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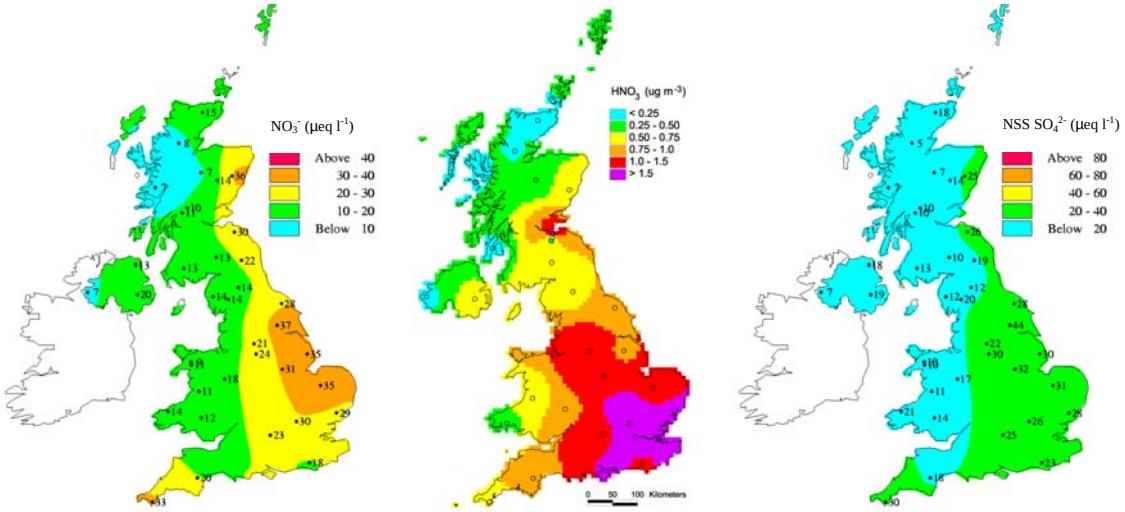

Maps of the Precipitation-weighted Concentrations of Nitrate and non-seasalt Sulphate (µeq l^{-1}) and of gaseous Nitric Acid (µg m^{-3}) for 2006

UK Acid Deposition Monitoring Network:

Data Summary 2006

Report to the Department for Environment, Food and Rural Affairs and the Devolved Administrations

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NATURAL ENVIRONMENT RESEARCH COUNCIL

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AEA Energy & Environment
The Gemini Building
Fermi Avenue
Harwell
Didcot
OX11 0QR

t: 0870 190 6515
f: 0870 190 6933

AEA Energy & Environment is a business name of AEA Technology plc

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Authors	Names	Helen Lawrence, Keith Vincent, Malcolm Smith and Chris Colbeck (AEA Energy & Environment) Y.S. Tang, M.A. Sutton, I. Simmons, L. Love, E.Vogt, N. van Dijk, J.N. Cape and R. I. Smith (Centre for Ecology and Hydrology, Edinburgh)
Reviewed by	Name	Helen Lawrence Keith Vincent
Approved by	Name	Geoff Dollard
	Signature	
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Executive Summary

This is the second annual data report prepared on the contract *UK Acid Deposition Monitoring Network* (RMP 2901), let by the Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations (the Scottish Executive, the National Assembly for Wales and the Northern Ireland Department of the Environment). This data report contains a comprehensive summary of the measurements made in the network for the year 2006.

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

A number of important observations have arisen from data provided by the monitoring network, an example being the geographical differences the monitoring network has shown in the rate of change of sulphur and oxidised and reduced nitrogen deposition. Such changes could not have been entirely nor accurately predicted when the monitoring network was set up in 1986. Sulphur deposition has been reduced most significantly (>70 %) close to the UK's major power stations, predominantly in the Yorkshire, Humber and Nottinghamshire regions. However, the rate of deposition in the south west of England has decreased by only about 30 %, significantly less than national or European sulphur emissions. Such a non-linearity can be attributed to the influence of shipping emissions, and action at the international level is underway to control emissions from the shipping sector. Likewise, it could not have been predicted that nitrate deposition would show only a marginal decrease in areas far from the major power stations, or that there would be a lack of trend in ammonium deposition. Now that the network has been in operation for more than 20 years, it may now, at some level, be in a position to detect any trends in sulphur and nitrogen deposition arising from climate change.

Following the tendering of the monitoring contract in January 2006, significant changes were made to the measurement programme, most notably the expansion of the nitric acid denuder network from 12 to 30 sites. Filter-pack measurements of sulphur dioxide were terminated and effectively replaced by measurements made in the expanded denuder network. A small number of acid deposition sampling sites were re-located, where practical, to achieve greater co-location of sampling within this programme (*i.e.* with the nitric acid denuder measurements) and/or with other national monitoring programmes such as the National Ammonia Monitoring Network. Some diffusion tube monitoring sites not used in the nitrogen dioxide Pollution Climate Mapping work have been closed, allowing triplicate diffusion tubes to be established at some sites that are co-located with automatic chemiluminescence analysers.

The 2006 Measurements

The key highlights from the 2006 measurements are:

- Concentrations of the gaseous and aerosol species in 2006 were consistent with long-term trends. Particulate sulphate concentrations increased slightly while nitrogen dioxide concentrations were slightly lower than those measured in 2005. There were no major episodes of elevated concentrations.
- Based on the rainwater volumes determined using the bulk rainwater collectors, the rainwater volume in 2006 was similar to the twenty year mean volume measured at most sites since 1986.
- Particulate sulphate concentrations have shown a downward trend since the late 1980s, although this decrease has been less marked in recent years. Annual mean concentrations in 2006 were slightly higher than those measured in 2005 and 2004, although still lower than those observed in the photochemically-active year of 2003. Over the period 1978 to 2006, the average concentration at Eskdalemuir declined from around 1.0 µg [SO_4 as S] m^{-3} during the late 1970's to about 0.4 µg [SO_4 as S] m^{-3} in 2006.

- The 2006 annual mean concentrations of nitrogen dioxide were lower than those measured in 2005, but at most sites higher than those determined in 2004. The highest concentrations in 2006 continue to be observed in the south east of England with annual mean concentrations of 7.2 ppb and 7.4 ppb measured at Flatford Mill and Compton respectively. Nitrogen dioxide concentrations have declined most noticeably at the relatively high concentration sites such as High Muffles, Barcombe Mills and previously Stoke Ferry.
- The Nitric Acid Monitoring Network continues to provide data on the behaviour of gaseous and aerosol species involved in transboundary and urban air pollution. The measurement data have been used to derive maps of the spatial distribution of gaseous nitric acid and hydrogen chloride in the UK and of the corresponding aerosol components – nitrate and chloride.
- The 2006 measurements provided further confirmation of the spatial patterns in trends previously observed.

