26.3	5.2	<1.0	54.8	0.6	22.0	11.6
12/06/2002	19/06/2002	4.9	42.4	19.0	36.5	2.9	4.3	14.8	9.3	5.4	<1.0	42.1	12.6	15.0	12.8
19/06/2002	26/06/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
26/06/2002	03/07/2002	5.5	59.1	27.3	48.2	29.1	19.2	54.2	55.9	5.9	<1.0	55.6	3.2	23.0	10.6
03/07/2002	10/07/2002	4.3	57.5	39.0	46.6	7.8	6.1	15.8	19.1	2.3	<1.0	56.6	47.9	30.0	21.8
10/07/2002	17/07/2002	4.9	116.8	74.6	99.6	13.8	16.4	73.0	37.7	9.8	<1.0	115.1	11.7	40.0	2.1
17/07/2002	24/07/2002	5.1	28.6	30.8	44.1	6.4	2.6	12.3	9.8	3.3	<1.0	27.8	8.1	13.0	44.5
24/07/2002	31/07/2002	4.7	69.3	100.6	103.4	4.6	14.9	51.7	9.5	8.0	<1.0	68.7	21.9	33.0	7.6
31/07/2002	07/08/2002	4.6	24.2	32.4	37.1	<0.9	0.9	2.9	4.8	1.2	<1.0	24.3	23.4	14.0	58.4
07/08/2002	14/08/2002	4.4	34.9	39.6	30.3	2.2	2.7	7.8	7.1	1.7	<1.0	34.7	43.7	24.0	29.5
14/08/2002	21/08/2002	6.4	137.1	74.9	224.2	5.6	9.3	34.6	14.9	7.9	11.3	136.4	0.4	42.0	5.8
21/08/2002	28/08/2002	6.3	44.5	36.0	91.2	5.7	5.0	20.8	10.4	3.1	<1.0	43.8	0.5	18.0	6.6
28/08/2002	04/09/2002	5.2	27.8	11.7	19.2	2.8	3.4	18.4	2.6	2.7	<1.0	27.4	6.5	<10.0	1.4
04/09/2002	11/09/2002	5.6	27.8	13.9	23.9	5.8	6.1	19.9	11.6	1.7	<1.0	27.1	2.8	10.0	16.1
11/09/2002	18/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
18/09/2002	25/09/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/09/2002	02/10/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
02/10/2002	09/10/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	2.4
09/10/2002	16/10/2002	4.2	57.8	66.4	54.0	132.5	32.5	22.8	163.9	4.0	<1.0	41.8	61.7	50.0	15.9
16/10/2002	23/10/2002	4.3	35.8	28.3	26.8	25.6	6.5	6.4	43.9	0.8	<1.0	32.8	50.1	26.0	37.7
23/10/2002	30/10/2002	4.6	33.2	17.1	11.3	59.1	22.9	18.5	77.0	1.9	<1.0	26.1	24.0	22.0	27.1
30/10/2002	06/11/2002	4.2	24.5	17.4	19.8	6.4	3.8	5.9	26.7	1.0	<1.0	23.7	66.1	18.0	32.2
06/11/2002	13/11/2002	4.5	27.3	8.0	9.1	11.9	5.0	8.8	33.6	0.6	<1.0	25.8	33.9	19.0	32.6
13/11/2002	20/11/2002	4.2	49.7	59.0	41.3	28.8	7.5	11.5	39.8	1.5	<1.0	46.3	67.6	38.0	36.2
20/11/2002	27/11/2002	4.6	73.3	57.9	81.1	47.6	15.8	36.7	67.6	1.2	<1.0	67.5	26.9	36.0	3.4
27/11/2002	04/12/2002	4.6	40.1	23.4	39.2	33.5	11.0	18.3	56.6	1.3	<1.0	36.1	26.3	25.0	15.6
04/12/2002	11/12/2002	4.7	165.3	130.5	99.8	501.4	118.2	43.6	579.9	13.2	<1.0	104.9	20.0	-	1.6
11/12/2002	18/12/2002	4.1	69.6	79.5	70.9	97.6	23.4	12.6	104.6	3.0	<1.0	57.9	77.6	50.0	12.6
18/12/2002	02/01/2003	4.4	25.7	16.4	23.0	13.5	3.2	3.3	18.0	<0.5	<1.0	24.1	42.7	15.0	66.2
			Precipitation-weighted annual mean for site (samples containing phosphate are excluded)												Total rainfall
5163			38.0	31.7	35.5	22.3	7.8	13.6	34.1	2.0	-	35.4	35.8	22.4	543.9

Appendix 2
Tables of Annual Mean Concentrations and Total Rainfall, 1986 to 2002

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 2002 (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
Goonhilly	20	23	15	19	14	26	15	17	20	18	19	20	14	13	-	22	31
Yarner Wood	17	20	14	20	13	17	18	17	18	15	18	18	12	14	-	23	17
Barcombe Mills	19	22	13	15	12	20	17	24	16	16	14	16	11	13	-	17	21
Compton	25	28	16	25	14	18	35	34	23	13	7	12	11	7	-	12	15
Crai Res	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	14	19
Flatford Mill	33	43	35	35	27	43	36	25	27	30	25	26	25	27	-	20	24
Woburn	45	50	37	37	28	35	37	27	30	22	15	24	25	14	-	23	28
Tycanol Wood	16	17	15	18	14	21	21	17	14	14	16	13	11	11	-	14	16
Llyn Brianne	16	21	18	19	17	24	20	19	16	12	14	15	12	11	-	-	16
Pumlumon	-	-	-	14	12	16	18	19	13	14	15	12	9	10	-	10	10
Stoke Ferry	35	36	30	40	18	22	30	27	18	24	16	19	18	17	-	15	28
Preston Montford	18	25	24	36	14	27	38	35	30	27	19	16	8	7	-	9	17
Bottesford	61	76	81	48	42	62	68	62	36	29	22	22	20	17	-	19	29
Llyn Llagi	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	15	13
Beddgelert	17	19	17	15	12	16	14	18	12	11	12	-	-	-	-	-	-
Llyn Llydaw	-	-	-	-	-	-	-	-	-	-	-	11	11	12	-	14	17
Wardlow Hay Cop	29	45	33	37	24	33	34	36	27	28	22	18	16	10	-	19	23
Driby	42	43	42	47	41	41	45	35	36	37	18	22	34	21	-	23	29
Jenny Hurn	89	100	85	63	53	80	81	67	39	58	54	55	45	33	-	31	-
River Etherow	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	29	34
Thorganby	75	73	88	84	64	55	82	80	44	51	44	29	43	16	-	26	30
High Muffles	58	63	72	55	55	58	59	47	42	41	40	33	35	22	-	38	36
Bannisdale	30	27	28	24	18	22	25	31	19	17	20	16	15	13	-	24	19
Scoat Tarn	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-	18
Hillsborough Fores	-	-	-	13	7	12	12	17	12	8	13	6	7	9	-	7	4
Lough Navar	11	9	10	10	8	6	8	11	7	8	6	7	5	6	-	8	8
Cow Green Res.	27	31	34	23	21	24	28	33	21	17	24	11	16	13	-	-	20
Loch Dee	29	23	19	15	15	19	17	22	15	13	19	11	10	12	-	19	13
Beaghs Burn	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	14	15
Redesdale	41	44	52	32	30	33	42	31	31	25	33	27	25	16	-	26	25
Eskdalemuir	21	25	27	20	24	22	22	26	17	16	17	17	14	14	-	22	17
Whiteadder	40	36	47	35	31	36	45	34	33	32	31	32	23	19	-	-	35
Loch Chon	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	24	22
Balquhidder	21	32	24	20	16	22	20	24	22	18	29	15	15	12	-	22	24
Polloch	-	-	-	-	-	14	14	15	13	12	16	10	8	9	-	13	13
Loch Nagar	-	-	-	-	-	-	-	-	-	-	-	-	-	20	-	34	43
Glen Dye	-	45	46	36	39	44	41	35	42	41	56	32	28	22	-	40	39
River Mharcaidh	22	22	21	20	18	17	17	17	18	16	19	16	11	10	-	17	19
Strathvaich Dam	-	16	16	13	11	15	20	13	11	10	13	12	10	10	-	12	13
Achanarras	10	19	25	25	19	20	24	22	17	16	21	21	14	14	-	20	25

Table A.2.2 - Precipitation-weighted Annual Mean Non-marine Sulphate, 1986 to 2002 (μeq l^{-1})

	Precipitation-weighted Annual Mean Non-marine Sulphate (μeq l^{-1})																
Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Goonhilly	30	34	21	29	24	36	22	29	26	24	31	25	17	17	20	22	20
Yarner Wood	27	37	22	27	19	28	25	28	28	24	33	27	18	18	14	19	16
Barcombe Mills	46	50	40	44	38	52	43	33	36	33	38	25	30	26	21	25	25
Compton	78	104	64	60	58	63	63	48	55	49	61	42	38	32	26	28	27
Crai Res	-	-	-	-	-	-	-	-	-	-	-	-	-	18	14	20	11
Flatford Mill	90	71	67	80	58	71	53	41	50	52	52	41	43	45	34	33	35
Woburn	73	80	85	73	66	63	57	44	59	46	56	39	42	38	30	34	32
Tycanol Wood	27	26	23	26	22	31	27	22	22	22	27	19	18	21	16	19	15
Llyn Brianne	24	29	26	27	27	30	28	26	26	22	26	20	19	17	15	-	14
Pumlumon	-	-	-	19	19	24	24	23	18	21	23	17	14	14	11	12	9
Stoke Ferry	80	76	66	84	81	77	67	54	61	50	52	49	43	40	41	34	35
Preston Montford	45	60	56	60	37	66	64	48	52	60	49	32	27	24	25	30	27
Bottesford	90	93	109	83	66	75	73	57	63	55	54	43	45	39	33	42	40
Llyn Llagi	-	-	-	-	-	-	-	-	-	-	-	-	-	17	17	16	12
Beddgelert	53	33	24	22	19	23	22	24	20	20	24	-	-	-	-	-	-
Llyn Llydaw	-	-	-	-	-	-	-	-	-	-	-	14	16	17	13	15	13
Wardlow Hay Cop	71	92	83	80	73	85	73	71	76	65	78	59	50	49	41	53	40
Driby	69	74	77	79	80	78	65	49	62	70	49	42	53	41	37	40	33
Jenny Hurn	110	106	121	98	89	83	77	60	80	65	81	58	70	54	51	53	-
River Etherow	-	-	-	-	-	-	-	-	-	-	-	-	-	39	32	42	30
Thorganby	85	80	88	87	82	119	88	79	72	56	69	62	60	50	45	51	41
High Muffles	63	74	82	73	67	75	71	56	60	51	65	47	49	37	36	40	34
Bannisdale	41	38	45	40	41	38	42	45	37	37	44	31	30	27	22	27	20
Scoat Tarn	-	-	-	-	-	-	-	-	-	-	-	-	-	23	17	-	15
Hillsborough Fores	-	-	-	52	36	42	41	40	45	33	45	26	29	31	23	33	18
Lough Navar	19	16	14	18	14	18	17	18	16	16	17	15	12	10	11	12	8
Cow Green Res.	35	39	44	35	33	34	38	40	31	31	37	26	26	25	19	-	17
Loch Dee	32	35	36	24	26	28	27	28	25	24	36	18	19	19	19	22	11
Beaghs Burn	-	-	-	-	-	-	-	-	-	-	-	-	-	37	16	21	12
Redesdale	58	46	62	47	36	43	46	35	42	37	51	37	34	25	23	29	22
Eskdalemuir	31	30	33	28	31	30	28	29	28	28	28	24	20	20	15	20	13
Whiteadder	53	48	61	46	33	45	50	37	40	43	44	33	27	24	24	-	28
Loch Chon	-	-	-	-	-	-	-	-	-	-	-	-	-	16	16	17	14
Balquhidder	26	33	28	24	22	27	23	26	22	21	38	21	19	15	15	19	15
Polloch	-	-	-	-	-	17	17	14	16	14	18	11	10	9	9	9	8
Loch Nagar	-	-	-	-	-	-	-	-	-	-	-	-	-	23	20	27	27
Glen Dye	-	48	49	41	39	45	43	38	46	41	62	31	29	27	21	29	23
River Mharcaidh	24	24	20	19	15	16	16	16	18	14	23	13	11	10	10	14	11
Strathvaich Dam	-	16	14	12	10	13	18	11	9	10	16	12	9	8	7	7	6
Achanarras	24	33	31	29	22	24	25	20	19	19	25	21	17	16	12	15	14

Table A.2.3 - Precipitation-weighted Annual Mean Nitrate, 1986 to 2002 (μeq l^{-1})

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

Table A.2.4 - Precipitation-weighted Annual Mean Ammonium, 1986 to 2002 (μeq l^{-1})

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

Table A.2.5 - Precipitation-weighted Annual Mean Sodium, 1986 to 2002 (μeq l^{-1})

