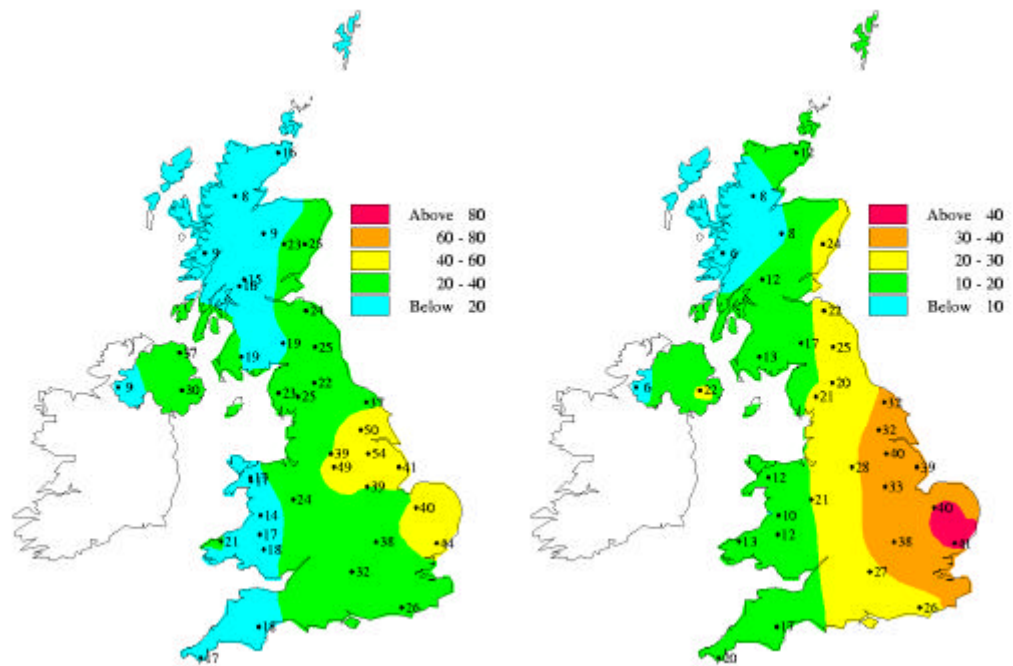


Operation and Management of the UK Acid Deposition Monitoring Networks

A report produced for Department of the Environment, Transport and the Regions



Precipitation-weighted Concentration Maps for Non Seasalt Sulphate and Nitrate (in $\mu\text{eq l}^{-1}$) for 1999

February 2001

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A report produced for Department of the
Environment, Transport and the Regions

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Executive Summary

The Acid Deposition Monitoring networks were established in 1986 to monitor the composition of precipitation and hence to provide information on deposition of acidifying compounds in the United Kingdom. The Acid Deposition Monitoring Networks comprise two monitoring networks in which rain water samples are collected and analysed. The aim of the first network, known as the "Primary" network, is to provide high quality data which can be used to identify trends with time. The second network, the "Secondary" network, provides information on the spatial distribution of acid deposition in the UK. The measurements made and their interpretation for the period 1986 to 1998 have been presented previously. In addition to the sampling of rainwater at both the Primary and Secondary Network sites, a range of other measurements are made which provide a more complete understanding of precipitation chemistry in the United Kingdom.

Throughout this period consistent operating and analytical procedures have been employed. The deposition data from the networks provide the foundation to the DETR-funded research programme that attempts to determine how acid rain is affecting sensitive ecosystems in the United Kingdom.

This report is the second annual report prepared under the current contract *The Operation and Management of the UK Acid Deposition Monitoring Networks* (EPG 1/3/137) and provides an overview of and the complete sets of measurements made in 1999.

Highlights of the 1999 Measurement

Apart from sites in Central England and Yorkshire, all the sites had lower rainfall in 1999 than that measured in 1998 by between 1% and 25%. The rainfall was however higher in 1999 than the period mean (1986-1999) at 20 out of the 32 sites by between 2% (Achanarras) to 28% (Thorganby). Lower annual rainfall was however observed on the southern (Barcombe Mills) and western sides (Goonhilly, Yarnar Wood, Lough Navar) of the United Kingdom.

Considering a selection of sites in sensitive areas in more detail:

- ***Llyn Brienne (Mid Wales):*** The rainfall measured at Llyn Brienne was 20% higher in 1999 than the period mean (1986-1999) but comparable to that observed in 1998. The wet deposition of non seasalt sulphate and hydrogen was smaller than that observed in 1998 although the deposition of ammonium and nitrate were higher. Analysis of the long term trends shows a significant decline in the concentration of sulphate and hydrogen. There is however no long-term trend in the concentrations of the nitrogen species although there has been a very slight increase in the deposition in recent years.
- ***Bannisdale (Lake District):*** The rainfall in 1999 was 17% lower than that measured in 1998 and comparable to the values observed in the drier years of 1995 and 1997. The wet deposition of non seasalt sulphate and hydrogen was lower than that observed in 1998. The trends in the concentrations of sulphate and hydrogen show statistically-significant reductions. The deposition of ammonium and nitrate was slightly lower than that observed in 1998 although the long-term trends in the concentrations showed no real change.

- **Cow Green Reservoir (N Pennines):** The rainfall was 6% lower in 1999 than in 1998 although 15% higher than the period mean. Although closer to the major power station sources of sulphur dioxide, the annual precipitation-weighted mean concentrations of non-seasalt sulphate and hydrogen are slightly smaller than those at Bannisdale and have shown a similar statistically-significant decline over the period 1986 to 1999. The deposition of nitrate and ammonium increased over the measurements made in 1998, although the long-term trends in concentration are not statistically significant.
- **Eskdalemuir (S Scotland):** The rainfall was 13% lower in 1999 than in 1998 although 4% higher than the period mean. The annual precipitation-weighted mean concentrations of non-seasalt sulphate and hydrogen were slightly smaller in 1999 leading to lower depositions of these species. The measurements made in 1999 confirm the previous statistically-significant trends. The deposition of nitrate and ammonium was slightly lower in 1999 than that measured in 1998. The long-term trends in the concentrations of the nitrogen species are not statistically significant.
- **Balquhiddier (SW Highlands):** Unlike other sites in the network, the rainfall was 21% higher in 1999 and 9% above the period. The 1999 measurements continue the steady decline in the annual wet deposition of non-seasalt sulphate and hydrogen reported over the period 1986 to 1998. although the concentrations of all species show no statistically-significant trend. The site was moved in 1994 and some caution is needed in interpreting data since then. There is little change in nitrate and ammonium deposition despite the site relocation. 1996 was a very dry year and precipitation-weighted mean concentrations of all ions were unusually large.
- **Polloch, Strathvaich Dam (Northern and Western Highlands):** These sites are relatively unpolluted and, of all the sites in the network, should be most sensitive to the limiting effect of any “background” pollutant levels in precipitation from the Atlantic. The ammonium concentrations in many samples are below the detection limit. Annual mean non-seasalt sulphate concentrations at both sites were below $10 \mu\text{eq l}^{-1}$ in 1999. Although no significant trend was observed at Strathvaich Dam in the sulphate concentration over the full measurement period, the more recent measurements at Polloch confirm the downward trend at this site. Deposition of non-seasalt sulphate has declined at both sites, more noticeably at Polloch. Nitrate concentration and deposition show no change at the Strathvaich Dam site. As a result, the non-seasalt sulphate to nitrate ratios in both concentration and deposition have fallen.

The annual mean sulphur dioxide concentration has decreased substantially at all sites with the exception of the Strathvaich Dam site over the period 1986 to 1999. For example, the annual mean concentration at High Muffles has decreased from an annual mean concentration of $7.3 \mu\text{g S m}^{-3}$ in 1987 to $0.9 \mu\text{g S m}^{-3}$ in 1999. Sulphate concentrations in rain 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 decreased by about 25%. The lowest concentrations were consistently measured at Strathvaich Dam.

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

The Nitric Acid Monitoring Network

A new monthly nitric acid monitoring network was established at 12 sites during 1999 by the Centre for Ecology and Hydrology (Bush). The network is now operating very smoothly and providing a record with very few missing points. The establishment of the daily site at Barcombe Mills was delayed while planning permission was sought and has only been operational since April 2000. Although most of the initial problems have been overcome, the day-to-day operation of the Chemspec system has been problematic with a large number of sampling problems leading to substantial down time. The improved performance of the Chemspec system will be a priority in the final phase of the project.

Valuable new data have been produced by the network on the behaviour of gaseous and aerosol species involved in transboundary and urban air pollution. In this report, the first measurements from the network are presented. The measurement data have been used to derive the first maps of the spatial distribution of gaseous nitric acid and hydrogen chloride in the UK and of the corresponding aerosol components - nitrate and chloride. Despite the poor performance of the daily system, the results indicate several periods when elevated concentrations of nitric acid were measured.

EMEP Intercomparisons

The measurements made in the UK Acid Deposition Monitoring Networks are reported to international bodies such as UN ECE European Modelling and Evaluation Programme (EMEP) and the World Meteorological Organisation (WMO). As part of a programme of quality control and assurance of the measurement data, AEA Technology participated in the 18th laboratory intercomparison exercise organised by EMEP.

Apart from the hydrogen ion concentrations, the measured ion concentrations were in excellent agreement with the expected concentrations for the four samples analysed. The hydrogen ion concentration is measured using a pH probe while the other ions were all measured using the new ion chromatographs. The discrepancy on the hydrogen ion measurements is being checked. It is however clear that the performance of the new ion chromatographs is very good. In the previous intercomparison, the largest differences were noted for magnesium and calcium. In the present intercomparison, the differences are now comparable to those of the other ions.

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 which 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 the National Expert Group on Transboundary Air Pollution (NEG-TAP). NEG-TAP was established 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.

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1. Introduction

This is the second annual report prepared on the contract *The Operation and Management of the UK Acid Deposition Monitoring Networks* (EPG 1/3/137), let by the Department of the Environment, Transport and the Regions. The Acid Deposition Monitoring networks were established in 1986 to monitor the composition of precipitation and hence to provide information on deposition of acidifying compounds in the United Kingdom.

The Acid Deposition Monitoring Networks comprise two monitoring networks in which rain water samples are collected and analysed. The aim of the first network, known as the “Primary” network, is to provide high quality data which can be used to identify trends with time. The second network, the “Secondary” network, provides information on the spatial distribution of acid deposition in the UK. The measurements made and their interpretation for the period 1986 to 1998 have been presented in previous reports [*e.g.* Campbell *et al.*, 1994, 1998; Vincent *et al.*, 1995, 1996, 1998; Hayman *et al.*, 2000].

In addition to the sampling of rainwater at both the Primary and Secondary Network sites, a range of other measurements are made which provide a more complete understanding of precipitation chemistry in the United Kingdom. At the commencement of the contract, the measurement programme comprised the sampling and determination of:

- rainwater composition using a wet-only collector at the “primary” sites on a daily basis;
- rainwater composition using a bulk collector at the Eskdalemuir site on a daily basis;
- rainwater composition using a bulk collector at the “primary” sites on a weekly basis;
- the concentrations of nitrogen dioxide using diffusion tubes on a monthly basis;
- the concentrations of particulate sulphate and sulphur dioxide concentrations at eight sites on a daily basis;
- total inorganic nitrate (TIN) and total inorganic ammonium (TIA) at two sites on a daily basis; and,
- nitric acid and the major constituents of particulate aerosol on a weekly basis at two sites.

The measurement programme was reviewed in February 1999 and significant changes were made to the network. The current monitoring programme comprises:

- the measurement of rainwater composition at the Eskdalemuir site using wet-only collectors on a daily basis and bulk collectors on a daily and weekly basis;
- the measurement of rainwater composition using bulk collectors at 38 other sites on either a weekly or fortnightly basis (following the installation of 7 new fortnightly sampling sites);
- the concentrations of nitrogen dioxide using diffusion tubes on a monthly basis at 32 sites;
- the concentrations of particulate sulphate and sulphur dioxide concentrations at eight sites on a daily basis;
- the measurement of nitric acid and other acidic species in both the gas- and aerosol-phases at 12 sites on a monthly basis (to replace the previous daily TIN/TIA and weekly nitric acid measurements);
- the measurement of nitric acid and other acidic species in both the gas- and aerosol-phases at a single site on a daily basis.

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 are currently being used to inform 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.

This report presents a comprehensive summary of the measurements made in the networks for 1999 and includes the first measurements from the new HNO₃ monitoring network and the other new monitoring sites. The 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 1999;
- an overview of the results from the Acid Deposition Networks for 1999 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 new nitric acid monitoring network and the first measurements are presented in Section 4.

Summary tables of the weekly bulk precipitation composition data for 1999 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. Appendix 3 describes the geostatistical techniques that have been used to calculate the concentration maps in this report. Concentrations of ions determined for samples collected using the wet-only sampler are presented in Appendix 4.

2. The Monitoring Programme

2.1 THE ACID DEPOSITION MONITORING NETWORKS

2.1.1 Site Locations

The Acid Deposition Monitoring Networks comprise two monitoring networks in which rainwater samples are collected and analysed. The aim of the first network, known as the “Primary” network, is to provide high quality data which can be used to identify trends with time. The second network, the “Secondary” network, provides information on the spatial nature 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.

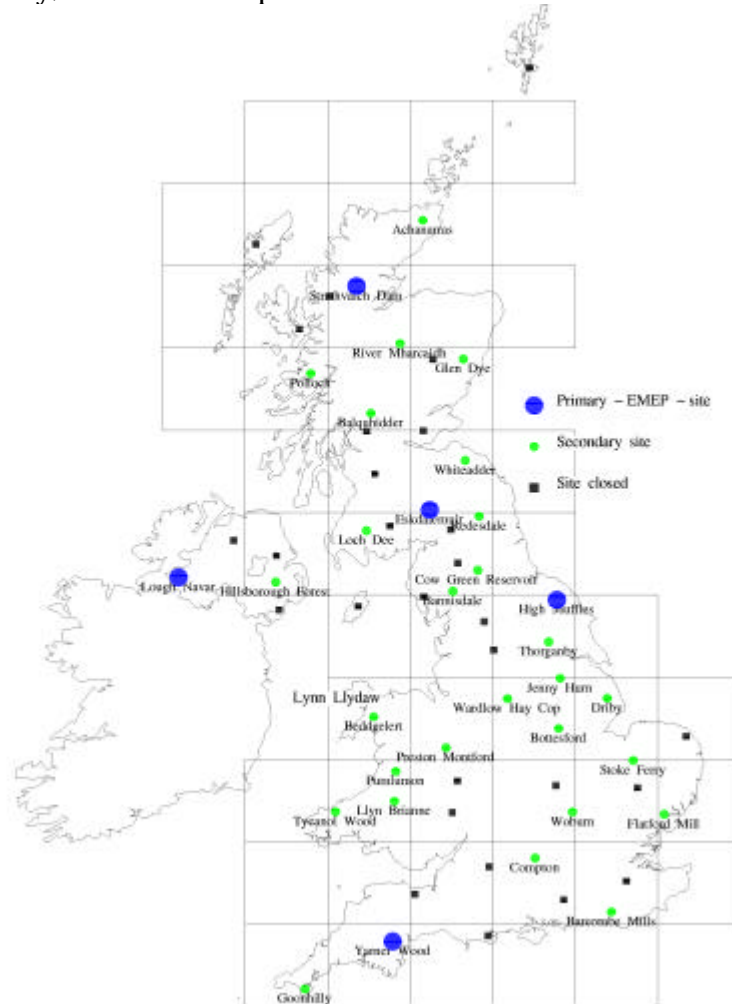


Figure 2.1: Location of the Current Primary and Secondary Sampling Sites (Also presented are the locations of the sites no longer operating. The 100 km squares show how the sampling site coverage meets the original coverage objective.)

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.

In addition to the sampling of rainwater composition, a range of other parameters are measured to provide a more complete understanding of precipitation chemistry in the United Kingdom. The measurement programme was reviewed in February 1999 by leading members of the UK Acid Rain community and significant changes were proposed and implemented. The current monitoring programme comprises the sampling and determination of:

- rainwater composition using bulk and wet-only collectors at the Eskdalemuir site on a daily basis;
- rainwater composition using bulk collectors at the other 38 network sites on either a weekly or fortnightly basis;
- the concentrations of nitrogen dioxide using diffusion tubes on a monthly basis at 32 sites;
- the concentrations of particulate sulphate and sulphur dioxide concentrations at eight sites on a daily basis;
- the concentrations of nitric acid and other acidic species in both the gas- and aerosol-phases at 12 sites on a monthly basis (see Section);
- the concentrations of nitric acid and other acidic species in both the gas- and aerosol-phases at a single site on a daily basis.

While the new nitric acid monitoring network was being established, the following measurements were continued to allow a period of overlap with those made in the new nitric acid monitoring network:

- total inorganic nitrate and total inorganic ammonium at two sites on a daily basis and
- nitric acid and the major constituents of particulate aerosol on a weekly basis at two sites.

The sampling techniques used to make these measurements are summarised in Sections 2.2.

2.1.2 Site Operations

The sites in operation in 1999 are listed together with the local operators who perform the weekly change over of samples in Table 2.1, Table 2.2 and Table 2.3.

2.2 SAMPLING TECHNIQUES

2.2.1 Precipitation

Weekly or Fortnightly precipitation samples were collected in bulk collectors at 39 sites using a collector designed by 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.

Acid deposition occurs primarily by wet and dry deposition. The wet-only collector, developed at the Warren Spring Laboratory (which now forms part of AEA Technology), is a daily precipitation collector. The collector incorporates a number of features designed to measure the wet deposition component, minimise the effect of dry deposition, preserve sample integrity, record associated tipping bucket volume data and allow unattended operation for up to eight days.

2.2.2 Sulphur Dioxide and Particulate Sulphate

The concentrations of particulate sulphate and sulphur dioxide were determined by first collecting a sample using eight-port bubbler instruments (AGL, Hitchin). Particulate sulphate was collected by drawing air through a Whatman 40 filter. Sulphur dioxide is collected by passing the air through a hydrogen peroxide solution where sulphur dioxide is oxidised to sulphate. The sulphate concentrations are determined by ion chromatography.

In addition to the daily sampling reported here, further monitoring of sulphur dioxide - *The Rural SO₂ Monitoring Network* - is undertaken as part of the Acid Deposition Processes contract let to the Centre for Ecology and Hydrology, Bush.

2.2.3 Nitrogen Dioxide

Diffusion tubes have been used to measure nitrogen dioxide concentrations at the Primary and Secondary Network sites. Tubes were 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 Total Inorganic Nitrate and Total Inorganic Ammonium

Total inorganic nitrate (TIN) and total inorganic ammonium (TIA) were collected on a daily basis using single-stage filter packs impregnated with sodium hydroxide and citric acid to absorb TIN and TIA, respectively. The filter packs are held within a protective hood and exposed throughout the sampling period. This is a recommended EMEP method.

Table 2.1 - Primary Network Sites and Measurements Made in 1999

Measurement:	Precipitation				NO ₂	SO ₂	Part. SO ₄	TIN /TIA	HNO ₃ /NO ₃
	Frequency:	daily wet	daily bulk	week bulk					
SITE:									
Yarner Wood	* - 1		*		*	*	*		
Lough Navar	* - 1		*		*	*	*		
High Muffles	* - 2		*		*	*	*	* - 3	* - 4
Eskdalemuir	*	*	*		*	*	*	*	
Strathvaich Dam	* - 2		*		*	*	*		

Notes (1) The daily wet-only measurement was stopped at 31st March 1999; (2) The daily wet-only measurement was stopped at 31st December 1999; (3) This measurement programme ended on 7th April 1999; (4) PTFE filters also analysed for the following ions: Na⁺, Cl⁻, NH₄⁺, SO₄²⁻ and NO₃⁻.

Table 2.2 - Secondary Network Sites and Measurements Made in 1999

Measurement:	Precipitation				NO ₂	SO ₂	Part. SO ₄	TIN /TIA	HNO ₃ /NO ₃
	Frequency:	daily wet	daily bulk	week bulk					
SITE:									
Barcombe Mills			*		*	*	*		
Stoke Ferry			*		*	*	*		* - 1
Glen Dye			*		*	*	*		
Goonhilly			*		*				
Compton			*		*				
Flatford Mill			*		*				
Woburn			*		*				
Tycanol Wood			*		*				
Llyn Brianne			*		*				
Pumlumon			*		*				
Preston Montford			*		*				
Bottesford			*		*				
Llyn Llydaw			*		*				
Wardlow Hay Cop			*		*				
Driby			*		*				
Jenny Hurn			*		*				
Thornganby			*		*				
Bannisdale			*		*				
Hillsborough For			*		*				
Cow Green Res			*		*				
Loch Dee			*		*				
Redesdale			*		*				
Whiteadder			*		*				
Balquhidder			*		*				
Polloch			*		*				
Allt a' Mharcaidh			*		*				
Achanarras			*		*				
Crai Reservoir - 2				*					
Beaghs Burn - 2				*					
Loch Chon - 2				*					
Lochnagar - 2				*					
River Etherow - 2				*					
Scoat Tarn - 2				*					
Llyn Llagi - 2				*					

Notes (1) PTFE filters also analysed for the following ions: Na⁺, Cl⁻, NH₄⁺, SO₄²⁻ and NO₃⁻; (2) New sites established in 1999.

Table 2.3 - Precipitation Composition Monitoring Sites, 1999
(those in *bold* are EMEP sites with daily wet-only sampling as well as weekly bulk).

Site Code	Site Name	O.S. Reference	Altitude (m)	Operator
5003	Goonhilly	SW 723214	108	British Telecom
5008	Yamer 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	Countryside Council for Wales
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
5117	Thorganby	SE 676428	8	Selby District Council
5009	High Muffles	SE 776939	267	Forest Enterprise
5111	Bannisdale	NY 515043	265	Institute of Freshwater Ecology
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
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

♣ The Beddgelert site was closed down July 1996 and replaced by Llyn Llydaw, O.S. co-ordinates SH 638549. The site is situated within the Environmental Change Networks' compound in the Snowdon Horseshoe

Following the strategic review of the networks in 1999, this sampling programme will be replaced. The existing measurement programme was discontinued at High Muffles on the 7th April 1999 and will continue at Eskdalemuir until 30th September 2000 to allow a period of overlap with the replacement measurement programme (see Section 4).

2.2.5 Nitric Acid

A two-stage filter-pack is used in the monitoring network for nitric acid. Air is drawn through the filter pack at 5 l min⁻¹. Particles are trapped on the PTFE membrane while the nylon filter absorbs nitric acid (and other gases of interest such as HCl). The filters are exposed for weekly periods. The samples collected are extracted using an alkaline extractant and analysed by ion chromatography. The samples collected under dry summer conditions are likely to under-read as ammonium nitrate may volatilise during sampling. During cool wet winter conditions nitric acid may be absorbed by the front filter. The measurement technique does not give quantitative measurements and is used for indicative purposes only.

As part of the strategic review of the networks (Section 2.1), this sampling programme has been replaced by the new nitric acid monitoring programme (Section 4). The existing measurement programme was discontinued at the High Muffles and Stoke Ferry sites from December 2000.

2.3 ANALYTICAL PROCEDURES

2.3.1 Sample Registration and Preparation

As for previous years, approximately 10,000 samples were received and analysed by the laboratory. 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.

$$I = \frac{2(\sum c - \sum a)}{\sum c + \sum a} \quad \text{(Equation 1)}$$

where \mathcal{S}_c = sum of cation concentrations in equivalents ($\mu\text{eq l}^{-1}$) and \mathcal{S}_a = sum of anion concentrations in equivalents ($\mu\text{eq l}^{-1}$). 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 2.4 are submitted for reanalysis. The reanalysis is usually completed within four months of sampling.

Table 2.4 - Ion Balance Criteria Used to Select Samples for Reanalysis

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

Typically, 10-15% of the samples would fail the criteria and would be reanalysis. This failure rate would be reduced on reanalysis. In recent years, the number of samples failing the criteria has increased significantly because of the high calcium and magnesium ion concentrations measured using the existing ion chromatographs (see Section 2.3.3).

2.3.3 Introduction of New Ion Chromatographs

Two new ion chromatographs have been purchased by Harwell Scientifics. One ion chromatograph will be dedicated to the measurement of cations, the other to the determination of anions. Following extensive tests of the performance of the two new ion chromatographs, Harwell Scientifics Limited have gained formal accreditation for the new ion chromatographs from the United Kingdom Accreditation Service.

The tests undertaken have clearly indicated that the new instruments give very reproducible results and are in excellent agreement with the measurements made using the old chromatographs. The performance of the new instruments is better with regard to the measurement of the base cations, calcium and magnesium. The concentrations are generally lower than those measured on the old instruments. Extensive tests have been undertaken to understand this discrepancy but the origin has not been identified. Operationally, the high calcium and magnesium ion concentrations have resulted in a significant number of reanalyses. It is expected that the number of reanalyses required will be reduced as a result.

At a meeting held between AEAT and HSL to review the performance of the new instruments in the summer of 2000, the following changeover was implemented:

- Rainwater Samples: *All samples collected during 2000 would be analysed with the new ion chromatographs. The samples collected during 2000 which have been analysed so far using the old ion chromatograph will be reanalysed.*
- Daily Bubbler Samples: *These are only analysed for sulphate. The intention was to continue to use the old ion chromatograph for these measurements.*
- Weekly Bubbler Samples: *This is the measurement programme undertaken in the Rural SO₂ Monitoring network, which AEA Technology operates under sub-contract to CEH Edinburgh as part of the Acid Deposition Processes project. The samples are only analysed for sulphate. The intention is*

to continue to use the old ion chromatograph for these measurements until the end of the contract which expired at the end of October.

The tests undertaken by Harwell Scientifics Limited indicate that the performance of the two instruments are identical within their respective measurement errors. This is important as the data collected in the networks are used to identify trends over time. Any step changes introduced will make the identification of such trends more difficult.

2.3.4 Changes to the Sample Registration System

A new sample registration system has been developed to replace the existing system which is used to process the large number of samples collected in the networks. The new system has been developed using Microsoft ACCESS and is now fully operational. The system contains the following additional functionality:

- *Data Reconciliation:* For many of the samples collected, air is drawn through a filter paper (*e.g.*, the collection of aerosol material to give the particulate sulphate concentration) or a solution (*e.g.*, the hydrogen peroxide bubbler for SO₂). The analysis of the samples give the amount or concentration of material present in the solution or extract. The total volume of air drawn through the sampler is needed to convert the analytical results into air concentrations. Previously, the total volume was derived from the information placed in the sample registration system when the individual samples were registered. This had to be extracted from the sample registration system and combined with the analytical results. The process was inefficient as the sample volume and analytical results needed to be reconciled and the datasets were held on different computer platforms with different operating systems. A facility has been included to perform this calculation within the new registration system.
- *Data Verification:* A facility has also been added to calculate the ion balance of the rainwater samples automatically and hence to identify the samples which need to be reanalysed. In the previous sample registration system, this calculation was made outside the registration system. The incorporation of these calculations in the registration system has significantly streamlined the data verification process. It is intended that the sample registration system will produce a ratified dataset which can be placed on the National Air Quality Information Archive or into the existing Air Pollution database for further data analysis.

The presence of these functions in the new sample registration system has improved the efficiency of the sample registration and subsequent data processing and verification.

2.4 DATA REPORTING CYCLE

Sample collection, analysis, reanalysis and verification is a continuous process. 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.

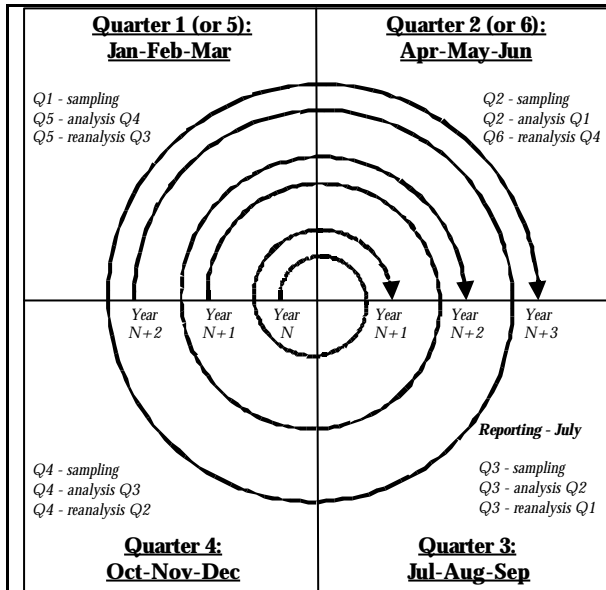


Figure 2.3 - Cycle for the Sample Collection, Analysis, Reanalysis and Reporting of the Composition of Precipitation.

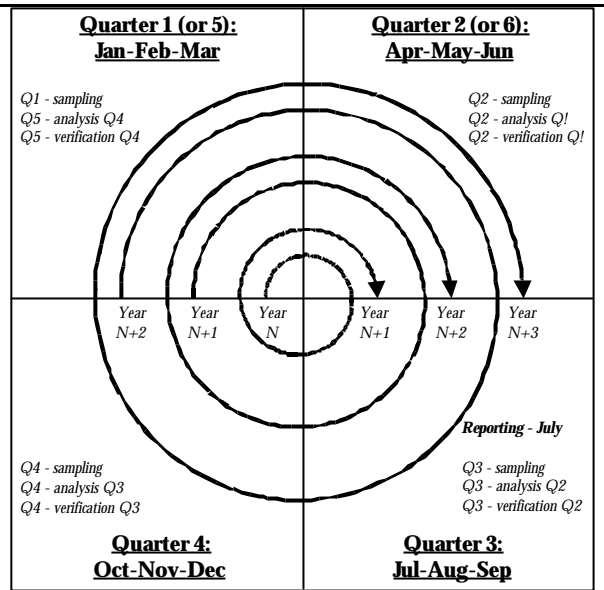


Figure 2.4 - Cycle for the Sample Collection, Analysis and Verification and Reporting of the Other Measurements.

3. 1999 Measurements and Trends

3.1 DATA SUMMARY

The complete set of precipitation measurements made in the Acid Deposition Monitoring Networks during 1999 is provided in Appendix 1. For each site, information is provided about the site and the measurements made. Plots are included in Appendix 1 which show (a) the trend in the annual precipitation-weighted mean concentrations for non-seasalt sulphate, nitrate, ammonium and hydrogen ion since 1986 and (b) the trend in the annual rainfall and in the corresponding annual deposition of the four species since 1986. 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 $> 0.1 \text{ mg P l}^{-1}$ (or $> 9.7 \text{ } \mu\text{eq l}^{-1}$) 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 means. The mean annual rainfall and the precipitation-weighted mean annual concentrations of all ions for the period from 1986 to 1999 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 presented in this section.

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] 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 (see Figure 3.1). 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.

3.2 PRECIPITATION CHEMISTRY

3.2.1 Highlights of the 1999 Measurements

Apart from sites in Central England and Yorkshire, all the sites had lower rainfall in 1999 than that measured in 1998 by between 1% and 25%. The rainfall was however higher in 1999 than the period mean (1986-1999) at 20 out of the 32 sites by between 2% (Achanarras) to 28% (Thorganby). Lower annual rainfall was however observed on the southern (Barcombe Mills)

and western sides (Goonhilly, Yarner Wood, Lough Navar) of the United Kingdom. The rainfall was also lower than the 30-year average for the period 1941-1970 at 29 of the sites by between 2% (Jenny Hurn) and 44% (Whiteadder). Only the sites at Pumlumon, Thorganby, High Muffles and Loch Dee showed an increase.

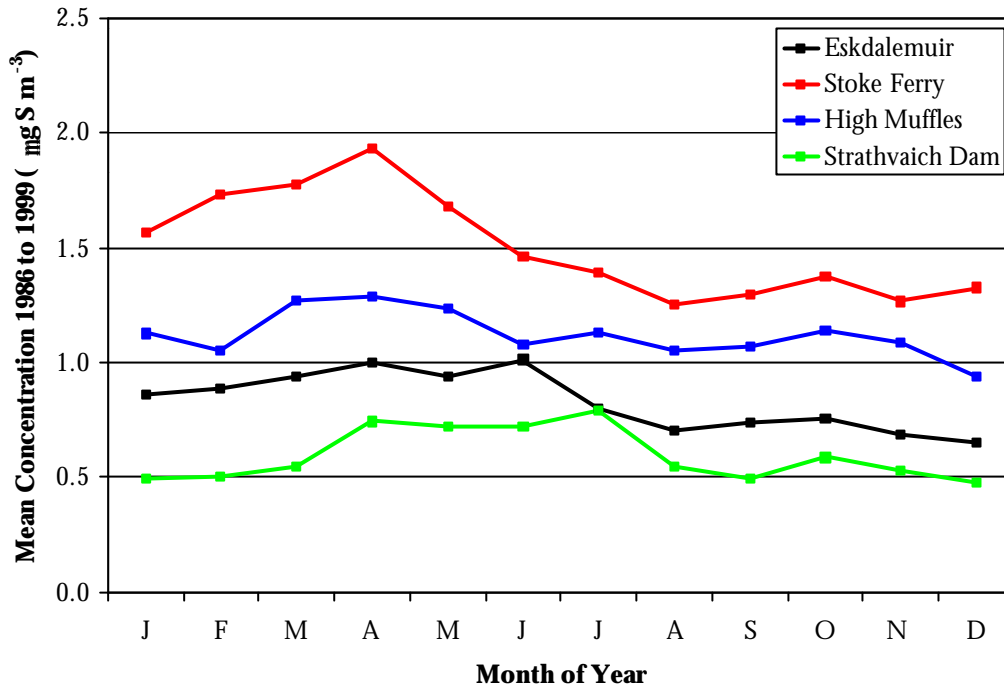


Figure 3.1 Seasonal Variation in the Particulate Sulphate Concentration at 4 Primary Sites as averages for the years 1986-1999.

Considering a selection of sites in sensitive areas in more detail:

- Llyn Brienne (Mid Wales):** The rainfall measured at Llyn Brienne was 20% higher in 1999 than the period mean (1986-1999) but comparable to that observed in 1998. The precipitation-weighted concentrations and hence wet deposition of non seasalt sulphate and hydrogen were lower than those observed in 1998 although the concentration and deposition of ammonium and nitrate were higher. Analysis of the long term trends shows a significant decline in the concentration of sulphate and hydrogen. There is however no long-term trend in the concentrations of the nitrogen species although there has been a very slight increase in the deposition in recent years.
- Bannisdale (Lake District):** The rainfall in 1999 was 17% lower than that measured in 1998 and comparable to the values observed in the drier years of 1995 and 1997. The trends in the concentrations of sulphate and hydrogen show statistically-significant reductions. The deposition of ammonium and nitrate was slightly lower than that observed in 1998 although the long-term trends in the concentrations showed no real change.
- Cow Green Reservoir (N Pennines):** The rainfall was 6% lower in 1999 than in 1998 although 15% higher than the period mean. Although closer to the major power station sources of sulphur dioxide, the annual precipitation-weighted mean concentrations of non-

seasalt sulphate and hydrogen are slightly smaller than those at Bannisdale and have shown a similar statistically-significant decline over the period 1986 to 1999. The deposition of nitrate and ammonium increased over the measurements made in 1998, although the long-term trends in concentration are not statistically significant.

- ***Eskdalemuir (S Scotland)***: The rainfall was 13% lower in 1999 than in 1998 although 4% higher than the period mean. The annual precipitation-weighted mean concentrations of non-seasalt sulphate and hydrogen were slightly smaller in 1999 leading to lower depositions of these species. The measurements made in 1999 confirm the previous statistically-significant trends. The deposition of nitrate and ammonium was slightly lower in 1999 than that measured in 1998. The long-term trends in the concentrations of the nitrogen species are not statistically significant.
- ***Balquhiddier (SW Highlands)***: Unlike other sites in the network, the rainfall was 21% higher in 1999 and 9% above the period. The 1999 measurements continue the steady decline in the annual wet deposition of non-seasalt sulphate and hydrogen reported over the period 1986 to 1998, although the concentrations of all species show no statistically-significant trend. The site was moved in 1994 and some caution is needed in interpreting data since then. There is little change in nitrate and ammonium deposition despite the site relocation. 1996 was a very dry year and precipitation-weighted mean concentrations of all ions were unusually large.
- ***Polloch, Strathvaich Dam (Northern and Western Highlands)***: These sites are relatively unpolluted and, of all the sites in the network, should be most sensitive to the limiting effect of any “background” pollutant levels in precipitation from the Atlantic. The ammonium concentrations in many samples are below the detection limit. Annual mean non-seasalt sulphate concentrations at both sites were below $10 \mu\text{eq l}^{-1}$ in 1999. Although no significant trend was observed at Strathvaich Dam in the sulphate concentration over the full measurement period, the more recent measurements at Polloch confirm the downward trend at this site. Deposition of non-seasalt sulphate has declined at both sites, more noticeably at Polloch. Nitrate concentration and deposition show no change at the Strathvaich Dam site. As a result, the non-seasalt sulphate to nitrate ratios in both concentration and deposition have fallen.

3.2.2 Concentration Maps for 1999

The spatial concentration patterns for hydrogen ion, non-sea sulphate, nitrate and ammonium are presented in Figure 3.2a to d for the original 32 bulk rainwater sites in the networks. Figure 3.2e to h present the maps that include the measurements from the original 32 bulk rainwater sites in the network and the 7 new sites established in 1999. The parameters used in the interpolation are presented in Appendix 3.

In previous years, in addition to concentration maps, deposition maps have been determined using rainfall fields supplied by the Meteorological Office. As these data are not available, only concentration maps are presented.

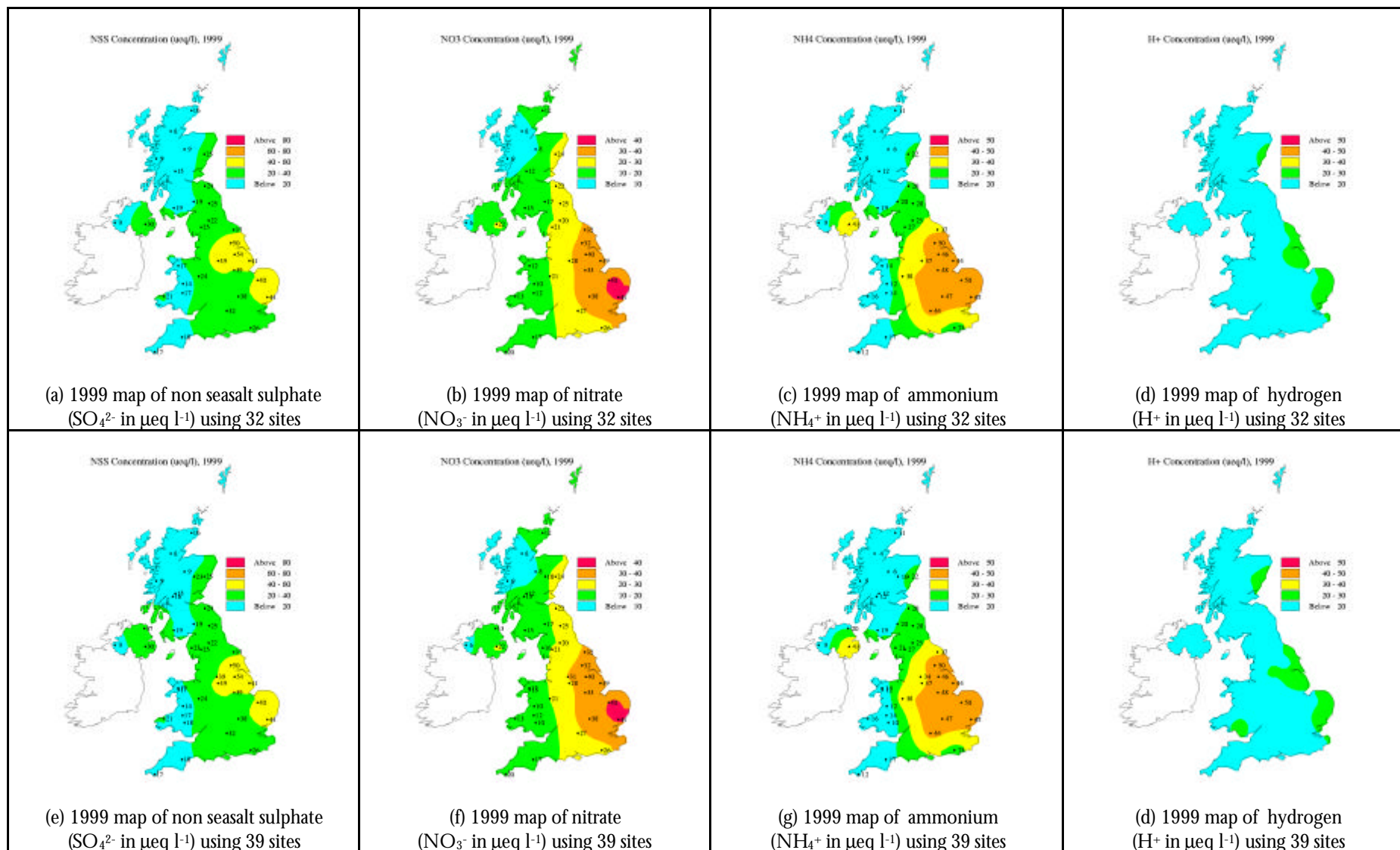


Figure 3.2: Precipitation-weighted concentration maps of non seasalt sulphate, nitrate, ammonium and hydrogen for 1999.

3.2.3 Precipitation Chemistry Trends

Figure 3.3 and Figure 3.4 show the monthly total and running annual average¹ of the monthly total deposition for non-seasalt sulphate and nitrate at each of the primary sites in the network. The data shown in these figures were derived from the samples collected by the weekly bulk collectors. The plots show that there is (a) a large month-to-month variation in deposition at all sites, (b) a variation in the average deposition between sites and (c) a variation in the long-term trends in deposition over the period 1986 to 1999.

The spatial variation in the long-term trend in wet deposition is, perhaps, surprisingly small between these sites. For the sites at Yarner Wood, Barcombe Mills, Stoke Ferry, Eskdalemuir and Glen Dye, the average monthly deposition of sulphate was close to 0.04 to 0.05 g S m⁻² month⁻¹ and nitrate around 0.03 g N m⁻² month⁻¹. There was greater wet deposition of sulphate at the High Muffles site (0.05 to 0.07 g S m⁻² month⁻¹) than at the other sites. The wet deposition of nitrate was however similar to that at the other sites. The Strathvaich Dam and Lough Navar sites received less deposition of both pollutants, around 0.02 to 0.03 g S m⁻² month⁻¹ and around 0.01 to 0.02 g N m⁻² month⁻¹.

The concentrations of non-sea salt sulphate and nitrate in rainwater (and also of sulphur dioxide, and particulate sulphate) are clearly decreasing in some regions of the United Kingdom while in other regions the change in concentration is less easy to discern. At all sites, the wet deposition of sulphate has tended to decrease, albeit with varying significance. The greatest decreases were observed at Stoke Ferry and Barcombe Mills, both of which are close to major UK sources. The trend in nitrate deposition is more variable; there is no significant change.

Maximum monthly deposition totals of both nitrate and non-seasalt sulphate were as large at Yarner Wood and Glen Dye as at High Muffles, even though the latter is close to the largest UK point sources of sulphur dioxide. This illustrates the importance of episodic meteorological conditions at these sites. The impact of the March 1996 episode of long-range transported sulphate and nitrate can be clearly seen in the monthly curves for Glen Dye.

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 $\mu\text{eq l}^{-1} \text{ year}^{-1}$. 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.

¹ In this report, the running annual mean is an average over 365 days and is centred on the midpoint of the interval. It removes the seasonal variation, thereby allowing the underlying trend to be discerned more clearly.

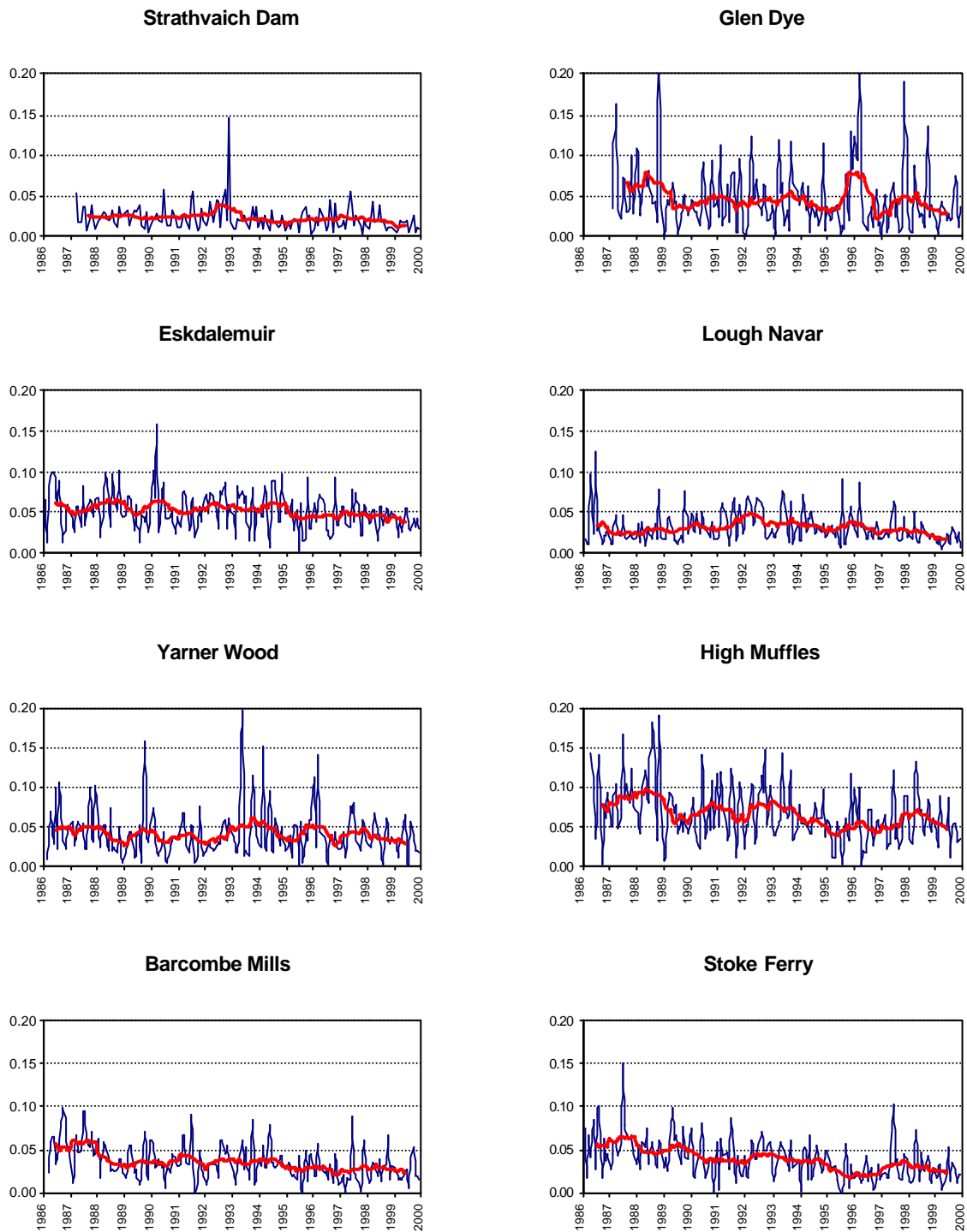


Figure 3.3: Monthly mean and running annual mean of wet deposited non-seasalt sulphate ($g S m^{-2} month^{-1}$)

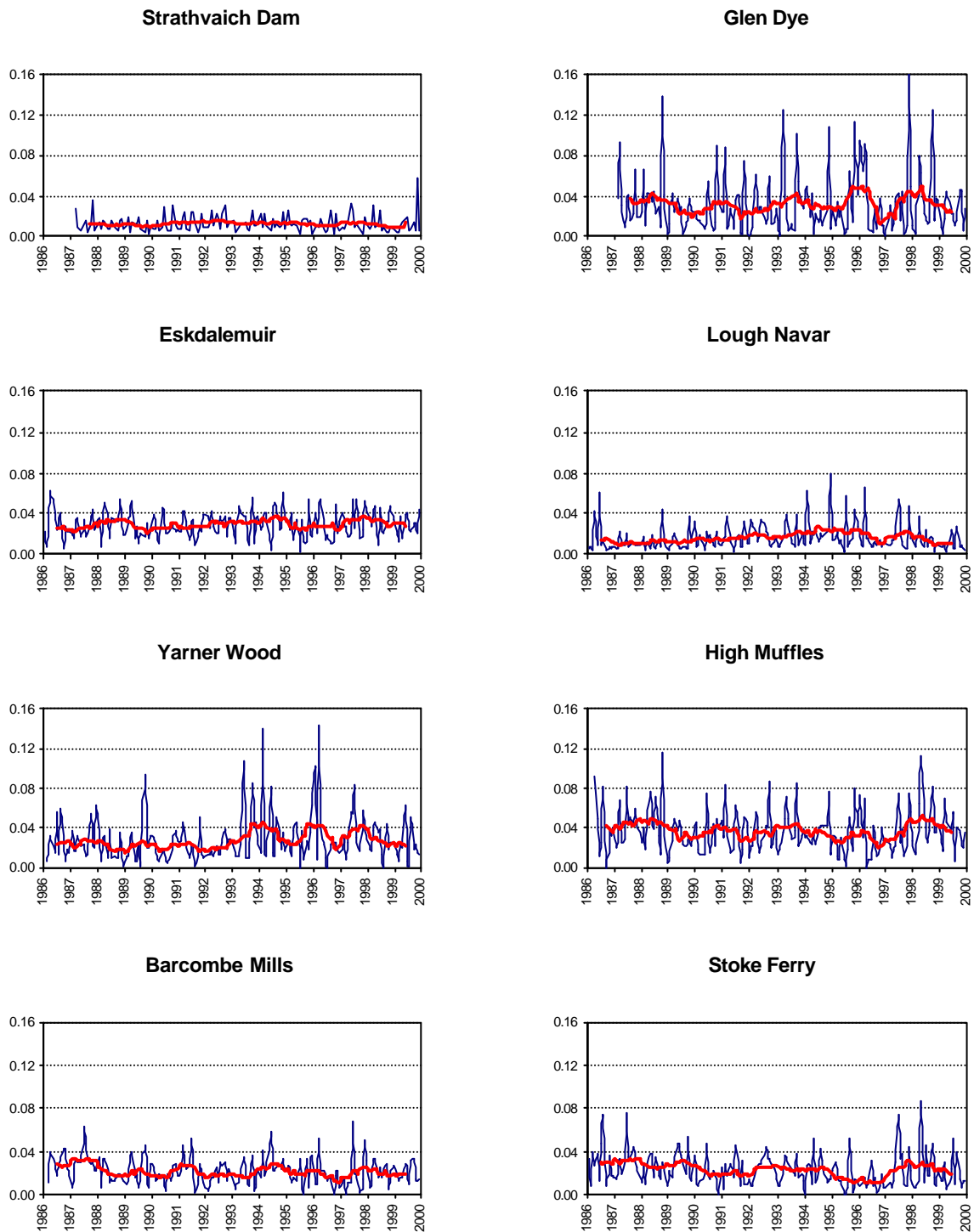


Figure 3.4: Monthly mean and running annual mean of wet deposited nitrate ($\text{g N m}^{-2} \text{ month}^{-1}$)

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

Table 3.2 presents a summary of the trend analysis performed on the non-sea salt sulphate 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 “ $F_{\text{calculated}}/F_{\text{critical}}$ ” 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 Observed at the Acid Deposition Monitoring Network Sites and its Significance.

Sampling site	Site code	$\mu\text{eq l year}^{-1}$	% change year ⁻¹	Trend status
Achanarras	5140	-0.95	-3.25	++
Balquhidder	5152	-0.63	-2.18	-
Bannisdale	5111	-0.90	-2.05	+
Barcombe Mills	5007	-1.63	-3.35	+++
Beddgelert	5119	-0.59	-2.37	+
Bottesford	5121	-4.61	-4.73	++++
Compton	5129	-3.52	-4.34	+++
Cow Green Res.	5113	-1.04	-2.57	++
Driby	5136	-2.71	-3.35	++
Eskdalemuir	5002	-0.80	-2.45	+++
Flatford Mill	5024	-3.15	-4.01	+++
Glen Dye	5011	-1.18	-2.37	-
Goonhilly	5003	-0.71	-2.32	-
High Muffles	5009	-2.48	-3.17	++
Hillsborough Forest	5149	-1.66	-3.23	+
Jenny Hurn	5118	-4.29	-3.89	+++
Llyn Brianne	5124	-0.66	-2.28	++
Loch Dee	5107	-0.97	-2.92	+
Lough Navar	5006	-0.36	-1.98	+
Polloch	5151	-0.96	-4.23	++
Preston Montford	5023	-1.94	-3.18	+
Pumlumon	5150	-0.65	-2.62	-
Redesdale	5109	-1.68	-3.12	++
Allt a' Mharcaidh	5103	-0.81	-3.64	++
Stoke Ferry	5004	-3.24	-3.86	++++
Strathvaich Dam	5010	-0.39	-2.61	-
Thorganby	5117	-2.90	-3.03	++
Tycanol Wood	5123	-0.51	-1.89	+
Wardlow Hay Cop	5120	-2.29	-2.64	++
Whiteadder	5106	-1.86	-3.46	++
Woburn	5127	-3.35	-4.17	++++
Yarner Wood	5008	-0.47	-1.62	-

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).

3.3 SULPHUR DIOXIDE AND PARTICULATE SULPHATE

3.3.1 The 1999 Measurements

A summary of the measurements of sulphur dioxide and of particulate sulphate made at the eight primary sites is presented in Appendices 4.1 and 4.2 respectively.

The measurement of sulphur dioxide concentrations is also made in the Rural SO₂ Monitoring Network which is covered by a separate DETR contract (under sub-contract from the NERC). The mapping of the sulphur dioxide concentration is undertaken under that contract and is not discussed in this report. Data reports have been prepared by Vincent and Campbell [1996], Hasler and Downing [1999] and Hasler *et al.* [2001a, 2001b].

3.3.2 Trends in Sulphur Dioxide

Figure 3.5 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 1999, the concentration has decreased by a similar factor of two to three, to less than 0.5 ppb. The figure also shows the large month-to-month variation and clearly illustrates how concentrations are increased during cold winter months with relatively high emissions and poor vertical dispersion of pollutants.

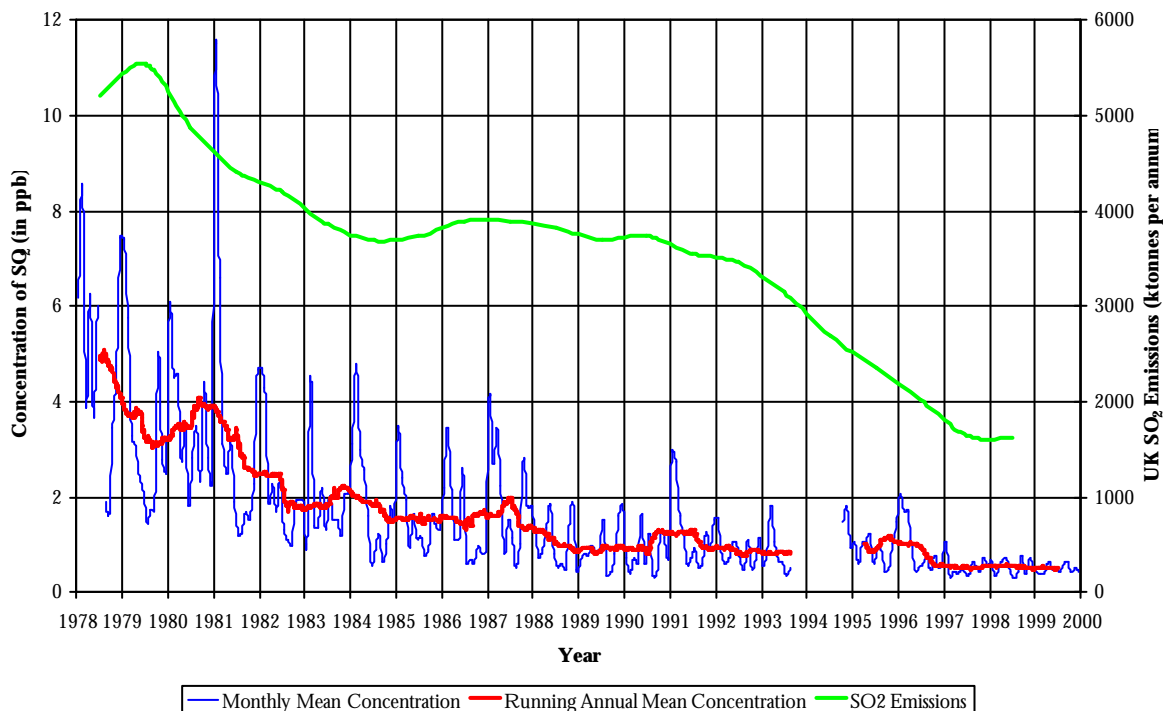


Figure 3.5: Trends in the concentration of sulphur dioxide observed at Eskdalemuir since 1978

The monthly and running annual mean concentrations of sulphur dioxide measured at each of the primary sites are presented in Figure 3.6. The strong seasonal variation is particularly noticeable at the High Muffles site, close to major sulphur dioxide sources. The annual mean sulphur dioxide concentration has decreased substantially at all sites with the exception of Strathvaich Dam over the period 1986 to 1999. For example, the annual mean at High Muffles has decreased from an annual mean concentration of $7.3 \mu\text{g S m}^{-3}$ in 1987 to $1.7 \mu\text{g S m}^{-3}$ in 1997 and $0.9 \mu\text{g S m}^{-3}$ in 1999.

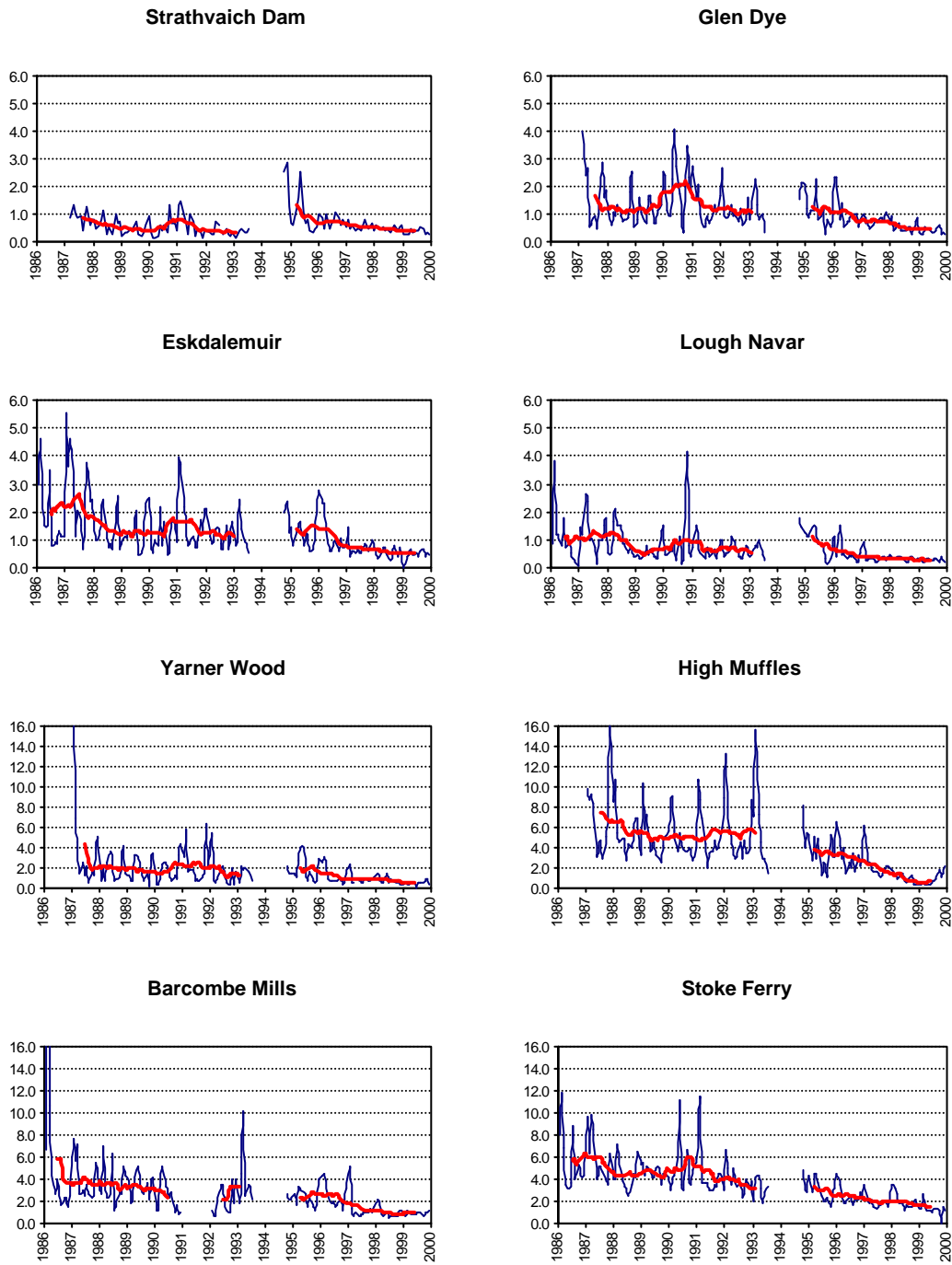


Figure 3.6: Monthly and Running Annual Mean Concentrations of Sulphur Dioxide at the Daily Sites, 1986 to 1999 (mg S m^{-3}).

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

3.3.3 Trends in Particulate Sulphate

Sulphate concentrations do not obviously exhibit the same degree of decrease as that observed for sulphur dioxide, as shown in Figure 3.7.

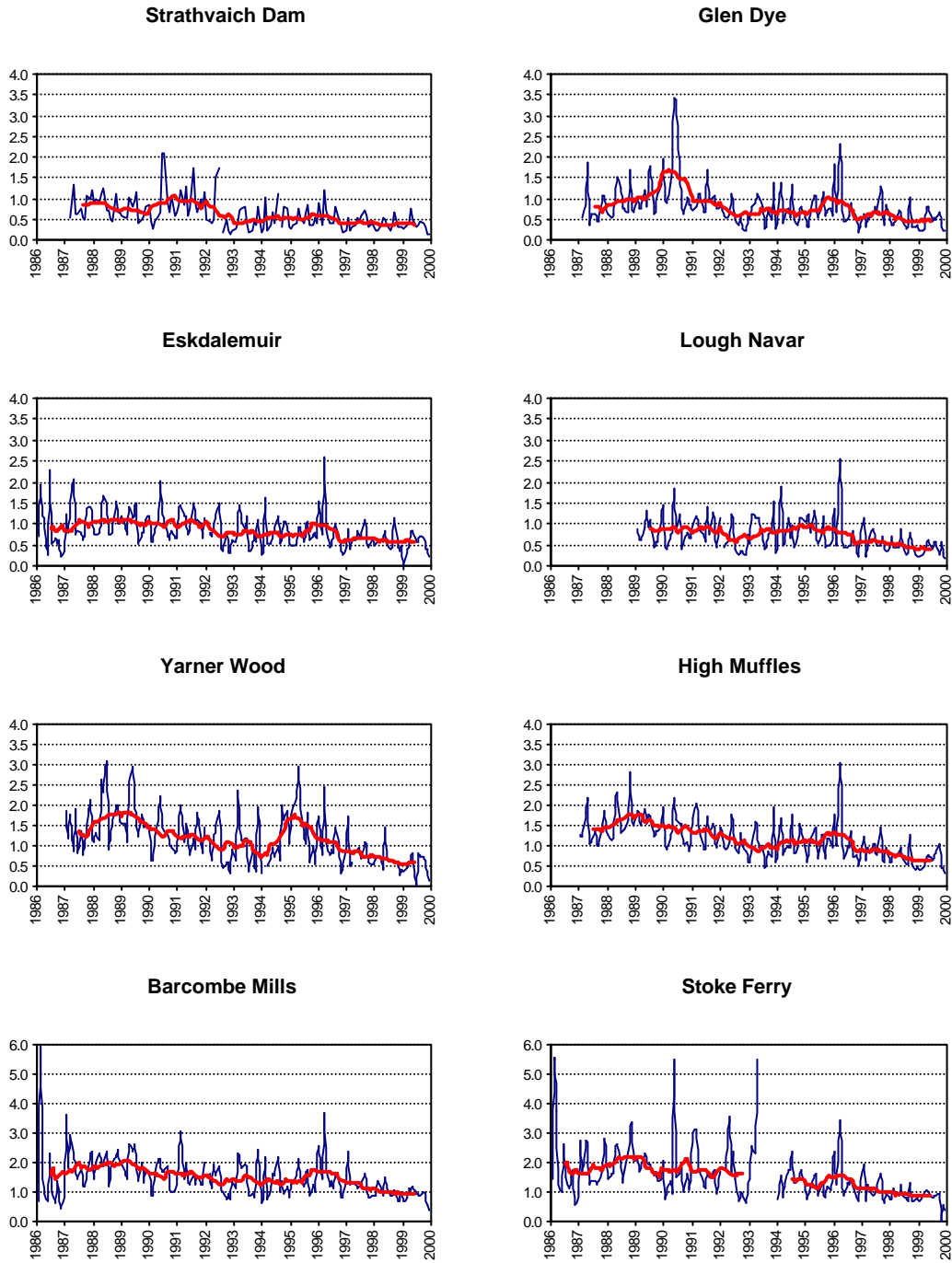


Figure 3.7: Monthly and Running Annual Mean Concentrations of Particulate Sulphate at the Daily Sites, 1986 to 1999 ($mg S m^{-3}$).

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.

Figure 3.8 provides the corresponding 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 1999. Over the period from 1978 to 1999 the average concentration declined from around $1 \mu\text{g S m}^{-3}$ to about $0.6 \mu\text{g S m}^{-3}$. 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.

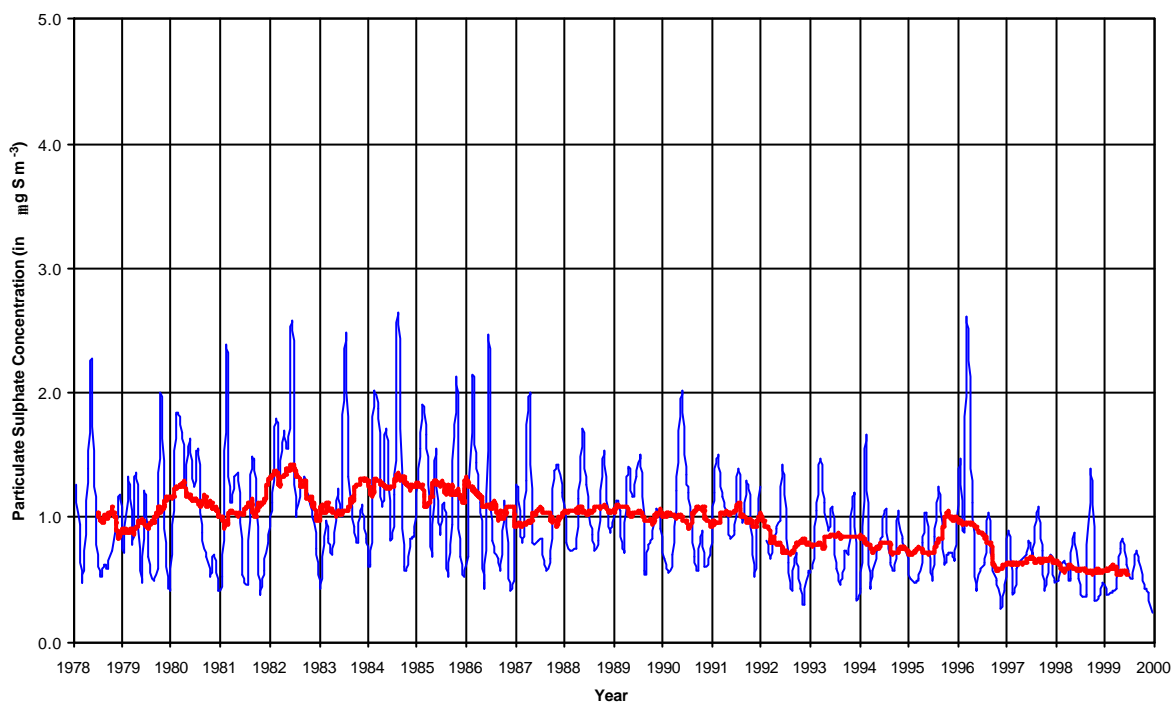


Figure 3.8: Trends in the particulate sulphate concentration observed at Eskdalemuir since 1978.

3.4 NITROGEN DIOXIDE

3.4.1 Concentration Map

The diffusion tube measurements have been used to produce a map of the rural nitrogen dioxide concentrations in the UK for 1999, as shown in Figure 3.9. The map shows that the highest concentrations were observed in the Midlands and southern England. In the main, this reflects the proximity of roads and other aspects of urbanisation to the sampling sites.

The determination of nitrogen dioxide at the rural locations in the acid rain network provides a key input to the mapping of nitrogen dioxide in the United Kingdom [Stedman, 1997].

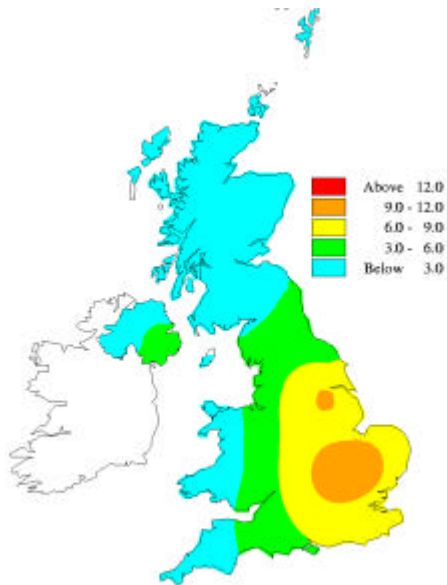


Figure 3.9: Interpolated nitrogen dioxide concentrations in 1999 (ppb)

3.4.2 Trends in Nitrogen Dioxide

The calculated annual average concentrations for nitrogen dioxide at the measured at 8 sites are presented in Figure 3.10. The annual mean concentrations in 1999 were higher than those measured in 1998. This is consistent with the generally higher concentrations measured for a range of pollutants in 1999. It is likely that the meteorological conditions led to poorer dispersion and dilution of emissions.

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.

3.5 NITRIC ACID

Nitric acid is a key intermediate in the atmospheric oxidation and removal of nitrogen oxides. It is readily adsorbed at plant surfaces and hence rapidly dry deposited. It is highly soluble and hence readily removed by wet deposition. Ambient concentrations are therefore relatively small even though the species makes a significant contribution to the total oxidised nitrogen deposition budget.

A dual filter technique is used in the UK Acid Deposition Network for nitric acid. The measurement is indicative only. The samples collected under dry summer conditions are likely to under-read as ammonium nitrate may volatilise during sampling. During cool wet winter conditions nitric acid may be absorbed by the front filter.