Use of the Measurement Data

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

Datasets produced by the Acid Deposition Monitoring Network provide information on the current state of the environment with respect to acidification and eutrophication. The individual measurements are used in a number of the projects supported by Defra and the Devolved Administrations:

- **Modelling the Concentrations and Depositions of Long range Air Pollution** (current contractor: CEH Edinburgh): The measurements made in the Acid Deposition Monitoring Network and the derived site-specific deposition rates are the principal datasets used to validate the performance of long range chemical transport model used to assess the effectiveness of emission reduction policies on acidification and eutrophication.
- **Pollution Climate Mapping** (current contractor: AEA Energy & Environment): The measurements of sulphur dioxide, nitrogen dioxide and particulate sulphate made in the Acid Deposition Monitoring Network underpin or validate the empirical modelling approaches developed by AEA Energy & Environment to meet the reporting requirements under the first air quality Daughter Directive.
- **Freshwater Critical Load Exceedences** (current contractor: ENSIS). A number of the sites in the Acid Deposition Monitoring Network are located in sensitive catchments and freshwater systems. The measurements made in the sampling programme therefore provide a direct measure of the atmospheric input and can be compared with critical loads of such systems.
- **Dynamic Modelling** (current contractor: CEH Bangor): A number of Acid Deposition Monitoring sites are located in sensitive catchments and freshwater systems. The measurements made in the sampling programme therefore provide a direct measure of the atmospheric input and are used in dynamic models used to assess the impact of acid and nitrogen deposition on freshwater and terrestrial habitats.
- **Acid Waters Monitoring Network** (current contractor: ENSIS): The measurements made in the Acid Deposition Monitoring Network were used in the major periodic assessment reports prepared under this contract.

The measurements made in these networks have been, and continue to be, key inputs into the expert reviews of our understanding of acid deposition, provided formerly by the Review Group on Acid Rain and more recently by the National Expert Group on Transboundary Air Pollution (NEGTAP). In addition, wet deposition and particulate sulphate measurements have long been key inputs to the Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP). Rainfall composition, daily particulate sulphate and gas/particle ratio measurements made within the Acid Deposition Monitoring Network are submitted to EMEP as part of the UK's Acidification and Eutrophication requirements under the new EMEP Monitoring Strategy.

Table of Contents

1 Introduction

This is the second annual data report prepared on the contract *UK Acid Deposition Monitoring Network* (RMP 2901), let by the Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations (the Scottish Executive, the National Assembly for Wales and the Northern Ireland Department of the Environment). This data report contains a comprehensive summary of the measurements made in the network for the year 2006.

The Acid Deposition Monitoring Network was established in 1986 to monitor the composition of precipitation and hence to provide information on the deposition of acidifying compounds in the UK. The aims of the rainwater sampling programme are to provide (1) high quality data which can be used to identify trends with time and (2) information on the spatial distribution of acid deposition in the UK. In addition to the sampling of rainwater at the network sites, a range of other measurements are made which provide a more complete understanding of precipitation chemistry in the UK. The measurements made and their interpretation for the calendar years 1986 to 2005 have been presented previously [*e.g*. Campbell *et al.,* 1994, 1998; Vincent *et al.,* 1995, 1996, 1998; Hayman *et al.*, 2000, 2001c, 2001d, 2003a, 2004, 2005a, 2005b, 2007a].

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

Wet deposition and particulate sulphate measurements have long been key inputs to the Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP). EMEP is a scientifically based and policy driven programme under the Convention on Long-Range Transboundary Air Pollution (CLRTAP) for international co-operation to solve transboundary air pollution problems. The EMEP programme is carried out in collaboration with a broad network of scientists and national experts that contribute to the systematic collection, analysis and reporting of emission data, measurement data and integrated assessment results. Initially, EMEP focused on assessing the transboundary transport of acidification and eutrophication, although the scope of the programme has now widened to address the formation of ground level ozone and, more recently, of persistent organic pollutants (POPs), heavy metals and particulate matter.

The main objectives of EMEP are to:

(a) Provide observational and modelling data on pollutant concentrations, deposition, emissions and transboundary fluxes on the regional scale and identify their trends in time;

(b) Identify the sources of the pollution concentrations and depositions and to assess the effects of changes in emissions;

(c) Improve our understanding of chemical and physical processes relevant to assessing the effects of air pollutants on ecosystems and human health in order to support the development of cost-effective abatement strategies; and

(d) Explore the environmental concentrations of new chemical substances that might require the attention of the Convention in the future.

This is achieved through (1) collection of emissions data, (2) measurements of air and precipitation quality and (3) modelling of atmospheric transport and deposition of air pollution.

The wet deposition, daily particulate sulphate and gas/particle ratio measurements made by the Acid Deposition Monitoring Network are sent to EMEP, and are key to fulfilling the UK's Acidification and Eutrophication requirements of the new EMEP Monitoring Strategy[1].

[1] EMEP Monitoring Strategy and Measurement Programme 2004-2009, As amended and adopted by the EMEP Steering Body at its twenty-eighth session, http://www.unece.org/env/emep/Monitoring%20Strategy_full.pdf

This annual data report is structured as follows:

- Section 2 describes the monitoring networks and the sampling techniques employed, together with the changes made to the network in 2006;
- Section 3 gives an overview of the results from the Acid Deposition Monitoring Networks for 2006 and presents concentration maps for non-seasalt sulphate, nitrate, ammonium, hydrogen ion and nitrogen dioxide, together with the trends in all acidifying components measured as part of the monitoring programme;
- Section 4 describes the Nitric Acid Monitoring Network and the measurements made.

Summary tables of the bulk precipitation composition data for 2006 at the individual sites are presented in Appendix 1. Time series graphs for data collected since 1986 and seasonal variation plots are presented, together with details of the sites themselves. Appendix 2 presents the annual concentrations at each site since 1986 together with the annual rainfall amounts determined using the bulk rain collector. The individual concentrations of particulate sulphate are provided in Appendix 3, together with the monthly and annual mean concentrations calculated for each site. Appendix 4 provides a summary of the nitrogen dioxide measurements, together with the annual mean concentrations calculated for each site. Appendix 5 provides a complete set of the measurements made in the HNO_3 Denuder Monitoring Network in 2006. Appendix 6 describes the geostatistical techniques that have been used to calculate the concentration maps in this report.

2 The Monitoring Programme

2.1 Acid Deposition Monitoring Network

2.1.1 Monitoring Locations

Historically, the UK Acid Deposition Monitoring Network comprised two monitoring networks, in which rainwater samples were collected and analysed. The aim of the first network, known as the 'Primary' network, was to provide high quality and high frequency data that could be used to identify trends with time. The "Secondary" network provided information on the spatial distribution of acid deposition in the UK. Originally, there were nine primary and 59 secondary monitoring sites, although both networks were reduced in size to 5 and 32 sites, respectively, following recommendations from the Review Group on Acid Rain (RGAR) in 1989.

In recent years, the distinction between the primary and secondary networks has become blurred with changes to the monitoring programme. In 2006, the UK Acid Deposition Monitoring Network comprised 38 sites, 6 of which provide data to EMEP.

The spatial distribution of the sites is shown below in Figure 2-1.

Figure 2-1 Locations of the Acid Deposition Monitoring Sites operational in 2006, showing sites that provide measurements to EMEP

Estimates of sulphur and nitrogen deposition in sensitive areas have been improved by increasing the number of sites in such areas, as recommended in the Fourth Report of the RGAR.