	Precipitation-weighted Annual Mean Sodium (μeq l^{-1})																
Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Goonhilly	264	206	212	276	506	327	238	227	265	270	313	284	292	292	299	225	283
Yarner Wood	98	125	150	166	245	140	104	101	123	128	127	118	127	88	104	91	204
Barcombe Mills	186	255	153	204	359	137	128	98	147	176	195	164	154	173	199	91	203
Compton	54	67	70	84	129	71	40	55	64	64	76	77	58	55	45	37	62
Crai Res	-	-	-	-	-	-	-	-	-	-	-	-	-	96	103	79	122
Flatford Mill	99	60	54	79	79	70	57	54	73	79	76	60	59	49	63	49	67
Woburn	71	65	50	60	87	54	28	41	56	51	61	58	36	46	34	31	41
Tycanol Wood	116	90	104	232	232	163	120	119	164	157	146	159	145	151	144	103	166
Llyn Brianne	94	68	83	112	152	111	72	97	90	84	94	96	90	103	90	-	116
Pumlumon	-	-	-	104	141	102	72	69	73	79	81	113	95	85	93	69	136
Stoke Ferry	74	49	50	58	84	75	57	53	54	46	71	55	56	55	44	60	37
Preston Montford	86	38	86	39	100	164	38	66	58	64	35	80	40	54	33	31	53
Bottesford	82	35	59	47	62	54	35	35	39	49	58	27	33	39	25	29	41
Llyn Llagi	-	-	-	-	-	-	-	-	-	-	-	-	-	110	90	75	116
Beddgelert	126	75	122	134	193	162	95	111	98	129	97	-	-	-	-	-	-
Llyn Llydaw	-	-	-	-	-	-	-	-	-	-	-	107	88	104	70	72	82
Wardlow Hay Cop	71	52	90	57	140	131	57	95	94	66	82	60	65	70	40	50	58
Driby	95	53	64	98	91	103	67	70	83	100	121	58	77	65	62	74	79
Jenny Hurn	97	47	80	68	104	55	37	47	53	54	73	36	61	51	30	39	-
River Etherow	-	-	-	-	-	-	-	-	-	-	-	-	-	60	46	47	65
Thorganby	74	50	52	69	90	96	50	51	52	51	59	45	67	53	33	43	35
High Muffles	61	63	67	95	83	103	78	111	88	113	153	82	106	76	61	76	57
Bannisdale	122	62	133	116	161	182	91	106	95	129	95	156	101	131	76	73	88
Scoat Tarn	-	-	-	-	-	-	-	-	-	-	-	-	-	85	71	-	76
Hillsborough Fores	-	-	-	89	140	107	72	87	125	108	107	78	97	90	90	70	65
Lough Navar	248	102	317	139	261	192	133	187	174	125	116	131	136	171	152	98	151
Cow Green Res.	74	40	69	76	90	84	74	72	77	93	91	99	89	100	55	-	73
Loch Dee	116	54	136	132	147	123	86	79	92	106	91	109	91	124	101	56	103
Beaghs Burn	-	-	-	-	-	-	-	-	-	-	-	-	-	171	150	128	139
Redesdale	114	44	66	91	67	80	59	73	76	75	93	55	65	65	50	45	59
Eskdalemuir	86	37	62	81	86	2	53	63	77	88	63	66	76	102	61	85	63
Whiteadder	112	53	83	92	78	59	79	103	120	100	121	93	80	86	93	-	81
Loch Chon	-	-	-	-	-	-	-	-	-	-	-	-	-	112	69	71	128
Balquhidder	122	45	59	110	100	89	61	145	120	71	122	87	81	123	83	59	84
Polloch	-	-	-	-	-	213	118	204	155	168	148	127	161	195	150	139	234
Loch Nagar	-	-	-	-	-	-	-	-	-	-	-	-	-	39	33	35	76
Glen Dye	-	52	73	83	81	78	65	86	108	98	121	112	91	83	71	77	89
River Mharcaidh	90	37	45	88	62	46	57	143	92	57	66	70	65	83	63	40	44
Strathvaich Dam	-	83	109	126	174	147	121	212	154	102	130	116	122	180	153	95	105
Achanarras	231	145	217	277	212	235	186	224	217	169	219	167	202	249	251	186	216

Table A.2.6 - Precipitation-weighted Annual Mean Magnesium, 1986 to 2002 (μeq l^{-1})

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

Table A.2.7 - Precipitation-weighted Annual Mean Calcium, 1986 to 2002 (μeq l^{-1})

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

Table A.2.8 - Precipitation-weighted Annual Mean Chloride, 1986 to 2002 (μeq l^{-1})

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

Table A.2.9 - Precipitation-weighted Annual Mean Sulphate, 1986 to 2002 (μeq l^{-1})

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

Table A.2.10 - Annual volume of Rain Samples collected in the Acid Deposition Monitoring Network*, 1986 to 2002 (mm)

	Rainfall (mm)																
Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001 †	2002
Goonhilly	907	879	910	753	790	800	776	1008	999	744	743	1000	936	831	935	*787*	1025
Yarner Wood	1150	1015	1123	1131	1174	1058	1049	1398	1333	1135	1007	1218	1383	1106	1315	*1025*	1342
Barcombe Mills	740	849	678	597	639	620	653	738	806	652	539	818	733	655	1215	*834*	923
Compton	586	629	530	550	407	449	709	644	586	647	392	576	642	644	856	*701*	805
Crai Res	–	–	–	–	–	–	–	–	–	–	–	–	–	2190	2292	*1659*	2207
Flatford Mill	528	660	532	392	393	362	510	518	438	335	231	409	493	546	613	*615*	586
Woburn	758	672	592	540	400	478	694	655	505	515	328	456	620	537	663	*670*	651
Tycanol Wood	1508	1318	1385	1340	1437	1422	1572	1692	1460	1320	1366	1589	1547	1246	1735	*1288*	1808
Llyn Brianne	1491	1497	1434	1417	1483	1224	1488	1573	1474	1143	1195	1296	1737	1725	1984	-	1567
Pumlumon	–	–	–	1896	1936	1908	2129	2123	2445	1622	1554	1780	2641	2230	2411	*1547*	2193
Stoke Ferry	503	617	537	495	348	350	508	601	479	375	318	519	517	435	577	*597*	694
Preston Montford	539	570	514	580	538	443	554	585	520	409	403	550	590	666	789	*536*	554
Bottesford	545	651	531	469	434	377	557	651	526	327	289	596	573	540	682	*572*	614
Llyn Llagi	–	–	–	–	–	–	–	–	–	–	–	–	–	2177	2979	*1925*	2608
Beddgelert	2758	2231	2794	2480	2394	2028	3013	2152	2375	2097	747	–	–	–	–	–	–
Llyn Llydaw	–	–	–	–	–	–	–	–	–	–	827	2068	2777	2313	3086	*1831*	1916
Wardlow Hay Cop	928	889	837	708	711	617	849	852	977	581	530	853	1018	860	1068	*786*	1066
Driby	702	685	605	457	473	398	676	636	513	375	415	578	620	598	616	*598*	568
Jenny Hurn	518	652	409	443	351	354	505	546	452	460	301	423	530	554	610	*512*	–
River Etherow	–	–	–	–	–	–	–	–	–	–	–	–	–	876	1205	*914*	1261
Thorganby	503	625	516	364	434	329	511	485	496	395	348	477	448	597	703	*543*	609
High Muffles	711	875	855	599	806	626	836	947	740	670	693	827	980	936	1160	*861*	879
Bannisdale	2249	2101	2091	1699	2270	1857	2027	1794	2290	1690	1328	1771	2167	1798	2552	*1607*	2082
Scoat Tarn	–	–	–	–	–	–	–	–	–	–	–	–	–	2110	2727	-	2618
Hillsborough Fores	–	–	–	642	909	668	635	802	614	742	662	824	777	730	900	*515*	894
Lough Navar	1439	1144	1492	1242	1617	1459	1977	1517	1631	1521	1373	1395	1686	1383	1297	*1004*	1358
Cow Green Res.	1129	1216	1138	858	1165	957	1073	1118	1293	807	1149	1058	1353	1275	1633	-	1411
Loch Dee	2373	2311	2619	2001	2574	2196	2659	1950	2393	2036	1928	2269	2473	2373		*1266*	2055
Beaghs Burn	–	–	–	–	–	–	–	–	–	–	–	–	–	1417	1695	*1148*	1494
Redesdale	745	828	832	499	724	581	662	585	541	507	444	437	843	632	842	*553*	1002
Eskdalemuir	1523	1275	1396	1236	1528	1248	1609	1330	1631	1202	1211	1487	1700	1479	1628	*1180*	1780
Whiteadder	584	718	712	489	721	569	665	722	566	473	395	546	750	583	817	-	722
Loch Chon	–	–	–	–	–	–	–	–	–	–	–	–	–	2123	1838	*1399*	2278
Balquhidder	2008	1428	1736	1967	2398	1683	1814	1575	1547	1637	1096	1579	1540	1863	1674	*1254*	1704
Polloch	–	–	–	–	–	2021	2355	1790	2012	1788	1606	1904	2250	2099	2011	*1171*	1800
Loch Nagar	–	–	–	–	–	–	–	–	–	–	–	–	–	987	1436	*957*	1885
Glen Dye	–	898	1067	659	809	691	758	969	637	724	740	1049	1005	792	1238	*998*	1320
River Mharcaidh	777	664	761	638	907	729	757	826	714	678	477	601	846	874	895	*593*	786
Strathvaich Dam	–	959	1205	1357	1713	1396	1609	1147	1272	1282	885	1200	1458	1444	1384	*996*	1173
Achanarras	889	864	642	476	776	512	635	567	535	622	488	478	700	646	598	*586*	663

* 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, 2002

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Appendix 3.1
Sulphur Dioxide Data, 2002

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National Environmental Technology Centre

Monthly and Annual Mean Concentrations of Sulphur Dioxide in 2002
Concentration in Air (μg SO_2 [as S] m^{-3})

Site	Jan	Feb	Mar	Apr -*1*	May -*1*	Jun -*1*	Jul -*1*	Aug -*1*	Sep -*1*	Oct -*1*	Nov -*1*	Dec -*1*	Annual Mean -*1*
Eskdalemuir -*2*	-	0.07	0.24	0.17	0.14	0.06	0.05	0.12	0.22	0.21	0.35	0.36	0.18
Stoke Ferry -*2*	0.60	-	0.74	0.58	0.57	0.46	0.61	0.46	0.38	0.61	0.52	0.49	0.55
Lough Navar -*2*	0.09	0.06	0.12	0.10	0.09	0.04	0.03	0.04	0.11	0.10	0.06	0.19	0.09
Barcombe Mills -*2*	0.40	0.86	-	0.53	0.50	0.31	0.45	0.40	0.38	0.48	0.39	0.42	0.47
Yarner Wood -*2*	0.21	-	-	0.37	0.26	0.09	0.14	0.20	0.38	0.29	0.07	-	0.21
High Muffles -*2*	1.34	0.49	1.13	-	1.06	0.59	0.78	0.64	0.83	1.01	1.11	0.93	0.93
Strathvaich Dam -*2*	0.18	0.02	0.06	0.09	0.05	0.05	0.02	0.03	0.05	0.07	-	0.09	0.06
Glen Dye –*2*	0.51	0.12	0.20	0.20	0.21	0.15	0.12	0.09	0.15	0.14	0.46	0.29	0.22

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 fortnightly filter-pack measurements. No correction has been made to the filter-pack measurements although an on-going measurement overlap programme suggests that the filter-pack sampler has an offset of about -0.13 μg SO_2 [as S] m^{-3}; (2) The filter-pack samplers were installed on the following dates:

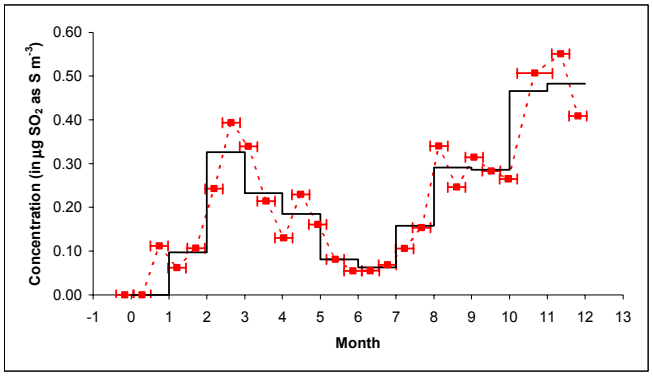
Site	Installation Date	Site	Installation Date	Site	Installation Date	Installation Date	Date
– Eskdalemuir	24th May 2001	– Stoke Ferry	10th May 2001	– Lough Navar	24th April 2001	– Barcombe Mills	10th May 2001
– Yarner Wood	16th July 2001	– High Muffles	21st May 2001	– Strathvaich Dam	19th June 2001	– 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 2002 to December 2002

Start Date		End Date	Duration	Concentration
19-Dec-2001	-	02-Jan-2002	14	0.81
02-Jan-2002	-	16-Jan-2002	14	N
16-Jan-2002	-	30-Jan-2002	14	0.11
30-Jan-2002	-	13-Feb-2002	14	0.06
13-Feb-2002	-	27-Feb-2002	14	0.11
27-Feb-2002	-	13-Mar-2002	14	0.24
13-Mar-2002	-	27-Mar-2002	14	0.39
27-Mar-2002	-	10-Apr-2002	14	0.34
10-Apr-2002	-	24-Apr-2002	14	0.21
24-Apr-2002	-	08-May-2002	14	0.13
08-May-2002	-	22-May-2002	14	0.23
22-May-2002	-	05-Jun-2002	14	0.16
05-Jun-2002	-	19-Jun-2002	14	0.08
19-Jun-2002	-	03-Jul-2002	14	0.05
03-Jul-2002	-	17-Jul-2002	14	0.06
17-Jul-2002	-	31-Jul-2002	14	0.07
31-Jul-2002	-	14-Aug-2002	14	0.11
14-Aug-2002	-	28-Aug-2002	14	0.15
28-Aug-2002	-	11-Sep-2002	14	0.34
11-Sep-2002	-	25-Sep-2002	14	0.25
25-Sep-2002	-	09-Oct-2002	14	0.31
09-Oct-2002	-	23-Oct-2002	14	0.28
23-Oct-2002	-	06-Nov-2002	14	0.26
06-Nov-2002	-	04-Dec-2002	28	0.51
04-Dec-2002	-	18-Dec-2002	14	0.55
18-Dec-2002	-	01-Jan-2003	14	0.41



Annual Mean Concentration	=	0.18
Data Capture	=	96.2%

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

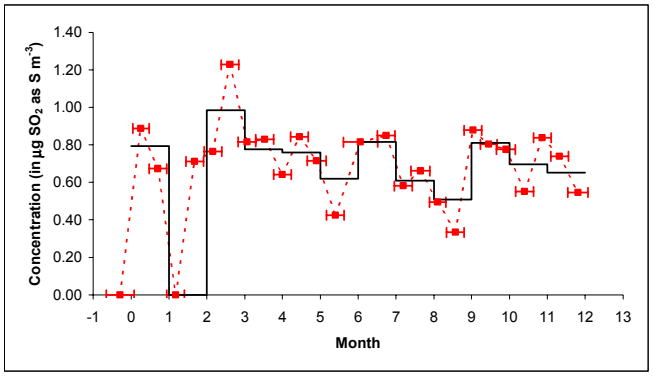
(3) Statistical parameters calculated only if data capture is greater than 75%.