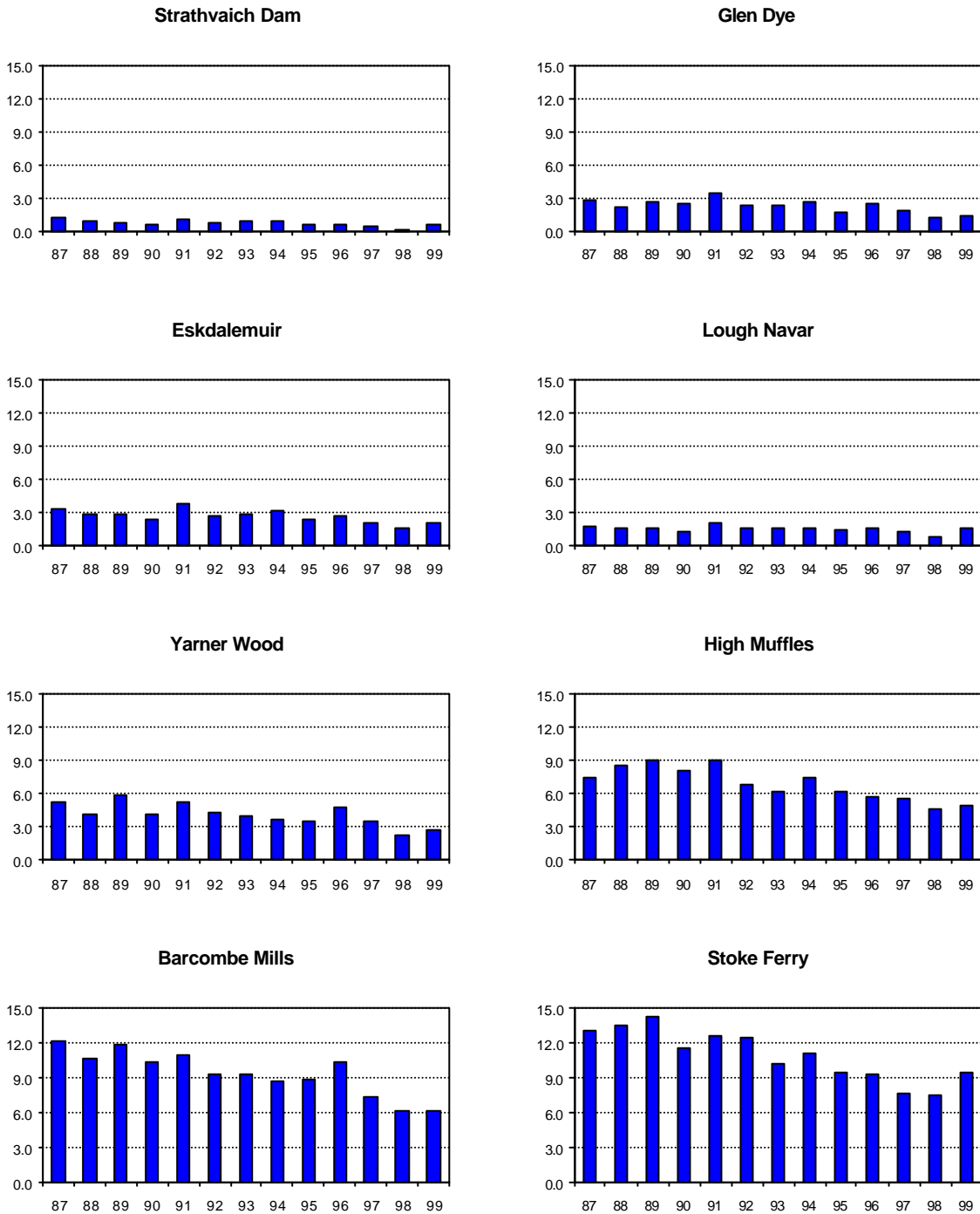


Figure 3.10: Annual average nitrogen dioxide concentration (ppb).

The concentrations of nitric acid measured at High Muffles and Stoke Ferry are presented in Figure 3.11 and Figure 3.12. During conditions of elevated ozone concentrations in the summer [Campbell, 1990], the weekly mean concentrations at both sites occasionally reached 1 to 2 $\mu\text{g N m}^{-3}$. At other times and especially during the winter, nitric acid concentrations were small. The seasonal variation in nitric acid concentrations was therefore much more marked than that in total nitrate, an observation that is probably only partly due to measurement artefacts. Nitric acid is formed largely through the oxidation of NO_2 by OH, a process that will be faster in summer than in winter because of the increased photochemical activity. Particulate nitrate can

be formed under winter conditions *via* night time oxidation of NO_3 by ozone and by heterogeneous processes involving N_2O_5 .

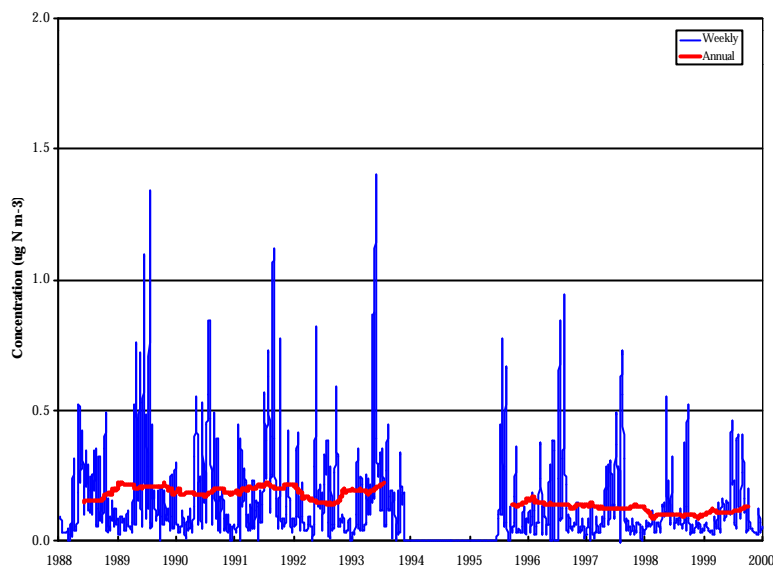


Figure 3.11: Weekly and Running Average Concentration of Nitric Acid at High Muffles ($\mu\text{g N m}^{-3}$)

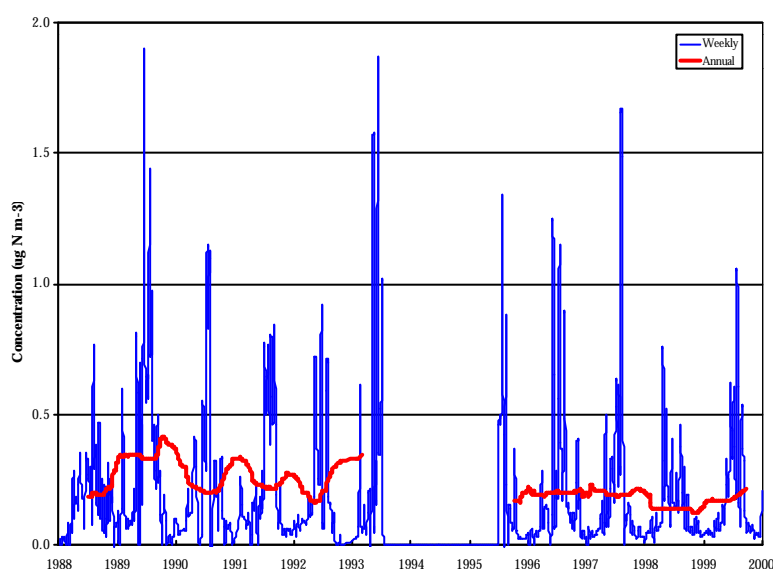


Figure 3.12: Weekly and Running Average Concentration of Nitric Acid at Stoke Ferry ($\mu\text{g N m}^{-3}$)

The annual mean concentration measured at High Muffles in 1999 was $0.11 \mu\text{g N m}^{-3}$. The concentration of HNO_3 shows a decrease over the period of the measurements. At Stoke Ferry, the annual mean concentration was higher at $0.17 \mu\text{g N m}^{-3}$. Again, the concentration of HNO_3 has tended to decrease over the period.

3.6 TOTAL INORGANIC NITRATE AND AMMONIUM

The concentrations of total inorganic nitrate (TIN), taken to be the sum of gaseous nitric acid and particulate nitrate, and of total inorganic ammonium (TIA), taken to be the sum of gaseous ammonia and particulate ammonium, are measured on a daily basis at Eskdalemuir and High Muffles. During 1999, this measurement programme was replaced by separate measurements of the gaseous and particulate phases. The monitoring programme at High Muffles was discontinued on 6th April 1999 while that at Eskdalemuir was continue until September 2000 to

provide overlap with the measurements from the new nitric acid monitoring network (Section 4).

The monthly mean concentrations of TIN and TIA measured at Eskdalemuir and High Muffles are presented in Figure 3.13 (TIN) and Figure 3.14 (TIA). Running annual averages are included to remove seasonal effects and to aid the identification of trends.

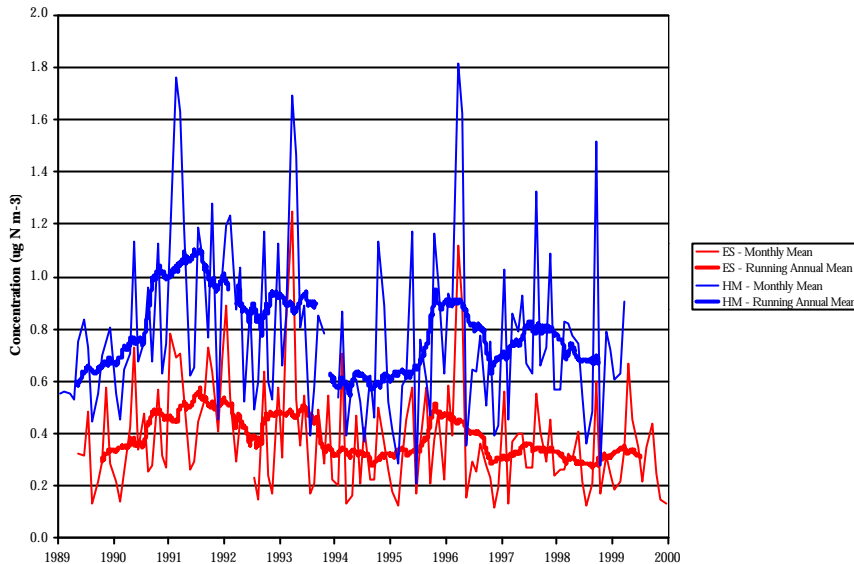


Figure 3.13: Monthly Mean and Annual Running Mean Concentrations of Total Inorganic Nitrate ($\mu\text{g N m}^{-3}$)

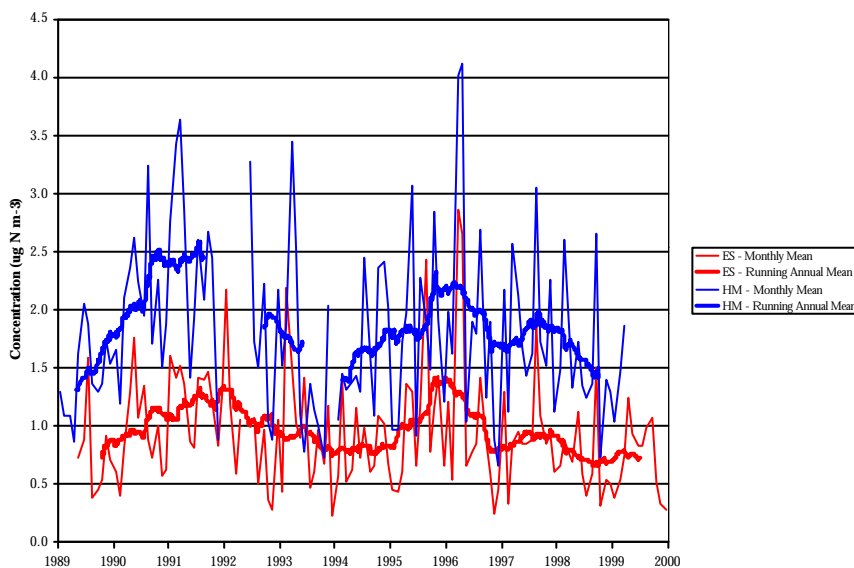


Figure 3.14: Monthly Mean and Annual Running Mean Concentrations of Total Inorganic Ammonium ($\mu\text{g N m}^{-3}$)

The TIN concentrations measured at High Muffles are approximately twice those measured at Eskdalemuir, similar to the ratio of nitrogen dioxide concentrations. This is consistent with the general trends in pollutant concentrations across the UK. There is no discernible trend in concentration at either site over this period. The influence of meteorology in causing episodes of increased concentration, such as that observed in March 1996, is evident.

As for TIN, the concentrations of total inorganic ammonium measured at High Muffles are approximately twice those measured at Eskdalemuir. There is no significant trend at either site.

4. Nitric Acid Monitoring Network

Following the strategic review of the monitoring programme in February 1999, the Department proposed to establish a new network to monitor nitric acid and related species in the UK. The new monitoring network was established during 1999 by the Centre for Ecology and Hydrology at Edinburgh. CEH operate and manage the network under subcontract with the analysis being undertaken by Harwell Scientifics Limited.

4.1 OBJECTIVES OF THE NETWORK

The former measurement programme of nitrogen species consisted of sampling total inorganic nitrate and ammonium on a daily basis at 2 sites (Section 2.2.3) and the indicative measurement of nitric acid on a daily basis at 2 sites (Section 2.2.5). These measurements were considered to have limited usefulness since gaseous and aerosol components were not separated, while the effort involved in daily sampling could be better distributed to include less frequent sampling at more sites over the UK. The new network has been established to provide:

- (a) monitoring of HNO_3 and related species at 12 locations over the UK on a monthly basis. The aim of these measurements is to explore spatial patterns, compare results with dispersion models, seasonality and contribute to national nitrogen deposition estimates.
- (b) monitoring of HNO_3 and related species at 1 site in a high HNO_3 concentration area of south east England on a daily basis. The aim of these measurements is to explore the dynamics of HNO_3 formation and concentrations in relation to other photochemical pollutants in order to improve the process based atmospheric chemistry and dispersion models. The effect of these changes should be seen in validation and improvement of the models in comparison with the observed occurrence of pollution episodes.

4.2 METHODS, SITES AND DATA COLLECTION

A map of the monthly HNO_3 monitoring network is shown in Figure 4.1. Nitric acid and related species are monitored on a monthly basis at 12 locations, and daily measurements are carried out at Barcombe Mills in East Sussex.

Monthly Sampling

The monthly monitoring has been implemented using the CEH DELTA (DEnuder for Long-Term Atmospheric sampling) system in an integrated fashion with the UK Ammonia Monitoring Network. Sampling commenced in September 1999.

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^+ . Extracted aqueous samples from



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

Daily Sampling

A new annular denuder system was established for the daily measurements. The Chemspec™ model 2500 air sampling system was installed at the Barcombe Mill site in February 2000 and daily measurements commenced in April 2000.

4.3 NITRIC ACID NETWORK MEASUREMENTS

4.3.1 Monthly measurements

The monthly measurements have proved successful and have now been running since September 1999. The smooth running has partly been due to the use of the ammonia network sites which were already established with reliable site operators. Using the DELTA sampler also builds on the established approach used for ammonia. The quality control using a double denuder systems confirms that the capture efficiency in the denuders is adequate and that little correction is needed for unsampled gases.

Graphs of the concentrations of HNO_3 and NO_3^- at each site are shown in Figure 4.3. The graphs illustrate that concentrations of both species are reasonably stable at a monthly level, and

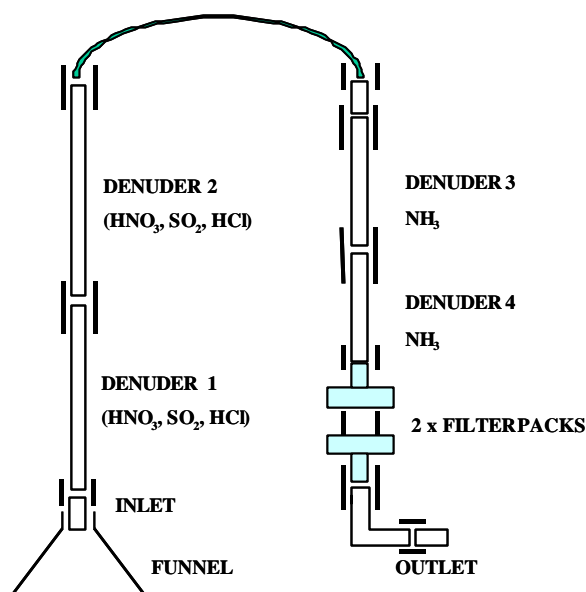


Figure 4.2: Sampling train for monthly air measurements.

the denuders and filter packs are sent to Harwell Scientifics Ltd for chemical analysis on a monthly basis. 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+} .

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 nitrate were largest in Spring 2000.

Although these graphs are shown here to illustrate the trends for HNO_3 and NO_3^- , parallel measurements have been made for HCl and Cl^- , SO_2 and SO_4^{2-} , as well as base cations. The results from the other measurements are illustrated by scatter plots of the concentrations between gas and aerosol phases of the different components (Figure 4.4).

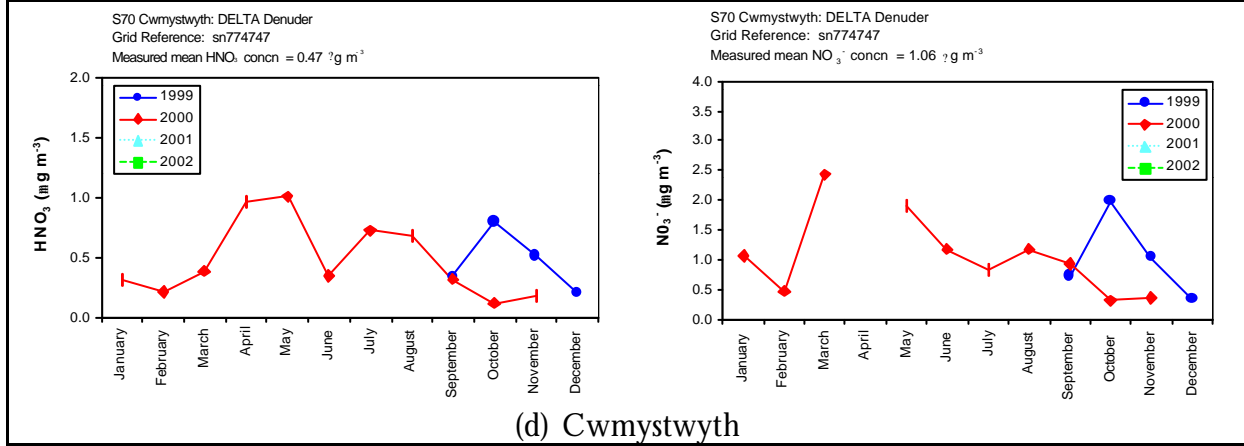
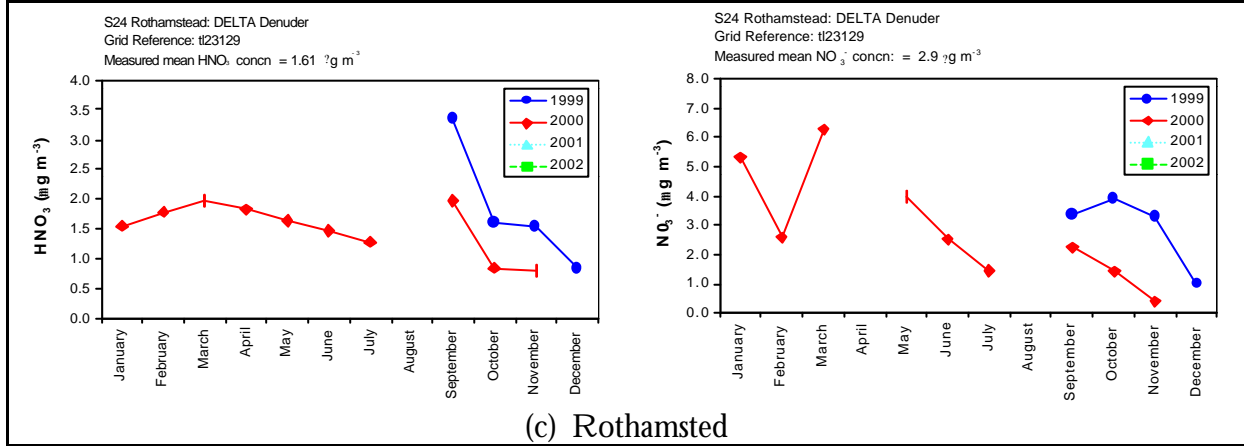
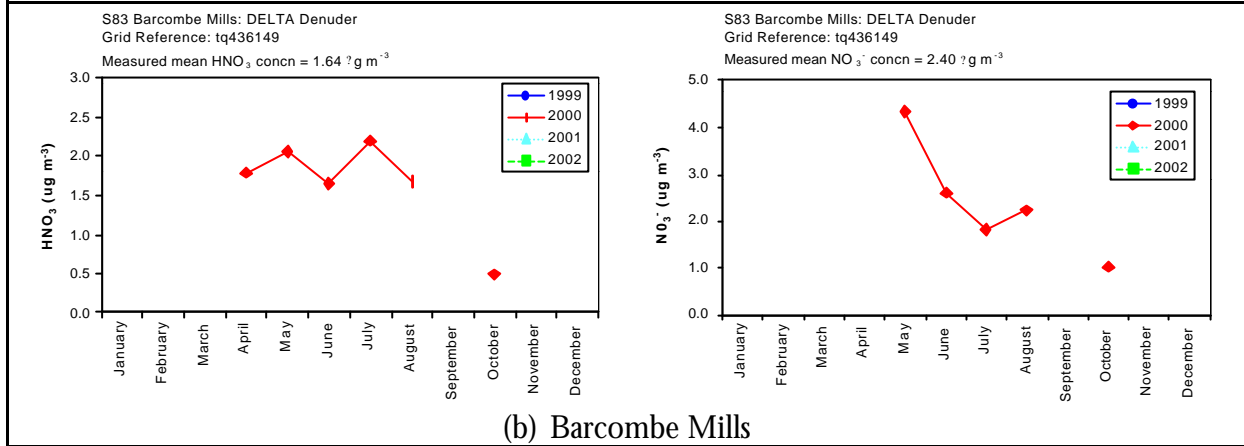
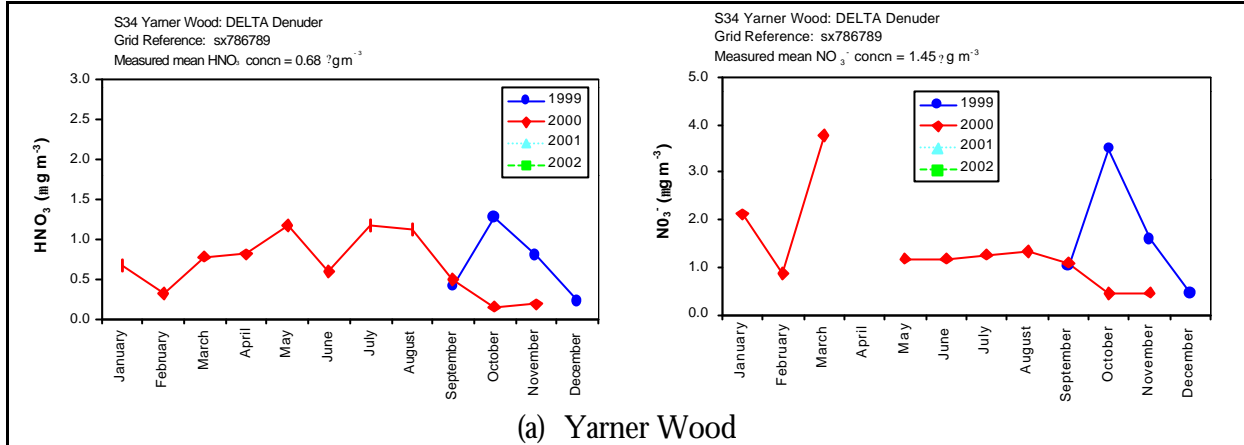
There is some correlation between the concentrations of all the pollutants, and much of this may be related to correlation in the emission distribution of precursor gases or the effect of long range transport of aerosol across the UK and from Europe. The comparison of the gas phase concentrations shows that there is more NH_3 than either SO_2 or HNO_3 at these sites (on molar basis), while SO_2 is in excess over HNO_3 . The correlations are highest for the aerosol components. This reflects the longer residence time of these measurements leading to more representative sampling as well as the close coupling between acidic and basic aerosol components. As with the gases, reduced nitrogen (NH_4^+) is in molar excess over SO_4^{2-} and NO_3^- . However, for aerosol NO_3^- is in molar excess over SO_4^{2-} and they are about equal in terms of equivalents of H^+ .

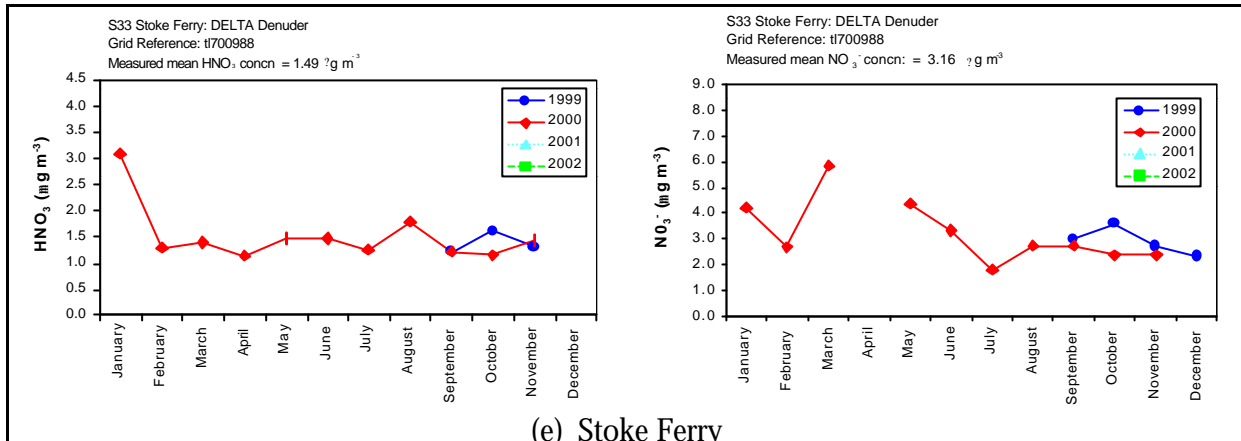
The good correlations between these species also indicate the quality of the measurements, since uncertainty in the measurements on a monthly basis would propagate through to scatter in these plots.

The following 3 pages contain Figure 4.3:

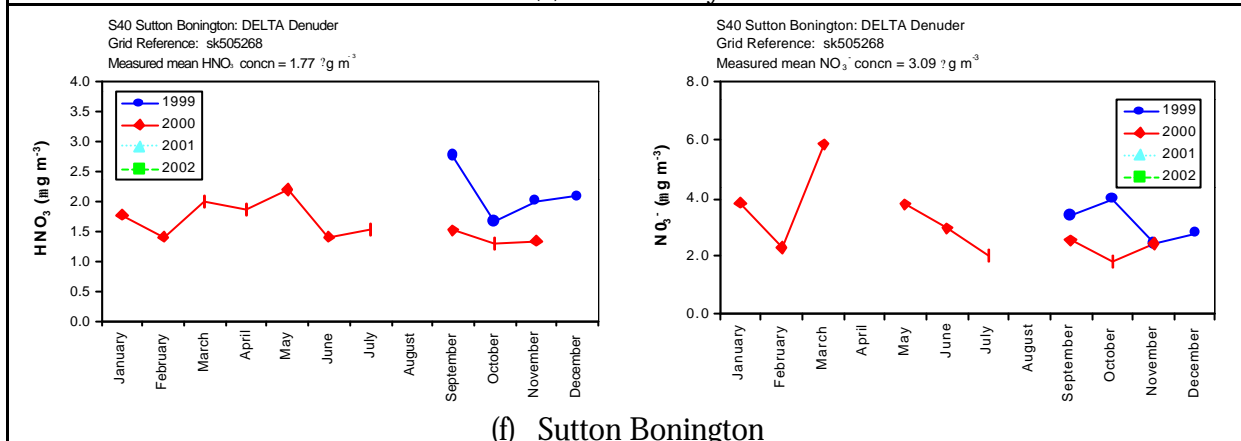
Figure 4.3: Measurements of Gaseous HNO_3 and aerosol NO_3^- made at the 12 Sites in the Nitric Acid Monitoring Network between September 1999 and November 2000.

(a) Yarner Wood	(b) Barcombe Mills
(c) Rothamsted	(d) Cwmystwyth
(e) Stoke Ferry	(f) Sutton Bonington
(g) High Muffles	(h) Lough Navar
(i) Eskdalemuir	(j) Bush, near Edinburgh
(k) Glensaugh	(l) Strathvaich Dam

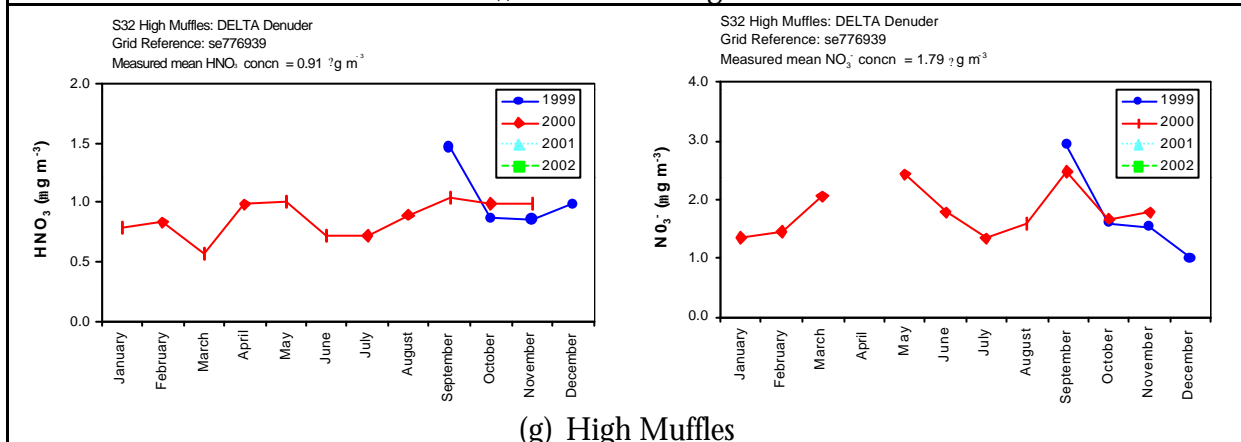




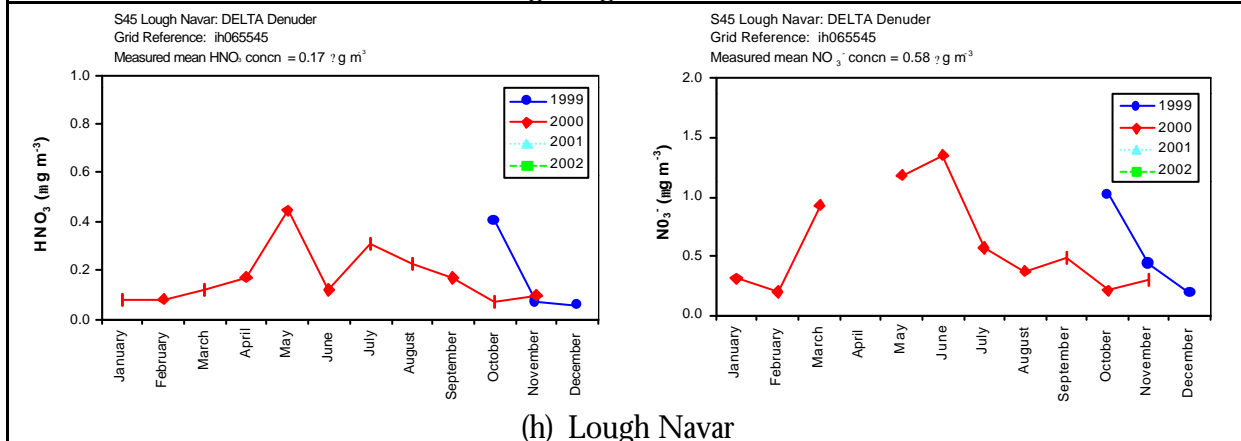
(e) Stoke Ferry



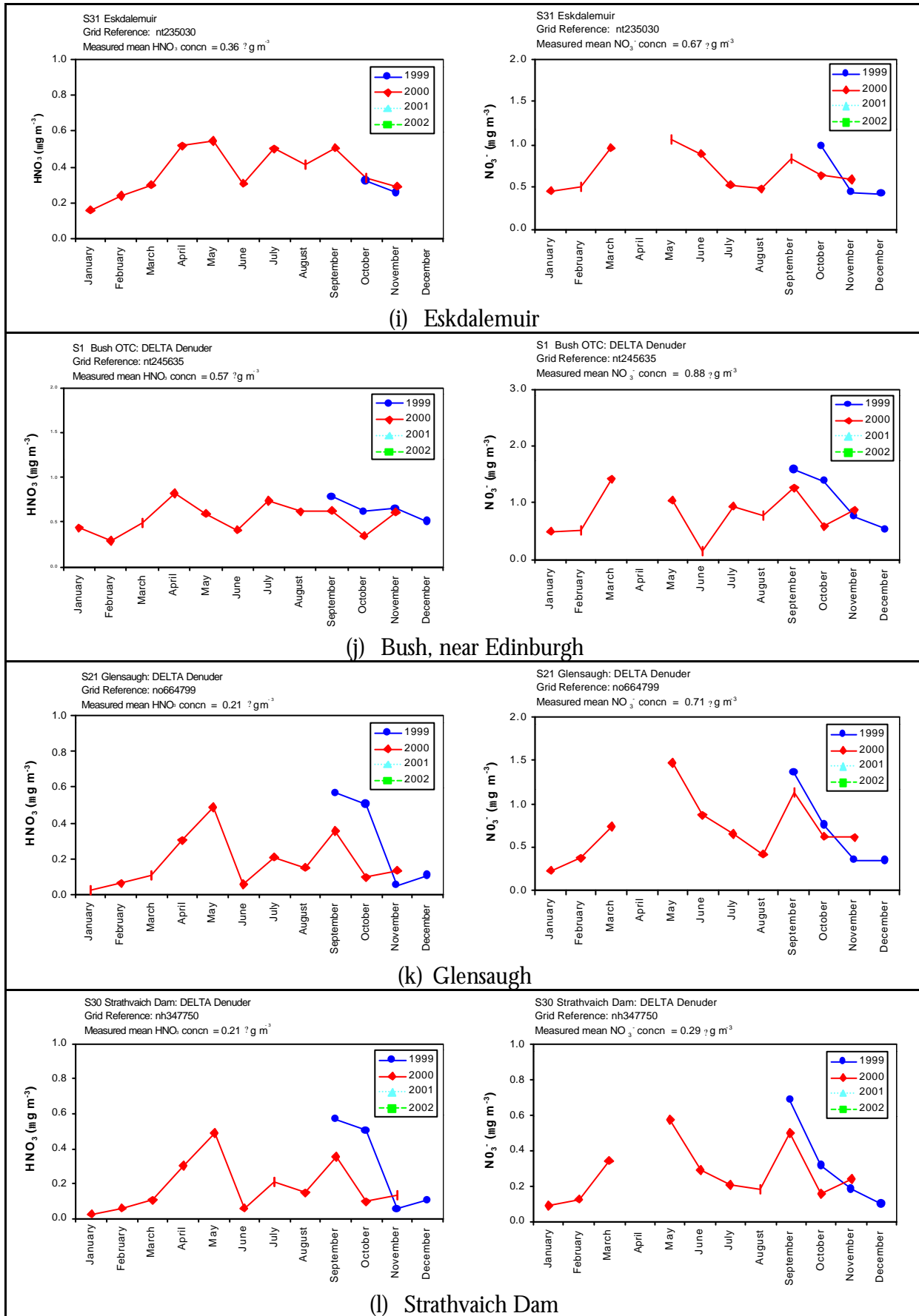
(f) Sutton Bonington



(g) High Muffles



(h) Lough Navar



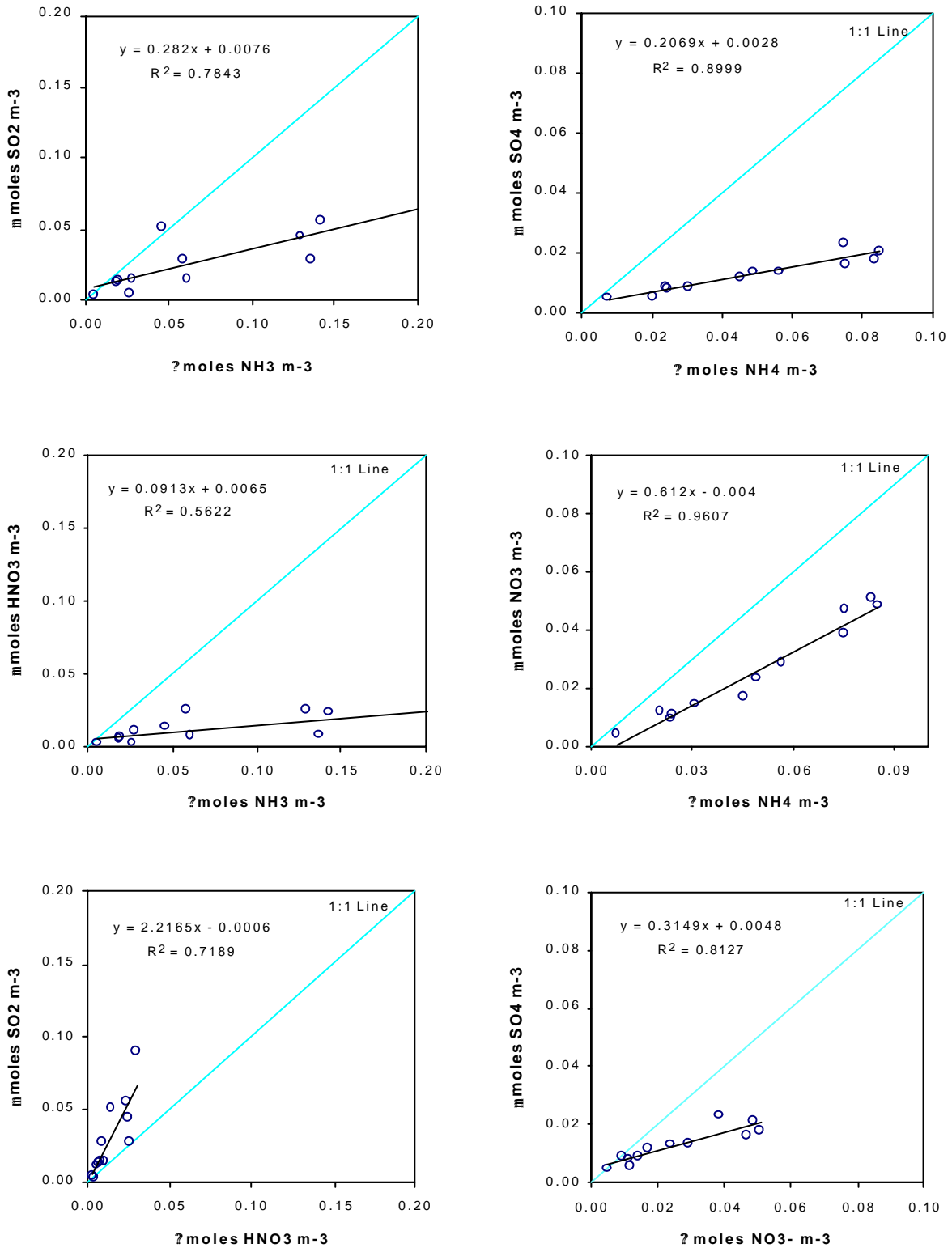


Figure 4.4: Scatter plots of showing the relationships between concentrations of HNO_3 , SO_2 , NO_3^- , and SO_4^{2-} from the monthly measurements at 12 sites (units: mmol m^{-3}).

Of major importance from the 12 site monthly network is the estimation of the concentration field across the UK. Illustrative maps for HNO_3 and HCl are shown in Figure 4.5 and Figure 4.6. 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.

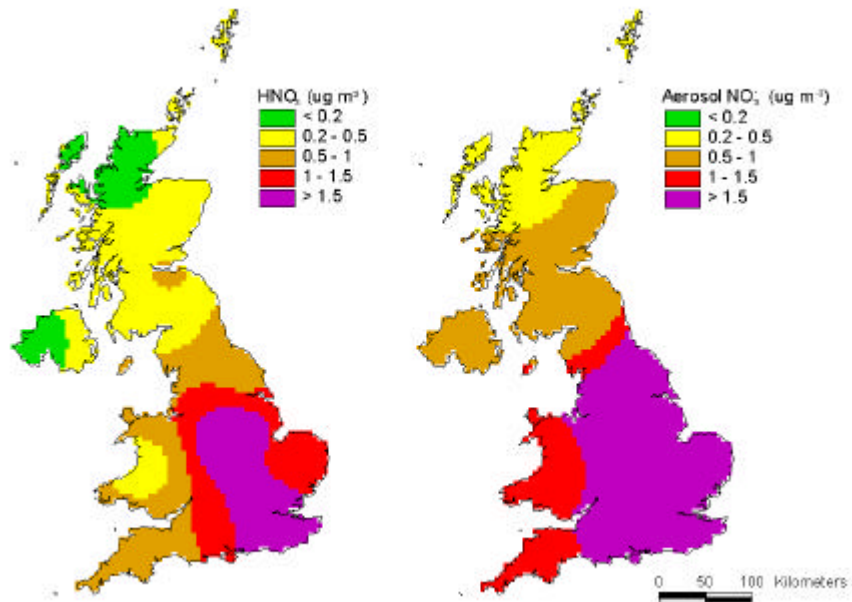


Figure 4.5: Spatial pattern of HNO_3 and aerosol NO_3^- concentrations in the UK from monthly measurements (Sept 1999-Nov 2000).

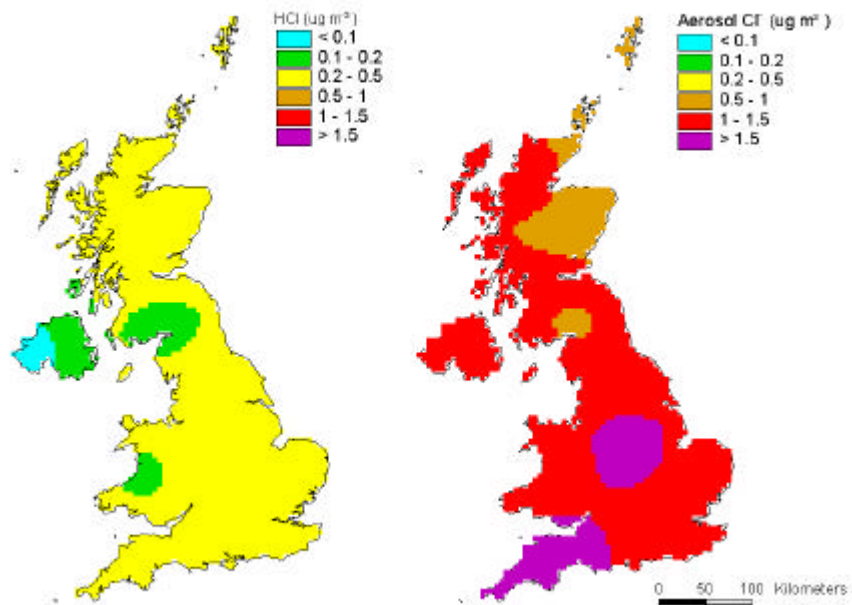


Figure 4.6: Spatial pattern of HCl and aerosol Cl^- concentrations in the UK from monthly measurements (Sept 1999-Nov 2000).

Although not so clearly seen in Figure 4.6, (in order to show concentrations on the same scales), HCl concentrations are largest in the south east of England (Stoke Ferry, Rothamsted) and lowest in the west of the country (Lough Navar, Eskdalemuir and Cwmystwyth). In contrast the highest concentrations of Cl⁻ are at Sutton Bonington and Yarner Wood. This difference in distribution may reflect the dual contribution to atmospheric Cl⁻ anthropogenic and marine sources. With highest HCl concentrations in the south east, this is presumably largely product of emission or reaction with HNO₃ to produce HCl. In contrast, the larger concentration of Cl⁻ in the south west probably reflects a marine contribution to the aerosol.

4.3.2 Daily measurements

The daily sampling system for HNO₃, particulate NO₃⁻ and other species has proved to be more involved and troublesome than the monthly measurements. Establishing the supply and receipt of the annular denuders (4 suitcases representing £5k of glassware every two weeks) was a major task and all the initial problems have mostly been overcome (with so far only one occurrence of breakage). More difficult has been the reliable operation of the Chemspec system, which has seen a large number of sampling problems, leading to substantial down time. The suppliers of this equipment (which is highly rated internationally) continue to be called out (under warranty) by CEH to fix the equipment. With perseverance, it is expected that these problems will be ironed out.

Nevertheless, despite these problems, this system has produced a substantial data series of daily concentrations. Example results are given in Figure 4.7 which show HNO₃ and nitrate concentrations for several months during 2000. The results illustrate the high temporal structure of these pollutants. The variation in HNO₃ reflects a close linkage to production in photochemical episodes as well as a relatively short lifetime before it is removed either by dry deposition or conversion to aerosol NO₃⁻.

4.4 SUMMARY AND NEXT STEPS

The new nitric acid monitoring network has been established for over a year. Valuable new data have been produced on the behaviour of gaseous and aerosol species involved in transboundary and urban air pollution.

The major challenge at present is to improve the reliability of the daily Chemspec system, and particular pressure is being placed on the supplier to fix problems such as temperature control, the performance of the inlet flaps. By contrast the monthly network is operating very smoothly, and providing a record with very few missing points.

Apart from the continued operation of the network, efforts over the next months will focus on quality assurance and the preparation of definitive datasets. These datasets will then be available for use on other DETR contracts (*e.g.*, mapping dry deposition, studying the evolution of nitric acid and nitrate in photochemical episodes).

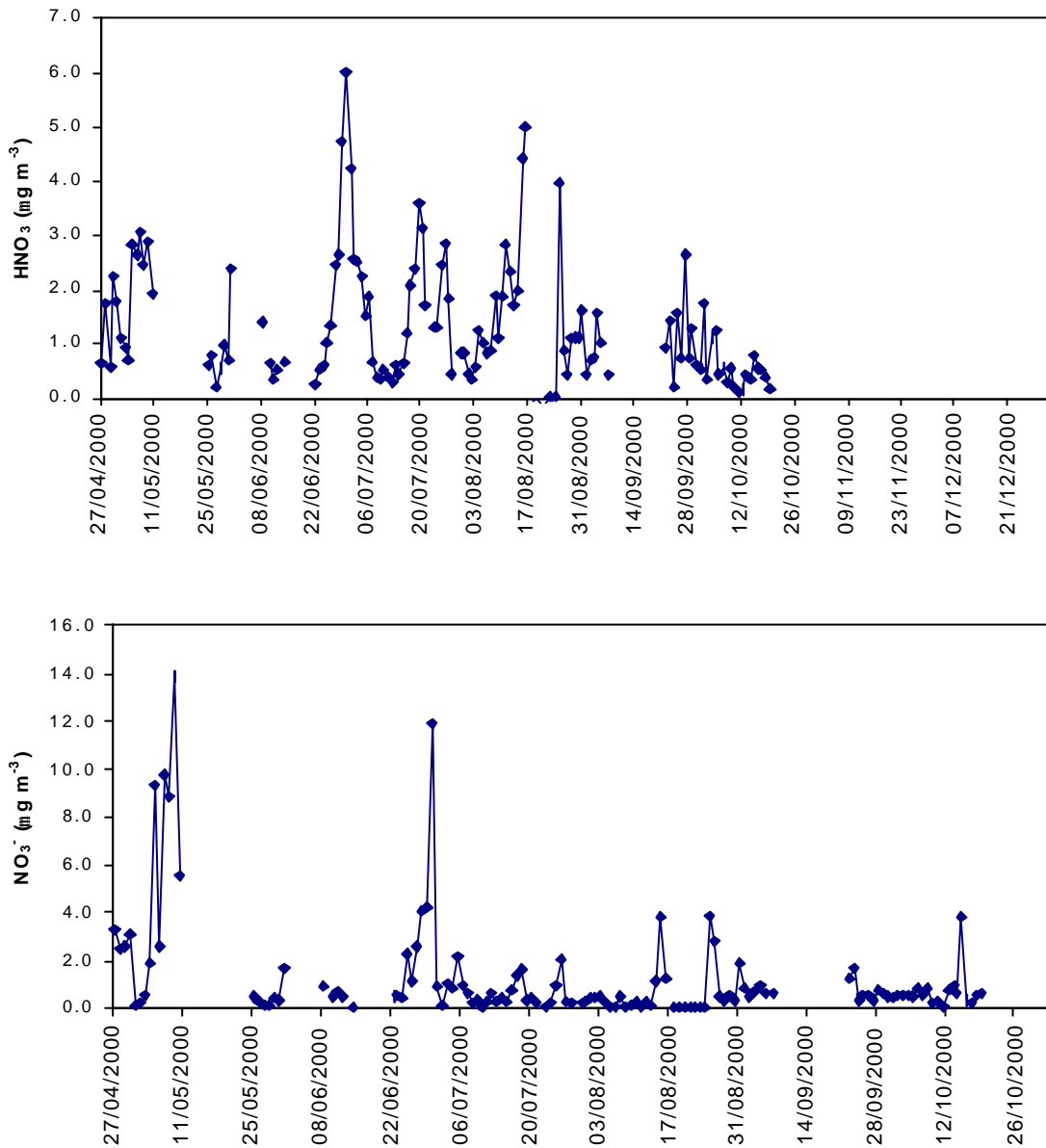


Figure 4.7: Record of daily concentrations of HNO₃ (upper panel) and aerosol NO₃⁻ (lower panel) at Barcombe Mills, Sussex

5. Other Activities

5.1 EMEP INTERCOMPARISON

AEA Technology participated in the 18th EMEP measurement intercomparison. Figure 5.1 presents a comparison of the ion concentrations determined at AEA Technology and those expected for the four rainwater samples G1 to G4.

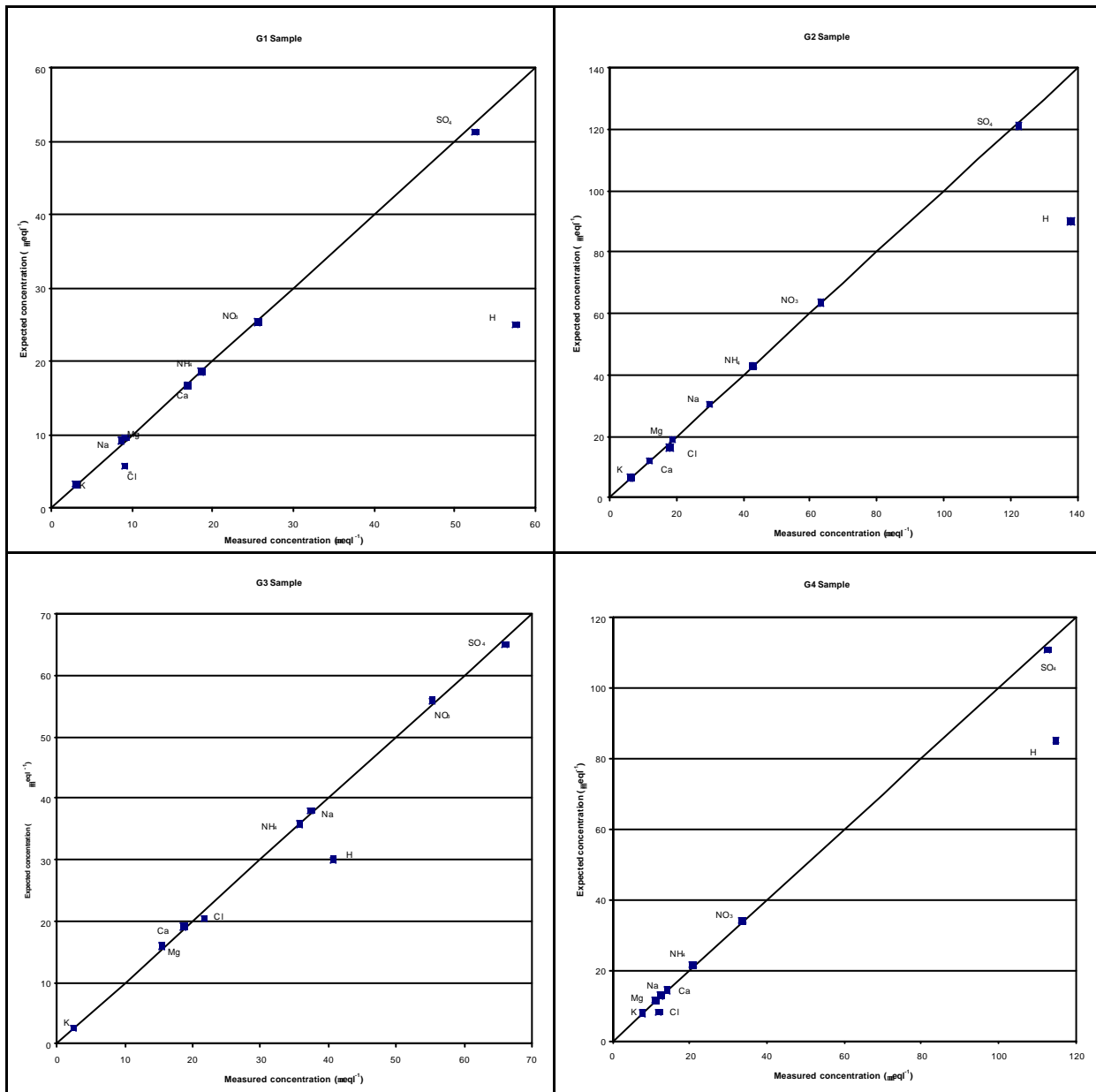


Figure 5.1: Expected and Measured Ion Concentrations for the EMEP Intercomparison

Apart from the hydrogen ion concentrations, the measured ion concentrations were in excellent agreement with the expected concentrations for all four samples. The hydrogen ion concentration is measured using a pH probe while the other ions were all measured using the new ion chromatographs. The discrepancy on the hydrogen ion measurements is being checked. It is however clear that the performance of the new ion chromatographs is very good. In the previous intercomparison, the largest differences were noted for magnesium and calcium. In the present intercomparison, the differences are now comparable to those of the other ions.

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7. Acknowledgements

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

We would like to acknowledge the dedication and contribution of Steve Baker (AEA Technology) who was involved in the monitoring programme until October 2000.

Appendices

CONTENTS

Appendix 1	Weekly Bulk Precipitation Data, 1999
Appendix 2	Tables of Mean Concentration and Total Rainfall, 1986 to 1999
Appendix 3	Geostatistics
Appendix 4	Concentration Data for Sulphur Dioxide and Particulate Sulphate, 1999

Appendix 1

Weekly data, 1999

Notes to Appendix 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 SO₂ Daily measurements of SO₂ by hydrogen peroxide bubbler and of particulate sulphate on a Whatman 40 filter with ion chromatographic analysis
- Weekly SO₂ Weekly measurements of SO₂ by hydrogen peroxide bubbler with ion chromatographic analysis
- TIN Daily measurements of total inorganic nitrate using a filter pack
- TIA Daily measurements of total inorganic ammonium using a filter pack
- ozone Hourly measurements surface ozone
- SO₂ Hourly measurements of SO₂
- NO_x Hourly measurements of NO_x
- WF Weekly measurements of nitric acid and nitrate, sulphate, ammonium, sodium and chloride particles using a filter pack
- 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.

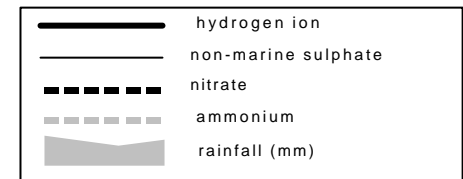
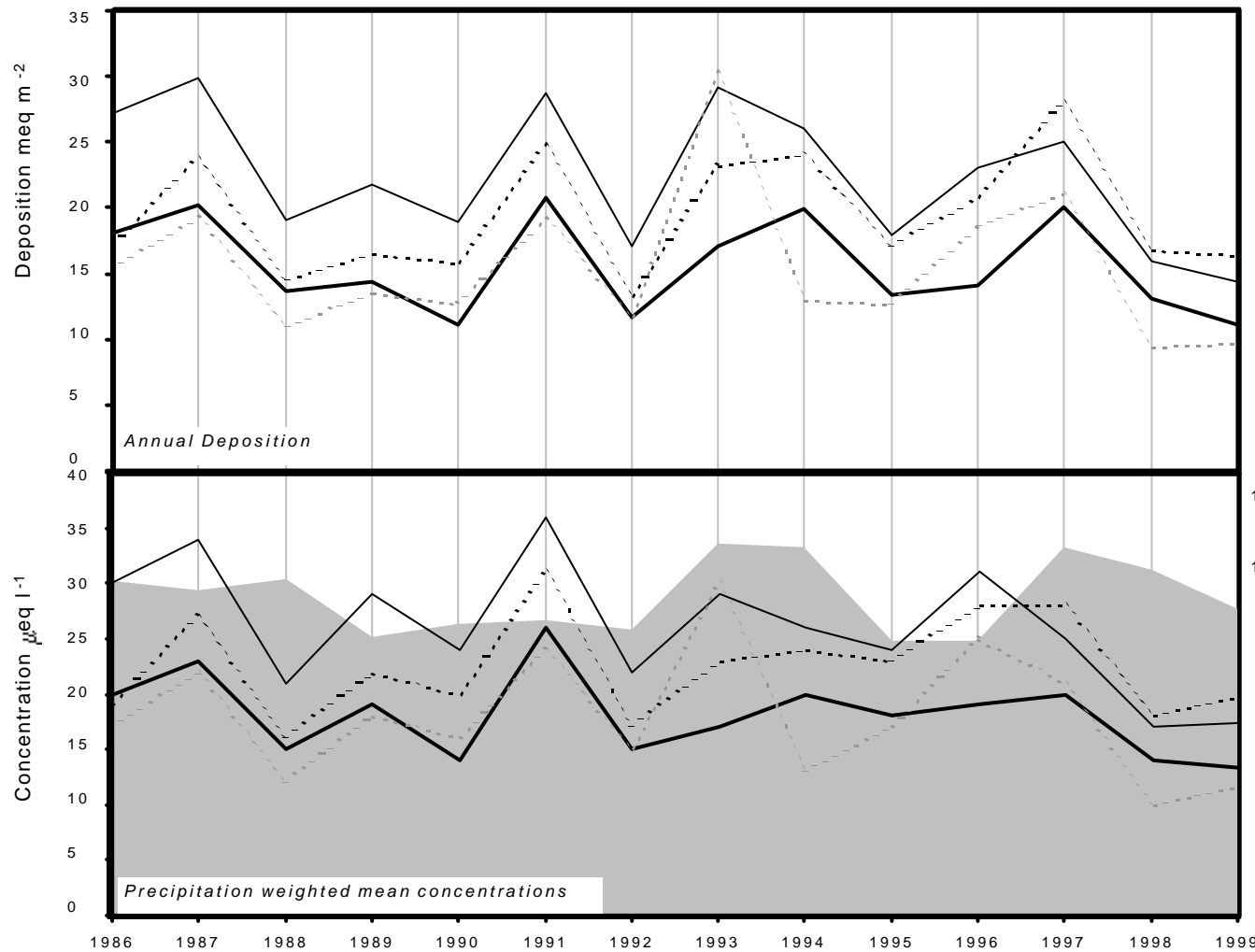
Goonhilly

1999 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)	
<i>hydrogen ion</i>	-0.30 ueq/l (-1.50 %/year): 14 years' data - No significant trend detected
<i>non-marine Sulphate</i>	-0.71 ueq/l (-2.32 %/year): 14 years' data - No significant trend detected
<i>Nitrate</i>	0.03 ueq/l (0.13 %/year): 13 years' data - No significant trend detected
<i>ammonium</i>	-0.19 ueq/l (-0.97 %/year): 14 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeqL ⁻¹	NO ₃ ⁻¹ µeqL ⁻¹	NH ₄ ⁻¹ µeqL ⁻¹	Na µeqL ⁻¹	Mg µeqL ⁻¹	Ca µeqL ⁻¹	Cl µeqL ⁻¹	K µeqL ⁻¹	PO ₄ ⁻¹ µeqL ⁻¹	nss-SO ₄ ⁻¹ µeqL ⁻¹	cond µScm ⁻¹	H µeqL ⁻¹	rain mm
07/01/99	5.1	88.1	14.6	15.3	594.5	156.7	44.6	754.1	12	< 9.7	16.5	97	7.8	3.1
13/01/99	5.4	38.2	2.6	< 2.1	301.1	103.7	28.3	334	6.1	< 9.7	1.9	53	4.4	44.8
20/01/99	5.1	80	23.8	19.7	492.6	138	40.2	573.2	12	< 9.7	20.6	85	8.1	7.4
28/01/99	5.5	52.8	17.6	24.9	288.5	103.5	35.1	308.4	6.1	< 9.7	18.1	54	2.8	16.4
10/02/99	5.3	46.2	15	19.9	237.5	81.9	26.9	256.8	7.9	< 9.7	17.6	43	4.9	11
19/02/99	5.4	41.9	5.3	8.4	265.1	99.5	35.4	294.3	5.9	< 9.7	9.9	45	3.9	8.7
25/02/99	5.1	62	8.1	7.1	430.8	122.3	31	490.3	8.6	< 9.7	10.1	66	7.4	40.6
05/03/99	4.7	75	51.2	36.4	353.6	93.9	31.7	388.7	7.4	< 9.7	32.4	78	20.9	9.1
17/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
25/03/99	4.8	54	24	16	238.8	73.7	27.7	255.2	7.3	< 9.7	25.2	47	14.8	4.4
01/04/99	4.7	78.9	36.8	21.5	322.1	88.5	34.3	348.1	7.1	< 9.7	40	71	22.4	11.4
08/04/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
15/04/99	4.8	49.8	12.9	8.1	271.9	85.8	24.3	302.7	6.1	< 9.7	17.1	54	15.8	28.5
23/04/99	4.5	58.6	20.3	6.6	195.6	53	13.5	215.8	4.2	< 9.7	35	53	32.4	13.7
30/04/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
06/05/99	4.4	133.6	41	18.3	846.7	194.3	57.7	923.4	21.6	< 9.7	31.6	142	43.7	4.7
13/05/99	5.4	87.1	111.8	91.8	221.2	73.6	90.2	224.4	12.5	< 9.7	60.5	57	3.6	2.3
21/05/99	6.2	90.3	57.2	45.2	295.6	103.4	103.2	299.7	38.6	< 9.7	54.7	64	0.6	17
28/05/99	4.8	36.1	30.6	29.3	43.3	22.1	30.9	42	2	< 9.7	30.9	23	15.1	50.7
03/06/99	4.9	43.5	6.6	3.7	245.5	78.6	24.9	273.6	5.5	< 9.7	14	52	13.5	21
16/06/99	5.2	45.2	34.8	20.1	179.4	68.1	38	184.2	8.3	< 9.7	23.5	39	6.6	25.7
30/06/99	4.6	59.9	24.1	31.4	185.9	72.2	27.6	206.7	30.5	< 9.7	37.5	48	27.5	10.4
07/07/99	6.2	125.6	62.4	76.3	560.9	164.3	86	588.2	16.2	< 9.7	58	99	0.6	3.7
29/07/99	4.4	77	59.2	27	121.2	33	35.7	117.5	4.1	< 9.7	62.4	52	42.7	13.7
12/08/99	5.7	36.1	5.9	7	227.4	88.7	26.8	250.2	7.6	< 9.7	8.7	43	2.1	25.6
19/08/99	4.7	30.2	26.3	17.3	76.1	27.2	14.1	74.4	3.7	< 9.7	21	25	18.2	54.7
03/09/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.1
09/09/99	4.9	27.7	17	6.6	111	41.7	14.8	121.7	2.7	< 9.7	14.3	27	12.3	27
16/09/99	4.5	77.2	21	8.2	519.4	137.3	33.4	543.4	10.7	< 9.7	14.6	92	32.4	15.1
23/09/99	5	50.5	7.6	< 2.1	338.1	104.8	32.5	369.1	10.7	< 9.7	9.7	63	11.2	26.4
30/09/99	4.9	208.5	40.6	19.1	1465.2	517.4	85.5	1415.6	32.3	< 9.7	32	228	13.8	3.6
07/10/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
15/10/99	4.3	164.3	220.6	108.2	719	170.8	74.1	773.8	17.9	< 9.7	77.7	156	49	7.1
21/10/99	4.7	168.5	20.1	12.1	1143	465.5	81.4	1295.7	27.7	< 9.7	30.8	184	22.4	2.9
28/10/99	4.5	78.6	21.3	8.1	435.5	119.2	40.7	484.2	10.6	< 9.7	26.1	86	30.9	22.6
04/11/99	5	45.6	15.6	5.1	288.3	85.1	20.9	326.4	6	< 9.7	10.9	58	11.2	24.3
11/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
22/11/99	4.9	91	25.8	25.6	516.4	137.7	42.2	607.1	12.4	< 9.7	28.7	87	12.6	3
26/11/99	4.7	52.9	15.9	< 2.1	350.9	98.4	26.4	386.6	7.6	< 9.7	10.6	62	20.9	20.1
01/12/99	5.5	7.4	133.8	7.1	922	415	62.2	1074.2	18.5	< 9.7	< 103.6	150	3.2	9.7
09/12/99	5	48.8	4.5	< 2.1	360.5	112.8	30.6	417.5	7	< 9.7	5.4	63	11	42.3
15/12/99	4.8	31	7.8	3.5	190	71.5	20.4	216.8	3.6	< 9.7	8.1	37	14.5	96.5
23/12/99	5.2	52.2	2.4	< 2.1	415	126.2	32.6	488.8	7.8	< 9.7	2.2	71	6.5	70.7
30/12/99	5.2	48.4	8.9	3	320	71.4	17	378.1	6.6	< 9.7	9.9	61	7.1	27.6
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5003		50.6	19.7	11.7	291.6	93.1	30.5	325.3	7.8		17.3	56.1	13.3	830.9

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
06/01/99	5.5	26	10.4	6.8	105.5	38.8	40	118.9	2.4	< 9.7	13.3	23	3.4	25.8
13/01/99	5.2	18.3	3.6	2.6	101.8	48.8	14.5	114.4	2	< 9.7	6	20	6.5	119.3
20/01/99	5.2	28.7	11.1	12	126.1	47.9	20	144.9	2.6	< 9.7	13.5	27	7.1	19.2
27/01/99	5.3	96.7	27	100.7	198.2	59.3	45.8	216.2	5.3	< 9.7	72.8	-	5	1.7
03/02/99	5.4	23.1	9.1	16.3	66.6	37.2	19.8	75.5	1.3	< 9.7	15.1	18	3.8	18.6
10/02/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1
16/02/99	5.7	53	8.1	22.3	328.1	117	47.9	356.1	6.5	< 9.7	13.5	54	2	13.7
24/02/99	5.4	23	4	8	142.8	50.7	15.4	165.9	2.6	< 9.7	5.7	25	3.8	35.9
03/03/99	5.3	30.7	9.2	14.3	144.5	46.1	19.3	165.4	3	< 9.7	13.3	25	5.5	13.9
10/03/99	5.2	19.4	22.6	23.6	13.2	9.5	25.2	15.1	< 1.3	< 9.7	17.8	11	6.3	15.3
16/03/99	5	85.6	45.4	40	168.5	43.6	60.5	186.5	7.8	< 9.7	65.3	-	10	1.7
24/03/99	4.8	42.1	26.5	31.6	58	22.6	22.7	62.6	1.8	< 9.7	35.1	24	14.5	31.7
31/03/99	5.4	41.4	37.4	48.9	60.4	30.9	53.3	62.3	2.3	< 9.7	34.1	23	3.9	11.8
07/04/99	5.5	33	4.9	8.6	187.6	81.6	37.9	212.6	5.7	< 9.7	10.4	34	3.2	17
14/04/99	4.9	29.7	15.4	18.9	70.1	32	14.5	73.7	1.7	< 9.7	21.3	21	11.5	56
21/04/99	5	21.7	11.1	12.2	62	40.6	22.3	73.6	2	< 9.7	14.2	18	9.8	40.8
05/05/99	5.1	71.1	48	52.9	247.5	80	56.7	260.8	7.3	< 9.7	41.2	60	7.4	17.4
12/05/99	6.2	46.9	45.1	76.9	105	64.2	82.8	110.8	5.4	< 9.7	34.3	31	0.6	7.4
26/05/99	5	42.2	46.6	57.4	15.9	11.6	48.8	19	1.8	< 9.7	40.3	21	10	73
02/06/99	4.9	22	7.4	7.4	75.1	38.3	15.7	83	2	< 9.7	13	21	12	42.9
09/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
23/06/99	5.3	21.6	22.6	9.4	33.6	12.6	20.5	35.5	2.4	< 9.7	17.6	-	5	1.5
30/06/99	4.7	24.8	18.7	12.3	30.2	20.2	17	26.9	2	< 9.7	21.1	-	20	1.7
07/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
14/07/99	4.6	45.6	26	10.8	95	30.7	35.1	92.9	7.1	< 9.7	34.2	28	27.5	5.5
28/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
04/08/99	4.8	29.9	20.8	21.8	34.8	14.2	7.5	36.4	< 1.3	< 9.7	25.7	20	16.6	52
10/08/99	4.8	25.3	16.8	11.6	47.7	28.1	23.7	51.7	< 1.3	< 9.7	19.6	19	15.8	30.8
18/08/99	4.5	42	58.4	46	51.9	16.6	15.6	48.8	3	< 9.7	35.7	31	31.6	23.7
24/08/99	4.7	25	20.1	18.7	9.8	< 4.1	9.7	14.2	2.3	< 9.7	23.8	14	19.1	32.3
06/09/99	4.5	74.7	44.3	25	91.8	26.7	36.8	86.3	3.7	< 9.7	63.6	38	35.5	4.3
15/09/99	5.1	22.3	9.9	11.3	70.6	35.2	18.1	76.5	1.8	< 9.7	13.8	18	7.6	55.5
22/09/99	4.5	24.1	7.6	3.2	96.4	38.7	12.1	107.1	2.6	< 9.7	12.5	24	34.7	72.6
29/09/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
13/10/99	3.9	104.1	199.6	122.9	95.8	23	18.2	95.2	4	< 9.7	92.5	82	117.5	3.4
20/10/99	4.9	23.3	17.6	19.7	76.8	37.9	21.7	87.2	1.8	< 9.7	14.1	23	12	57.4
27/10/99	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1
02/11/99	4.8	32.7	15.9	10	129	46.5	20.9	147.8	4.2	< 9.7	17.2	32	15.5	30.2
10/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	2.9
17/11/99	5.2	37.7	17.2	24.5	99.5	37.6	29.6	110.5	6.3	< 9.7	25.8	25	6.6	4
23/11/99	4.6	39.4	16.4	8.6	171.1	52	15.7	192	4.5	< 9.7	18.8	37	26.3	26.3
01/12/99	5.6	48.2	5.3	8.7	356.6	116.2	43.2	398.8	10.4	< 9.7	5.2	60	2.3	6
08/12/99	5.1	23.7	3.1	< 2.1	166.3	64	17.5	191.6	3.2	< 9.7	3.7	30	7.6	52.1
15/12/99	4.6	14.5	9.1	4.2	32.3	17.6	13.3	36.2	0.7	< 9.7	10.6	14	25.7	69.8
29/12/99	5.4	12	5.5	< 2.1	32.1	5.9	3.6	35.6	< 1.3	< 9.7	8.1	10	3.8	6.2
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5008		28.4	16.5	16.9	87.6	37.1	21.7	97.7	2.4		17.9	23.5	13.6	1106.2