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

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

The locations are shown in Figure 2-2.

With the exception of Crai Reservoir, all sites were specifically located within sensitive ecosystems forming part of the UK Acid Waters Monitoring Network, which provides measurements of the composition of lakes and freshwaters affected by acid deposition.

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

Figure 2-2 Rainwater sites in ecologically sensitive locations

2.1.2 The Sampling Programme

2006 was the first year of the new monitoring contract, RMP 2901. Although the rainwater sampling programme was largely unaffected, a number of significant changes were made to other elements of the UK Acid Deposition Monitoring Network as part of the re-tendering:

- **Expansion of the Nitric Acid Monitoring Network from 12 to 30 sites.** This sampling programme determines gaseous concentrations of nitric acid (HNO_3), sulphur dioxide (SO_2), hydrogen chloride (HCl) and six aerosol components (sulphate, nitrate, chloride, sodium, calcium and magnesium) using coated denuders and filters on a monthly basis. The Nitric Acid Monitoring Network is described in detail in Section 4.

- **Termination of the SO_2 filter-pack measurements** in the Acid Deposition Monitoring Network and related Rural SO_2 Monitoring Network (part of the Acid Deposition Processes in the UK contract). SO_2 concentrations are now determined from the expanded Nitric Acid network.

- **Relocation of Acid Deposition monitoring sites**, where practical, to achieve greater co-location of sampling within this programme (*i.e.*, with the nitric acid denuder measurements) and/or with other national monitoring programmes such as the National Ammonia Monitoring Network.

  The following sites were moved to nearby sites in 2006 to maintain, as far as possible, (a) the same spatial distribution of sites in the network for mapping purposes and (b) a single data record for trend analysis:

Previous (2005) site:	Relocated in 2006 to:	Distance (km)
Woburn	Rothamsted	28.1
Cow Green Reservoir	Moorhouse	4.7
Glen Dye	Glensaugh	6.9
Achanarras	Forsinain 2	25.7

- **Exposure of triplicate diffusion tubes** at three sites where there are (or will be) co-located automatic analysers. Triplicate measurements commenced at Yarner Wood and Eskdalemuir in 2006. Triplicate exposures at Harwell began in January 2007, coinciding with the relocation of the rain collector and diffusion tube from Compton.

  As a result, the following seven diffusion tube sites not used in the production of UK nitrogen dioxide concentration maps have been closed:

  - England: Bottesford, Preston Montford, Stoke Ferry, Thorganby, Wardlow Hay Cop, Woburn
  - Wales: Llyn Brianne

  Analysis of the triplicate measurements from Yarner Wood and Eskdalemuir are presented in section 3.5.2. Results from Harwell will be presented in the 2007 data report.

The sampling programme for 2006 is shown below in Table 2-1.

Table 2-1 Acid Deposition Monitoring Network – sampling programme 2006

Measurement	Technique	Frequency	Number of sites
Precipitation composition	Bulk collector	Daily	1
	Bulk collector	Fortnightly	38
	Sequential wet-only collector *	Daily	1
Particulate sulphate	AGL Bubblers	Daily	5
Nitrogen dioxide	Single diffusion tube	4-weekly	22
	Triplicate diffusion tubes	4-weekly	2
Nitric Acid and other Acid Gases	DELTA Denuder sampler	Calendar-monthly	30

* Although measured under this contract, data will be reported and discussed as part of the '*Operation & Management of the EMEP Supersite at Auchencorth Moss*' contract held by CEH Edinburgh

2.1.3 EMEP Data Reporting

Data obtained through the UK Acid Deposition Monitoring network also form part of the wider EMEP network. Wet deposition, daily particulate sulphate and gas/particle ratio measurements made by selected Acid Deposition Monitoring Network sites (shown in blue in Figure 2-1 and below in Table 2-2) are sent to EMEP, and are key to fulfilling the UK's Acidification and Eutrophication requirements of the new EMEP Monitoring Strategy. Results from EMEP are used to underpin the modelling studies that form the basis of negotiation of UNECE Protocols for controlling the transboundary transport of acidifying pollutants.

Components measured in rainfall are: pH, volume (mm), conductivity, Na^+, K^+, Ca^{2+}, Mg^{2+}, NH_4^+, Cl^-, SO_4^{2-} and NO_3^-.

Table 2-2 Acid Deposition Monitoring Network data reported to EMEP

AEA site code	EMEP site code	Site name	Deposition			Particulate SO_4^{2-}
			Daily wet-only	Daily bulk	Multi-day bulk	
5002	GB0002R	Eskdalemuir		✓	✓	✓
5006	GB0006R	Lough Navar			✓	✓
5007	GB0007R	Barcombe Mills				✓
5008	GB0013R	Yarner Wood			✓	✓
5009	GB0014R	High Muffles			✓	✓
5010	GB0015R	Strathvaich Dam			✓	
5341	GB0048R	Auchencorth Moss	✓ *			

* Data will be submitted under the '*Operation & Management of the EMEP Supersite at Auchencorth Moss*' contract, held by CEH Edinburgh.

2.1.4 Daily Wet-Only Measurements at Auchencorth Moss

The EMEP Monitoring Strategy proposes three levels of measurement complexity, each targeting the EMEP objectives in different ways. The main objective of monitoring at Level 1 sites is to provide long-term basic chemical and physical measurements of the traditional EMEP parameters. Level 2 sites will provide additional parameters essential for process understanding and further chemical speciation of relevant components, and thus represent an essential supplement to Level 1 sites. A Level 1 site extending its programme to include Level 2 activities is often referred to as a "Supersite". Level 3 activities are optional and research-oriented (typically undertaken by research groups) and may also include campaign data.

The UK has decided to establish two monitoring sites (Harwell and Auchencorth Moss), which will eventually operate as EMEP Level 2 Supersites. One of the required Level 1 measurements is the sampling of precipitation composition on a daily basis. Defra has already purchased two new sequential wet-only collectors for this purpose; the Auchencorth Moss sampler has been operational since June 2006, and deployment at Harwell is planned for the future.

The new UK Acid Deposition Monitoring contract, RMP 2901, includes the operation of the wet-only collector at Auchencorth Moss and analysis of the daily samples. However, as sampling only commenced in June 2006, it is considered too early at this point to draw any meaningful conclusions from the data; comparison with measurements made by the bulk precipitation collectors will be made and discussed as part of the 2007 Acid Deposition Monitoring Network data report.

Data obtained from the wet-only collector at Auchencorth Moss will be reported and discussed in full as part of the Defra contract: '*Operation & Management of the EMEP Supersite at Auchencorth Moss*', held by CEH Edinburgh.