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

Site: 5004 Stoke Ferry

Fortnightly measurements, collection-day - non standard
Summary for January 2002 to December 2002

Start Date		End Date	Duration	Concentration
11-Dec-2001	-	02-Jan-2002	22	1.26
02-Jan-2002	-	15-Jan-2002	13	0.89
15-Jan-2002	-	29-Jan-2002	14	0.67
29-Jan-2002	-	12-Feb-2002	14	N
12-Feb-2002	-	26-Feb-2002	14	0.71
26-Feb-2002	-	12-Mar-2002	14	0.77
12-Mar-2002	-	26-Mar-2002	14	1.23
26-Mar-2002	-	09-Apr-2002	14	0.82
09-Apr-2002	-	23-Apr-2002	14	0.83
23-Apr-2002	-	07-May-2002	14	0.64
07-May-2002	-	21-May-2002	14	0.84
21-May-2002	-	05-Jun-2002	15	0.71
05-Jun-2002	-	19-Jun-2002	14	0.43
19-Jun-2002	-	16-Jul-2002	27	0.82
16-Jul-2002	-	30-Jul-2002	14	0.85
30-Jul-2002	-	13-Aug-2002	14	0.58
13-Aug-2002	-	28-Aug-2002	15	0.66
28-Aug-2002	-	10-Sep-2002	13	0.49
10-Sep-2002	-	24-Sep-2002	14	0.33
24-Sep-2002	-	08-Oct-2002	14	0.88
08-Oct-2002	-	21-Oct-2002	13	0.80
21-Oct-2002	-	05-Nov-2002	15	0.78
05-Nov-2002	-	19-Nov-2002	14	0.55
19-Nov-2002	-	03-Dec-2002	14	0.84
03-Dec-2002	-	17-Dec-2002	14	0.74
17-Dec-2002	-	02-Jan-2003	16	0.55



Annual Mean Concentration	=	0.55
Data Capture	=	96.2%

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

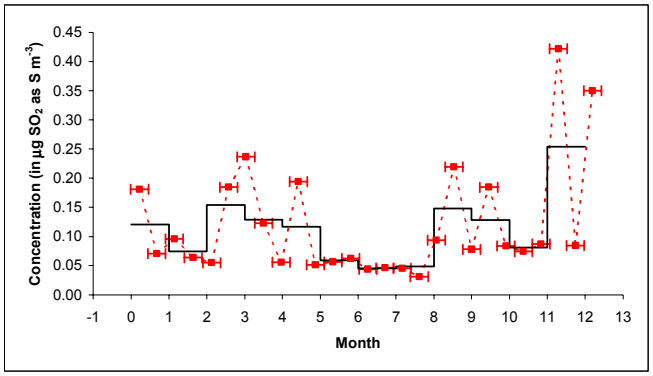
(3) Statistical parameters calculated only if data capture is greater than 75%.

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

Site: 5006 Lough Navar

Fortnightly measurements, collection-day - non standard
Summary for January 2002 to December 2002

Start Date		End Date	Duration	Concentration
31-Dec-2001	-	14-Jan-2002	14	0.18
14-Jan-2002	-	28-Jan-2002	14	0.07
28-Jan-2002	-	11-Feb-2002	14	0.10
11-Feb-2002	-	25-Feb-2002	14	0.06
25-Feb-2002	-	11-Mar-2002	14	0.06
11-Mar-2002	-	25-Mar-2002	14	0.18
25-Mar-2002	-	08-Apr-2002	14	0.24
08-Apr-2002	-	22-Apr-2002	14	0.12
22-Apr-2002	-	06-May-2002	14	0.06
06-May-2002	-	20-May-2002	14	0.19
20-May-2002	-	03-Jun-2002	14	0.05
03-Jun-2002	-	17-Jun-2002	14	0.06
17-Jun-2002	-	01-Jul-2002	14	0.06
01-Jul-2002	-	15-Jul-2002	14	0.04
15-Jul-2002	-	29-Jul-2002	14	0.05
29-Jul-2002	-	12-Aug-2002	14	0.05
12-Aug-2002	-	26-Aug-2002	14	0.03
26-Aug-2002	-	09-Sep-2002	14	0.09
09-Sep-2002	-	23-Sep-2002	14	0.22
23-Sep-2002	-	07-Oct-2002	14	0.08
07-Oct-2002	-	21-Oct-2002	14	0.18
21-Oct-2002	-	04-Nov-2002	14	0.08
04-Nov-2002	-	18-Nov-2002	14	0.07
18-Nov-2002	-	02-Dec-2002	14	0.09
02-Dec-2002	-	16-Dec-2002	14	0.42
16-Dec-2002	-	30-Dec-2002	14	0.08
30-Dec-2002	-	13-Jan-2003	14	0.35



Annual Mean Concentration	=	0.09
Data Capture	=	100.0%

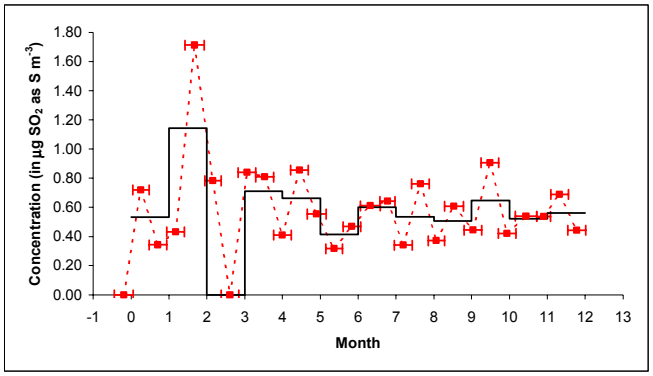
Notes:
(1) N = no or non valid measurement;
(2) Measurements preceded by < are below the Limit of Detection.
included in the calculation of the statistical parameters at 50% of its value
(3) Statistical parameters calculated only if data capture is greater than 75%.

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

Site: 5007 Barcombe Mills

Fortnightly measurements, collection-day - non standard
Summary for January 2002 to December 2002

Start Date		End Date	Duration	Concentration
18-Dec-2001	-	02-Jan-2002	15	1.09
02-Jan-2002	-	15-Jan-2002	13	0.72
15-Jan-2002	-	29-Jan-2002	14	0.34
29-Jan-2002	-	12-Feb-2002	14	0.43
12-Feb-2002	-	27-Feb-2002	15	1.71
27-Feb-2002	-	12-Mar-2002	13	0.78
12-Mar-2002	-	26-Mar-2002	14	N
26-Mar-2002	-	09-Apr-2002	14	0.84
09-Apr-2002	-	23-Apr-2002	14	0.81
23-Apr-2002	-	07-May-2002	14	0.41
07-May-2002	-	21-May-2002	14	0.86
21-May-2002	-	05-Jun-2002	15	0.56
05-Jun-2002	-	18-Jun-2002	13	0.32
18-Jun-2002	-	02-Jul-2002	14	0.47
02-Jul-2002	-	18-Jul-2002	16	0.61
18-Jul-2002	-	30-Jul-2002	12	0.64
30-Jul-2002	-	13-Aug-2002	14	0.34
13-Aug-2002	-	27-Aug-2002	14	0.76
27-Aug-2002	-	09-Sep-2002	13	0.37
09-Sep-2002	-	24-Sep-2002	15	0.61
24-Sep-2002	-	08-Oct-2002	14	0.44
08-Oct-2002	-	22-Oct-2002	14	0.91
22-Oct-2002	-	05-Nov-2002	14	0.42
05-Nov-2002	-	22-Nov-2002	17	0.54
22-Nov-2002	-	03-Dec-2002	11	0.54
03-Dec-2002	-	17-Dec-2002	14	0.69
17-Dec-2002	-	31-Dec-2002	14	0.44



Annual Mean Concentration	=	0.47
Data Capture	=	96.2%

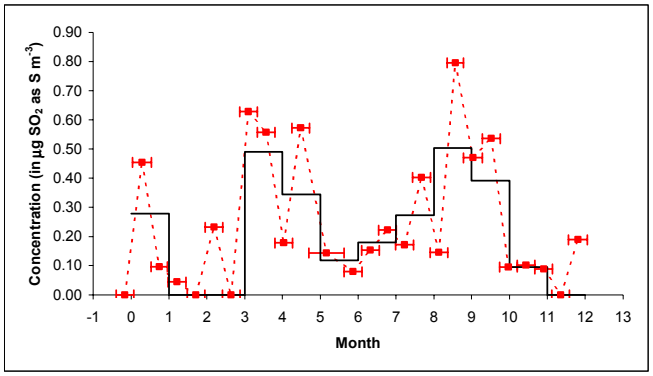
Notes:
(1) N = no or non valid measurement;
(2) Measurements preceded by < are below the Limit of Detection.
included in the calculation of the statistical parameters at 50% of its value
(3) Statistical parameters calculated only if data capture is greater than 75%.

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

Site: 5008 Yarner Wood

Fortnightly measurements, collection-day - non standard
Summary for January 2002 to December 2002

Start Date		End Date	Duration	Concentration
19-Dec-2001	-	02-Jan-2002	14	0.48
02-Jan-2002	-	17-Jan-2002	15	0.45
17-Jan-2002	-	30-Jan-2002	13	0.10
30-Jan-2002	-	13-Feb-2002	14	0.04
13-Feb-2002	-	27-Feb-2002	14	N
27-Feb-2002	-	13-Mar-2002	14	0.23
13-Mar-2002	-	27-Mar-2002	14	N
27-Mar-2002	-	10-Apr-2002	14	0.63
10-Apr-2002	-	24-Apr-2002	14	0.56
24-Apr-2002	-	08-May-2002	14	0.18
08-May-2002	-	22-May-2002	14	0.57
22-May-2002	-	19-Jun-2002	28	0.14
19-Jun-2002	-	03-Jul-2002	14	0.08
03-Jul-2002	-	17-Jul-2002	14	0.15
17-Jul-2002	-	31-Jul-2002	14	0.22
31-Jul-2002	-	14-Aug-2002	14	0.17
14-Aug-2002	-	28-Aug-2002	14	0.40
28-Aug-2002	-	11-Sep-2002	14	0.15
11-Sep-2002	-	24-Sep-2002	13	0.80
24-Sep-2002	-	09-Oct-2002	15	0.47
09-Oct-2002	-	23-Oct-2002	14	0.54
23-Oct-2002	-	06-Nov-2002	14	0.10
06-Nov-2002	-	20-Nov-2002	14	0.10
20-Nov-2002	-	04-Dec-2002	14	0.09
04-Dec-2002	-	18-Dec-2002	14	N
18-Dec-2002	-	02-Jan-2003	15	0.19



Annual Mean Concentration	=	0.21
Data Capture	=	88.5%

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

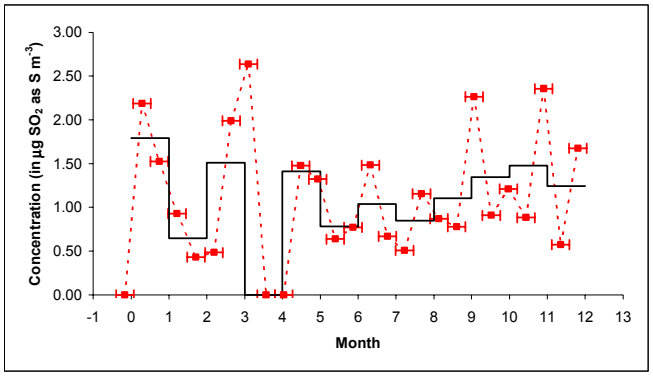
(3) Statistical parameters calculated only if data capture is greater than 75%.

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 2002 to December 2002

Start Date		End Date	Duration	Concentration
19-Dec-2001	-	02-Jan-2002	14	1.75
02-Jan-2002	-	16-Jan-2002	14	2.19
16-Jan-2002	-	30-Jan-2002	14	1.52
30-Jan-2002	-	13-Feb-2002	14	0.93
13-Feb-2002	-	27-Feb-2002	14	0.43
27-Feb-2002	-	13-Mar-2002	14	0.49
13-Mar-2002	-	27-Mar-2002	14	1.99
27-Mar-2002	-	10-Apr-2002	14	2.64
10-Apr-2002	-	24-Apr-2002	14	N
24-Apr-2002	-	08-May-2002	14	N
08-May-2002	-	22-May-2002	14	1.48
22-May-2002	-	05-Jun-2002	14	1.32
05-Jun-2002	-	19-Jun-2002	14	0.64
19-Jun-2002	-	03-Jul-2002	14	0.77
03-Jul-2002	-	17-Jul-2002	14	1.48
17-Jul-2002	-	31-Jul-2002	14	0.67
31-Jul-2002	-	14-Aug-2002	14	0.51
14-Aug-2002	-	28-Aug-2002	14	1.16
28-Aug-2002	-	11-Sep-2002	14	0.87
11-Sep-2002	-	25-Sep-2002	14	0.78
25-Sep-2002	-	09-Oct-2002	14	2.26
09-Oct-2002	-	23-Oct-2002	14	0.91
23-Oct-2002	-	06-Nov-2002	14	1.21
06-Nov-2002	-	20-Nov-2002	14	0.88
20-Nov-2002	-	04-Dec-2002	14	2.36
04-Dec-2002	-	18-Dec-2002	14	0.57
18-Dec-2002	-	01-Jan-2003	14	1.68



Annual Mean Concentration	=	0.93
Data Capture	=	92.3%

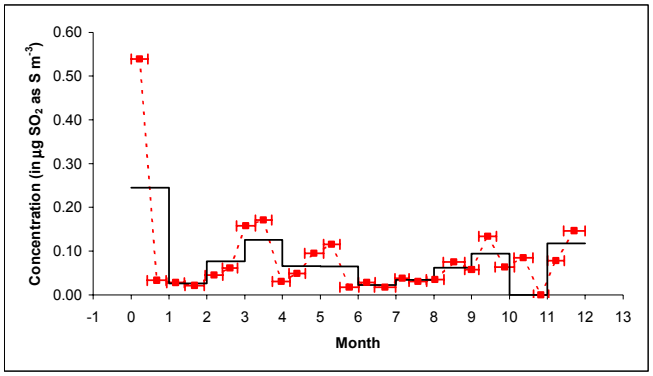
Notes:
(1) N = no or non valid measurement;
(2) Measurements preceded by < are below the Limit of Detection.
included in the calculation of the statistical parameters at 50% of its value
(3) Statistical parameters calculated only if data capture is greater than 75%.

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

Site: 5010 Strathvaich Dam

Fortnightly measurements, collection-day - non standard
Summary for January 2002 to December 2002

Start Date		End Date	Duration	Concentration
01-Jan-2002	-	14-Jan-2002	13	0.54
14-Jan-2002	-	29-Jan-2002	15	0.03
29-Jan-2002	-	12-Feb-2002	14	0.03
12-Feb-2002	-	27-Feb-2002	15	0.02
27-Feb-2002	-	13-Mar-2002	14	0.04
13-Mar-2002	-	25-Mar-2002	12	0.06
25-Mar-2002	-	09-Apr-2002	15	0.16
09-Apr-2002	-	22-Apr-2002	13	0.17
22-Apr-2002	-	06-May-2002	14	0.03
06-May-2002	-	19-May-2002	13	0.05
19-May-2002	-	03-Jun-2002	15	0.09
03-Jun-2002	-	16-Jun-2002	13	0.12
16-Jun-2002	-	01-Jul-2002	15	0.02
01-Jul-2002	-	14-Jul-2002	13	0.03
14-Jul-2002	-	31-Jul-2002	17	0.02
31-Jul-2002	-	11-Aug-2002	11	0.04
11-Aug-2002	-	25-Aug-2002	14	0.03
25-Aug-2002	-	08-Sep-2002	14	0.04
08-Sep-2002	-	25-Sep-2002	17	0.07
25-Sep-2002	-	06-Oct-2002	11	0.06
06-Oct-2002	-	20-Oct-2002	14	0.13
20-Oct-2002	-	04-Nov-2002	15	0.06
04-Nov-2002	-	19-Nov-2002	15	0.08
19-Nov-2002	-	01-Dec-2002	12	N
01-Dec-2002	-	14-Dec-2002	13	0.08
14-Dec-2002	-	31-Dec-2002	17	0.15



Annual Mean Concentration	=	0.06
Data Capture	=	96.7%

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

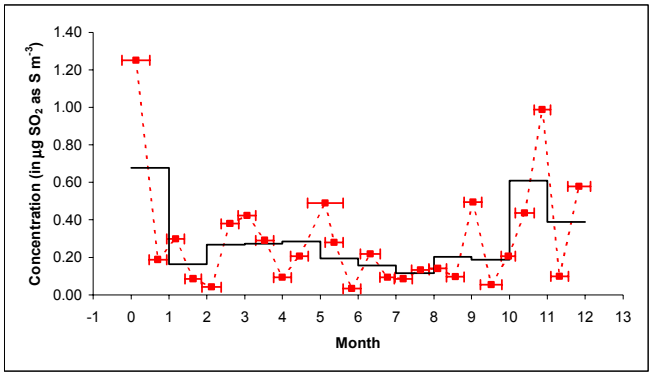
(3) Statistical parameters calculated only if data capture is greater than 75%.