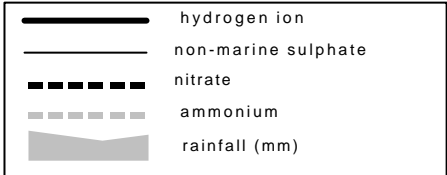
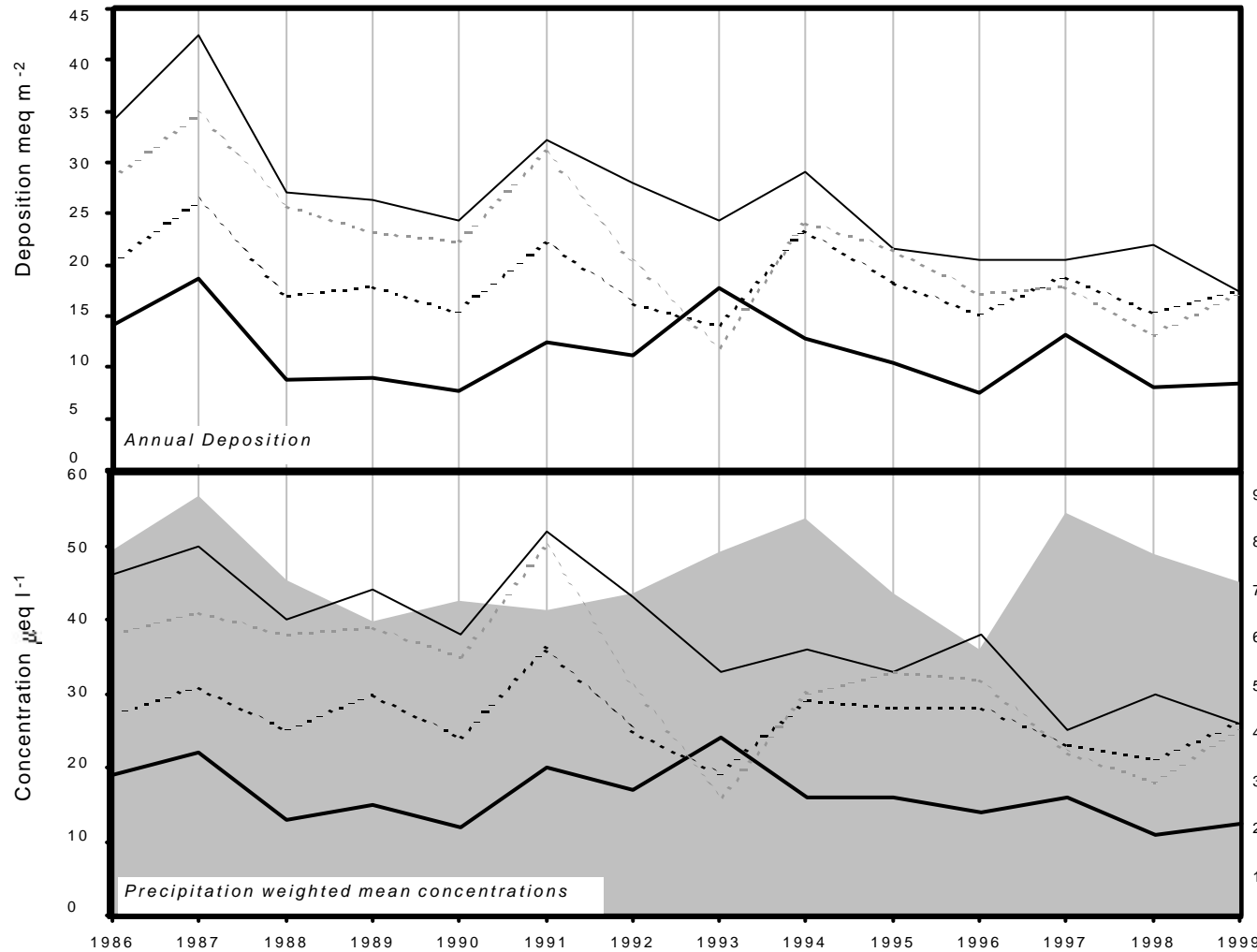
Barcombe Mills

1999 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, EMEP

Site Operator:
South East Water plc



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-0.38 ueq/l (-2.01 %/year): 14 years' data - No significant trend detected
<i>non-marine Sulphate</i>	-1.63 ueq/l (-3.35 %/year): 14 years' data +++ Strong trend detected
<i>Nitrate</i>	-0.35 ueq/l (-1.22 %/year): 14 years' data - No significant trend detected
<i>ammonium</i>	-1.53 ueq/l (-3.64 %/year): 14 years' data ++ Moderately strong trend detected

Rainfall (mm)

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
05/01/99	4.7	59.7	30.9	23.7	292.3	76.9	28.8	325.8	6.8	< 9.7	24.5	64	21.4	16
12/01/99	5.2	66.7	11.5	15.8	433.9	133.2	40.4	501.8	9.2	< 9.7	14.4	79	5.9	50
19/01/99	5.2	59.8	26.2	31.9	225.4	78.6	38.1	254.3	8.4	< 9.7	32.7	51	6.3	10
26/01/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.3
02/02/99	5.5	34.6	28.4	44.6	41.5	22.1	55.3	44.1	1.9	< 9.7	29.6	18	3	6.2
09/02/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
16/02/99	6.1	60.1	31.3	68.7	133.7	57.2	60.7	138.3	13.9	< 9.7	44	34	0.9	1.8
23/02/99	4.5	71.6	56.7	60.1	193.1	50.4	18.8	221.5	6	< 9.7	48.3	54	29.5	13.3
02/03/99	5.3	59.1	17.3	25.7	318.4	96.2	37.9	356.9	9.4	< 9.7	20.7	52	5.5	9.8
09/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
16/03/99	5.8	83.8	54	7	147.3	60.8	171.7	166.3	36	< 9.7	66	43	1.7	2.7
23/03/99	5	37.6	49.5	54.1	29.1	15.6	40.1	31	4.2	< 9.7	34.1	23	11	17.6
30/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
06/04/99	5.9	41.2	14.6	17.4	171	77.4	81.6	197.3	26.3	< 9.7	20.6	36	1.4	10.3
13/04/99	4.4	93.3	122.1	105.9	105.6	28.3	39.2	112	11.4	< 9.7	80.5	61	42.7	8.6
20/04/99	6.4	60.9	26.2	87.7	131.3	63.9	29.3	161.1	20.2	37.3	45.1	39	0.4	15.2
04/05/99	5.3	219.2	189.7	167.8	142.8	66.2	436.9	141.2	25.3	< 9.7	202	-	5	1.2
11/05/99	5	43.1	41.3	26.6	61.9	26.9	66.1	62.2	6.4	< 9.7	35.6	25	8.9	11.5
18/05/99	3.9	203.7	300.4	246.8	23.5	15.8	98.8	29.4	6.4	< 9.7	200.9	113	125.9	4.4
01/06/99	5.3	30.5	23.9	28.8	39.1	27.7	47.7	41.8	4	< 9.7	25.8	17	4.9	40.1
08/06/99	3.5	413.2	355.8	63	73.3	72.6	129.9	131.4	209	20.1	404.3	219	338.8	1.5
15/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
22/06/99	4.9	32.6	24.7	27	53.8	28	26.8	56.1	3.4	< 9.7	26.1	24	13.2	27.3
29/06/99	6.1	58.3	72.9	111.8	70.4	42.9	86	82.6	17.9	22.2	49.8	36	0.8	1.8
13/07/99	5.9	33	32	42.6	44.5	26.3	73.6	39.5	15.8	15.7	27.6	18	1.2	7.8
27/07/99	5.9	96.5	189.3	115.3	76.9	35.6	395	42.7	18.2	< 9.7	87.2	49	1.2	3.8
03/08/99	5.2	27.6	24.5	43.6	3.5	< 4.1	22.9	7.4	< 1.3	< 9.7	27.2	12	6	53.1
10/08/99	4.8	24.1	20.3	9.6	34.2	13.7	29.7	34.9	2.8	< 9.7	20	16	17.4	11.9
17/08/99	5.3	24.6	16.6	14.2	84.1	29.5	19.6	89.9	4.9	< 9.7	14.4	20	5.5	26.1
23/08/99	6.2	36.6	42.4	37.3	41.7	16.3	95.2	39.9	20.9	< 9.7	31.6	19	0.6	5.4
07/09/99	4.4	60.9	78.7	47.8	40.5	13	54.7	36.1	6.5	< 9.7	56.1	34	36.3	7.3
14/09/99	4.8	27.1	15	18.5	50.1	19.6	12.8	55.6	1.7	< 9.7	21	18	17.8	58.7
21/09/99	5	31.4	12.7	11.2	107.5	42.7	22.4	120.3	7	< 9.7	18.4	26	10	56.5
28/09/99	5	62.4	13.8	6	275.5	90.9	62.3	304.2	19.1	< 9.7	29.3	57	8.9	18.2
05/10/99	5.3	79.4	68.2	55.4	86.5	30.4	90	105.4	11	< 9.7	68.9	-	5	0.9
19/10/99	4.6	68.1	22.6	16.6	356.6	103.1	49.8	400.4	10.8	< 9.7	25.1	75	23.4	40.4
26/10/99	5.6	69.6	36.9	42.8	230.6	78.9	96.7	258.4	15.6	< 9.7	41.8	50	2.3	3.9
02/11/99	5.7	71.9	34.7	20.7	348.7	102.7	79.6	412.8	19.1	< 9.7	29.9	65	1.9	5.4
09/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
16/11/99	6.1	106.7	39	< 2.1	138.3	81.4	471.9	232.7	26.5	< 9.7	90	55	0.8	5.8
23/11/99	4.3	78	45.5	38.3	274.3	71.4	26.2	312.7	10.1	< 9.7	44.9	64	45.7	9.1
30/11/99	5.1	275.5	38.3	17.5	1976.9	608.9	192.6	2205.2	71.2	< 9.7	37.4	311	8.5	2.3
07/12/99	5.1	39.2	8.4	7.1	238.1	83.6	37.9	264.7	7.9	< 9.7	10.5	42	8.3	4
14/12/99	4.7	39.5	23.2	18.5	174.4	60.4	29	204.4	6.6	< 9.7	18.5	41	21.9	12.1
21/12/99	5.2	45.7	6.8	4.6	340	107.2	37.6	386.1	7.7	< 9.7	4.8	58	6.3	63.9
29/12/99	5	20.5	13.8	13.6	54.3	11.9	4.7	61.5	1.9	< 9.7	14	18	9.8	24.8
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5007		46.6	25.2	25.4	172.6	56.9	42.9	195.3	7.3		25.8	40.3	12.5	655.4

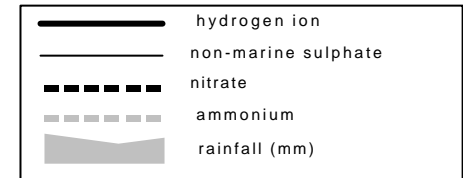
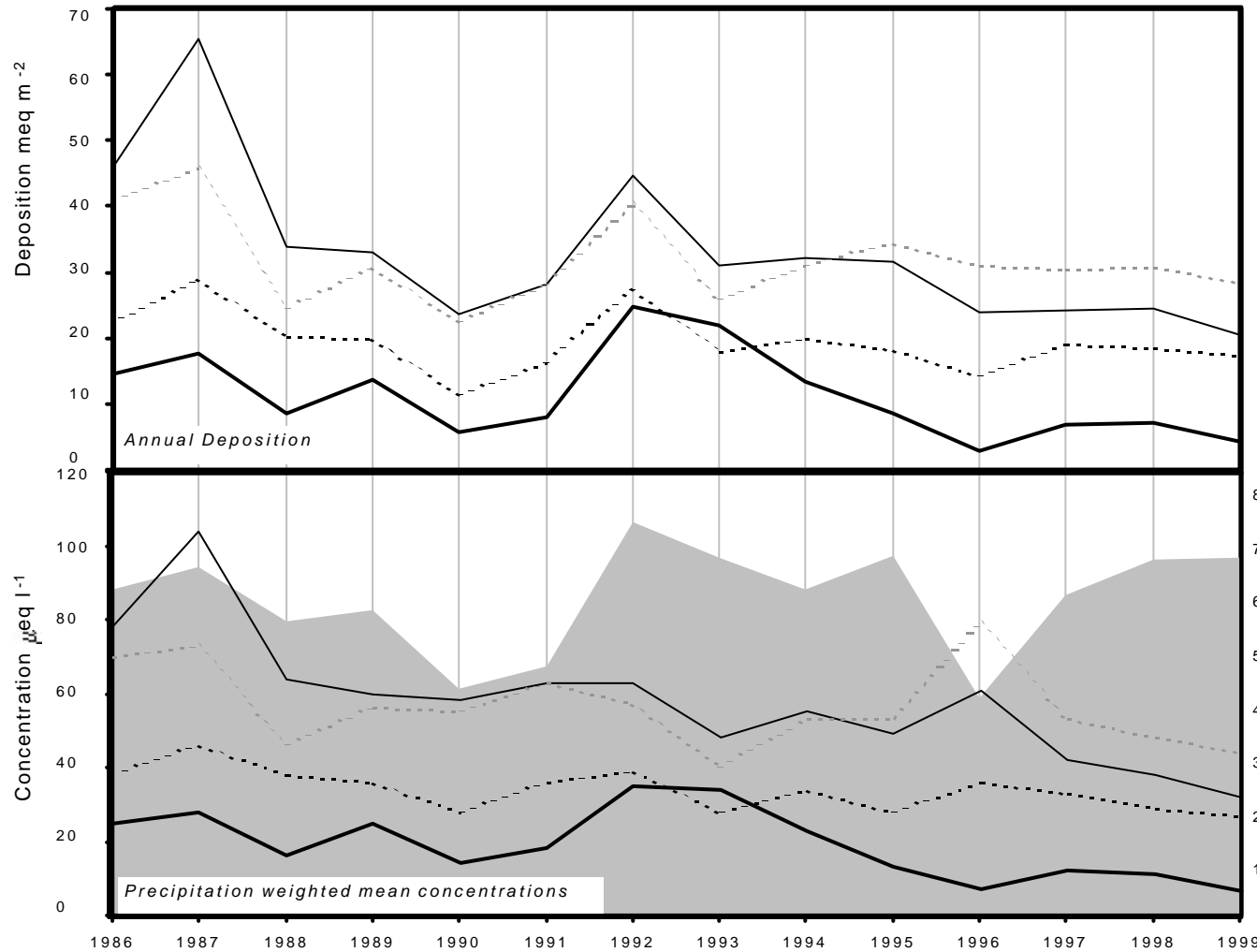
Compton

1999 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



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-1.27 ueq/l (-4.65 %/year): 14 years' data + Significant trend detected
<i>non-marine Sulphate</i>	-3.52 ueq/l (-4.34 %/year): 14 years' data +++ Strong trend detected
<i>Nitrate</i>	-0.86 ueq/l (-2.17 %/year): 14 years' data + Significant trend detected
<i>ammonium</i>	-0.98 ueq/l (-1.56 %/year): 14 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeq l ⁻¹	NO ₃ ⁻¹ µeq l ⁻¹	NH ₄ ⁻¹ µeq l ⁻¹	Na µeq l ⁻¹	Mg µeq l ⁻¹	Ca µeq l ⁻¹	Cl µeq l ⁻¹	K µeq l ⁻¹	PO ₄ ⁻¹ µeq l ⁻¹	nss-SO ₄ ⁻¹ µeq l ⁻¹	cond µScm ⁻¹	H µeq l ⁻¹	rain mm	
04/01/99	4.9	36.9	20.1	30.3	86.3	27.7	26.7	98.3	3.1	< 9.7	26.5	27	11.5	9.7	
11/01/99	5.4	19	7.8	13.3	65.7	30	15.5	73.9	1.5	< 9.7	11	15	3.9	31.1	
18/01/99	5.2	39.1	22.5	45.9	74.4	36.1	17.8	84.2	2.1	< 9.7	30.1	24	6.3	18.6	
25/01/99	4.8	45.2	43.7	56.5	59.1	18.9	25.4	68	1.8	< 9.7	38	29	15.5	7.4	
01/02/99	6.6	95.1	46.1	91.5	211.6	68.4	144.2	230.2	8.5	< 9.7	69.6	52	0.3	1.3	
08/02/99	5.2	196.1	128.6	255.5	220.1	37	135.2	222.1	5.8	< 9.7	169.6	76	6.5	1.7	
15/02/99	6.6	68.7	32.4	117.3	177	66.5	98.4	198.1	5	< 9.7	47.4	46	0.2	4	
22/02/99	6.3	35.2	19.1	64.2	68.5	39	35.9	78.4	1.7	< 9.7	26.9	21	0.5	13.9	
01/03/99	5.5	35.7	23.1	48.1	69.5	32.2	27.5	80.3	< 1.3	< 9.7	27.4	20	2.9	14.1	
08/03/99	4.8	76	46.8	98.6	14.4	5.3	40.2	16.7	1.9	< 9.7	74.3	31	16.2	7.2	
15/03/99	7	151.9	39.7	163.8	156.3	49.7	259.1	176.7	14	< 9.7	133.1	64	0.1	1.8	
29/03/99	6.5	183.2	101.6	291.1	90.8	39.8	106	94.7	6.4	< 9.7	172.2	60	0.3	1.3	
06/04/99	6.6	52.5	22.2	44.7	111.7	51.7	119.4	125.2	16	< 9.7	39	32	0.3	4.7	
12/04/99	6.2	99.4	77.7	143.3	56.4	38	93.3	64.6	2.9	< 9.7	92.6	39	0.6	9.5	
19/04/99	5.5	45.5	27.8	47.2	77.8	40.4	28.3	86.9	16.7	< 9.7	36.1	27	3.3	29.2	
03/05/99	5.6	55.7	34.7	46.9	21	13.9	93.5	27.5	2.8	< 9.7	53.2	22	2.8	8.5	
10/05/99	6.1	34.1	26.9	60.1	70.1	38.7	50.7	78.1	3.4	< 9.7	25.6	25	0.8	16.5	
17/05/99	4.4	66.4	104.4	85.9	17.1	9.2	47.8	23.4	2.5	< 9.7	64.3	44	40.7	12.2	
24/05/99	5.8	66.8	67.9	71.4	36.2	20.4	95.8	34.3	2.8	< 9.7	62.4	27	1.4	11.6	
01/06/99	4.9	31.7	31.3	34.8	33.5	17.5	30.5	37.2	1.4	< 9.7	27.7	20	13.2	36.4	
07/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	
14/06/99	5.6	97.8	145	107.3	32.9	24.9	666	38.6	15.8	< 9.7	93.8	-	2.5	1.1	
21/06/99	5.1	151	165.3	130.3	69.6	33.2	578.9	63	12	< 9.7	142.6	59	7.2	2.2	
28/06/99	5.1	27.9	23.2	35.3	9	5.5	20.5	13.8	1.1	< 9.7	26.8	12	7.8	31.1	
02/08/99	5.5	29.5	30.3	51.6	7.2	4.7	28.5	12.1	1.5	< 9.7	28.6	13	2.8	46.7	
09/08/99	4.8	46.7	41.1	53	22.3	9.4	17.5	26.5	2.5	< 9.7	44	24	15.8	14.8	
16/08/99	6.1	38.3	19.3	43.6	85.2	49.9	35.1	99.4	3	< 9.7	28	260	0.8	19.2	
23/08/99	4.9	148.9	187.3	263.3	36	17.3	114.1	36	5.7	< 9.7	144.6	56	12.3	5.3	
13/09/99	5.4	27.1	17.5	35	22.1	14.2	23.2	24.5	2.2	< 9.7	24.4	13	3.8	49.3	
20/09/99	5.2	26.1	15.5	24.4	50.3	24.1	14	54.1	1.7	< 9.7	20	17	7.1	29.2	
27/09/99	5.2	22.3	7.4	15.6	86.4	48.1	24.9	91.9	4.6	< 9.7	11.9	19	6.3	32.8	
04/10/99	5.3	179.1	132.8	201.4	149.5	52.1	195.6	150.9	6.6	< 9.7	161.1	-	5	0.8	
18/10/99	5.4	33.7	21.3	29.8	68.6	30.6	31.7	75.3	2.4	< 9.7	25.4	22	4.3	40.2	
25/10/99	5.7	72.1	33.3	58	66.5	33.7	89.8	81.3	11.8	< 9.7	64.1	31	1.8	5	
01/11/99	4.9	49.4	25.9	30.3	129.6	44.5	43	157.7	13.9	< 9.7	33.8	38	13.2	8.3	
08/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	
15/11/99	4.7	76.9	34.4	73.1	102.1	32.6	36.3	116.3	2.5	< 9.7	64.6	38	20	8	
22/11/99	4.6	39.4	22.3	31.2	83.5	31.1	19.9	94	2.5	< 9.7	29.4	25	24	15.7	
29/11/99	5.5	60.7	19	60.8	118.4	39.3	41.7	159.6	3.1	< 9.7	46.4	34	3.5	3.7	
06/12/99	5.5	26.4	8.4	25.5	93.3	62.6	27.5	108.3	2.2	< 9.7	15.2	22	3.1	18.8	
13/12/99	5.1	36.4	11.4	25	74.1	31.8	27.6	88.9	2.5	< 9.7	27.5	21	7.2	7.5	
20/12/99	5.6	22.1	9.4	13.3	61.1	32.8	16.2	92.7	5.5	< 9.7	14.8	19	2.6	39.9	
26/12/99	5.3	19.8	9.9	24.6	21.4	4.1	2.9	25.8	0.7	< 1.0	17.3	10	4.7	22.9	
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall	
5129		38.3	27	44	55.1	26.9		35.6	64.1	3.5		31.7	28.8	6.6	643.9

Sampling Start Date	pH	SO ₄ ⁻¹ µeq l ⁻¹	NO ₃ ⁻¹ µeq l ⁻¹	NH ₄ ⁻¹ µeq l ⁻¹	Na µeq l ⁻¹	Mg µeq l ⁻¹	Ca µeq l ⁻¹	Cl µeq l ⁻¹	K µeq l ⁻¹	PO ₄ ⁻¹ µeq l ⁻¹	nss-SO ₄ ⁻¹ µeq l ⁻¹	cond µScm ⁻¹	H µeq l ⁻¹	rain mm
13/01/99	5	24.6	4.5	5.5	101.6	42.7	13.6	110.6	2.6	< 9.7	12.4	23	10.2	279.6
30/01/99	5.9	53.5	19.7	47.4	223.8	93.6	55.1	242.7	5.3	< 9.7	26.6	42	1.2	23.5
12/02/99	5.2	33.3	10.5	18.5	143.5	73.3	26.5	158.8	2.6	< 9.7	16	28	7.1	75.2
26/02/99	5.2	24.5	2.6	4.4	136.7	50.9	13.8	160	2.8	< 9.7	8	28	6.5	130.1
11/03/99	5	47.8	22.7	34.8	103.9	50.4	54.2	115.1	2.5	< 9.7	35.3	31	9.3	28
26/03/99	4.7	50.7	15.2	19.8	75.9	29.9	29	87.4	2	< 9.7	41.5	30	20	62.3
09/04/99	5	28.6	9.1	10.6	115.5	54.1	22.3	140	2.4	< 9.7	14.7	27	8.9	118.5
23/04/99	-	-	-	-	-	-	-	-	-	-	-	-	-	39.4
07/05/99	4.8	42.9	16.7	22	111	42.6	20	126.1	3.1	< 9.7	29.5	32	14.5	101.5
21/05/99	4.6	39.1	27.4	26	32.8	11.5	18.5	36.9	1.4	< 9.7	35.1	29	24	74
04/06/99	5	25.9	10.6	8.2	110.8	50.3	20.2	127.1	3.4	< 9.7	12.5	26	9.1	20.1
18/06/99	4.7	39.4	23.4	22.6	41.7	14.5	18.7	43.9	1.6	< 9.7	34.3	22	21.9	37.8
02/07/99	4.6	45.6	38.5	29.6	48.2	11.2	27	49.3	10.6	< 9.7	39.8	26	26.3	23.8
16/07/99	4.7	30.5	11.4	13.5	35.3	13.8	11.9	38.6	1.5	< 9.7	26.3	17	19.5	8.7
30/07/99	4.8	25	28.5	29.4	7.9	5.3	15	12.6	< 1.3	< 9.7	24.1	16	16.2	66.9
13/08/99	4.6	23.5	18.1	10.3	30.2	10.4	10.1	33.9	< 1.3	< 9.7	19.9	17	23.4	61.7
27/08/99	4.9	50.6	27.6	36.8	41.6	17	34.2	41.7	5.4	< 9.7	45.6	20	13.8	15.6
10/09/99	5.1	18.2	7.8	7	45.1	24.9	10.8	50.6	3.2	< 9.7	12.7	14	7.9	169.6
24/09/99	4.9	26	5.1	5.6	91.1	38.7	20	107.5	2.3	< 9.7	15	24	11.7	191.1
08/10/99	7.1	959	23.4	4488.4	654.1	487.6	367.9	589.2	666.1	1887.1	880.2	-	0.1	7.3
22/10/99	4.9	26.6	8.4	5.4	109.4	40.8	13.8	121.7	3.5	< 9.7	13.5	28	12.6	127.5
05/11/99	4.8	44.9	14.8	16	223.2	75.9	25.5	247.7	4.8	< 9.7	44	17.8	33.3
19/11/99	4.8	29.2	9.2	5.4	86	39.4	13.1	126.3	1.6	< 9.7	18.8	26	15.1	141.6
03/12/99	5	24.5	4.1	2.1	113.3	48.6	14	166	2	< 9.7	10.9	28	9.3	173.2
17/12/99	5.1	27	5.5	2.1	118.2	50.9	17.2	166.5	2.5	< 9.7	12.8	29	8.5	138.6
30/12/99	4.5	29.4	8.4	4.6	133.6	29.3	8.8	160.3	3.4	< 1.0	13.3	32	30.2	40.8
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5154		29.2	10.2	10.4	96	40.1	17.5	116	2.6		17.6	39.4	12	2189.9

NOTE - In Issue 1 of the report, the sample collected on 23/4/99 was shown to have a pH of 3 and ion concentrations were given. This sample has subsequently been shown to have had acid added and hence has been excluded from the above table. The precipitation-weighted hydrogen ion concentration has been revised down from 32 meq l⁻¹ to the value shown (12 meq l⁻¹).

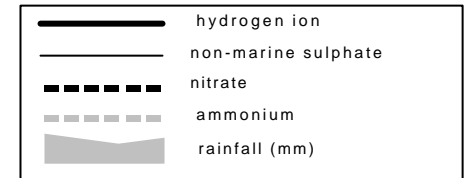
Flatford Mill

1999 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



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-1.03 ueq/l (-2.73 %/year): 14 years' data ++ Moderately strong trend detected
<i>non-marine Sulphate</i>	-3.15 ueq/l (-4.01 %/year): 14 years' data +++ Strong trend detected
<i>Nitrate</i>	-0.56 ueq/l (-1.27 %/year): 14 years' data - No significant trend detected
<i>ammonium</i>	-0.99 ueq/l (-1.87 %/year): 13 years' data - No significant trend detected

Sampling Start_Date	pH	SO ₄ ⁻¹ µeqL ⁻¹	NO ₃ ⁻¹ µeqL ⁻¹	NH ₄ ⁻¹ µeqL ⁻¹	Na µeqL ⁻¹	Mg µeqL ⁻¹	Ca µeqL ⁻¹	Cl µeqL ⁻¹	K µeqL ⁻¹	PO ₄ ⁻¹ µeqL ⁻¹	nss-SO ₄ ⁻¹ µeqL ⁻¹	cond µScm ⁻¹	H µeqL ⁻¹	rain mm
06/01/99	4.8	37.9	29.8	38.2	42.3	14.7	18	49.8	2	< 9.7	32.8	23	17.4	19.1
13/01/99	5	46.2	25.2	43.8	111.4	38.1	24.8	128.5	3.5	< 9.7	32.7	32	11.2	7.6
20/01/99	4.6	58.3	49.5	64.8	54.3	17.3	18.4	62	2	< 9.7	51.8	35	26.3	6.9
27/01/99	-	-	-	-	-	-	-	-	-	-	-	-	-	3.8
03/02/99	4.9	174.9	126.1	206.8	240.5	59.4	111.1	257.2	11.3	< 9.7	145.9	79	12	3.2
17/02/99	5	60	44.8	78.9	58.6	17.9	27.3	65.6	< 1.3	< 9.7	52.9	28	10.5	19.4
03/03/99	4.4	78.4	56.4	61.6	127.6	33.3	22.1	155.1	4.8	< 9.7	63	55	43.7	8.8
10/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0
17/03/99	5.4	49.3	24.1	78.9	50.5	23.6	50.1	55.7	9	< 9.7	43.3	25	3.8	9.6
24/03/99	4.5	91	79.4	94.5	45.1	17.3	47.9	48.3	8.4	< 9.7	85.6	43	30.9	7.2
30/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
07/04/99	5.9	55.7	26.4	60.1	40.8	29.1	74.1	46.9	3.2	< 9.7	50.8	20	1.3	9.7
14/04/99	4.6	77.9	77.9	103.8	58.5	21.5	34.7	64.8	6.1	< 9.7	70.8	41	26.3	6.5
21/04/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1
05/05/99	5.4	130.7	96.8	119.9	81.2	37.8	136.1	72.9	8.1	< 9.7	120.9	44	4	4.1
12/05/99	5.4	57.5	58	75	88.3	35.7	70.1	97.9	4.4	< 9.7	46.8	32	4.2	2.9
26/05/99	4.7	80.1	97.1	84.4	42.8	19.9	72.3	42.3	3.8	< 9.7	74.9	40	20.4	14.8
02/06/99	4.5	41.1	26.6	24.2	25	9.5	12.3	30	2.5	< 9.7	38.1	26	30.2	31.4
09/06/99	4	84.9	74.2	47	6	< 4.1	5.1	12.9	< 1.3	< 9.7	84.2	60	102.3	38.1
16/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
23/06/99	4.9	27	25.8	23.9	7.8	7.8	27.1	14	4	< 9.7	26.1	15	13.8	28.8
30/06/99	4.3	71	88	70.4	19.4	9.9	33.4	24.6	5.7	< 9.7	68.7	46	50.1	8.8
07/07/99	4.8	114	135.5	141.9	31.9	39.3	158.3	43.4	20.8	14.6	110.2	45	14.1	2.7
14/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9
28/07/99	4.8	42.2	56.6	57.4	7.6	7.5	46.7	16.5	6.1	< 9.7	41.3	25	15.5	17.1
04/08/99	4.6	39.1	25.1	26.6	15.8	5.8	9	22.2	1.5	< 9.7	37.1	23	24	63.9
11/08/99	4.8	21.8	15.9	14.3	13	7.7	13.5	17.3	< 1.3	< 9.7	20.2	14	16.6	49.6
18/08/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
25/08/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
08/09/99	4.2	79.5	101.7	118.6	15.7	5	24	20.5	2.6	< 9.7	77.6	41	57.5	30.2
15/09/99	4.8	50.3	39.2	40.8	67.3	24.9	30.9	75.1	12.6	< 9.7	42.2	30	14.1	17.6
22/09/99	4.7	31.1	13.3	14.3	44	17.2	12.5	47.2	2	< 9.7	25.8	20	19.1	36.4
29/09/99	6.4	160.9	28.8	433.1	138.7	63.5	65.2	134.2	70.8	260.7	144.2	88	0.4	6.4
06/10/99	6.1	39.9	27.8	68.5	25.9	38.8	58.2	30.5	4.4	< 9.7	36.8	18	0.8	5
20/10/99	5.2	55.5	26.3	29.4	203	63.5	51.4	230	12.3	< 9.7	31	47	6.8	18.8
27/10/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
03/11/99	4.9	56.1	32.3	30.6	143.1	47.4	50.8	173.9	9.7	< 9.7	38.8	39	11.7	6.6
10/11/99	4.4	114.5	89.2	63.2	259.2	65.1	38.2	294.5	8.4	< 9.7	83.2	85	40.7	2.4
17/11/99	5.2	74.8	27.2	29.5	418.2	116.5	37.2	488.2	9.3	< 9.7	24.4	72	6.5	5.9
24/11/99	4.5	55.3	40.7	42.2	75.9	22.5	20.3	84.3	2.6	< 9.7	46.2	33	31.6	7.7
01/12/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
08/12/99	4.7	27.1	15.1	17.4	58.6	25	17.8	69.1	2.3	< 9.7	20	19	20.9	12
15/12/99	4.7	36.6	24.2	27.6	127.4	44.4	22.3	146.1	3.8	< 9.7	21.2	33	21.4	14.8
29/12/99	5	27.2	31.2	20.3	16.5	4.4	6.7	21.3	1.4	< 9.7	25.2	21	11.2	13.7
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5024		50.3	41.1	44.7	48.6	17.7	25.5	57.1	3.6		44.5	30.7	27	546.2

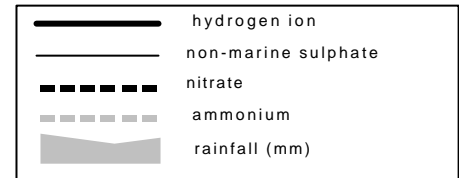
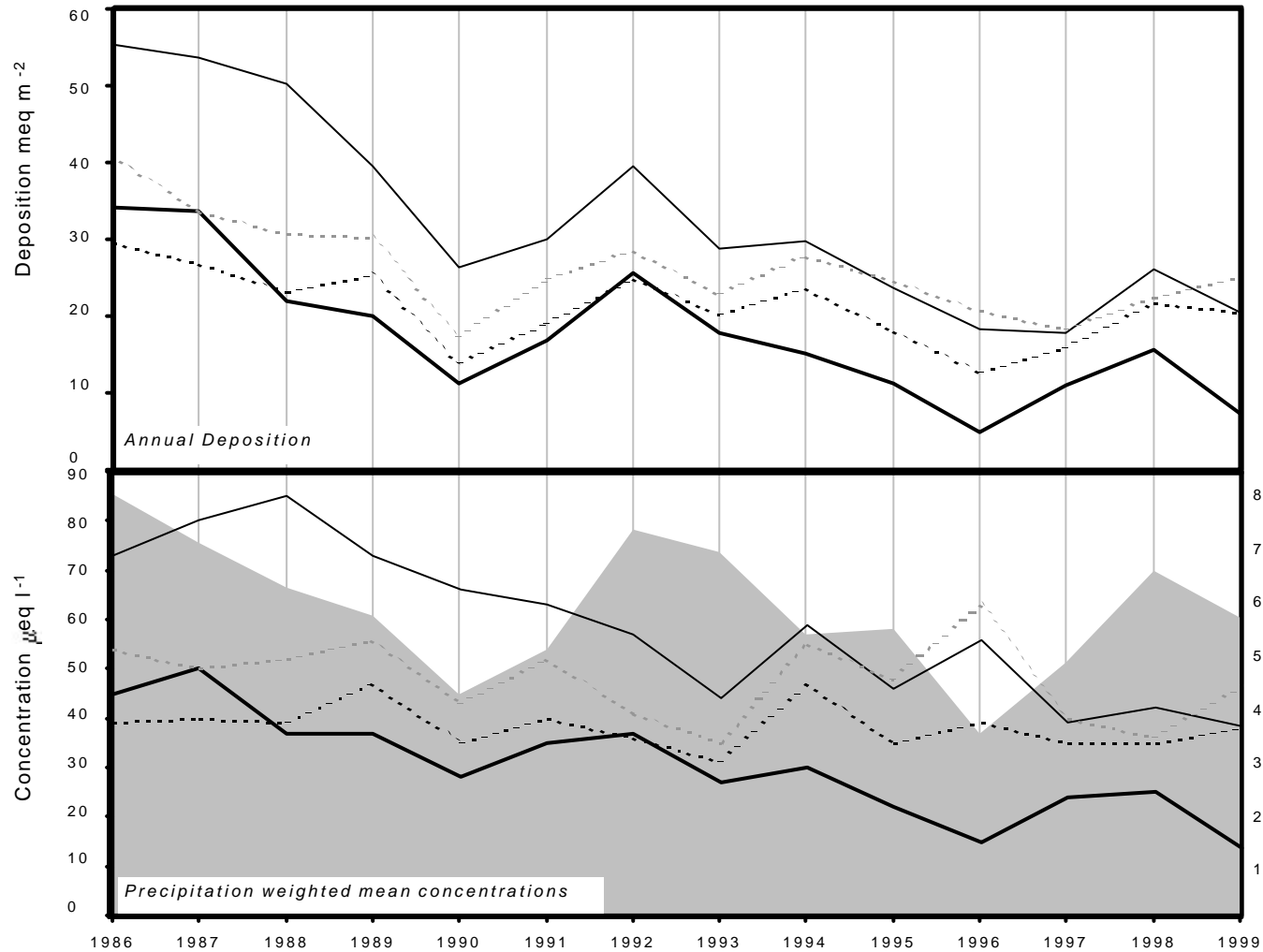
Woburn

1999 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



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-2.22 ueq/l (-4.95 %/year): 14 years' data +++ Strong trend detected
<i>non-marine Sulphate</i>	-3.35 ueq/l (-4.17 %/year): 14 years' data ++++ Very strong trend detected
<i>Nitrate</i>	-0.31 ueq/l (-0.78 %/year): 14 years' data - No significant trend detected
<i>ammonium</i>	-0.62 ueq/l (-1.19 %/year): 14 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
06/01/99	4.8	31.8	26.5	25.4	38.2	12.6	19.1	42.7	< 1.3	< 9.7	27.2	21	16.6	15.5
13/01/99	5.2	20.3	10.3	14.3	58	27.7	15.5	65	< 1.3	< 9.7	13.3	16	6.6	22.6
20/01/99	4.9	72.6	49.4	77.9	103.3	29.7	38.6	111.4	3.1	< 9.7	60.1	36	13.5	3.8
27/01/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.9
03/02/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
10/02/99	-	-	-	-	-	-	-	-	-	-	-	-	-	2
17/02/99	5.7	62.8	22.8	55.5	181.8	57.3	43.6	203.7	4	< 9.7	40.9	37	2.1	5.4
24/02/99	5.5	31.4	21.3	39.5	50.8	22.1	23.9	57.8	1.4	< 9.7	25.3	18	2.9	8.6
03/03/99	4.7	64.9	40.6	74.9	51.8	14.8	16.3	62.8	1.7	< 9.7	58.6	34	20.9	13
10/03/99	5.1	69.8	53	67.3	19.5	9.5	72.8	19.9	2	< 9.7	67.5	23	8.1	4.2
17/03/99	6.4	64.1	23.1	58.1	56.7	30	113.2	63.8	2	< 9.7	57.2	23	0.4	3.6
24/03/99	5.1	173.2	182.7	273.4	58	25.3	115.3	65.1	3.7	< 9.7	166.2	62	8.7	4.2
31/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.1
07/04/99	6.2	37	16.5	42	45.8	31.2	66.3	48.5	1.4	< 9.7	31.5	18	0.6	9
14/04/99	4.5	78.5	99.6	108.1	23.4	6	32.3	26.1	1.5	< 9.7	75.7	39	34.7	4.6
20/04/99	4.4	57.8	54.5	52.3	75.5	22.1	17.3	80.4	2.7	< 9.7	48.7	43	39.8	20.6
04/05/99	6	81.3	61.6	73.7	30.2	21.2	108.8	27.2	5.1	< 9.7	77.7	28	1.1	10.5
11/05/99	6.2	68.6	41.5	68.2	101	51.1	112	108.9	4	< 9.7	56.5	37	0.7	6.2
18/05/99	4.5	179	235.8	215.9	59.9	31.6	173.2	64.6	5.6	< 9.7	171.8	75	29.5	4.8
25/05/99	-	-	-	-	-	-	-	-	-	-	-	-	-	3
01/06/99	4.9	28.3	31.5	33.8	13.7	8.4	16.9	17.3	1.3	< 9.7	26.6	17	13.2	72.2
08/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
17/06/99	5	52	96.8	21.9	18.6	25.7	125.2	28.1	19.4	< 9.7	49.8	28	10.7	1.7
22/06/99	5.5	25	28.1	23.3	18	14.8	55.1	21.5	7.9	< 9.7	22.9	12	3.2	18.3
29/06/99	4.7	100.4	86.4	109.6	32.4	9.5	74	35.3	9.9	< 9.7	96.5	36	20.9	6.5
20/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4
27/07/99	6.4	80.3	90.9	84.4	22.8	18.4	187	13.5	9	< 9.7	77.6	33	0.4	9.4
04/08/99	4.8	43.4	40	63.6	10.8	4.6	8.1	16.7	1.3	< 9.7	42.1	23	16.2	69.3
10/08/99	5.6	24.6	34	40	19.7	15.4	41.7	20.2	2	< 9.7	22.3	14	2.6	12.8
17/08/99	5.3	30.9	35.6	43.4	30.6	14.2	31	29.7	2.2	< 9.7	27.3	17	5.5	7.5
24/08/99	4.4	90.6	101.9	121.7	14.9	5.1	55.1	20	4.4	< 9.7	88.8	39	37.2	4.3
07/09/99	4.9	122.7	113.8	50	75	25.2	169.6	72.6	27.6	< 9.7	113.7	46	12.3	2.3
14/09/99	4.8	44.9	45.7	52	20.4	7.5	21.5	22.9	1.9	< 9.7	42.5	26	17	27.1
21/09/99	5	22.7	17.3	23.8	73.7	36.8	22.9	78.4	7	< 9.7	13.8	17	8.9	21.8
28/09/99	4.9	38	19.6	26.5	58	22.6	21.3	62.6	2	< 9.7	31	23	13.8	21.3
12/10/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
19/10/99	4.7	36.5	27.6	23.8	70.2	24.4	23.9	79.1	2.6	< 9.7	28	27	19.5	33.3
26/10/99	4.6	68.3	76.2	68.7	107.3	30.4	41.5	122.3	3.3	< 9.7	55.4	50	25.7	4.9
02/11/99	5.3	30.4	25.9	25.4	80.8	31.4	33.3	88.2	4.9	< 9.7	20.6	24	4.8	7.9
09/11/99	4.6	85.8	51.5	62.5	142.5	39.1	42.2	164.9	4.7	< 9.7	68.6	53	23.4	5.5
16/11/99	4.8	86.8	53.1	49	342.2	86	50.5	392	7.3	< 9.7	45.5	67	15.8	3.9
23/11/99	4.6	59.6	43.6	43.8	148.3	41.3	28.7	166.2	3.4	< 9.7	41.7	43	22.9	6.3
30/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	3.1
07/12/99	5.2	20.5	9.7	17.1	44	33.6	24.8	49.5	1.8	< 9.7	15.2	14	5.8	20.7
14/12/99	4.9	46.6	21.9	47	82.4	34.2	33.3	100	1.6	< 9.7	36.7	27	12.9	6.4
21/12/99	5	19.7	10.2	8.6	63.5	27.9	12.1	91.7	1.5	< 9.7	12.1	19	8.9	10.5
28/12/99	4.9	27.8	12.1	19.4	35.6	7.2	5.2	43.4	1.2	< 1.0	23.5	16	11.7	12.7
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5127		43.9	38.1	46.6	45.8	19.1	33.2	52.1	2.8		38.3	24.8	13.5	537.1

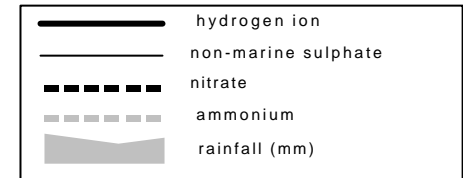
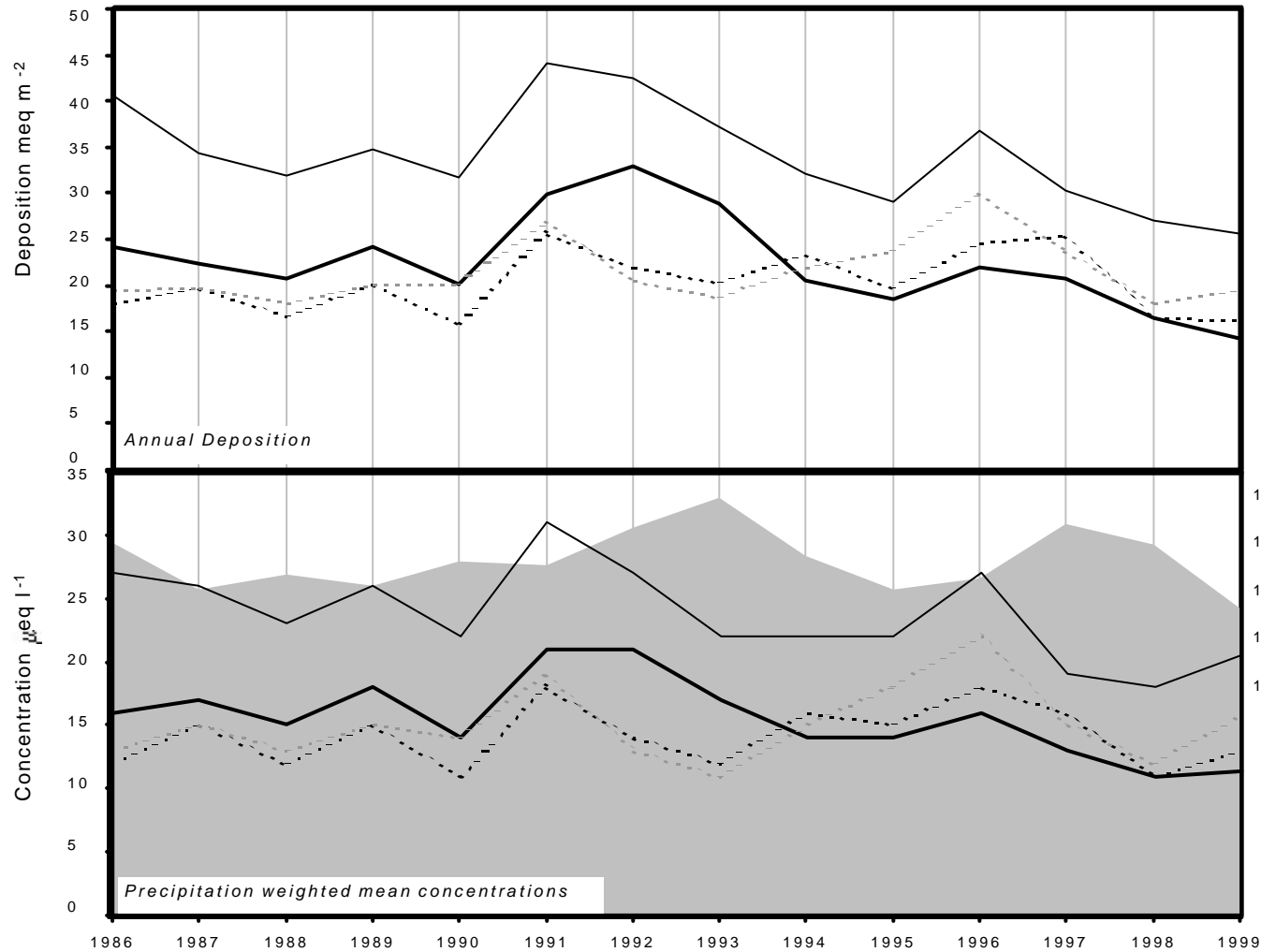
Tycanol Wood

1999 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



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-0.40 ueq/l (-2.21 %/year): 14 years' data + Significant trend detected
<i>non-marine Sulphate</i>	-0.51 ueq/l (-1.89 %/year): 14 years' data + Significant trend detected
<i>Nitrate</i>	0.08 ueq/l (0.61 %/year): 14 years' data - No significant trend detected
<i>ammonium</i>	0.17 ueq/l (1.19 %/year): 14 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
05/01/99	5.2	44.8	13.5	10.8	179.3	61.3	49.4	200.6	4	< 9.7	23.2	35	6.3	53.6
12/01/99	5.2	27.3	< 2.1	4	166.2	64.9	17.6	192.6	3.2	< 9.7	7.3	32	6.2	82
19/01/99	4.8	36.4	14.1	15.8	131.3	41.7	11	148.6	2.7	< 9.7	20.5	32	14.1	37.7
26/01/99	5.5	55	21	36.8	230.2	85.5	56.2	256.3	6.5	< 9.7	27.2	43	3.2	5
02/02/99	5.8	36.4	12	27.3	172.7	79.2	31	186.5	4.1	< 9.7	15.6	33	1.6	12.5
09/02/99	5.1	58.6	28.3	49.6	198.6	64.9	23.4	215.8	4.3	< 9.7	34.7	41	7.8	11.4
16/02/99	5.9	25.9	5.1	20.3	122.4	58.4	26.3	136.5	2.7	< 9.7	11.1	23	1.3	11.7
23/02/99	5.6	20.1	5.1	10.3	111.1	47.8	14.3	125.4	1.8	< 9.7	6.8	20	2.3	44.6
02/03/99	4.9	80.7	15.6	15.4	542.8	140.7	33.9	622.9	11.4	< 9.7	15.3	87	11.5	25.6
09/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0
16/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6
23/03/99	5.2	40.2	15.2	24.8	109.3	48.1	35.2	124.7	2.9	< 9.7	27	29	7.1	30.4
30/03/99	5	50.9	32.4	39.3	85.1	38.5	57.8	89.6	2	< 9.7	40.7	29	8.9	16.4
06/04/99	5.7	25	6	11.6	104.5	56.8	36.9	122.5	2.5	< 9.7	12.4	22	1.9	17.8
13/04/99	5.1	32.5	11.6	19.1	109.1	44.8	20.9	120.3	2.7	< 9.7	19.4	26	7.9	33
20/04/99	5	44.4	10.5	13.3	221.4	75.4	22.9	246.9	4.7	< 9.7	17.7	46	9.3	17.9
04/05/99	6	56.9	30	30.6	157.4	56.2	118.4	174.7	6	< 9.7	37.9	41	0.9	46.9
11/05/99	5.8	75.4	16.8	27.6	353.5	102.5	97.1	392.5	11.9	< 9.7	32.8	62	1.5	5.6
25/05/99	4.9	49.3	38.4	44.1	34.8	17.2	45.6	34.5	1.7	< 9.7	45.1	25	12.6	21.1
01/06/99	4.8	26	20.1	21.9	41.4	18.4	8.7	45.2	< 1.3	< 9.7	21	20	15.5	28.9
15/06/99	5.2	47.7	25.8	33.6	87.5	41.5	47.9	95.1	5.3	< 9.7	37.2	25	6.9	3.8
22/06/99	4.7	54.7	40.4	39	71.2	26.4	48.9	75.3	2.7	< 9.7	46.1	32	20.4	8.3
29/06/99	4.6	59.5	28.8	25.1	92.3	26.8	16.3	96.2	4.4	< 9.7	48.4	35	23.4	8.6
06/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5
13/07/99	4.6	51	18.6	20.2	69.2	21.2	20.2	73.9	3.4	< 9.7	42.7	27	24.5	12.7
27/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
03/08/99	5	21.1	18.8	24.1	6.7	< 4.1	7	10.2	< 1.3	< 9.7	20.3	12	10.7	55.9
10/08/99	4.9	24.5	11.5	9.4	41.8	17.9	14.8	44.1	< 1.3	< 9.7	19.4	18	13.5	19.7
17/08/99	4.8	26.3	27.2	17.2	39.9	17.3	24.3	40.3	2.1	< 9.7	21.5	19	14.1	21.4
24/08/99	4.8	22.4	16.7	14.1	13.4	5.3	11.9	15.9	1.8	< 9.7	20.8	13	15.8	49.3
31/08/99	-	-	-	-	-	-	-	-	-	-	-	-	-	4.7
08/09/99	4.8	36.3	18.8	15.3	87.3	30.3	13	99.3	2.4	< 9.7	25.8	28	17	36.6
14/09/99	4.6	52.4	15.1	15.7	294.1	91.1	28	324.3	7	< 9.7	17	57	22.9	20.8
21/09/99	5.5	28	6.9	29.9	78.1	38.9	12	90.9	6.1	< 9.7	18.6	20	3.5	77.7
28/09/99	4.8	39.5	7.6	6.6	188.8	60.7	15.6	208.1	3.8	< 9.7	16.7	42	14.5	46.2
05/10/99	5.4	22.9	13.1	15.8	87	35.6	29.6	95.1	3.9	< 9.7	12.4	19	3.6	8.1
19/10/99	5.1	34.6	9.9	12.6	181.5	70.3	24	200.5	4.4	< 9.7	12.8	37	7.4	35.2
26/10/99	5.2	46.8	12	13.6	266.8	89.2	32.1	283.9	6.1	< 9.7	14.7	51	6.6	32.9
02/11/99	4.4	36.6	16.4	6.5	161.3	48.5	13.8	181.8	3.5	< 9.7	17.2	37	39.8	30.6
09/11/99	4.8	187	70.8	84.2	84.2	25.1	30.1	84.5	4.3	< 9.7	176.8	38	16.6	2.4
16/11/99	4.7	42.6	13.4	15.3	236.9	69.5	33.1	249.6	13.9	< 9.7	14.1	-	20	4
23/11/99	4.6	88	16.7	10.9	274.2	78.4	20	289.7	5.7	< 9.7	55	56	26.3	63
30/11/99	5.5	72.3	5.9	9.6	527.1	152.2	42.5	612.8	10.3	< 9.7	8.8	91	3.5	17.2
07/12/99	5.2	40.8	3.1	6.1	266.8	93.3	32.7	319.3	5.9	< 9.7	8.7	50	6	22.3
14/12/99	4.7	23.4	5.3	5.9	118.8	61.4	20.3	142.4	2	< 9.7	9.1	26	20.4	69.1
21/12/99	5	33.2	2.4	2.2	238.4	90.5	26.1	278.2	4.3	< 9.7	4.5	45	8.9	51.9
28/12/99	5.2	16.9	3.6	3.7	69.6	14.7	3.8	82.1	1.3	< 1.0	8.5	16	6.9	38.2
Precipitation weighted annual mean for site: samples containing phosphate are excluded														Total rainfall
5123		38.6	13	15.7	150.6	53.5	26	169.5	3.8		20.5	33.3	11.3	1246

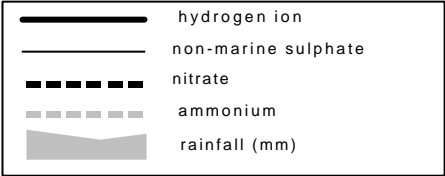
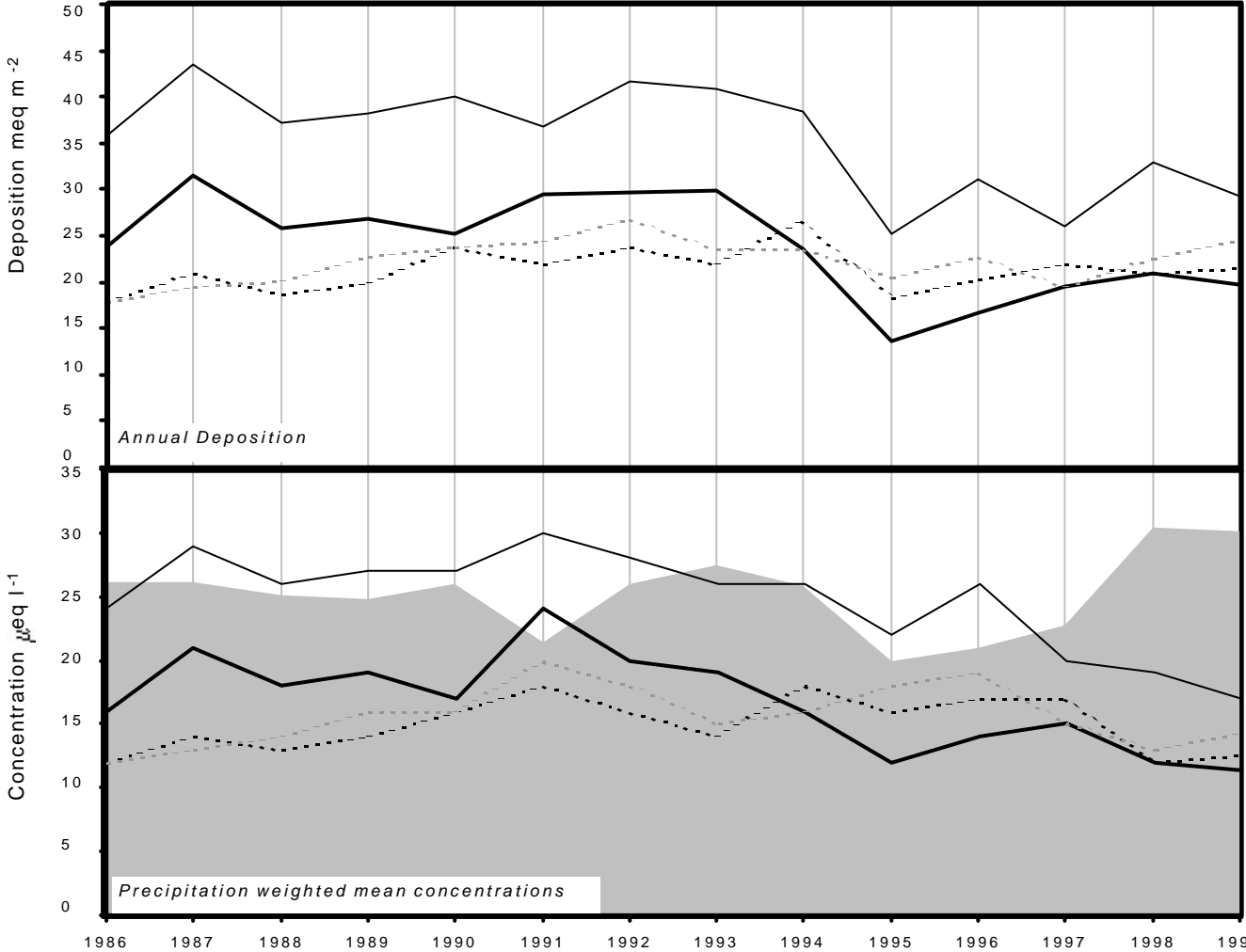
Llyn Brianne

1999 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



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-0.60 ueq/l (-2.89 %/year): 14 years' data ++ Moderately strong trend detected
<i>non-marine Sulphate</i>	-0.66 ueq/l (-2.28 %/year): 14 years' data ++ Moderately strong trend detected
<i>Nitrate</i>	0.09 ueq/l (0.60 %/year): 14 years' data - No significant trend detected
<i>ammonium</i>	0.12 ueq/l (0.81 %/year): 14 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
06/01/99	5.2	18.8	7.5	8.4	69.3	39.3	19.3	77.9	2	< 9.7	10.5	17	5.8	31.3
13/01/99	5.2	22.5	3.4	5.7	121.1	54	15.3	138.5	2.6	< 9.7	7.9	25	6.2	109.3
20/01/99	5	32.1	12.6	16.8	103.3	37.9	11.7	115.4	2.1	< 9.7	19.6	27	11	35
27/01/99	-	-	-	-	-	-	-	-	-	-	-	-	-	12.7
02/02/99	-	-	-	-	-	-	-	-	-	-	-	-	-	11.6
10/02/99	5.1	50.2	25.3	41.9	151.8	58.7	25.7	173.5	3.4	< 9.7	31.9	34	7.4	15.3
18/02/99	5.6	21.9	5.1	12.7	100.4	64.4	28.6	111	2.1	< 9.7	9.8	19	2.3	40.6
24/02/99	5.3	17.9	3.7	8.7	82.3	38	16.4	93.8	< 1.3	< 9.7	8	16	4.5	93.2
03/03/99	5	32.1	14.3	19.2	92.3	31.1	15	103.8	3.1	< 9.7	20.9	27	11.2	14.3
18/03/99	5.9	58.5	16.2	47.5	198	85.1	54.2	220.5	4.2	< 9.7	34.6	43	1.3	15.2
24/03/99	5.1	32.1	19.5	28.8	67.9	38.4	21.6	76.6	1.7	< 9.7	23.9	22	7.6	29.9
01/04/99	5.3	36.3	14.7	28.3	60.4	35	31	66.9	1.6	< 9.7	29	20	5.2	23.1
07/04/99	5.6	34.6	6.9	15.6	184.2	91	34.3	209.8	4.5	< 9.7	12.4	35	2.4	36.4
14/04/99	5	34	11.3	13.3	149.9	56.3	17.2	164.7	3	< 9.7	15.9	33	9.5	45.5
21/04/99	4.7	37.6	22.1	17.4	89.2	30	10.1	108.6	3.2	< 9.7	26.9	30	20.4	36
05/05/99	5	39.5	19.7	25.3	106.5	46.1	24.6	120.9	2.8	< 9.7	26.7	30	10	108.1
19/05/99	5.8	120.2	33.3	58.8	647.6	76	166.1	650	13.1	< 9.7	42.2	103	1.5	3.9
26/05/99	4.7	39.2	40.6	39.2	14.4	9.2	37.9	17	1.3	< 9.7	37.4	19	20	33.2
02/06/99	4.8	24	13.6	14.1	49.9	23	6.7	55.5	< 1.3	< 9.7	18	19	14.5	28
16/06/99	4.7	52.2	40	54.9	45.3	18.7	21.6	48.6	2.4	< 9.7	46.7	29	18.6	31
30/06/99	4.7	57.9	34.4	56.2	77.7	30.8	21.6	85.3	2.9	< 9.7	48.5	33	18.6	8.8
06/07/99	5	92	110.6	103.1	38.7	23.4	134.2	20.9	10.3	< 9.7	87.3	-	10	1.8
14/07/99	4.7	36.4	17.5	17.1	84.1	30.6	18.8	89.9	2.1	< 9.7	26.3	27	18.2	19.3
28/07/99	5.2	47.5	95.5	45.9	58.4	25.8	99.5	35.3	4.4	< 9.7	40.4	27	6	7
04/08/99	4.8	20.8	22.6	22.3	6.2	4.9	12.5	11.9	1.6	< 9.7	20	12	16.2	57.4
11/08/99	5	22.2	9.1	12.1	39.7	19.8	15.5	44.3	< 1.3	< 9.7	17.4	16	11	22.9
18/08/99	4.6	30.8	47.6	29.4	31	10.1	17.1	30	2.8	< 9.7	27	24	26.3	20.4
25/08/99	5.3	42.7	32.7	33.2	64.3	27.6	47.8	54.3	5.9	< 9.7	34.9	-	5	2.6
08/09/99	4.9	38.6	18.1	23.1	56	21.3	14.7	58.1	3	< 9.7	31.8	23	13.5	33.4
15/09/99	5.1	13.5	9.5	6.7	26.4	15.7	8.9	31.2	< 1.3	< 9.7	10.3	12	8.5	42
22/09/99	5.3	14.5	3.5	3.1	40.5	18.7	4.9	45.9	1.4	< 9.7	9.6	12	5.2	109.7
27/09/99	5	29.8	4.9	6.2	140.8	53.9	15.1	160.6	3.7	< 9.7	12.8	30	9.5	108.2
05/10/99	5.3	33.9	12.7	27.3	56	27.4	12.8	59.6	2.2	< 9.7	27.2	18	5	18.2
19/10/99	4.8	24.7	17.6	10.3	64.7	24.6	14.2	71.4	1.7	< 9.7	16.9	22	14.8	48.9
27/10/99	4.8	31.9	13.6	9.3	123.8	43.4	20.5	146.3	3.6	< 9.7	17	31	15.1	30.9
02/11/99	4.9	33.6	11.4	7.7	147.8	50.2	17.6	168.5	2.9	< 9.7	15.8	36	12	47.7
11/11/99	5.1	41.6	18.5	20.9	191.6	65.6	26	206.7	9.6	< 9.7	18.5	38	7.9	25.7
17/11/99	4.8	42.4	20	23.8	134.1	47.7	23	145.5	4.8	< 9.7	26.3	31	14.5	16.3
24/11/99	5	28.1	10.9	9.7	100.9	41.2	17.4	112.6	2.4	< 9.7	16	23	11.2	73.5
30/11/99	5.1	39.9	4.1	4.1	230.1	78.8	37.5	261.7	9.3	< 9.7	12.1	42	8.1	48.1
08/12/99	4.9	32.1	5.2	6.5	184.1	77.4	25	222.9	3.7	< 9.7	10	37	12.3	63
14/12/99	5.4	18.1	4.3	< 2.1	75.6	44.4	18.1	88.4	6.8	< 9.7	9	17	3.8	27.6
20/12/99	4.5	24.2	5.9	4.6	131.8	28.7	6	156.5	2.6	< 1.0	8.3	28	28.2	138.3
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5124		29.4	12.5	14.3	102.9	40.6	18.5	117.1	2.8		17	25.4	11.4	1725.2

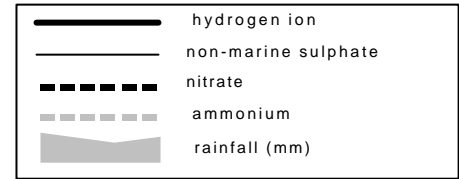
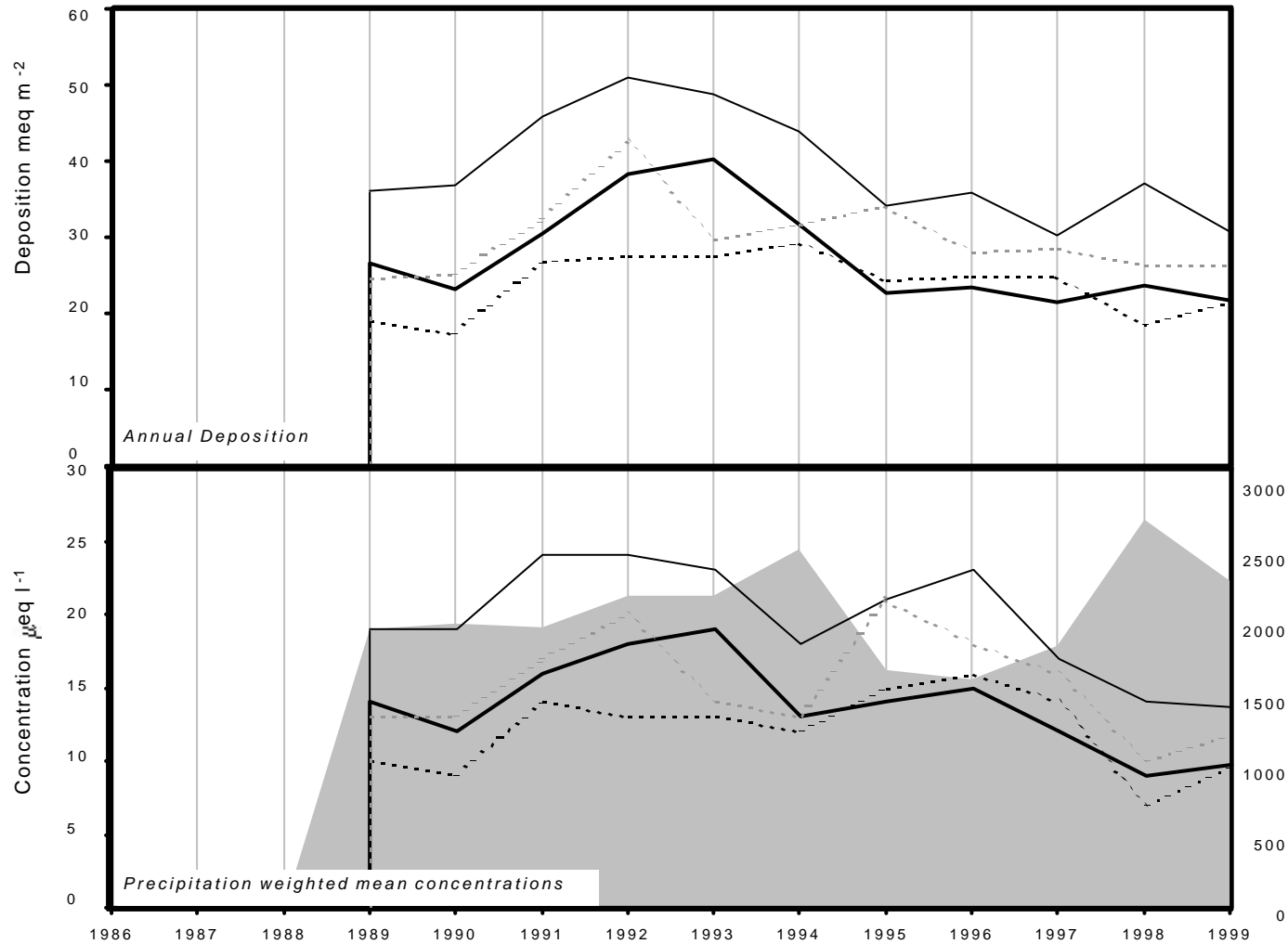
Pumlumon

1999
 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)



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-0.51 ueq/l (-2.87 %/year): 11 years' data - No significant trend detected
<i>non-marine Sulphate</i>	-0.65 ueq/l (-2.62 %/year): 11 years' data - No significant trend detected
<i>Nitrate</i>	-0.02 ueq/l (-0.13 %/year): 11 years' data - No significant trend detected
<i>ammonium</i>	-0.17 ueq/l (-1.00 %/year): 11 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
05/01/99	5.3	19.6	8.6	5.3	65.9	28.6	15.1	72.3	1.7	< 9.7	11.6	16	4.7	54.5
12/01/99	5.3	20.9	3.1	4.7	112.3	55.7	16.7	128.9	2.4	< 9.7	7.4	23	5.1	104.4
19/01/99	5.2	19.8	6.1	6.9	75.7	38	12	84.8	1.5	< 9.7	10.7	18	6.8	51.9
26/01/99	5.6	18.8	3.8	12.3	80.9	46.5	14	92.1	1.9	< 9.7	9.1	17	2.6	72.7
02/02/99	6	41	10.1	27	213.4	93.8	34.1	227.6	4.3	< 9.7	15.3	44	1	38.7
09/02/99	5	29.8	18.7	24.3	61.6	22	10.6	66.8	1.4	< 9.7	22.3	18	11.2	10.5
16/02/99	5.5	17.7	2.9	12.6	57	45.3	18.7	67	< 1.3	< 9.7	10.8	12	2.8	92.9
23/02/99	5.3	10.2	< 2.1	6.6	27.1	17.5	7.8	30.1	< 1.3	< 9.7	7	< 10.0	4.6	198.2
02/03/99	5	36.9	8.9	10.1	194.2	59.4	16.8	225.2	3.9	< 9.7	13.5	41	10.7	35.2
09/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
16/03/99	5.4	47.9	11.6	40.9	172.9	73.7	29.2	195.1	3.8	< 9.7	27.1	39	4.4	31.3
23/03/99	5.1	24.5	10.6	17.3	52.8	31.5	37	56.2	1.3	< 9.7	18.1	16	7.6	33.5
30/03/99	5.6	23	7.9	16.2	82.3	50.1	48.7	89.9	1.9	< 9.7	13	17	2.7	96.9
13/04/99	4.8	34.9	21	31.3	64.4	22.6	12.6	69.6	1.3	< 9.7	27.2	24	14.5	24.4
20/04/99	4.6	49.5	25.8	31.7	119.7	37.6	10.8	142.7	2.5	< 9.7	35	40	25.1	48.9
04/05/99	5	33.9	20.6	28.4	61.1	34.9	48.6	63.8	2.1	< 9.7	26.6	22	9.3	36.6
11/05/99	7.5	82	15.3	377.8	104.9	88.6	61.2	110	46.5	121.5	69.4	72	0	19.8
18/05/99	-	-	-	-	-	-	-	-	-	-	-	-	-	3.4
25/05/99	7	173.2	63.8	444.3	90.3	51.8	118	105.4	91.5	359.4	162.4	94	0.1	8.4
01/06/99	4.8	26.2	25.9	26.5	32.7	13.6	7.8	37.8	< 1.3	< 9.7	22.3	18	15.8	3.2
08/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
15/06/99	5.3	27.3	12.2	21.8	43	26.9	17.1	47.7	1.4	< 9.7	22.1	17	5.5	16.9
22/06/99	4.6	49	34.3	44.9	45.8	17.4	22.9	48.8	1.9	< 9.7	43.5	29	27.5	25.4
29/06/99	4.9	20.6	13.8	13.3	22.1	12.3	24.7	23	1.8	< 9.7	17.9	13	12.6	23.3
06/07/99	5	90.3	105.8	87.3	38.8	22.1	111.6	17.1	6.9	< 9.7	85.6	-	10	2.1
13/07/99	4.7	34.5	14.3	13.6	50	24.1	45.2	55.2	2.1	< 9.7	28.5	21	18.6	21.7
20/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4
28/07/99	5	28.8	35.1	31.6	13.1	9.1	27.9	10.2	1.9	< 9.7	27.2	14	11.2	20.5
03/08/99	4.7	29.4	31.4	31	5.2	< 4.1	9.6	9.4	< 1.3	< 9.7	28.8	19	22.4	46.7
10/08/99	7	35.6	13.3	119.3	41.9	34.3	17.8	36.9	12.2	24.5	30.5	30	0.1	18.2
17/08/99	4.9	22.4	18	12.2	52.8	19.6	18.4	50.9	5.2	< 9.7	16	17	11.7	27.6
24/08/99	4.7	39.9	40.6	43.1	42.3	12	19.4	41.4	7	< 9.7	34.8	24	20.9	17.8
31/08/99	5.2	28.4	30.1	19.6	35.9	17.2	41.5	22.3	3.3	< 9.7	24.1	14	6.2	8.5
07/09/99	4.9	26.5	15.4	13.1	43.3	22.1	23.8	42.5	1.5	< 9.7	21.3	15	13.8	12.3
14/09/99	4.8	11.4	6.5	5.6	18.7	10.3	8	23.2	< 1.3	< 9.7	9.2	< 10.0	15.1	66.6
21/09/99	5	12.5	4.1	4.6	31.3	16.6	7.8	31.6	3.1	< 9.7	8.8	10	9.3	71.6
28/09/99	5	34	5.4	7.5	156.4	58.1	15.9	175.1	3.8	< 9.7	15.2	34	10	100.3
04/10/99	5.2	28	8.9	20.8	47.3	27.4	10.3	52.4	< 1.3	< 9.7	22.3	17	6	78.7
18/10/99	5	18	13.9	9.6	49.9	23.5	13.4	53.1	1.3	< 9.7	12	18	10	56.2
25/10/99	4.9	36.7	12.3	11.6	171.3	58.7	17.9	197.7	4.1	< 9.7	16	37	13.2	33.9
01/11/99	5.2	25.7	6.4	4.6	134.4	57.2	17.2	149.9	2.6	< 9.7	9.5	29	7.1	70.1
08/11/99	4.4	69.1	48	56	76.6	20.4	12.7	81.5	1.7	< 9.7	59.9	40	38	6.9
16/11/99	4.8	34.7	11.7	9.5	168.2	55.6	17.7	188.9	3.3	< 9.7	14.4	35	16.2	20.5
23/11/99	4.5	22.6	6.6	5.5	68.4	29.4	8.3	77.3	1.2	< 9.7	14.3	21	30.2	88.1
30/11/99	5.3	3.1	27.6	6.3	140.2	65.2	22.9	163.8	2.7	< 9.7	< 13.8	28	4.8	79
07/12/99	5	25	5	3.4	144.8	52.3	12.9	172	2.8	< 9.7	7.6	29	10	121.1
14/12/99	5.1	15.8	4.3	3.5	70.9	38.5	15.8	102.1	< 1.3	< 9.7	7.3	18	7.4	66.9
20/12/99	5	18.5	3.6	< 2.1	102.1	22.4	4.7	120.6	1.9	< 9.7	6.2	21	10.7	161.2
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5150		23.2	9.7	11.8	84.6	36.8	16.8	96.5	2		13.7	20.7	9.7	2230.3