Table 2-3 Network Sites and Measurements Made in 2006

Measurement	Precipitation			NO_2	Part. SO_4	HNO_3 denuder
Frequency / Site	Daily bulk	Daily wet-only	Fortnightly bulk	Monthly	Daily	Monthly
Yarner Wood			✓	✓✓✓	✓	✓
Barcombe Mills			✓	✓	✓	✓
Lough Navar			✓	✓	✓	✓
High Muffles			✓	✓	✓	✓
Eskdalemuir	✓		✓	✓✓✓	✓	✓
Auchencorth Moss		✓ [1]				✓
Goonhilly			✓	✓		✓
Compton			✓	✓		
Rothamsted [2]			✓	[3]		✓
Flatford Mill			✓	✓		
Tycanol Wood			✓	✓		
Llyn Brianne			✓	[3]		
Pumlumon			✓	✓		
Stoke Ferry			✓	[3]		✓
Preston Montford			✓	[3]		
Bottesford			✓	[3]		
Llyn Llydaw			✓	✓		
Wardlow Hay Cop			✓	[3]		
Driby			✓	✓		
Thornganby			✓	[3]		
Bannisdale			✓	✓		
Hillsborough Forest [4]			✓	✓		✓
Moorhouse [5]			✓	✓		✓
Loch Dee			✓	✓		
Redesdale			✓	✓		
Whiteadder			✓	✓		
Balquhidder			✓	✓		
Polloch			✓	✓		
Glensaugh [6]			✓	✓		✓
Allt a' Mharcaidh			✓	✓		
Strathvaich Dam			✓	✓		✓
Forsinain 2 [7], [8]			✓	✓		✓
Crai Reservoir			✓			
River Etherow			✓			
Scoat Tarn			✓			
Llyn Llagi			✓			
Beaghs Burn			✓			
Loch Chon			✓			
Lochnagar			✓			
Bush						✓
Sutton Bonington						✓
Cwmystwyth						✓
Rosemaund						✓
Narberth						✓
Shetland						✓
London Cromwell Rd						✓
Lagganlia						✓
Rum						✓
Edinburgh St Leonards						✓
Carradale						✓
Detling						✓
Harwell						✓
Ladybower						✓
Plas Y Brenin						✓
Caenby						✓

✓✓✓ Triplicate measurements made
[1] Data reported as part of the '*Operation & Management of the EMEP Supersite at Auchencorth Moss*' contract held by CEH Edinburgh
[2] Rothamsted – bulk rain collector moved from Woburn in 2006
[3] Diffusion tube site closed in 2006
[4] Hillsborough Forest – the co-located Nitric Acid monitoring site is called Hillsborough
[5] Moorhouse – bulk rain collector and diffusion tube moved from Cow Green Reservoir in 2006
[6] Glensaugh – bulk rain collector and diffusion tube moved from Glen Dye in 2006
[7] Forsinain 2 – bulk rain collector and diffusion tube moved from Glen Dye in 2006. Also replaces Forsinard diffusion tube.
[8] Forsinain 2 – the co-located Nitric Acid monitoring site is called Halladale

Table 2-4 Network Site Details (those in bold report data to EMEP)				
Site code	Site name	OS Grid Reference	Altitude	Local Site Operating Body
5008	**Yarner Wood**	**SX 786789**	**119**	**English Nature (now a part of Natural England)**
5007	**Barcombe Mills**	**TQ 437149**	**10**	**South East Water**
5006	**Lough Navar**	**IH 065545**	**130**	**Forestry Service, Northern Ireland**
5009	**High Muffles**	**SE 776939**	**267**	**Forestry Commission**
5002	**Eskdalemuir**	**NT 235032**	**259**	**Met Office**
5010	**Strathvaich Dam**	**NH 347750**	**270**	**Clova Environmental Research & Testing Services**
5341	**Auchencorth Moss**	**NT221562**	**190**	**Centre for Ecology & Hydrology (Edinburgh)**
5003	Goonhilly	SW 723214	108	BT
5129	Compton	SU 512804	105	AEA Energy & Environment
5165	Rothamsted	TL 131132	130	Rothamsted Experimental Station
5024	Flatford Mill	TM 077333	5	Field Studies Council
5123	Tycanol Wood	SN 093364	205	Countryside Council for Wales (CCW)
5124	Llyn Brianne	SN 807492	372	Forestry Commission
5150	Pumlumon	SN 823854	390	Centre for Ecology & Hydrology (Bangor)
5004	Stoke Ferry	TL 700988	15	Borough Council of King's Lynn & West Norfolk
5023	Preston Montford	SJ 432143	70	Field Studies Council
5121	Bottesford	SK 797376	32	E.On
5153	Llyn Llydaw	SH 638549	490	Countryside Council for Wales
5120	Wardlow Hay Cop	SK 177739	350	Natural England
5136	Driby	TF 386744	47	Anglian Water
5117	Thornganby	SE 676428	8	Selby District Council
5111	Bannisdale	NY 515043	265	Ray Newport
5149	Hillsborough Forest	IJ 243577	120	Agri-Food and Biosciences Institute
5167	Moorhouse	NY 758328	570	Centre for Ecology & Hydrology (Lancaster)
5107	Loch Dee	NX 468779	230	SEPA / Forest Enterprise
5109	Redesdale	NY 833954	240	ADAS
5106	Whiteadder	NT 664633	250	East of Scotland Water
5152	Balquhidder 2	NN 545207	130	Mountain Environments
5151	Polloch	NM 792689	30	Jim Kirby
5164	Glensaugh	NO 660796	242	Macaulay Land Use Research Institute
5103	Allt a' Mharcaidh	NH 876052	274	Fisheries Research Services
5166	Forsinain 2 / Halladale	NC 906486	70	Fountain Forestry Ltd
5154	Crai Reservoir	SN 288222	310	Welsh Water
5158	River Etherow	SK 125986	485	ENSIS
5159	Scoat Tarn	NY 158103	595	ENSIS
5160	Llyn Llagi	SH 647483	380	ENSIS
5155	Beaghs Burn	D 165283	250	Agri-Food and Biosciences Institute
5156	Loch Chon	NN 429084	150	Fisheries Research Services
5157	Lochnagar	NO 252859	785	ENSIS
1	Bush	NT 245635		Centre for Ecology & Hydrology (Edinburgh)
40	Sutton Bonington	SK 505268		University of Nottingham
70	Cwmystwyth	SN 771742		ADAS
6B	Rosemaund	SO 564476		ADAS
8C	Narberth	SN 146127		Pembrokeshire County Council
19	Shetland	HU 500400		Met Office (Lerwick Observatory)
36C	London Cromwell Rd	TQ 266791		Colin Gillham
41	Lagganlia	NH 856037		Centre for Ecology & Hydrology (Banchory)
47	Rum	NM 408992		Rum NNR
60C	Edinburgh St Leonards	NT 262731		City of Edinburgh Council
77	Carradale	NR 798378		SEPA
97	Detling	TQ 801597		Medway Council
98	Harwell	SU 474863		AEA Energy & Environment
99	Ladybower	SK 164892		Nick Hewitt
100	Plas Y Brenin	SH 716578		Countryside Council for Wales
102	Caenby	SK 993900		East Riding of Yorkshire Council

2.2 Sampling Techniques

2.2.1 Precipitation Composition

Bulk Sampling

Fortnightly precipitation samples were collected at 38 sites using bulk collectors based on the design of Hall [1986]. Daily precipitation composition measurements are also made at Eskdalemuir, also a bulk collector. Stone and Tily [1992] provided an assessment of the collection efficiency of the bulk collector. For the two-year period 1986 to 1987, the bulk collector was found to have collection efficiencies ranging from 77% to 99% when compared to the 5-inch meteorological rain gauge.