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

Site: 5011 Glen Dye

Fortnightly measurements, collection-day - non standard
Summary for January 2002 to December 2002

Start Date		End Date	Duration	Concentration
24-Dec-2001	-	15-Jan-2002	22	1.25
15-Jan-2002	-	29-Jan-2002	14	0.19
29-Jan-2002	-	12-Feb-2002	14	0.30
12-Feb-2002	-	25-Feb-2002	13	0.09
25-Feb-2002	-	12-Mar-2002	15	0.04
12-Mar-2002	-	26-Mar-2002	14	0.38
26-Mar-2002	-	09-Apr-2002	14	0.42
09-Apr-2002	-	23-Apr-2002	14	0.29
23-Apr-2002	-	07-May-2002	14	0.09
07-May-2002	-	21-May-2002	14	0.21
21-May-2002	-	18-Jun-2002	28	0.49
04-Jun-2002	-	18-Jun-2002	14	0.28
18-Jun-2002	-	02-Jul-2002	14	0.03
02-Jul-2002	-	18-Jul-2002	16	0.22
18-Jul-2002	-	30-Jul-2002	12	0.09
30-Jul-2002	-	13-Aug-2002	14	0.09
13-Aug-2002	-	27-Aug-2002	14	0.13
27-Aug-2002	-	10-Sep-2002	14	0.14
10-Sep-2002	-	24-Sep-2002	14	0.10
24-Sep-2002	-	08-Oct-2002	14	0.49
08-Oct-2002	-	25-Oct-2002	17	0.06
25-Oct-2002	-	05-Nov-2002	11	0.21
05-Nov-2002	-	20-Nov-2002	15	0.44
20-Nov-2002	-	03-Dec-2002	13	0.99
03-Dec-2002	-	17-Dec-2002	14	0.10
17-Dec-2002	-	04-Jan-2003	18	0.58



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%.

Appendix 3.2
Particulate Sulphate Data, 2002

AEA Technology
National Environmental Technology Centre

Monthly and Annual Mean Concentrations of Particulate Sulphate in 2002
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	0.48	0.20	0.46	0.71	0.52	0.45	0.39	0.35	0.63	0.36	0.40	0.55	0.46
Stoke Ferry -*1*	-	-	-	-	-	-	-	-	-	-	-	-	-
Lough Navar	0.44	0.23	0.54	-	-	0.32	0.25	0.29	0.70	0.28	0.18	0.62	0.40
Barcombe Mills	0.82	0.43	0.72	1.20	0.55	0.63	0.77	0.86	0.63	0.48	0.48	0.90	0.71
Yarner Wood	0.57	0.39	-	0.82	0.57	0.46	0.42	0.54	0.97	0.60	0.32	0.66	0.58
High Muffles	0.65	0.27	0.65	0.78	0.60	0.54	0.74	0.56	0.53	0.41	0.41	0.80	0.59
Strathvaich Dam -*1*	-	-	-	-	-	-	-	-	-	-	-	-	-
Glen Dye -*1*	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: - indicates that no average was determined as the data capture was less than 75%; (1) The programme of particulate sulphate measurements was discontinued with effect from 4th December 2001 at Stoke Ferry, 31st December 2001 at Strathvaich Dam and 13th November 2001 at Glen Dye..

National Environmental Technology Centre
Site: 5002 Eskdalemuir - 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	0.30	0.19	0.17	0.19	0.13	0.50	0.19	0.67	0.17	0.44	0.40	0.29
2 - 3	0.28	0.21	0.15	1.95	0.13	1.09	0.28	0.17	0.47	0.41	0.34	0.30
3 - 4	1.10	0.24	0.14	1.52	0.27	0.25	0.31	0.36	1.07	0.14	0.39	0.48
4 - 5	0.31	0.22	0.28	2.40	0.39	0.40	0.25	1.58	1.13	0.26	0.31	0.31
5 - 6	0.33	0.12	0.48	1.75	0.51	1.00	0.26	0.77	0.23	0.19	0.32	0.73
6 - 7	0.45	0.11	0.18	0.74	0.59	1.69	0.40	0.77	0.16	0.13	0.19	0.55
7 - 8	0.64	0.28	0.51	0.56	0.45	0.73	0.26	0.18	0.32	0.67	0.19	0.38
8 - 9	0.98	0.30	0.34	0.99	0.64	1.03	0.19	0.20	0.62	0.65	0.20	0.74
9 - 10	2.17	0.16	0.21	0.64	0.86	0.26	0.24	0.19	1.05	0.52	0.32	N
10 - 11	1.44	0.12	0.22	1.03	1.21	0.16	0.36	0.75	0.23	0.66	0.36	0.48
11 - 12	0.66	0.24	0.19	1.04	0.13	0.15	0.27	0.22	0.98	1.32	0.20	0.54
12 - 13	1.49	0.18	0.20	0.16	0.81	0.29	0.18	0.28	1.88	0.25	0.23	1.27
13 - 14	0.28	0.10	0.19	0.26	0.46	0.46	0.33	0.20	0.52	0.41	0.35	1.29
14 - 15	0.31	0.24	0.36	0.14	0.25	0.16	0.76	0.40	1.03	0.27	0.19	0.57
15 - 16	0.38	0.38	0.35	0.19	0.72	0.41	0.28	0.28	1.19	0.09	0.11	1.05
16 - 17	0.22	0.51	0.45	0.31	1.76	0.71	0.34	0.54	1.02	0.78	0.17	0.36
17 - 18	0.14	0.23	0.95	1.10	1.47	0.45	0.83	0.44	0.77	0.36	0.21	0.33
18 - 19	0.33	0.19	0.36	1.17	0.39	0.44	1.05	0.06	0.34	0.23	0.50	0.32
19 - 20	0.32	0.16	0.32	0.76	0.30	0.34	0.26	0.16	0.76	0.18	0.97	0.65
20 - 21	0.18	0.10	0.43	0.84	0.80	0.32	0.21	0.14	0.54	0.19	0.83	N
21 - 22	0.36	0.12	0.24	0.90	0.49	0.31	0.29	0.21	0.31	0.19	0.50	0.82
22 - 23	0.26	0.07	0.45	0.49	0.37	0.24	0.28	0.19	0.15	0.15	0.57	0.32
23 - 24	0.34	0.10	1.06	0.67	0.29	0.31	0.10	0.19	0.24	0.16	0.44	0.51
24 - 25	0.09	0.36	0.96	0.51	0.20	0.33	0.22	0.15	0.23	0.22	0.33	0.26
25 - 26	0.22	0.24	0.36	0.25	0.29	0.43	0.49	0.26	0.40	0.18	0.57	0.56
26 - 27	0.16	0.13	0.15	0.12	0.49	0.25	0.91	0.47	0.24	0.19	0.76	0.36
27 - 28	0.33	0.19	1.03	0.19	0.46	0.23	<0.04	0.16	0.35	0.14	0.54	0.22
28 - 29	0.20	0.18	0.94	0.12	0.54	0.30	0.19	0.32	1.07	0.28	0.38	0.24
29 - 30	0.23		N	0.17	0.23	0.15	0.26	0.21	1.10	0.37	0.55	0.36
30 - 31	0.28		1.97	0.16	0.19	0.10	0.83	0.18	0.37	0.54	0.67	0.80
31 - 1	0.25		0.27		0.23		1.37	0.12		0.72		0.72
Arithmetic Mean (3)	0.48	0.20	0.46	0.71	0.52	0.45	0.39	0.35	0.63	0.36	0.40	0.55
Standard Deviation (3)	0.47	0.10	0.40	0.59	0.39	0.35	0.31	0.30	0.43	0.27	0.21	0.29
Sample Size	31	28	30	30	31	30	31	31	30	31	30	29

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 2002 to December 2002

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.51	0.15	0.13	0.21	N	N	0.11	2.34	0.31	0.51	0.14	0.14
2 - 3	0.68	0.17	0.25	0.46	N	N	0.24	0.89	0.65	0.27	0.22	0.15
3 - 4	0.86	0.18	0.22	0.22	N	0.14	0.23	0.75	0.80	0.11	0.10	0.14
4 - 5	0.84	0.19	0.26	0.69	N	0.12	0.45	0.38	0.95	0.21	0.14	0.13
5 - 6	0.20	0.17	0.50	1.40	N	0.46	0.41	0.31	0.11	0.21	0.15	0.06
6 - 7	0.85	0.16	0.39	1.36	N	0.80	0.19	0.12	0.10	0.32	0.13	0.42
7 - 8	0.95	0.45	0.54	0.53	N	1.65	0.21	0.16	0.14	0.60	0.11	0.70
8 - 9	1.05	0.22	0.17	0.77	N	0.41	0.08	0.30	0.30	0.51	0.04	0.97
9 - 10	1.42	0.12	0.14	0.43	N	0.16	0.10	0.11	0.57	0.88	0.21	0.72
10 - 11	0.86	0.14	0.20	0.96	N	0.17	0.18	0.14	0.19	1.14	0.13	0.61
11 - 12	0.71	0.25	0.21	0.68	N	0.09	0.21	0.14	0.31	0.71	0.12	0.52
12 - 13	0.73	0.17	0.19	0.18	N	0.23	0.16	0.12	3.39	0.06	0.16	1.47
13 - 14	0.30	0.17	0.28	0.21	N	0.40	0.22	0.12	1.24	0.06	0.32	2.12
14 - 15	0.17	0.42	0.51	0.19	N	0.22	0.24	0.18	1.18	0.31	0.14	1.64
15 - 16	0.14	0.32	1.06	N	N	0.26	0.16	0.15	0.57	0.22	0.15	2.06
16 - 17	0.30	0.35	0.66	N	N	0.34	0.15	0.36	0.95	0.09	0.12	0.66
17 - 18	0.14	0.12	0.73	N	N	0.30	0.13	0.21	0.43	0.13	0.13	0.49
18 - 19	0.18	0.34	0.39	N	N	0.25	0.22	0.12	0.63	0.05	0.34	0.51
19 - 20	0.18	0.30	0.36	N	N	0.20	0.24	0.10	1.24	0.06	0.43	0.42
20 - 21	0.19	0.28	0.37	N	N	0.39	0.24	0.12	0.54	0.22	0.23	0.95
21 - 22	0.24	0.16	0.34	N	N	0.15	0.26	0.23	0.52	0.19	0.18	0.58
22 - 23	0.22	0.26	0.65	N	N	0.20	0.13	0.33	0.17	0.08	0.14	0.22
23 - 24	0.18	0.18	1.84	N	N	0.33	0.10	0.34	0.25	0.11	0.14	0.40
24 - 25	0.17	0.14	0.41	N	N	0.22	0.28	0.11	0.65	0.13	0.22	0.11
25 - 26	0.18	0.42	0.29	N	N	0.34	0.23	0.16	0.71	0.08	0.18	0.36
26 - 27	0.14	0.17	0.59	N	N	0.21	1.02	0.26	0.85	0.13	0.22	0.53
27 - 28	0.20	0.13	1.30	N	N	0.31	0.73	0.18	0.56	0.07	0.17	0.18
28 - 29	0.25	0.18	1.39	N	N	0.31	0.22	0.14	0.98	0.16	0.21	0.27
29 - 30	0.27		1.25	N	N	0.17	0.16	0.11	0.97	0.20	0.12	0.18
30 - 31	0.15		0.79	N	N	0.09	0.21	0.07	0.77	0.19	0.22	0.92
31 - 1	0.28		0.24		N		0.39	0.10		0.80		0.57
Arithmetic Mean (3)	0.44	0.23	0.54	-	-	0.32	0.25	0.29	0.70	0.28	0.18	0.62
Standard Deviation (3)	0.35	0.10	0.42	-	-	0.30	0.19	0.42	0.61	0.28	0.08	0.54
Sample Size	31	28	31	14	0	28	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 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 2002 to December 2002