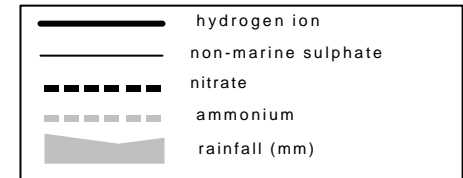
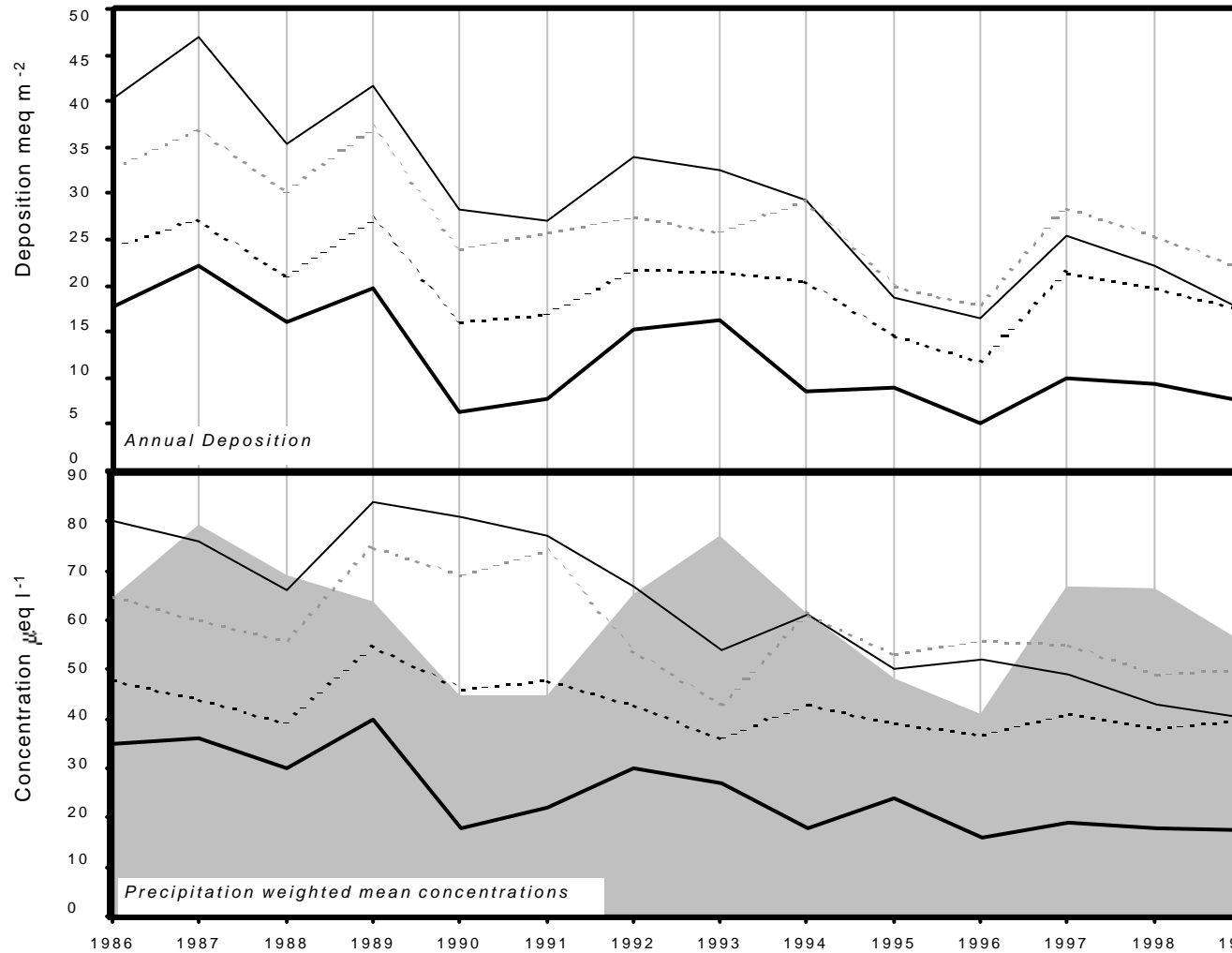
Stoke Ferry

1999 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, WF, EMEP

Site Operator:
Kings Lynn and West Norfolk BC



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-1.49 ueq/l (-4.30 %/year): 14 years' data ++ Moderately strong trend detected
<i>non-marine Sulphate</i>	-3.24 ueq/l (-3.86 %/year): 14 years' data ++++ Very strong trend detected
<i>Nitrate</i>	-0.73 ueq/l (-1.55 %/year): 14 years' data + Significant trend detected
<i>ammonium</i>	-1.29 ueq/l (-1.92 %/year): 14 years' data + Significant trend detected

Sampling Start Date	pH	SO ₄ ⁻² µeq l ⁻¹	NO ₃ ⁻ µeq l ⁻¹	NH ₄ ⁺ µeq l ⁻¹	Na µeq l ⁻¹	Mg µeq l ⁻¹	Ca µeq l ⁻¹	Cl µeq l ⁻¹	K µeq l ⁻¹	PO ₄ ⁻³ µeq l ⁻¹	nss-SO ₄ ⁻² µeq l ⁻¹	cond µScm ⁻¹	H µeq l ⁻¹	rain mm
05/01/99	4.6	58.1	48.6	55.1	68	20	37	76.6	2.6	< 9.7	49.9	37	26.3	10
12/01/99	5.1	27.3	18	26.6	52.6	24.5	21.8	59.1	2	< 9.7	21	18	7.9	12.9
19/01/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
26/01/99	4.8	33.8	37	47.8	29.8	11.2	16	32.7	< 1.3	< 9.7	30.2	21	15.1	6.9
02/02/99	5.3	125.8	75.9	113.5	243.8	65.4	121.3	282.2	12.1	< 9.7	96.4	-	5	1.1
09/02/99	5	173.8	109.7	231.9	184.3	49.1	92	206.3	7.9	< 9.7	151.6	72	9.8	3.3
16/02/99	4.7	50.2	40.5	58.7	60	19.2	20.1	73.5	1.5	< 9.7	43	29	20	7.5
23/02/99	5	33.1	26.8	40.2	30	20	34.2	32.4	< 1.3	< 9.7	29.5	16	9.3	17.7
02/03/99	4.2	45.3	44	48.8	35.3	10	8.9	43.6	1.4	< 9.7	41	26	70.8	11.5
09/03/99	4.3	50	56.5	46.1	12.5	4.6	15.4	15.8	< 1.3	< 9.7	48.5	35	45.7	15.5
16/03/99	6.4	58.8	20.6	77.8	72.1	45.3	74.9	82.5	3.6	< 9.7	50.1	29	0.4	6.8
23/03/99	5.1	134.3	175.8	261	52.5	22.1	114.1	57.4	4	< 9.7	128	57	7.8	3.6
30/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0
06/04/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
13/04/99	4.5	69.8	84.6	99.6	26.8	10.3	22.5	33.7	1.7	< 9.7	66.6	37	32.4	4.1
20/04/99	-	-	-	-	-	-	-	-	-	-	-	-	-	2.9
04/05/99	6.3	150.3	137.8	207.2	83.7	33.4	187.2	82.9	6	< 9.7	140.2	51	0.5	5.3
11/05/99	6.2	41	34.2	67.8	50.5	32.2	61.9	48.5	2.7	< 9.7	35	22	0.7	9.9
18/05/99	5.6	88.3	59.7	58.5	87.6	34.2	162.1	82.9	6.3	< 9.7	77.7	-	2.5	2.4
25/05/99	6.1	92.2	112.6	96.2	71.7	33.6	227.3	78.5	8.2	< 9.7	83.6	46	0.8	4.3
01/06/99	5.1	37	36.5	52.5	26.1	16.3	30.2	28.1	1.9	< 9.7	33.9	20	8.3	28.7
08/06/99	4.2	56.6	60.9	39.1	8.8	< 4.1	11.9	15.7	< 1.3	< 9.7	55.5	41	61.7	16.1
15/06/99	5.4	109.7	102.4	70	43.5	28.9	542.2	49.2	12.9	< 9.7	104.4	36	3.8	1.6
22/06/99	5.7	45.2	46.9	46.4	27.3	14.6	99.9	23.5	6.6	< 9.7	41.9	19	1.9	7.9
29/06/99	4.8	31.1	37.4	37.7	6.2	6.3	30.3	11.5	2	< 9.7	30.4	18	15.5	28.9
06/07/99	3.7	176	193.9	117	26.8	8.9	38.3	30.2	10.1	< 9.7	172.8	112	182	2.5
13/07/99	5.7	99.2	94.6	80.2	28.7	17.9	162.1	26.4	6.3	< 9.7	95.7	33	1.9	3
20/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0
03/08/99	4.8	36	43.5	53.8	7.4	< 4.1	17.2	11.9	< 1.3	< 9.7	35.1	21	16.2	50.9
10/08/99	4.8	36.6	49.1	46.1	31.8	14.1	33.8	31.4	2.2	< 9.7	32.7	24	14.5	8.5
17/08/99	5.1	40.8	28.3	41.7	90.3	31	40.2	93.2	9.1	< 9.7	29.9	24	8.5	6
24/08/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
07/09/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
21/09/99	5.1	23.5	23	32.7	19.5	11.8	10.9	23.4	1.6	< 9.7	21.2	15	8.5	23
28/09/99	4.7	41	19.4	26.7	53.3	23	23.3	61.1	2.7	< 9.7	34.6	24	18.6	27.2
05/10/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
19/10/99	5.8	50.5	28.9	42	125.2	52.2	57.1	142.7	4.8	< 9.7	35.4	34	1.5	11.3
26/10/99	4.8	169.7	85.6	137	172.7	52.5	105.6	201	11.4	< 9.7	148.9	64	14.1	1.9
02/11/99	6.2	54.5	37.8	44.6	82.1	27.7	112.6	90.3	7	< 9.7	44.6	28	0.7	5.8
09/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.1
16/11/99	4.8	98.7	30	35.7	488.6	128.7	44.7	566.5	11.9	< 9.7	39.8	91	15.1	10.9
23/11/99	5	68.9	53.2	85.9	117.7	47.6	60.6	122.9	8.6	< 9.7	54.7	34	10	6.2
30/11/99	5.6	54.1	22.1	47.5	115.9	52.2	56.4	133.5	3.9	< 9.7	40.1	32	2.5	5.6
07/12/99	4.8	19.4	11.6	15.7	29.9	27.2	21	32.7	1.5	< 9.7	15.8	12	15.1	23.4
14/12/99	4.7	51.3	20.1	28.4	177.6	55.3	26.9	197.1	4.5	< 9.7	29.9	42	21.9	9.2
21/12/99	5.2	26.3	19.3	28.8	63.7	41.3	25	70.1	2.3	< 9.7	18.6	19	6.5	16
29/12/99	5	33.3	22.7	37.8	17.8	4.3	6.4	24.4	1.6	< 9.7	31.2	18	9.5	10.7
Precipitation weighted annual mean for site: samples containing phosphate are excluded														Total rainfall
5004		46.7	40	50.2	54.5	22.4	38.8	62.1	2.8		40.2	27.2	17.4	435.4

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
06/01/99	5.9	16.8	3.3	24.4	14.9	15.5	12.5	19.2	< 1.3	< 9.7	15	< 10.0	1.4	16.8
13/01/99	6.1	23.1	3.4	18.8	111	59.6	22.1	127.1	2.9	< 9.7	9.8	23	0.9	33.3
20/01/99	6.1	22.8	5.9	35.3	40.5	37	27.5	43.3	2.5	< 9.7	17.9	13	0.9	14.3
27/01/99	5	44.6	16.3	79.9	98.5	47.7	41.6	93.4	8.1	< 9.7	32.7	-	10	2.4
03/02/99	6.6	55.5	17.1	98	204	86.8	68.2	225.6	10.8	< 9.7	30.9	47	0.3	4.8
10/02/99	6.8	49.4	37.4	117.8	67.2	35.1	49.2	70.1	9.7	< 9.7	41.3	28	0.2	3.1
17/02/99	6	38.2	9	29.4	183	85.8	38.3	213.6	5.5	< 9.7	16.1	34	1	16.7
24/02/99	6.3	15.5	2.8	29.6	59.5	27.8	18.1	66	2.2	< 9.7	8.3	14	0.5	13.2
03/03/99	5	46.9	30.3	55.4	49.5	21	22.5	58.7	2.8	< 9.7	41	27	11.2	8
10/03/99	5.6	84.2	59.6	68	32.5	9.7	58.4	32.5	5.1	< 9.7	80.3	-	2.5	1.1
17/03/99	6.7	56.3	16.3	61.1	165.1	70.2	104.9	185.7	14.4	< 9.7	36.4	39	0.2	3.3
24/03/99	6.2	64	34.2	107.4	30	26.9	32.6	36.2	2.3	< 9.7	60.4	21	0.6	4.9
31/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	3.8
07/04/99	6	25.8	9.7	27.1	85.5	52.2	42.3	102	7.8	< 9.7	15.5	22	1.1	14.5
14/04/99	6	39.7	27.6	74.9	24.6	21	30.4	28.1	3.7	< 9.7	36.8	17	1	10.6
21/04/99	4.6	80.7	78.1	114.6	69.1	23.2	22.3	85.2	3	< 9.7	72.3	40	24.5	6.4
05/05/99	5.9	38.6	27.4	61.2	32.8	22.4	59.5	36.2	2.2	< 9.7	34.7	20	1.3	27.6
12/05/99	6.3	21.6	9.5	47.4	38.8	34	45	36.9	< 1.3	< 9.7	17	14	0.5	12.2
19/05/99	6.5	103.7	68.7	126.9	108.6	48.1	146.2	126.6	13.2	< 9.7	90.6	48	0.4	1.6
26/05/99	4.7	52.2	79.1	93.1	10.2	5.8	38.9	14.9	1.5	< 9.7	50.9	26	21.4	16.1
02/06/99	5.4	20	22.4	36.3	18.4	9.7	6.8	22.3	2.3	< 9.7	17.8	12	4.1	28.2
09/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	3.2
16/06/99	6.4	31	17.3	45.6	54.4	42.4	55.7	65.6	18.2	< 9.7	24.4	23	0.4	5.4
23/06/99	5.3	48.6	45.6	51	10.4	14.4	39	17	10.3	< 9.7	47.3	20	4.6	12.3
30/06/99	6.7	52.2	41.4	197.5	31.3	36.5	65.4	32	22.4	< 9.7	48.4	38	0.2	4.6
07/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
14/07/99	6.3	31.6	23.5	70.4	39.1	33.4	76.5	47	7.1	< 9.7	26.9	18	0.4	3.2
28/07/99	5.3	45.3	60.5	76.7	5.6	8.1	60.2	8.7	3.7	< 9.7	44.6	19	4.8	18.7
04/08/99	4.7	37.6	34.7	43.5	6.9	7.2	26.1	12.7	< 1.3	< 9.7	36.8	20	20.9	57.2
11/08/99	6	18.9	11.1	28.8	26.4	19.2	22	29.6	< 1.3	< 9.7	15.7	11	1.1	25.1
18/08/99	4.9	40.7	46.9	48.1	24.3	12	50	24.7	4.1	< 9.7	37.7	20	11.5	17.3
25/08/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
01/09/99	6.2	64.9	62.8	68	21.3	19.1	187.9	18.2	11.2	< 9.7	62.3	23	0.6	2
08/09/99	5.2	27.9	20.6	25.3	25.4	12.4	42.6	26.7	4.4	< 9.7	24.8	12	5.6	6.2
17/09/99	4.9	24	23	28.1	6	5.4	6.1	10.7	< 1.3	< 9.7	23.3	13	12	64.7
22/09/99	5.4	11	6	12.7	17.4	8.4	3.9	21.8	1.6	< 9.7	9	< 10.0	3.6	22.6
29/09/99	5.6	19.5	4.1	12.2	88.1	44	20.4	100.5	5.7	< 9.7	8.9	19	2.8	34.1
20/10/99	5	31.2	23.9	38.6	37.2	22.6	21	43.4	1.6	< 9.7	26.7	19	8.9	25.8
27/10/99	6.2	33.8	11.6	30.8	120.2	59.2	51.9	145	5	< 9.7	19.3	29	0.7	9.6
03/11/99	5.7	19.5	4.6	10.4	91.8	42.6	47.2	109.7	5.2	< 9.7	8.4	21	2.2	11.1
10/11/99	6	98.1	38.9	103.2	168.1	57.5	73	195.4	8.2	< 9.7	77.9	47	1.1	4.3
17/11/99	6	51.7	23.6	58.2	66.8	26.7	37.4	73.9	3.7	< 9.7	43.6	22	1	1.5
24/11/99	5	16.2	6.1	13.1	37.3	22.1	16.4	42	2.7	< 9.7	11.7	12	10.7	12.9
01/12/99	5.2	50.5	6.4	7.8	282.3	94.7	48.5	333.8	22.9	< 9.7	16.5	57	6.3	8.6
08/12/99	5.3	19.8	5.8	14.2	89.9	41.6	15.7	106.2	3.4	< 9.7	8.9	20	5.4	29
15/12/99	5.9	29.1	9.4	29.2	81	37.7	25.8	96.1	2.6	< 9.7	19.4	21	1.3	4.7
22/12/99	5.3	23.1	4	10.7	108.1	24	5.4	133.2	4.8	< 9.7	10.1	26	5.2	38.1
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5023		30.5	20.7	38	53.7	27		27.9	63.4	3.6		24	19.6	666.3

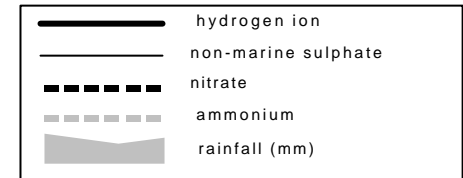
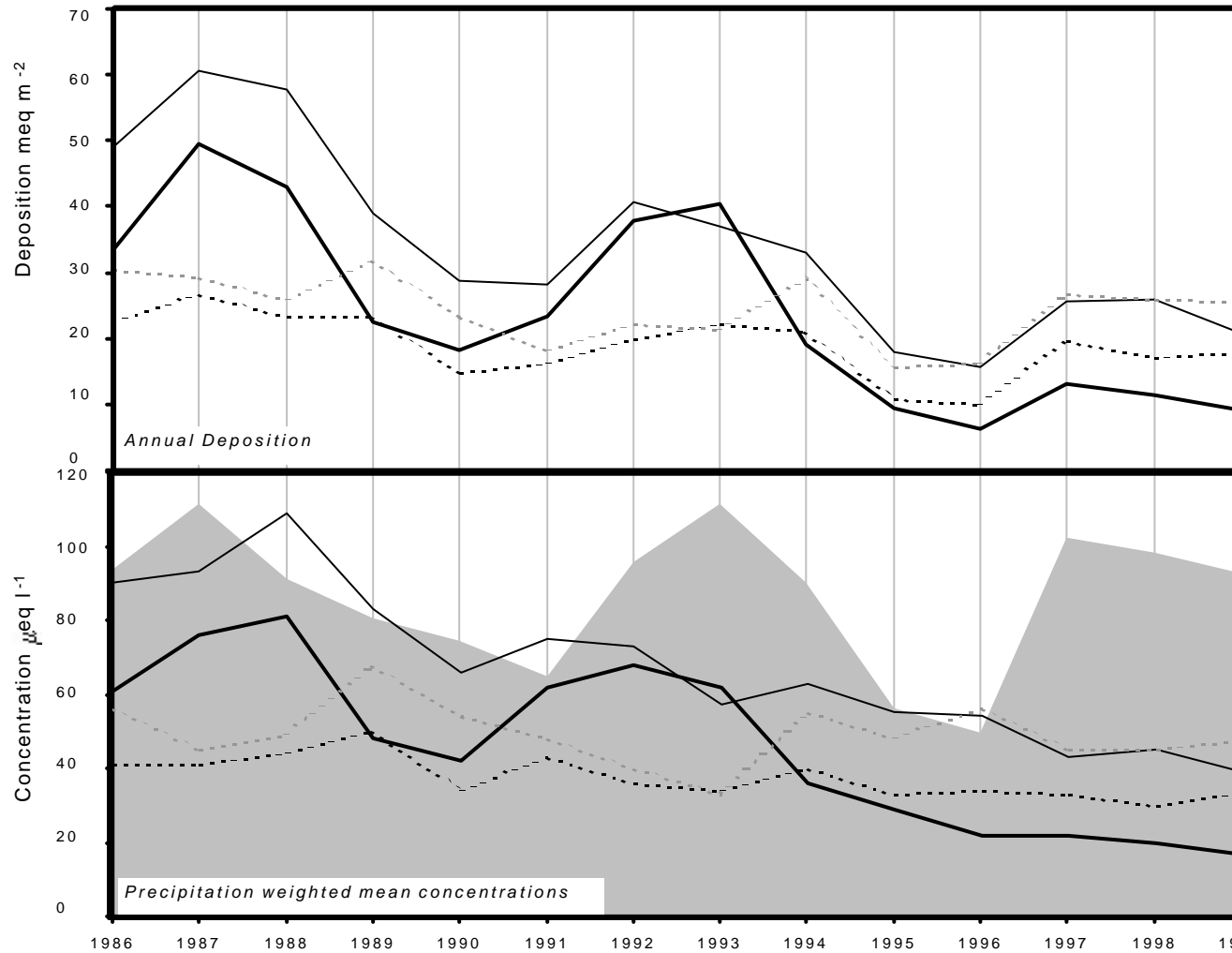
Bottesford

1999 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



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-4.51 ueq/l (-5.98 %/year): 14 years' data +++ Strong trend detected
<i>non-marine Sulphate</i>	-4.61 ueq/l (-4.73 %/year): 14 years' data ++++ Very strong trend detected
<i>Nitrate</i>	-0.98 ueq/l (-2.24 %/year): 14 years' data ++ Moderately strong trend detected
<i>ammonium</i>	-0.54 ueq/l (-1.02 %/year): 14 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
05/01/99	4.6	27.5	19.9	22.4	18.4	6.5	12.3	28.4	< 1.3	< 9.7	25.3	19	25.1	16.8
12/01/99	5	23.6	8.9	17.5	52.5	25.3	16.6	63.1	1.4	< 9.7	17.3	17	9.1	22.1
19/01/99	5.3	28.3	14.9	33.3	22.9	20.2	16.9	28.6	< 1.3	< 9.7	25.6	13	5.2	11.8
26/01/99	6.6	19.1	11.1	23.7	89.9	21.2	35	21.1	< 1.3	< 9.7	8.3	12	0.2	15.4
02/02/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
09/02/99	5.7	158.9	35.9	165.3	74.4	29.9	104	84.3	2.4	< 9.7	149.9	41	1.9	3
16/02/99	5.2	66.7	16.3	45.3	165.4	58.8	56.4	197.4	3.7	< 9.7	46.8	38	6.2	6.8
23/02/99	6.2	16	11.6	21.1	51.5	13.2	14.4	29.2	< 1.3	< 9.7	9.8	10	0.6	20.9
02/03/99	4.4	38.8	35.2	31.8	16	4.9	7.1	29.2	< 1.3	< 9.7	36.9	30	40.7	23.7
09/03/99	4.6	40.5	34.5	35.8	11.3	4.2	11.8	14	< 1.3	< 9.7	39.2	23	26.9	15.7
16/03/99	6.3	81.8	20.8	69.2	46.7	32.6	106.3	49.3	2.7	< 9.7	76.2	23	0.5	4.8
23/03/99	6	104.6	115.6	234.7	13.7	21.5	76.1	20.7	2.7	< 9.7	102.9	42	1	11.8
30/03/99	6.6	49.7	56.2	71.7	75.9	13.6	89.8	21	4	< 9.7	40.5	26	0.2	6.8
06/04/99	6	65.4	22.3	61	65.2	37.9	106.5	81.6	14	< 9.7	57.6	25	1	5.5
13/04/99	4.4	61.1	66	79.1	13.4	< 4.1	20	19.7	< 1.3	< 9.7	59.5	34	38	32
20/04/99	4.6	33.4	32.7	33.1	15.1	9.1	14.4	21.3	< 1.3	< 9.7	31.6	20	23.4	16.6
04/05/99	5.6	39.9	44	57.4	41.1	26.6	71.5	44.9	3.4	< 9.7	34.9	23	2.5	10.2
11/05/99	5	50.5	27.1	53.7	42	22.6	33.1	48.5	2.3	< 9.7	45.5	25	9.5	14.3
18/05/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
25/05/99	6	82.2	83.1	107.2	23	25.7	153.1	20.2	5	< 9.7	79.4	30	1	3.3
01/06/99	4.5	40.9	38.3	43.5	15.1	6.3	10.6	21.6	< 1.3	< 9.7	39.1	25	28.2	43.7
08/06/99	4.7	251.8	176.6	143.8	47.7	31	152.5	77	11.5	< 9.7	246.1	-	20	1.2
15/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
22/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6
29/06/99	4.7	74	53	80.1	12.3	8.2	39	17.1	2.7	< 9.7	72.5	31	22.4	14.7
06/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
13/07/99	6.2	58.2	32.4	39.7	27.8	19.8	112.8	27.3	8.3	< 9.7	54.9	20	0.6	2.6
20/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
27/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
03/08/99	5	59.8	54.8	81.4	35.6	19.3	54.8	40.4	3	< 9.7	55.5	27	8.9	18.4
10/08/99	4.7	77.2	74.9	91.3	44.7	18.7	56.5	44.1	4.8	< 9.7	71.8	34	20	6.4
17/08/99	6.2	103.3	83.8	97.9	74.5	58	380.8	91.5	56	16.8	94.3	45	0.7	1.8
24/08/99	4.8	48.2	69.5	77.6	20.7	8.6	45.3	21.3	4.9	< 9.7	45.7	25	15.1	17.9
31/08/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
07/09/99	5	204.7	129.4	91.6	117.4	46.7	598.2	117.9	39.1	< 9.7	190.6	-	10	1
14/09/99	4.7	48.7	40.8	57.6	14.5	7.4	24.7	30.8	1.4	< 9.7	47	26	19.1	24.9
21/09/99	4.8	20.8	18.5	15.8	17.4	8	13.3	23.3	2.1	< 9.7	18.7	14	17.4	14.6
28/09/99	5.1	15.5	5.9	8.8	15.7	11.6	12.4	20.2	< 1.3	< 9.7	13.6	10	8.5	35.1
05/10/99	4.9	51.5	30.8	43	18.8	10.5	43.8	26.6	< 1.3	< 9.7	49.2	20	12.9	2.6
19/10/99	4.8	28.4	25.7	25.5	64.5	25.4	16.4	72.6	1.9	< 9.7	20.6	24	14.5	20.9
26/10/99	5.3	88.1	41.1	76.8	105.5	36.5	80.7	123.8	12.1	< 9.7	75.4	34	4.7	2.5
02/11/99	4.9	22.6	16.3	15.9	23.2	18.8	32	31.1	2.5	< 9.7	19.8	12	12.6	7.4
11/11/99	5.4	70.5	37.7	88.9	33.2	13.8	28.9	38	1.9	< 9.7	66.5	22	4.3	8.7
16/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1
23/11/99	5.6	50.7	29.2	43.8	87.8	43.2	46.5	102.7	9.8	< 9.7	40.1	26	2.6	6.7
30/11/99	5.2	84.4	17.9	57.7	254.4	78.4	46.9	285.5	6.3	< 9.7	53.8	57	5.6	8.6
07/12/99	4.5	29.1	15.3	17.1	41.1	19.4	16.2	50.3	< 1.3	< 9.7	24.2	19	34.7	22.4
14/12/99	4.7	40.3	12.3	23.3	112.5	44.7	42	133.9	2.8	< 9.7	26.7	31	20.4	8.4
21/12/99	4.9	19.8	8.1	19.8	58.3	31.7	24	70.4	1.9	< 9.7	12.8	17	11.5	15.7
28/12/99	4.8	46.7	15.1	46.1	28.9	5.8	4.4	41.9	1	< 1.0	43.2	19	16.2	5.6
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5121		43.4	33.3	47.7	38.6	16.7	30.7	42.9	2.1		38.7	23.3	16.7	539.7

Sampling Start Date	pH	SO ₄ ⁻¹ µeqL ⁻¹	NO ₃ ⁻¹ µeqL ⁻¹	NH ₄ ⁻¹ µeqL ⁻¹	Na µeqL ⁻¹	Mg µeqL ⁻¹	Ca µeqL ⁻¹	Cl µeqL ⁻¹	K µeqL ⁻¹	PO ₄ µeqL ⁻¹	nss-SO ₄ µeqL ⁻¹	cond µScm ⁻¹	H µeqL ⁻¹	rain mm
01/03/99	5.3	20.5	5.6	6.2	97	39.1	14.3	111.5	2.5	< 9.7	8.8	17	5.4	92.5
08/03/99	4.8	54.8	39.6	53.8	130.4	48.6	26.9	145.8	3	< 9.7	39.1	41	16.2	32.7
22/03/99	4.9	43.4	21.1	29.9	76.6	32.4	23.6	85.3	1.9	< 9.7	34.2	26	12.9	98.9
06/04/99	5.1	24.8	9.3	10	99.3	37.1	13.9	109.9	1.9	< 9.7	12.9	22	8.5	79.9
19/04/99	5	28.5	12.3	9.1	103.5	41.1	14.3	125.4	2.2	< 9.7	16	27	11	63.5
04/05/99	4.9	37.9	16	18.9	119.7	45.7	18	129.1	2.7	< 9.7	23.5	33	12.3	84.7
17/05/99	4.6	70.9	42.2	42.8	117.1	40.9	50.7	130	3.5	< 9.7	56.8	44	24	45.3
01/06/99	4.7	35.7	25.5	26	74.6	29.5	12.1	81.2	2.2	< 9.7	26.7	28	19.1	45.6
15/06/99	4.7	35.1	23.9	31.2	31.6	14.7	17.3	34.7	1.6	< 9.7	31.3	20	18.2	64.7
29/06/99	4.6	36.2	18.1	22.9	42.1	13.8	12.4	42.4	< 1.3	< 9.7	31.1	22	25.7	32.4
12/07/99	4.8	33.3	15.3	14.8	59.7	28.1	16.8	65.3	< 1.3	< 9.7	26.1	22	16.2	71.7
26/07/99	4.7	27.4	36	29.6	8.4	4.1	18.4	12.3	< 1.3	< 9.7	26.4	18	18.6	58.4
09/08/99	4.9	26.3	15.4	17.3	28	13.2	10.3	30.1	< 1.3	< 9.7	23	17	13.5	58.6
23/08/99	4.6	47.3	36.3	36	32.4	11.2	13	31.2	3.5	< 9.7	43.4	25	27.5	41.4
06/09/99	5	18.7	6.4	8.9	42.8	19.5	6.6	46.4	< 1.3	< 9.7	13.6	15	9.5	127.7
20/09/99	5	25.2	6.8	4.5	131.7	51.4	15	147.1	4.7	< 9.7	9.3	27	10.5	206.4
04/10/99	5.8	46.6	32.3	39.7	111.8	53.8	28.8	103.5	13.9	< 9.7	33.1	31	1.6	40
18/10/99	4.9	27.9	12.2	8.7	116.8	43.5	18.4	131	3.9	< 9.7	13.9	29	12	131.7
02/11/99	4.8	33.6	13.3	5.5	133.1	44.6	17	148.5	2.7	< 9.7	17.6	34	15.8	71.9
15/11/99	4.9	39.2	11.6	11.4	186.7	59.2	15.6	210.4	3.4	< 9.7	16.7	37	13.2	108.1
29/11/99	5	40.5	7.4	3.2	244.9	87.1	24.5	279.1	4.6	< 9.7	11	46	11	174.6
13/12/99	5	27.9	5.3	3.1	185.4	70.2	18	207.9	3.3	< 9.7	5.6	35	10.7	138.8
29/12/99	4.8	15.4	3.7	< .7	77.3	17	4.1	93.5	1.6	< 1.0	6.1	19	14.1	307.8
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5160		30.4	12.9	12.4	110.2	39.8	15.8	124.2	2.8		17.2	27.3	13	2177.3

Sampling Start Date	pH	SO ₄ ⁻¹ µeqL ⁻¹	NO ₃ ⁻¹ µeqL ⁻¹	NH ₄ ⁻¹ µeqL ⁻¹	Na µeqL ⁻¹	Mg µeqL ⁻¹	Ca µeqL ⁻¹	Cl µeqL ⁻¹	K µeqL ⁻¹	PO ₄ ⁻¹ µeqL ⁻¹	nss-SO ₄ ⁻¹ µeqL ⁻¹	cond µScm ⁻¹	H µeqL ⁻¹	rain mm
06/01/99	5.1	30.1	9.2	8.9	161.3	60.3	20.6	185.1	3.7	< 9.7	10.6	33	7.4	35.6
13/01/99	5.2	29.3	4.6	3.4	190.2	76.8	22.6	217.8	3.8	< 9.7	6.4	34	5.8	143
20/01/99	5	33.2	12	14.3	150.5	53.7	15.1	169.9	3	< 9.7	15.1	33	8.9	58
27/01/99	4.9	52	18.3	15.1	286.5	84.5	23.5	317.9	6.4	< 9.7	17.4	54	13.8	41.3
03/02/99	6.2	104.7	20.8	56.7	624.7	184.5	59	711.4	13.8	< 9.7	29.4	102	0.6	33.6
10/02/99	4.8	53.3	28.7	35.5	164.5	49.1	19.5	186.2	4	< 9.7	33.5	41	16.2	12.8
17/02/99	5.5	22.3	4.3	18	53.4	37	13.2	58.8	< 1.3	< 9.7	15.9	13	3.5	58.9
24/02/99	5.3	19.5	3.4	7.4	90.9	40.4	12.6	101.8	1.5	< 9.7	8.6	17	5.4	115.1
03/03/99	4.5	36.4	21.6	14.1	81.7	22.1	6.4	93.3	1.8	< 9.7	26.5	32	31.6	28.6
10/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
17/03/99	5	50.6	15.7	38.5	109.1	49.4	28.2	125.6	2.5	< 9.7	37.5	30	9.3	24.3
24/03/99	4.9	33.8	18.2	27.8	57.6	28	17.3	57	1.6	< 9.7	26.9	20	12.6	46.2
31/03/99	5.2	24.7	12.1	20.5	48	30.5	37.6	49.4	< 1.3	< 9.7	18.9	16	6.8	51
07/04/99	5.5	18	4.1	7.5	80.3	42.4	9.7	93.2	1.8	< 9.7	8.4	18	3.5	48.8
14/04/99	5.1	27.3	10.4	10.8	108	44.5	15.5	125.7	2.2	< 9.7	14.3	26	8.7	53.4
21/04/99	4.8	35.1	21.3	20.3	97.3	37.6	16.9	112.6	1.8	< 9.7	23.4	30	17	29.2
28/04/99	4.2	148.5	131.6	205.4	12.3	5.5	31.7	16.7	2.2	< 9.7	147	64	63.1	7
05/05/99	5	32.2	11.6	17	96.4	42.7	25.1	110	2.5	< 9.7	20.6	26	9.8	91.1
12/05/99	4.8	27.6	12.6	8	78.2	31.2	28.7	84.8	1.8	< 9.7	18.2	22	16.2	31
19/05/99	4.7	42.2	34.5	34.5	61.9	29.3	37.6	68.3	1.5	< 9.7	34.7	25	18.6	21.9
26/05/99	4.5	56.8	46	49.2	22.6	8.6	20.4	24.7	< 1.3	< 9.7	54	30	28.8	28.6
02/06/99	4.7	26.5	18.7	16.9	50	20.5	9.1	55.2	< 1.3	< 9.7	20.4	22	19.5	22.7
09/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.3
16/06/99	5.3	15.7	8.6	15.7	17.6	11	7.4	20.1	1.7	< 9.7	13.5	< 10.0	4.8	37.7
23/06/99	6.9	48	33.6	110.7	19.1	10.3	22.3	20.1	29.8	29.4	45.7	29	0.1	22.9
30/06/99	4.7	36.3	21.9	28.3	43.6	18.5	13.1	48.3	1.6	< 9.7	31.1	23	18.2	17.7
07/07/99	8	261.4	21.8	3269.4	246.4	127.1	101.1	134.3	379.5	565.4	231.7	372	0	9.8
14/07/99	4.9	24.3	11.3	13.6	42.4	21.2	15.6	48	< 1.3	< 9.7	19.2	16	12	44.8
21/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
28/07/99	7.2	100.4	49.8	788.8	12.2	49.8	48.6	10.6	106.4	179.7	99	107	0.1	21.3
04/08/99	4.7	24.7	23.9	20.7	14.8	6.3	7.3	19.8	< 1.3	< 9.7	22.9	17	20	50.3
11/08/99	9	30.7	11.3	168.7	30.9	29.7	18.2	29.3	17	34.8	27	28	0	24.1
18/08/99	4.6	44.2	57	46.8	45.3	11	37	42.1	7.7	< 9.7	38.8	29	25.7	19.8
25/08/99	4.4	54.5	35.5	32.4	31.2	8.1	6.7	30.3	3.1	< 9.7	50.7	32	38.9	16.6
01/09/99	4.8	14.2	8.4	9.3	20.2	12.3	19.9	23	1.6	< 9.7	11.7	< 10.0	14.5	35.7
08/09/99	4.7	55.4	26.2	36.1	104.9	31.9	18.7	117.4	5.7	< 9.7	42.8	30	22.4	20.5
15/09/99	4.8	21.5	11.1	10.9	36.6	16.9	4.4	41.6	< 1.3	< 9.7	17.1	16	15.1	118.9
22/09/99	5	15.9	5.4	3.2	61.2	27.7	8.5	69	1.4	< 9.7	8.5	16	9.5	107.3
29/09/99	5.1	24.3	3.2	6.4	128.7	58.9	18.6	141.9	4.2	< 9.7	8.8	27	7.8	86.4
06/10/99	5.1	26.1	9.4	19.6	31.5	22.2	14.4	34.5	< 1.3	< 9.7	22.3	14	8.1	50.1
20/10/99	4.7	25.8	13.8	11.7	54.5	20.9	9	61	< 1.3	< 9.7	19.2	22	20.9	68.6
27/10/99	5	29.6	10.4	9	120	46.6	17.5	136.9	3.1	< 9.7	15.1	28	11.2	54.8
03/11/99	4.8	25.5	10.4	4.8	77.7	29.8	8	84.9	2.1	< 9.7	16.1	22	14.1	75.5
10/11/99	4.7	50.7	27.2	29.9	121.2	36.3	16.2	138.6	3.4	< 9.7	36.1	37	20.9	12.9
17/11/99	4.9	24.8	6.4	3.4	103.9	39.1	11.1	117.8	2.1	< 9.7	12.3	25	13.5	48.8
24/11/99	4.5	46.8	15.3	15.4	185.6	57.3	15.1	206.5	3.9	< 9.7	24.4	42	29.5	51.5
01/12/99	5	32.2	4.2	2.4	197.7	79.8	24.1	228.6	3.7	< 9.7	8.4	37	10.5	71.9
08/12/99	4.7	33.2	9	8.6	135.1	46.6	12.6	160.8	2.6	< 9.7	16.9	31	19.5	81.7
15/12/99	5	18.8	7.4	4.2	66.6	36.8	11.9	94.2	< 1.3	< 9.7	10.8	19	9.3	50.2
22/12/99	5.2	31.3	4.4	< 2.1	170.5	65.6	17	234.3	3.1	< 9.7	10.7	39	6.8	58.6
29/12/99	5	11.8	3.5	2.7	16.7	< 4.1	< 2.5	49.4	< 1.3	< 9.7	9.8	13	10.7	69.2
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5153		29.7	11.7	13.6	103.7	41	16.2	119.7	2.4		17.3	25.7	12.3	2312.8

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
04/03/99	4.3	53.9	35.8	41.4	22.1	5.3	4.6	33.5	< 1.3	< 9.7	51.2	31	51.3	13.2
10/03/99	4.7	69	43.8	67.3	67.1	23.5	32.7	75.7	1.9	< 9.7	60.9	35	19.5	27.3
27/03/99	4.2	88.8	105.4	92.5	88.5	36.7	22.9	101.5	3	< 9.7	78.1	58	70.8	3.8
06/04/99	4.5	51.5	38.5	36.7	58.8	17.4	15.2	69.6	1.5	< 9.7	44.4	35	33.1	48.8
20/04/99	4.5	63.7	45.8	50.7	41.4	12.3	17.8	48.2	1.8	< 9.7	58.7	37	35.5	20.6
05/05/99	4.8	37.2	26.9	42.8	21.9	12.7	21.1	28.7	< 1.3	< 9.7	34.5	19	14.1	83.3
18/05/99	5	89.6	76.6	79.5	119.7	42.6	83.2	122.6	5	< 9.7	75.2	43	9.8	14
02/06/99	4.5	47	35.8	40	19.6	6.1	11.5	24.1	< 1.3	< 9.7	44.6	27	29.5	57.9
15/06/99	4.7	45.3	39.5	31.2	34.3	14.6	46.8	29.4	2.1	< 9.7	41.2	23	19.1	21
29/06/99	7	121.9	39.6	337.9	64.4	19.6	34.2	55.8	77.8	233.4	114.1	60	0.1	25.7
13/07/99	4.6	63.3	24.6	35	114	34.2	38	129.8	3.3	< 9.7	49.5	35	26.9	22.7
27/07/99	4.4	89.1	76.2	98.9	69.4	24	43.2	75.3	3.5	< 9.7	80.8	44	39.8	32.9
10/08/99	4.8	40.7	18.9	30.2	37.6	14.8	28.8	39.7	2.8	< 9.7	36.1	20	17.4	56.6
24/08/99	4.5	53.3	70.6	32.3	46.4	15.2	53.3	35.5	5.6	< 9.7	47.7	32	35.5	18.2
07/09/99	4.7	44.1	40.5	39.8	20.8	9.4	32.6	24.7	1.5	< 9.7	41.6	24	21.9	52.6
21/09/99	4.7	28	13.5	14.6	46.3	18.6	11.1	52.2	2.6	< 9.7	22.4	21	20.4	108.7
05/10/99	4.7	47.2	25.1	31.3	35.6	11.8	20.9	40.9	1.4	< 9.7	42.9	24	20.9	17
19/10/99	4.5	45.9	33.7	26.4	81.6	24.9	18.9	93.9	2.6	< 9.7	36	31	29.5	71.2
02/11/99	4.7	51.4	37.2	34.5	64.4	18.3	17.1	75.1	2.5	< 9.7	43.6	34	20.9	17.1
16/11/99	4.7	45.9	26.4	33.5	99.8	31.4	15.8	107.4	2	< 9.7	33.8	31	19.1	22.3
30/11/99	4.5	37.2	12.4	10.7	116.1	38.2	14.8	137.7	2.4	< 9.7	23.2	33	28.2	97.4
14/12/99	4.7	35.8	14.3	21.4	103.5	39.2	18.1	120.5	2.2	< 9.7	23.3	28	19.1	33.9
27/12/99	5	41.7	17.6	27.6	121.1	27.6	9.2	145.8	2.8	< 1.0	27.2	32	9.8	10
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5158		45.9	30.6	34.1	60.3	20.9	22.3	69	2.2		38.6	28.4	24.6	876.1

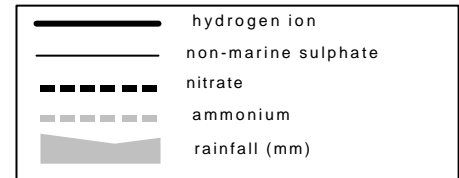
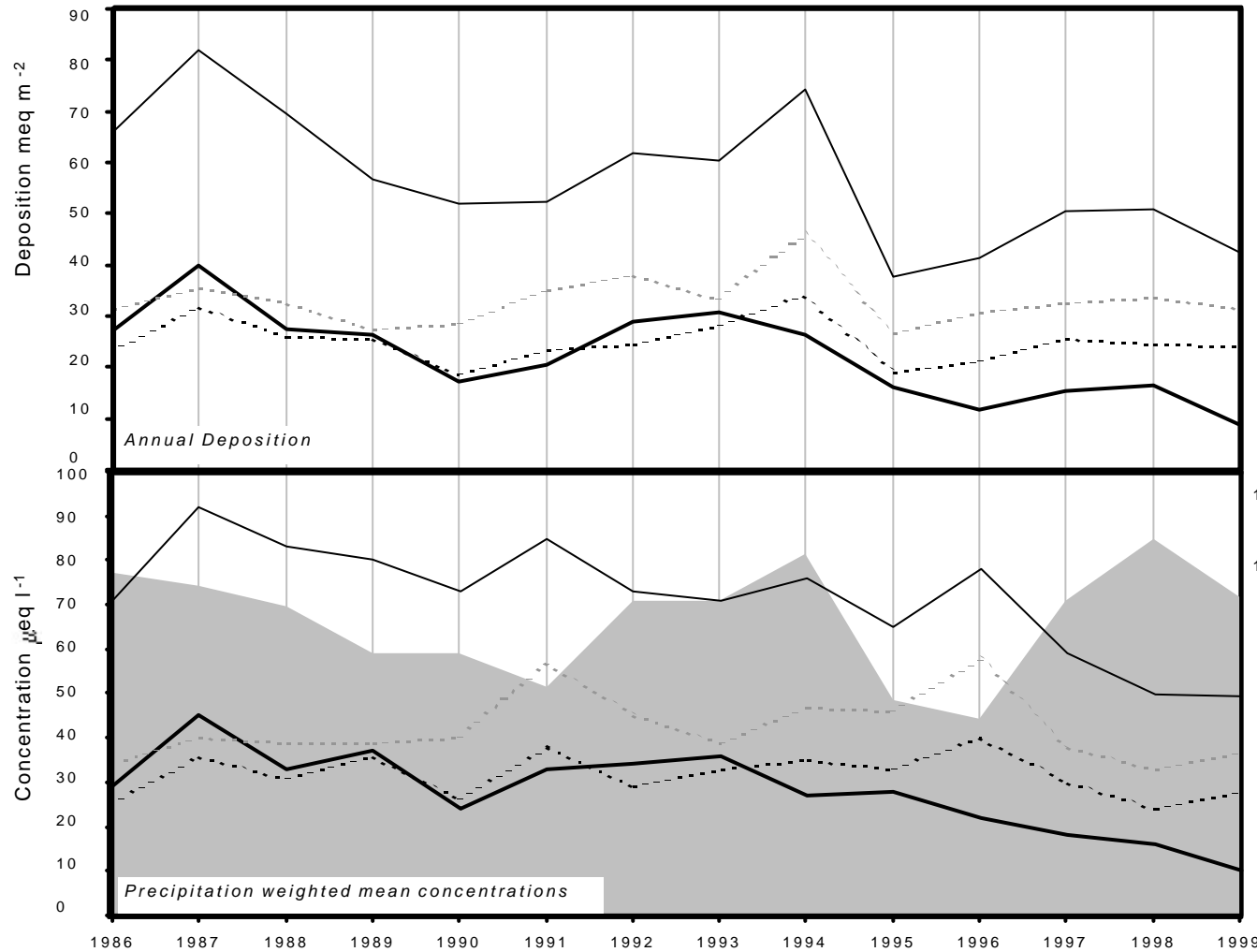
Wardlow Hay Cop

1999 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



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-1.75 ueq/l (-4.45 %/year): 14 years' data ++ Moderately strong trend detected
<i>non-marine Sulphate</i>	-2.29 ueq/l (-2.64 %/year): 14 years' data ++ Moderately strong trend detected
<i>Nitrate</i>	-0.10 ueq/l (-0.30 %/year): 14 years' data - No significant trend detected
<i>ammonium</i>	0.17 ueq/l (0.41 %/year): 14 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
03/01/99	5.1	37	13.3	17.1	59.2	21.3	47	69.3	2	< 9.7	29.9	21	8.3	31.4
10/01/99	5.7	46.2	9.4	23.3	136.8	54.7	61.1	155.8	3	< 9.7	29.8	32	2	34
17/01/99	4.8	62.7	23.1	46.5	50.5	20.7	47.7	60.5	2.1	< 9.7	56.6	28	14.8	15.4
24/01/99	6.2	40.5	13.9	32.3	59.1	34.7	64.5	63.9	5.8	< 9.7	33.4	20	0.6	12.5
31/01/99	6.5	62.7	12.1	18.3	167	55.9	153.3	200.3	4	< 9.7	42.6	43	0.3	18.6
07/02/99	6.7	81.2	38.3	56.2	76	18.1	224.1	79.2	2.6	< 9.7	72	34	0.2	4.4
14/02/99	6.5	74.3	13.4	36.5	179.4	63.4	148	203.7	3.6	< 9.7	52.7	42	0.3	26.9
21/02/99	6	133.7	33.4	48.3	602.2	168.6	147.6	702.8	13.7	< 9.7	61.1	110	1	5.1
28/02/99	5.9	20.6	7.4	18.6	30.1	17.7	35.4	33	2.1	< 9.7	17	11	1.2	43
07/03/99	4.3	61.8	56.9	45	24	8.7	24.8	29.6	1.7	< 9.7	58.9	40	47.9	17.3
14/03/99	6.6	76.3	14.3	32.8	71.4	24.4	179.3	79.5	2.6	< 9.7	67.7	31	0.3	9.5
21/03/99	5.9	81.2	35.8	65.1	51.9	21.6	115.4	59.5	2.7	< 9.7	75	30	1.3	15.4
28/03/99	6.7	155.8	117.1	185.2	46.4	21.5	198.6	44.8	3.1	< 9.7	150.2	53	0.2	5.1
05/04/99	6.4	60.5	13.4	31.6	139.5	52.8	135.3	161.6	5.1	< 9.7	43.7	34	0.4	21.9
13/04/99	4.3	71.5	55.7	42.9	19.8	5.1	47.7	23.3	1.4	< 9.7	69.1	36	44.7	28.1
20/04/99	4.6	37.6	20.3	21.1	20.9	9.1	19.2	29.4	< 1.3	< 9.7	35	21	23.4	26.6
25/04/99	5	279.6	279.7	367.8	39.9	18.3	105.4	74.3	5.3	< 9.7	274.8	-	10	1.3
02/05/99	5	52.5	40.3	44.9	10.7	9.2	84.6	18.4	1.4	< 9.7	51.2	19	9.3	37.1
09/05/99	6.1	60.1	27.8	69.5	62	35.6	102.6	64.7	< 1.3	< 9.7	52.6	27	0.8	9.5
16/05/99	6.7	325.1	114.3	38.7	446.3	125.1	957.4	527.4	24.3	< 9.7	271.4	133	0.2	1.8
23/05/99	6.7	73.7	49.7	55	30.6	17.2	355.1	32.9	2.7	< 9.7	70	31	0.2	13.6
30/05/99	4.9	49.5	44.1	48.5	16.7	7.7	58.8	21.8	< 1.3	< 9.7	47.5	24	13.5	22.1
06/06/99	7.1	70.9	26.1	35.5	41.2	16.5	644.7	53.7	6.3	< 9.7	66	30	0.1	4
13/06/99	4.6	75.8	43.3	45	20.6	7.8	91.7	26.2	1.4	< 9.7	73.3	27	24	25.9
20/06/99	6.3	48.7	29.1	25.2	23.6	13.5	121.4	26.7	2.8	< 9.7	45.8	19	0.5	17.5
27/06/99	5.5	48.7	28.3	37.2	8.4	6.3	85.9	13.5	2.3	< 9.7	47.7	16	3	30.4
11/07/99	6.8	171.4	58.4	127.1	57.5	33.7	629.8	68.3	17.2	< 9.7	164.4	50	0.1	2
18/07/99	6.8	61	21.9	37.6	63.7	23.9	232.8	69.3	5.5	< 9.7	53.3	30	0.2	10.1
01/08/99	4.9	125.2	124.5	169.6	17.2	10.2	106.4	18.4	4.7	< 9.7	123.1	44	12	14.1
08/08/99	4.6	53.3	26	31.8	29.5	10.5	29.2	33.6	< 1.3	< 9.7	49.8	27	25.1	35.5
15/08/99	6.8	58.8	25.1	43.6	46.2	18.4	182.8	51.2	4.6	< 9.7	53.2	25	0.2	8.4
22/08/99	4.5	75.1	77.5	67.1	44.2	15.8	58.9	42.5	6.3	< 9.7	69.8	37	28.8	9.7
06/09/99	6.9	124.3	43	44.8	31.3	12.6	416.2	31.7	5.1	< 9.7	120.5	37	0.1	7.2
13/09/99	4.8	48.7	32.5	38	15.5	7.7	47.6	19.3	1.6	< 9.7	46.8	20	16.6	32.5
20/09/99	4.6	50.7	32.3	30.5	15.5	4.7	25.8	22.6	1.8	< 9.7	48.8	26	25.1	14
26/09/99	5.2	49.3	13.3	18.5	50.1	21	81.3	59.9	1.9	< 9.7	43.3	21	5.9	62.6
19/10/99	4.7	58.1	38.3	35.4	81	25.1	44.3	94.8	2.7	< 9.7	48.4	36	21.9	33.8
24/10/99	4.9	85.2	44.2	32.5	57.9	14.7	121.8	66.4	4.1	< 9.7	78.2	32	13.5	10.8
31/10/99	5.2	31.3	14.1	6.4	38.4	14.3	29.2	45.6	3.2	< 9.7	26.6	15	7.1	16.8
07/11/99	4.3	213.7	86.4	119.1	78.8	24.5	132.9	121.7	6.5	< 9.7	204.2	75	52.5	2.6
14/11/99	5.3	213.3	48.9	109.6	304.7	64	533.9	315.7	24.4	< 9.7	176.6	-	5	1.4
21/11/99	6	32.9	10.9	19.3	34.2	30	74.9	38.4	1.1	< 9.7	28.8	14	1.1	18.6
28/11/99	6.1	86	9.6	20.9	366.5	108.7	133	401	8.1	< 9.7	41.9	73	0.9	27.1
05/12/99	6	36.6	11.7	30.5	96	43.9	71.1	109.2	8.7	< 9.7	25.1	26	0.9	38.9
12/12/99	5.2	35.4	10.3	14	85.3	38.5	73.7	101.5	2.1	< 9.7	25.1	23	5.8	11.1
19/12/99	5.1	33.7	12.9	29.3	82.5	42.1	42	98.4	1.8	< 9.7	23.8	22	7.9	23.8
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5120		57.7	28	36.7	69.5	26.8	91.8	80.3	3.1		49.3	28.7	10.3	859.5

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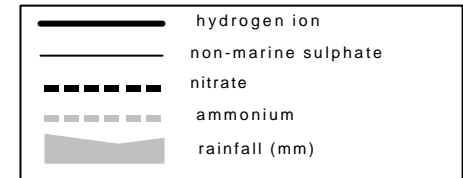
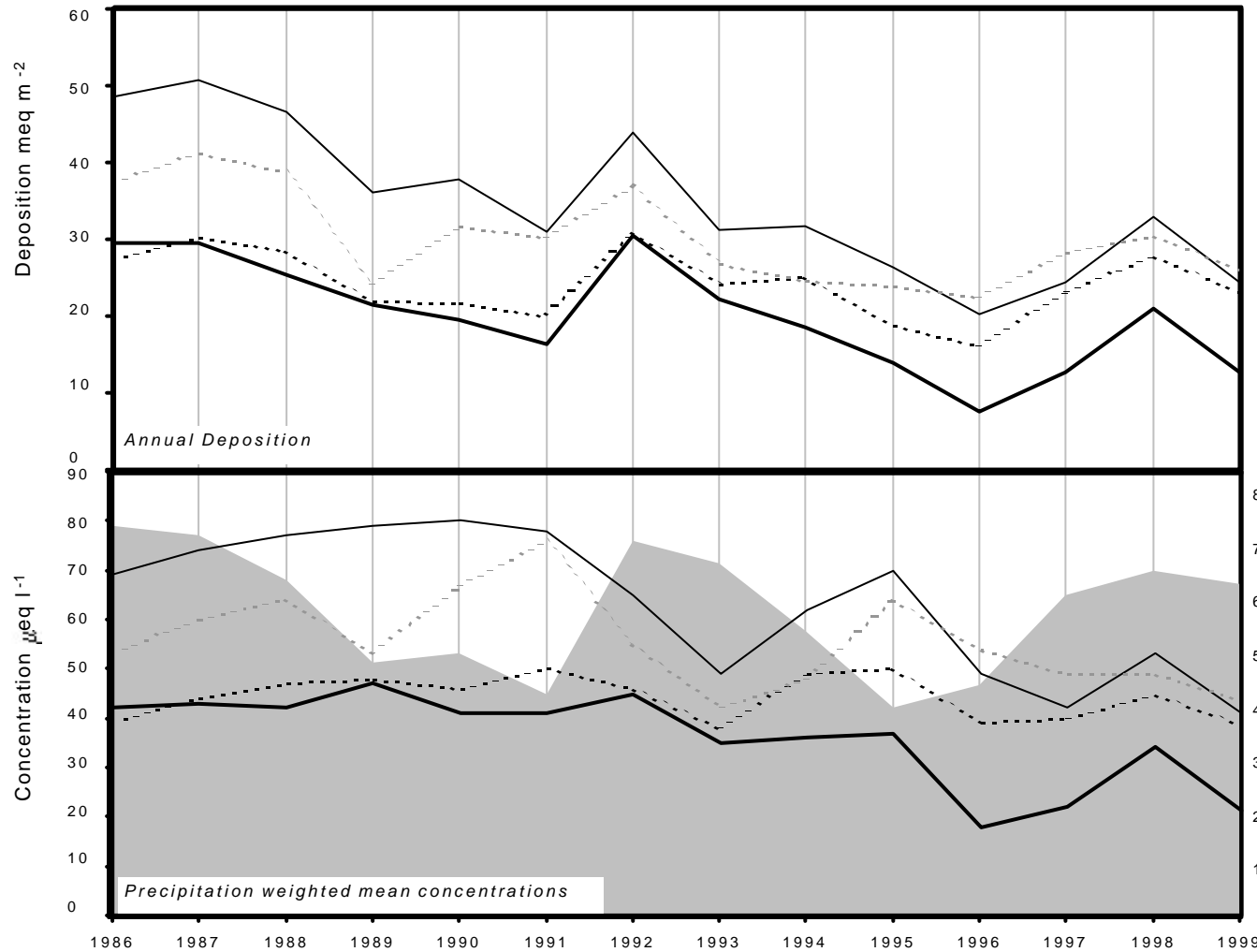
1999

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



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-1.75 ueq/l (-3.69 %/year): 14 years' data ++ Moderately strong trend detected
<i>non-marine Sulphate</i>	-2.71 ueq/l (-3.35 %/year): 14 years' data ++ Moderately strong trend detected
<i>Nitrate</i>	-0.24 ueq/l (-0.52 %/year): 14 years' data - No significant trend detected
<i>ammonium</i>	-1.06 ueq/l (-1.70 %/year): 14 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
05/01/99	4.5	33.4	25.5	18.6	46.6	14.7	9.4	57.3	< 1.3	< 9.7	27.8	28	31.6	24.1
14/01/99	5.2	18	10.4	15.4	35.3	19.7	14.1	39.8	< 1.3	< 9.7	13.7	11	6.2	19.5
19/01/99	4.9	36.1	26.5	45.9	26	11.9	13	30.4	< 1.3	< 9.7	32.9	19	12	10.2
26/01/99	4.5	34.4	32.5	33.6	32.5	10.9	14	44.7	< 1.3	< 9.7	30.5	27	28.8	10.1
02/02/99	5.2	89.2	41	61	209.8	68.3	86.5	230.7	7.5	< 9.7	63.9	50	5.8	4.1
11/02/99	4.4	80.1	70	76.7	98.3	28.3	41.2	124.7	2.7	< 9.7	68.3	51	38.9	5.3
18/02/99	5.1	42.5	15	43.6	46.5	18.6	21.3	59.5	1.6	< 9.7	36.9	23	8.1	6.2
04/03/99	4.4	51.6	47	45.2	64.3	19.1	11.5	69.9	2.2	< 9.7	43.8	37	37.2	47.7
11/03/99	4.7	103.1	54.1	110.5	58.2	25	56.7	65.4	2.3	< 9.7	96	37	19.1	13
25/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
01/04/99	5.7	116.6	48.6	87.5	60.4	34.1	152.9	90.1	4.1	< 9.7	109.3	39	2	7.7
13/04/99	4.4	56.2	45.8	48.7	51.6	16.2	14.6	64.8	1.9	< 9.7	50	38	40.7	33.6
23/04/99	4.4	124.8	180	172.8	112.4	34.1	63.4	106.3	6	< 9.7	111.2	76	39.8	8.7
07/05/99	5.4	73.7	74	132	40.8	21.6	41.6	45	2.5	< 9.7	68.8	33	4	15.7
14/05/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
27/05/99	4.6	40	37.3	37.6	21	11.5	18.4	25.5	< 1.3	< 9.7	37.5	25	24.5	66.5
24/06/99	4.7	47.8	37.2	42.3	22.5	10.7	31.3	23.1	2.1	< 9.7	45.1	22	21.9	12.9
30/06/99	4.3	108.7	82.2	114.5	27.9	14.5	38.3	32.4	8.9	< 9.7	105.3	46	46.8	7
07/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
14/07/99	6.3	55.5	67.8	45.4	32.2	25.1	182.5	25.7	6.9	< 9.7	51.6	22	0.5	2.4
21/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
04/08/99	4.8	36.4	35.4	41.1	50.5	20.4	17.2	49.4	1.6	< 9.7	30.3	24	14.8	61
11/08/99	4.3	113	120.3	131.4	73.1	25	54.3	73.7	7.4	< 9.7	104.2	55	46.8	7.1
18/08/99	4.6	60.9	58.9	56.3	72.9	23.9	46.9	78.9	8.5	< 9.7	52.1	35	25.1	11.2
01/09/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
08/09/99	5.2	30.9	33.7	17.5	12.4	6.7	32.8	16.6	1.7	< 9.7	29.4	20	6.5	36.6
16/09/99	4.8	45.7	49	56.7	53.6	21.2	21.2	61.8	2.4	< 9.7	39.2	30	16.2	16.2
22/09/99	4.9	32.8	27.9	34.5	36.1	16.4	17.8	39.1	2.4	< 9.7	28.4	20	12.6	14.5
01/10/99	4.5	33.8	7.4	8	10.5	4.4	16	17	< 1.3	< 9.7	32.5	20	28.8	28.2
06/10/99	4.6	49.7	28.1	36	37.9	12.8	26.9	49.7	1.6	< 9.7	45.1	26	24.5	4.4
20/10/99	4.8	43.4	31.6	30	119.1	40	25.6	143.3	3.2	< 9.7	29.1	36	16.6	35.3
27/10/99	5.1	86.8	53.2	90.9	106.8	37	55.8	129.1	3.5	< 9.7	73.9	40	8.5	4.5
03/11/99	4.7	29.1	23.3	25.9	44.5	20.2	22.1	55.4	3.5	< 9.7	23.8	20	21.9	10.1
10/11/99	5.3	54.6	31	24.3	153.4	62.9	53.8	185.4	3.3	< 9.7	36.2	36	5	5.1
17/11/99	4.6	89.3	27.3	15.8	527	139.3	38.4	623.2	11.2	< 9.7	25.8	94	25.1	14.5
24/11/99	4.8	62.8	45.8	64.2	115.4	39.1	29.4	135.2	3.3	< 9.7	48.9	36	14.1	7.1
01/12/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
08/12/99	4.7	39.6	18.5	17.7	119.9	45.2	18.8	179.6	2.5	< 9.7	25.2	36	20	23.8
15/12/99	4.9	45.1	39.9	39	76.6	32.3	27.3	103.8	1.8	< 9.7	35.9	28	12.9	2.9
22/12/99	5.2	25.2	17.8	20.6	47.8	27.2	22.7	72.4	< 1.3	< 9.7	19.4	18	5.9	14.9
29/12/99	5.3	73.8	28.6	73.6	69.1	13.6	12.3	86.4	2.7	< 9.7	65.5	29	5	2.8
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5136		48.8	38.9	43.7	65.2	23.5	26.3	77.7	2.4		41	31.1	21.4	597.6

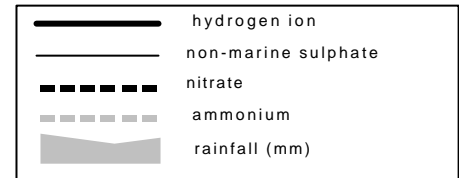
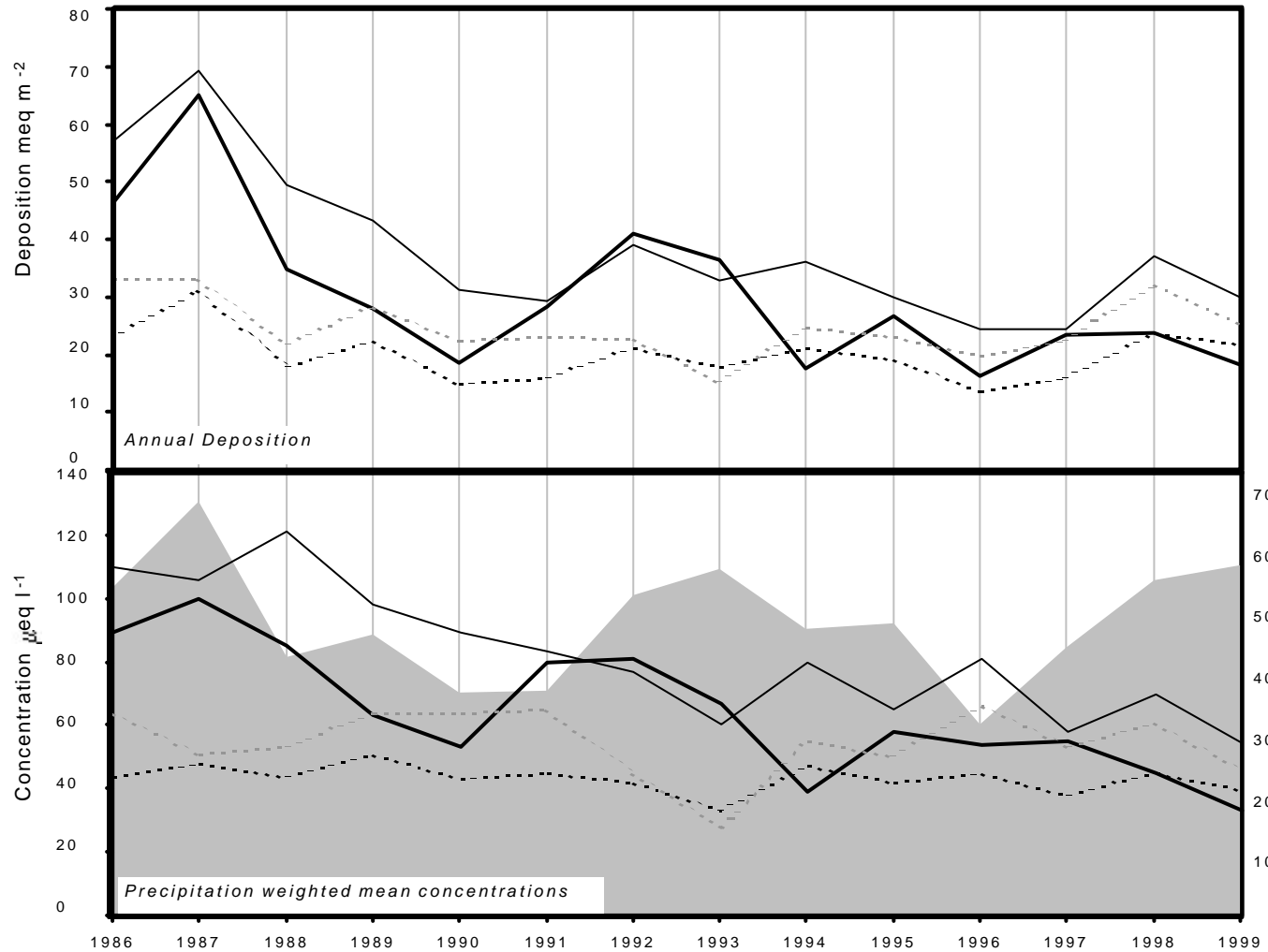
Jenny Hurn