To assess whether the switch from single week to fortnightly sampling in 2001 had any effect on sampling performance an intercomparison exercise was initiated, which continued until the end of 2005. The results of the intercomparison were presented in the 2004 data report (using available results from the start of sampling to the end of 2004) [Hayman *et al.*, 2005b]. The results from the first three years of the intercomparison indicated that there was good agreement between the parameters collected for the different sampling durations. The least scatter about the 1:1 line was seen for rainwater volumes and the deposition of non-seasalt sulphate and nitrate observed at Thorganby, followed by those at Eskdalemuir and Lough Navar.

Local Site Operators (LSOs) collect the samples from the rain collectors and return them in their entirety to AEA at Harwell for registration, volume measurement and sub-sampling. Sub-samples are then sent to Harwell Scientifics for analysis.

Wet-only Sampling

The wet-only sequential sampler can hold eight daily samples, and sample changeovers are made on a weekly basis. The individual daily samples are returned to AEA at Harwell for registration before being passed to Harwell Scientifics for analysis. The procedures and protocols for sample handling and analysis are the same as those used for determining the composition of precipitation from the bulk sampling programme.

The daily wet-only data will be reported and discussed by CEH Edinburgh as part of the Defra contract: '*Operation & Management of the EMEP Supersite at Auchencorth Moss*'. Data will also be made available to the Air Quality Archive and reported to the Chemical Co-ordination Centre of EMEP, fulfilling the UK's obligations under the Convention on Long-range Transport of Air Pollution.

2.2.2 Particulate Sulphate

Concentrations of particulate sulphate are determined on a daily basis using an eight-port hydrogen peroxide bubbler instrument (AGL, Hitchin). Particulate sulphate is collected by drawing air through a Whatman 40 filter at a rate of 2-4 m^3 per day. Each filter is exposed for 24-hours and is returned to AEA in individual sealed bags before being registered and being passed to Harwell Scientifics for analysis. Concentrations in air are calculated from sulphate concentrations in filter extract solutions (analysed by ion chromatography) and volumes of air sampled.

2.2.3 Nitrogen Dioxide

Nitrogen dioxide concentrations are measured using passive diffusion tubes. Diffusion tubes work on the principle that the gas species of interest diffuses up the tube and is collected on an efficient absorbent medium at the end. The amount of gas absorbed is then measured by an appropriate analytical technique. The tube components are manufactured to a 0.1 mm tolerance and this provides a known diffusion path length and hence a constant resistance to uptake. The ambient concentration of the gas can then be calculated from the diffusion path length, amount absorbed (determined analytically), exposure time and diffusion coefficient of the gas.

The diffusion tube consists of a plastic tube, on one end of which is a Low Density Polyethylene cap. Two stainless steel grids impregnated with the absorbent chemical are mounted within this cap. In

this case, the absorbent is a solution of triethanolamine & acetone. The absorbent is extracted from the exposed tubes using de-ionised water. The nitrite content is analysed using a colorimetric technique on a Bran & Luebbe Segmented Flow Auto Analyser III. The instrument is calibrated at the beginning of each run and a QC sample of known concentration is analysed several times during any one run in adherence to UKAS guidelines. This particular method has a limit of detection of 0.03 µg nitrite, with any samples greater than 2.0 µg requiring dilution. The exposure time of each diffusion tube is used to convert the measured nitrate concentration (in µg) into ambient air concentrations of nitrogen dioxide (in µg m^{-3} or ppb).

Diffusion tubes are mounted on the upright post of the rain collector stand and are exposed for four-week periods throughout each year to coordinate sample changeovers with the fortnightly rain collections. They are returned to AEA in sealed bags for registration before being passed to Harwell Scientifics for analysis.

Laboratory blanks and a 'travel' blank are undertaken for each 4-week monitoring period as QA/QC.

Triplicate Diffusion Tubes

Historically, UK maps of nitrogen dioxide (and hence oxides of nitrogen) used the diffusion tube measurements to define the rural concentration field, upon which urban contributions were superimposed. With the introduction of automatic analysers, mainly in England, a hybrid approach is now adopted in the mapping work (Kent *et al.*, 2006). Automatic sites, where available have been used in preference to diffusion tubes as these are considered to be more accurate. Automatic measurements are preferred at Yarner Wood, High Muffles and Barcombe Mills (automatic site nearby at Lullington Heath). The first year for which sufficient automatic sites are available for this to be possible was 2004. These measures have been established as a result of Directive 2002/3/EC relating to ozone in ambient air. Diffusion tube sampling has therefore been stopped at some sites, where diffusion tube measurements are not used in the production of the nitrogen dioxide map, allowing the network to be reconfigured to make triplicate measurements at three sites where there are/will be automatic analysers – Yarner Wood, Harwell and Eskdalemuir.

All other aspects of the sampling programme – sampling schedule, analysis, data reporting and dissemination are the same as that described above.

2.2.4 Nitric Acid DELTA Denuder

The DELTA denuder methodology used to determine concentrations of nitric acid and other acid gases and particulate components is described later in Section 4.

2.3 Analytical Procedures

2.3.1 Sample Registration and Preparation

Due to termination of the SO_2 filter-pack monitoring element of the programme, the number of samples received and analysed by the laboratory in 2006 was less than in previous years. Samples returned to AEA are logged in a sample registration database and precipitation volumes recorded. Sample preparation and handling is carried out using standard operating procedures.

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

2.3.2 Analysis

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

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

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

where Σc = sum of cation concentrations in equivalents (μeq l^{-1}) and Σa = sum of anion concentrations in equivalents (μeq l^{-1}). A correction is estimated for the concentration of bicarbonate in samples which have a pH greater than 5.5. Samples that fall outside the criteria listed in Table 2-5 are submitted for reanalysis. The reanalysis is usually completed within four months of sampling. With the introduction of new ion chromatographs [Hayman *et al.*, 2001d], less than 10% of the samples are expected to fail the criteria and would need to be reanalysed.

Table 2-5 Ion Balance Criteria Used to Select Samples for Reanalysis

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

2.4 Data Reporting

Sample collection, analysis, re-analysis and verification are continuous processes. Figure 2-3 below shows the reporting cycle for the measurements made in the monitoring programme. Reanalysis is only undertaken for the composition of precipitation if the sample fails the ion balance criterion. Simple data verification is undertaken on an approximately quarterly basis for the other measurements.