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.31	0.56	N	0.23	0.10	1.11	0.23	0.46	0.50	0.64	0.31	0.41
2 - 3	0.51	0.34	N	2.54	0.23	1.27	0.13	0.60	0.86	1.39	0.36	0.24
3 - 4	0.72	0.21	N	0.25	0.03	0.26	0.39	0.94	0.97	0.24	0.31	0.22
4 - 5	0.90	N	N	1.38	0.51	0.33	0.35	0.60	1.21	0.30	0.38	0.28
5 - 6	0.92	N	N	1.82	1.11	0.07	0.59	1.19	0.74	0.70	0.36	0.23
6 - 7	1.07	0.35	0.39	0.64	0.85	0.49	0.61	1.28	0.44	0.58	0.31	0.98
7 - 8	2.03	0.23	N	0.72	0.74	0.28	0.18	0.28	0.25	0.52	0.33	0.98
8 - 9	2.15	0.44	N	1.02	1.29	0.42	0.12	0.24	0.38	0.61	0.25	1.25
9 - 10	0.67	0.32	N	1.31	2.25	0.24	0.18	0.44	0.31	0.84	0.22	1.14
10 - 11	0.48	0.35	N	2.66	1.39	0.25	0.28	0.48	0.32	1.51	0.25	1.83
11 - 12	0.66	0.25	N	3.26	0.62	0.16	0.27	0.28	0.67	1.32	0.31	1.76
12 - 13	0.89	0.30	N	2.59	0.02	0.37	0.38	0.32	2.59	0.24	0.27	1.03
13 - 14	0.25	0.41	0.43	0.73	0.35	1.46	0.34	0.48	1.08	0.30	0.21	1.06
14 - 15	0.31	0.49	0.56	0.40	0.31	0.43	0.60	1.42	1.86	0.53	0.27	0.66
15 - 16	0.15	0.72	0.44	0.41	0.71	0.47	0.42	0.26	1.08	0.35	0.31	0.40
16 - 17	0.15	1.74	0.80	0.56	1.21	0.12	0.47	0.20	0.80	0.66	0.56	0.84
17 - 18	0.14	0.73	0.41	0.37	0.53	0.60	0.41	0.82	1.08	0.33	0.30	1.37
18 - 19	0.26	0.37	0.27	0.19	0.43	0.51	1.21	0.30	0.93	0.32	0.54	0.99
19 - 20	0.33	0.19	0.13	0.24	0.75	0.34	1.52	0.03	1.12	0.38	0.67	1.25
20 - 21	0.26	0.29	0.20	0.41	1.19	0.35	0.40	0.55	1.18	0.69	0.40	0.20
21 - 22	0.65	0.15	0.25	0.70	0.52	0.39	0.40	0.43	2.36	0.55	0.27	0.16
22 - 23	0.32	0.24	0.37	0.33	0.26	0.26	0.41	0.50	0.97	0.27	0.24	0.25
23 - 24	0.35	0.27	1.13	0.21	0.19	0.28	0.30	0.26	0.50	0.37	0.25	0.45
24 - 25	0.23	0.21	1.05	0.71	0.27	0.54	0.36	0.56	N	0.30	0.24	0.44
25 - 26	0.24	0.10	1.14	0.24	0.18	0.73	0.30	1.37	1.12	0.31	0.28	0.47
26 - 27	0.13	0.13	0.59	0.16	0.13	0.46	0.25	N	1.04	0.40	0.28	0.27
27 - 28	0.27	N	0.80	0.12	0.18	0.33	0.43	N	0.79	0.28	0.58	0.24
28 - 29	0.59	N	1.51	0.12	0.14	0.51	0.55	0.35	1.83	0.35	0.14	0.23
29 - 30	0.73		1.71	0.16	0.32	0.47	0.25	0.29	0.59	0.98	0.21	0.14
30 - 31	0.40		1.48	0.11	0.38	0.19	0.49	0.37	0.67	1.28	0.25	0.29
31 - 1	0.51		0.37		0.38		0.22	0.26		1.03		0.46
Arithmetic Mean (3)	0.57	0.39	-	0.82	0.57	0.46	0.42	0.54	0.97	0.60	0.32	0.66
Standard Deviation (3)	0.48	0.33	-	0.88	0.50	0.32	0.29	0.37	0.57	0.37	0.12	0.49
Sample Size	31	24	20	30	31	30	31	29	29	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 2002 to December 2002

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.61	0.30	0.21	0.55	0.18	N	0.22	0.40	0.27	0.76	0.68	0.30
2 - 3	0.77	0.20	0.29	1.65	0.29	1.26	0.31	0.29	0.43	0.87	0.58	0.19
3 - 4	0.86	0.25	0.33	2.02	0.26	0.78	0.75	0.90	0.57	0.14	0.25	1.06
4 - 5	0.88	0.28	0.33	1.81	0.20	0.62	0.24	0.66	0.61	0.18	0.24	0.24
5 - 6	0.49	0.21	0.71	1.20	0.27	0.68	0.34	0.70	0.70	0.15	0.54	0.74
6 - 7	0.46	0.15	<0.03	0.57	0.27	1.42	0.66	0.59	0.28	0.10	0.19	0.97
7 - 8	0.69	0.33	0.46	0.59	0.67	0.70	0.49	1.12	0.26	0.27	0.16	0.61
8 - 9	1.30	0.37	0.37	0.66	0.49	0.98	0.40	0.27	0.60	0.29	0.24	0.89
9 - 10	1.90	0.13	0.25	0.65	0.60	0.55	0.50	0.41	0.48	0.47	0.29	0.52
10 - 11	1.14	0.19	0.31	1.52	1.58	0.27	0.53	0.39	0.58	0.67	0.31	0.42
11 - 12	1.14	0.20	0.21	1.76	0.48	0.29	0.31	0.67	1.43	0.98	0.31	0.56
12 - 13	1.12	0.19	0.20	0.45	1.18	0.29	0.72	0.46	1.04	0.67	0.26	1.79
13 - 14	1.07	0.10	0.21	0.12	0.88	0.42	1.21	0.33	0.67	0.87	0.33	1.57
14 - 15	0.79	0.17	0.41	0.51	N	0.55	1.10	0.76	0.39	0.27	0.21	2.12
15 - 16	0.38	0.35	0.79	0.44	N	0.33	0.48	0.64	0.19	0.10	0.55	1.16
16 - 17	1.10	1.11	0.87	0.72	1.89	0.86	1.38	0.71	0.69	0.20	0.36	1.82
17 - 18	0.37	0.59	1.17	1.48	0.94	0.59	1.16	1.72	0.43	0.43	0.11	0.27
18 - 19	0.52	0.23	0.81	0.62	0.57	0.32	0.29	1.05	0.18	0.41	0.44	0.45
19 - 20	0.33	0.20	0.55	1.16	0.56	0.41	0.82	0.61	0.89	0.38	0.93	0.81
20 - 21	0.35	N	0.54	1.03	1.44	0.66	0.53	0.33	0.40	0.44	0.78	1.81
21 - 22	0.74	0.19	0.35	0.66	0.68	0.65	0.32	0.30	0.27	0.69	0.39	1.31
22 - 23	0.32	0.09	0.37	0.58	0.46	0.39	0.47	0.29	0.07	0.56	0.22	0.72
23 - 24	0.51	0.11	0.29	0.54	0.33	0.32	0.25	0.25	0.09	0.22	N	0.37
24 - 25	0.30	0.33	1.15	0.90	0.26	0.58	0.22	0.36	0.37	0.27	N	0.47
25 - 26	0.30	0.24	0.82	0.21	0.31	0.42	0.56	0.14	0.45	0.15	N	0.69
26 - 27	0.21	0.16	0.61	0.20	0.34	0.30	0.61	0.50	0.30	0.16	N	0.31
27 - 28	0.27	N	1.11	0.24	0.70	0.26	1.56	0.89	0.69	0.11	0.91	0.24
28 - 29	0.23	N	1.81	0.18	0.49	0.32	0.72	0.44	1.02	0.13	0.59	0.29
29 - 30	0.35		1.65	0.18	0.34	0.24	2.06	0.35	1.12	0.40	0.32	0.22
30 - 31	0.44		1.90	0.32	0.23	0.24	2.11	0.29	0.58	0.44	0.39	1.22
31 - 1	0.31		1.02		N		1.63	0.68		0.77		0.65
Arithmetic Mean (3)	0.65	0.27	0.65	0.78	0.60	0.54	0.74	0.56	0.53	0.41	0.41	0.80
Standard Deviation (3)	0.40	0.21	0.49	0.55	0.44	0.30	0.53	0.33	0.32	0.26	0.23	0.55
Sample Size	31	25	31	30	28	29	31	31	30	31	26	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

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Nitrogen Dioxide
Concentration in air (ppb)

Monthly measurements, collection-day - non standard
Summary for January 2002 to December 2002

Site	Sampling Period	Start Date	End Date		Concentration (in ppb)
Goonhilly	1	28-Nov-2001	02-Jan-2002		6.56
	2	02-Jan-2002	01-Feb-2002		2.71
	3	01-Feb-2002	28-Feb-2002		1.76
	4	28-Feb-2002	13-Apr-2002	*	3.71
	5	13-Apr-2002	02-May-2002		1.49
	6	02-May-2002	30-May-2002		1.77
	7	30-May-2002	17-Jul-2002	*	1.21
	8	17-Jul-2002	16-Aug-2002		1.26
	9	16-Aug-2002	11-Sep-2002		1.48
	10	11-Sep-2002	10-Oct-2002		6.35
	11	10-Oct-2002	08-Nov-2002		2.98
	12	08-Nov-2002	05-Dec-2002		4.61
	13	05-Dec-2002	02-Jan-2003		N
	14				
		Annual Mean Concentration =			5.16
Yarner Wood	1	05-Dec-2001	02-Jan-2002		8.86
	2	02-Jan-2002	30-Jan-2002		5.26
	3	30-Jan-2002	27-Feb-2002		2.18
	4	27-Feb-2002	27-Mar-2002		3.41
	5	27-Mar-2002	24-Apr-2002		3.27
	6	24-Apr-2002	24-May-2002		N
	7	24-May-2002	19-Jun-2002		3.75
	8	19-Jun-2002	17-Jul-2002		1.34
	9	17-Jul-2002	14-Aug-2002		2.08
	10	14-Aug-2002	11-Sep-2002		1.01
	11	11-Sep-2002	09-Oct-2002		4.53
	12	09-Oct-2002	06-Nov-2002		4.26
	13	06-Nov-2002	04-Dec-2002		1.89
	14	04-Dec-2002	02-Jan-2003		9.74
		Annual Mean Concentration =			6.87
Barcombe Mills	1	03-Dec-2001	02-Jan-2002		11.06
	2	02-Jan-2002	29-Jan-2002		8.63
	3	29-Jan-2002	27-Feb-2002		5.21
	4	27-Feb-2002	27-Mar-2002		6.10
	5	27-Mar-2002	23-Apr-2002		6.18
	6	23-Apr-2002	21-May-2002		5.11
	7	21-May-2002	18-Jun-2002		3.71
	8	18-Jun-2002	18-Jul-2002		4.20
	9	18-Jul-2002	13-Aug-2002		3.81
	10	13-Aug-2002	29-Aug-2002		7.63
	11	29-Aug-2002	08-Oct-2002	*	3.09
	12	08-Oct-2002	31-Oct-2002		7.56
	13	31-Oct-2002	03-Dec-2002		7.45
	14	03-Dec-2002	31-Dec-2002		12.19
		Annual Mean Concentration =			11.72

Site	Sampling Period	Start Date/Time	End Date/Time	Concentration (in ppb)
Compton	1	03-Dec-2001	02-Jan-2002	15.39
	2	02-Jan-2002	28-Jan-2002	14.69
	3	28-Jan-2002	24-Feb-2002	8.97
	4	24-Feb-2002	25-Mar-2002	8.55
	5	25-Mar-2002	23-Apr-2002	8.12
	6	23-Apr-2002	20-May-2002	7.11
	7	20-May-2002	17-Jun-2002	7.14
	8	17-Jun-2002	15-Jul-2002	4.76
	9	15-Jul-2002	12-Aug-2002	5.98
	10	12-Aug-2002	10-Sep-2002	7.60
	11	10-Sep-2002	07-Oct-2002	8.92
	12	07-Oct-2002	04-Nov-2002	12.53
	13	04-Nov-2002	02-Dec-2002	13.45
	14	02-Dec-2002	30-Dec-2002	13.43
		Annual Mean Concentration =		17.97
Flatford Mill	1	27-Nov-2001	02-Jan-2002	11.44
	2	02-Jan-2002	29-Jan-2002	15.01
	3	29-Jan-2002	26-Feb-2002	8.25
	4	26-Feb-2002	25-Mar-2002	8.86
	5	25-Mar-2002	23-Apr-2002	5.85
	6	23-Apr-2002	21-May-2002	7.10
	7	21-May-2002	18-Jun-2002	2.94
	8	18-Jun-2002	16-Jul-2002	4.96
	9	16-Jul-2002	13-Aug-2002	2.75
	10	13-Aug-2002	10-Sep-2002	2.67
	11	10-Sep-2002	08-Oct-2002	6.81
	12	08-Oct-2002	05-Nov-2002	9.49
	13	05-Nov-2002	03-Dec-2002	10.23
	14	03-Dec-2002	31-Dec-2002	14.98
		Annual Mean Concentration =		15.54
Woburn	1	04-Dec-2001	02-Jan-2002	18.66
	2	02-Jan-2002	30-Jan-2002	14.97
	3	30-Jan-2002	26-Feb-2002	10.21
	4	26-Feb-2002	28-Mar-2002	10.77
	5	28-Mar-2002	24-Apr-2002	11.00
	6	24-Apr-2002	21-May-2002	9.10
	7	21-May-2002	19-Jun-2002	5.77
	8	19-Jun-2002	17-Jul-2002	7.31
	9	17-Jul-2002	13-Aug-2002	14.29
	10	13-Aug-2002	11-Sep-2002	10.35
	11	11-Sep-2002	09-Oct-2002	17.73
	12	09-Oct-2002	07-Nov-2002	15.20
	13	07-Nov-2002	03-Dec-2002	17.43
	14	03-Dec-2002	02-Jan-2003	17.42
		Annual Mean Concentration =		23.88

Notes: * denotes extended sampling period (greater than the expected 4 or 5 week period). N denotes missing sample. Annual mean concentration only given 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 2002 to December 2002

Site	Sampling Period	Start Date	End Date		Concentration (in ppb)
Tycanol Wood	1	28-Nov-2001	03-Jan-2002		7.15
	2	03-Jan-2002	30-Jan-2002		5.49
	3	30-Jan-2002	27-Feb-2002		0.86
	4	27-Feb-2002	27-Mar-2002		2.14
	5	27-Mar-2002	27-Apr-2002		2.19
	6	27-Apr-2002	23-May-2002		2.01
	7	23-May-2002	19-Jun-2002		1.40
	8	19-Jun-2002	17-Jul-2002		1.62
	9	17-Jul-2002	14-Aug-2002		1.36
	10	14-Aug-2002	11-Sep-2002		1.16
	11	11-Sep-2002	08-Oct-2002		3.78
	12	08-Oct-2002	06-Nov-2002		4.00
	13	06-Nov-2002	04-Dec-2002		3.10
	14	04-Dec-2002	31-Dec-2002		8.48
		Annual Mean Concentration =			5.60
Llyn Brianne	1	30-Jan-2001	31-Dec-2001	*	N
	2	01-Jan-2002	04-Mar-2002	*	N
	3	04-Mar-2002	27-Mar-2002		3.61
	4	27-Mar-2002	24-Apr-2002		3.41
	5	24-Apr-2002	22-May-2002		2.30
	6	22-May-2002	19-Jun-2002		1.27
	7	19-Jun-2002	17-Jul-2002		1.27
	8	17-Jul-2002	14-Aug-2002		1.10
	9	14-Aug-2002	11-Sep-2002		1.17
	10	11-Sep-2002	11-Oct-2002		4.97
	11	11-Oct-2002	06-Nov-2002		4.20
	12	06-Nov-2002	04-Dec-2002		4.45
	13	04-Dec-2002	06-Jan-2003		10.97
	14				
		Annual Mean Concentration =			6.78
Pumlumon	1	04-Dec-2001	03-Jan-2002		6.38
	2	03-Jan-2002	29-Jan-2002		3.89
	3	29-Jan-2002	26-Feb-2002		1.41
	4	26-Feb-2002	26-Mar-2002		2.80
	5	26-Mar-2002	23-Apr-2002		2.55
	6	23-Apr-2002	21-May-2002		1.78
	7	21-May-2002	18-Jun-2002		1.33
	8	18-Jun-2002	16-Jul-2002		1.26
	9	16-Jul-2002	20-Aug-2002		0.89
	10	20-Aug-2002	10-Sep-2002		0.79
	11	10-Sep-2002	08-Oct-2002		3.50
	12	08-Oct-2002	05-Nov-2002		4.46
	13	05-Nov-2002	03-Dec-2002		2.84
	14	03-Dec-2002	07-Jan-2003		9.30
		Annual Mean Concentration =			5.51