1999 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



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-3.90 ueq/l (-4.35 %/year): 14 years' data +++ Strong trend detected
<i>non-marine Sulphate</i>	-4.29 ueq/l (-3.89 %/year): 14 years' data +++ Strong trend detected
<i>Nitrate</i>	-0.43 ueq/l (-0.93 %/year): 14 years' data - No significant trend detected
<i>ammonium</i>	-0.51 ueq/l (-0.88 %/year): 14 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeq l ⁻¹	NO ₃ ⁻¹ µeq l ⁻¹	NH ₄ ⁻¹ µeq l ⁻¹	Na µeq l ⁻¹	Mg µeq l ⁻¹	Ca µeq l ⁻¹	Cl µeq l ⁻¹	K µeq l ⁻¹	PO ₄ ⁻¹ µeq l ⁻¹	nss-SO ₄ ⁻¹ µeq l ⁻¹	cond µScm ⁻¹	H µeq l ⁻¹	rain mm
05/01/99	4.3	40.5	23.1	36.3	34	10.3	11.2	72	1.3	< 9.7	36.4	35	46.8	9.9
12/01/99	4.6	47.8	12.9	26.1	122.4	37.2	21.2	154.1	2.7	< 9.7	33.1	38	23.4	9.7
19/01/99	-	-	-	-	-	-	-	-	-	-	-	-	-	3.8
26/01/99	6.7	316.2	34.5	1539.4	63.7	59.5	60	194.5	545.3	1736	308.5	224	0.2	7.7
09/02/99	6.7	69.3	18.1	64.2	170	42.9	81.3	118.1	6.5	< 9.7	48.8	35	0.2	7.3
16/02/99	4.8	62.1	29.3	46.7	146.1	47.8	42.8	178.9	4.2	< 9.7	44.5	40	15.1	7.4
23/02/99	4.9	67.7	24.6	53.3	68.2	24.9	48.1	92.8	1.7	< 9.7	59.5	30	12.9	8.4
02/03/99	4.5	38.9	31.2	31.3	23.5	8.1	9.9	31.8	< 1.3	< 9.7	36	26	31.6	36.7
09/03/99	4.1	79.4	95.1	50.5	79.5	22.6	27.9	97.7	2.6	< 9.7	69.8	66	83.2	9.3
16/03/99	6.1	144.2	61.2	148	88.9	49.6	137.7	109.3	3.9	< 9.7	133.5	44	0.9	4.1
23/03/99	6.2	81	46.4	95.9	70.9	20	63.7	45.6	3.1	< 9.7	72.4	30	0.6	14.3
30/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4
06/04/99	5.1	167.7	51	107.7	156.2	59.4	134.7	190.9	13.9	< 9.7	148.9	59	7.9	4.7
13/04/99	4.2	72.1	73.7	60.4	40.2	12.5	15.7	44.3	1.7	< 9.7	67.2	48	63.1	40.1
20/04/99	4.2	41.2	25.1	32.3	21.7	5.8	12.1	66.2	< 1.3	< 9.7	38.6	39	60.3	27.2
04/05/99	5.2	59.6	53.3	85.5	35.9	21.1	49.2	45.6	2.6	< 9.7	55.3	28	6.9	17.4
11/05/99	-	-	-	-	-	-	-	-	-	-	-	-	-	3
18/05/99	6.5	87.6	40.3	30.8	115.5	57.6	180.5	125.4	6.6	< 9.7	73.7	39	0.3	5.4
25/05/99	5.8	103.5	90.9	90.9	25.3	26.3	147.4	24	2.8	< 9.7	100.4	38	1.7	6.9
01/06/99	4.5	40.3	33.5	36.6	9.6	4.8	9	20.1	< 1.3	< 9.7	39.1	26	30.9	42.5
08/06/99	4.2	132.9	55.6	60	33.4	17.8	45.5	45.4	9.5	< 9.7	128.9	54	69.2	3.7
15/06/99	5.9	31.4	20.8	< 2.1	25.3	36.7	112.7	34.4	7.4	< 9.7	28.3	18	1.1	9.7
22/06/99	4.4	143.4	92.8	129.3	32.1	23.5	97.5	60.2	10.9	< 9.7	139.5	57	36.3	2.1
29/06/99	4.7	49	21.6	28.4	5.8	7.4	24.3	12.5	3.8	< 9.7	48.3	21	22.4	22.8
13/07/99	6.7	129.4	78.1	93.3	42.3	43.9	425.7	53.4	10.7	< 9.7	124.3	40	0.2	2.7
20/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
27/07/99	6	309.7	317.1	18.1	16.5	14.8	62.4	27.1	3.6	< 9.7	307.7	95	0.9	1.9
03/08/99	4.6	81	48.8	62.9	55.2	23.4	48.5	67	3.3	< 9.7	74.4	37	25.1	32.6
10/08/99	4.3	80.3	98.9	82.2	41.9	17	31.3	40.1	4.4	< 9.7	75.2	49	50.1	10.4
17/08/99	4.2	96	52.5	64.4	33.5	9.6	29.8	57.3	7.5	< 9.7	92	51	66.1	13.6
24/08/99	4.1	63.3	34.7	29.7	28	6.3	22.8	47.6	7.9	< 9.7	59.9	42	72.4	10.8
31/08/99	5.7	87.8	118	74.4	20.2	51.1	507.1	31.3	29.3	< 9.7	85.3	39	1.8	1.5
07/09/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
14/09/99	4.8	44	36.2	31.6	20.3	15	44.9	28.7	2.1	< 9.7	41.6	22	15.5	18.4
21/09/99	4.1	57	45.9	37.9	7.9	< 4.1	10.7	29.1	< 1.3	< 9.7	56	42	72.4	23.6
28/09/99	4.7	31.3	11.3	15.8	24	10.5	12.3	34	< 1.3	< 9.7	28.4	20	19.1	22.3
05/10/99	5.1	44	18.9	31.8	12.9	11.4	42.4	19	< 1.3	< 9.7	42.4	17	7.6	6.1
19/10/99	4.5	33.5	26.7	26.7	70.6	26.7	20.2	78.8	2.2	< 9.7	25	31	30.9	23
26/10/99	3.7	128.1	51	71.2	132.4	40.3	52	328.6	5.9	< 9.7	112.1	119	195	2.8
02/11/99	4.3	40	21.5	37.8	15.9	6.2	9	56.4	2.4	< 9.7	38.1	35	47.9	13.6
09/11/99	5.7	135	41.5	131.6	80.9	36.4	79.2	94.5	3.2	< 9.7	125.2	41	2	5.2
16/11/99	5.4	104.5	30.7	41.9	435.1	127.4	76.2	521.8	10.6	< 9.7	52.1	79	3.6	5
23/11/99	4.7	41.9	24.4	29.7	25.6	8.7	10.2	32.9	0.9	< 9.7	38.8	21	20	9.7
30/11/99	5.1	70.3	18.6	30.8	231.1	79.4	53.6	263.5	5	< 9.7	42.5	51	8.3	10.1
07/12/99	4.5	36.9	15.6	19.5	55	20.2	18.2	73.2	1	< 9.7	30.3	25	32.4	13.7
14/12/99	4.8	44.9	9.9	25.5	134	46.4	27.4	173.7	2.6	< 9.7	28.8	36	17.8	10.8
21/12/99	6	52.8	18.8	39.7	123.4	57	102.8	178.3	3.7	< 9.7	38	37	1.1	6.5
28/12/99	5.5	120.1	12.1	160.4	26.8	4.4	5.8	38.8	12.6	91.5	116.9	30	3.3	3.2
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5118		60.4	39.6	45.7	51.4	19.9	37.7	67.5	2.8		54.2	35.5	33.2	553.5

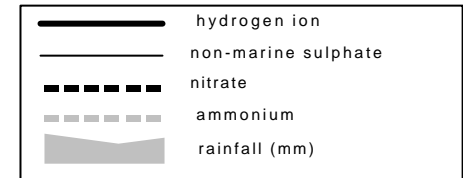
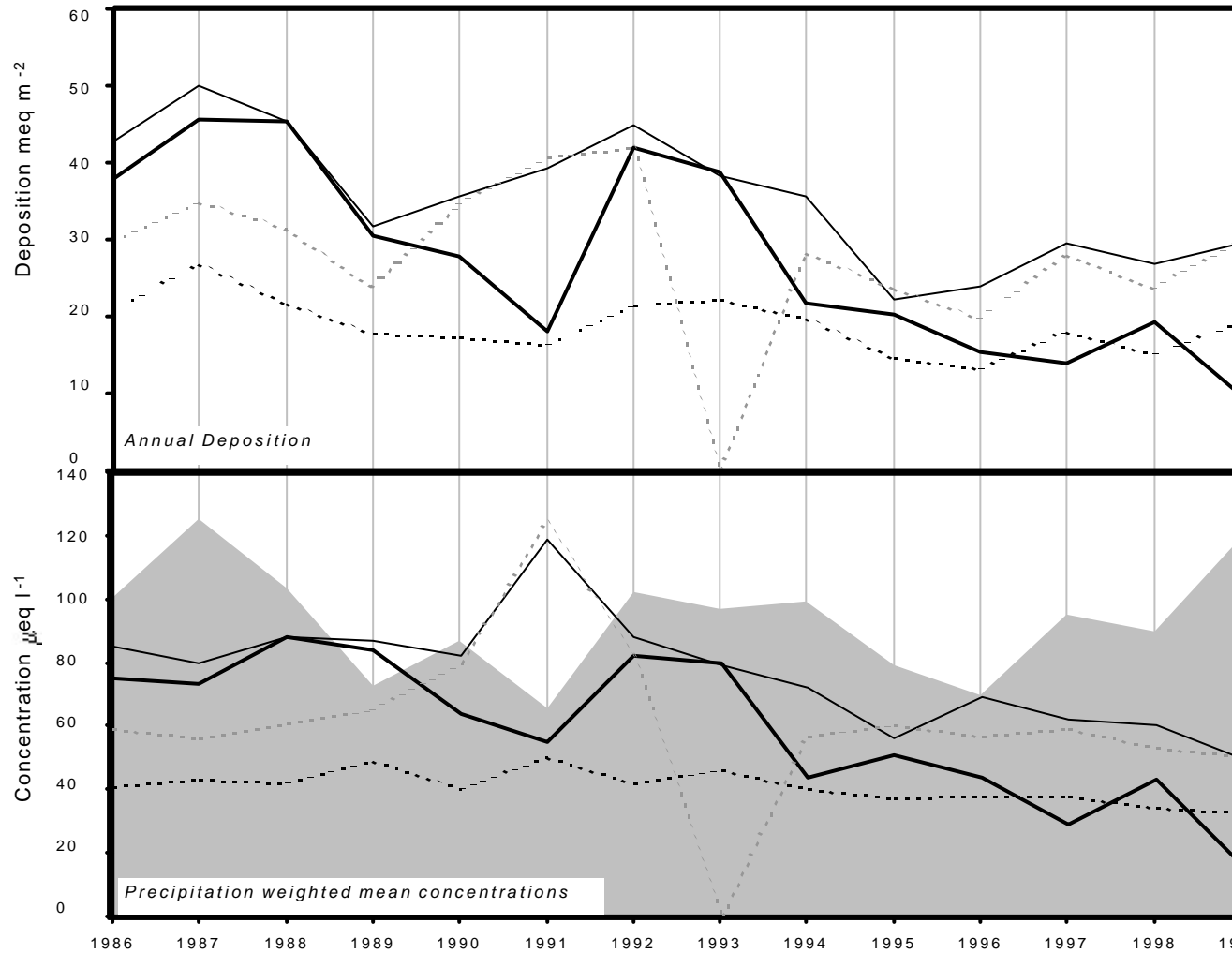
Thorganby

1999 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



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-4.41 ueq/l (-5.02 %/year): 14 years' data +++ Strong trend detected
<i>non-marine Sulphate</i>	-2.90 ueq/l (-3.03 %/year): 14 years' data ++ Moderately strong trend detected
<i>Nitrate</i>	-0.80 ueq/l (-1.74 %/year): 14 years' data + Significant trend detected
<i>ammonium</i>	-1.14 ueq/l (-1.53 %/year): 13 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
06/01/99	4.2	30.3	32.6	28.4	15.8	4.2	5.2	46.5	< 1.3	< 9.7	28.4	35	61.7	18.4
13/01/99	4.6	58.1	18.3	39.5	101.2	32.1	30.4	139.4	2.5	< 9.7	45.9	39	26.9	14.5
20/01/99	4.5	77	22.6	63.2	61.5	19.1	26.3	91.5	1.9	< 9.7	69.6	40	35.5	10.3
27/01/99	7.1	95.4	57.7	538.5	80	69.6	132.4	215.9	96.3	273.3	85.7	99	0.1	3.6
03/02/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
10/02/99	6.8	207.5	58.3	240.6	198.4	74.7	201.2	246.8	41	13.9	183.6	85	0.1	3
17/02/99	6.3	37.1	28.1	58.3	66	41.8	64.2	81.7	11.5	< 9.7	29.2	23	0.5	9.1
24/02/99	4.8	53.5	16.9	49	39.5	11.8	31.8	65.5	1.7	< 9.7	48.8	24	16.6	16.8
03/03/99	4.6	34.2	35.1	33.8	32.1	11.3	8.4	34.5	3	< 9.7	30.4	25	24.5	25.3
10/03/99	4.4	59.3	44.1	40.4	10.4	4.4	20.6	18.8	2.2	< 9.7	58	32	40.7	8.9
17/03/99	6.3	77.4	20.8	65.7	87.5	41.6	99.5	91.2	6.4	< 9.7	66.9	29	0.5	4.8
24/03/99	4.7	100.7	49.3	88.2	17.7	14.5	60.5	31.4	3.4	< 9.7	98.6	36	21.9	11.2
31/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
07/04/99	8	341.1	19.5	2978.5	63.9	112.5	93.6	331.2	325.6	1645.3	333.4	396	0	9.8
14/04/99	5.6	48.3	32.1	62.7	77.8	38.3	31.3	88.3	3.4	< 9.7	39	28	2.8	40.4
21/04/99	4.3	62.5	51.1	51.8	25.7	9.3	19.6	39.2	2.3	< 9.7	59.4	42	53.7	10.6
05/05/99	4.9	84.7	59.6	90.1	39.6	21.6	68.6	52.8	6.3	< 9.7	79.9	37	13.5	18.7
12/05/99	7.7	156.8	15.8	999.3	84.8	31.4	44.3	111.3	196.8	379.9	146.6	159	0	11.1
19/05/99	-	-	-	-	-	-	-	-	-	-	-	-	-	9.7
26/05/99	7.4	621.5	< 2.1	8155.6	383.5	131.3	630.3	228	530.9	1090.6	575.3	873	0	16.4
02/06/99	6.4	78.4	24.8	494.6	41.9	32.8	73.2	33.9	34.4	76	73.3	78	0.4	47.4
09/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
16/06/99	6.3	43	24.4	66.8	41.8	35.2	104.2	53.2	14.5	< 9.7	38	25	0.5	7.5
23/06/99	5	79.8	37.8	75.4	21.5	20.1	81	29.2	6.6	< 9.7	77.2	25	10.7	14.3
30/06/99	4.6	70.5	28.8	52.9	13	8.2	34.1	24.1	4.5	< 9.7	68.9	28	25.7	11.4
07/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4
14/07/99	6.6	144.3	60	96.5	93.3	64.1	421.3	126	24.3	< 9.7	133	48	0.2	3
21/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
04/08/99	7.1	187.6	65.4	1341.6	93.5	108.7	147.2	109.2	59	238.5	176.4	183	0.1	20.6
11/08/99	4.5	67.9	49.8	52.2	18.4	13	47.9	30.2	2.3	< 9.7	65.7	34	28.2	29.9
18/08/99	5	34.3	33.1	29.1	61.1	22.9	43.3	65.2	6.1	< 9.7	27	19	8.9	14.9
25/08/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
01/09/99	6.1	134.9	82	53.7	18.2	54.7	583.7	28.1	21.4	< 9.7	132.7	39	0.8	3.3
08/09/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.1
15/09/99	5.2	60	42.7	50.7	25.5	20.4	59.9	31.5	3.8	< 9.7	56.9	24	6.3	15.3
22/09/99	6.7	43	26.7	18.3	7.1	37.5	164.9	23.2	39.8	< 9.7	42.2	24	0.2	36.1
29/09/99	4.8	29.5	9.4	17.1	42.3	19.9	15.3	53	2.3	< 9.7	24.4	19	15.5	21.6
06/10/99	5.1	39.5	18.8	25.1	18.1	13.2	48.1	25.4	2.1	< 9.7	37.3	17	8.5	6.8
20/10/99	4.8	39.1	30.8	29.1	84.3	32.4	29.9	101.9	3	< 9.7	28.9	30	16.2	29.7
27/10/99	5.4	147.7	48.5	113.1	177.6	76.6	139.6	219.9	10.5	< 9.7	126.3	56	4.3	2.7
03/11/99	7.4	124.4	18.8	1130.4	84.8	29.9	29.9	42.8	104.1	529.6	114.2	134	0	14.4
10/11/99	8.8	2283.5	61.5	28596.9	1454.6	54.2	52.5	1075.2	3288.3	12388.6	2108.2	2310	0	1.9
17/11/99	6.2	42.4	8.2	108.9	241	101.8	37.7	384.3	7.2	< 9.7	13.4	58	0.6	10.2
24/11/99	5.1	81.3	33.7	81.8	75.4	38.4	58.9	96.2	2.8	< 9.7	72.3	34	7.6	14
01/12/99	6.2	96.1	24.3	87.3	335.7	107.9	100.4	378.8	9.9	< 9.7	55.7	72	0.6	3.2
08/12/99	6.8	177.9	18.6	1001.9	206.1	130.3	138.3	239.8	136.4	522.3	153	169	0.2	20.8
15/12/99	5.7	48.7	18.8	44.9	77.3	30	56.5	94.2	7.6	< 9.7	39.4	25	1.8	6
22/12/99	4.9	59.3	21.3	37.6	123	45.7	37.8	202.1	6.7	< 9.7	44.4	42	13.8	9.9
28/12/99	5.5	70.7	15.6	80.8	53.2	12.5	10.4	71.6	2.3	< 1.0	64.3	23	3.4	6.2
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5117		55.9	32.3	50.2	53.2	27.1	57.2	72.7	7.2		49.5	30.4	16.2	597

High Muffles

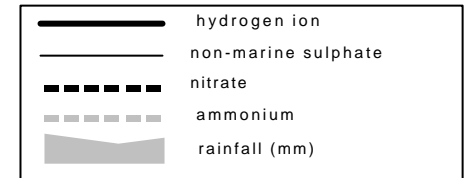
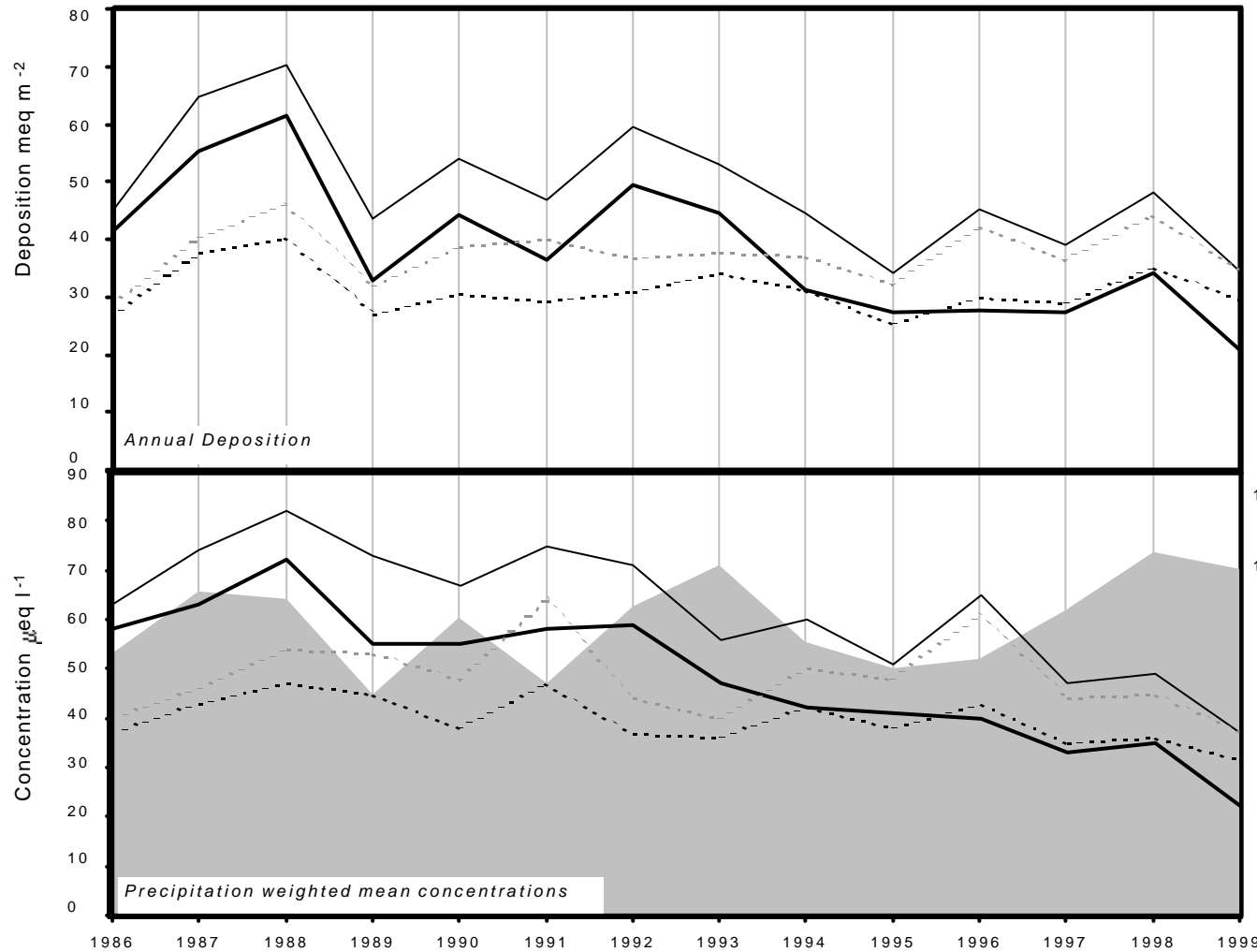
1999

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:
WOC, DT, Daily SO₂, TIN, TIA, WF, ozone, EMEP

Site Operator:
Forest Enterprise



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-2.99 ueq/l (-4.40 %/year): 14 years' data +++ Very strong trend detected
<i>non-marine Sulphate</i>	-2.48 ueq/l (-3.17 %/year): 14 years' data ++ Moderately strong trend detected
<i>Nitrate</i>	-0.89 ueq/l (-1.92 %/year): 13 years' data + Significant trend detected
<i>ammonium</i>	-0.28 ueq/l (-0.56 %/year): 14 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
06/01/99	4.4	35.1	23.4	15	57.5	16.1	4.9	71.7	1.5	< 9.7	28.2	30	38.9	31.3
13/01/99	4.5	49.6	25.2	43.4	74.2	23.5	13.2	92.5	1.9	< 9.7	40.6	34	28.2	16.4
20/01/99	4.7	64.9	35.8	76.4	67.5	24.4	17.5	84.2	1.6	< 9.7	56.8	34	18.2	10.3
27/01/99	4.5	53.6	67.2	80.4	58.5	17.4	13.9	89.1	2.6	< 9.7	46.6	45	35.5	9
03/02/99	5.8	47	9.1	18	197.4	84.4	57.1	223.4	6	< 9.7	23.2	40	1.5	8.8
10/02/99	4.4	92.6	102.9	143	96.5	23.5	22.9	123.6	2.5	< 9.7	80.9	57	43.7	4.7
17/02/99	4.8	30.3	31.5	27.3	44.7	16.5	18.7	49	< 1.3	< 9.7	24.9	20	17.8	6.3
24/02/99	5	36.4	18.2	35.4	44.7	13.7	16.9	48.9	< 1.3	< 9.7	31	21	11	26.2
03/03/99	4.7	26.8	15.5	9	73	22.6	5.7	82.4	1.8	< 9.7	18	25	20.4	139
10/03/99	4.1	128.1	170.5	186.6	37.8	12	33.3	53.5	2.6	< 9.7	123.6	79	83.2	6
17/03/99	5.8	40.7	9.4	35.8	111.1	55	30	121.8	2.5	< 9.7	27.3	27	1.4	17.3
24/03/99	4.6	84.4	45.1	78.5	19.6	11.1	41.6	28.2	< 1.3	< 9.7	82	33	22.9	15.8
31/03/99	6.6	228.9	355.7	469.8	33.2	26.4	532	39.4	6.2	< 9.7	224.9	99	0.2	2.4
07/04/99	5.5	33.6	12.6	24.2	68.3	39.3	45	79.3	2.2	< 9.7	25.3	20	3.3	20
14/04/99	4.5	53	52.4	61.7	42.6	14.3	9.9	46.9	1.5	< 9.7	47.8	32	28.8	35.5
21/04/99	4.2	92.9	85.2	93.7	48.1	14.2	16.5	61.2	1.4	< 9.7	87.1	56	66.1	13.5
05/05/99	5.8	52.5	49.8	62.5	29.9	16.8	117.9	33.6	1.6	< 9.7	48.9	24	1.7	36.7
12/05/99	5	105.6	61.7	94.9	90.8	26.3	39.2	108.2	2.6	< 9.7	94.7	-	10	1.2
19/05/99	6.3	158.2	62.9	152.7	144.6	54.5	136.8	163.4	8.3	< 9.7	140.8	57	0.5	2.6
26/05/99	5.8	64	60	58.7	60.8	31.3	147.8	65.3	5.3	< 9.7	56.7	32	1.7	10.8
02/06/99	4.4	46.7	37.2	36.9	23.4	8.4	7.8	30.6	< 1.3	< 9.7	43.8	31	38.9	45.4
09/06/99	4.3	73.8	32.7	37.8	47	13.7	17	49.2	2	< 9.7	68.1	40	45.7	6
16/06/99	5.9	77.5	58.7	73.5	30.8	18.4	142.9	37.6	3.5	< 9.7	73.8	27	1.3	5.9
23/06/99	4.5	76.9	47	73	13.9	6.9	28.4	21.4	2.1	< 9.7	75.2	34	33.1	19.9
30/06/99	4.5	79.9	50	71.4	11.9	6.9	31.3	16.9	2.5	< 9.7	78.4	35	34.7	13.5
14/07/99	5.3	60.5	29.3	40.3	14.2	10.8	97.2	22.5	1.9	< 9.7	58.8	20	4.9	11.1
04/08/99	4.7	41.5	32	21.7	152.7	47.5	25.1	173.9	3.5	< 9.7	23.1	41	18.6	30.1
11/08/99	4.8	34.1	23.9	38.6	12.2	7.9	18.4	16.4	< 1.3	< 9.7	32.7	17	16.6	44.2
18/08/99	4.7	36.4	16.1	5.9	132.8	39.8	25.7	150.4	5.4	< 9.7	20.4	32	19.5	32.3
25/08/99	4.7	44.4	29.1	32.2	26.4	< 4.1	19.8	24.1	8.1	< 9.7	41.2	21	22.4	9.3
01/09/99	6	63.2	42.4	36.5	16.3	15.1	200.3	20.5	7.6	< 9.7	61.2	19	1.1	4.4
08/09/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
15/09/99	4.6	41.3	34.8	45.3	22.4	9.8	19.9	24.9	1.6	< 9.7	38.6	21	23.4	30
22/09/99	4.5	53.8	34.2	36.8	27.5	8.8	17.4	34.3	1.8	< 9.7	50.5	29	35.5	29.2
29/09/99	5.2	28.3	9.3	21.3	65.2	39.1	22.6	72.6	1.8	< 9.7	20.4	19	6.2	22.7
06/10/99	5.2	25.5	21.7	28	17.6	13.3	26.9	16.4	< 1.3	< 9.7	23.3	15	6.5	7.1
13/10/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
20/10/99	4.7	39	37	34.2	78.3	26	19.7	87.1	2.2	< 9.7	29.6	32	22.4	42.1
27/10/99	4.8	100.4	47.8	79.6	229.5	68.2	58.2	251.3	6.2	< 9.7	72.7	57	16.6	5.8
03/11/99	4.8	32.4	21.5	22.3	49.6	18.1	7.5	60	2	< 9.7	26.4	24	15.5	30.8
10/11/99	4.7	40.5	25.1	16.1	112	33.7	14.1	125.1	3	< 9.7	27.1	33	22.4	14.2
17/11/99	4.9	63.6	6.9	< 2.1	462.5	132.8	36.8	542.4	9.7	< 9.7	7.8	76	12	24.7
24/11/99	5.8	106.4	37.7	112.6	177.3	66.3	72.4	197.1	4.5	< 9.7	85.1	51	1.5	6.9
01/12/99	4.8	9.2	34.5	21.1	58	33.3	18	67.2	< 1.3	< 9.7	2.2	18	17.8	27.6
08/12/99	4.4	42.4	24.6	19.1	156.1	45.5	14.5	185.3	3.4	< 9.7	23.6	42	36.3	31.4
15/12/99	4.3	66.1	33.3	46.3	132.6	35.4	26.1	172.8	3.6	< 9.7	50.1	49	49	8.1
22/12/99	4.5	42.8	20.1	31.6	75	23.8	15.5	92.5	1.6	< 9.7	33.8	30	33.1	15.7
29/12/99	4.5	119.1	67.1	146.6	116.4	26.5	22.3	151.8	3.4	< 9.7	105.1	55	28.8	3.2
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5009		45.9	31.6	37.2	75.7	26.3	28	88.2	2.4		36.8	30.9	22.1	936.3

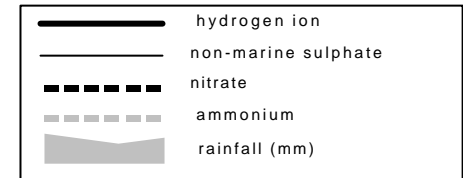
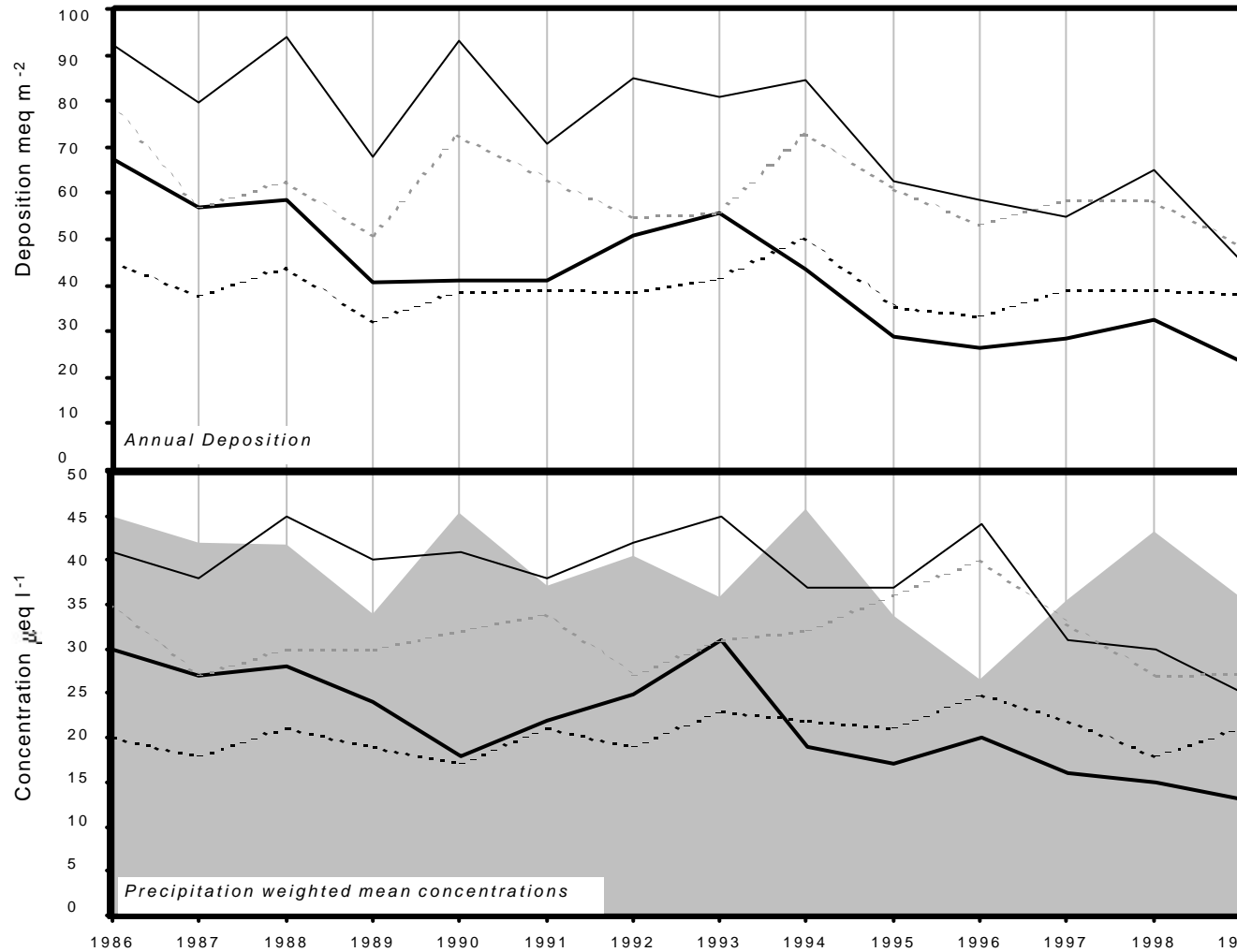
Bannisdale

1999 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:
Institute of Freshwater Ecology



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-1.09 ueq/l (-3.78 %/year): 14 years' data ++ Moderately strong trend detected
<i>non-marine Sulphate</i>	-0.90 ueq/l (-2.05 %/year): 14 years' data + Significant trend detected
<i>Nitrate</i>	0.20 ueq/l (1.07 %/year): 14 years' data - No significant trend detected
<i>ammonium</i>	0.03 ueq/l (0.09 %/year): 14 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
05/01/99	5	24.6	10.6	15.2	43.2	21.1	12.3	47.4	< 1.3	< 9.7	19.4	16	10.2	96.5
13/01/99	5.2	49.9	7.8	14.7	291.8	96	30.1	316.5	5.5	< 9.7	14.8	54	5.8	81.7
19/01/99	4.9	39.1	23.9	35.8	88.8	32.3	11.9	100.6	1.8	< 9.7	28.4	28	13.8	52.5
26/01/99	7.3	49.3	15.9	294.2	75.6	50.9	51.5	73.3	16.9	35.2	40.2	51	0.1	13.8
02/02/99	6.1	75.2	19.7	73.4	223.7	72.8	39.2	245.7	4.5	< 9.7	48.3	53	0.8	10.1
09/02/99	6.1	85.8	38.7	131	98.6	54.4	35.5	106.6	2.7	< 9.7	73.9	34	0.8	3.4
16/02/99	5.7	29.8	6.9	24.3	107.2	69.2	24.6	121.6	1.8	< 9.7	16.8	22	2	50
23/02/99	5	40.6	17.3	27.8	156.5	58.5	22.5	182.3	2.4	< 9.7	21.8	32	9.3	23.7
02/03/99	5.2	19.5	7.9	14.4	48	28.1	13.5	54.8	< 1.3	< 9.7	13.7	11	5.6	61.8
09/03/99	4.2	101.6	157	62.7	30.9	7.2	39.2	56.8	2.7	< 9.7	97.8	60	57.5	8.1
16/03/99	5.5	31.5	10.9	39.3	49.2	29.6	17.7	52.5	1.5	< 9.7	25.6	18	3.5	32.3
23/03/99	5.8	45.2	18.3	52	57.9	34.7	31.7	63.2	1.6	< 9.7	38.2	20	1.4	44.1
30/03/99	5	71.1	52.7	91.1	55.8	24.3	35.4	60.8	1.9	< 9.7	64.4	33	11.2	23.5
06/04/99	5.8	33.4	10.5	30	99.8	50.2	27.2	111.7	2.1	< 9.7	21.4	24	1.7	30.2
13/04/99	5.2	32.3	15.5	25.2	87.6	38.4	23.3	95.1	2.2	< 9.7	21.8	21	5.9	7.8
20/04/99	4.7	37.6	17.6	25.8	46.3	18.4	14.2	53.6	< 1.3	< 9.7	32	23	20	43.1
04/05/99	4.8	47	35.1	48.8	48	22.2	36.2	50.7	1.9	< 9.7	41.2	25	17.8	56.3
11/05/99	4.9	26.8	11.9	14.6	88.5	33.8	19.5	95.2	1.7	< 9.7	16.1	22	12	31.9
18/05/99	6.4	64.6	24	62.3	259.9	97	80	268.9	6.1	< 9.7	33.3	57	0.4	19.3
25/05/99	6.7	82.7	25.8	354.2	46.3	41.6	30.7	43.9	36	120.7	77.1	64	0.2	41.1
01/06/99	5	27.8	31.3	37.3	17.5	23.5	36.2	23.2	< 1.3	< 9.7	25.7	17	11.2	22
08/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2
15/06/99	5.4	19.7	12.6	24.1	15.4	11.1	26	17.7	< 1.3	< 9.7	17.9	< 10.0	4.4	26.2
22/06/99	5	44	33.8	50	24.2	12.8	37.5	27.1	2.1	< 9.7	41.1	20	11.2	24.8
29/06/99	4.8	35.4	26.6	32.3	26.8	13.1	21.7	30.4	1.6	< 9.7	32.2	21	15.8	13.4
13/07/99	5.2	34.4	18.3	30.4	75.9	24.5	19	78.1	8.4	< 9.7	25.2	18	6	72.3
20/07/99	6	28.4	11.6	30.1	113.4	55.6	21.5	129.5	2.1	< 9.7	14.7	24	1.1	10.9
27/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
03/08/99	4.2	108.2	132.1	150.5	9.4	6.3	31.8	19	2.1	< 9.7	107	64	61.7	16.1
10/08/99	4.7	36.9	24.6	37	37.2	14.2	16.3	38.8	1.3	< 9.7	32.5	20	19.1	43.4
17/08/99	5	23.3	16.9	26.8	12.4	7.3	20	16.9	< 1.3	< 9.7	21.8	11	10.7	7.4
24/08/99	4.4	55.1	33.7	37	17.7	< 4.1	8.3	19.9	3.4	< 9.7	53	27	37.2	33.6
31/08/99	5.5	19	14	25.8	9.4	6.6	23.3	14.1	1.6	< 9.7	17.9	< 10.0	3.5	36.7
07/09/99	5.5	49.8	27.7	50.8	49.8	23.6	52.2	52.5	3.4	< 9.7	43.8	20	3	13.8
14/09/99	4.9	42.4	34	45.3	31.3	11.9	22.9	31.6	2.5	< 9.7	38.6	21	13.8	22.6
21/09/99	4.5	31.3	17.3	17.1	36	14.9	7.6	41.4	1.3	< 9.7	26.9	21	28.8	48.6
28/09/99	5.1	28.6	6.8	8.1	147.8	56.2	18	170.8	4.8	< 9.7	10.8	32	8.7	72.1
05/10/99	5	37.9	24.6	34.8	53.9	34.8	32.2	57.8	1.5	< 9.7	31.4	23	10.5	24.8
19/10/99	4.5	33.5	28.6	19.6	72.8	25.3	17.2	82.7	1.8	< 9.7	24.7	30	28.8	33.5
26/10/99	5	74	17.8	33	341.6	104.1	37	369.6	8	< 9.7	32.8	68	10	38.7
02/11/99	6.3	44.2	21.3	17.9	83.9	26.9	193.6	95.1	2.3	< 9.7	34.1	34	0.5	42.3
09/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
16/11/99	5.3	161.2	63	148.3	483.6	131	65	553.3	13.1	< 9.7	102.9	90	5	2.2
23/11/99	4.9	60	20.1	31.5	237.1	73.2	24.1	256.1	5.2	< 9.7	31.4	49	12.3	70.1
30/11/99	4.8	3.7	38.5	5.8	182.3	73.7	23.5	214.6	3.4	< 9.7	< 18.2	37	16.6	164.2
07/12/99	4.7	64.8	8.7	6.5	458.2	138.7	39.7	521	9.2	< 9.7	9.6	82	20.4	87.1
14/12/99	5	24.9	4	5.9	128.9	62.1	21.5	147.7	2.5	< 9.7	9.4	27	10.2	36.1
20/12/99	4.7	52.5	16.3	28.6	213.1	47.9	11.4	260.9	4.3	< 1.0	26.8	46	21.9	101.9
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5111		38.5	21.2	27.2	131.4	47.5	27.6	148.6	3.3		25.2	32.5	13	1798.1

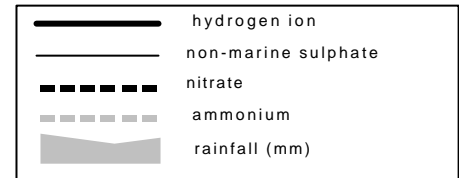
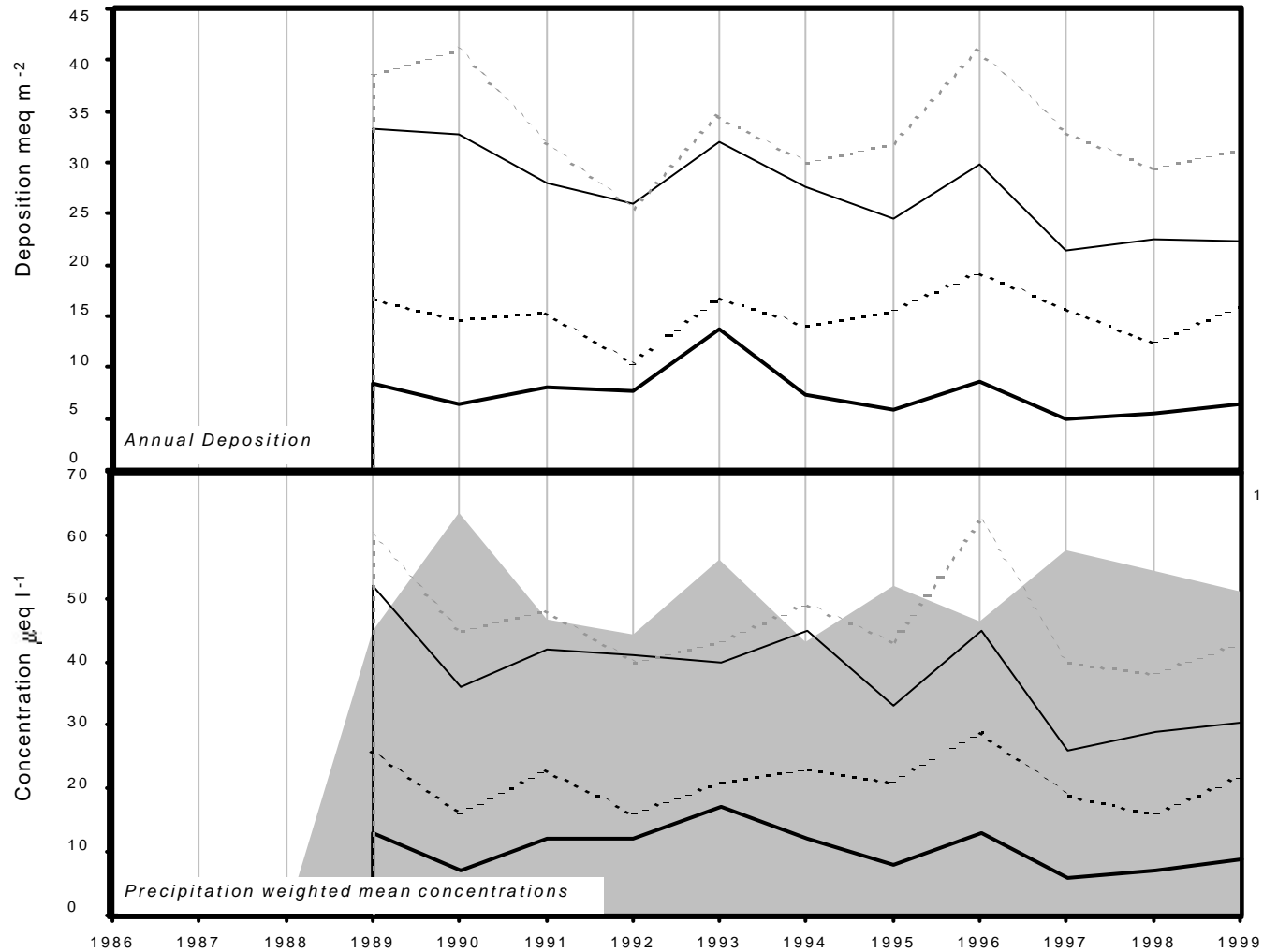
Hillsborough Forest

1999 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



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-0.42 ueq/l (-3.00 %/year): 11 years' data - No significant trend detected
<i>non-marine Sulphate</i>	-1.66 ueq/l (-3.23 %/year): 11 years' data + Significant trend detected
<i>Nitrate</i>	-0.07 ueq/l (-0.31 %/year): 11 years' data - No significant trend detected
<i>ammonium</i>	-0.85 ueq/l (-1.59 %/year): 11 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
08/01/99	6.5	51.8	5.5	84.2	80.6	49	35.8	89	3.2	< 9.7	42.1	26	0.3	11.1
21/01/99	6	22.2	4.5	26.8	49.9	34.8	18	54.1	< 1.3	< 9.7	16.2	14	1	33
28/01/99	6.7	118.6	38.6	187.5	131.7	50.5	72.3	147.2	6.4	< 9.7	102.7	46	0.2	2.3
04/02/99	6.5	106.7	11.4	92	459.3	150.2	57.6	538.7	11.2	< 9.7	51.4	90	0.3	4.4
11/02/99	6.6	107.6	12.7	149	396.7	130.3	62.9	437.7	9	< 9.7	59.8	80	0.3	3.5
18/02/99	6.2	66.6	3.1	29.1	439.5	132.2	36.4	492.9	8.3	< 9.7	13.7	71	0.7	19.4
25/02/99	6	26.9	4.7	29.4	89.7	44.9	21.7	102.1	< 1.3	< 9.7	16.1	19	1	26.6
04/03/99	6.1	41	4.5	36.8	188.4	70.3	58.5	214.1	4	< 9.7	18.4	35	0.8	4.1
11/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.3
18/03/99	6.6	59	10.1	50.9	203.3	80.3	58	209.5	4.6	< 9.7	34.5	40	0.3	5.7
25/03/99	6.3	27.5	6.7	48.5	51.5	39.8	42.5	56.4	1.4	< 9.7	21.3	16	0.4	4.4
01/04/99	6.7	67.3	64.3	118.1	82.7	44.9	84.8	94.7	3	< 9.7	57.3	39	0.2	10.4
08/04/99	5.5	50.3	13.7	35.8	175.2	69.2	27.5	206.6	3.8	< 9.7	29.2	39	2.9	41.1
22/04/99	5.3	51.9	26.8	86.8	85.1	37	27.9	93.7	3	< 9.7	41.7	27	5	4.1
29/04/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
06/05/99	6.3	20.7	9.1	26.1	32.6	21.3	73.9	34.5	< 1.3	< 9.7	16.8	13	0.5	37.3
13/05/99	5.6	59.1	36.3	74.4	30.9	22.3	70.6	35.8	2.3	< 9.7	55.4	-	2.5	0.9
20/05/99	6.9	55.3	17.3	72.8	170.5	74.3	90.3	195.7	4.8	< 9.7	34.7	47	0.1	12.3
27/05/99	4.4	65.5	58	67.1	18.2	7.5	17.6	24.8	< 1.3	< 9.7	63.3	37	39.8	18.1
03/06/99	7.1	79.9	9.5	602.5	91.6	60.6	33.9	56.5	80.7	160.2	68.8	94	0.1	12.1
10/06/99	6.4	41.5	22.8	62.7	29.4	19.6	52	28.2	2.1	< 9.7	38	19	0.4	6.5
17/06/99	6.1	23.8	13.7	34.8	26.4	18.1	51.6	30.5	1.7	< 9.7	20.6	13	0.7	17.9
24/06/99	4.9	51.3	35.6	54.3	19.5	11.2	26	25.3	1.7	< 9.7	49	22	12.3	11.5
01/07/99	5.5	25.4	27.4	63.8	22	16.5	47.9	22.3	7.2	< 9.7	22.7	14	2.9	5
08/07/99	4.4	126.6	118.4	149.6	32.8	13.9	57.5	39.4	6.6	< 9.7	122.7	52	38.9	8.3
29/07/99	4.4	70.7	72.4	75.2	10.2	4.2	17.6	15.8	2.1	< 9.7	69.5	42	43.7	65
05/08/99	4.5	66.1	52	73.1	19.3	7.6	10	23.4	1.3	< 9.7	63.8	32	33.9	16.4
12/08/99	6.5	18.2	7.5	38.2	32.1	22.8	16.2	36.3	2	< 9.7	14.3	13	0.3	21.4
19/08/99	4.8	93.7	111.8	126.3	136.3	50.5	64.6	134.6	7.2	< 9.7	77.3	49	15.5	4.1
26/08/99	5.4	23.4	13.8	35.9	30.4	21.3	49.8	31	4.6	< 9.7	19.7	12	3.6	5.3
02/09/99	5.8	16.6	7.1	26.6	15.1	17	40	17.5	1.4	< 9.7	14.8	< 10.0	1.7	38.7
09/09/99	5.3	15.1	5.6	11.6	36.8	29.6	33.1	39.1	1.5	< 9.7	10.7	11	4.8	37.7
16/09/99	6.5	55.1	14.6	197.6	118.4	88.1	122.6	142.7	44.3	42.5	40.9	59	0.3	38.9
23/09/99	7	95.2	< 2.1	1702.1	48.6	145.3	472.6	62.2	165.5	312.2	89.3	248	0.1	9.8
30/09/99	6.5	43.4	4.9	41.7	225.8	73.7	105.2	248.3	5	< 9.7	16.2	51	0.4	10.8
07/10/99	5.1	50.8	62.8	54.5	81.3	35.3	64	80.3	3	< 9.7	41	30	7.6	3.7
21/10/99	5.6	93	54.4	92.4	314.4	101.2	57.5	353.7	8.7	< 9.7	55.1	72	2.4	16.4
28/10/99	5.8	48	19.7	28.8	210.3	71.1	40.3	230.8	4.5	< 9.7	22.7	44	1.4	7.3
04/11/99	5.8	20.6	7.2	17.8	54.5	29.1	19.3	60.8	1.3	< 9.7	14	15	1.7	19.6
11/11/99	6.1	82.9	11.9	56.8	283.9	93.3	51.1	307.1	7.8	< 9.7	48.7	55	0.8	5.4
18/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
25/11/99	5.8	26	4.1	24.5	77.3	41.7	20.3	89.3	1.2	< 9.7	16.7	19	1.8	27.6
02/12/99	5.5	25.8	3.1	9.9	132.4	57.4	22.7	152.5	2.3	< 9.7	9.8	26	3.3	26.3
09/12/99	5.1	23.8	7.7	21.7	51.6	34.4	28.8	59.4	0.9	< 9.7	17.5	16	7.4	29
16/12/99	5.3	24.3	4.6	7.8	84.7	18.2	5.9	96.6	1.8	< 9.7	14.1	20	5.5	44.2
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5149		41.3	21.7	42.9	89.8	38	34.2	101.9	2.5		30.5	27.8	8.9	730.3

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
04/01/99	5.3	28.5	6.1	8.1	166.9	57.4	19.2	190.9	4.1	< 9.7	8.4	33	5.4	19.4
11/01/99	5.9	46.5	3.5	13.4	341.5	119.2	42.1	382.4	14.9	< 9.7	5.3	61	1.3	44.8
18/01/99	6.2	11.4	2.8	5.4	29.3	19.8	58	33.1	2.8	< 9.7	7.9	< 10.0	0.6	38.1
25/01/99	5.5	25.1	3.2	4.8	158	67.9	25.1	182.2	3.2	< 9.7	6.1	30	3.4	30.1
01/02/99	5.6	87.9	6.9	7.7	640.7	195	60.5	754.8	15.1	< 9.7	10.7	113	2.5	15
08/02/99	6.2	13.7	4.2	13.6	51	45.1	32.5	54.8	6.6	< 9.7	7.5	13	0.6	17
15/02/99	5.5	78.9	2.9	4.4	635.1	190	52.5	730	13.5	< 9.7	2.3	100	3.5	38.4
22/02/99	5.3	25.1	3.3	5	164	74.2	24	186.2	2.9	< 9.7	5.4	29	4.6	63.9
01/03/99	5.3	29.1	2.6	5.6	199.9	72.7	22.6	221	4.2	< 9.7	5	33	4.9	21.7
08/03/99	5.9	25.9	8.1	25.3	114.5	48.5	40.2	129.2	2.8	< 9.7	12.1	23	1.2	7.3
15/03/99	5.2	60.4	8.6	14.8	346.8	110.7	38.6	386.5	7.5	< 9.7	18.7	67	6	14.5
22/03/99	5.6	26.6	4.1	16.3	97.6	46.8	26.7	111.7	2.1	< 9.7	14.9	22	2.3	27.4
29/03/99	6.3	37.7	24.2	45.5	90.6	47	58.7	101.9	2.5	< 9.7	26.8	27	0.5	15
05/04/99	5.1	26.6	3.5	3.1	161.1	58.4	23.1	185.6	2.6	< 9.7	7.2	30	7.6	37.3
12/04/99	5.5	69.5	3.8	10.4	505.3	158.4	58	554.9	10.6	< 9.7	8.6	78	3.2	7.8
03/05/99	6.5	73.2	72	119.1	43.8	25.5	157.1	47.2	2.8	< 9.7	67.9	33	0.3	8.6
10/05/99	5.4	18.8	6.6	14.4	37.9	19.7	19.5	40.7	1.3	< 9.7	14.3	11	3.8	18.2
17/05/99	5.9	64.8	14.8	13.2	608.7	126	82.9	452.2	9.2	< 9.7	< 8.6	77	1.3	21.8
24/05/99	4.6	53.2	44.6	34.5	137.6	40	27.6	156.6	4.1	< 9.7	36.6	46	26.3	9.7
31/05/99	6.3	33	20	36.1	78.8	43.4	62.2	90.3	2.9	< 9.7	23.5	25	0.5	14.9
07/06/99	5.5	26.1	12.6	7.4	60.6	29	54.6	65.9	2.4	< 9.7	18.8	16	3.4	4.4
14/06/99	5.1	13.2	6.4	< 2.1	40.7	21.6	31.1	45.2	< 1.3	< 9.7	8.3	12	7.4	30
21/06/99	5.6	20.8	11.8	16.2	28	19.8	65.3	33.3	1.8	< 9.7	17.4	11	2.3	28.1
28/06/99	5.8	30.7	16.8	30	80.6	44.5	54.7	84.7	2.9	< 9.7	21	22	1.7	12.8
05/07/99	5.6	17.7	17.6	13.9	16.3	11.9	48.4	17.1	2.7	< 9.7	15.7	< 10.0	2.5	5.4
12/07/99	5.2	19.8	5.1	3.6	97.7	40.6	17.7	114.9	3.4	< 9.7	8	21	6.9	39.3
19/07/99	5	30.1	2.8	< 2.1	191.4	67.1	23.5	216.3	3.9	< 9.7	7.1	35	8.9	32
02/08/99	4.8	33.3	31.5	38.9	4.9	2.8	26.6	8.5	< 1.3	< 9.7	32.7	16	16.6	34.6
09/08/99	6.4	28.6	16.5	22.3	70.2	33.7	109.3	75.4	1.9	< 9.7	20.2	22	0.4	15.9
16/08/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6
23/08/99	5.2	18	14.9	14.9	33	14.3	31.1	32.9	5.7	< 9.7	14	10	6.5	40.4
30/08/99	5.6	10.8	6.1	17.6	14.7	12.4	59.6	17.7	3.3	< 9.7	9	< 10.0	2.4	6.9
06/09/99	5.2	7.6	< 2.1	3.9	25.2	21.1	20.7	28.4	1.6	< 9.7	4.6	< 10.0	5.6	72.1
13/09/99	5	17.6	6	12.7	42.1	21.3	28	46.9	< 1.3	< 9.7	12.5	12	8.9	18.3
20/09/99	4.9	18.5	10.9	11	12.4	7.3	8.1	18	< 1.3	< 9.7	17	11	12.9	27.5
27/09/99	5.4	35.8	2.6	5.2	249.8	83	24.7	262.3	8.3	< 9.7	5.7	44	4	42
04/10/99	5.3	21.7	3.3	5.4	102.8	49.1	17	107.5	3.2	< 9.7	9.3	22	4.5	30.8
11/10/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
18/10/99	5.4	123.2	108.5	147.1	264.1	82.6	80.5	290.7	9.8	< 9.7	91.4	72	3.9	3
25/10/99	5.7	41.3	8.8	13.6	240.9	87.3	45.4	276.4	7.3	< 9.7	12.3	46	2.2	27
01/11/99	4.9	20.2	4.3	< 2.1	58.8	28.6	31.5	65.8	1.3	< 9.7	13.1	16	12	51.3
08/11/99	5	22.5	10.3	< 2.1	45.5	20.3	43.7	54.1	3.2	< 9.7	17	-	10	1.7
15/11/99	5.5	22.3	< 2.1	< 2.1	141.1	53.9	25	163.8	3.2	< 9.7	5.3	27	3.2	15.2
22/11/99	5	15.3	1.9	< 2.1	55.5	30	12.1	61.5	1	< 9.7	8.7	13	9.1	90.9
29/11/99	5.1	33.5	< 2.1	< 2.1	263.3	91.7	26.3	278.5	5.1	< 9.7	1.8	46	7.4	77
06/12/99	5	54.5	< 2.1	< 2.1	465.6	152.4	48.4	524.5	10.1	< 9.7	< 1.6	78	10.5	83.2
13/12/99	5.3	20.7	2.3	2.6	153.2	68	26	172	3.8	< 9.7	2.3	29	4.8	22.4
20/12/99	5.2	20.1	2.1	2.4	137.8	62	22.8	155.6	2.5	< 9.7	3.5	26	6.3	85
27/12/99	5.4	9.9	2.3	< 2.1	45.2	9.2	4.2	49.4	1.6	< 9.7	4.5	13	3.9	12.3
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5006		29.6	6.5	9	170.8	62.8	33.3	187.9	4.4		9.4	32.1	6.1	1382.9

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
06/01/99	4.7	18	28	13.6	36.1	11.7	5.2	41	< 1.3	< 9.7	13.7	20	20.9	11.8
13/01/99	5.3	33.5	7.2	12.3	167	66.3	22.9	191.8	3.3	< 9.7	13.4	33	5	84.2
20/01/99	5.1	30.3	19.8	21.3	94.7	38.6	19.4	104	2.1	< 9.7	18.8	25	8.5	25.8
27/01/99	5.6	39.9	24.2	44.8	101.9	56.1	33.1	111.7	2.5	< 9.7	27.6	28	2.5	13.3
03/02/99	6	82.6	11.6	27.8	611.1	176.9	58.3	679.1	12.8	< 9.7	9	101	1.1	3.3
10/02/99	5.8	75.8	57	126.5	84.6	50.4	32.1	95.4	2.3	< 9.7	65.6	32	1.6	8.1
17/02/99	5.5	22.5	12.1	23.2	62.6	43.5	21.9	72.2	< 1.3	< 9.7	15	15	3	33.7
25/02/99	5.3	32.4	5.8	12.6	166.6	61.4	19.7	187.6	3.4	< 9.7	12.4	29	4.7	66.8
03/03/99	5	16.3	12.1	10.6	32	13.2	11.7	34.9	< 1.3	< 9.7	12.5	13	9.1	12.7
10/03/99	4.5	90.6	100.6	96.1	183.8	48.1	29.6	205.7	4.5	< 9.7	68.5	61	33.9	6.9
17/03/99	5.8	24.6	11.8	32.7	49.9	41.4	30.4	52.8	< 1.3	< 9.7	18.6	15	1.4	35.2
31/03/99	5.8	42.4	27.9	47.9	72.8	45.2	43.1	80	1.7	< 9.7	33.6	24	1.7	31.4
06/04/99	5.6	20.6	8.7	20.1	46.7	37	26.5	51.9	1.4	< 9.7	15	14	2.6	36.7
15/04/99	4.5	46.4	26.1	26.6	37.2	12.2	8	43.1	< 1.3	< 9.7	41.9	30	33.1	36.3
23/04/99	4.1	101.3	113.1	88.3	44.1	11.9	18.2	49.3	1.8	< 9.7	96	61	81.3	3.7
28/04/99	4.5	100.4	122.1	86.9	79.3	32.8	69.6	62.1	3.5	< 9.7	90.8	47	31.6	4.4
06/05/99	4.7	37.4	27.3	32.3	40.3	16.3	12.1	45	< 1.3	< 9.7	32.5	25	21.4	61.4
12/05/99	5	28.6	18.1	21.3	74.8	30.2	19.3	83.6	2.5	< 9.7	19.6	20	11	4.1
19/05/99	5.9	39.9	15	34.5	125.8	55.9	43.5	137.1	3.8	< 9.7	24.7	30	1.4	23.2
26/05/99	4.7	37.4	35.8	35	11.4	6.2	21.9	15.3	< 1.3	< 9.7	36.1	20	19.5	35.6
04/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
09/06/99	5.2	25.2	18.7	25.8	23	14.8	32.8	22.7	< 1.3	< 9.7	22.4	12	6.5	25.4
23/06/99	4.8	55.8	42.1	56.9	41.3	15.6	33	40.8	1.9	< 9.7	50.8	26	15.8	38.1
16/07/99	5.2	40.8	37.7	38.5	61	22.8	45.5	63.1	5	< 9.7	33.5	21	6	30.3
04/08/99	4.6	58.5	65	77.4	30.2	11.4	23.3	33.7	2.3	< 9.7	54.9	31	24.5	10.8
18/08/99	4.3	41.7	36.5	37.8	43.3	16.2	15.6	44	2.4	< 9.7	36.5	27	44.7	42.6
25/08/99	4.5	51.8	28.8	35.1	20.9	5.5	5.5	23.3	2.1	< 9.7	49.3	26	31.6	28.4
01/09/99	5.3	16.2	13.1	16.6	6.9	< 4.1	20.6	11.6	1.7	< 9.7	15.3	< 10.0	5.5	21.7
08/09/99	5.1	46	40.7	38.3	51.1	28.5	66.7	44.2	2.1	< 9.7	39.8	23	8.5	11.3
15/09/99	4.7	37.1	29.1	40.2	25.3	10.9	15.2	27.9	1.7	< 9.7	34.1	19	20.9	13.4
22/09/99	4.6	28	17.5	12.3	40.1	11.9	8	43.5	2.9	< 9.7	23.2	22	26.9	38.5
29/09/99	5.4	16.1	3.4	5.4	67.4	35	18.2	75.1	< 1.3	< 9.7	8	16	4	39.5
13/10/99	4.7	50.3	38.8	30	144.2	42.2	27.4	158.7	3	< 9.7	32.9	43	19.1	12.9
20/10/99	4.3	46.6	38.8	29.3	52	14.8	6.9	62.4	2.2	< 9.7	40.3	37	49	21.9
27/10/99	4.8	60.2	20.6	15.2	297.3	94.7	39.6	330.3	6.1	< 9.7	24.4	55	15.5	33.7
04/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/11/99	4.8	32.9	22.3	18.6	50.4	16.5	12.4	51.2	1.1	< 9.7	26.9	19	15.5	10.2
17/11/99	5.3	40.9	18.1	24.6	181	71.3	24.2	206.7	3.6	< 9.7	19.1	34	5.1	24.3
26/11/99	4.8	43.9	15.6	17.8	180.3	66.8	27	207.2	3.9	< 9.7	22.2	39	15.5	39.7
01/12/99	5.1	2.4	15.6	3.3	54	50.7	21.1	59.2	< 1.3	< 9.7	< 4.1	12	7.8	136.3
08/12/99	5	43.2	6.6	4.1	307	100.1	29.3	356.1	6.2	< 9.7	6.2	55	10.7	50.5
15/12/99	5	21.8	9.7	9.9	79.6	37	16.9	88.3	1.3	< 9.7	12.2	20	11.2	35.6
22/12/99	4.8	39.3	11.1	13.5	209	47.1	10.4	250.1	4	< 1.0	14.1	42	14.5	71
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5113		33.7	20.4	23.2	99.8	41	22.6	112.7	2.3		22.3	26.8	13.4	1275

Sampling Start Date	pH	SO ₄ ⁻¹ µeqL ⁻¹	NO ₃ ⁻¹ µeqL ⁻¹	NH ₄ ⁻¹ µeqL ⁻¹	Na µeqL ⁻¹	Mg µeqL ⁻¹	Ca µeqL ⁻¹	Cl µeqL ⁻¹	K µeqL ⁻¹	PO ₄ µeqL ⁻¹	nss-SO ₄ µeqL ⁻¹	cond µScm ⁻¹	H µeqL ⁻¹	rain mm
03/03/99	5.2	19.7	19.2	24.3	26.8	12.8	14.3	29.3	1.5	< 9.7	16.5	16	5.6	9.5
11/03/99	5	45.5	25.3	49.7	67.3	47.8	33.9	74.6	1.8	< 9.7	37.4	26	9.8	76.5
24/03/99	5.2	29.3	16.1	25.3	53	30.6	33.3	58.2	1.4	< 9.7	22.9	18	5.8	133.7
07/04/99	5	34.7	15.1	26.3	76	36.1	17.6	86	1.7	< 9.7	25.5	23	9.1	88.8
21/04/99	4.8	43.3	22.3	29.8	75.5	28.5	14.7	85.1	2.1	< 9.7	34.2	27	14.5	22.8
06/05/99	4.8	34.2	20.7	25.6	65.7	26.2	12.8	68.3	2.6	< 9.7	26.3	25	15.8	98.7
19/05/99	5	42.2	23.6	36.8	72.8	32.7	24.7	79.5	1.8	< 9.7	33.5	26	11	107.9
03/06/99	4.9	41	24.3	42.7	37.1	14.6	18.8	38.7	< 1.3	< 9.7	36.5	20	12.9	40
17/06/99	4.8	33.1	25.3	38.5	21.4	12	19.4	25.6	< 1.3	< 9.7	30.5	18	15.5	139.6
30/06/99	4.5	55.8	37.8	37.5	53.7	14.3	19	53.3	8.6	< 9.7	49.3	34	35.5	39.2
14/07/99	4.8	23.6	8.9	10.9	52.4	23.2	11.4	58.7	< 1.3	< 9.7	17.3	16	15.1	149.6
28/07/99	4.3	105.2	137.1	138.8	8.9	7.8	50.3	14.9	2.8	< 9.7	104.2	59	51.3	15.5
11/08/99	4.8	27.5	17.1	16.3	38.8	15.6	11.1	41.1	1.6	< 9.7	22.8	19	17.4	83
25/08/99	4.9	38	21	36	40.2	20.3	23.8	41.7	2.7	< 9.7	33.1	20	13.8	71.3
08/09/99	4.8	28.7	19	19.3	34.3	14.4	16	37.5	< 1.3	< 9.7	24.6	18	17	86
22/09/99	4.8	27.9	9.6	9.8	109.5	40.7	12.8	122.5	5	< 9.7	14.7	27	14.5	92.2
06/10/99	5	28.8	13.1	20.1	47	18.8	9.3	49.8	1.6	< 9.7	23.2	18	11	74.1
20/10/99	4.8	38.9	18.9	18.8	143.1	47.1	14.6	166.6	3.4	< 9.7	21.6	36	15.5	110.5
03/11/99	4.8	29.3	11.6	10.1	63.9	23	3.5	70.4	1.5	< 9.7	21.6	23	17.8	108.1
18/11/99	4.7	48.9	11.3	10.1	228.2	71.3	19.1	248	4.5	< 9.7	21.4	50	18.6	84.4
01/12/99	4.9	24.5	5.4	< 2.1	123.5	47.7	13.7	143	2.5	< 9.7	9.6	27	12.3	166.5
15/12/99	4.9	43.7	9.7	12.2	242.5	80	21.3	266.2	4.5	< 9.7	14.5	47	13.2	81.5
29/12/99	5	21.1	5.5	5.9	106.3	23.5	4.8	124.3	2.2	< 1.0	8.3	23	10.2	230.8
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5159		32.9	16	20.8	85	31.7	16.2	95.1	2.3		22.7	25.2	13.9	2110.2

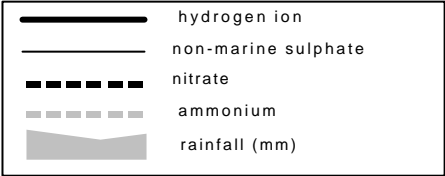
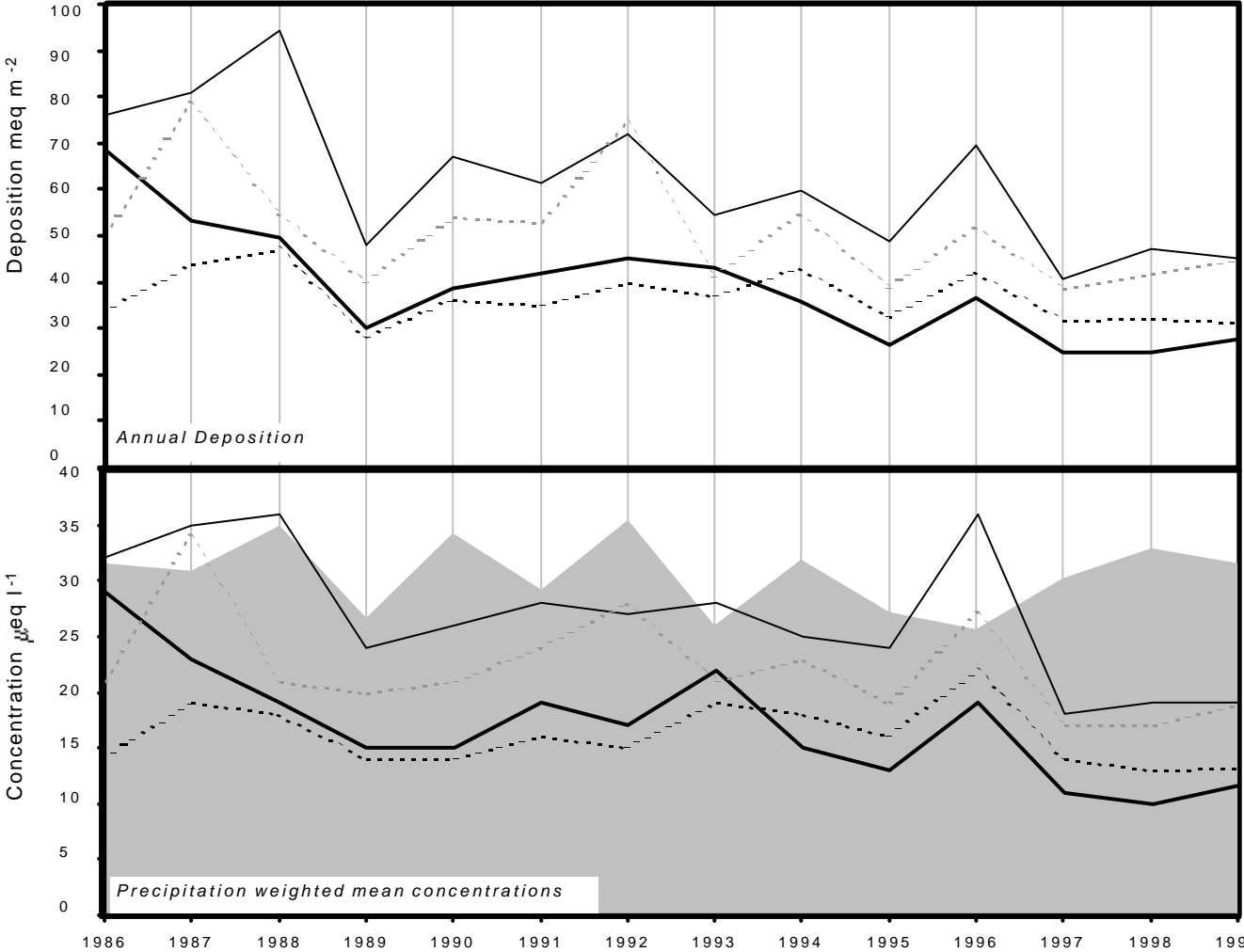
Loch Dee