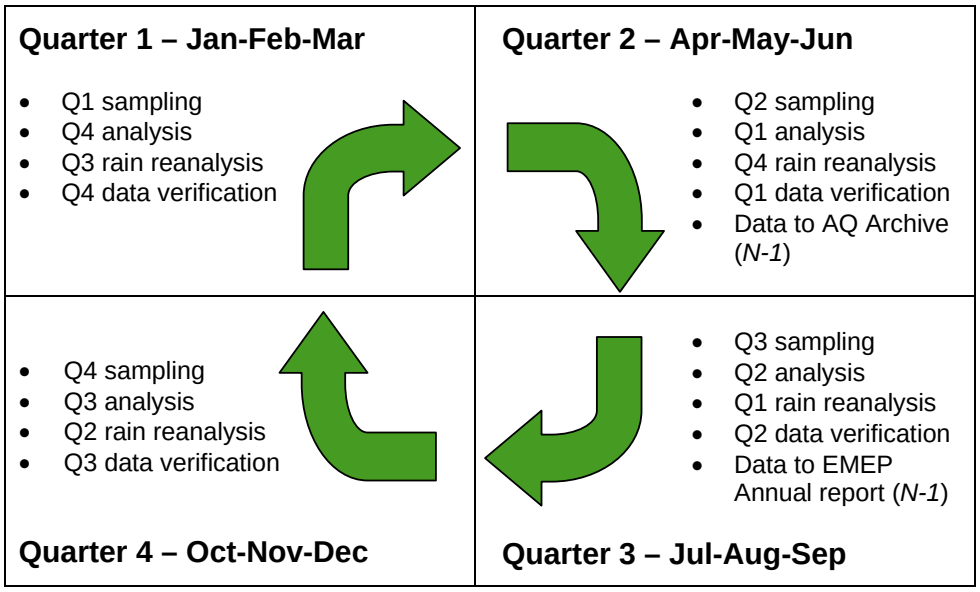


Figure 2-3 Cycle for the sample collection, analysis, reanalysis, verification and reporting of the Acid Deposition measurements, for the year *N*

The cycle shows that measurements made in Year *N* would be available to the public and scientific community *via* the Defra-funded UK Air Quality Archive[2] by the end of Quarter 1 of *Year N+1* and formally reported in Quarter 3. Although the existing cycles approach this scheme, it is intended to adhere to these reporting cycles more closely.

Precipitation and particulate sulphate measurements made in the main Acid Deposition Monitoring Network are reported annually to EMEP's Chemical Co-ordination Centre (EMEP CCC) at NILU, Norway, as part of the UK's obligation under the UNECE Convention on Long-Range Transport of Air Pollution. The UK has a strong commitment to the timely submission of data to this forum. Measurements of nitrogen dioxide and particulate sulphate are also indirectly reported to the European Commission through other air quality monitoring and modelling contracts.

[2] UK National Air Quality Archive: www.airquality.co.uk

3 2006 Measurements and Trends

3.1 Data Summary

The complete set of precipitation measurements made in the Acid Deposition Monitoring Network during 2006 is provided in the following appendices:

- Appendix 1 Precipitation Composition from Fortnightly Bulk Collectors
- Appendix 2 Annual Mean Precipitation-weighted Concentrations
- Appendix 3 Particulate Sulphate Measurements and Statistics
- Appendix 4 NO_2 Measurements and Statistics
- Appendix 5 CEH HNO_3 Denuder Measurements and Statistics

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

3.2 Rainwater Volumes in 2006

According to the rainwater volumes determined using the bulk rainwater collectors, 2006 was similar at most sites compared to the long-term average, though slightly wetter at the higher rainfall sites. Figure 3-1 shows how the measured rain volumes in 2006 compare against the long-term average volume measured in previous years.

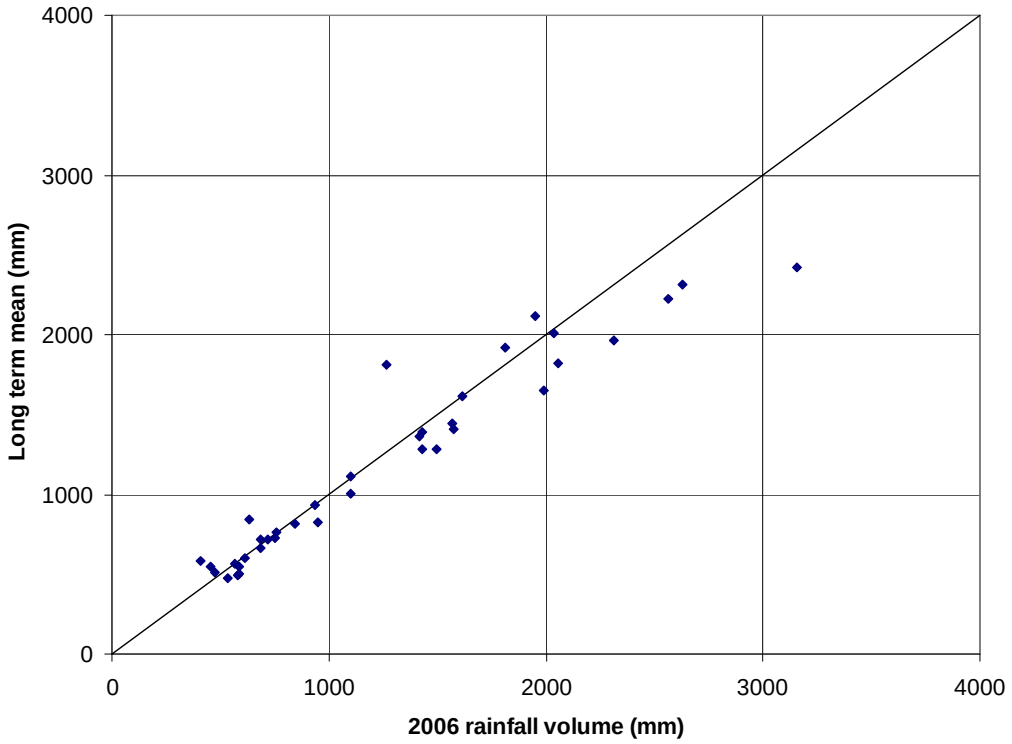


Figure 3-1 A Comparison of Rainwater Volumes in 2006 against the Long-term Mean Determined using the Bulk Rain Collectors

An alternative assessment of the rainfall in 2006 can be based on information provided by the Met Office[3]. The Met Office provides regional, annual average rainfall statistics, determined by quality-controlled data from the UK climate network of observing stations. Figure 3-2 shows the average rainfall amounts in England, Wales, Northern Ireland and Scotland during 2006 (blue diamonds) and also how this compares with the long-term, 1961-1990 average (red squares show the percentage difference between 2006 and the long-term average).