Site	Sampling Period	Start Date/Time	End Date/Time		Concentration (in ppb)
Stoke Ferry	1	04-Dec-2001	02-Jan-2002		12.47
	2	02-Jan-2002	28-Jan-2002		17.96
	3	28-Jan-2002	26-Feb-2002		9.88
	4	26-Feb-2002	26-Mar-2002		7.79
	5	26-Mar-2002	23-Apr-2002		4.76
	6	23-Apr-2002	21-May-2002		5.39
	7	21-May-2002	18-Jun-2002		5.52
	8	18-Jun-2002	16-Jul-2002		5.21
	9	16-Jul-2002	13-Aug-2002		3.52
	10	13-Aug-2002	10-Sep-2002		4.45
	11	10-Sep-2002	08-Oct-2002		7.04
	12	08-Oct-2002	05-Nov-2002		10.34
	13	05-Nov-2002	03-Dec-2002		13.05
	14	03-Dec-2002	02-Jan-2003		13.31
		Annual Mean Concentration =			15.96
Preston Montford	1	04-Dec-2001	02-Jan-2002		23.43
	2	02-Jan-2002	30-Jan-2002		8.81
	3	30-Jan-2002	24-Feb-2002		3.69
	4	24-Feb-2002	24-Mar-2002		N
	5	24-Mar-2002	24-Apr-2002		9.67
	6	24-Apr-2002	19-May-2002		N
	7	19-May-2002	16-Jun-2002		5.86
	8	16-Jun-2002	14-Jul-2002		4.46
	9	14-Jul-2002	23-Aug-2002	*	3.24
	10	23-Aug-2002	16-Sep-2002		5.63
	11	16-Sep-2002	06-Oct-2002		9.77
	12	06-Oct-2002	03-Nov-2002		11.15
	13	03-Nov-2002	01-Dec-2002		10.10
	14	01-Dec-2002	29-Dec-2002		16.32
		Annual Mean Concentration =			15.31
Bottesford	1	04-Dec-2001	02-Jan-2002		15.30
	2	02-Jan-2002	29-Jan-2002		13.82
	3	29-Jan-2002	26-Feb-2002		9.64
	4	26-Feb-2002	26-Mar-2002		7.93
	5	26-Mar-2002	23-Apr-2002		5.41
	6	23-Apr-2002	21-May-2002		5.44
	7	21-May-2002	18-Jun-2002		3.60
	8	18-Jun-2002	16-Jul-2002		5.85
	9	16-Jul-2002	13-Aug-2002		2.01
	10	13-Aug-2002	25-Sep-2002	*	6.79
	11	25-Sep-2002	22-Oct-2002		5.33
	12	22-Oct-2002	19-Nov-2002		11.05
	13	19-Nov-2002	02-Dec-2002		15.52
	14	02-Dec-2002	03-Jan-2003		13.98
		Annual Mean Concentration =			15.13

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

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Site	Sampling Period	Start Date	End Date		Concentration (in ppb)
Llyn Llydaw	1	05-Dec-2001	02-Jan-2002		3.18
	2	02-Jan-2002	30-Jan-2002		0.11
	3	30-Jan-2002	27-Feb-2002		1.16
	4	27-Feb-2002	27-Mar-2002		2.31
	5	27-Mar-2002	24-Apr-2002		2.31
	6	24-Apr-2002	22-May-2002		1.96
	7	22-May-2002	19-Jun-2002		1.06
	8	19-Jun-2002	17-Jul-2002		1.36
	9	17-Jul-2002	11-Sep-2002	*	1.33
	10	11-Sep-2002	09-Oct-2002		3.48
	11	09-Oct-2002	06-Nov-2002		3.94
	12	06-Nov-2002	11-Dec-2002		3.81
	13	11-Dec-2002	01-Jan-2003		7.45
	14				
		Annual Mean Concentration =			4.91
Wardlow Hay Cop	1	31-Dec-2001	29-Jan-2002		14.38
	2	29-Jan-2002	24-Feb-2002		8.64
	3	24-Feb-2002	24-Mar-2002		8.92
	4	24-Mar-2002	21-Apr-2002		7.69
	5	21-Apr-2002	19-May-2002		6.40
	6	19-May-2002	17-Jun-2002		4.17
	7	17-Jun-2002	14-Jul-2002		4.90
	8	14-Jul-2002	11-Aug-2002		5.37
	9	11-Aug-2002	08-Sep-2002		5.97
	10	08-Sep-2002	06-Oct-2002		8.66
	11	06-Oct-2002	03-Nov-2002		11.72
	12	03-Nov-2002	01-Dec-2002		14.02
	13	01-Dec-2002	29-Dec-2002		17.07
	14	29-Dec-2002	26-Jan-2003		9.34
		Annual Mean Concentration =			17.45
Driby	1	05-Dec-2001	04-Jan-2002		11.44
	2	04-Jan-2002	30-Jan-2002		13.16
	3	30-Jan-2002	27-Feb-2002		7.33
	4	27-Feb-2002	27-Mar-2002		6.50
	5	27-Mar-2002	01-May-2002		4.05
	6	01-May-2002	29-May-2002		3.47
	7	29-May-2002	27-Jun-2002		3.46
	8	27-Jun-2002	17-Jul-2002		4.32
	9	17-Jul-2002	21-Aug-2002		3.07
	10	21-Aug-2002	11-Sep-2002		4.68
	11	11-Sep-2002	09-Oct-2002		6.09
	12	09-Oct-2002	06-Nov-2002		7.68
	13	06-Nov-2002	04-Dec-2002		10.73
	14	04-Dec-2002	15-Jan-2003	*	9.68
		Annual Mean Concentration =			12.39

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 =			14.98
Thorganby	1	05-Dec-2001	02-Jan-2002		13.04
	2	02-Jan-2002	30-Jan-2002		13.94
	3	30-Jan-2002	27-Mar-2002	*	N
	4	27-Mar-2002	24-Apr-2002		4.94
	5	24-Apr-2002	22-May-2002		5.56
	6	22-May-2002	12-Jun-2002		5.79
	7	12-Jun-2002	17-Jul-2002		4.53
	8	17-Jul-2002	14-Aug-2002		4.75
	9	14-Aug-2002	11-Sep-2002		5.09
	10	11-Sep-2002	09-Oct-2002		7.66
	11	09-Oct-2002	06-Nov-2002		8.77
	12	06-Nov-2002	04-Dec-2002		14.37
	13	04-Dec-2002	02-Jan-2003		10.41
	14				
		Annual Mean Concentration =			14.98
High Muffles	1	05-Dec-2001	02-Jan-2002		10.47
	2	02-Jan-2002	30-Jan-2002		11.93
	3	30-Jan-2002	27-Feb-2002		5.34
	4	27-Feb-2002	27-Mar-2002		3.87
	5	27-Mar-2002	24-Apr-2002		N
	6	24-Apr-2002	22-May-2002		3.13
	7	22-May-2002	19-Jun-2002		3.99
	8	19-Jun-2002	17-Jul-2002		2.97
	9	17-Jul-2002	14-Aug-2002		2.26
	10	14-Aug-2002	11-Sep-2002		2.61
	11	11-Sep-2002	09-Oct-2002		3.62
	12	09-Oct-2002	05-Nov-2002		5.93
	13	05-Nov-2002	04-Dec-2002		8.93
	14	04-Dec-2002	01-Jan-2003		6.28
		Annual Mean Concentration =			9.80

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Site	Sampling Period	Start Date	End Date		Concentration (in ppb)
Bannisdale	1	04-Dec-2001	06-Jan-2002		8.09
	2	06-Jan-2002	30-Jan-2002		6.47
	3	30-Jan-2002	02-Mar-2002		2.78
	4	02-Mar-2002	24-Mar-2002		2.95
	5	24-Mar-2002	24-Apr-2002		4.93
	6	24-Apr-2002	19-May-2002		2.79
	7	19-May-2002	16-Jun-2002		2.84
	8	16-Jun-2002	15-Jul-2002		1.51
	9	15-Jul-2002	12-Aug-2002		1.31
	10	12-Aug-2002	11-Sep-2002		1.78
	11	11-Sep-2002	06-Oct-2002		4.02
	12	06-Oct-2002	03-Nov-2002		4.44
	13	03-Nov-2002	01-Dec-2002		7.01
	14	01-Dec-2002	01-Jan-2003		5.42
		Annual Mean Concentration =			7.23
Hillsborough Forest	1	12-Dec-2001	16-Jan-2002		8.16
	2	16-Jan-2002	27-Feb-2002	*	3.28
	3	27-Feb-2002	13-Mar-2002		4.19
	4	13-Mar-2002	27-Mar-2002		5.35
	5	27-Mar-2002	25-Apr-2002		3.78
	6	25-Apr-2002	06-Jun-2002	*	2.62
	7	06-Jun-2002	20-Jun-2002		2.74
	8	20-Jun-2002	18-Jul-2002		2.49
	9	18-Jul-2002	28-Aug-2002	*	3.62
	10	28-Aug-2002	25-Sep-2002		4.86
	11	25-Sep-2002	09-Oct-2002		4.73
	12	09-Oct-2002	06-Nov-2002		6.50
	13	06-Nov-2002	18-Dec-2002	*	8.14
	14	18-Dec-2002	08-Jan-2003		12.27
		Annual Mean Concentration =			9.31
Lough Navar	1	31-Dec-2001	28-Jan-2002		2.09
	2	28-Jan-2002	25-Feb-2002		1.03
	3	25-Feb-2002	25-Mar-2002		1.57
	4	25-Mar-2002	22-Apr-2002		1.02
	5	22-Apr-2002	20-May-2002		1.58
	6	20-May-2002	17-Jun-2002		1.08
	7	17-Jun-2002	15-Jul-2002		4.78
	8	15-Jul-2002	12-Aug-2002		0.36
	9	12-Aug-2002	09-Sep-2002		0.45
	10	09-Sep-2002	07-Oct-2002		1.80
	11	07-Oct-2002	03-Nov-2002		1.76
	12	03-Nov-2002	01-Dec-2002		1.99
	13	01-Dec-2002	30-Dec-2002		2.65
	14	30-Dec-2002	27-Jan-2003		2.17
		Annual Mean Concentration =			2.80

Site	Sampling Period	Start Date/Time	End Date/Time		Concentration (in ppb)
Cow Green Reservoir	1	05-Dec-2001	07-Jan-2002		5.75
	2	07-Jan-2002	30-Jan-2002		5.91
	3	30-Jan-2002	27-Feb-2002		2.42
	4	27-Feb-2002	27-Mar-2002		3.81
	5	27-Mar-2002	23-Apr-2002		4.13
	6	23-Apr-2002	20-May-2002		3.21
	7	20-May-2002	19-Jun-2002		2.61
	8	19-Jun-2002	17-Jul-2002		1.58
	9	17-Jul-2002	13-Aug-2002		2.06
	10	13-Aug-2002	10-Sep-2002		2.84
	11	10-Sep-2002	08-Oct-2002		3.33
	12	08-Oct-2002	14-Nov-2002		4.31
	13	14-Nov-2002	06-Dec-2002		10.38
	14	06-Dec-2002	06-Jan-2003		7.60
		Annual Mean Concentration =			7.79
Loch Dee	1	03-Dec-2001	07-Jan-2002		4.24
	2	07-Jan-2002	01-Feb-2002		4.74
	3	01-Feb-2002	02-Apr-2002	*	1.71
	4	02-Apr-2002	01-May-2002		1.48
	5	01-May-2002	07-Jun-2002		0.69
	6	07-Jun-2002	01-Jul-2002		N
	7	01-Jul-2002	01-Oct-2002	*	1.06
	8	01-Oct-2002	04-Nov-2002		2.90
	9	04-Nov-2002	02-Dec-2002		4.60
	10	02-Dec-2002	06-Jan-2003		4.71
	11				
	12				
	13				
	14				
		Annual Mean Concentration =			4.41
Redesdale	1	31-Dec-2001	31-Jan-2002		6.83
	2	31-Jan-2002	24-Feb-2002		2.91
	3	24-Feb-2002	24-Mar-2002		2.66
	4	24-Mar-2002	23-Apr-2002		3.03
	5	23-Apr-2002	19-May-2002		2.67
	6	19-May-2002	17-Jun-2002		2.07
	7	17-Jun-2002	16-Jul-2002		1.44
	8	16-Jul-2002	13-Aug-2002		1.10
	9	13-Aug-2002	10-Sep-2002		2.25
	10	10-Sep-2002	07-Oct-2002		2.41
	11	07-Oct-2002	05-Nov-2002		3.95
	12	05-Nov-2002	03-Dec-2002		8.84
	13	03-Dec-2002	02-Jan-2003		6.65
	14				
		Annual Mean Concentration =			6.98

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Site	Sampling Period	Start Date	End Date		Concentration (in ppb)
Eskdalemuir	1	01-Jan-2002	27-Jan-2002		5.70
	2	27-Jan-2002	27-Feb-2002		1.59
	3	27-Feb-2002	27-Mar-2002		1.68
	4	27-Mar-2002	24-Apr-2002		1.69
	5	24-Apr-2002	22-May-2002		1.60
	6	22-May-2002	22-Jun-2002		1.41
	7	22-Jun-2002	17-Jul-2002		1.55
	8	17-Jul-2002	11-Sep-2002	*	0.76
	9	11-Sep-2002	10-Oct-2002		1.90
	10	10-Oct-2002	06-Nov-2002		1.98
	11	06-Nov-2002	04-Dec-2002		4.21
	12	04-Dec-2002	17-Jan-2003	*	2.68
	13				
	14				
		Annual Mean Concentration =			4.02
Whiteadder	1	31-Dec-2001	28-Jan-2002		3.68
	2	28-Jan-2002	25-Feb-2002		2.57
	3	25-Feb-2002	08-Apr-2002	*	2.22
	4	08-Apr-2002	22-Apr-2002		2.23
	5	22-Apr-2002	20-May-2002		2.40
	6	20-May-2002	17-Jun-2002		2.09
	7	17-Jun-2002	15-Jul-2002		1.38
	8	15-Jul-2002	14-Aug-2002		0.98
	9	14-Aug-2002	11-Sep-2002		2.23
	10	11-Sep-2002	06-Oct-2002		4.03
	11	06-Oct-2002	18-Nov-2002	*	3.15
	12	18-Nov-2002	02-Dec-2002		8.72
	13	02-Dec-2002	30-Dec-2002		5.97
	14	30-Dec-2002	27-Jan-2003		3.88
		Annual Mean Concentration =			5.72
Balquhidder 2	1	30-Dec-2001	26-Jan-2002		3.52
	2	26-Jan-2002	25-Feb-2002		1.24
	3	25-Feb-2002	08-Apr-2002	*	1.36
	4	08-Apr-2002	20-Apr-2002		2.77
	5	20-Apr-2002	28-May-2002		1.77
	6	28-May-2002	16-Jun-2002		1.95
	7	16-Jun-2002	15-Jul-2002		< 0.31
	8	15-Jul-2002	12-Aug-2002		< 0.33
	9	12-Aug-2002	16-Sep-2002		< 0.26
	10	16-Sep-2002	06-Oct-2002		2.14
	11	06-Oct-2002	03-Nov-2002		2.32
	12	03-Nov-2002	01-Dec-2002		5.76
	13	01-Dec-2002	29-Dec-2002		2.70
	14	29-Dec-2002	27-Jan-2003		1.62
		Annual Mean Concentration =			3.60