1999 *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:
SEAP; West Region



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-0.95 ueq/l (-4.08 %/year): 14 years' data ++ Moderately strong trend detected
<i>non-marine Sulphate</i>	-0.97 ueq/l (-2.92 %/year): 14 years' data + Significant trend detected
<i>Nitrate</i>	-0.08 ueq/l (-0.49 %/year): 14 years' data - No significant trend detected
<i>ammonium</i>	-0.49 ueq/l (-1.92 %/year): 14 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
06/01/99	5.2	16.5	5.5	6.9	63.7	35	13.3	70.6	1.3	< 9.7	8.9	15	6.3	62.2
12/01/99	5.5	48.3	6.7	11.6	309.8	103.6	29.7	337.9	6	< 9.7	11	55	3.4	86.3
20/01/99	5	27.6	10.9	13.6	98.7	43.7	14.1	112.1	1.8	< 9.7	15.7	24	8.9	87.2
28/01/99	-	-	-	-	-	-	-	-	-	-	-	-	-	5.4
03/02/99	5.7	77.9	4.9	13.1	599.8	185.5	51.7	690.8	13	< 9.7	5.7	97	2	18.9
11/02/99	5.5	42.5	5.6	16.2	244.5	98.6	27.9	278.5	4.7	< 9.7	13	43	2.9	104.9
24/02/99	5.2	33.7	11.4	18.6	126.7	46.2	16.9	144.5	2.2	< 9.7	18.4	26	6.9	51.3
03/03/99	4.6	57.2	70.7	85.6	65.3	23.4	17.9	71	2.1	< 9.7	49.3	37	24	24.8
10/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
17/03/99	5.4	31.4	7.4	25.1	108.9	47.6	18	123.4	2.2	< 9.7	18.3	23	4.1	57
24/03/99	5.3	15	5.1	11.1	46.9	27.2	14	51.1	< 1.3	< 9.7	9.4	13	4.5	79.8
31/03/99	5.4	33.1	15.6	26.1	70.8	40.8	25.1	77.9	2.4	< 9.7	24.6	20	4	57.1
07/04/99	5.4	27.8	6.9	17.3	117.3	51.1	19.2	128.3	4.3	< 9.7	13.6	24	3.8	55.3
14/04/99	4.7	38.9	21.1	26.8	48	18.4	8.4	56.8	1.9	< 9.7	33.1	24	21.4	36.3
20/04/99	5.3	20.9	10.2	17.3	47.1	28.5	12	52.3	1.5	< 9.7	15.2	15	5.2	39
28/04/99	4.7	35	21	19.4	76.1	27	15.6	83.7	2.1	< 9.7	25.8	26	21.9	107.9
13/05/99	5.5	17.6	12.6	15.3	42.1	27.5	13.1	43.4	3.5	< 9.7	12.5	13	3	15.1
20/05/99	5.3	45.5	14.8	40.8	118.9	49.3	24.2	132.4	3.7	< 9.7	31.2	32	5.5	53.6
26/05/99	5.4	71.9	71.2	101.6	26.1	20.7	59.3	28.5	11.4	< 9.7	68.7	30	3.9	8
02/06/99	4.9	30.4	21.4	30.7	20.1	12.6	16.2	25.9	2.2	< 9.7	28	17	12.9	29.5
09/06/99	5.2	53.8	40.6	75.3	28.2	16.4	41.1	29.3	2.3	< 9.7	50.4	22	6.6	9.9
16/06/99	4.8	26.4	9.4	26	19.3	13.3	21.9	22.5	< 1.3	< 9.7	24.1	11	14.5	55.2
22/06/99	4.5	54.8	51.2	65.2	15.8	6.3	13.1	18.2	2.1	< 9.7	52.9	30	31.6	32.2
30/06/99	5.4	41.9	28.7	48.3	50.6	26.5	28.8	54.4	4.3	< 9.7	35.8	20	4.3	29.6
07/07/99	6.8	79.5	35.2	207	78.2	78.7	94.4	85.4	28.2	65.2	70.1	50	0.2	12.5
14/07/99	5.1	21.9	11.5	14.9	29.6	21	16.4	32.6	< 1.3	< 9.7	18.3	13	7.8	126.3
22/07/99	6.6	170.5	159.1	438.5	23.5	59.7	102.4	26.2	29.1	48.3	167.7	76	0.3	15.7
11/08/99	5	24.5	12	19.9	34.8	20.2	13.1	39.1	< 1.3	< 9.7	20.3	15	10	55.6
18/08/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
25/08/99	4.9	30.1	18.3	25.4	19.3	11.3	14.7	23.5	1.4	< 9.7	27.8	15	13.5	64.1
08/09/99	6.3	72	31.3	190.4	76.6	44.5	18.6	81	19.6	39.8	62.8	38	0.4	42
15/09/99	4.7	28.6	25.8	27.1	22.7	26	19.2	25.9	1.7	< 9.7	25.8	18	20.9	126.5
23/09/99	4.9	30.8	8.9	9.1	118.9	42.8	12.3	133.7	3	< 9.7	16.5	29	12.6	43.2
06/10/99	5.2	31.2	12.3	26	64	33.5	14.9	68.5	2.3	< 9.7	23.5	20	5.8	45.7
13/10/99	4.7	42.2	20.2	17.5	149.1	49.7	16.6	167	3.1	< 9.7	24.3	37	21.4	147
20/10/99	5.1	12.9	5.4	3.5	28.5	17.3	7.8	31.8	0.9	< 9.7	9.4	10	8.7	11.9
11/11/99	5.2	33.2	9.4	23.1	114.9	59	20.3	134.1	2.7	< 9.7	19.3	26	7.1	35.1
25/11/99	4.8	57.1	6.7	9.2	354.9	111.9	29.2	381	7.1	< 9.7	14.3	64	14.8	104.9
01/12/99	5.1	33	< 2.1	5	215.4	86.1	27.6	230	4.1	< 9.7	7	39	8.7	165
09/12/99	4.7	13	8.7	3.5	37.5	19.5	6.6	42.2	< 1.3	< 9.7	8.5	14	20	43.6
15/12/99	4.7	32.3	13.6	16.5	117.3	42.5	11.3	135	2.1	< 9.7	18.2	29	20	111.7
23/12/99	5	36	4.6	3.9	223.6	50.4	10.1	253	4.8	< 9.7	9.1	43	11	114.9
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5107		33.9	13.2	18.8	124.2	47.9	18.8	137.8	2.9		19	29.1	11.6	2373.2

Beaghs Burn

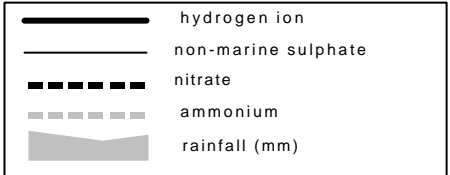
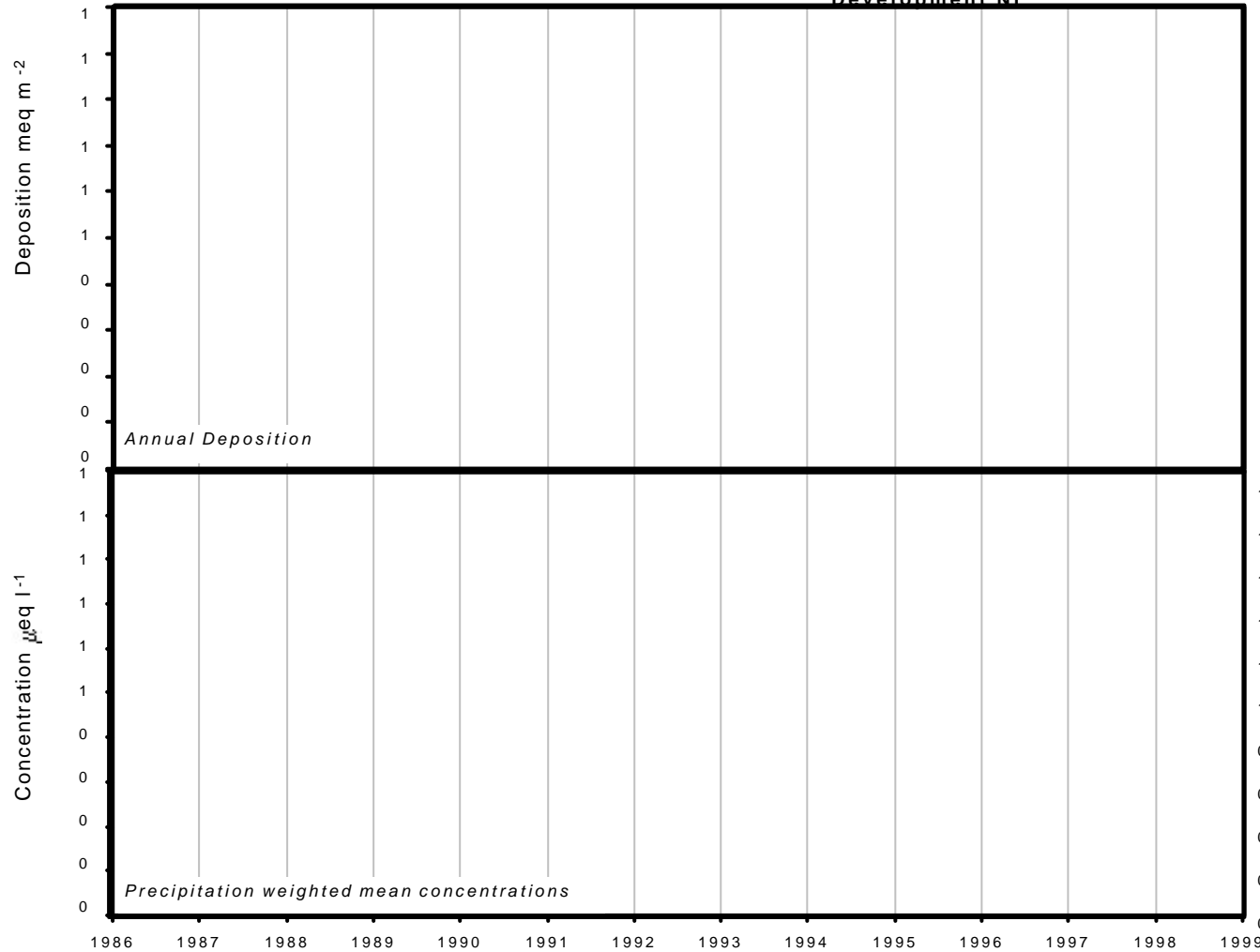
1999

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



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	0.00 ueq/l (0.00 %/year): 0 years' data n/a Insufficient Data
<i>non-marine Sulphate</i>	0.00 ueq/l (0.00 %/year): 0 years' data n/a Insufficient Data
<i>Nitrate</i>	0.00 ueq/l (0.00 %/year): 0 years' data n/a Insufficient Data
<i>ammonium</i>	0.00 ueq/l (0.00 %/year): 0 years' data n/a Insufficient Data

Rainfall (mm)

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
28/01/99	5.8	58.3	5.1	13.6	431.1	144.8	42.6	487.9	8.7	< 9.7	6.3	75	1.6	43.3
09/02/99	6	80.2	< 2.1	16.2	607.9	188.6	49.1	685.6	13.1	< 9.7	7	95	1	66.9
23/02/99	5.5	28.1	4.6	11.6	163.8	62.6	17.5	188.5	3.4	< 9.7	8.3	31	2.9	47.3
09/03/99	6.1	32.9	5.8	29.6	134.6	69.5	34	151.7	2.9	< 9.7	16.7	29	0.8	47.8
23/03/99	6.9	74.5	14.4	338.2	93.1	66.2	107.1	78.1	36.4	77.1	63.3	74	0.1	39.3
08/04/99	5.1	59.3	11.9	15.3	346.6	111.7	31.2	399	7.3	< 9.7	17.6	67	8.7	90.3
22/04/99	5.3	57.1	52.7	48.3	95.4	38.9	45.7	92	5.4	< 9.7	45.6	29	5.4	9.4
06/05/99	4.7	41.8	30.1	31.5	59.5	21.6	21	61.4	1.5	< 9.7	34.6	26	22.4	10.1
18/05/99	4.7	56.1	41.8	53	122.3	41.7	24.2	141.2	3	< 9.7	41.4	41	18.6	64.8
02/06/99	5.1	23.5	14.6	24	22.6	9.6	10	25.1	< 1.3	< 9.7	20.8	13	7.9	41.7
15/06/99	5.2	24.5	12.3	20.6	39.1	24.9	19.1	43.2	1.6	< 9.7	19.7	14	7.1	51.3
29/06/99	5.1	44.1	27.1	50.5	52.5	22.4	20.1	49.7	4.3	< 9.7	37.8	21	8.1	37
27/07/99	4.5	83.7	62.8	98.1	35.3	11.9	13.5	36.8	2.8	< 9.7	79.4	41	33.9	30.8
10/08/99	5.1	31	12.3	17.8	98.7	45.8	19.5	119.2	4.2	< 9.7	19.1	25	7.2	35.2
24/08/99	5.2	20.1	11.8	25.3	17.6	24.3	21.9	20.6	1.7	< 9.7	18	10	5.9	48.1
07/09/99	4.8	28.6	16.1	18.2	48.2	20.7	8.8	62.8	1.6	< 9.7	22.8	18	15.8	116
21/09/99	5.2	35.9	8.9	10.3	211.4	79.1	21.9	234.2	5.6	< 9.7	10.5	42	6.5	70.6
05/10/99	4.6	39.9	48	39.7	63.8	20.8	13.3	66.9	1.8	< 9.7	32.2	31	22.9	31.7
19/10/99	4.4	88	51.3	51.7	337.7	124.7	67	367.2	8.3	< 9.7	47.3	79	38.9	36
02/11/99	6.8	385.5	3.9	< 2.1	241.2	144.3	744.3	230.7	3.9	< 9.7	356.4	103	0.2	73.9
16/11/99	5.4	21.4	2.8	11.6	97.7	45.3	11.2	111.1	2	< 9.7	9.6	20	4.1	81.1
30/11/99	4.9	37.7	5.2	4.4	191.8	78.2	29	223.5	3.8	< 9.7	14.6	37	11.5	165
14/12/99	5.2	19.3	4.1	6.9	105.7	23	4.8	130.4	2.1	< 1.0	6.5	21	5.9	179.6
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5155		57.6	13.4	19.6	171	64.4	60.9	193.6	4		37	39.4	9.3	1417.2

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
05/01/99	4.9	13.8	10.5	7.6	6	< 4.1	4	11.2	< 1.3	< 9.7	13.1	< 10.0	13.5	27.1
12/01/99	5.4	29.7	6	11	157.6	69.5	23.6	182.6	4	< 9.7	10.7	30	3.9	17.9
19/01/99	5	21.2	15.9	16.7	46.2	21.2	10.2	50.5	< 1.3	< 9.7	15.7	16	10	25
26/01/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4
02/02/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
09/02/99	6.6	44.4	29.5	91.7	117.5	39	45.5	130.3	5	< 9.7	30.3	32	0.3	2.2
16/02/99	6.1	19	7.6	26.8	70.7	49.8	34.5	77.9	< 1.3	< 9.7	10.5	15	0.8	12
23/02/99	5.7	30.3	11.6	24.1	151.3	56.6	21.8	170.7	2.9	< 9.7	12.1	25	2.1	20.9
02/03/99	5.3	22.3	13.7	24.7	65.3	34.8	16.7	72.8	1.6	< 9.7	14.4	19	4.8	29.9
09/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	4.5
16/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	5.4
23/03/99	5.1	23.2	15.1	40.8	41.6	20.1	37.1	42.2	1.9	< 9.7	18.2	17	8.3	5.9
30/03/99	5.9	86.1	67.2	124.7	93.2	49	74.8	95.7	3.5	< 9.7	74.9	36	1.2	6.3
06/04/99	5.4	21.5	12	22.6	55.2	33.2	23.8	60.5	1.5	< 9.7	14.8	15	4.2	9.6
13/04/99	5	43.9	36.6	58.7	39.6	19.5	18.7	43.4	1.5	< 9.7	39.1	20	10.2	9.7
20/04/99	4.8	43.7	32.9	35.3	27.5	10.5	15.7	33.9	1.9	< 9.7	40.4	21	17.4	8.3
04/05/99	4.4	54.9	53.7	57.9	33.7	11.5	15.7	34.2	< 1.3	< 9.7	50.8	36	39.8	43.6
11/05/99	5.4	10.1	6.8	10.1	14	16.4	21.9	18.4	< 1.3	< 9.7	8.4	< 10.0	4	20.4
18/05/99	5.7	42.8	22.9	41.2	145.6	67.7	58.1	156.4	4.2	< 9.7	25.3	32	2.1	4.5
25/05/99	4.6	61	66.8	72.9	16.4	9	35.1	19.5	1.6	< 9.7	59	32	23.4	15.1
01/06/99	5.2	23.4	23.3	36.5	19.9	15.2	12.9	25.2	< 1.3	< 9.7	21	14	6.8	27.3
08/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8
15/06/99	5.7	22.2	24.2	27.3	32.3	21.5	42.4	30.5	4.2	< 9.7	18.3	12	2	5
22/06/99	4.7	37.7	32.3	40	13	6.6	16.3	15.5	1.5	< 9.7	36.1	20	20.9	29.8
29/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
06/07/99	4.4	69.2	53.6	48.6	9.3	< 4.1	15.4	13.7	4.4	< 9.7	68.1	33	42.7	15.6
12/07/99	5.2	14.3	13.6	18.9	16.7	8.8	19.7	20.7	3.5	< 9.7	12.3	10	5.6	13.4
20/07/99	5.7	20.3	13.6	20.9	29.9	15.9	32.9	33.2	1.6	< 9.7	16.7	11	2.1	3.2
03/08/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2
10/08/99	4.9	29.6	25.9	23	50.5	24.6	23.3	55.6	1.5	< 9.7	23.5	20	13.2	8.5
17/08/99	4.5	26.5	24.5	15.1	40	12.9	10.1	45.2	1.5	< 9.7	21.6	24	30.9	29.9
24/08/99	4.2	64.3	46.1	43.5	27.4	5.8	7.9	28.3	4.8	< 9.7	61	36	57.5	16
31/08/99	5.2	19	24.3	24.7	73.8	8.5	70.9	66.6	22.8	< 9.7	10.1	< 10.0	6.8	9.2
07/09/99	-	-	-	-	-	-	-	-	-	-	-	-	-	5.3
14/09/99	5.2	35.2	28.4	41.8	22.4	10	17.5	24.8	6.7	< 9.7	32.5	16	6.3	27.2
21/09/99	4.6	34.1	34.9	24.7	18.1	6.3	8.9	25.5	2	< 9.7	31.9	22	27.5	9.4
28/09/99	5	30	22.8	26.8	69.5	25.7	17.8	77.5	4.6	< 9.7	21.6	20	10.5	10.7
05/10/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1
12/10/99	4.7	123.3	94.6	68	339.6	82	35.9	370.9	11.8	< 9.7	82.4	-	20	1.7
19/10/99	4.4	49.3	41.8	25.3	144.1	38.6	9.7	163.2	3.3	< 9.7	31.9	49	42.7	27.1
26/10/99	-	-	-	-	-	-	-	-	-	-	-	-	-	2.2
02/11/99	4.8	24	15.1	5.9	49.5	27.7	31.5	54.4	1.4	< 9.7	18.1	20	14.5	14.5
09/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
16/11/99	5.8	36.7	11	15.1	233.9	87.1	30.1	257.6	4.8	< 9.7	8.5	41	1.6	8.5
23/11/99	5	26.5	10.6	16.2	100.5	46.1	15.6	110.4	1.9	< 9.7	14.3	22	9.1	18.8
30/11/99	5.4	16.2	4.3	2.9	72.7	31.4	13.1	83.7	1.8	< 9.7	7.4	16	4.2	19.7
07/12/99	4.9	24.3	10.7	5	125.2	48.9	19.5	139.4	3.5	< 9.7	9.2	26	11.7	37.1
14/12/99	-	-	-	-	-	-	-	-	-	-	-	-	-	2.6
21/12/99	4.8	44.2	12.3	12.1	239.3	75.4	19.5	268.9	4.5	< 9.7	15.3	48	17.4	13.7
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5109		33.1	24.7	28.2	64.9	26.5	19.3	72.7	2.7		25.3	23.1	16.3	631.8

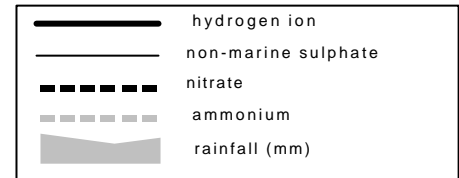
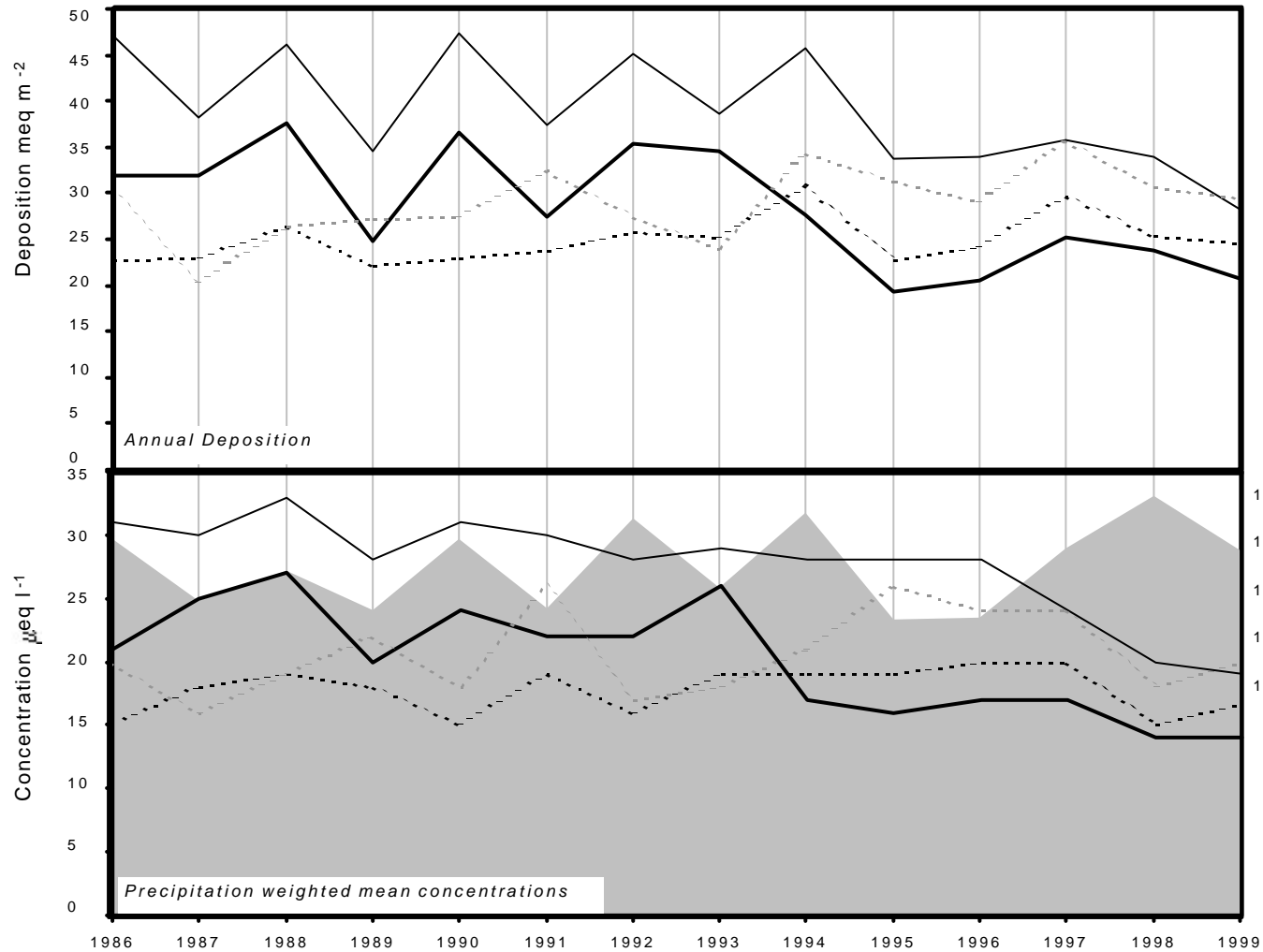
Eskdalemuir

1999 Site Code: 5002
 Easting: 3235
 Northing: 6030
 Latitude: 55 18 54 N
 Longitude: 03 12 20 W
 Altitude (m): 259
 Rainfall (mm): 1745
 [30 year mean 1940 - 1971]

Site Environment:
Open moorland, Met Office Observatory

Other measurements:
WOC, DT, Daily SO₂, TIN, TIA, WF, ozone, Met, EMEP

Site Operator:
Meteorological Office



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-0.82 ueq/l (-3.23 %/year): 14 years' data ++ Moderately strong trend detected
<i>non-marine Sulphate</i>	-0.80 ueq/l (-2.45 %/year): 14 years' data +++ Strong trend detected
<i>Nitrate</i>	0.08 ueq/l (0.44 %/year): 14 years' data - No significant trend detected
<i>ammonium</i>	0.23 ueq/l (1.22 %/year): 14 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeqL ⁻¹	NO ₃ ⁻¹ µeqL ⁻¹	NH ₄ ⁻¹ µeqL ⁻¹	Na µeqL ⁻¹	Mg µeqL ⁻¹	Ca µeqL ⁻¹	Cl µeqL ⁻¹	K µeqL ⁻¹	PO ₄ ⁻¹ µeqL ⁻¹	nss-SO ₄ ⁻¹ µeqL ⁻¹	cond µScm ⁻¹	H µeqL ⁻¹	rain mm
06/01/99	4.8	24.3	23.2	23.3	55.2	19.2	7	63.3	1.5	< 9.7	17.7	20	15.1	9.5
13/01/99	5.2	42.6	6.8	11.1	256.9	89.1	24.9	282.7	5.2	< 9.7	11.7	49	6.9	90.3
20/01/99	5	20.5	10.5	12.6	45	23.5	8.9	49.5	< 1.3	< 9.7	15.1	15	10	46.1
27/01/99	5.8	39.5	23.4	55.9	83.1	53.2	31.9	92.4	2.2	< 9.7	29.5	25	1.4	15.6
03/02/99	6	87.8	5.6	11.2	692.9	189.3	52.5	774.2	19.6	< 9.7	4.4	109	1	3.3
10/02/99	5.5	47.3	20.1	38.8	208.1	84.2	28.2	227.8	4.3	< 9.7	22.2	39	3.2	9.5
17/02/99	5.4	16.8	4.9	12.6	59.6	61.4	21	64.5	< 1.3	< 9.7	9.7	13	4	48.7
24/02/99	5.3	32.3	11.1	22.2	137.7	57.4	19.3	159.8	2.1	< 9.7	15.7	27	5.5	37
03/03/99	4.4	55.1	45.1	41.9	104.3	26.7	12.4	117.9	2.7	< 9.7	42.5	41	42.7	4.2
10/03/99	4.2	101.1	148.8	157.7	87.6	21.9	16.6	100.3	2.7	< 9.7	90.6	71	60.3	7.9
17/03/99	5.8	22	6.7	28.1	39.8	20.8	8.2	43.1	< 1.3	< 9.7	17.2	13	1.5	31.9
24/03/99	5.5	12	5.8	13.6	29.6	18.2	5.7	30.8	< 1.3	< 9.7	8.5	10	3.5	37.8
31/03/99	5.3	32.4	24.2	42	45.9	28.1	31.7	49.6	2.9	< 9.7	26.8	18	5.1	34.4
07/04/99	5.6	19.6	7.3	19.6	44.2	32	12.8	47	< 1.3	< 9.7	14.3	13	2.5	36.3
14/04/99	4.5	35.7	26.6	18.9	27.2	8.3	6.2	30.4	1.7	< 9.7	32.5	24	32.4	21.4
21/04/99	4.9	29.5	16.1	19.1	64.5	27.8	11.8	71.9	< 1.3	< 9.7	21.7	22	12.6	19.8
05/05/99	4.8	26	14.3	14.1	64.3	25.8	11.4	71.1	< 1.3	< 9.7	18.2	20	15.8	86.1
12/05/99	4.9	31.6	22.7	28.3	39.6	19.8	14.1	40.8	1.7	< 9.7	26.8	22	13.2	9.6
19/05/99	6	38.4	13.3	34.3	127.8	58.4	42	146.9	3	< 9.7	23	31	1	36.5
26/05/99	4.5	57.9	63.6	69.1	14.5	6.9	22.6	19.5	< 1.3	< 9.7	56.1	33	33.1	13.7
02/06/99	4.8	21.7	17.2	18.8	8.9	5.3	4.7	14.2	< 1.3	< 9.7	20.6	14	17	36.6
09/06/99	5.3	41	30	53.8	18.4	15	30.7	20.8	2.2	< 9.7	38.8	18	5.4	7
16/06/99	5.3	15.7	10.4	16.3	12.8	8.7	16.1	17.2	1.3	< 9.7	14.1	< 10.0	5	25.4
23/06/99	4.6	43.9	38.8	44.3	10.5	5.3	14.7	17	< 1.3	< 9.7	42.6	23	25.7	27.6
30/06/99	4.4	62.8	50.3	58.5	34.2	11.4	10.9	37.9	1.7	< 9.7	58.6	39	42.7	14.2
07/07/99	4.4	60.2	40.1	43	23.2	11.8	25.9	24.7	4.1	< 9.7	57.4	32	39.8	6.3
14/07/99	5	17.8	10.8	11.9	23.4	14.1	8.2	26.6	< 1.3	< 9.7	15	12	10.7	41.5
21/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
28/07/99	4.3	82.6	91.4	117.5	2.4	< 4.1	21.6	9.3	1.8	< 9.7	82.3	46	49	14.3
04/08/99	4.7	147.6	152.5	149.7	324.9	90	112.7	348.9	11.5	< 9.7	108.5	94	19.5	3.4
11/08/99	4.8	28.1	22.9	27	27.8	15.1	20.2	30.6	< 1.3	< 9.7	24.8	18	14.5	29.3
18/08/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
25/08/99	4.7	39.3	27.1	34.8	28.3	9.1	25.1	28.5	4.2	< 9.7	35.9	21	18.2	18.6
01/09/99	5.2	21	18.6	22.1	18.6	10.4	30.3	19.4	3.9	< 9.7	18.7	11	6	13.1
08/09/99	5.3	22	10.9	17.8	40	25.6	22.7	41.1	2.4	< 9.7	17.1	13	4.6	20.8
15/09/99	4.8	27.4	19.5	19.5	42.8	17.7	13.1	43.4	< 1.3	< 9.7	22.2	20	16.6	48.8
22/09/99	4.6	25.2	16.6	12.2	38.3	14.6	6.8	42.5	1.7	< 9.7	20.6	18	26.9	40.7
29/09/99	5.1	26.2	5.4	9.8	122.1	61.1	21.3	138.8	4	< 9.7	11.5	27	8.7	13.2
06/10/99	5.3	28.4	15.3	31.2	62.2	38.8	14.9	70.1	1.6	< 9.7	20.9	20	5.2	14.1
13/10/99	4.2	131.1	97.9	55.5	381.2	91.7	37	401.5	9.9	< 9.7	85.1	99	63.1	2.3
20/10/99	4.4	49	39.3	17.6	151.3	40.5	12.2	177.2	3.6	< 9.7	30.8	51	43.7	31.7
27/10/99	5.5	34.7	8.4	13.6	194.4	74.2	23.6	213.1	5.1	< 9.7	11.3	37	3.3	49.6
03/11/99	4.8	32.8	10.3	5.9	127	43.5	8	148.9	2.8	< 9.7	17.5	33	15.8	50.5
10/11/99	5.5	39.3	25.6	29.3	43.5	16.9	23	41.3	6.3	< 9.7	34.1	20	3.3	1.9
17/11/99	5.5	28.6	11.8	26.3	94.4	52.9	19.8	100.6	2.2	< 9.7	17.2	21	3.1	20.6
24/11/99	4.8	44.9	8.2	8.7	255	79.5	20.4	260.6	5	< 9.7	14.1	49	17	90.9
01/12/99	4.8	2.5	17.6	3.9	67.4	45.5	13.4	77.8	< 1.3	< 9.7	< 5.6	15	15.5	82.1
08/12/99	4.7	40.7	10	< 2.1	270.6	84.1	23.4	307.4	5.5	< 9.7	8.1	50	20	41.9
15/12/99	4.5	27.4	12.6	17.6	88.2	34.8	9.5	98	1.6	< 9.7	16.8	23	30.2	45.6
22/12/99	4.9	33.1	6.1	6.4	214.2	75.1	19.8	232.5	4.1	< 9.7	7.3	40	12.9	35.8
29/12/99	5.3	22.4	8.6	8.4	95.5	19.2	7.6	106.5	2.8	< 9.7	10.9	24	5.5	50.9
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5002		30.9	16.7	19.9	102.4	40.6	16.8	112.9	2.4		19.1	26.9	14	1478.7

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
06/01/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7
12/01/99	5.9	30.3	8.7	13.7	170.7	69.4	28.6	193.3	7.6	< 9.7	9.7	34	1.3	15.9
19/01/99	5.1	16.7	9.2	6.4	46.7	22	8.6	51.3	< 1.3	< 9.7	11	14	8.5	28.9
26/01/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4
09/02/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1
16/02/99	5.5	28.9	7.2	10.4	148.8	70.8	40.9	175.3	4.4	< 9.7	11	27	2.9	6.2
23/02/99	5.2	19.7	6.6	11.4	82.2	46.7	17.2	90.2	1.4	< 9.7	9.8	17	5.8	15.6
02/03/99	4.9	43.3	23.3	23.3	189.3	52.8	18.1	211.1	4.6	< 9.7	20.5	37	11.7	17.1
09/03/99	5.3	102.9	121.2	141.3	171.4	40.6	33.4	180.7	7.9	< 9.7	82.3	-	5	1.6
16/03/99	5.6	18.5	6.1	18.1	51.2	29.2	34.2	51.7	4	< 9.7	12.4	15	2.5	13.3
23/03/99	5.3	13.5	9.7	10.8	36.5	22	28.6	37.7	4.7	< 9.7	9.1	11	4.8	7
30/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	2
06/04/99	5.9	32.4	18.8	35.5	82.2	45.1	38.7	90	3.1	< 9.7	22.5	19	1.4	5.2
13/04/99	5.1	23.5	9	12.8	57.2	30	16.2	61.4	1.9	< 9.7	16.6	15	7.8	4.5
20/04/99	4.5	48.8	40.6	40.8	48.6	13.1	16.6	47.3	4.4	< 9.7	43	27	28.8	3.4
04/05/99	4.6	46.1	43.5	48.3	40.7	13.6	16.6	44.3	1.9	< 9.7	41.2	30	25.7	32.6
11/05/99	5.2	12.7	9.6	10.1	21.1	13.4	23.3	23.9	< 1.3	< 9.7	10.1	< 10.0	6.5	6.5
18/05/99	6.6	59.8	21.9	16.8	370.1	146.3	113.8	414	10.2	< 9.7	15.2	68	0.3	6.1
24/05/99	4.5	53.3	53.4	62.8	16.4	5.3	14.3	18.3	< 1.3	< 9.7	51.4	29	33.1	7.6
01/06/99	4.6	27.9	21.5	15.8	28.2	10.9	8.3	33.3	< 1.3	< 9.7	24.5	21	24.5	26.2
08/06/99	4.6	40.3	18.7	16.3	20.9	7.4	27.3	22.3	< 1.3	< 9.7	37.8	19	22.9	9.8
15/06/99	6.8	40	25.2	196.4	14.3	26.1	48.5	22.8	27.2	63.3	38.3	34	0.2	44.8
29/06/99	4.4	68	42.8	33.5	17	5.3	9.5	19.7	3.2	< 9.7	66	36	43.7	17.4
06/07/99	4.3	61.4	57.6	21.6	14.9	8.6	34.1	14	6.4	< 9.7	59.6	33	45.7	4.5
13/07/99	5.1	18	20.3	18.1	23.3	15.4	15.4	28.4	< 1.3	< 9.7	15.2	13	7.9	16.4
20/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
10/08/99	4.8	17.8	18.7	12.9	19.4	10	19	22.8	1.6	< 9.7	15.5	14	14.5	7.3
17/08/99	4.6	36	25.9	16.8	84.2	26.5	13.4	96	6.1	< 9.7	25.9	31	24	39.1
24/08/99	4.2	82.6	85.1	62	78	20.2	20.2	78.8	5.8	< 9.7	73.2	50	58.9	3.8
31/08/99	4.8	11.4	18.1	8.8	8.1	6.5	25.2	9.1	4	< 9.7	10.4	< 10.0	15.8	7.4
07/09/99	5.6	38.6	25.8	34.9	75.6	30.3	47.5	84.3	5	< 9.7	29.4	20	2.5	6.1
14/09/99	4.5	53.5	32.3	58.5	19.1	9.5	7.9	21.9	2	< 9.7	51.2	25	32.4	28.2
21/09/99	4.3	46.2	48.5	22.5	27.4	8.1	6.6	29.6	1.9	< 9.7	42.9	32	45.7	10.2
28/09/99	4.7	26	12.8	9.9	66.4	28.7	17.5	71.5	2.5	< 9.7	18	20	18.2	10.4
05/10/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
12/10/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2
19/10/99	4.5	48.1	38.7	25.2	161.7	43.9	12.2	184.1	3.9	< 9.7	28.6	48	32.4	27.4
26/10/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7
02/11/99	4.7	39.8	13.1	8.3	149.8	45.6	13.7	174	3.6	< 9.7	21.8	38	20.9	35
09/11/99	4.6	84.8	60.5	69.2	66.6	19.2	36.4	62.4	3.1	< 9.7	76.8	39	22.9	2.8
16/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.3
23/11/99	5.3	38.1	10.2	13.6	180.1	61.6	25	207.6	4.3	< 9.7	16.4	34	4.7	12.6
30/11/99	5	16.9	2.9	< 2.1	98.5	55.4	22	109	2.1	< 9.7	5	20	9.3	25.7
07/12/99	4.7	17.4	10.7	< 2.1	79	40.2	18	89.7	1.5	< 9.7	7.9	21	20.9	45.9
14/12/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9
21/12/99	4.8	39.1	13.1	14.2	198.8	62.7	18.4	216.3	3.9	< 9.7	15.1	41	17.4	14
28/12/99	5.1	61.5	17.9	19.1	347.2	145.2	65.4	407.1	7.1	< 9.7	19.7	62	8.7	4.1
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5106		34.7	22.1	20.3	86.3	33.2	18.9	97.1	3		24.3	27.3	19.1	583.2

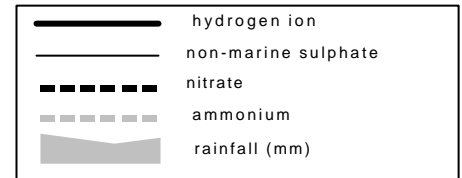
Loch Chon

1999 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]

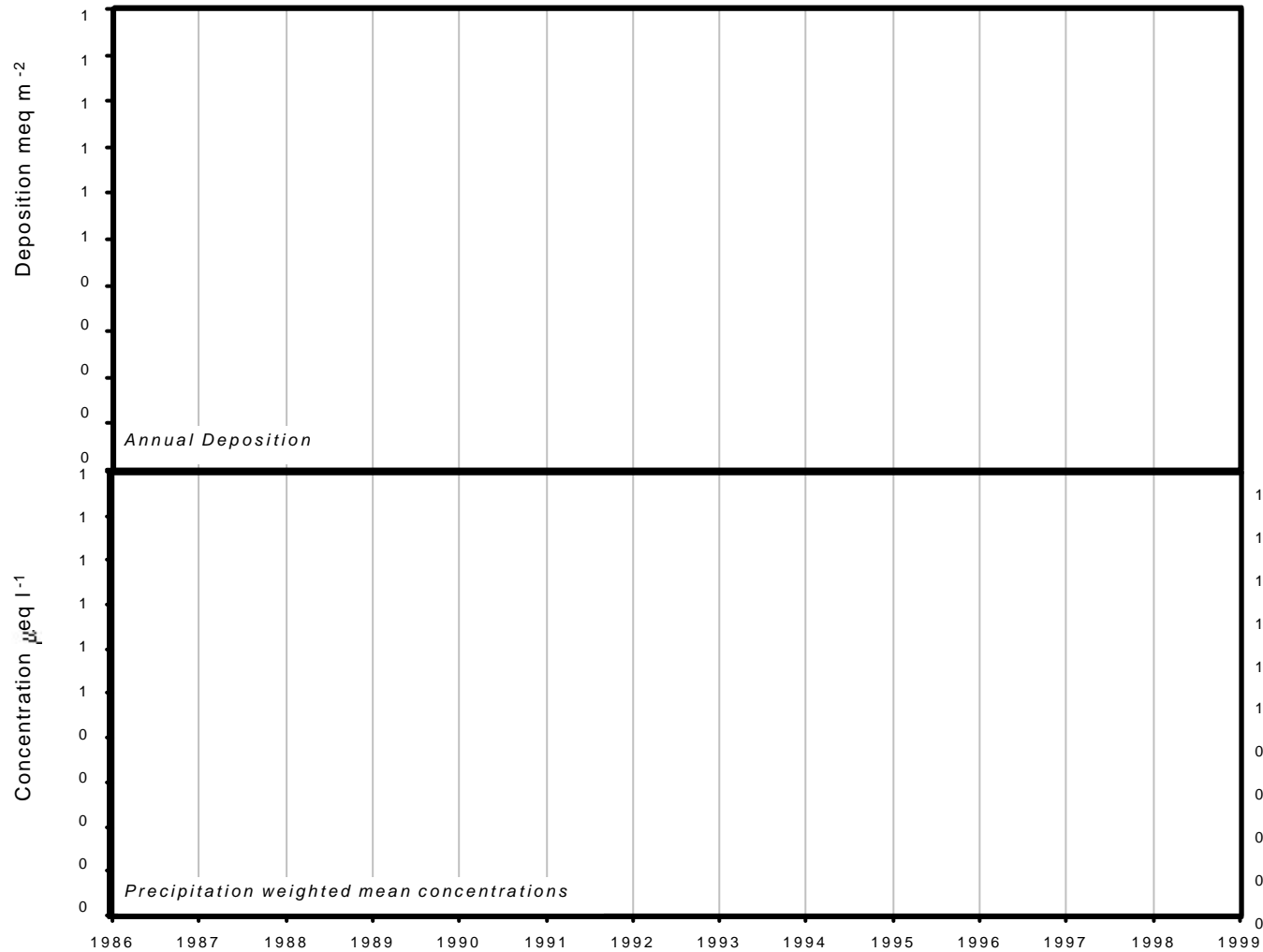
Site Environment:
Moorland overlooking Loch Katrine

Other measurements:
UKAWMN

Site Operator:
Freshwater Fisheries Laboratory



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	0.00 ueq/l (0.00 %/year): 0 years' data n/a Insufficient Data
<i>non-marine Sulphate</i>	0.00 ueq/l (0.00 %/year): 0 years' data n/a Insufficient Data
<i>Nitrate</i>	0.00 ueq/l (0.00 %/year): 0 years' data n/a Insufficient Data
<i>ammonium</i>	0.00 ueq/l (0.00 %/year): 0 years' data n/a Insufficient Data



Rainfall (mm)

Sampling Start Date	pH	SO ₄ ⁻¹ µeqL ⁻¹	NO ₃ ⁻¹ µeqL ⁻¹	NH ₄ ⁻¹ µeqL ⁻¹	Na µeqL ⁻¹	Mg µeqL ⁻¹	Ca µeqL ⁻¹	Cl µeqL ⁻¹	K µeqL ⁻¹	PO ₄ µeqL ⁻¹	nss-SO ₄ µeqL ⁻¹	cond µScm ⁻¹	H µeqL ⁻¹	rain mm
24/02/99	5.1	18.1	2.8	4	94.3	36.7	9.9	110.2	1.8	< 9.7	6.7	18	7.4	79.9
03/03/99	5.1	38.8	37.7	54	55	37.4	22.2	54.6	1.7	< 9.7	32.2	23	7.4	36.5
17/03/99	5.3	17.5	6.2	11.3	60.7	38.1	23.4	64.7	< 1.3	< 9.7	10.2	15	5.2	91.5
31/03/99	5.2	24.1	15.6	21.3	44.8	31.2	16.1	51.7	1.3	< 9.7	18.7	16	7.1	52
14/04/99	4.7	25.9	17.6	16	18.1	8.3	5	22.6	< 1.3	< 9.7	23.7	18	20.9	94
28/04/99	4.7	34.3	26.2	26.1	30.3	12.3	15.7	32.2	< 1.3	< 9.7	30.7	22	20	65
12/05/99	5	39.9	10.9	9.9	214.3	75.6	27.5	222.4	4.3	< 9.7	14	42	11.2	70.3
26/05/99	4.5	28.1	31.6	23.4	6	< 4.1	8.5	12.5	< 1.3	< 9.7	27.3	21	28.8	43.6
09/06/99	6.6	42.5	9.6	395.4	24.6	23.3	23.7	27	41.3	98.3	39.5	56	0.2	47.7
23/06/99	4.5	36.7	28.9	29.3	13.9	5.5	11.1	16.2	< 1.3	< 9.7	35.1	24	28.8	49.4
07/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	2.3
21/07/99	6.5	113	57.5	337	32	26	38	28.4	26.2	36.2	109.2	53	0.3	9.8
04/08/99	4.4	44	39.8	28.6	38.3	12.2	12.2	44.1	3.8	< 9.7	39.4	32	37.2	22.8
18/08/99	4.7	30.1	21.8	20.3	33.1	9.3	18	34.3	5.9	< 9.7	26.1	18	20	28.5
01/09/99	4.6	31.9	21.6	24.1	45.1	15.2	8.2	52.3	2.3	< 9.7	26.5	20	23.4	99.5
15/09/99	4.5	27.7	22.4	16	16.2	4.8	5.5	17.8	2	< 9.7	25.7	20	28.8	133
29/09/99	5.1	28.7	3.9	< 2.1	193.3	68.1	17.5	220.1	3.6	< 9.7	5.4	37	8.3	56.1
06/10/99	4.8	32.3	30.4	11.6	154.6	48.3	12.6	173.8	3.2	< 9.7	13.6	39	17.4	261.6
13/10/99	4.2	38.9	41.9	17.4	61.5	17.4	5.6	66.8	1.5	< 9.7	31.5	38	64.6	28.5
27/10/99	5.1	44.2	12.8	14.8	222.3	70.5	18	246.6	5	< 9.7	17.4	46	8.1	171.1
10/11/99	4.8	32.6	9.9	16.7	94.3	38	13.6	104.7	2	< 9.7	21.2	23	14.1	30
24/11/99	5.1	2.1	26.1	< 2.1	144.8	66.5	18	168	2.5	< 9.7	< 15.4	28	7.8	288.9
08/12/99	4.9	18.8	8.4	4.1	59.5	31.1	9.2	86.1	< 1.3	< 9.7	11.7	19	12.9	149.6
22/12/99	4.8	31	5.2	3.4	195.7	44.3	8.1	231.5	3.8	< 1.0	7.4	38	16.6	211.6
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5156		26.5	18.6	12	112.2	40.1	13.3	128.7	2.5		16.2	28.8	15.7	2123.2

Sampling Start Date	pH	SO ₄ ⁻¹ µeqL	NO ₃ ⁻¹ µeqL	NH ₄ ⁻¹ µeqL	Na µeqL	Mg µeqL	Ca µeqL	Cl µeqL	K µeqL	PO ₄ ⁻¹ µeqL	nss-SO ₄ ⁻¹ µeqL	cond µScm ⁻¹	H µeqL	rain mm
02/01/99	5.2	31.7	3	< 2.1	232.7	78.3	20.5	254.6	4.5	< 9.7	3.7	43	6.2	52.7
09/01/99	5.4	48	4.8	9.4	337.1	112.3	30.8	377.8	7.4	< 9.7	7.4	60	3.7	99.8
17/01/99	5.1	23.8	6.9	7.4	100	45.9	15.3	113.5	2.1	< 9.7	11.8	22	7.9	128.1
24/01/99	5.4	20.5	3.7	4.3	129.6	59.8	20.7	148.3	3.5	< 9.7	4.9	24	4.1	37.5
30/01/99	5.6	89.8	4.9	7.5	725.8	358.5	59.1	811.3	17	< 9.7	2.4	121	2.6	40.6
06/02/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
13/02/99	5.9	31.9	2.2	12.3	230.9	77.7	20.2	255.1	5.7	< 9.7	4.1	37	1.3	67.8
21/02/99	5.7	22.6	2.4	9.3	150.9	64	21	169.3	3.4	< 9.7	4.5	26	1.8	49.2
28/02/99	5.2	17.3	4.9	6.3	68.6	34.2	13.5	75.9	1.8	< 9.7	9.1	17	6.3	31.8
06/03/99	4.2	110.4	139.5	122.8	135.3	32.9	17.9	132	4	< 9.7	94.1	71	64.6	8
13/03/99	5.9	29.1	11.9	38	86.3	41	14.6	100.9	2.2	< 9.7	18.7	18	1.1	2.8
21/03/99	5.4	25.8	6.6	15.2	87.8	45.2	48.7	94.5	2	< 9.7	15.2	20	4.1	15.6
28/03/99	4.7	20.2	20.2	25.4	34.8	24.7	20.1	37.7	< 1.3	< 9.7	16	14	20	57.3
03/04/99	5.2	21	11.4	17.1	45.8	24.1	19.8	49.5	< 1.3	< 9.7	15.4	15	5.9	27.7
11/04/99	5.3	10.7	3.4	4.9	26	20	13.4	28.6	< 1.3	< 9.7	7.5	< 10.0	5.5	17.7
16/04/99	4.5	30.3	22.4	10.6	20.5	6.7	6.4	24.8	< 1.3	< 9.7	27.9	24	31.6	23.7
30/04/99	4.4	58.6	66.2	52.4	33.4	11	18.7	37.7	1.8	< 9.7	54.6	40	42.7	15.1
09/05/99	4.8	24.4	14.6	17.1	28.6	14.8	10.3	29.3	< 1.3	< 9.7	20.9	16	14.5	56
17/05/99	4.9	45.2	7.7	5.5	283.2	90.5	30.4	312.8	5.4	< 9.7	11.1	51	13.2	21.6
22/05/99	5.4	38.4	7.6	11.6	240.1	89.7	32.4	263.9	5	< 9.7	9.5	45	3.9	15.9
27/05/99	5.1	25.1	30.2	26.1	5.4	23.5	36.9	11.3	< 1.3	< 9.7	24.4	13	7.4	7
15/06/99	5	15.7	10.5	14.9	10.7	8.9	10.7	16.3	< 1.3	< 9.7	14.4	< 10.0	9.8	42.4
26/06/99	4.5	48.4	41.6	43.1	13.8	5.5	7.4	19.4	1.3	< 9.7	46.7	30	34.7	33.1
04/07/99	6	32.2	32.1	30.3	5.6	18.4	85.1	9.8	3.4	< 9.7	31.5	16	1.1	6.8
10/07/99	5.5	15.8	10.6	8.5	35.4	23.8	10.4	41.7	3.9	< 9.7	11.5	12	3	16.9
17/07/99	4.8	17.8	13.1	5.9	6.4	6.7	7	13.3	< 1.3	< 9.7	17.1	12	15.8	29
01/08/99	4.4	72.8	62	76.9	2.5	< 4.1	17.5	10.4	4.9	< 9.7	72.5	36	40.7	12.7
08/08/99	4.1	87.3	92.6	63.4	19.5	7.1	15.8	21.1	1.4	< 9.7	85	53	83.2	5.5
13/08/99	4.6	40	28.4	23.9	31	10.2	12.7	35.6	2.6	< 9.7	36.3	26	25.1	14.8
21/08/99	6.6	71.5	40.7	273.3	21.8	37.5	25.7	20.5	37.4	126.4	68.9	36	0.2	10.6
28/08/99	5.1	16.3	7.5	8.7	25.3	14.7	27.7	27.8	1.7	< 9.7	13.3	10	8.1	13.2
04/09/99	4.6	30.8	18.4	25.5	47.6	31.6	28.8	51.8	2.7	< 9.7	25.1	20	25.1	62.9
12/09/99	4.6	29.7	23.3	17.3	15.8	6.6	7.1	20.6	< 1.3	< 9.7	27.8	20	26.3	45.5
19/09/99	4.5	34.2	29.3	30.4	10.4	< 4.1	2.8	16.8	< 1.3	< 9.7	33	22	32.4	49.9
23/09/99	4.9	20.5	6.3	3.9	67.3	27.2	9.7	78.9	< 1.3	< 9.7	12.3	20	12.9	51.1
04/10/99	5.6	21.3	10.6	10.2	82.5	42.5	32.3	86.8	2.6	< 9.7	11.4	-	2.5	15.1
12/10/99	4.7	27.8	10.8	19.2	49.8	20.4	29.9	55.2	1.3	< 9.7	21.8	-	20	1.9
16/10/99	4.3	58.1	41.5	24.7	173.9	45.8	12	197.7	4	< 9.7	37.1	56	50.1	30.3
24/10/99	4.5	39.8	33.6	33.8	55	17.7	13.5	60.2	4	< 9.7	33.2	28	30.2	21.3
30/10/99	5.3	37.4	7.2	9.6	212.7	77	21.2	233.6	4.4	< 9.7	11.8	42	5.1	133.8
07/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
13/11/99	4.9	26.8	10.3	17.8	66.6	29.8	15.2	74.4	1.8	< 9.7	18.7	18	13.2	16.2
24/11/99	5.3	22	3.9	3.1	116.1	53.3	16.6	132.6	2.1	< 9.7	8	24	5.5	74.3
28/11/99	5.2	18.5	< 2.1	< 2.1	128.7	64.6	35	146	3.1	< 9.7	3	24	7.1	91.9
04/12/99	5	20.6	4.5	< 2.1	103.9	54.5	17.5	145.1	1.7	< 9.7	8.1	25	9.1	85
12/12/99	4.9	12.5	7.9	3.7	31.7	26.2	8.5	42.5	< 1.3	< 9.7	8.7	12	12	86.5
22/12/99	5	16.4	3.8	< 2.1	74.8	38.3	10.9	105.1	1.4	< 9.7	7.4	20	9.1	118
26/12/99	4.6	22.2	8.5	< 2.1	53.4	11.4	3.5	85.8	2	< 9.7	15.8	21	22.9	16.9
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5152		29.3	11.7	12.1	122.5	51.8	18.9	140.4	2.9		14.5	28.9	12.4	1862.7

Polloch

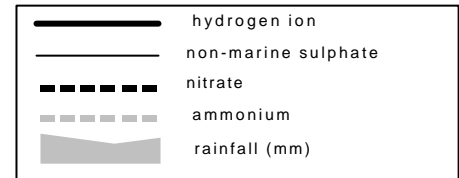
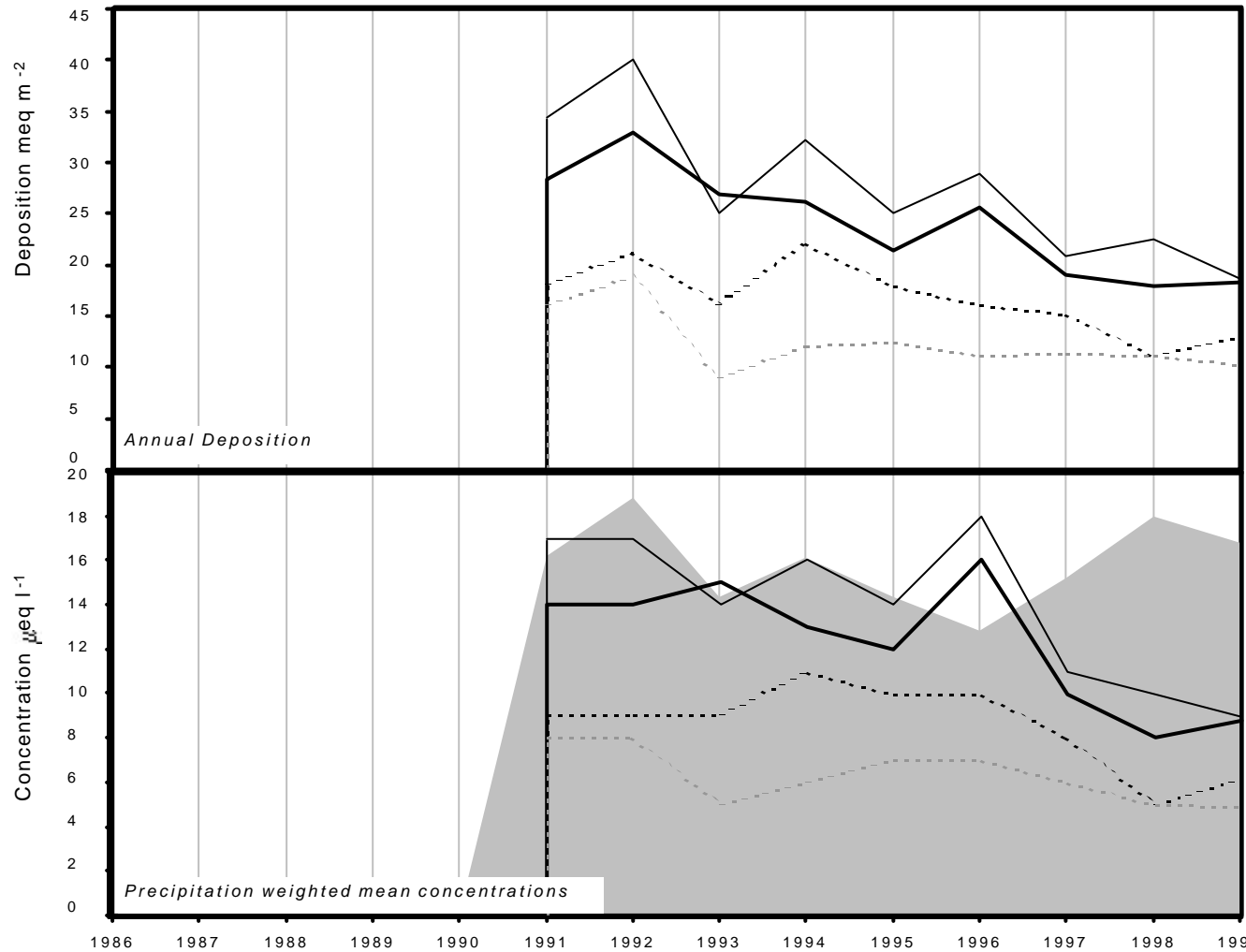
1999

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



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-0.77 ueq/l (-3.99 %/year): 9 years' data + Significant trend detected
<i>non-marine Sulphate</i>	-0.96 ueq/l (-4.23 %/year): 9 years' data ++ Moderately strong trend detected
<i>Nitrate</i>	-0.44 ueq/l (-3.50 %/year): 9 years' data - No significant trend detected
<i>ammonium</i>	-0.31 ueq/l (-3.37 %/year): 9 years' data + Significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeql ⁻¹	NO ₃ ⁻¹ µeql ⁻¹	NH ₄ ⁻¹ µeql ⁻¹	Na µeql ⁻¹	Mg µeql ⁻¹	Ca µeql ⁻¹	Cl µeql ⁻¹	K µeql ⁻¹	PO ₄ ⁻¹ µeql ⁻¹	nss-SO ₄ ⁻¹ µeql ⁻¹	cond µScm ⁻¹	H µeql ⁻¹	rain mm
05/01/99	5.1	25.7	8.8	3.7	137	56	21.1	155.5	3	< 9.7	9.2	28	7.6	16.9
12/01/99	5.3	70.7	2.7	< 2.1	563.6	160.8	39.9	648	11.2	< 9.7	2.8	97	5.4	113.5
19/01/99	5.3	17	2.7	3.2	84.5	43.2	13.9	92.4	1.9	< 9.7	6.9	18	5	87.9
26/01/99	5.2	35.4	5.1	2.7	220.7	78.1	22.6	234.5	4.6	< 9.7	8.8	41	7.1	26.8
02/02/99	5.5	167.9	5	3.1	1364.7	518.4	80	1560.9	30.3	< 9.7	3.5	215	3.4	22.6
09/02/99	5.2	43.6	6.1	7.7	289.3	94.2	27.6	315.6	6.6	< 9.7	8.8	47	6	29.3
16/02/99	5.3	49.1	< 2.1	< 2.1	392	130.7	34.9	443.7	7.5	< 9.7	1.9	63	4.5	53.6
23/02/99	5.2	34.7	3.5	2.9	263.9	105.6	40.5	296.4	4.8	< 9.7	2.9	45	5.9	24.5
02/03/99	5.5	16.8	4.3	8.1	77	32.1	15.3	83.9	1.9	< 9.7	7.6	17	3.5	13.3
09/03/99	5.1	22.4	17.8	21.8	53.7	25.8	13	57.8	1.4	< 9.7	15.9	17	7.8	74.6
16/03/99	5.2	23	< 2.1	3.9	131.6	61.6	44	146.9	2.7	< 9.7	7.1	26	5.8	15.4
23/03/99	5.2	26.9	4.6	9.4	127.1	64.5	44	147.1	2.9	< 9.7	11.6	27	5.6	17.1
30/03/99	5.2	34.8	14.3	15.6	35.5	16.5	17.7	38.6	< 1.3	< 9.7	30.5	14	7.1	47.9
06/04/99	5.1	17	4	< 2.1	94.9	38.8	14.7	107.4	1.7	< 9.7	5.5	19	7.4	48.8
13/04/99	5	24.1	9.1	5.5	83	36.7	15.8	94.2	1.8	< 9.7	14.1	23	11.2	16.9
20/04/99	4.7	18.4	13.7	7.1	14.5	9.1	4.3	20.9	< 1.3	< 9.7	16.7	14	20	29.4
04/05/99	4.7	25.5	20.5	15.2	19.2	8.5	15.7	23.5	< 1.3	< 9.7	23.2	18	19.1	9.3
11/05/99	4.8	20	15.8	8.4	38.3	16.5	21.8	39.4	< 1.3	< 9.7	15.4	17	16.2	14.6
18/05/99	5.3	69.5	3.6	3.1	558.8	157.4	39.9	615.7	10.7	< 9.7	2.2	98	5.2	47.2
25/05/99	4.7	24.5	20.6	17.3	30.6	13.7	4.6	35.5	1.4	< 9.7	20.8	19	20.4	23.8
01/06/99	4.9	17.3	9.7	10.3	25	16.6	9.1	28.9	1.7	< 9.7	14.3	12	11.7	13.7
08/06/99	4.9	10.5	6.1	< 2.1	9.5	6.4	12.7	14.6	< 1.3	< 9.7	9.4	< 10.0	12.9	15.8
15/06/99	5.1	13.7	6.4	4.9	36.2	23.6	17.2	41	< 1.3	< 9.7	9.3	12	7.8	62.3
22/06/99	4.6	34.9	32.8	30.3	14.4	9.1	27.8	16	2.5	< 9.7	33.2	21	23.4	11.1
29/06/99	4.9	14.5	10.1	5.6	21.1	12.2	10.3	25.5	< 1.3	< 9.7	12	11	12	34.6
06/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	3.9
13/07/99	5	14	8.3	< 2.1	48	27.9	10.4	52	< 1.3	< 9.7	8.3	14	9.5	21.9
20/07/99	4.8	16.5	8.7	< 2.1	36.4	23.5	10.1	40	< 1.3	< 9.7	12.1	15	15.8	69.9
10/08/99	6.8	14.7	6.3	4.3	41.2	23.1	14.2	45.2	< 1.3	< 9.7	9.8	14	0.2	4.5
17/08/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4
24/08/99	4.7	18.4	9.5	8.2	30.9	24.9	88.1	33.1	2.5	< 9.7	14.7	13	20.9	43.2
31/08/99	5.2	12.2	5.6	7.3	9.8	7.9	22.4	14.9	1.5	< 9.7	11	< 10.0	5.6	31.1
07/09/99	4.9	23.2	4.8	5.9	109	44.5	13	127.9	3.2	< 9.7	10.1	25	12.3	111.8
14/09/99	4.7	20.1	15.9	10.5	9.4	23.3	42.1	14.7	< 1.3	< 9.7	19	13	20	45.5
21/09/99	5	14.6	8.3	5.2	6.5	5.5	6	11.6	< 1.3	< 9.7	13.8	< 10.0	10.2	23.4
28/09/99	5.2	38.6	< 2.1	< 2.1	297.9	98.6	23.9	324.8	5.9	< 9.7	2.7	55	5.9	30.2
05/10/99	5.3	27.2	< 2.1	< 2.1	196	71.3	19.4	224.5	3.8	< 9.7	3.6	37	5.2	55.4
12/10/99	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1
19/10/99	4.4	37.9	39.5	9.8	97.1	25.5	14.6	104.4	2.6	< 9.7	26.2	36	39.8	5.8
26/10/99	5	52.5	8.4	8.6	368.2	114.1	36.3	408.3	9.9	< 9.7	8.2	67	9.1	97.8
02/11/99	5.1	18.9	3.6	2.7	69.4	34.7	11.9	77.8	1.5	< 9.7	10.5	18	7.9	81.4
09/11/99	5.7	20.7	4.1	3.9	137.8	53.3	19.4	154.2	4.8	< 9.7	4.1	24	2.2	14.4
16/11/99	5	50	12.2	3.9	233.4	65.6	23.5	253.2	7.7	< 9.7	21.9	-	10	5.1
23/11/99	5.4	20.4	3.5	3.6	119.7	55.6	22.9	131.8	2.8	< 9.7	6	22	4.3	72.5
30/11/99	5.3	49.4	< 2.1	< 2.1	403.7	134.5	34.9	478.1	7.5	< 9.7	0.8	67	4.8	146.2
10/12/99	-	-	-	-	-	-	-	-	-	-	-	-	-	7.9
14/12/99	5	15.9	5	< 2.1	75.5	42.8	15.3	107.5	1.8	< 9.7	6.8	19	9.1	115.8
23/12/99	5	39.6	3.4	< 2.1	240.3	84.9	22.5	345.3	4.3	< 9.7	10.6	53	9.1	83.4
28/12/99	5.1	30.8	3.9	3.6	195.5	44.4	10	228.6	3.9	< 9.7	7.3	38	7.9	153.1
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5151		32.3	6.2	4.9	194.5	68.2	23.5	225.7	4.2		8.9	37.8	8.8	2098.4

Sampling Start Date	pH	SO ₄ ⁻¹ µeqL ⁻¹	NO ₃ ⁻¹ µeqL ⁻¹	NH ₄ ⁻¹ µeqL ⁻¹	Na µeqL ⁻¹	Mg µeqL ⁻¹	Ca µeqL ⁻¹	Cl µeqL ⁻¹	K µeqL ⁻¹	PO ₄ ⁻¹ µeqL ⁻¹	nss-SO ₄ ⁻¹ µeqL ⁻¹	cond µScm ⁻¹	H µeqL ⁻¹	rain mm
25/03/99	4.7	30.3	20.5	20.6	29.1	11.4	15.9	31.5	< 1.3	< 9.7	26.8	18	22.4	24.1
07/04/99	4.9	22.8	15.7	12.6	49.3	23.3	18.2	54.3	1.4	< 9.7	16.9	18	11.7	26.8
21/04/99	4.3	56.6	48.4	35.8	48.8	13.8	9.1	55.5	< 1.3	< 9.7	50.8	40	47.9	14
05/05/99	4.7	27.9	25.4	22.3	25.6	12.2	9.5	31.6	< 1.3	< 9.7	24.8	21	21.9	86.5
19/05/99	5	19.3	11.3	10.3	51.7	24	11.6	55.5	1.5	< 9.7	13	18	11.2	57.6
02/06/99	4.9	15.5	12.5	9.3	12.8	8.3	6.2	16.4	< 1.3	< 9.7	14	11	13.2	88.1
16/06/99	4.7	23.5	29.4	20.9	12.3	6.2	14.5	15.9	< 1.3	< 9.7	22	17	20	10.4
30/06/99	4.6	28.1	19.1	18.6	7.9	< 4.1	20.1	10.5	2.6	< 9.7	27.1	17	25.1	50.7
14/07/99	4.5	20.8	7.9	< 2.1	6	4.4	3.5	10.6	< 1.3	< 9.7	20.1	13	34.7	39
28/07/99	4.8	84	71.2	24.8	407.1	113	74.1	443.4	11.5	< 9.7	35	83	17.4	6.8
11/08/99	4.4	40.7	35	16.3	75.9	21.1	9.4	82.3	3.1	< 9.7	31.5	35	39.8	29.7
25/08/99	4.9	21.9	9.7	10.9	24.9	18.2	18.4	28.3	1.7	< 9.7	18.9	13	12.3	52
09/09/99	4.7	43.8	29.9	40	20.2	7.5	6	19.5	1.4	< 9.7	41.4	23	20	156.7
22/09/99	4.7	23.1	9.9	7.1	32.1	11.2	5.7	32.1	2.4	< 9.7	19.3	18	20.9	50.1
06/10/99	4.8	32.3	30.4	11.6	154.6	48.3	12.6	173.8	3.2	< 9.7	13.6	39	17.4	25.2
20/10/99	4.6	53.5	27.4	19.1	203.8	77.4	54.6	223.8	5.3	< 9.7	29	47	25.1	9.1
03/11/99	4.8	25.2	11.6	12.5	42	18.4	9.5	44.5	< 1.3	< 9.7	20.1	17	16.2	44.5
17/11/99	5	15.5	4.4	4	44.8	29.8	9.1	49.9	0.8	< 9.7	10.1	13	10	107.9
01/12/99	4.7	19.8	6.2	< 2.1	73.7	35.9	11.5	108.1	< 1.3	< 9.7	11	21	20.4	19.9
19/12/99	4.5	23	10.6	11.6	29.1	12.3	2.8	32.8	< 1.3	< 9.7	19.5	15	30.9	78
28/12/99	5	20.8	6.3	6	93	20.6	5.5	109.1	2.2	< 1.0	9.6	20	10.2	10.3
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5157		27.3	17.6	16.4	38.5	16.7	10.2	43.2	1.4		22.6	19.2	19.8	987.5

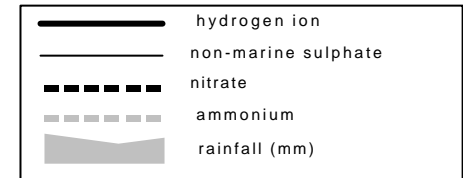
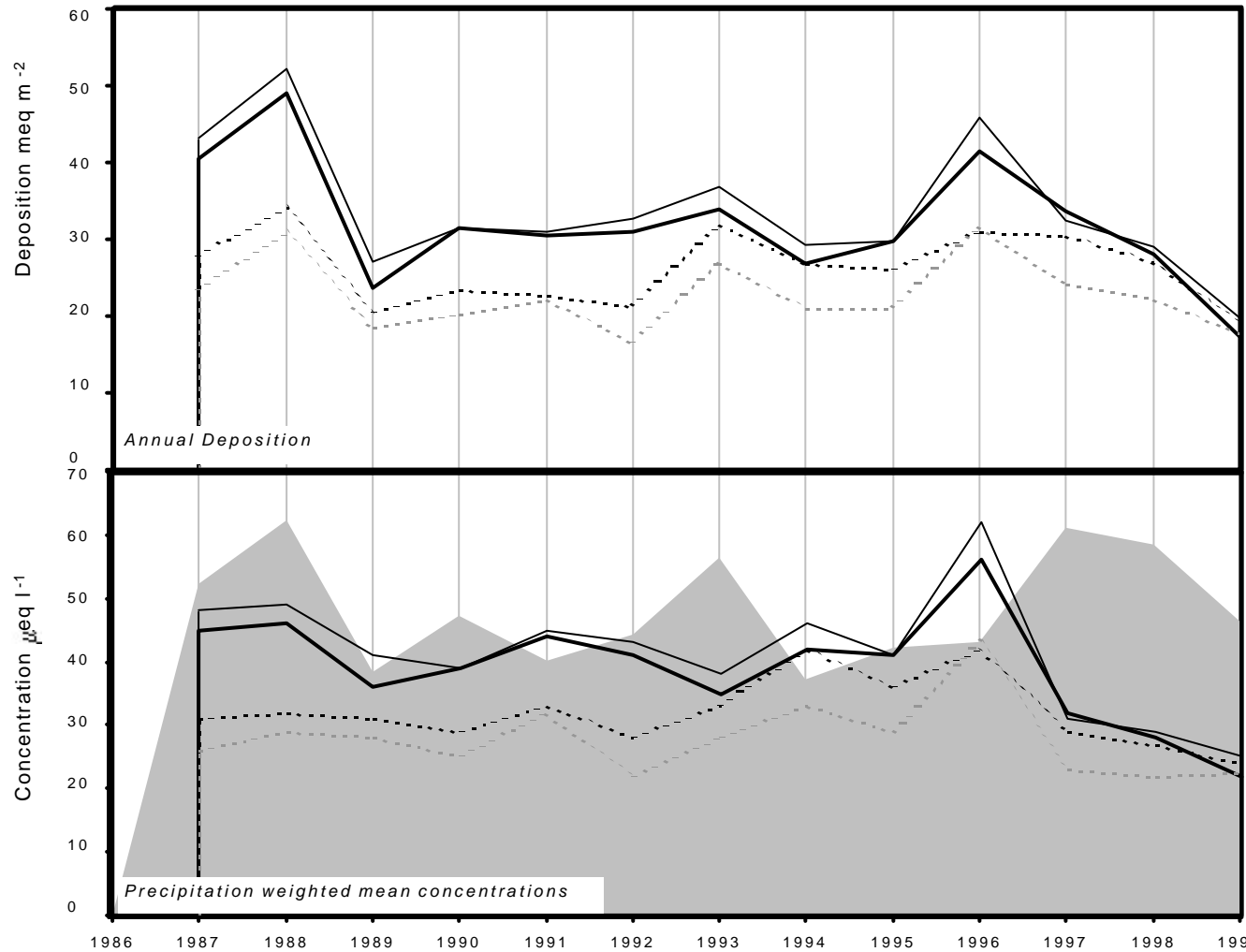
Glen Dye