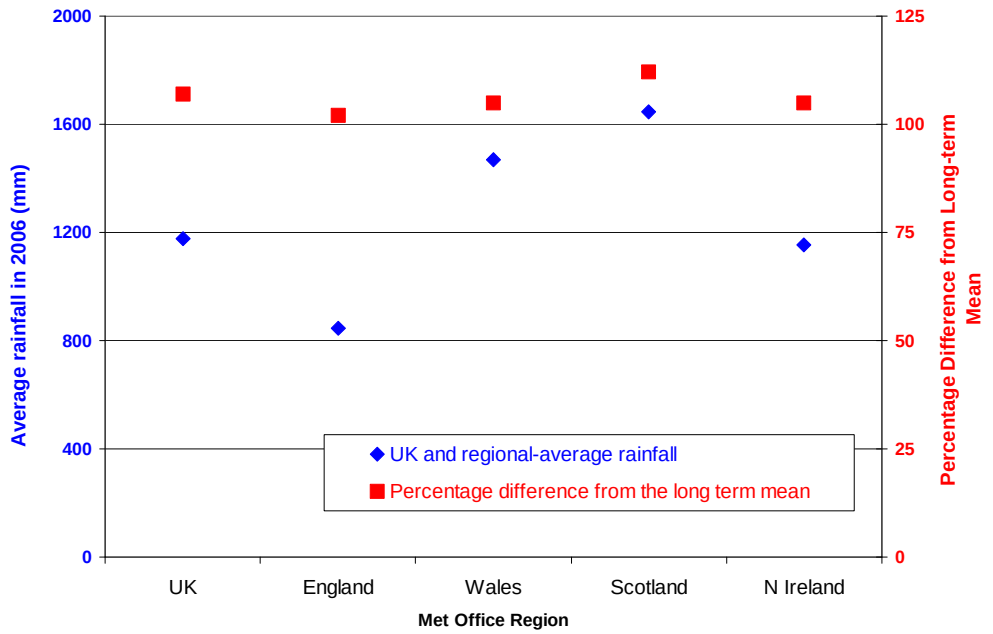


Figure 3-2 Comparison of regional-average rainwater volumes during 2006 (using Met Office data) and the corresponding difference between 2006 and the long-term average (1961 to 1990)

The Met Office confirms that Scotland was again the wettest part of the UK in 2006, followed by Wales, Northern Ireland and England. All UK regions experienced more rainfall in 2006 than the long-term (1961-1990) average amounts.

The UK as a whole saw 7% more rain in 2006 than the long-term (1961-1990) average. Rainfall in England was 2% above the long-term annual average. Both Wales and Northern Ireland saw 5% more rain in 2006 than the long-term average. Scotland was much wetter than previous years: rainfall volumes in 2006 were 12% above the long-term annual average.

[3] http://www.metoffice.com/climate/uk/2006/annual/averages1.html

3.3 Precipitation Chemistry

3.3.1 The Measurements

The measurements of precipitation composition made using the bulk collectors are presented in Appendix 1. It should be noted that the tables in Appendix 1 contain all the analytical results obtained, including those samples affected by contamination by bird strike. A phosphate concentration >0.01 mg P l^{-1} (or >1.0 µeq l^{-1}) was taken as evidence of contamination. Although all these samples have been included in the tables, they were not included in the calculation of annual mean precipitation-weighted ion concentrations[4]. The mean annual rainfall and the precipitation-weighted mean annual concentrations of all ions for the period from 1986 to 2006 are also tabulated in Appendix 2. The rainfall totals presented in Appendix 2, Table 10 include all samples collected and are therefore sometimes higher than the totals used for the calculation of the annual mean concentrations.

Appendix 1 also contains two plots, which show (a) the trend in the annual precipitation-weighted mean concentrations for non-seasalt sulphate, nitrate, ammonium and hydrogen ion since the commencement of the site and (b) the trend in the annual rainfall and in the corresponding annual deposition of the four species. The trends shown in the two plots varies from site to site (Appendix 1), although in general 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.

Seasonal Variation

Appendix 1 has previously included a figure for each site showing the seasonal variation in the concentrations. The seasonal plots presented in Hayman *et al.* [2000, 2001c,d] clearly showed that the largest concentrations of both non-seasalt sulphate and nitrate occur in the period from April to June at most of the sites. This is partly a consequence of the seasonal variation of emissions and of the oxidising capacity of the atmosphere, as demonstrated by the seasonal variation observed in particulate sulphate concentrations (Figure 3-3, right).

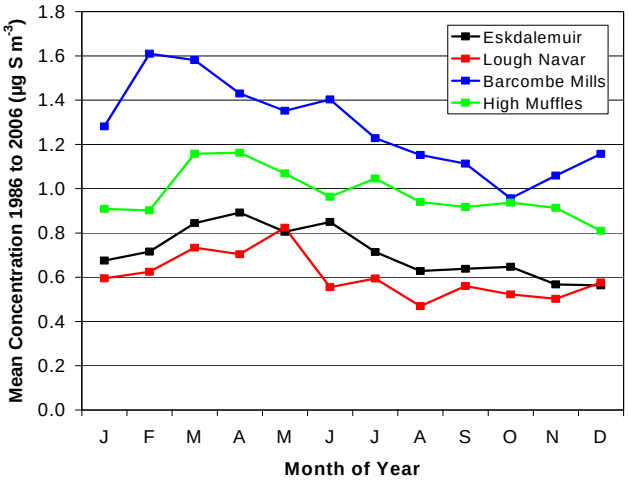


Figure 3-3 Seasonal variation in particulate sulphate concentrations at 4 of the 5 sites as averages for 1986-2006

3.3.2 Concentration Maps for 2006

The spatial patterns of the annual mean precipitation-weighted concentration of acidity, non-seasalt sulphate, nitrate and ammonium are presented in Figure 3-4 to Figure 3-7 for the eight most recent years. The parameters used in the interpolation are presented in Appendix 6. As previously reported, there are no hydrogen ion maps for 2000 as the acidity measurements were removed from the 2000 dataset [Hayman *et al.*, 2001d].

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

The maps show that:

- The hydrogen ion concentration tends to be highest on the eastern seaboard where the rainwater volume is smallest. Concentrations appear relatively constant over the previous three years.
- The highest concentrations continue to be measured in the source region.
- The nitrate concentrations are remarkably consistent throughout the eight years shown. The trend, or lack of trend, in nitrate concentrations will be discussed in the next section.
- Ammonium concentrations are highest in the areas of the United Kingdom where intensive livestock activity is highest.

3.3.3 Precipitation Chemistry Trends

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

In the analysis presented below, a 5% significance level has been used. This means that there is a 5% chance that the trend is not significant. Further, the "strength" of the observed trend is quantified using multiples of the ratio of the calculated F statistic to the critical F value. These multiples (more or less arbitrarily defined) are presented in Table 3-1.

Table 3-2 presents a summary of the trend analysis performed on the non-sea salt sulphate and nitrate concentrations measured at the sampling sites in the acid rain monitoring network. Sites that show a very strong trend are situated in relatively dry locations, often downwind of major sources. Values of "$F_{calculated} / F_{critical}$" that are <1 indicate that no statistically significant trend can be detected. This most often occurs for sites located in the more remote parts of the United Kingdom.