Site	Sampling Period	Start Date/Time	End Date/Time		Concentration (in ppb)
Polloch	1	01-Jan-2002	29-Jan-2002		1.77
	2	29-Jan-2002	26-Feb-2002		0.64
	3	26-Feb-2002	26-Mar-2002		0.45
	4	26-Mar-2002	24-Apr-2002		0.83
	5	24-Apr-2002	21-May-2002		0.43
	6	21-May-2002	18-Jun-2002		0.99
	7	18-Jun-2002	16-Jul-2002		0.81
	8	16-Jul-2002	13-Aug-2002		< 0.33
	9	13-Aug-2002	10-Sep-2002		< 0.32
	10	10-Sep-2002	08-Oct-2002		0.54
	11	08-Oct-2002	04-Nov-2002		0.69
	12	04-Nov-2002	03-Dec-2002		1.69
	13	03-Dec-2002	31-Dec-2002		0.89
	14				
		Annual Mean Concentration =			1.50
Glen Dye	1	11-Dec-2001	15-Jan-2002		3.00
	2	15-Jan-2002	29-Jan-2002		2.66
	3	29-Jan-2002	25-Feb-2002		2.20
	4	25-Feb-2002	26-Mar-2002		1.30
	5	26-Mar-2002	23-Apr-2002		1.75
	6	23-Apr-2002	21-May-2002		1.86
	7	21-May-2002	18-Jun-2002		1.99
	8	18-Jun-2002	18-Jul-2002		1.23
	9	18-Jul-2002	13-Aug-2002		< 0.35
	10	13-Aug-2002	10-Sep-2002		0.91
	11	10-Sep-2002	08-Oct-2002		2.28
	12	08-Oct-2002	05-Nov-2002		1.95
	13	05-Nov-2002	03-Dec-2002		3.60
	14	03-Dec-2002	04-Jan-2003		2.69
		Annual Mean Concentration =			3.67
Allt a´ Mharcaidh	1	31-Dec-2001	11-Feb-2002	*	1.51
	2	11-Feb-2002	26-Feb-2002		0.99
	3	26-Feb-2002	25-Mar-2002		0.74
	4	25-Mar-2002	22-Apr-2002		0.95
	5	22-Apr-2002	20-May-2002		0.69
	6	20-May-2002	17-Jun-2002		1.09
	7	17-Jun-2002	15-Jul-2002		0.93
	8	15-Jul-2002	12-Aug-2002		0.22
	9	12-Aug-2002	09-Sep-2002		< 0.33
	10	09-Sep-2002	07-Oct-2002		1.22
	11	07-Oct-2002	04-Nov-2002		0.65
	12	04-Nov-2002	02-Dec-2002		2.46
	13	02-Dec-2002	30-Dec-2002		1.84
	14	30-Dec-2002	27-Jan-2003		0.99
		Annual Mean Concentration =			2.03

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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	01-Jan-2002	29-Jan-2002		1.05		1			
	2	29-Jan-2002	27-Feb-2002		2.21		2			
	3	27-Feb-2002	25-Mar-2002		0.50		3			
	4	25-Mar-2002	22-Apr-2002		0.70		4			
	5	22-Apr-2002	19-May-2002		0.74		5			
	6	19-May-2002	16-Jun-2002		1.07		6			
	7	16-Jun-2002	14-Jul-2002		0.64		7			
	8	14-Jul-2002	11-Aug-2002		< 0.33		8			
	9	11-Aug-2002	08-Sep-2002		< 0.33		9			
	10	08-Sep-2002	06-Oct-2002		0.67		10			
	11	06-Oct-2002	04-Nov-2002		1.32		11			
	12	04-Nov-2002	01-Dec-2002		2.04		12			
	13	01-Dec-2002	31-Dec-2002		1.02		13			
	14						14			
		Annual Mean Concentration =			1.83			Annual Mean Concentration =		
Achanarras	1	05-Dec-2001	02-Jan-2002		1.55		1			
	2	02-Jan-2002	30-Jan-2002		2.09		2			
	3	30-Jan-2002	27-Feb-2002		1.05		3			
	4	27-Feb-2002	27-Mar-2002		1.05		4			
	5	27-Mar-2002	27-Apr-2002		1.05		5			
	6	27-Apr-2002	22-May-2002		1.15		6			
	7	22-May-2002	19-Jun-2002		1.23		7			
	8	19-Jun-2002	14-Aug-2002	*	0.87		8			
	9	14-Aug-2002	11-Sep-2002		0.45		9			
	10	11-Sep-2002	09-Oct-2002		1.24		10			
	11	09-Oct-2002	06-Nov-2002		0.92		11			
	12	06-Nov-2002	04-Dec-2002		3.55		12			
	13	04-Dec-2002	01-Jan-2003		3.01		13			
	14						14			
		Annual Mean Concentration =			2.74			Annual Mean Concentration =		
Forsinard	1	30-Dec-2001	27-Jan-2002		1.00		1			
	2	27-Jan-2002	24-Feb-2002		0.84		2			
	3	24-Feb-2002	24-Mar-2002		0.80		3			
	4	24-Mar-2002	22-Apr-2002		0.96		4			
	5	22-Apr-2002	20-May-2002		0.80		5			
	6	20-May-2002	15-Jun-2002		1.46		6			
	7	15-Jun-2002	15-Jul-2002		1.07		7			
	8	15-Jul-2002	12-Aug-2002		0.29		8			
	9	12-Aug-2002	11-Sep-2002		< 0.31		9			
	10	11-Sep-2002	07-Oct-2002		1.07		10			
	11	07-Oct-2002	04-Nov-2002		0.98		11			
	12	04-Nov-2002	02-Dec-2002		3.09		12			
	13	02-Dec-2002	30-Dec-2002		2.04		13			
	14	30-Dec-2002	27-Jan-2003		0.59		14			
		Annual Mean Concentration =			2.13			Annual Mean Concentration =		

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

Appendix 5
Denuder Measurements

Table A5.1 provides a listing of the measurements and the 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 Bonnington	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 2002.***

Nitric Acid: μg HNO_3 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-02	0.52	**0.40** [2]	1.48	0.37	0.69	2.69	1.44	0.88	1.32	1.71	0.27	0.52
Feb-02	0.24	0.16	0.92	0.12	0.17	0.48	0.82	0.41	0.65	1.49	0.11	0.15
Mar-02	0.51	0.70	1.80	0.10	0.35	0.60	1.00	0.51	**0.74** [2]	1.60	0.38	0.46
Apr-02	0.73	0.69	1.83	0.45	0.45	1.05	1.47	1.02	1.43	1.84	0.04	0.74
May-02	0.51	**ND** [1]	1.67	0.19	0.34	0.69	1.07	0.83	1.10	1.65	0.28	0.60
Jun-02	0.28	**0.28** [2]	0.89	0.10	0.13	0.58	0.86	0.22	1.07	1.14	0.11	0.10
Jul-02	0.43	0.30	1.94	0.11	0.35	0.79	1.30	0.45	1.20	1.52	0.13	**ND** [1]
Aug-02	0.73	0.30	2.29	0.22	0.22	0.73	1.23	0.59	1.92	2.12	0.13	0.29
Sep-02	0.82	**0.15** [2]	2.69	0.20	0.69	0.90	1.18	**1.11** [2]	1.64	1.95	0.34	0.83
Oct-02	0.60	**0.39** [2]	2.18	0.25	0.39	0.84	1.48	0.64	1.45	1.88	0.26	0.57
Nov-02	0.80	**ND** [1]	1.99	0.40	0.63	1.52	1.19	0.33	1.01	1.59	0.18	0.36
Dec-02	1.06	0.74	2.20	0.36	0.56	1.56	1.78	0.86	1.75	2.58	0.50	0.83
Mean	0.60	0.41	1.82	0.24	0.41	1.04	1.24	0.65	1.27	1.76	0.23	0.50
Min	0.24	0.15	0.89	0.10	0.13	0.48	0.82	0.22	0.65	1.14	0.04	0.10
Max	1.06	0.74	2.69	0.45	0.69	2.69	1.78	1.11	1.92	2.58	0.50	0.83
SD	0.24	0.22	0.53	0.13	0.19	0.62	0.28	0.28	0.39	0.36	0.13	0.25
CV (%)	39.4	53.8	29.2	53.2	46.6	60.1	22.6	43.3	30.6	20.7	59.0	50.8
N	12	10	12	12	12	12	12	12	12	12	12	11

Aerosol Nitrate: μg NO_3^- 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-02	1.65	**0.66** [2]	2.98	0.36	1.54	3.11	3.75	2.21	1.72	4.11	1.01	1.32
Feb-02	0.30	0.16	1.88	0.03	0.39	0.94	1.96	0.89	1.92	1.55	0.15	0.37
Mar-02	3.28	4.28	5.80	0.25	0.54	2.06	3.62	2.04	**2.39** [2]	5.97	2.89	2.63
Apr-02	3.27	1.65	6.00	1.76	2.48	5.04	8.14	4.65	7.80	5.33	0.12	3.98
May-02	1.27	**ND** [1]	3.48	0.43	1.01	1.78	3.37	2.24	3.11	1.33	1.00	1.82
Jun-02	0.81	**0.57** [2]	1.91	0.34	0.71	1.58	2.13	0.79	1.04	1.67	0.41	0.84
Jul-02	0.71	0.36	1.84	0.15	0.57	1.23	1.88	0.75	1.26	1.72	0.34	**ND** [1]
Aug-02	0.98	0.80	3.02	0.36	0.61	1.62	3.55	1.76	2.21	2.90	0.26	1.20
Sep-02	2.21	**1.17** [2]	3.14	0.66	1.31	2.09	2.39	**1.69** [2]	2.59	3.94	1.71	3.19
Oct-02	1.17	**0.92** [2]	3.64	0.41	0.94	1.83	3.40	1.63	3.05	3.74	1.06	1.68
Nov-02	1.38	**ND** [1]	2.97	0.43	1.07	2.41	3.36	0.94	2.67	3.62	0.42	0.75
Dec-02	1.57	0.75	3.70	0.58	1.14	2.23	4.73	1.83	3.29	4.61	2.00	1.61
Mean	1.55	1.13	3.36	0.48	1.03	2.16	3.52	1.78	2.75	3.38	0.95	1.76
Min	0.30	0.16	1.84	0.03	0.39	0.94	1.88	0.75	1.04	1.33	0.12	0.37
Max	3.28	4.28	6.00	1.76	2.48	5.04	8.14	4.65	7.80	5.97	2.89	3.98
SD	0.94	1.18	1.36	0.44	0.57	1.07	1.69	1.06	1.74	1.55	0.86	1.10
CV (%)	60.8	104.3	40.3	91.1	55.6	49.3	47.8	59.2	63.2	46.1	91.0	62.3
N	12	10	12	12	12	12	12	12	12	12	12	11

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

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 2002.***

Sulphur Dioxide: μg SO_2 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-02	1.09	**0.69** [2]	1.87	0.64	1.49	5.35	2.04	0.92	2.02	4.03	0.30	0.73
Feb-02	0.51	0.27	2.15	0.13	0.26	1.56	1.63	1.16	2.09	6.86	0.19	0.30
Mar-02	1.19	1.54	3.02	0.21	0.94	2.97	2.26	0.75	**1.57** [2]	5.44	0.77	0.87
Apr-02	1.62	0.40	2.01	0.24	0.75	3.27	2.12	1.30	2.02	4.85	0.03	1.98
May-02	2.26	**ND** [1]	1.97	0.11	0.42	2.59	1.62	0.91	1.28	2.90	0.30	1.04
Jun-02	0.88	**0.53** [2]	1.18	0.12	0.13	1.42	1.27	0.27	0.68	2.33	0.13	0.07
Jul-02	1.40	0.34	2.08	0.04	0.17	3.63	1.61	0.32	1.53	2.87	0.10	**ND** [1]
Aug-02	1.71	0.11	2.43	0.03	0.12	1.66	1.19	0.58	1.57	4.15	0.08	0.20
Sep-02	2.47	**0.49** [2]	2.52	0.27	1.12	3.40	1.69	**1.92** [2]	1.99	4.06	0.40	2.06
Oct-02	1.33	**0.73** [2]	3.02	0.23	0.74	2.86	2.18	0.80	1.85	3.72	0.37	1.07
Nov-02	1.77	**ND** [1]	2.78	0.88	1.38	5.01	2.03	0.36	1.67	3.35	0.33	0.49
Dec-02	2.20	1.24	4.03	0.28	1.27	4.25	2.76	1.22	2.86	5.72	0.90	1.89
Mean	1.54	0.63	2.42	0.27	0.73	3.16	1.87	0.88	1.76	4.19	0.33	0.97
Min	0.51	0.11	1.18	0.03	0.12	1.42	1.19	0.27	0.68	2.33	0.03	0.07
Max	2.47	1.54	4.03	0.88	1.49	5.35	2.76	1.92	2.86	6.86	0.90	2.06
SD	0.59	0.44	0.73	0.25	0.51	1.28	0.45	0.48	0.53	1.32	0.27	0.72
CV (%)	38.3	70.0	30.1	93.9	69.5	40.4	24.0	54.8	29.9	31.6	82.0	74.3
N	12	10	12	12	12	12	12	12	12	12	12	11