1999 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, EMEP

Site Operator:
SEPA; North Region



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-1.09 ueq/l (-2.34 %/year): 13 years' data - No significant trend detected
<i>non-marine Sulphate</i>	-1.18 ueq/l (-2.37 %/year): 13 years' data - No significant trend detected
<i>Nitrate</i>	-0.09 ueq/l (-0.27 %/year): 13 years' data - No significant trend detected
<i>ammonium</i>	-0.10 ueq/l (-0.33 %/year): 13 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeq l ⁻¹	NO ₃ ⁻¹ µeq l ⁻¹	NH ₄ ⁻¹ µeq l ⁻¹	Na µeq l ⁻¹	Mg µeq l ⁻¹	Ca µeq l ⁻¹	Cl µeq l ⁻¹	K µeq l ⁻¹	PO ₄ ⁻¹ µeq l ⁻¹	nss-SO ₄ ⁻¹ µeq l ⁻¹	cond µScm ⁻¹	H µeq l ⁻¹	rain mm
05/01/99	4.8	18.9	18.6	15	29.4	10.4	4.8	34.2	< 1.3	< 9.7	15.4	16	16.6	11.6
12/01/99	4.9	37.1	13.8	19.8	123.2	42.7	14.2	140.9	2.7	< 9.7	22.2	31	12.9	14.2
19/01/99	4.7	39.7	29.8	26.1	91.1	27.7	9.9	97.1	2	< 9.7	28.8	31	21.9	6.6
26/01/99	5.2	10.8	6.1	5.1	31.4	10.7	16.5	32.4	1.7	< 9.7	7	10	6.6	3.3
02/02/99	5.9	16.4	2.7	3.9	103.5	38.6	20.6	118.3	5.3	< 9.7	3.9	19	1.3	2.5
09/02/99	5.7	19.8	9.4	6.8	110.9	38.9	21.3	116.4	7.5	< 9.7	6.5	20	1.8	6.7
16/02/99	5.4	30	< 2.1	2.9	228.3	94.2	26.9	252.2	4.6	< 9.7	2.5	37	4.2	7.3
23/02/99	4.8	23.5	15.1	11.6	79.7	31.2	12.4	89.4	1.9	< 9.7	13.9	22	14.5	5.3
02/03/99	4.8	31.4	17.3	13.3	134.1	39.2	9.6	155.5	2.9	< 9.7	15.2	27	14.5	21.2
09/03/99	4.2	105.6	127.6	123	123.8	28.8	22.5	132	3.9	< 9.7	90.7	70	64.6	3.9
16/03/99	5.5	14.3	3	8.2	72.6	43.6	42.1	79.3	2.1	< 9.7	5.6	17	3.3	9.2
23/03/99	6.3	33	20.1	32.4	43.8	40.7	50.2	45.9	4.2	< 9.7	27.7	18	0.5	6.6
30/03/99	5.1	55	66.5	63.8	48.7	17.9	42.9	39.8	3.6	< 9.7	49.1	25	8.7	4.3
06/04/99	5.4	21	5.9	7	89.9	51.6	50	100.8	3.5	< 9.7	10.2	19	4.3	10.2
13/04/99	5	22.8	12.3	12.7	67.3	30.5	8.9	72.8	1.8	< 9.7	14.7	19	9.8	31.1
20/04/99	4.4	43.7	45.4	37.2	67.5	20.2	5.3	83.4	1.5	< 9.7	35.6	37	39.8	58.8
04/05/99	4.2	53.5	82.9	55.4	29.4	8.5	10.6	34.6	< 1.3	< 9.7	50	44	64.6	10.9
11/05/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
18/05/99	4.8	44.9	24.1	5.1	149.2	50.6	43	164.7	14.7	< 9.7	26.9	37	16.2	2.1
25/05/99	4.8	19.5	22.1	20.3	9.3	5.4	9.2	13.9	< 1.3	< 9.7	18.3	14	15.8	24.2
01/06/99	4.7	14.9	13.2	9.4	16.7	9.5	12	21.2	< 1.3	< 9.7	12.9	11	18.6	54.3
08/06/99	4.7	19.5	19.1	14	11.2	4.9	5.5	14.9	< 1.3	< 9.7	18.1	14	20	12.9
15/06/99	5.1	16.4	8.9	7.2	25.4	14	19	27.8	1.2	< 9.7	13.3	< 10.0	7.8	4.5
22/06/99	4.6	25.9	24.9	20.3	17.6	7.7	10.4	19.2	< 1.3	< 9.7	23.8	18	22.9	6.1
29/06/99	4.6	19.7	14.1	11.2	5.6	2	3.2	9.9	< 1.3	< 9.7	19	12	26.3	30.1
06/07/99	5	36.4	19.5	23.3	39.2	16	8.4	42.7	1.4	< 9.7	31.7	< 10.0	9.1	29.7
13/07/99	4.8	23.3	20	16.6	44.4	11.8	57.9	46	11.4	< 9.7	18	15	15.5	6.7
20/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.1
10/08/99	4.9	11.1	12	< 2.1	7.3	4.2	11	13.7	< 1.3	< 9.7	10.2	10	13.5	12.5
17/08/99	5.3	128.6	30.7	25.7	881.3	217.1	69.2	973.1	17.9	< 9.7	22.4	-	5	1
24/08/99	4.2	99.2	100.1	91.3	35.4	6.8	12.2	34.4	6.1	< 9.7	94.9	46	58.9	7.7
31/08/99	5.2	17.3	10.3	14.6	13.4	4.1	49.2	15	4.3	< 9.7	15.7	< 10.0	5.9	20.5
07/09/99	4.3	51.3	36	28.6	65.2	21.7	17.9	72.1	3.5	< 9.7	43.4	34	49	11.6
14/09/99	4.5	69.5	47.1	68.4	34.2	12.9	12.3	35.6	2.5	< 9.7	65.4	35	28.2	54.7
21/09/99	4.8	17.7	13.3	8.4	4.9	< 4.1	3.2	9.8	< 1.3	< 9.7	17.1	12	14.8	16.2
28/09/99	4.6	31	15.4	11.8	57	17.9	12.9	64.2	3.6	< 9.7	24.1	21	23.4	6.5
05/10/99	5.3	15.8	15.1	12.9	22.2	22	24	22.8	2.6	< 9.7	13.1	10	5	3.8
12/10/99	4.5	108.6	112.1	55.2	428.1	108.6	33.1	444.5	12.9	< 9.7	57	94	29.5	2.2
19/10/99	4.5	56	32.7	21.3	233.6	61.2	13.7	254.1	5.2	< 9.7	27.9	59	32.4	80
26/10/99	4.7	53.4	34.9	33.4	116.6	38.4	35.2	134.7	3.7	< 9.7	39.4	38	20.9	7.8
02/11/99	4.7	27.6	11.9	8.3	62.2	23.1	10.5	72.6	1.4	< 9.7	20.1	21	20.9	13.1
09/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16/11/99	5.5	41	< 2.1	< 2.1	320	104.2	31	370.4	6.6	< 9.7	2.5	53	3.5	12.3
23/11/99	4.9	24.8	9.9	14.3	51.4	28.6	20.9	57.7	1.3	< 9.7	18.6	16	12.9	22.4
30/11/99	5.3	19.6	4.6	2.5	120.4	63	23.6	137.2	2.2	< 9.7	5.1	23	5.2	5.6
07/12/99	4.6	27.3	12.7	4.6	126.7	44.6	14.6	143	2.5	< 9.7	12	29	24	29.1
14/12/99	5.1	55.5	9.3	9.6	398.6	126.2	39.8	454.1	8.1	< 9.7	7.5	70	8.5	7.3
21/12/99	4.6	25.7	15.8	18.9	55.9	27.7	10	63.2	< 1.3	< 9.7	19	19	24.5	81
28/12/99	5.1	33.7	16.4	20.7	116.6	25.8	7.9	133.1	2.9	< 9.7	19.6	30	7.6	11.1
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5011		35	24	22.4	82.7	28.4	14.9	92.9	2.5		25	26.8	21.8	792.4

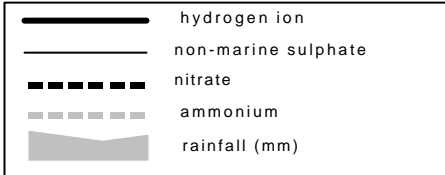
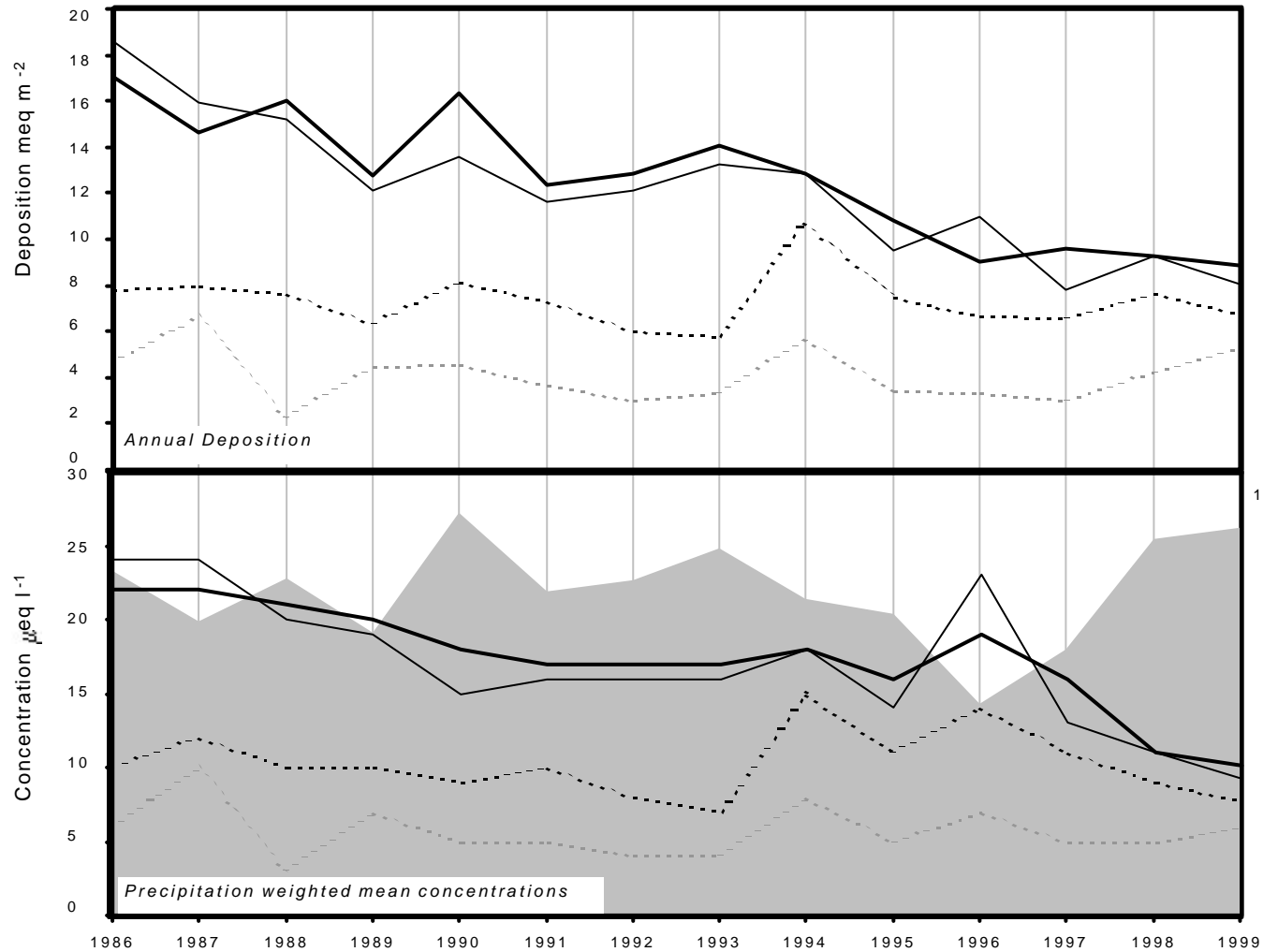
Allt a' Mharcaidh

1999 *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



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-0.73 ueq/l (-3.30 %/year): 14 years' data +++ Strong trend detected
<i>non-marine Sulphate</i>	-0.81 ueq/l (-3.64 %/year): 14 years' data ++ Moderately strong trend detected
<i>Nitrate</i>	0.00 ueq/l (-0.05 %/year): 14 years' data - No significant trend detected
<i>ammonium</i>	-0.06 ueq/l (-1.00 %/year): 14 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeq l ⁻¹	NO ₃ ⁻¹ µeq l ⁻¹	NH ₄ ⁻¹ µeq l ⁻¹	Na µeq l ⁻¹	Mg µeq l ⁻¹	Ca µeq l ⁻¹	Cl µeq l ⁻¹	K µeq l ⁻¹	PO ₄ ⁻¹ µeq l ⁻¹	nss-SO ₄ ⁻¹ µeq l ⁻¹	cond µScm ⁻¹	H µeq l ⁻¹	rain mm
05/01/99	5	14	14.2	8.1	27.3	13.7	18.2	29.6	< 1.3	< 9.7	10.7	11	9.3	3.1
11/01/99	5.2	38.8	4.9	3.4	291.3	92.6	24.7	320.9	5.5	< 9.7	3.7	52	6	20.5
18/01/99	5.1	15.3	4	2.2	54.8	25.3	10.2	60.9	< 1.3	< 9.7	8.7	14	7.9	17.8
25/01/99	5.3	15.8	2.8	3.1	90.6	36.8	18.4	100.5	1.8	< 9.7	4.9	18	4.7	10.7
01/02/99	5.4	136.7	3.7	3	1121.7	443.6	69.4	1276.6	22.9	< 9.7	1.6	177	3.6	9.1
08/02/99	-	-	-	-	-	-	-	-	-	-	-	-	-	4.8
15/02/99	5.4	27.9	< 2.1	< 2.1	190.2	78	25.3	212.4	3.4	< 9.7	5	32	4.3	36.1
23/02/99	5.2	11.9	< 2.1	< 2.1	67.9	40.3	12.1	74.5	< 1.3	< 9.7	3.7	13	5.6	14.4
01/03/99	4.9	21.6	8.4	6.3	94.6	29.9	9.7	106.9	1.9	< 9.7	10.2	19	11.5	17.1
08/03/99	5.8	31.1	25.3	47.9	29.7	27.3	24.8	24.3	< 1.3	< 9.7	27.5	12	1.5	4.7
15/03/99	5.4	17.6	< 2.1	6.5	90.4	38.3	20.7	99.5	2.1	< 9.7	6.7	17	4.3	10.1
22/03/99	5.5	12.7	3.8	7.3	28.3	20.8	46.9	28.9	3.3	< 9.7	9.3	< 10.0	2.9	9
29/03/99	5.1	13	10.1	7.6	36.4	21.7	24.3	35.8	< 1.3	< 9.7	8.7	11	8.7	18.7
06/04/99	5.6	164.3	15.3	287.6	118.8	62.3	69.6	115.2	57.1	309.9	150	-	2.5	1.7
12/04/99	5.2	17.7	10.3	14.1	46.3	49.3	20	49.3	3.1	< 9.7	12.1	14	6.5	26.1
19/04/99	4.1	69.8	63.5	20.6	50.3	13	22.2	45.1	2.8	< 9.7	63.7	44	72.4	3.3
03/05/99	6.5	88	38.9	244.6	65.8	32.9	60.1	45.6	109.6	312	80	47	0.3	4.5
10/05/99	4.6	21.1	16.2	11.3	11.7	4.7	2.8	14.9	< 1.3	< 9.7	19.7	17	22.9	11.5
17/05/99	5.3	30.5	3.6	4.2	228.1	90.9	41.7	242.4	5.6	< 9.7	3	43	4.6	18.7
24/05/99	4.6	21.6	26.3	21.6	25.7	10.6	27.2	31	< 1.3	< 9.7	18.5	17	24.5	31.6
31/05/99	6.5	30.1	9.4	110.1	37.8	43.6	58.7	34.4	30.6	40.1	25.5	32	0.3	45.9
08/06/99	7.2	71.9	16.1	772.8	33.8	59.3	20.3	26.4	58.3	150.4	67.9	95	0.1	10.8
14/06/99	8.2	521.1	14.5	3779.2	129.5	164.5	119.9	134.8	556	1501.3	505.5	436	0	6.2
21/06/99	4.8	15.7	19	12.5	4.5	4.4	14.4	9.3	1.3	< 9.7	15.1	12	15.5	12.8
28/06/99	4.8	< 2.5	12.8	5.9	2.8	< 4.1	7.8	9.2	< 1.3	< 9.7	< 2.8	< 10.0	14.5	31.8
05/07/99	5.1	14	11.3	14.8	5.2	4.3	9	9	< 1.3	< 9.7	13.4	< 10.0	7.8	46.9
12/07/99	5.1	49.3	12.4	22.4	29	21	35.2	29	2.1	< 9.7	45.8	10	7.4	3.5
19/07/99	5.1	8.2	7.5	< 2.1	1.9	7.2	8.9	9.1	< 1.3	< 9.7	8	< 10.0	8.1	14.4
26/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
02/08/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
09/08/99	4.7	14.7	11	< 2.1	14	5.6	10.6	16.1	< 1.3	< 9.7	13	10	22.4	8.8
16/08/99	4.7	42.4	18.1	5.6	173.7	53.9	18.9	211.6	4.2	< 9.7	21.4	41	21.9	11.2
23/08/99	5	10.5	6.4	2.1	9.9	6.3	23.5	14.6	< 1.3	< 9.7	9.3	< 10.0	9.3	8.4
30/08/99	4.8	10.5	6.4	4.7	14.3	10	57.1	15.6	3	< 9.7	8.8	< 10.0	17	4.7
06/09/99	5	14.8	5.1	4.8	43.9	26.3	13.5	44.9	1.8	< 9.7	9.5	13	11	42.7
13/09/99	4.6	36.2	35.5	26.8	18.4	6.5	9.4	17.1	1.6	< 9.7	34	23	24	16.3
20/09/99	4.6	23.5	12.5	9.7	3.5	< 4.1	5	9.8	< 1.3	< 9.7	23.1	14	25.1	19.6
27/09/99	4.9	15.8	5.1	< 2.1	42.8	18.4	8.3	46.9	< 1.3	< 9.7	10.6	14	13.8	27.8
04/10/99	5.1	14	2.4	< 2.1	65.2	28.1	20.2	74.7	1.5	< 9.7	6.1	18	7.4	11.9
18/10/99	4.8	45.5	32.5	13.5	178	50.9	19	187.8	5.7	< 9.7	24	42	17.8	10
25/10/99	5.1	23.5	5.2	4.9	113	52.3	40	131.5	3.2	< 9.7	9.8	26	7.4	20.3
01/11/99	5.3	9.5	< 2.1	< 2.1	37.2	21.3	4.4	39.8	< 1.3	< 9.7	5.1	10	4.7	21.8
08/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
15/11/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
22/11/99	5.1	9.5	2.6	< 2.1	32.4	21.6	10.2	36.8	1.9	< 9.7	5.6	< 10.0	8.3	49.3
29/11/99	5.2	18.7	< 2.1	< 2.1	141.3	71.6	24.5	160.7	2.5	< 9.7	1.6	26	6.8	39.3
06/12/99	5.1	11.8	< 2.1	< 2.1	70.6	53.7	19.7	79.2	1.3	< 9.7	3.3	14	7.4	24.5
13/12/99	5.2	13	2.6	< 2.1	83.8	41.5	15.9	97.5	1.5	< 9.7	2.9	17	6.6	22.3
20/12/99	5.2	13.5	< 2.1	< 2.1	82	17.6	3.7	91	2.1	< 9.7	3.7	17	5.9	88.2
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5103		19.1	7.7	6	82.7	35.5	16.5	92.9	2.1		9.2	18.9	10.2	874.1

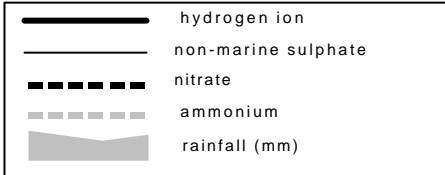
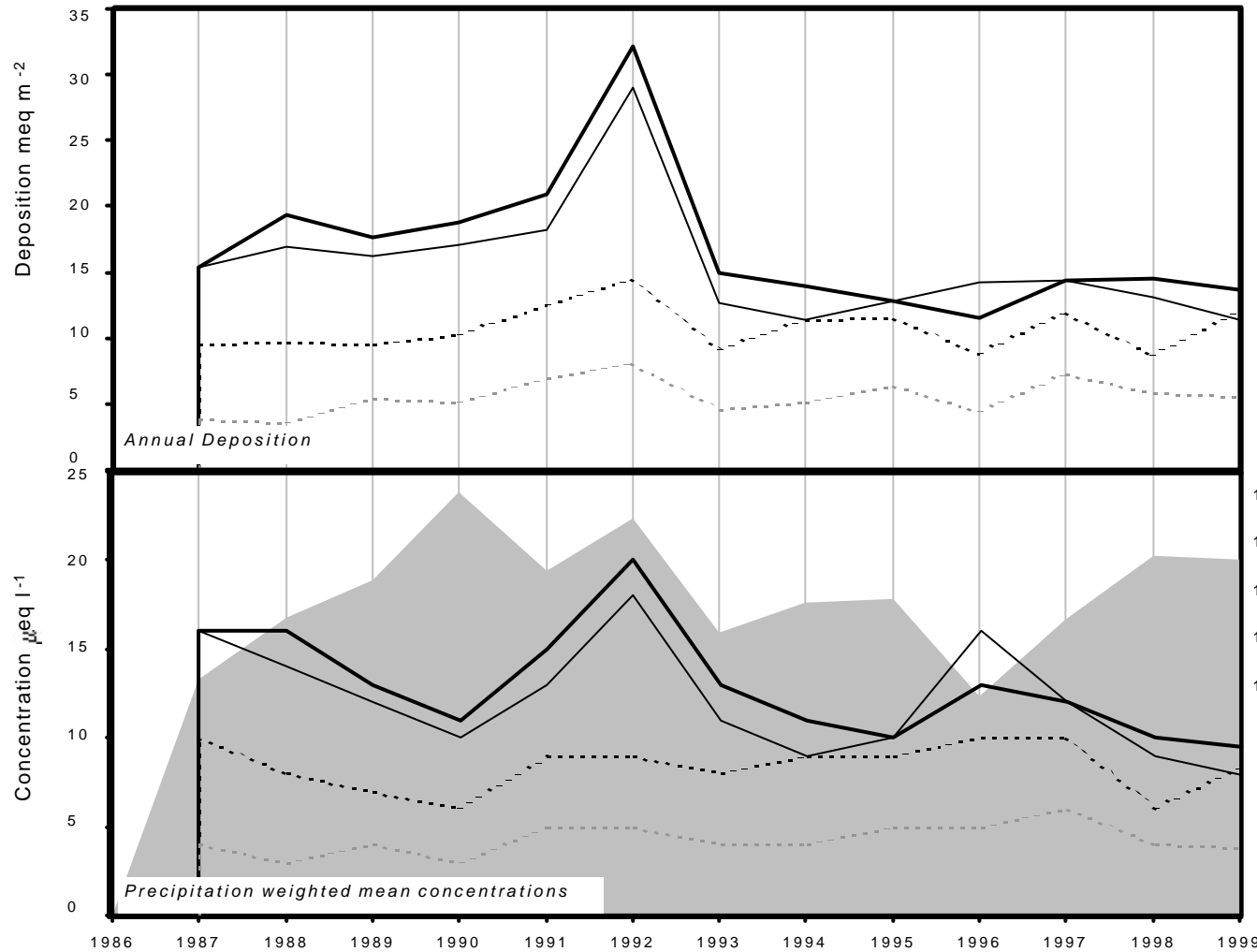
Strathvaich Dam

1999 *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:
WOC, DT, Daily SO₂, NO_x, SO₂, ozone, EMEP

Site Operator:
SEPA; North Region



long-term trends in concentration (+x = increase; -x = decrease)	
<i>hydrogen ion</i>	-0.47 ueq/l (-2.90 %/year): 13 years' data + Significant trend detected
<i>non-marine Sulphate</i>	-0.39 ueq/l (-2.61 %/year): 13 years' data - No significant trend detected
<i>Nitrate</i>	0.02 ueq/l (0.27 %/year): 13 years' data - No significant trend detected
<i>ammonium</i>	0.09 ueq/l (2.57 %/year): 13 years' data - No significant trend detected

Sampling Start Date	pH	SO ₄ ⁻¹ µeqL ⁻¹	NO ₃ ⁻¹ µeqL ⁻¹	NH ₄ ⁻¹ µeqL ⁻¹	Na µeqL ⁻¹	Mg µeqL ⁻¹	Ca µeqL ⁻¹	Cl µeqL ⁻¹	K µeqL ⁻¹	PO ₄ ⁻¹ µeqL ⁻¹	nss-SO ₄ ⁻¹ µeqL ⁻¹	cond µScm ⁻¹	H µeqL ⁻¹	rain mm
05/01/99	5.2	26.3	9.3	4.6	154.8	45.7	22.6	180.4	3	< 9.7	7.6	29	5.8	5.9
12/01/99	5.3	43.2	2.3	< 2.1	343.8	112.5	30	390.5	6.8	< 9.7	1.8	61	5	66.2
19/01/99	5.3	< 2.5	< 2.1	< 2.1	59	34	10.3	65.5	< 1.3	< 9.7	< 9.6	13	4.8	65.1
26/01/99	5.2	21.8	4.5	< 2.1	137.3	56.8	16.5	154.7	2.8	< 9.7	5.2	27	6.8	13.8
02/02/99	5.5	277.2	3.5	< 2.1	2352.2	890.5	128.5	2622.7	49.9	< 9.7	< 6.1	343	2.8	23.4
09/02/99	5	48.7	6.6	2.9	333.3	97.5	25.3	367.5	7	< 9.7	8.6	56	9.3	17.1
16/02/99	5.1	55.3	< 2.1	< 2.1	391	131.9	36.7	454.6	8.2	< 9.7	8.2	67	7.8	49.3
23/02/99	5.3	26	< 2.1	2.5	199.3	72.7	23.3	220.5	3.3	< 9.7	2	33	4.8	32.1
02/03/99	5	36.8	7.4	2.8	238.4	68.6	17.8	260.7	4.9	< 9.7	8.1	46	10.5	12.5
09/03/99	4.8	18.2	12.3	11.1	36.5	16	10.2	39.6	< 1.3	< 9.7	13.8	17	16.2	28.2
16/03/99	5.4	21.3	< 2.1	2.9	133.3	68.9	29.4	152.1	2.7	< 9.7	5.3	25	4.2	50.6
23/03/99	5.2	28	2.4	5	168.5	63	24.5	193.4	3.1	< 9.7	7.7	33	6.5	18.1
30/03/99	5.2	14.3	14.1	8.9	54.5	31.4	25	58.4	< 1.3	< 9.7	7.7	14	5.8	19.3
06/04/99	5.3	17.8	2.8	< 2.1	99.8	53	27.5	113.4	2.1	< 9.7	5.8	21	5.1	41.1
13/04/99	4.7	27.1	15.6	7.9	95.3	33.6	8.3	105.8	1.8	< 9.7	15.7	27	19.5	40.6
20/04/99	4.4	18.4	28.9	10.9	12.6	4.8	5.3	16.7	< 1.3	< 9.7	16.9	24	40.7	9.3
27/04/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
04/05/99	4.7	27.3	28.6	24.8	13.5	7	18.1	18	< 1.3	< 9.7	25.6	18	18.6	18
11/05/99	4.7	14	17.2	5.4	7	< 4.1	3.4	10.1	< 1.3	< 9.7	13.2	13	21.9	6.7
18/05/99	5.4	54.2	2.9	< 2.1	443.9	139.2	41.7	493.4	9.2	< 9.7	0.7	78	3.8	38.8
25/05/99	4.9	12.6	12.8	7.8	10.7	7.2	9.4	15.7	< 1.3	< 9.7	11.3	11	13.8	41.1
01/06/99	4.8	20.6	10.5	5.8	81.3	35	16.2	90.3	2.1	< 9.7	10.8	23	14.5	33.6
08/06/99	4.8	18.1	16	6.5	18.6	9.2	10.3	19.8	< 1.3	< 9.7	15.8	13	17.4	4.3
15/06/99	5.1	12.4	6.8	< 2.1	36.2	21.6	9.6	41.4	< 1.3	< 9.7	8	12	8.1	28.1
22/06/99	4.8	15.5	16	11.1	2.5	5.5	17.4	8.7	< 1.3	< 9.7	15.2	10	14.5	32
29/06/99	5	< 2.5	9.6	5.4	3.9	< 4.1	6.5	8.7	< 1.3	< 9.7	< 3.0	< 10.0	11	31.6
06/07/99	4.8	12.4	14.3	5.1	5.5	5.4	17	7.8	1.7	< 9.7	11.7	11	14.8	11.2
13/07/99	5.1	9.5	6.5	< 2.1	43.2	24.9	27.6	48.2	< 1.3	< 9.7	4.3	12	8.1	21.5
20/07/99	4.7	35.6	13.4	< 2.1	114	38.1	12.9	116.9	2	< 9.7	21.8	28	20.4	4.2
10/08/99	4.9	13.5	9.2	< 2.1	26.4	13.3	14.9	30.1	< 1.3	< 9.7	10.3	12	13.8	16.7
17/08/99	4.5	39.9	26.8	4.4	114.8	30.3	23.3	125.9	5.1	< 9.7	26.1	32	32.4	10
24/08/99	4.9	20.6	10.1	4.3	59.5	25.3	13.6	57.1	3.9	< 9.7	13.5	15	11.5	9.8
31/08/99	5.3	6	< 2.1	< 2.1	10.3	18.8	17.2	14.6	1.9	< 9.7	4.8	< 10.0	4.6	30.6
07/09/99	5	23.1	7.4	6.1	98.5	45.8	15.5	112.9	5.2	< 9.7	11.2	23	10	41.9
14/09/99	4.7	23.6	14.9	16.5	6.7	9.5	5.2	8.6	< 1.3	< 9.7	22.8	14	18.6	38.7
21/09/99	4.8	12.7	12	37.1	30.1	7.4	13	6.9	2.2	< 9.7	9.1	< 10.0	15.1	13.9
28/09/99	5.3	23.9	< 2.1	< 2.1	189.3	76.4	21.9	208.8	4.2	< 9.7	1.1	34	4.6	51.3
05/10/99	5.3	29.8	< 2.1	< 2.1	235.1	84.5	23.6	255.6	4.8	< 9.7	1.4	45	5.5	21.9
19/10/99	4.6	41.8	31.6	9.9	177.4	49.1	14	198.4	3.8	< 9.7	20.4	48	24	10.8
26/10/99	5.4	32.3	< 2.1	< 2.1	259.3	87.9	24	276.6	5.5	< 9.7	1	45	3.9	46.2
02/11/99	5.2	12	1.4	< 2.1	56.2	26.7	4.4	64.3	1.5	< 9.7	5.3	14	6.6	33
09/11/99	5.5	12.1	3.4	< 2.1	60.8	29.7	6.5	65.2	1.4	< 9.7	4.8	12	3.2	10.2
16/11/99	4.7	48.5	9.7	2.8	267.2	76.6	22.5	295.2	5.4	< 9.7	16.3	50	22.4	16.2
23/11/99	5.1	12.5	< 2.1	< 2.1	82.5	50.2	13.2	94.8	1.2	< 9.7	2.6	16	7.6	98
30/11/99	5.1	< 1.9	43.9	< 2.1	325.1	104.9	25.5	354.1	5.6	< 9.7	< 41.0	56	7.8	85.8
07/12/99	4.9	27.3	7.1	< 2.1	188.9	65.3	18.2	213.7	3.7	< 9.7	4.5	35	12.6	15.6
14/12/99	4.9	25.3	2.2	< 2.1	191.8	65.5	17.7	216.1	3.4	< 9.7	2.2	35	12.6	35.3
21/12/99	5	10	1.8	< 2.1	48.9	36	10.3	53.5	0.8	< 9.7	4.1	11	10	84.1
28/12/99	5.6	66.5	< 2.1	< 2.1	552.1	124.9	25	616.4	11.4	< 9.7	0	89	2.6	9.8
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5010		25.5	8.3	3.8	180.3	68.5	20.4	201.5	3.8		7.9	34.1	9.5	1444.3

Sampling Start Date	pH	SO ₄ ⁻¹ µeqL ⁻¹	NO ₃ ⁻¹ µeqL ⁻¹	NH ₄ ⁻¹ µeqL ⁻¹	Na µeqL ⁻¹	Mg µeqL ⁻¹	Ca µeqL ⁻¹	Cl µeqL ⁻¹	K µeqL ⁻¹	PO ₄ ⁻¹ µeqL ⁻¹	nss-SO ₄ ⁻¹ µeqL ⁻¹	cond µScm ⁻¹	H µeqL ⁻¹	rain mm
06/01/99	5.3	23.1	8.3	7	134.5	55.3	18	154.8	2.7	< 9.7	6.9	26	5.5	18.2
13/01/99	5.4	47.8	4.4	5.6	325.3	94.9	30.5	368.3	6	< 9.7	8.6	53	4.4	5.9
20/01/99	5.5	14.3	3.1	2.4	69.4	39.9	18.7	77.5	1.4	< 9.7	5.9	15	3.4	16.1
27/01/99	5.6	47.2	3.5	4.9	372.6	117	38.2	409.3	7.7	< 9.7	2.3	65	2.3	15.1
03/02/99	5.5	190	2.4	5.4	1545.5	565.4	90.8	1746.1	32	< 9.7	3.8	226	3.5	18.7
17/02/99	5.2	69.8	< 2.1	3.7	547.4	149.5	35.4	608	10.4	< 9.7	3.9	86	6	20.7
24/02/99	5.3	33	5.1	5.3	236.5	75.1	26.8	261.7	4.7	< 9.7	4.5	39	5	9.2
03/03/99	4.8	75.1	23.6	14.7	472.2	124.7	38.7	542.4	10.7	< 9.7	18.2	84	15.8	3.5
10/03/99	5.7	30.1	42	15.8	147.7	63.8	58.5	138.1	3.5	< 9.7	12.3	27	2.1	3.1
17/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
24/03/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0
31/03/99	5.5	42.6	77.3	37.8	138.2	60.4	82.1	131.8	4.1	< 9.7	26	34	2.8	6.2
07/04/99	5.1	49.5	3.9	< 2.1	364.5	106.5	33.5	400.7	6.5	< 9.7	5.6	62	7.2	12.7
14/04/99	4.6	66.6	44.9	36.3	315.9	84.4	22.9	359.7	6.5	< 9.7	28.6	64	24	16
21/04/99	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2
05/05/99	4.5	62.6	58.9	41.6	158.7	45.7	25.7	178.2	3.4	< 9.7	43.5	54	32.4	17
12/05/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
19/05/99	5.2	50.6	6.5	< 2.1	374.2	107.8	43.9	410.4	6.2	< 9.7	5.5	59	5.6	8.9
26/05/99	4.4	41.1	40	17.6	86.3	24.4	12.6	98.3	2	< 9.7	30.7	41	43.7	16.4
02/06/99	4.7	35.9	15.8	11.8	136.4	45.4	13.5	158.5	2.5	< 9.7	19.4	38	20	30
09/06/99	5	19.2	9	< 2.1	40.2	17.2	17.8	45.1	1.4	< 9.7	14.4	-	10	4.4
16/06/99	-	-	-	-	-	-	-	-	-	-	-	-	-	6.7
23/06/99	4.9	17.4	12.6	7.4	11.1	7.2	7	15.8	< 1.3	< 9.7	16.1	11	13.2	25.4
30/06/99	4.5	29.9	16.9	2.8	30.1	12	6.7	29.2	< 1.3	< 9.7	26.3	19	29.5	20.4
07/07/99	6.6	13.6	< 2.1	28.8	12.3	11.4	41.4	31.9	< 1.3	< 9.7	12.1	< 10.0	0.3	28.6
21/07/99	-	-	-	-	-	-	-	-	-	-	-	-	-	3.5
11/08/99	5.4	12.4	< 2.1	< 2.1	32.2	23.1	69.4	36.4	2.3	< 9.7	8.5	< 10.0	4	19.5
18/08/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
25/08/99	5.1	18.2	< 2.1	< 2.1	39.8	23.2	26.6	37.2	3.4	< 9.7	13.4	< 10.0	8.1	12.2
01/09/99	5.2	13.8	< 2.1	< 2.1	77.5	46	17.5	86.3	2	< 9.7	4.5	16	6.2	22.6
08/09/99	4.4	66.4	34.4	36.3	206	59.2	21.5	228.7	6	< 9.7	41.6	54	39.8	5.7
15/09/99	4.3	98.9	47.6	54.6	195.8	52	20.7	220.4	6.3	< 9.7	75.4	66	49	39.9
22/09/99	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9
29/09/99	5.2	96.9	< 2.1	< 2.1	782.3	356.5	56.5	882.1	15.9	< 9.7	2.7	128	7.1	9.1
06/10/99	5.1	23.3	< 2.1	12	142.4	56.5	20.6	161.8	2.8	< 9.7	6.1	29	7.9	14.5
13/10/99	4.9	144.2	45.6	48	812.2	330.4	55.5	939.8	36.2	26.8	46.4	143	12.9	3.7
20/10/99	4.6	55.8	20.7	19.2	259.4	79.9	24.1	286.7	8.5	< 9.7	24.5	56	24	26.4
27/10/99	4.7	91.8	8.3	< 2.1	773.6	186.9	52.3	890	7.8	< 9.7	< 1.4	-	20	2.4
03/11/99	5.2	24.8	< 2.1	< 2.1	184.3	64	19.4	205	2.2	< 9.7	2.6	35	5.6	9.2
10/11/99	5.1	35.6	< 2.1	< 2.1	227.7	83.5	26.5	246.7	4.6	< 9.7	8.2	41	7.9	25.3
17/11/99	5.3	38.7	< 2.1	< 2.1	301.6	95.2	25.8	324.1	4.8	< 9.7	2.4	50	4.9	8.4
24/11/99	5	45.5	< 2.1	< 2.1	366.6	121.7	35.1	400	6.1	< 9.7	1.4	65	10.2	36.8
01/12/99	5.2	39.6	5.4	< 2.1	214.6	85.7	25.9	233.9	4.7	< 9.7	13.7	37	5.6	31.7
08/12/99	4.9	91.4	1.5	< 2.1	720.1	190.5	49.5	857.1	14.4	< 9.7	4.6	121	11.7	13.5
22/12/99	5.3	21	< 2.1	< 2.1	138.8	29.9	6.3	166.6	2.3	< 9.7	4.3	27	5.1	54.6
Precipitation weighted annual mean for site: samples containing phosphate are excluded.														Total rainfall
5140		45.9	12.5	11.4	249	82.9	27.8	280.4	5.3		15.9	48	13.6	645.7

Appendix 2

Tables of Annual Mean Concentrations and Total Rainfall, 1986 TO 1999

Table A.2.1 - Precipitation-weighted Annual Mean Acidity, 1986 to 1999 ($\mu\text{eq l}^{-1}$)

Site	Year	Precipitation-weighted Annual Mean Acidity ($\mu\text{eq l}^{-1}$)													
		86	87	88	89	90	91	92	93	94	95	96	97	98	99
Goonhilly		20	23	15	19	14	26	15	17	20	18	19	20	14	13
Yarner Wood		17	20	14	20	13	17	18	17	18	15	18	18	12	14
Barcombe Mills		19	22	13	15	12	20	17	24	16	16	14	16	11	13
Compton		25	28	16	25	14	18	35	34	23	13	7	12	11	7
Flatford Mill		33	43	35	35	27	43	36	25	27	30	25	26	25	27
Woburn		45	50	37	37	28	35	37	27	30	22	15	24	25	14
Tycanol Wood		16	17	15	18	14	21	21	17	14	14	16	13	11	11
Llyn Brianne		16	21	18	19	17	24	20	19	16	12	14	15	12	11
Pumlumon		-	-	-	14	12	16	18	19	13	14	15	12	9	10
Stoke Ferry		35	36	30	40	18	22	30	27	18	24	16	19	18	17
Preston Montford		18	25	24	36	14	27	38	35	30	27	19	16	8	7
Bottesford		61	76	81	48	42	62	68	62	36	29	22	22	20	17
Beddgelert		17	19	17	15	12	16	14	18	12	11	12	-	-	-
Llyn Llydaw		-	-	-	-	-	-	-	-	-	-	-	11	11	12
Wardlow Hay Cop		29	45	33	37	24	33	34	36	27	28	22	18	16	10
Driby		42	43	42	47	41	41	45	35	36	37	18	22	34	21
Jenny Hurn		89	100	85	63	53	80	81	67	39	58	54	55	45	33
Thorganby		75	73	88	84	64	55	82	80	44	51	44	29	43	16
High Muffles		58	63	72	55	55	58	59	47	42	41	40	33	35	22
Bannisdale		30	27	28	24	18	22	25	31	19	17	20	16	15	13
Hillsborough Forest		-	-	-	13	7	12	12	17	12	8	13	6	7	9
Lough Navar		11	9	10	10	8	6	8	11	7	8	6	7	5	6
Cow Green Reservoir		27	31	34	23	21	24	28	33	21	17	24	11	16	13
Loch Dee		29	23	19	15	15	19	17	22	15	13	19	11	10	12
Redesdale		41	44	52	32	30	33	42	31	31	25	33	27	25	16
Eskdalemuir		21	25	27	20	24	22	22	26	17	16	17	17	14	14
Whiteadder		40	36	47	35	31	36	45	34	33	32	31	32	23	19
Balquhidder		21	32	24	20	16	22	20	24	22	18	29	15	15	12
Polloch		-	-	-	-	-	14	14	15	13	12	16	10	8	9
Glen Dye		-	45	46	36	39	44	41	35	42	41	56	32	28	22
Allt a' Mharcaidh		22	22	21	20	18	17	17	17	18	16	19	16	11	10
Strathvaich Dam		-	16	16	13	11	15	20	13	11	10	13	12	10	9
Achanarras		10	19	25	25	19	20	24	22	17	16	21	21	14	14

Table A.2.2 - Precipitation-weighted Annual Mean Non-marine Sulphate, 1986 to 1999 ($\mu\text{eq l}^{-1}$)

Site	Year	Precipitation-weighted Annual Mean Non-marine Sulphate ($\mu\text{eq l}^{-1}$)													
		86	87	88	89	90	91	92	93	94	95	96	97	98	99
Goonhilly		30	34	21	29	24	36	22	29	26	24	31	25	17	17
Yarner Wood		27	37	22	27	19	28	25	28	28	24	33	27	18	18
Barcombe Mills		46	50	40	44	38	52	43	33	36	33	38	25	30	26
Compton		78	104	64	60	58	63	63	48	55	49	61	42	38	32
Flatford Mill		90	71	67	80	58	71	53	41	50	52	52	41	43	44
Woburn		73	80	85	73	66	63	57	44	59	46	56	39	42	38
Tycanol Wood		27	26	23	26	22	31	27	22	22	22	27	19	18	21
Llyn Brianne		24	29	26	27	27	30	28	26	26	22	26	20	19	17
Pumlumon		-	-	-	19	19	24	24	23	18	21	23	17	14	14
Stoke Ferry		80	76	66	84	81	77	67	54	61	50	52	49	43	40
Preston Montford		45	60	56	60	37	66	64	48	52	60	49	32	26	24
Bottesford		90	93	109	83	66	75	73	57	63	55	54	43	45	39
Beddgelert		53	33	24	22	19	23	22	24	20	20	24	-	-	-
Llyn Llydaw		-	-	-	-	-	-	-	-	-	-	-	14	16	17
Wardlow Hay Cop		71	92	83	80	73	85	73	71	76	65	78	59	50	49
Driby		69	74	77	79	80	78	65	49	62	70	49	42	53	41
Jenny Hurn		110	106	121	98	89	83	77	60	80	65	81	58	70	54
Thorganby		85	80	88	87	82	119	88	79	72	56	69	62	60	50
High Muffles		63	74	82	73	67	75	71	56	60	51	65	47	49	37
Bannisdale		41	38	45	40	41	38	42	45	37	37	44	31	30	25
Hillsborough Forest		-	-	-	52	36	42	41	40	45	33	45	26	29	30
Lough Navar		19	16	14	18	14	18	17	18	16	16	17	15	12	9
Cow Green Reservoir		35	39	44	35	33	34	38	40	31	31	37	26	26	22
Loch Dee		32	35	36	24	26	28	27	28	25	24	36	18	19	19
Redesdale		58	46	62	47	36	43	46	35	42	37	51	37	34	25
Eskdalemuir		31	30	33	28	31	30	28	29	28	28	28	24	20	19
Whiteadder		53	48	61	46	33	45	50	37	40	43	44	33	27	24
Balquhidder		26	33	28	24	22	27	23	26	22	21	38	21	19	15
Polloch		-	-	-	-	-	17	17	14	16	14	18	11	10	9
Glen Dye		-	48	49	41	39	45	43	38	46	41	62	31	29	25
Allt a' Mharcaidh		24	24	20	19	15	16	16	16	18	14	23	13	11	9
Strathvaich Dam		-	16	14	12	10	13	18	11	9	10	16	12	9	8
Achanarras		24	33	31	29	22	24	25	20	19	19	25	21	17	16

Table A.2.3 - Precipitation-weighted Annual Mean Nitrate, 1986 to 1999 ($\mu\text{eq l}^{-1}$)

Site	Year	Precipitation-weighted Annual Mean Nitrate ($\mu\text{eq l}^{-1}$)													
		86	87	88	89	90	91	92	93	94	95	96	97	98	99
Goonhilly		19	27	16	22	20	31	17	23	24	23	28	28	18	20
Yarner Wood		16	24	14	18	13	19	16	20	25	21	31	27	14	17
Barcombe Mills		27	31	25	30	24	36	25	19	29	28	28	23	21	25
Compton		38	46	38	36	28	36	39	28	34	28	36	33	29	27
Flatford Mill		39	45	43	56	38	44	40	30	37	39	38	36	39	41
Woburn		39	40	39	47	35	40	36	31	47	35	39	35	35	38
Tycanol Wood		12	15	12	15	11	18	14	12	16	15	18	16	11	13
Llyn Brianne		12	14	13	14	16	18	16	14	18	16	17	17	12	12
Pumlumon		-	-	-	10	9	14	13	13	12	15	16	14	7	10
Stoke Ferry		48	44	39	55	46	48	43	36	43	39	37	41	38	40
Preston Montford		22	32	26	31	20	35	38	27	32	38	33	24	19	21
Bottesford		41	41	44	50	34	43	36	34	40	33	34	33	30	33
Beddgelert		17	16	13	11	10	12	10	14	13	15	15	-	-	-
Llyn Llydaw		-	-	-	-	-	-	-	-	-	-	-	11	10	12
Wardlow Hay Cop		25	36	31	36	26	38	29	33	35	33	40	30	24	28
Driby		39	44	47	48	46	50	46	38	49	50	39	40	45	39
Jenny Hurn		44	48	44	51	43	45	42	33	47	42	45	38	45	40
Thorganby		41	43	42	49	40	50	42	46	40	37	38	38	34	32
High Muffles		37	43	47	45	38	47	37	36	42	38	43	35	36	32
Bannisdale		20	18	21	19	17	21	19	23	22	21	25	22	18	21
Hillsborough Forest		-	-	-	26	16	23	16	21	23	21	29	19	16	22
Lough Navar		8	8	7	9	7	9	9	10	15	12	10	12	6	6
Cow Green Reservoir		19	21	25	20	20	21	23	25	21	22	24	18	18	20
Loch Dee		14	19	18	14	14	16	15	19	18	16	22	14	13	13
Redesdale		34	26	33	31	26	31	36	26	32	27	33	35	30	25
Eskdalemuir		15	18	19	18	15	19	16	19	19	19	20	20	15	17
Whiteadder		34	29	42	34	23	32	35	29	34	31	35	30	24	22
Balquhidder		13	21	16	13	10	17	13	18	17	14	24	16	13	12
Polloch		-	-	-	-	-	9	9	9	11	10	10	8	5	6
Glen Dye		-	31	32	31	29	33	28	33	42	36	42	29	27	24
Allt a' Mharcaidh		10	12	10	10	9	10	8	7	15	11	14	11	9	8
Strathvaich Dam		-	10	8	7	6	9	9	8	9	9	10	10	6	8
Achanarras		14	22	24	25	18	22	16	18	21	18	22	21	15	13

Table A.2.4 - Precipitation-weighted Annual Mean Ammonium, 1986 to 1999 ($\mu\text{eq l}^{-1}$)

Site	Year	Precipitation-weighted Annual Mean Ammonium ($\mu\text{eq l}^{-1}$)													
		86	87	88	89	90	91	92	93	94	95	96	97	98	99
Goonhilly		17	22	12	18	16	24	15	30	13	17	25	21	10	12
Yarner Wood		15	28	14	19	13	22	17	23	25	20	37	26	14	17
Barcombe Mills		38	41	38	39	35	50	31	16	30	33	32	22	18	25
Compton		70	73	46	56	55	63	57	40	53	53	79	53	48	44
Flatford Mill		-	50	49	66	44	59	40	31	40	48	49	38	43	45
Woburn		54	50	52	56	43	52	41	35	55	48	63	40	36	47
Tycanol Wood		13	15	13	15	14	19	13	11	15	18	22	15	12	16
Llyn Brianne		12	13	14	16	16	20	18	15	16	18	19	15	13	14
Pumlumon		-	-	-	13	13	17	20	14	13	21	18	16	10	12
Stoke Ferry		65	60	56	75	69	74	54	43	61	53	56	55	49	50
Preston Montford		47	57	49	53	44	57	57	36	50	54	60	38	36	38
Bottesford		56	45	49	68	54	48	40	33	55	48	56	45	45	48
Beddgelert		14	11	12	15	14	13	15	14	11	14	17	-	-	-
Llyn Llydaw		-	-	-	-	-	-	-	-	-	-	-	10	11	14
Wardlow Hay Cop		34	40	39	39	40	57	45	39	47	46	58	38	33	37
Driby		53	60	64	53	67	76	55	42	48	64	54	49	49	44
Jenny Hurn		64	51	53	64	64	65	45	28	55	50	66	53	61	46
Thorganby		59	56	61	65	80	124	82	-	57	60	57	59	53	50
High Muffles		40	46	54	53	48	64	44	40	50	48	61	44	45	37
Bannisdale		35	27	30	30	32	34	27	31	32	36	40	33	27	27
Hillsborough Forest		-	-	-	60	45	48	40	43	49	43	62	40	38	43
Lough Navar		11	9	8	11	8	9	12	11	11	16	14	14	9	9
Cow Green Reservoir		20	19	25	23	24	26	25	28	21	30	26	27	20	23
Loch Dee		21	34	21	20	21	24	28	21	23	19	27	17	17	19
Redesdale		41	15	23	34	24	32	30	21	30	33	44	37	32	28
Eskdalemuir		20	16	19	22	18	26	17	18	21	26	24	24	18	20
Whiteadder		30	20	35	32	17	30	27	22	24	28	33	24	21	20
Balquhidder		14	15	12	14	11	16	16	15	12	12	24	18	14	12
Polloch		-	-	-	-	-	8	8	5	6	7	7	6	5	5
Glen Dye		-	26	29	28	25	32	22	28	33	29	43	23	22	22
Allt a' Mharcaidh		6	10	3	7	5	5	4	4	8	5	7	5	5	6
Strathvaich Dam		-	4	3	4	3	5	5	4	4	5	5	6	4	4
Achanarras		11	35	21	18	15	26	9	8	12	15	14	13	13	11

Table A.2.5 - Precipitation-weighted Annual Mean Sodium, 1986 to 1999 ($\mu\text{eq l}^{-1}$)

Site	Year	Precipitation-weighted Annual Mean Sodium ($\mu\text{eq l}^{-1}$)													
		86	87	88	89	90	91	92	93	94	95	96	97	98	99
Goonhilly		264	206	212	276	506	327	238	227	265	270	313	284	292	292
Yarner Wood		98	125	150	166	245	140	104	101	123	128	127	118	127	88
Barcombe Mills		186	255	153	204	359	137	128	98	147	176	195	164	154	173
Compton		54	67	70	84	129	71	40	55	64	64	76	77	58	55
Flatford Mill		99	60	54	79	79	70	57	54	73	79	76	60	59	49
Woburn		71	65	50	60	87	54	28	41	56	51	61	58	36	46
Tycanol Wood		116	90	104	232	232	163	120	119	164	157	146	159	145	151
Llyn Brianne		94	68	83	112	152	111	72	97	90	84	94	96	90	103
Pumlumon		-	-	-	104	141	102	72	69	73	79	81	113	95	85
Stoke Ferry		74	49	50	58	84	75	57	53	54	46	71	55	56	55
Preston Montford		86	38	86	39	100	164	38	66	58	64	35	80	40	54
Bottesford		82	35	59	47	62	54	35	35	39	49	58	27	33	39
Beddgelert		126	75	122	134	193	162	95	111	98	129	97	-	-	-
Llyn Llydaw		-	-	-	-	-	-	-	-	-	-	-	107	88	104
Wardlow Hay Cop		71	52	90	57	140	131	57	95	94	66	82	60	65	70
Driby		95	53	64	98	91	103	67	70	83	100	121	58	77	65
Jenny Hurn		97	47	80	68	104	55	37	47	53	54	73	36	61	51
Thorganby		74	50	52	69	90	96	50	51	52	51	59	45	67	53
High Muffles		61	63	67	95	83	103	78	111	88	113	153	82	106	76
Bannisdale		122	62	133	116	161	182	91	106	95	129	95	156	101	131
Hillsborough Forest		-	-	-	89	140	107	72	87	125	108	107	78	97	90
Lough Navar		248	102	317	139	261	192	133	187	174	125	116	131	136	171
Cow Green Reservoir		74	40	69	76	90	84	74	72	77	93	91	99	89	100
Loch Dee		116	54	136	132	147	123	86	79	92	106	91	109	91	124
Redesdale		114	44	66	91	67	80	59	73	76	75	93	55	65	65
Eskdalemuir		86	37	62	81	86	2	53	63	77	88	63	66	76	102
Whiteadder		112	53	83	92	78	59	79	103	120	100	121	93	80	86
Balquhidder		122	45	59	110	100	89	61	145	120	71	122	87	81	122
Polloch		-	-	-	-	-	213	118	204	155	168	148	127	161	194
Glen Dye		-	52	73	83	81	78	65	86	108	98	121	112	91	83
Allt a' Mharcaidh		90	37	45	88	62	46	57	143	92	57	66	70	65	83
Strathvaich Dam		-	83	109	126	174	147	121	212	154	102	130	116	122	180
Achanarras		231	145	217	277	212	235	186	224	217	169	219	167	202	249

Table A.2.6 - Precipitation-weighted Annual Mean Magnesium, 1986 to 1999 ($\mu\text{eq l}^{-1}$)

Site	Year	Precipitation-weighted Annual Mean Magnesium ($\mu\text{eq l}^{-1}$)													
		86	87	88	89	90	91	92	93	94	95	96	97	98	99
Goonhilly		61	48	49	63	19	77	57	54	64	73	86	82	87	93
Yarner Wood		23	30	35	38	58	32	26	28	33	38	37	35	41	37
Barcombe Mills		44	62	35	49	85	34	33	28	40	48	58	48	48	57
Compton		13	19	21	21	31	18	11	15	18	20	25	26	26	27
Flatford Mill		32	17	16	23	22	19	15	15	18	20	21	17	20	18
Woburn		9	11	13	18	24	14	9	12	15	15	18	18	13	19
Tycanol Wood		27	21	24	53	54	39	29	31	43	45	43	45	48	54
Llyn Brianne		21	16	20	27	36	27	19	26	25	24	29	27	32	41
Pumlumon		-	-	-	24	32	23	19	20	23	25	25	33	35	37
Stoke Ferry		20	12	13	16	23	18	16	15	16	12	21	16	19	22
Preston Montford		21	11	22	11	24	43	11	18	20	42	15	25	25	27
Bottesford		26	11	18	16	18	16	11	10	12	14	16	10	14	17
Beddgelert		29	18	26	31	44	37	24	29	28	37	31	-	-	-
Llyn Llydaw		-	-	-	-	-	-	-	-	-	-	-	32	33	41
Wardlow Hay Cop		18	15	25	17	35	32	15	25	27	18	24	18	23	27
Driby		24	14	18	27	27	26	18	22	22	26	34	18	23	23
Jenny Hurn		36	16	30	25	35	21	14	16	22	19	24	13	22	20
Thorganby		22	16	17	23	27	31	16	15	19	15	19	16	23	27
High Muffles		15	17	19	23	29	27	19	30	23	29	39	21	30	26
Bannisdale		29	15	33	27	38	43	23	27	27	35	27	41	32	48
Hillsborough Forest		-	-	-	21	31	24	20	25	36	34	29	27	42	38
Lough Navar		57	24	80	32	60	47	34	48	48	38	37	40	53	63
Cow Green Reservoir		17	10	17	18	22	20	19	19	22	25	25	29	29	41
Loch Dee		29	12	31	31	35	29	22	22	25	31	28	34	35	48
Redesdale		26	12	19	23	18	19	15	20	21	21	27	17	21	26
Eskdalemuir		20	9	15	20	21	25	14	17	22	26	20	20	30	41
Whiteadder		26	13	22	23	20	15	19	26	33	26	31	26	25	33
Balquhidder		29	11	14	26	24	21	16	37	31	22	33	24	28	52
Polloch		-	-	-	-	-	48	30	52	40	46	41	37	54	68
Glen Dye		-	12	18	21	21	19	16	22	26	25	30	28	26	28
Allt a' Mharcaidh		21	8	12	20	15	11	14	35	24	16	20	19	23	35
Strathvaich Dam		-	20	25	28	39	32	31	51	42	31	40	33	42	69
Achanarras		55	37	46	64	49	54	46	56	58	45	59	43	61	83

Table A.2.7 - Precipitation-weighted Annual Mean Calcium, 1986 to 1999 ($\mu\text{eq l}^{-1}$)

Site	Year	Precipitation-weighted Annual Mean Calcium ($\mu\text{eq l}^{-1}$)													
		86	87	88	89	90	91	92	93	94	95	96	97	98	99
Goonhilly		16	15	14	18	31	22	18	18	19	24	23	21	27	30
Yarner Wood		11	15	12	13	17	15	12	13	18	18	16	16	20	22
Barcombe Mills		20	29	22	30	33	32	22	20	28	29	37	25	49	43
Compton		23	51	33	22	32	30	23	20	34	41	55	34	61	36
Flatford Mill		33	21	27	37	29	24	18	21	25	21	22	18	26	25
Woburn		23	30	38	28	32	24	19	18	24	21	34	23	28	33
Tycanol Wood		12	9	9	31	17	13	11	10	14	17	16	15	19	26
Llyn Brianne		7	8	9	10	15	10	10	10	12	12	12	11	17	19
Pumlumon		-	-	-	7	11	11	9	7	9	12	10	12	14	17
Stoke Ferry		31	22	24	28	45	33	32	25	30	22	35	34	33	39
Preston Montford		14	19	19	14	14	37	18	17	24	76	28	18	34	28
Bottesford		36	33	50	33	23	29	19	17	23	29	25	21	31	31
Beddgelert		9	10	13	9	12	11	11	11	14	18	13	-	-	-
Llyn Llydaw		-	-	-	-	-	-	-	-	-	-	-	11	14	16
Wardlow Hay Cop		47	59	56	55	75	57	55	52	64	55	69	64	89	92
Driby		18	19	27	34	33	27	18	19	28	35	30	21	26	26
Jenny Hurn		56	45	73	48	50	39	27	26	60	31	35	23	44	38
Thorganby		25	25	30	37	35	67	27	24	67	29	32	33	53	57
High Muffles		13	21	23	27	20	23	21	19	25	26	23	21	20	28
Bannisdale		13	12	14	13	15	16	15	14	16	17	16	17	20	28
Hillsborough Forest		-	-	-	13	14	17	16	15	24	25	24	21	36	34
Lough Navar		17	10	21	12	18	25	19	24	27	26	25	23	29	33
Cow Green Reservoir		7	8	12	12	13	11	13	12	13	16	14	13	16	23
Loch Dee		10	9	11	9	11	10	11	9	11	14	10	12	23	19
Redesdale		12	10	20	18	11	14	13	10	18	13	16	13	13	19
Eskdalemuir		7	5	8	21	8	10	8	9	14	13	8	10	17	17
Whiteadder		14	14	20	16	11	13	12	12	18	19	15	13	14	19
Balquhidder		8	5	6	9	8	11	8	11	10	9	10	9	16	19
Polloch		-	-	-	-	-	16	13	13	14	13	12	11	20	24
Glen Dye		-	7	10	11	9	9	10	10	12	10	10	10	10	15
Allt a' Mharcaidh		10	8	7	8	7	6	9	11	12	7	11	9	13	17
Strathvaich Dam		-	7	7	8	13	9	10	13	14	11	15	11	16	20
Achanarras		16	15	20	20	21	17	17	18	18	17	18	15	20	28

Table A.2.8 - Precipitation-weighted Annual Mean Chloride, 1986 to 1999 ($\mu\text{eq l}^{-1}$)

Site	Year	Precipitation-weighted Annual Mean Chloride ($\mu\text{eq l}^{-1}$)													
		86	87	88	89	90	91	92	93	94	95	96	97	98	99
Goonhilly		311	242	253	322	595	373	265	255	296	313	368	320	324	325
Yarner Wood		118	152	180	190	291	160	122	116	139	147	149	133	143	98
Barcombe Mills		226	310	186	252	427	161	156	115	166	202	230	187	180	195
Compton		54	92	94	110	159	89	54	73	74	81	91	89	68	64
Flatford Mill		109	80	70	99	95	88	71	67	79	95	90	68	69	57
Woburn		82	82	61	75	109	69	38	50	64	61	66	64	41	52
Tycanol Wood		141	109	123	266	268	190	135	135	178	184	171	178	162	169
Llyn Brianne		107	83	99	131	178	129	81	109	100	95	107	106	101	117
Pumlumon		-	-	-	124	165	118	83	76	83	91	95	127	108	97
Stoke Ferry		95	65	66	73	101	90	72	63	62	57	86	62	63	62
Preston Montford		109	56	114	59	123	203	50	83	72	84	46	94	47	63
Bottesford		115	58	100	78	97	85	62	63	55	67	74	37	42	43
Beddgelert		154	83	137	156	225	185	107	128	105	149	112	-	-	-
Llyn Llydaw		-	-	-	-	-	-	-	-	-	-	-	120	99	120
Wardlow Hay Cop		99	85	131	84	183	163	78	121	113	87	104	74	78	80
Driby		128	76	90	126	135	123	88	84	98	125	144	69	90	78
Jenny Hurn		169	99	151	123	170	124	86	84	83	99	111	72	89	68
Thorganby		140	102	121	139	166	180	123	106	96	96	90	64	107	73
High Muffles		89	96	106	131	146	140	110	139	108	146	187	98	126	88
Bannisdale		148	75	168	141	193	213	107	124	109	151	113	178	114	149
Hillsborough Forest		-	-	-	106	165	123	84	102	140	130	123	89	110	102
Lough Navar		293	125	409	166	298	222	153	215	191	144	135	150	155	188
Cow Green Reservoir		91	52	85	91	107	98	86	84	89	108	105	117	100	113
Loch Dee		152	66	159	159	173	144	96	89	106	121	106	123	102	138
Redesdale		133	54	84	112	83	97	72	92	86	89	108	62	74	73
Eskdalemuir		105	47	76	97	103	118	65	71	85	101	74	74	87	113
Whiteadder		129	64	100	110	93	69	93	117	132	115	139	104	91	97
Balquhidder		146	58	70	131	125	104	70	166	135	83	146	100	92	140
Polloch		-	-	-	-	-	249	135	226	169	191	176	143	183	226
Glen Dye		-	64	86	98	98	91	78	102	124	115	146	124	103	93
Allt a' Mharcaidh		104	39	52	104	72	53	65	158	99	66	76	82	75	93
Strathvaich Dam		-	101	129	148	207	168	138	227	169	116	149	131	138	201
Achanarras		280	174	253	317	251	272	209	255	245	195	246	189	225	280

Table A.2.9 - Precipitation-weighted Annual Mean Sulphate, 1986 to 1999 ($\mu\text{eq l}^{-1}$)

Site	Year	Precipitation-weighted Annual Mean Sulphate ($\mu\text{eq l}^{-1}$)													
		86	87	88	89	90	91	92	93	94	95	96	97	98	99
Goonhilly		61	59	47	63	85	75	50	57	58	56	69	59	53	51
Yarner Wood		39	52	40	47	49	44	38	40	43	39	48	41	34	28
Barcombe Mills		68	80	58	68	82	68	58	45	54	54	61	45	48	47
Compton		84	112	72	70	73	71	67	55	63	57	70	51	45	38
Flatford Mill		102	78	73	89	67	79	59	48	58	62	61	48	50	50
Woburn		82	86	91	81	76	70	60	49	66	52	63	46	46	44
Tycanol Wood		41	37	36	54	50	51	41	37	42	40	45	38	36	39
Llyn Brianne		36	37	36	40	46	43	36	38	37	32	38	31	30	29
Pumlumon		-	-	-	32	35	34	32	31	27	30	33	31	26	23
Stoke Ferry		89	82	72	91	91	86	74	60	68	56	61	55	49	47
Preston Montford		56	65	66	65	49	85	69	56	59	68	53	42	31	30
Bottesford		100	98	116	89	73	82	77	62	67	61	61	47	49	43
Beddgelert		61	39	39	38	42	43	34	38	32	35	35	-	-	-
Llyn Llydaw		-	-	-	-	-	-	-	-	-	-	-	27	27	30
Wardlow Hay Cop		80	98	94	86	90	100	80	83	87	73	88	66	58	58
Driby		80	80	85	91	91	90	73	58	72	82	64	49	62	49
Jenny Hurn		121	112	130	107	101	90	81	66	86	72	90	62	78	60
Thorganby		94	86	94	96	93	126	94	85	78	62	76	68	69	56
High Muffles		70	82	90	85	77	87	80	69	70	65	83	57	62	46
Bannisdale		56	45	61	54	60	60	53	57	48	53	55	50	42	38
Hillsborough Forest		-	-	-	62	53	55	50	51	60	46	58	36	41	41
Lough Navar		48	28	34	34	46	41	33	40	37	31	31	31	28	30
Cow Green Reservoir		44	43	53	44	44	44	47	49	40	43	48	38	36	34
Loch Dee		47	41	52	39	43	42	37	38	36	37	47	31	29	34
Redesdale		72	51	70	58	44	52	53	44	51	46	63	44	42	33
Eskdalemuir		41	35	41	38	42	43	34	37	38	38	36	32	30	31
Whiteadder		66	55	72	58	42	52	59	49	54	55	58	44	37	35
Balquhidder		41	39	35	37	34	38	31	43	38	30	52	31	29	29
Polloch		-	-	-	-	-	42	31	39	34	33	36	26	30	32
Glen Dye		-	54	58	51	49	54	51	48	60	53	76	44	40	35
Allt a' Mharcaidh		35	29	26	29	23	22	23	32	29	21	31	22	19	19
Strathvaich Dam		-	26	27	27	31	30	33	35	28	22	32	26	24	25
Achanarras		52	50	57	63	48	52	47	47	45	40	51	41	41	46

Table A.2.10 - Annual volume of Rain Samples collected in the Secondary Network*, 1986 to 1999 (mm)

Site	Year	Annual Mean Rainfall (mm)													
		86	87	88	89	90	91	92	93	94	95	96	97	98	99
Goonhilly		907	879	910	753	790	800	776	1008	999	744	743	1000	936	831
Yarner Wood		1150	1015	1123	1131	1174	1058	1049	1398	1333	1135	1007	1218	1383	1106
Barcombe Mills		740	849	678	597	639	620	653	738	806	652	539	818	733	655
Compton		586	629	530	550	407	449	709	644	586	647	392	576	642	644
Flatford Mill		528	660	532	392	393	362	510	518	438	335	231	409	493	546
Woburn		758	672	592	540	400	478	694	655	505	515	328	456	620	537
Tycanol Wood		1508	1318	1385	1340	1437	1422	1572	1692	1460	1320	1366	1589	1505	1246
Llyn Brianne		1491	1497	1434	1417	1483	1224	1488	1573	1474	1143	1195	1296	1737	1725
Pumlumon		-	-	-	1896	1936	1908	2129	2123	2445	1622	1554	1780	2641	2230
Stoke Ferry		503	617	537	495	348	350	508	601	479	375	318	519	517	435
Preston Montford		539	570	514	580	538	443	554	585	520	409	403	550	590	666
Bottesford		545	651	531	469	434	377	557	651	526	327	289	596	573	540
Beddgelert		2758	2231	2794	2480	2394	2028	3013	2152	2375	2097	747	-	-	-
Llyn Llydaw		-	-	-	-	-	-	-	-	-	-	827	2068	2777	2313
Wardlow Hay Cop		928	889	837	708	711	617	849	852	977	581	530	853	1018	860
Driby		702	685	605	457	473	398	676	636	513	375	415	578	620	598
Jenny Hurn		518	652	409	443	351	354	505	546	452	460	301	423	530	554
Thorganby		503	625	516	364	434	329	511	485	496	395	348	477	448	597
High Muffles		711	875	855	599	806	626	836	947	740	670	693	827	980	936
Bannisdale		2249	2101	2091	1699	2270	1857	2027	1794	2290	1690	1328	1771	2167	1798
Hillsborough Forest		-	-	-	642	909	668	635	802	614	742	662	824	777	730
Lough Navar		1439	1144	1492	1242	1617	1459	1977	1517	1631	1521	1373	1395	1686	1383
Cow Green Reservoir		1129	1216	1138	858	1165	957	1073	1118	1293	807	1149	1058	1353	1275
Loch Dee		2373	2311	2619	2001	2574	2196	2659	1950	2393	2036	1928	2269	2473	2373
Redesdale		745	828	832	499	724	581	662	585	541	507	444	437	843	632
Eskdalemuir		1523	1275	1396	1236	1528	1248	1609	1330	1631	1202	1211	1487	1700	1479
Whiteadder		584	718	712	489	721	569	665	722	566	473	395	546	750	583
Balquhidder		2008	1428	1736	1967	2398	1683	1814	1575	1547	1637	1096	1579	1540	1863
Polloch		-	-	-	-	-	2021	2355	1790	2012	1788	1606	1904	2250	2098
Glen Dye		-	898	1067	659	809	691	758	969	637	724	740	1049	1005	792
Allt a' Mharcaidh		777	664	761	638	907	729	757	826	714	678	477	601	846	874
Strathvaich Dam		-	959	1205	1357	1713	1396	1609	1147	1272	1282	885	1200	1458	1444
Achanarras		889	864	642	476	776	512	635	567	535	622	488	478	700	646

* All samples including those with phosphate contamination

Appendix 3

Geostatistics

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:

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

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

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

Spherical

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

Linear

$$\gamma(h) = c_0 + \omega h^\theta \quad 4$$

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 variable 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 $l_1 z_1 + l_2 z_2 + \dots$. 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.3.1.

Table A.3.1 - Variogram Models fitted to 1999 Annual Mean Concentrations of the Major Ions

Ion	Model	Sill ($\mu\text{eq l}^{-1}$) ²	Range (km)
acidity (\log_e transformed)	exponential	0.45	260
non-marine sulphate	exponential	400	300
nitrate	exponential	200	260
ammonium	exponential	400	260

Appendix 4

Sulphur Data, 1999

A4.1	Sulphur Dioxide
A4.2	Particulate Sulphate

Appendix 4.1

Sulphur Dioxide Data, 1999

Monthly and Annual Mean Concentrations of Sulphur Dioxide as S (SO₂ - S)
Concentration in Air (µg S m⁻³)

Site	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99	Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99	Annual Mean
Eskdalemuir	-	0.39	0.44	0.66	0.48	0.52	0.43	0.62	0.64	0.42	0.51	0.43	0.50
Stoke Ferry	1.39	2.68	1.84	1.25	1.10	1.06	1.33	1.25	1.13	-	1.48	1.24	1.42
Lough Navar	0.31	0.21	0.27	0.31	0.33	0.27	0.33	0.34	0.20	0.37	0.23	0.20	0.28
Barcombe Mills	0.75	1.18	1.07	0.76	0.84	0.84	1.08	0.92	0.67	0.95	0.95	1.18	0.93
Yarner Wood	0.54	0.47	0.43	0.54	0.62	-	0.59	0.51	0.50	0.73	0.97	0.34	0.57
High Muffles	0.36	0.50	0.31	0.42	0.32	0.77	0.82	0.84	1.87	1.08	1.52	2.27	0.92
Strathvaich Dam	0.23	0.24	0.28	0.49	0.35	0.43	0.39	0.53	0.45	0.26	0.30	0.24	0.35
Glen Dye	0.35	0.24	0.53	0.49	0.49	0.31	0.30	0.43	0.62	0.29	0.34	0.28	0.39

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

National Environmental Technology Centre
 Site: 5002 Eskdalemuir - Sulphur Dioxide as S (SO₂ - S)
 Concentration in air ($\mu\text{g S m}^{-3}$)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.27	N	0.12	2.94	0.40	0.40	0.19	0.48	0.24	0.45	0.19	0.13
2 - 3	0.22	0.37	0.15	1.07	0.79	0.52	0.57	2.10	0.20	0.28	0.32	0.46
3 - 4	0.18	0.19	0.51	0.44	0.60	0.22	0.41	0.82	0.23	0.26	0.20	0.34
4 - 5	0.31	0.21	0.58	0.17	1.70	0.22	0.39	0.91	0.33	0.40	0.30	0.50
5 - 6	0.15	0.36	2.42	0.25	1.21	0.14	0.18	0.20	1.49	0.39	0.27	0.31
6 - 7	N	0.72	0.64	0.17	0.92	0.24	0.21	0.23	0.32	0.43	0.31	0.25
7 - 8	N	0.30	0.16	0.29	1.57	0.31	0.26	0.32	0.24	0.24	0.22	0.37
8 - 9	N	1.11	0.35	0.26	0.45	0.45	0.27	0.23	0.55	<0.11	0.27	0.16
9 - 10	N	1.18	0.19	0.25	0.19	0.29	N	0.31	0.30	0.13	0.38	<0.15
10 - 11	N	0.86	1.00	0.18	0.36	0.67	1.21	0.57	1.47	0.11	1.80	0.58
11 - 12	N	0.29	3.08	0.24	0.24	0.32	0.24	0.59	0.72	0.14	1.34	0.67
12 - 13	N	0.22	0.26	0.52	0.33	0.19	0.31	1.89	0.44	0.28	0.26	0.29
13 - 14	N	0.56	0.27	0.65	0.28	0.14	0.20	0.23	0.62	0.41	0.60	0.97
14 - 15	N	0.18	0.25	0.34	0.24	0.18	0.25	0.18	0.29	0.62	0.66	1.01
15 - 16	N	0.10	0.14	1.46	0.20	0.31	0.23	0.16	2.71	0.31	0.29	0.33
16 - 17	N	0.19	0.18	0.18	0.50	0.28	0.25	0.23	0.41	0.45	0.77	0.17
17 - 18	N	0.24	0.15	0.30	0.12	0.25	0.35	1.32	0.44	0.58	0.62	0.27
18 - 19	N	0.19	0.16	0.27	0.27	0.40	0.29	0.80	1.08	0.31	0.94	1.45
19 - 20	N	0.16	0.14	1.13	0.37	0.17	0.22	1.70	0.52	0.38	1.99	0.82
20 - 21	N	0.15	0.14	1.11	0.37	0.24	0.22	1.50	1.77	0.67	0.74	1.55
21 - 22	N	0.15	0.20	0.47	0.21	0.13	0.27	0.41	0.44	1.21	0.53	0.59
22 - 23	N	0.21	0.16	0.23	0.13	N	0.50	0.49	1.18	1.27	0.30	0.46
23 - 24	N	0.32	0.13	0.29	0.24	0.93	0.36	1.06	0.32	0.49	0.16	0.18
24 - 25	N	1.51	0.21	0.35	0.71	0.87	0.22	0.36	0.23	0.24	0.20	0.18
25 - 26	N	0.14	0.17	2.95	0.22	3.32	0.27	0.44	0.32	0.85	0.34	0.28
26 - 27	0.36	0.35	0.27	0.27	0.15	2.30	0.51	0.29	0.36	0.27	0.26	0.23
27 - 28	0.41	0.19	0.16	N	0.80	0.41	0.54	0.35	0.57	0.30	0.34	<0.12
28 - 29	0.95	0.22	0.28	0.31	0.59	0.38	0.35	0.30	0.87	0.19	0.29	0.21
29 - 30	1.05		0.33	1.02	0.26	0.62	0.35	0.35	0.43	0.77	0.38	0.21
30 - 31	0.38		0.25	0.92	0.19	0.27	1.60	0.29	0.24	0.30	0.15	0.21
31 - 1	N		0.48		0.39		1.55	0.27		0.14		0.11
Arithmetic Mean (3)	-	0.39	0.44	0.66	0.48	0.52	0.43	0.62	0.64	0.42	0.51	0.43
Standard Deviation (3)	-	0.36	0.65	0.73	0.40	0.68	0.37	0.54	0.57	0.29	0.46	0.38
Sample Size	10	27	31	29	31	29	30	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: 5004 Stoke Ferry - Sulphur Dioxide as S (SO₂ - S)
 Concentration in air ($\mu\text{g S m}^{-3}$)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	1.38	4.01	0.74	2.91	2.97	0.53	0.81	1.49	3.05	1.02	0.93	1.30
2 - 3	0.88	2.81	0.72	1.28	1.25	0.66	0.77	2.10	2.22	0.54	0.69	0.29
3 - 4	1.39	1.30	0.61	0.56	1.13	0.50	0.71	2.13	1.02	0.53	1.20	1.56
4 - 5	0.78	1.13	2.86	0.57	1.08	0.62	0.56	1.12	1.43	1.11	1.76	2.97
5 - 6	0.94	2.63	2.79	0.52	1.51	0.52	0.37	0.75	0.76	N	1.40	0.85
6 - 7	2.14	0.76	2.81	0.60	0.81	0.73	1.25	0.59	1.43	N	1.70	0.70
7 - 8	1.03	4.17	2.33	0.86	1.30	0.53	1.72	0.75	0.98	N	1.59	0.63
8 - 9	2.21	4.59	1.10	4.97	0.52	2.14	2.76	0.66	1.29	N	2.27	0.86
9 - 10	0.78	3.54	1.58	1.05	1.04	1.26	0.47	N	0.42	N	1.60	1.45
10 - 11	0.57	4.34	3.36	0.81	0.61	1.17	0.53	1.01	1.24	N	<0.26	1.44
11 - 12	2.06	4.52	2.60	0.70	0.65	0.81	0.79	0.86	2.10	N	0.33	0.62
12 - 13	2.10	4.41	3.52	1.72	0.80	0.39	3.51	1.17	0.64	N	0.34	1.74
13 - 14	2.02	5.73	1.53	1.34	1.97	0.43	1.55	1.17	0.93	N	<0.29	2.08
14 - 15	0.74	2.17	0.84	1.97	1.43	1.52	2.26	0.77	1.23	N	2.98	1.70
15 - 16	1.39	1.94	0.87	1.25	0.40	0.98	1.57	0.57	1.36	N	2.72	2.67
16 - 17	0.99	3.67	1.67	1.00	0.59	2.11	0.83	0.99	0.53	N	1.50	1.69
17 - 18	0.76	3.44	1.41	1.22	0.70	1.66	1.01	0.90	0.57	N	2.65	1.58
18 - 19	0.28	2.16	5.23	0.57	1.01	1.11	0.98	0.79	0.99	N	1.32	N
19 - 20	0.76	1.43	2.51	0.57	2.14	1.07	0.68	7.19	1.36	2.11	2.28	N
20 - 21	0.81	3.17	1.98	0.93	1.86	0.60	0.61	1.00	0.91	1.92	4.56	N
21 - 22	0.50	1.45	0.90	1.16	0.83	3.23	0.70	1.02	0.51	0.95	2.22	N
22 - 23	1.87	<0.27	1.94	N	0.71	1.85	1.33	0.59	1.03	2.60	2.37	1.64
23 - 24	0.75	4.54	2.95	N	0.92	1.42	1.59	0.54	0.31	0.69	1.23	0.65
24 - 25	0.63	1.90	1.53	N	1.04	0.65	1.17	0.62	0.38	1.29	0.84	0.44
25 - 26	0.53	2.34	1.51	0.95	0.93	0.70	1.52	1.27	0.26	0.62	1.19	0.41
26 - 27	1.14	1.08	2.31	1.20	0.79	1.83	5.41	0.54	0.38	2.27	0.71	0.46
27 - 28	4.12	0.85	0.86	1.94	2.51	0.50	0.78	1.33	0.46	0.95	0.95	0.84
28 - 29	2.56	0.72	1.08	0.81	1.31	0.51	1.27	0.83	2.15	2.72	1.10	N
29 - 30	1.40		0.27	0.39	0.88	0.62	0.86	1.44	0.42	1.35	0.65	N
30 - 31	2.81		0.99	1.78	0.31	1.04	1.60	1.11	3.48	1.20	1.11	N
31 - 1	2.90		1.72		0.20		1.29	2.37		0.58		N
Arithmetic Mean (3)	1.39	2.68	1.84	1.25	1.10	1.06	1.33	1.25	1.13	-	1.48	1.24
Standard Deviation (3)	0.88	1.51	1.08	0.94	0.63	0.67	1.02	1.22	0.80	-	0.97	0.73
Sample Size	31	28	31	27	31	30	31	30	30	17	30	23

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 - Sulphur Dioxide as S (SO₂ - S)
 Concentration in air ($\mu\text{g S m}^{-3}$)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	<0.19	0.42	0.19	0.77	0.19	0.23	0.31	0.24	0.23	0.24	0.19	0.23
2 - 3	0.31	0.25	<0.14	0.23	0.27	0.58	0.25	0.28	0.28	0.19	0.21	0.20
3 - 4	0.20	0.23	0.25	0.27	0.34	0.23	0.11	0.31	0.14	0.23	1.00	0.24
4 - 5	0.20	<0.15	0.15	0.24	0.67	0.18	<0.15	0.43	0.17	0.19	0.46	0.28
5 - 6	0.18	0.25	0.22	0.17	0.26	0.22	0.31	0.27	0.32	0.22	0.15	0.11
6 - 7	0.39	0.20	<0.20	0.21	1.09	0.16	0.26	0.26	0.29	<0.16	0.18	0.24
7 - 8	0.16	0.18	<0.16	0.34	0.19	N	0.29	0.31	0.30	<0.15	0.19	0.20
8 - 9	0.17	0.24	0.17	0.29	0.22	0.24	0.54	0.32	0.25	0.14	<0.14	0.27
9 - 10	0.23	0.16	0.67	0.16	0.14	0.16	0.52	0.34	0.29	<0.19	0.15	0.28
10 - 11	0.35	0.20	0.47	<0.17	0.20	0.14	0.28	0.37	0.25	0.21	<0.14	0.14
11 - 12	0.93	0.22	0.67	<0.14	0.20	0.12	0.31	0.35	0.15	<0.14	0.19	0.33
12 - 13	0.44	0.19	0.17	0.27	0.13	<0.20	0.37	0.35	0.28	0.48	N	<0.14
13 - 14	0.46	0.25	0.22	0.30	0.23	0.14	0.22	0.21	0.17	0.15	0.27	0.21
14 - 15	0.53	0.24	0.35	0.25	0.19	0.27	0.12	0.13	0.26	0.31	0.17	0.16
15 - 16	0.54	0.24	0.32	0.30	0.21	0.36	0.28	0.24	0.20	0.70	<0.13	0.27
16 - 17	0.60	0.29	0.23	0.64	0.19	0.29	0.17	0.19	0.19	0.40	0.20	0.20
17 - 18	0.56	<0.16	0.45	0.40	0.23	0.32	0.13	0.21	0.20	0.64	0.24	0.17
18 - 19	0.38	<0.16	0.23	0.29	0.71	0.35	0.14	0.25	<0.14	1.01	0.29	0.20
19 - 20	0.19	0.15	0.22	0.40	0.38	0.29	0.15	0.21	0.13	1.04	0.26	0.20
20 - 21	0.24	0.21	0.29	0.26	1.60	0.30	0.14	0.37	0.26	1.34	0.28	0.26
21 - 22	0.21	0.23	0.18	0.28	0.19	0.32	0.13	0.35	0.16	0.86	0.18	0.24
22 - 23	0.86	0.16	0.15	0.34	0.16	0.29	<0.16	0.62	<0.13	0.48	0.32	0.15
23 - 24	0.26	<0.16	0.34	0.28	0.13	0.26	0.17	1.20	0.20	0.29	0.14	0.17
24 - 25	<0.16	0.23	0.32	0.28	0.13	0.27	0.17	1.11	0.13	0.15	0.15	0.12
25 - 26	0.32	0.21	0.23	0.24	0.21	0.41	0.20	0.17	<0.13	0.16	0.39	0.16
26 - 27	0.20	0.20	0.30	0.63	0.31	0.36	0.49	0.29	0.16	0.19	0.18	0.17
27 - 28	<0.17	0.24	0.35	0.56	0.33	0.55	0.55	0.18	0.25	N	0.35	0.24
28 - 29	<0.16	0.24	0.18	0.41	0.31	0.34	1.11	0.27	0.20	0.40	<0.14	0.24
29 - 30	0.16		0.21	0.18	0.20	0.13	1.02	<0.12	0.26	0.18	0.19	0.21
30 - 31	<0.15		0.23	0.16	0.27	0.24	0.98	0.30	<0.13	0.16	0.19	<0.13
31 - 1	0.18		0.25		0.23		0.45	0.24		0.38		0.15
Arithmetic Mean (3)	0.31	0.21	0.27	0.31	0.33	0.27	0.33	0.34	0.20	0.37	0.23	0.20
Standard Deviation (3)	0.22	0.07	0.14	0.16	0.31	0.12	0.27	0.24	0.08	0.32	0.17	0.06
Sample Size	31	28	31	30	31	29	31	31	30	30	29	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 - Sulphur Dioxide as S (SO₂ - S)
 Concentration in air ($\mu\text{g S m}^{-3}$)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.34	4.13	0.18	0.74	1.48	1.47	0.44	2.11	0.95	0.30	0.45	1.21
2 - 3	0.30	1.31	0.41	0.86	1.18	0.56	0.43	1.66	1.05	0.32	0.44	0.87
3 - 4	0.23	0.49	0.39	0.51	1.87	0.61	0.98	0.74	0.90	0.29	<0.17	0.78
4 - 5	0.32	0.42	1.15	0.55	1.06	0.49	0.79	0.69	1.76	1.00	0.78	0.72
5 - 6	0.86	0.49	1.68	0.37	2.15	0.41	0.52	0.47	1.37	0.95	0.59	0.61
6 - 7	0.74	0.63	1.41	0.43	0.51	0.75	0.93	0.73	0.98	2.00	0.45	0.21
7 - 8	0.33	1.17	0.40	0.75	0.93	0.31	1.14	0.42	0.62	0.58	0.57	0.42
8 - 9	0.78	1.23	1.13	0.97	1.31	0.57	2.18	0.59	0.43	0.45	0.68	0.33
9 - 10	1.07	3.37	0.76	0.40	0.56	0.52	0.76	0.88	0.78	0.44	1.21	0.35
10 - 11	1.69	4.47	2.40	0.28	0.56	0.90	2.95	0.33	1.06	0.26	2.12	0.49
11 - 12	1.37	2.98	1.76	0.51	0.41	1.63	2.84	0.52	1.43	0.50	1.11	0.19
12 - 13	0.43	1.69	1.85	0.80	0.28	1.44	3.73	1.36	0.43	3.23	1.65	0.21
13 - 14	0.77	1.54	0.58	0.56	0.39	0.61	0.90	1.24	0.38	0.92	1.22	0.58
14 - 15	0.68	1.11	0.50	1.18	0.29	1.51	0.42	0.33	0.71	2.27	1.13	1.40
15 - 16	0.48	1.06	1.05	0.76	0.65	0.82	0.97	0.48	0.79	1.03	0.86	5.02
16 - 17	0.32	0.49	0.93	0.49	1.09	0.98	0.70	0.52	0.33	1.13	0.88	1.69
17 - 18	0.37	0.50	2.35	0.89	0.48	1.22	0.65	0.51	0.28	1.09	1.26	1.34
18 - 19	0.43	0.43	2.22	0.97	1.29	0.82	0.83	0.88	1.02	1.71	2.19	4.49
19 - 20	0.26	0.40	1.42	1.04	1.19	1.18	0.84	0.76	0.48	2.17	1.62	3.64
20 - 21	0.39	0.52	2.16	0.56	1.02	0.70	0.80	1.07	0.45	2.91	1.07	3.10
21 - 22	0.61	0.30	0.47	0.47	0.42	0.62	0.51	1.18	0.39	1.09	1.28	1.75
22 - 23	1.22	0.87	0.70	0.85	0.28	0.88	0.60	1.23	0.67	0.72	1.29	1.22
23 - 24	0.52	1.04	0.41	1.06	0.38	0.55	0.64	1.88	0.32	0.43	0.81	0.40
24 - 25	0.29	0.65	0.37	1.28	0.52	1.53	0.75	1.60	0.39	0.39	0.58	0.28
25 - 26	0.23	0.80	1.31	0.78	0.57	1.02	0.73	1.09	0.23	0.32	0.36	0.52
26 - 27	0.34	0.33	0.92	2.09	0.53	1.31	0.46	0.52	0.32	0.29	0.48	0.40
27 - 28	0.62	0.37	0.46	1.04	1.72	0.55	0.61	0.45	0.31	0.29	0.46	0.73
28 - 29	1.47	0.32	1.65	0.50	0.34	0.41	0.75	0.80	0.63	0.53	0.77	1.41
29 - 30	1.99		0.33	0.43	1.86	<0.17	1.13	1.46	0.29	0.85	1.60	0.91
30 - 31	1.37		0.66	0.76	0.49	0.64	1.63	0.68	0.49	0.63	0.57	0.41
31 - 1	2.35		1.23		0.39		1.79	1.29		0.38		0.74
Arithmetic Mean (3)	0.75	1.18	1.07	0.76	0.84	0.84	1.08	0.92	0.67	0.95	0.95	1.18
Standard Deviation (3)	0.56	1.15	0.67	0.36	0.54	0.41	0.81	0.48	0.39	0.80	0.52	1.24
Sample Size	31	28	31	30	31	30	31	31	30	31	30	31

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

National Environmental Technology Centre
 Site: 5008 Yarner Wood - Sulphur Dioxide as S (SO₂ - S)
 Concentration in air ($\mu\text{g S m}^{-3}$)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.18	0.86	<0.13	1.50	0.33	N	0.43	0.42	0.43	0.19	0.19	0.27
2 - 3	0.12	0.69	0.11	0.37	0.88	N	0.83	0.42	0.92	<0.18	0.75	0.26
3 - 4	0.15	0.16	<0.11	0.18	1.73	N	0.37	0.39	1.00	0.21	0.20	0.26
4 - 5	0.24	0.22	0.20	0.20	2.90	N	0.36	0.80	1.17	0.20	0.50	0.27
5 - 6	0.66	0.19	0.21	0.13	1.62	N	0.36	0.41	1.56	0.85	0.29	0.29
6 - 7	0.47	0.19	<0.17	0.18	0.53	N	0.19	0.37	0.44	0.85	0.16	0.19
7 - 8	0.17	0.23	0.26	0.26	0.53	N	0.40	0.28	N	0.31	0.16	0.15
8 - 9	3.99	4.02	1.75	0.25	0.25	N	0.31	0.30	0.53	0.15	0.35	0.18
9 - 10	1.17	0.94	1.38	0.21	0.66	N	1.15	0.44	0.46	<0.14	3.81	0.13
10 - 11	N	0.36	1.33	0.17	0.22	N	0.93	N	1.61	0.21	3.72	0.20
11 - 12	N	0.22	2.38	0.14	0.43	N	1.26	0.35	0.47	0.29	1.27	0.15
12 - 13	1.82	0.92	0.25	0.25	0.19	N	0.71	0.77	0.52	0.55	1.67	0.12
13 - 14	N	1.08	0.18	0.14	0.18	N	0.36	0.26	0.34	1.56	0.76	0.28
14 - 15	0.15	0.20	0.23	0.85	0.59	N	0.25	0.21	0.37	2.96	1.80	0.81
15 - 16	N	0.24	0.31	0.21	0.42	N	0.36	0.23	N	2.08	0.51	0.49
16 - 17	0.19	N	N	0.43	0.99	N	0.31	0.23	0.24	1.06	0.43	0.32
17 - 18	0.16	0.15	0.30	1.78	0.37	N	0.38	N	0.36	1.18	0.39	0.28
18 - 19	<0.11	0.11	0.17	0.24	0.34	0.43	0.31	N	0.28	1.87	0.13	0.51
19 - 20	0.18	0.12	0.27	0.34	1.27	0.33	0.38	N	0.32	2.52	3.40	2.28
20 - 21	0.24	<0.17	0.21	0.20	0.23	0.50	0.24	0.80	0.21	1.51	3.32	0.65
21 - 22	0.23	0.18	0.19	0.26	0.15	0.57	0.40	0.86	0.37	0.62	1.62	0.32
22 - 23	0.56	0.20	0.11	0.34	0.14	N	0.29	0.75	0.32	0.29	0.38	0.17
23 - 24	0.54	0.28	N	0.19	0.15	0.31	0.45	1.59	0.21	0.23	0.20	0.15
24 - 25	0.26	N	N	0.36	0.21	1.35	0.47	0.56	0.20	0.15	0.25	0.20
25 - 26	0.23	0.24	0.21	0.33	<0.15	1.48	1.13	0.46	0.14	0.32	0.25	0.11
26 - 27	0.19	<0.12	0.15	0.82	N	1.08	1.13	0.47	0.27	0.22	0.34	0.15
27 - 28	0.24	0.13	0.38	0.60	N	0.27	0.79	N	0.26	0.44	0.48	0.29
28 - 29	0.17	0.17	0.50	0.88	N	0.39	0.63	0.33	0.25	0.29	0.70	0.34
29 - 30	0.34		0.18	2.95	N	0.40	0.92	0.51	N	0.77	0.66	0.35
30 - 31	0.87		0.19	1.51	N	0.34	1.54	0.38	0.20	0.28	0.32	0.20
31 - 1	0.95		0.52		N		0.55	0.62		0.19		0.21
Arithmetic Mean (3)	0.54	0.47	0.43	0.54	0.62	-	0.59	0.51	0.50	0.73	0.97	0.34
Standard Deviation (3)	0.80	0.78	0.57	0.63	0.66	-	0.36	0.29	0.40	0.77	1.13	0.39
Sample Size	27	26	28	30	25	12	31	26	27	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 - Sulphur Dioxide as S (SO₂ - S)
 Concentration in air ($\mu\text{g S m}^{-3}$)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.60	0.16	0.17	0.65	0.57	0.58	2.10	1.79	0.24	0.40	3.09	0.20
2 - 3	0.24	0.15	0.13	0.86	0.29	0.21	1.91	2.55	5.26	0.50	0.45	0.34
3 - 4	0.19	0.17	0.16	0.64	0.86	0.27	0.67	1.51	4.23	1.16	1.64	0.23
4 - 5	0.25	0.14	0.18	0.56	0.19	0.29	N	1.26	1.17	4.05	5.29	1.49
5 - 6	0.33	0.30	0.31	0.31	0.27	0.28	N	0.42	0.94	1.94	1.85	1.50
6 - 7	0.12	0.64	0.18	0.17	0.26	0.23	N	2.69	1.81	2.18	1.08	0.37
7 - 8	<0.09	0.64	0.15	0.39	0.56	0.24	N	0.21	1.08	0.52	0.42	0.51
8 - 9	0.14	1.09	0.13	0.32	0.20	0.26	0.98	0.24	0.55	0.24	2.41	3.06
9 - 10	0.26	2.12	0.17	0.29	0.41	0.33	0.44	0.21	4.01	0.14	1.72	0.74
10 - 11	0.59	2.16	0.16	0.27	0.49	0.41	0.50	0.97	2.15	0.28	0.39	0.89
11 - 12	0.57	0.52	0.34	0.30	0.33	0.25	0.49	1.01	1.87	0.20	0.22	0.73
12 - 13	1.40	0.74	0.54	0.36	0.18	0.20	0.73	0.70	0.44	0.37	0.18	0.60
13 - 14	0.16	0.74	0.19	0.22	0.24	0.30	1.14	1.56	2.39	1.13	0.57	2.50
14 - 15	0.65	0.40	0.19	0.28	0.15	0.44	0.42	0.23	1.60	0.66	0.22	1.65
15 - 16	0.16	0.46	0.40	0.22	0.25	0.97	0.27	0.22	0.58	0.27	0.94	1.71
16 - 17	0.21	0.26	0.21	0.14	0.25	0.44	0.32	0.22	2.27	0.48	1.33	0.53
17 - 18	0.23	0.26	0.20	0.16	0.18	0.40	0.68	1.71	1.90	0.39	3.56	2.91
18 - 19	0.68	0.32	0.14	0.60	0.21	0.38	0.84	0.37	0.85	0.32	1.88	5.66
19 - 20	0.46	0.21	0.46	0.23	0.54	0.29	4.02	0.45	0.61	0.69	0.83	4.90
20 - 21	0.33	0.15	0.13	0.30	0.54	0.33	0.68	0.90	1.02	1.38	1.39	9.03
21 - 22	0.13	0.21	0.11	1.71	0.19	0.57	0.29	0.97	6.10	0.97	1.25	11.35
22 - 23	0.26	0.39	0.23	0.49	0.15	0.32	0.44	0.41	2.58	2.42	1.02	5.62
23 - 24	0.72	0.68	0.19	0.75	0.16	1.43	0.26	0.31	3.66	1.55	2.51	3.31
24 - 25	0.47	0.32	0.28	0.70	0.13	2.35	N	0.33	1.21	0.24	1.97	1.45
25 - 26	0.20	0.39	0.30	0.37	0.20	5.57	0.68	1.16	0.69	0.74	1.78	0.58
26 - 27	0.28	0.17	0.12	0.24	0.24	2.64	0.34	0.57	1.03	0.51	1.72	0.27
27 - 28	0.15	0.15	0.20	0.17	0.70	0.75	0.40	0.50	1.36	0.99	2.42	2.74
28 - 29	0.54	0.14	1.14	0.33	0.32	0.71	0.25	0.37	2.50	0.27	2.38	1.88
29 - 30	0.30		0.50	0.24	0.20	0.87	N	1.78	1.29	3.99	0.63	1.84
30 - 31	0.22		0.53	0.23	0.17	0.65	0.62	0.30	0.60	1.83	0.43	0.72
31 - 1	0.15		1.38		0.58		0.95	0.25		2.83		0.94
Arithmetic Mean (3)	0.36	0.50	0.31	0.42	0.32	0.77	0.82	0.84	1.87	1.08	1.52	2.27
Standard Deviation (3)	0.27	0.52	0.29	0.31	0.19	1.08	0.81	0.70	1.47	1.06	1.14	2.62
Sample Size	31	28	31	30	31	30	25	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: 5010 Strathvaich Dam - Sulphur Dioxide as S (SO₂ - S)
 Concentration in air ($\mu\text{g S m}^{-3}$)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.64	0.33	<0.34	1.37	0.32	0.29	0.52	1.01	0.30	0.44	<0.27	0.28
2 - 3	0.32	<0.33	<0.35	1.49	<0.30	0.25	0.50	1.20	<0.31	<0.28	<0.31	0.44
3 - 4	<0.35	<0.33	0.40	0.51	0.39	<0.24	0.51	0.74	0.39	<0.30	<0.28	0.21
4 - 5	0.40	<0.35	0.36	0.43	0.70	0.30	0.37	0.88	0.33	0.62	0.37	0.18
5 - 6	<0.35	<0.36	<0.34	0.46	0.42	0.28	0.46	0.59	0.46	<0.30	0.39	0.27
6 - 7	<0.35	<0.36	<0.33	0.38	0.42	0.28	0.41	0.52	0.31	<0.31	<0.30	0.40
7 - 8	<0.34	<0.37	<0.34	0.41	<0.32	<0.26	<0.31	0.41	0.35	<0.29	<0.30	<0.29
8 - 9	<0.35	<0.36	<0.32	0.37	<0.32	0.44	<0.31	0.34	0.34	<0.28	<0.28	0.75
9 - 10	<0.33	<0.35	0.36	0.47	<0.31	0.47	1.17	0.37	<0.29	0.38	<0.28	<0.30
10 - 11	<0.35	<0.32	0.46	0.34	<0.32	0.50	<0.32	0.38	0.46	<0.30	0.39	<0.27
11 - 12	<0.35	<0.33	0.72	0.43	0.55	0.59	0.30	0.44	<0.31	<0.30	<0.29	<0.27
12 - 13	<0.35	0.34	0.35	0.32	0.75	0.61	0.38	0.41	<0.29	<0.30	0.36	<0.30
13 - 14	<0.36	0.61	<0.32	0.42	0.45	0.50	<0.30	0.46	0.49	0.31	0.35	<0.28
14 - 15	<0.36	<0.33	0.35	0.52	0.34	0.69	<0.27	0.32	0.41	<0.30	0.50	<0.27
15 - 16	<0.37	<0.35	<0.33	0.43	0.39	0.53	<0.29	<0.33	1.92	<0.29	<0.29	<0.30
16 - 17	<0.36	<0.37	<0.33	0.42	0.49	0.46	<0.29	0.39	0.89	0.47	0.19	<0.30
17 - 18	<0.33	<0.34	0.39	0.66	<0.29	0.57	<0.30	0.69	0.34	<0.32	0.47	<0.28
18 - 19	0.58	<0.30	<0.35	0.49	0.31	0.47	<0.29	0.38	0.78	0.36	0.39	<0.27
19 - 20	<0.34	<0.34	<0.35	0.31	0.53	0.68	<0.30	0.39	0.54	0.31	0.49	<0.25
20 - 21	<0.35	0.42	<0.34	0.49	0.35	0.55	0.28	0.40	<0.33	0.52	0.26	1.24
21 - 22	<0.30	<0.34	<0.33	0.84	0.39	0.64	0.40	0.61	0.59	0.57	0.26	0.46
22 - 23	0.51	<0.34	0.34	0.31	<0.31	0.30	0.45	0.46	0.85	0.45	0.54	<0.29
23 - 24	<0.33	0.47	<0.33	<0.28	<0.31	<0.29	0.41	0.46	0.55	0.33	0.03	<0.30
24 - 25	<0.34	0.71	0.39	<0.28	0.36	<0.29	<0.32	0.50	0.53	0.30	0.23	<0.28
25 - 26	<0.33	<0.33	<0.33	0.58	0.36	0.63	0.44	0.40	<0.30	<0.33	0.51	<0.27
26 - 27	0.34	<0.32	<0.33	0.50	0.39	1.12	0.34	0.44	0.35	0.29	0.37	<0.27
27 - 28	<0.35	<0.34	<0.33	0.65	0.52	0.37	0.75	<0.30	0.33	<0.29	0.75	<0.26
28 - 29	<0.35	<0.35	<0.35	0.47	<0.31	<0.26	0.31	0.83	0.41	<0.29	0.23	<0.30
29 - 30	<0.35		<0.33	<0.32	<0.30	0.37	<0.31	0.43	0.30	<0.30	0.28	<0.28
30 - 31	0.34		<0.33	0.31	0.41	0.35	0.60	0.99	0.43	0.34	0.45	<0.29
31 - 1	<0.35		1.09		0.46		1.78	0.53		<0.28		<0.30
Arithmetic Mean (3)	0.23	0.24	0.28	0.49	0.35	0.43	0.39	0.53	0.45	0.26	0.30	0.24
Standard Deviation (3)	0.13	0.15	0.20	0.29	0.17	0.22	0.34	0.24	0.34	0.15	0.16	0.23
Sample Size	31	28	31	30	31	30	31	31	30	31	30	31

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

National Environmental Technology Centre
 Site: 5011 Glen Dye - Sulphur Dioxide as S (SO₂ - S)
 Concentration in air (µg S m⁻³)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.89	0.30	0.20	2.79	0.37	0.24	0.27	0.79	0.33	<0.21	0.42	0.23
2 - 3	0.42	0.27	0.56	0.57	0.41	0.49	0.20	1.17	0.31	0.24	<0.14	0.15
3 - 4	0.53	0.26	0.22	1.34	2.43	<0.19	0.17	0.29	0.32	<0.21	1.00	0.11
4 - 5	0.50	0.22	0.20	0.50	0.55	0.34	<0.17	0.51	0.62	0.23	1.18	0.18
5 - 6	0.29	0.22	<0.20	0.40	0.35	0.16	<0.17	0.59	1.51	<0.20	<0.20	0.25
6 - 7	<0.18	0.18	0.21	0.25	0.40	0.27	0.29	0.37	0.87	0.56	0.31	0.14
7 - 8	0.28	0.25	<0.18	0.15	0.21	0.22	0.29	0.23	0.50	<0.20	0.23	<0.22
8 - 9	0.18	0.26	0.30	0.19	0.18	0.28	0.30	0.68	1.13	<0.21	0.24	0.55
9 - 10	<0.18	0.34	0.45	0.21	0.47	<0.16	0.34	0.26	1.00	0.20	0.30	0.50
10 - 11	0.22	<0.18	1.09	0.17	0.80	<0.16	0.33	0.37	1.37	0.29	<0.21	0.22
11 - 12	0.86	0.17	4.27	<0.16	0.41	0.40	0.18	0.34	0.73	<0.17	0.42	<0.22
12 - 13	0.28	<0.18	0.96	0.20	0.18	0.17	0.93	0.63	0.30	0.25	0.19	<0.22
13 - 14	0.49	0.93	0.72	<0.18	0.39	<0.17	0.32	0.34	1.00	0.21	<0.20	<0.21
14 - 15	0.50	0.21	0.77	<0.17	0.35	<0.16	0.28	0.31	0.39	0.21	<0.21	0.27
15 - 16	0.41	<0.16	0.48	0.27	0.17	0.54	0.25	0.23	1.57	0.30	<0.21	<0.22
16 - 17	0.69	<0.16	0.29	0.18	0.21	0.38	0.27	0.46	0.34	0.25	0.31	<0.22
17 - 18	0.43	<0.16	0.24	0.21	0.25	0.46	0.25	1.34	0.42	0.49	0.30	<0.23
18 - 19	0.85	<0.16	0.18	0.18	0.26	0.19	0.46	0.36	0.44	0.24	0.31	0.23
19 - 20	0.19	<0.15	0.24	0.25	0.42	<0.17	0.60	0.34	0.20	0.23	0.22	<0.23
20 - 21	0.22	0.22	<0.18	0.23	0.84	<0.18	0.30	0.27	0.25	0.44	0.29	1.16
21 - 22	<0.18	0.16	0.39	1.45	0.34	<0.17	0.21	0.34	1.04	0.57	0.22	0.88
22 - 23	0.20	<0.17	0.26	0.64	0.27	0.31	<0.16	0.52	1.40	0.57	0.32	0.35
23 - 24	0.29	0.18	0.25	1.21	0.17	0.44	0.16	0.35	0.83	0.48	1.10	0.77
24 - 25	0.23	0.95	<0.18	0.63	0.20	1.02	0.15	0.34	0.42	0.44	0.21	0.24
25 - 26	<0.18	0.22	0.25	0.38	0.55	0.88	0.22	0.34	0.20	0.24	0.50	<0.20
26 - 27	0.31	0.27	<0.19	0.28	1.67	0.98	0.26	0.23	0.21	<0.18	0.26	<0.21
27 - 28	0.32	0.32	0.19	N	1.04	0.10	0.31	<0.18	0.22	<0.20	0.23	0.25
28 - 29	0.23	0.24	0.66	N	0.22	0.41	0.26	0.19	<0.20	0.33	0.20	<0.20
29 - 30	0.25		0.96	0.57	<0.18	0.26	0.28	0.57	0.27	0.61	0.68	<0.20
30 - 31	<0.15		0.35	0.35	0.56	<0.18	0.73	0.18	0.23	0.58	0.28	0.47
31 - 1	0.36		1.32		0.41		0.55	0.39		<0.21		0.54
Arithmetic Mean (3)	0.35	0.24	0.53	0.49	0.49	0.31	0.30	0.43	0.62	0.29	0.34	0.28
Standard Deviation (3)	0.23	0.21	0.76	0.58	0.48	0.26	0.18	0.27	0.44	0.17	0.29	0.26
Sample Size	31	28	31	28	31	30	31	31	30	31	30	31

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

Appendix 4.2

Particulate Sulphate Data, 1999

Monthly and Annual Mean Concentrations of Particulate Sulphate as S (SO₄ - S)
Concentration in Air (µg S m⁻³)

Site	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99	Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99	Annual Mean
Eskdalemuir	-	0.39	0.46	0.78	0.84	0.56	0.56	0.68	0.65	0.44	0.38	0.24	0.54
Stoke Ferry	0.68	0.85	1.01	1.07	1.00	0.83	0.87	0.86	0.95	-	0.55	0.35	0.82
Lough Navar	0.23	0.28	0.37	0.49	0.63	0.38	0.58	0.58	0.26	0.58	0.29	0.16	0.41
Barcombe Mills	0.69	0.83	1.15	1.08	1.16	0.92	0.96	0.90	0.98	0.79	0.58	0.37	0.87
Yarner Wood	0.38	0.45	0.54	0.63	0.81	-	0.80	0.72	0.74	0.52	0.34	0.14	0.56
High Muffles	0.43	0.47	0.58	0.68	0.75	0.63	0.72	0.82	1.03	0.48	0.46	0.31	0.62
Strathvaich Dam	0.27	0.34	0.40	0.73	0.47	0.32	0.35	0.46	0.40	0.33	0.14	0.13	0.36
Glen Dye	0.22	0.21	0.39	0.76	0.81	0.46	0.53	0.50	0.68	0.40	0.24	0.23	0.45

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

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

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.50	1.16	0.13	3.01	0.37	1.43	0.45	1.28	0.66	0.26	0.27	0.18
2 - 3	0.34	1.13	0.29	2.96	2.57	0.77	0.72	2.06	0.62	0.19	0.35	0.16
3 - 4	0.36	0.68	0.29	1.30	1.93	0.68	0.65	1.44	0.46	0.12	1.04	0.10
4 - 5	0.35	0.29	0.23	0.37	2.16	0.23	0.37	1.60	0.33	N	0.46	0.10
5 - 6	0.29	0.18	0.27	0.45	1.23	0.19	0.36	1.67	2.03	0.20	0.26	0.16
6 - 7	N	0.21	0.28	0.19	1.40	0.13	0.38	1.03	0.77	0.50	0.08	0.18
7 - 8	N	0.23	0.28	0.16	1.70	0.30	0.55	0.53	0.30	0.20	0.29	0.27
8 - 9	N	0.26	0.40	0.56	0.52	0.18	0.68	0.44	0.24	0.20	0.16	0.18
9 - 10	N	0.28	0.63	0.68	0.84	0.20	1.93	0.27	0.25	0.38	0.19	0.12
10 - 11	N	0.38	0.81	0.17	0.50	0.34	2.09	0.41	0.73	0.19	0.31	0.16
11 - 12	N	0.65	1.40	0.22	0.42	0.56	0.54	0.42	1.07	0.22	0.46	0.14
12 - 13	N	0.20	0.97	0.15	0.46	0.26	0.42	1.69	0.35	0.28	0.46	0.14
13 - 14	N	0.92	0.53	0.19	0.50	0.48	0.33	0.75	0.34	0.35	0.42	0.13
14 - 15	N	0.25	0.61	0.15	0.70	0.50	0.15	0.16	N	0.33	0.52	0.14
15 - 16	N	0.28	0.51	0.21	0.45	0.55	0.20	0.16	1.28	0.65	0.25	0.13
16 - 17	N	0.19	0.59	0.23	0.46	0.40	0.51	0.19	0.36	0.88	0.22	0.24
17 - 18	N	0.11	1.09	0.39	0.44	0.23	0.29	0.60	0.34	0.53	0.45	0.19
18 - 19	N	0.19	0.30	0.52	0.64	0.57	0.33	0.39	0.94	0.46	0.31	0.14
19 - 20	N	0.24	0.27	1.19	0.92	0.20	0.23	0.29	1.07	0.41	0.25	0.12
20 - 21	N	0.28	0.30	0.36	0.63	0.09	0.20	0.22	0.95	0.90	0.17	0.36
21 - 22	N	0.12	0.10	0.53	0.26	0.20	0.08	0.39	0.80	0.87	0.48	1.24
22 - 23	N	0.13	0.15	0.47	0.34	N	0.18	0.43	1.70	1.03	0.77	0.51
23 - 24	N	0.24	0.50	0.30	0.31	1.30	0.72	0.63	0.39	0.57	0.67	0.27
24 - 25	N	0.68	0.68	0.62	0.27	1.59	0.36	0.51	0.38	0.44	0.40	0.28
25 - 26	0.43	0.63	0.23	2.54	0.38	1.84	0.15	0.92	0.40	0.27	0.44	0.24
26 - 27	0.32	0.43	0.25	1.52	0.54	1.29	0.14	0.41	0.28	0.36	0.35	0.27
27 - 28	0.48	0.33	0.19	N	1.30	0.54	0.25	0.59	0.63	0.37	0.61	0.45
28 - 29	0.50	0.29	0.22	1.22	1.10	0.24	0.90	0.37	0.52	0.24	0.42	0.11
29 - 30	0.23		0.57	1.00	0.22	0.40	0.80	0.48	0.35	1.09	0.21	N
30 - 31	0.43		0.47	0.86	0.23	0.48	1.24	0.20	0.24	0.52	0.26	N
31 - 1	0.44		0.72		2.25		1.27	0.70		0.30		N
Arithmetic Mean (3)	-	0.39	0.46	0.78	0.84	0.56	0.56	0.68	0.65	0.44	0.38	0.24
Standard Deviation (3)	-	0.29	0.30	0.81	0.66	0.47	0.49	0.52	0.45	0.27	0.20	0.22
Sample Size	12	28	31	29	31	29	31	31	29	30	30	28

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: 5004 Stoke Ferry - Sulphate as S (SO₄ - S)
 Concentration in air ($\mu\text{g S m}^{-3}$)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.57	1.62	0.57	3.05	2.62	0.37	0.72	2.21	1.84	0.48	0.39	0.46
2 - 3	0.41	1.15	0.87	1.04	1.60	1.53	1.30	1.43	2.76	0.19	0.29	0.49
3 - 4	0.45	0.89	0.36	0.95	1.96	0.84	1.00	1.21	1.18	0.12	0.66	0.81
4 - 5	0.41	0.93	0.63	1.23	0.77	0.59	0.70	1.17	1.00	0.31	0.55	0.41
5 - 6	1.06	0.54	0.77	1.09	1.57	0.33	0.59	0.61	1.88	N	0.32	0.19
6 - 7	0.64	0.28	1.03	0.58	1.11	0.47	1.41	1.35	2.30	N	0.28	0.19
7 - 8	0.51	0.42	0.50	0.51	1.13	0.59	1.59	N	0.72	N	0.48	0.26
8 - 9	0.72	0.77	0.76	1.65	0.81	0.85	1.71	0.72	0.78	N	0.59	0.26
9 - 10	0.57	0.79	0.92	1.55	1.05	0.81	1.17	N	0.09	N	0.77	0.31
10 - 11	0.51	0.74	1.50	0.47	0.54	0.62	0.18	0.43	3.09	N	0.11	0.32
11 - 12	1.05	1.13	1.88	0.56	0.51	1.42	0.63	0.25	3.22	N	0.13	0.24
12 - 13	0.87	1.50	1.89	0.45	0.56	0.77	1.13	0.56	0.58	N	0.12	0.35
13 - 14	0.65	1.96	1.12	0.49	0.47	1.11	1.02	1.65	0.52	N	0.08	0.58
14 - 15	0.54	1.31	0.50	0.82	1.12	0.85	0.45	0.90	0.97	N	0.80	0.53
15 - 16	0.35	0.88	0.71	0.57	0.34	1.62	0.64	0.34	0.46	N	0.66	0.26
16 - 17	0.31	0.74	1.00	1.17	0.45	1.74	0.77	0.51	0.63	N	1.06	0.39
17 - 18	0.37	0.56	1.06	1.16	0.76	0.59	0.64	0.64	0.25	N	0.33	0.28
18 - 19	0.26	0.92	1.29	1.00	1.07	0.83	0.89	0.53	0.45	N	0.54	N
19 - 20	0.71	0.82	0.71	1.07	1.82	0.90	0.73	0.80	0.78	2.01	1.07	N
20 - 21	0.65	0.66	0.88	2.67	2.06	0.36	0.48	0.35	0.39	1.14	0.63	N
21 - 22	0.86	0.53	0.70	0.53	0.68	0.53	0.36	0.28	0.51	1.22	0.82	N
22 - 23	1.72	0.25	0.68	N	0.69	1.07	0.39	0.28	0.56	0.65	0.60	0.43
23 - 24	0.99	0.39	1.58	N	1.27	0.95	1.29	0.38	0.38	0.34	1.15	0.24
24 - 25	0.44	0.63	1.08	N	0.59	1.06	1.06	0.63	0.36	0.24	0.69	0.16
25 - 26	0.28	1.21	2.00	1.10	0.56	0.55	0.59	1.35	0.37	0.50	0.41	0.19
26 - 27	0.38	1.03	1.00	0.93	0.66	1.41	0.48	0.73	0.63	0.90	0.77	0.22
27 - 28	0.63	0.57	0.81	1.22	1.39	0.82	0.65	1.00	0.31	0.62	0.44	0.46
28 - 29	0.56	0.53	0.82	1.46	0.81	0.27	0.73	1.11	0.66	0.73	0.89	N
29 - 30	0.67		0.20	0.42	1.06	0.33	0.81	1.36	0.29	1.42	0.50	N
30 - 31	1.41		1.84	1.29	0.42	0.69	1.15	0.50	0.64	0.65	0.45	N
31 - 1	1.57		1.72		0.56		1.89	1.71		0.31		N
Arithmetic Mean (3)	0.68	0.85	1.01	1.07	1.00	0.83	0.87	0.86	0.95	-	0.55	0.35
Standard Deviation (3)	0.37	0.41	0.48	0.63	0.56	0.40	0.41	0.51	0.86	-	0.29	0.16
Sample Size	31	28	31	27	31	30	31	29	30	17	30	23

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 ($\mu\text{g S m}^{-3}$)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.17	0.57	0.22	1.56	0.38	0.64	0.39	0.55	0.25	0.16	0.13	0.23
2 - 3	0.17	0.64	0.14	0.53	2.11	0.92	0.66	0.68	0.25	0.11	0.39	0.16
3 - 4	0.21	0.28	0.27	0.72	1.41	0.47	0.32	0.61	0.15	0.16	0.98	0.12
4 - 5	0.26	0.32	0.21	0.44	2.43	0.09	0.06	1.81	0.13	0.18	0.22	0.11
5 - 6	0.33	0.32	0.16	0.29	0.23	0.21	0.41	0.93	0.45	0.28	0.10	0.10
6 - 7	0.32	0.19	0.04	0.20	2.18	0.22	0.33	0.74	0.11	0.16	0.14	0.16
7 - 8	0.32	0.14	0.02	0.15	0.89	0.33	0.37	1.24	0.17	0.23	0.13	0.15
8 - 9	0.22	0.20	0.22	0.40	0.39	0.25	0.68	0.55	0.22	0.15	0.16	0.18
9 - 10	0.11	0.17	0.77	0.29	0.55	0.18	1.29	0.41	0.21	0.07	0.26	0.13
10 - 11	0.14	0.23	1.00	<0.02	0.33	0.31	0.58	0.46	0.40	0.16	0.53	0.16
11 - 12	0.39	0.43	1.29	0.19	0.36	0.27	1.02	0.47	0.09	0.18	1.02	0.20
12 - 13	0.20	0.16	0.14	0.25	0.17	0.04	1.17	0.65	0.15	0.33	N	0.09
13 - 14	0.31	0.67	0.15	0.25	0.52	0.34	0.15	0.15	0.13	0.39	0.63	0.11
14 - 15	0.42	0.24	0.39	0.19	0.49	0.24	0.16	0.26	0.16	0.90	0.38	0.11
15 - 16	0.18	0.28	0.52	0.18	0.23	0.49	0.20	0.26	0.31	1.51	0.11	0.11
16 - 17	0.15	0.21	0.45	0.24	0.11	0.33	0.26	0.23	0.23	2.10	0.16	0.14
17 - 18	0.22	0.25	0.56	0.13	0.69	0.22	0.19	0.36	0.16	1.24	0.19	0.13
18 - 19	0.29	0.12	0.28	0.18	0.76	0.29	0.23	0.75	0.30	0.85	0.20	0.27
19 - 20	0.31	0.23	0.27	0.68	0.73	0.14	0.39	0.27	0.30	0.79	0.20	0.12
20 - 21	0.18	0.17	0.33	0.41	0.33	0.17	0.15	0.23	0.62	1.52	0.13	0.32
21 - 22	0.16	0.22	0.15	0.28	0.25	0.22	0.18	0.68	0.63	1.65	0.25	0.23
22 - 23	0.33	0.24	0.66	0.23	0.03	0.24	0.09	0.98	0.31	0.55	0.62	0.14
23 - 24	0.17	0.24	0.57	0.26	0.15	0.34	0.35	1.29	0.04	0.63	0.24	0.23
24 - 25	0.14	0.67	0.18	0.31	0.20	0.51	0.18	1.20	0.28	0.76	0.14	0.24
25 - 26	0.14	0.19	0.20	0.38	0.17	1.78	0.16	0.37	0.16	0.24	0.28	0.10
26 - 27	0.07	0.13	0.17	1.92	0.38	1.09	0.21	0.48	0.19	0.13	0.13	0.11
27 - 28	0.19	0.18	0.34	1.50	0.93	0.15	0.41	0.29	0.48	N	0.19	N
28 - 29	0.14	0.19	0.34	1.66	0.53	0.18	1.69	0.45	0.42	0.23	0.12	N
29 - 30	0.14		0.27	0.52	0.23	0.30	1.95	0.18	0.31	1.08	0.12	N
30 - 31	0.29		0.27	0.27	1.01	0.35	1.62	0.28	0.25	0.34	0.24	N
31 - 1	0.50		0.88		0.50		2.19	0.21		0.30		N
Arithmetic Mean (3)	0.23	0.28	0.37	0.49	0.63	0.38	0.58	0.58	0.26	0.58	0.29	0.16
Standard Deviation (3)	0.10	0.16	0.29	0.50	0.61	0.35	0.59	0.39	0.15	0.55	0.24	0.06
Sample Size	31	28	31	30	31	30	31	31	30	30	29	26

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 ($\mu\text{g S m}^{-3}$)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.45	1.68	0.64	2.30	1.45	2.34	1.08	2.47	1.41	0.81	0.37	0.41
2 - 3	0.35	1.14	0.73	0.85	2.86	1.09	1.39	1.86	2.52	0.39	0.32	0.42
3 - 4	0.42	0.91	0.49	0.94	2.14	0.76	0.70	0.66	0.96	0.23	0.39	0.30
4 - 5	0.08	0.97	0.98	1.08	0.95	0.44	0.73	0.98	1.70	0.43	0.48	0.22
5 - 6	0.92	0.46	0.78	1.67	1.46	0.32	0.60	0.55	1.92	0.25	0.42	0.26
6 - 7	0.75	0.60	0.73	0.85	0.67	0.72	0.23	0.89	2.38	0.59	0.51	0.07
7 - 8	0.33	0.48	0.68	1.06	1.00	0.17	1.18	0.65	1.03	0.96	0.33	0.29
8 - 9	0.47	0.53	1.20	0.45	0.83	0.55	2.16	0.60	0.98	0.80	0.65	0.41
9 - 10	0.91	0.72	1.12	1.63	0.91	0.63	1.12	0.52	0.47	0.88	0.61	0.29
10 - 11	1.01	0.77	1.72	0.76	0.78	0.85	0.87	0.37	2.86	0.51	0.53	0.29
11 - 12	1.08	0.75	1.78	0.64	0.90	1.62	0.88	0.27	3.12	0.36	0.47	0.27
12 - 13	0.48	1.10	1.80	0.61	0.85	1.97	1.50	1.69	0.54	0.66	1.17	0.08
13 - 14	0.55	1.50	0.84	0.64	0.75	1.30	1.17	1.23	0.46	0.78	0.76	0.24
14 - 15	0.72	1.03	0.55	0.75	0.74	1.29	0.15	0.17	0.80	1.44	0.52	0.46
15 - 16	0.76	1.64	1.09	0.85	0.99	0.50	0.81	0.33	0.96	1.78	0.31	0.44
16 - 17	0.28	0.62	1.43	0.59	0.58	1.48	0.52	0.39	0.41	1.08	0.40	0.42
17 - 18	0.27	0.65	1.69	1.16	0.80	1.58	0.71	0.40	0.30	0.76	0.33	0.35
18 - 19	0.53	0.72	1.21	1.28	1.68	0.72	0.49	0.46	0.51	0.79	0.37	0.37
19 - 20	0.85	0.91	1.80	1.07	1.30	0.68	0.64	0.62	0.65	1.42	0.47	0.44
20 - 21	0.73	0.52	1.01	1.17	2.28	0.67	0.53	0.56	0.44	1.88	0.59	0.74
21 - 22	0.93	0.39	0.76	0.74	1.28	0.36	0.36	0.63	0.39	1.38	0.92	0.63
22 - 23	1.08	0.36	1.11	0.80	0.73	N	N	0.94	0.49	0.72	0.70	0.69
23 - 24	1.84	0.46	1.31	0.76	1.25	N	0.77	0.98	0.57	0.43	0.83	0.53
24 - 25	0.65	0.89	1.15	0.72	1.13	N	1.02	1.00	0.63	0.27	0.81	0.34
25 - 26	0.35	1.17	2.02	0.97	0.62	N	1.35	1.77	0.47	0.38	0.52	0.29
26 - 27	0.35	1.31	0.64	2.88	0.68	N	0.49	0.80	0.39	0.61	0.99	0.25
27 - 28	0.58	0.36	0.64	1.68	1.66	N	0.87	0.95	0.49	0.47	0.50	0.41
28 - 29	0.52	0.57	1.40	1.73	0.95	N	1.12	1.34	0.61	0.71	1.11	N
29 - 30	1.08		1.08	0.77	1.70	0.72	1.14	2.16	0.53	1.18	0.81	N
30 - 31	1.20		1.49	0.97	1.16	0.50	1.73	0.78	0.42	1.14	0.35	N
31 - 1	1.02		1.89		0.97		2.45	0.85		0.43		N
Arithmetic Mean (3)	0.69	0.83	1.15	1.08	1.16	0.92	0.96	0.90	0.98	0.79	0.58	0.37
Standard Deviation (3)	0.36	0.38	0.45	0.54	0.53	0.56	0.52	0.57	0.80	0.44	0.24	0.16
Sample Size	31	28	31	30	31	23	30	31	30	31	30	27

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 ($\mu\text{g S m}^{-3}$)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.22	1.23	0.12	1.79	1.40	N	0.68	1.34	0.51	0.46	0.11	0.17
2 - 3	0.20	0.87	0.24	0.29	1.58	N	1.79	0.62	2.66	0.04	0.23	0.17
3 - 4	0.18	1.00	0.18	0.49	2.56	N	0.58	0.32	2.38	0.12	0.23	0.09
4 - 5	0.49	0.59	0.24	0.06	1.25	N	0.74	0.76	1.56	0.15	0.29	0.12
5 - 6	0.66	0.37	0.33	0.55	1.00	N	0.56	0.40	1.54	0.34	0.13	0.10
6 - 7	0.30	0.46	0.04	0.35	0.51	N	0.33	0.95	1.69	0.63	0.12	0.10
7 - 8	0.21	0.21	0.46	0.58	0.64	N	0.38	0.54	N	0.77	0.11	0.09
8 - 9	1.37	0.49	1.23	1.01	0.84	N	1.10	0.47	1.98	0.53	0.27	0.10
9 - 10	0.39	0.29	1.11	0.39	0.66	N	1.70	0.92	0.23	0.22	0.62	0.10
10 - 11	N	0.29	1.41	0.24	0.45	N	0.99	N	2.71	0.13	0.55	0.09
11 - 12	N	0.43	1.78	0.33	0.44	N	0.85	0.59	1.47	0.23	0.44	0.08
12 - 13	0.35	0.56	0.98	0.30	0.32	N	1.44	1.40	0.20	0.33	0.84	0.09
13 - 14	N	0.81	0.19	0.27	0.34	N	0.72	0.36	0.15	0.78	0.68	0.07
14 - 15	0.50	0.47	0.24	0.34	0.95	N	0.35	N	0.22	1.48	0.75	0.20
15 - 16	0.17	0.52	0.30	0.26	1.65	N	0.31	0.27	N	1.21	0.29	0.14
16 - 17	0.13	N	N	0.46	0.82	N	0.28	0.21	0.12	1.21	0.15	0.14
17 - 18	0.13	0.46	0.32	1.41	0.58	N	0.38	N	0.18	0.64	0.23	0.10
18 - 19	0.17	0.19	0.37	0.24	0.17	0.48	0.65	N	0.24	0.57	0.05	0.18
19 - 20	0.14	0.17	0.48	0.44	2.17	0.47	0.41	N	0.36	1.26	0.35	0.18
20 - 21	0.14	0.04	0.36	0.41	0.43	0.41	0.24	0.52	0.35	1.42	0.45	0.24
21 - 22	0.23	0.28	0.28	0.42	0.45	0.38	0.25	0.88	0.28	0.36	0.53	0.58
22 - 23	0.30	0.27	0.45	0.30	0.44	N	0.33	0.83	0.21	0.18	0.26	0.15
23 - 24	0.82	0.24	N	0.28	0.12	0.46	0.41	1.06	0.24	0.16	0.87	0.11
24 - 25	0.28	N	N	0.37	0.44	1.62	0.55	0.89	0.23	0.10	0.31	0.11
25 - 26	0.18	0.78	0.74	0.47	0.12	1.69	1.63	1.03	0.23	0.66	0.22	0.09
26 - 27	0.16	0.17	0.25	1.30	N	2.19	0.57	0.76	0.23	0.21	0.33	0.09
27 - 28	0.26	0.25	0.40	1.63	N	0.22	0.79	0.79	0.18	0.45	0.27	0.09
28 - 29	0.41	0.21	0.64	1.12	N	0.19	1.02	0.70	0.23	0.36	0.43	0.14
29 - 30	0.43		0.52	1.55	N	0.34	1.14	0.99	0.23	0.95	0.14	N
30 - 31	0.95		0.40	1.28	N	0.38	1.82	0.34	0.25	0.19	0.07	N
31 - 1	0.72		1.09		N		1.96	0.73		0.05		N
Arithmetic Mean (3)	0.38	0.45	0.54	0.63	0.81	-	0.80	0.72	0.74	0.52	0.34	0.14
Standard Deviation (3)	0.29	0.29	0.43	0.49	0.63	-	0.53	0.31	0.85	0.43	0.23	0.10
Sample Size	28	26	28	30	25	12	31	26	28	31	30	28

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 ($\mu\text{g S m}^{-3}$)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.39	0.61	0.36	2.32	1.47	1.09	1.30	1.90	0.68	0.19	0.50	0.16
2 - 3	0.32	0.70	0.36	2.31	1.26	0.57	1.66	1.78	1.76	0.19	0.27	0.21
3 - 4	0.32	0.75	0.23	0.97	2.33	0.80	0.77	1.39	2.77	0.19	1.08	0.10
4 - 5	0.28	0.29	0.42	0.89	0.93	0.49	0.77	2.04	1.13	0.35	0.68	0.19
5 - 6	0.67	0.29	0.19	0.67	0.61	0.53	1.50	2.70	2.29	0.25	0.60	0.30
6 - 7	0.30	0.29	0.27	0.31	1.46	0.54	0.81	3.24	2.26	0.66	0.22	0.19
7 - 8	0.52	0.30	0.23	0.26	0.93	0.52	0.78	1.33	0.52	0.48	0.38	0.21
8 - 9	0.38	0.43	0.38	0.22	0.50	0.37	0.80	0.60	0.33	0.26	0.36	0.36
9 - 10	0.44	0.48	0.65	0.81	0.97	0.30	0.48	0.23	0.88	0.32	0.34	0.23
10 - 11	0.48	0.56	0.70	0.23	0.49	0.32	0.95	0.24	1.91	0.37	0.42	0.24
11 - 12	0.73	0.42	1.27	0.23	0.42	0.56	0.75	0.34	2.61	0.26	0.17	0.25
12 - 13	0.43	0.98	1.31	0.22	0.38	0.62	0.88	0.52	0.36	0.27	0.12	0.22
13 - 14	0.40	1.34	0.48	0.26	0.45	0.53	0.85	1.01	0.54	0.58	0.33	0.39
14 - 15	0.42	0.48	0.48	0.53	0.81	0.57	0.27	0.27	0.43	0.26	0.25	0.32
15 - 16	0.25	0.34	0.56	0.42	0.33	0.81	0.35	0.32	0.49	0.38	0.63	0.26
16 - 17	0.24	0.28	0.70	0.26	0.31	0.64	0.51	0.31	0.62	0.46	0.23	0.33
17 - 18	0.38	0.32	1.08	0.27	0.32	0.20	0.85	0.41	0.71	0.45	0.27	0.29
18 - 19	0.40	0.42	0.26	0.75	0.59	0.55	1.20	0.38	0.68	0.42	0.26	0.41
19 - 20	0.36	0.27	0.34	0.49	1.14	0.47	0.91	0.30	1.17	0.63	0.35	0.42
20 - 21	0.35	0.30	0.51	0.59	1.43	0.18	0.37	0.24	1.07	0.97	0.50	0.63
21 - 22	0.41	0.20	0.22	0.58	0.35	0.35	0.16	0.28	1.64	0.86	0.43	0.59
22 - 23	0.68	0.20	0.29	0.45	0.46	0.47	0.18	0.24	0.91	0.97	0.42	0.60
23 - 24	0.74	0.35	0.75	0.76	0.72	1.16	0.90	0.25	0.73	0.61	1.49	0.31
24 - 25	0.54	0.39	0.93	1.06	0.24	1.04	0.44	0.37	0.58	0.29	0.62	0.31
25 - 26	0.31	1.02	0.99	1.15	0.28	1.61	0.21	1.12	0.70	0.46	0.50	0.24
26 - 27	0.38	0.44	0.35	0.73	0.55	1.45	0.22	0.66	0.90	0.42	0.42	0.20
27 - 28	0.33	0.37	0.33	1.14	1.50	0.87	0.35	0.72	0.48	0.52	0.39	0.35
28 - 29	0.34	0.31	0.70	1.01	0.79	0.36	0.35	0.64	0.74	0.24	0.78	0.27
29 - 30	0.57		0.64	0.37	0.50	0.52	0.83	0.66	0.59	1.45	0.26	N
30 - 31	0.57		0.79	0.32	0.25	0.49	0.78	0.32	0.44	0.63	0.42	N
31 - 1	0.40		1.28		0.61		1.07	0.54		0.42		N
Arithmetic Mean (3)	0.43	0.47	0.58	0.68	0.75	0.63	0.72	0.82	1.03	0.48	0.46	0.31
Standard Deviation (3)	0.14	0.27	0.33	0.53	0.49	0.34	0.38	0.78	0.70	0.28	0.28	0.13
Sample Size	31	28	31	30	31	30	31	31	30	31	30	28

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: 5010 Strathvaich Dam - Sulphate as S (SO₄ - S)
 Concentration in air ($\mu\text{g S m}^{-3}$)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.42	0.68	0.24	2.27	0.33	0.18	0.26	1.54	0.19	0.12	0.09	0.15
2 - 3	0.24	0.47	0.25	2.77	0.67	0.26	0.46	1.88	0.22	0.13	0.15	0.08
3 - 4	0.31	0.22	0.29	2.32	1.35	0.17	0.56	0.86	0.32	0.15	0.40	0.08
4 - 5	0.24	0.47	0.45	0.68	1.86	0.15	0.09	0.93	0.13	0.10	<0.04	0.14
5 - 6	0.29	0.36	0.27	0.27	1.11	0.11	0.22	0.92	0.15	0.10	0.05	0.40
6 - 7	0.20	0.29	0.43	0.21	0.99	0.20	0.24	1.03	0.10	0.24	0.11	0.10
7 - 8	0.32	0.34	0.35	0.18	1.09	0.12	0.15	0.34	0.23	0.15	0.16	0.13
8 - 9	0.29	0.33	0.30	0.34	0.77	0.40	0.25	0.19	0.29	0.09	0.15	0.09
9 - 10	0.23	0.39	0.80	0.31	0.33	0.12	0.79	0.16	0.26	0.16	0.19	0.10
10 - 11	0.26	0.35	1.05	0.24	0.19	0.10	0.49	0.12	0.46	0.17	0.14	0.10
11 - 12	0.29	0.27	1.07	0.27	0.32	0.12	0.40	0.14	0.15	0.23	0.10	0.17
12 - 13	0.31	0.25	0.33	0.30	0.55	0.13	0.68	0.58	0.12	0.20	0.18	0.13
13 - 14	0.27	0.49	0.24	0.32	0.26	0.10	0.15	0.19	0.30	0.10	0.49	0.11
14 - 15	0.40	0.32	0.28	0.28	0.26	0.13	0.12	0.12	0.15	0.23	0.29	0.12
15 - 16	0.26	0.42	0.19	0.31	0.30	0.34	0.13	0.09	0.63	0.24	0.07	0.09
16 - 17	0.20	0.36	0.19	0.35	0.20	0.31	0.20	0.11	0.44	1.21	0.10	0.07
17 - 18	0.26	0.23	0.54	0.46	0.36	0.22	0.13	0.50	0.30	0.54	0.11	0.11
18 - 19	0.26	0.23	0.48	0.37	0.40	0.29	0.16	0.35	0.75	0.43	0.11	0.09
19 - 20	0.29	0.31	0.33	0.44	0.46	0.40	0.45	0.16	1.37	0.28	0.11	0.26
20 - 21	0.20	0.44	0.20	0.49	0.40	0.31	0.11	0.14	0.69	0.76	0.11	0.30
21 - 22	0.25	0.35	0.24	1.11	0.16	0.26	0.10	0.21	0.97	1.28	0.06	0.22
22 - 23	0.26	0.33	0.22	0.35	0.18	0.18	0.29	0.31	1.30	0.61	0.35	0.06
23 - 24	0.23	0.31	0.36	0.52	0.15	0.28	0.11	0.61	0.70	0.47	0.16	0.04
24 - 25	0.26	0.42	0.31	0.57	0.18	0.42	0.14	0.54	0.26	0.55	0.06	0.10
25 - 26	0.22	0.25	0.21	1.63	0.24	1.44	0.15	0.33	0.44	0.27	0.11	0.08
26 - 27	0.28	0.24	0.29	1.60	0.09	2.01	0.10	0.49	0.24	0.08	0.07	0.07
27 - 28	0.30	0.22	0.32	1.69	0.37	0.32	0.17	0.39	0.42	0.09	0.10	0.09
28 - 29	0.31	0.24	0.47	0.56	0.13	0.16	0.32	0.34	0.19	0.18	0.08	N
29 - 30	0.20		0.34	0.44	0.14	0.12	0.32	0.24	0.14	0.48	0.08	N
30 - 31	0.21		0.31	0.43	0.23	0.12	1.02	0.14	0.17	0.42	0.12	N
31 - 1	0.34		1.04		0.41		1.99	0.25		0.15		N
Arithmetic Mean (3)	0.27	0.34	0.40	0.73	0.47	0.32	0.35	0.46	0.40	0.33	0.14	0.13
Standard Deviation (3)	0.05	0.10	0.25	0.72	0.41	0.40	0.38	0.43	0.33	0.30	0.11	0.08
Sample Size	31	28	31	30	31	30	31	31	30	31	30	27

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: 5011 Glen Dye - Sulphate as S (SO₄ - S)
 Concentration in air ($\mu\text{g S m}^{-3}$)

Daily measurements - Summary for January 1999 to December 1999

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.83	0.30	0.11	2.67	0.68	0.40	0.28	1.44	0.25	0.14	0.14	0.07
2 - 3	0.23	0.51	0.29	2.62	1.32	1.02	1.22	1.88	0.51	0.11	0.25	0.07
3 - 4	0.20	0.13	0.17	3.18	3.51	0.39	0.64	0.94	0.24	0.10	1.22	0.05
4 - 5	0.17	0.17	0.25	1.04	1.74	0.42	0.37	0.86	0.59	0.11	0.40	0.09
5 - 6	0.23	0.17	0.18	0.50	0.94	0.22	0.39	0.97	1.83	0.08	0.10	0.09
6 - 7	0.07	0.27	0.28	0.10	0.92	0.24	0.28	1.22	0.89	0.39	0.09	0.08
7 - 8	0.17	0.17	0.27	0.07	0.80	0.23	0.56	0.46	0.17	0.15	0.20	0.09
8 - 9	0.13	0.17	0.27	0.18	0.84	0.33	0.39	0.29	0.43	0.10	0.06	0.24
9 - 10	0.12	0.26	0.64	0.37	0.95	0.30	1.34	0.17	0.30	0.14	0.25	0.12
10 - 11	0.14	0.27	0.92	0.15	0.59	0.35	N	0.14	1.01	0.14	0.14	0.07
11 - 12	0.35	0.18	1.68	0.17	0.51	0.25	0.50	0.15	1.38	0.18	0.28	0.15
12 - 13	0.28	0.39	0.93	0.20	0.53	0.27	1.00	0.75	0.15	0.25	0.25	0.14
13 - 14	0.18	0.57	0.64	0.23	0.57	0.29	0.58	0.67	0.52	0.13	0.50	0.12
14 - 15	0.23	0.17	0.49	0.11	0.41	0.54	0.19	0.09	0.30	0.19	0.39	0.12
15 - 16	0.26	0.18	0.63	0.21	N	0.59	0.14	0.08	0.51	0.13	0.09	0.09
16 - 17	0.31	0.15	0.11	0.19	0.48	0.46	0.26	0.18	0.34	0.44	0.09	0.07
17 - 18	0.31	0.14	0.51	0.22	0.51	0.25	0.40	0.77	0.34	0.53	0.12	0.08
18 - 19	0.39	0.07	0.23	0.26	1.58	0.25	0.36	0.40	0.97	0.38	0.12	0.13
19 - 20	0.21	0.13	0.19	0.32	0.86	0.23	0.47	0.25	1.92	0.31	0.15	0.20
20 - 21	0.25	0.14	0.09	0.58	0.97	0.18	0.32	0.15	1.52	0.87	0.12	0.30
21 - 22	0.09	0.08	0.11	1.03	0.51	0.21	0.14	0.18	1.64	1.36	0.06	0.75
22 - 23	0.43	0.15	0.09	0.37	0.38	0.27	0.23	0.37	2.31	0.88	0.31	0.56
23 - 24	0.34	0.18	0.34	1.01	0.31	0.47	N	0.45	0.72	0.89	0.69	0.35
24 - 25	0.17	0.35	0.22	1.12	0.25	1.04	0.29	0.38	0.31	0.79	0.08	0.33
25 - 26	0.12	0.17	0.20	1.26	0.82	2.03	0.18	0.51	0.13	0.40	0.36	1.40
26 - 27	0.12	0.23	0.12	1.92	0.18	1.19	0.18	0.50	0.23	0.19	0.12	0.23
27 - 28	0.11	0.22	0.14	N	1.14	0.48	0.29	0.31	0.34	0.34	0.17	0.12
28 - 29	0.14	0.10	0.29	N	0.73	0.33	0.54	0.34	0.15	0.16	0.11	N
29 - 30	0.10		0.48	0.71	0.26	0.28	0.71	0.38	0.34	1.16	0.20	N
30 - 31	0.07		0.28	0.42	0.32	0.21	1.93	0.15	0.12	0.99	0.10	N
31 - 1	0.07		1.08		0.73		1.11	0.23		0.26		N
Arithmetic Mean (3)	0.22	0.21	0.39	0.76	0.81	0.46	0.53	0.50	0.68	0.40	0.24	0.23
Standard Deviation (3)	0.15	0.12	0.36	0.86	0.63	0.39	0.42	0.43	0.61	0.36	0.24	0.29
Sample Size	31	28	31	28	30	30	29	31	30	31	30	27

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%.