Aerosol Sulphate: μg SO_4^{2-} 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-02	1.33	**0.38** [2]	1.47	0.54	1.28	1.87	1.75	1.66	2.11	2.23	1.08	1.21
Feb-02	0.56	0.40	1.24	0.32	0.60	0.85	1.24	1.08	1.57	1.45	0.59	0.83
Mar-02	1.43	2.08	2.53	0.53	0.27	1.34	1.84	1.35	**1.60** [2]	2.53	2.32	1.54
Apr-02	2.18	1.32	2.93	1.54	2.08	2.32	3.39	2.33	3.95	1.89	0.30	2.93
May-02	1.21	**ND** [1]	2.10	0.57	1.02	1.30	2.11	1.79	2.23	0.78	0.92	1.53
Jun-02	0.93	**0.46** [2]	1.90	0.55	0.91	1.26	1.50	1.02	1.14	1.62	0.80	1.01
Jul-02	1.25	0.47	2.05	0.40	1.02	1.72	1.76	0.97	1.53	1.76	0.86	**ND** [1]
Aug-02	1.09	0.73	2.56	0.63	0.80	1.82	3.08	1.79	2.38	2.76	0.46	1.10
Sep-02	1.74	**0.81** [2]	2.00	0.81	1.39	1.51	1.47	**1.05** [2]	1.96	2.17	1.69	2.71
Oct-02	0.76	**0.46** [2]	1.49	0.60	0.75	1.02	1.53	0.97	1.58	1.67	0.66	0.95
Nov-02	1.39	**ND** [1]	1.39	0.52	0.72	1.33	1.33	1.00	1.64	1.63	0.59	0.71
Dec-02	1.09	0.76	2.14	0.70	1.12	1.84	2.55	1.40	2.43	2.54	1.46	1.19
Mean	1.25	0.79	1.98	0.64	1.00	1.52	1.96	1.37	2.01	1.92	0.98	1.43
Min	0.56	0.38	1.24	0.32	0.27	0.85	1.24	0.97	1.14	0.78	0.30	0.71
Max	2.18	2.08	2.93	1.54	2.08	2.32	3.39	2.33	3.95	2.76	2.32	2.93
SD	0.43	0.54	0.52	0.31	0.46	0.41	0.69	0.44	0.73	0.56	0.58	0.74
CV (%)	34.6	68.1	26.3	48.2	45.9	27.3	35.4	32.1	36.1	29.0	59.5	51.5
N	12	10	12	12	12	12	12	12	12	12	12	11

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

Table A5.1c ***Monthly Concentrations of HCl and of Aerosol Cl⁻ Measured at the 12 Monitoring Sites in the Nitric Acid Monitoring Network in 2002.***

Hydrochloric Acid: μg HCl 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-02	0.16	**0.44** [2]	0.25	0.20	0.25	0.31	0.30	0.33	0.36	0.24	0.11	0.18
Feb-02	0.17	0.16	0.32	0.21	0.11	0.18	0.39	0.26	0.46	0.46	0.12	0.19
Mar-02	0.34	0.50	0.47	0.48	0.24	0.31	0.30	0.32	**0.33** [2]	0.47	0.25	0.32
Apr-02	0.30	0.48	0.36	0.31	0.22	0.28	0.39	0.33	0.32	0.47	0.05	0.27
May-02	0.22	**ND** [1]	0.46	0.19	0.21	0.28	0.35	0.30	0.39	0.41	0.14	0.33
Jun-02	0.18	**0.23** [2]	0.22	0.11	0.11	0.18	0.41	0.20	0.30	0.34	0.10	0.09
Jul-02	0.11	0.09	0.24	0.09	0.16	0.95	0.61	0.21	0.36	0.31	0.06	**ND** [1]
Aug-02	0.32	0.13	0.25	0.20	0.08	0.15	0.27	0.19	0.20	0.27	0.11	0.10
Sep-02	0.13	**0.08** [2]	0.51	0.17	0.18	0.27	0.36	**0.28** [2]	0.39	0.34	0.12	0.25
Oct-02	0.20	**0.51** [2]	0.29	0.17	0.17	0.26	0.25	0.23	0.23	0.26	0.09	0.24
Nov-02	0.28	**ND** [1]	0.26	0.25	0.23	0.44	0.26	0.18	0.33	0.28	0.23	0.28
Dec-02	0.22	0.58	0.46	0.32	0.34	0.71	0.35	0.44	0.32	0.48	0.17	0.37
Mean	0.22	0.32	0.34	0.22	0.19	0.36	0.35	0.27	0.33	0.36	0.13	0.24
Min	0.11	0.08	0.22	0.09	0.08	0.15	0.25	0.18	0.20	0.24	0.05	0.09
Max	0.34	0.58	0.51	0.48	0.34	0.95	0.61	0.44	0.46	0.48	0.25	0.37
SD	0.08	0.20	0.11	0.11	0.07	0.24	0.10	0.08	0.07	0.09	0.06	0.09
CV (%)	34.2	62.1	31.1	47.4	37.6	65.9	27.6	27.9	21.2	25.1	46.6	37.9
N	12	10	12	12	12	12	12	12	12	12	12	11

Aerosol Chloride: μg Cl^- 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-02	1.37	**0.51** [2]	2.80	0.96	1.19	1.46	2.56	3.48	1.12	2.56	2.31	2.82
Feb-02	1.86	1.36	2.68	1.84	1.93	2.04	2.08	3.95	4.57	2.60	2.74	3.86
Mar-02	1.47	2.33	1.70	1.53	0.75	2.05	2.15	2.40	**2.79** [2]	2.14	3.22	2.00
Apr-02	1.30	0.73	1.43	0.97	1.01	1.21	1.19	1.48	1.16	1.05	0.88	1.51
May-02	0.88	**ND** [1]	1.21	0.80	0.79	0.91	1.13	1.57	2.23	0.31	0.97	1.47
Jun-02	0.92	**0.59** [2]	0.92	0.80	0.93	0.67	0.65	1.76	1.04	1.01	1.28	1.67
Jul-02	0.31	0.00	0.28	0.28	0.34	0.33	0.29	0.50	0.68	0.39	0.56	**ND** [1]
Aug-02	0.43	0.32	0.46	0.60	0.36	0.43	0.59	0.92	0.24	0.32	0.66	0.28
Sep-02	0.59	**0.48** [2]	0.92	0.64	0.39	0.69	1.02	**0.20** [2]	0.79	0.77	0.69	0.66
Oct-02	0.88	**0.79** [2]	1.89	0.69	0.69	1.33	0.90	2.06	1.46	1.88	0.65	1.20
Nov-02	1.35	**ND** [1]	1.37	0.72	0.93	1.01	1.30	3.10	2.90	1.77	1.53	1.74
Dec-02	0.84	0.61	1.77	0.79	1.11	1.34	1.80	1.93	1.40	1.92	1.25	1.59
Mean	1.02	0.77	1.45	0.89	0.87	1.12	1.30	1.95	1.70	1.39	1.40	1.71
Min	0.31	0.00	0.28	0.28	0.34	0.33	0.29	0.20	0.24	0.31	0.56	0.28
Max	1.86	2.33	2.80	1.84	1.93	2.05	2.56	3.95	4.57	2.60	3.22	3.86
SD	0.46	0.65	0.78	0.42	0.44	0.56	0.70	1.15	1.22	0.85	0.89	0.97
CV (%)	45.4	84.0	53.7	47.5	50.8	50.0	53.7	59.0	71.8	61.3	64.0	56.7
N	12	10	12	12	12	12	12	12	12	12	12	11

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

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 2002.*

Calcium: µg Ca^{2+} 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-02	0.02	**-0.03** [2]	0.12	0.00	0.02	0.05	0.07	0.08	0.61	0.05	0.03	0.03
Feb-02	0.04	0.07	0.07	0.06	0.05	0.06	0.05	0.10	0.13	0.05	0.07	0.10
Mar-02	0.03	0.05	0.07	0.04	0.01	0.05	0.08	0.06	**-0.05** [2]	0.09	0.14	0.06
Apr-02	0.08	0.06	0.11	0.10	0.06	0.07	0.08	0.08	0.09	0.10	0.02	0.06
May-02	0.01	**ND** [1]	0.05	0.02	0.02	0.04	0.05	0.06	0.06	0.06	0.04	0.05
Jun-02	-0.03	**-0.01** [2]	0.03	0.02	0.04	0.02	0.03	0.06	0.01	0.07	0.03	0.06
Jul-02	0.01	0.01	0.05	0.02	0.03	-0.02	0.01	0.01	0.02	0.04	0.02	**ND** [1]
Aug-02	-0.03	-0.01	0.05	0.00	0.02	0.02	0.04	0.02	0.02	0.02	0.04	0.02
Sep-02	-0.03	**-0.07** [2]	0.04	0.01	0.01	0.03	0.03	**-0.01** [2]	0.03	0.08	0.03	0.19
Oct-02	-0.04	**-0.07** [2]	0.05	0.01	0.02	0.03	0.04	0.06	0.04	0.06	0.03	0.03
Nov-02	0.06	**ND** [1]	-0.01	0.01	0.03	0.03	0.06	0.04	0.05	0.04	0.04	0.06
Dec-02	-0.03	-0.01	0.06	0.02	0.02	0.03	0.04	0.03	0.07	0.08	0.02	0.06
Mean	0.01	-0.01	0.06	0.03	0.03	0.04	0.05	0.05	0.09	0.06	0.04	0.06
Min	*-0.04*	*-0.07*	*-0.01*	0.00	0.01	*-0.02*	0.01	*-0.01*	-0.05	0.02	0.02	0.02
Max	0.08	0.07	0.12	0.10	0.06	0.07	0.08	0.10	0.61	0.10	0.14	0.19
SD	0.04	0.05	0.04	0.03	0.02	0.02	0.02	0.03	0.17	0.02	0.03	0.05
CV (%)	521.0	-803.8	61.5	104.4	59.6	66.4	44.6	67.3	189.3	35.1	77.1	73.1
N	12	11	12	12	12	12	12	12	12	12	12	11

Magnesium: µg Mg^{2+} 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-02	0.07	**0.02** [2]	0.11	0.06	0.08	0.10	0.14	0.21	0.45	0.08	0.10	0.14
Feb-02	0.07	0.08	0.13	0.10	0.09	0.10	0.08	0.21	0.25	0.10	0.15	0.21
Mar-02	0.07	0.13	0.10	0.08	0.00	0.10	0.12	0.13	**0.14** [2]	0.11	0.01	0.11
Apr-02	0.08	0.07	0.08	0.08	0.07	0.06	0.07	0.08	0.06	0.08	0.04	0.08
May-02	0.04	**ND** [1]	0.07	0.05	0.05	0.05	0.07	0.10	0.13	0.08	0.06	0.08
Jun-02	0.03	**0.06** [2]	0.05	0.05	0.06	0.05	0.05	0.10	0.07	0.07	0.07	0.10
Jul-02	0.02	0.02	0.03	0.02	0.02	0.01	0.02	0.03	0.05	0.04	0.03	**ND** [1]
Aug-02	0.01	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.02	0.05	0.03	0.03
Sep-02	0.02	**0.03** [2]	0.04	0.03	0.03	0.04	0.05	**0.04** [2]	0.04	0.04	0.04	0.04
Oct-02	0.02	**0.05** [2]	0.09	0.04	0.05	0.08	0.06	0.10	0.08	0.09	0.05	0.07
Nov-02	0.05	**ND** [1]	0.01	0.04	0.05	0.05	0.08	0.14	0.14	0.09	0.09	0.12
Dec-02	-0.01	0.05	0.09	0.05	0.07	0.08	0.09	0.10	0.10	0.12	0.06	0.10
Mean	0.04	0.06	0.07	0.05	0.05	0.06	0.07	0.11	0.13	0.08	0.06	0.10
Min	-0.01	0.02	0.01	0.02	0.00	0.01	0.02	0.03	0.02	0.04	0.01	0.03
Max	0.08	0.13	0.13	0.10	0.09	0.10	0.14	0.21	0.45	0.12	0.15	0.21
SD	0.03	0.03	0.04	0.03	0.03	0.03	0.04	0.06	0.12	0.02	0.04	0.05
CV (%)	59.9	61.9	56.5	47.2	53.3	50.9	52.5	58.5	94.7	31.5	65.6	51.6
N	12	10	12	12	12	12	12	12	12	12	12	11

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

Table A5.1e *Monthly Concentrations of Aerosol Na^+ Measured at the 12 Monitoring Sites in the Nitric Acid Monitoring Network in 2002.*

Sodium: µg Na^+ 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-02	0.94	**0.41** [2]	1.49	0.76	0.94	0.99	1.43	1.95	1.86	1.25	1.20	1.49
Feb-02	1.00	0.76	1.48	1.07	1.09	1.06	1.11	2.25	2.72	1.33	1.57	2.13
Mar-02	0.93	1.46	1.11	0.86	0.00	1.27	1.34	1.52	**1.77** [2]	1.12	1.74	1.21
Apr-02	0.82	0.48	0.79	0.69	0.65	0.76	0.72	0.92	0.68	0.87	0.49	0.89
May-02	0.62	**ND** [1]	0.88	0.55	0.54	0.57	0.78	1.14	1.40	0.88	0.65	0.85
Jun-02	0.65	**0.45** [2]	0.70	0.66	0.74	0.57	0.64	1.20	0.72	0.74	0.84	1.08
Jul-02	0.27	0.19	0.30	0.21	0.25	0.27	0.23	0.37	0.63	0.26	0.47	**ND** [1]
Aug-02	0.33	0.27	0.35	0.44	0.27	0.35	0.31	0.47	0.23	0.60	0.21	0.22
Sep-02	0.36	**0.30** [2]	0.62	0.44	0.31	0.49	0.69	**0.05** [2]	0.61	0.48	0.49	0.47
Oct-02	0.57	**0.50** [2]	1.06	0.49	0.54	0.93	0.60	1.16	0.98	0.98	0.43	0.79
Nov-02	0.87	**ND** [1]	0.12	0.56	0.69	0.66	0.90	1.64	1.69	0.88	1.00	1.21
Dec-02	0.56	0.49	1.03	0.69	0.77	0.91	0.99	1.24	1.03	1.19	0.74	1.12
Mean	0.66	0.53	0.83	0.62	0.57	0.74	0.81	1.16	1.19	0.88	0.82	1.04
Min	0.27	0.19	0.12	0.21	0.00	0.27	0.23	0.05	0.23	0.26	0.21	0.22
Max	1.00	1.46	1.49	1.07	1.09	1.27	1.43	2.25	2.72	1.33	1.74	2.13
SD	0.25	0.36	0.44	0.22	0.31	0.30	0.37	0.64	0.71	0.32	0.47	0.51
CV (%)	38.1	68.1	53.1	36.0	55.3	41.1	45.2	55.7	59.5	36.5	57.8	48.7
N	12	10	12	12	12	12	12	12	12	12	12	11

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

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 ω is called the factor and θ 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 2002 Annual Mean Concentrations of the Major Ions

Ion	Model	Sill $(\mu eq\ l^{-1})^2$	Range (km)
acidity ($\log_e$ transformed)	exponential	0.5	250
non-marine sulphate	exponential	200	250
nitrate	exponential	130	150
ammonium	exponential	300	350