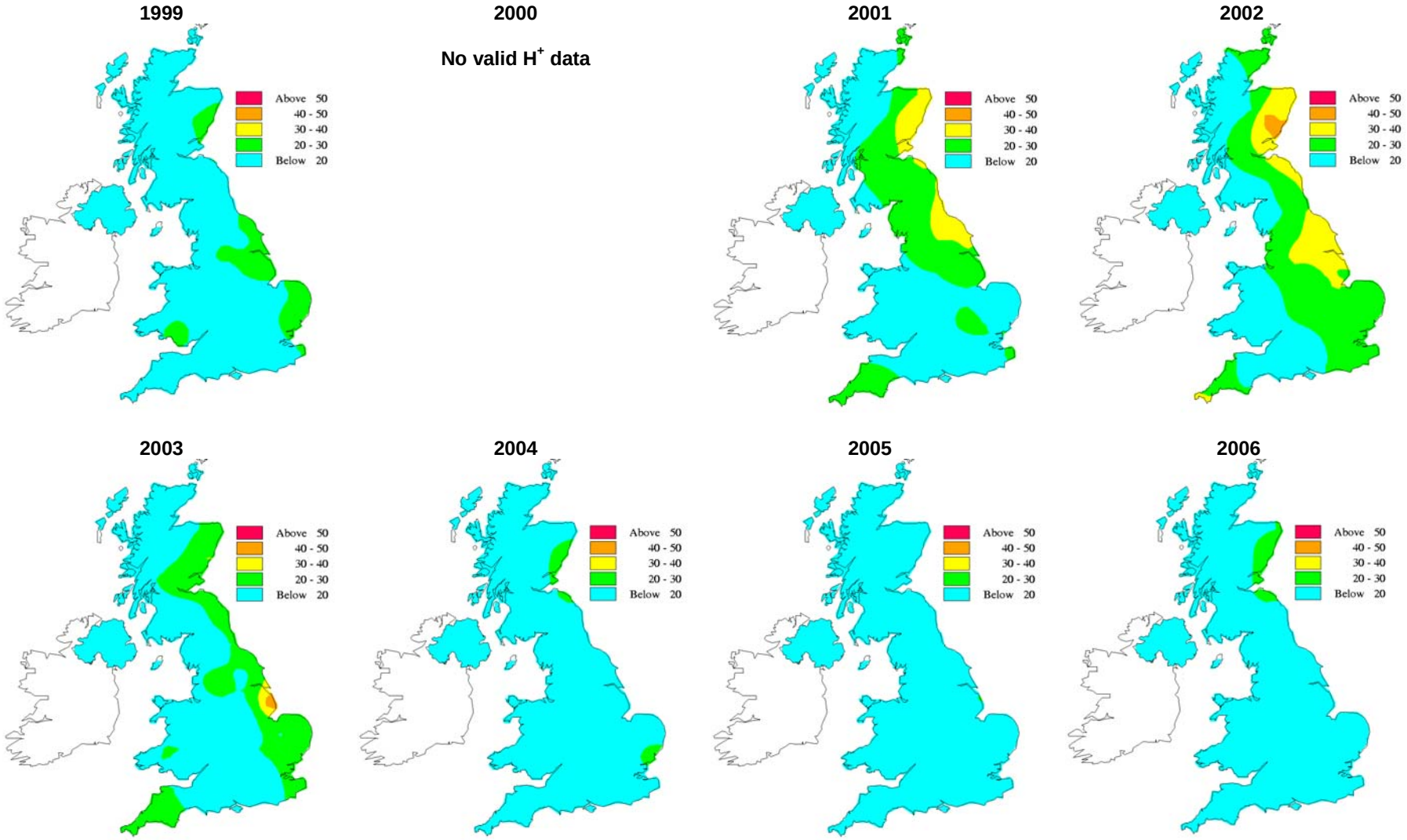


Figure 3-4 Precipitation-weighted concentration maps of Acidity (in μeq l^{-1}) for 1999-2006

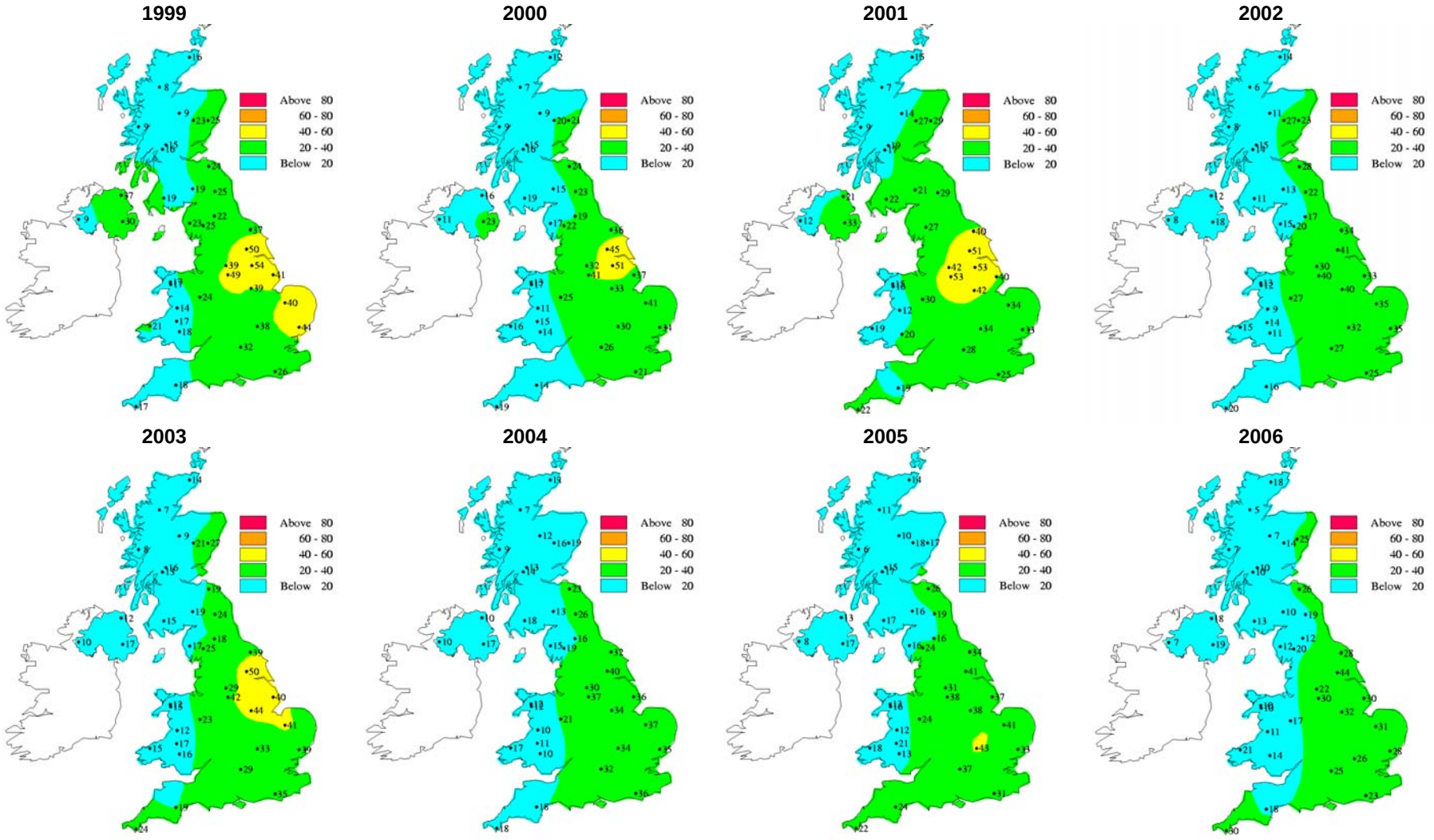


Figure 3-5 Precipitation-weighted Concentration Maps of Non-Seasalt Sulphate (in µeq l^{-1}) for 1999-2006

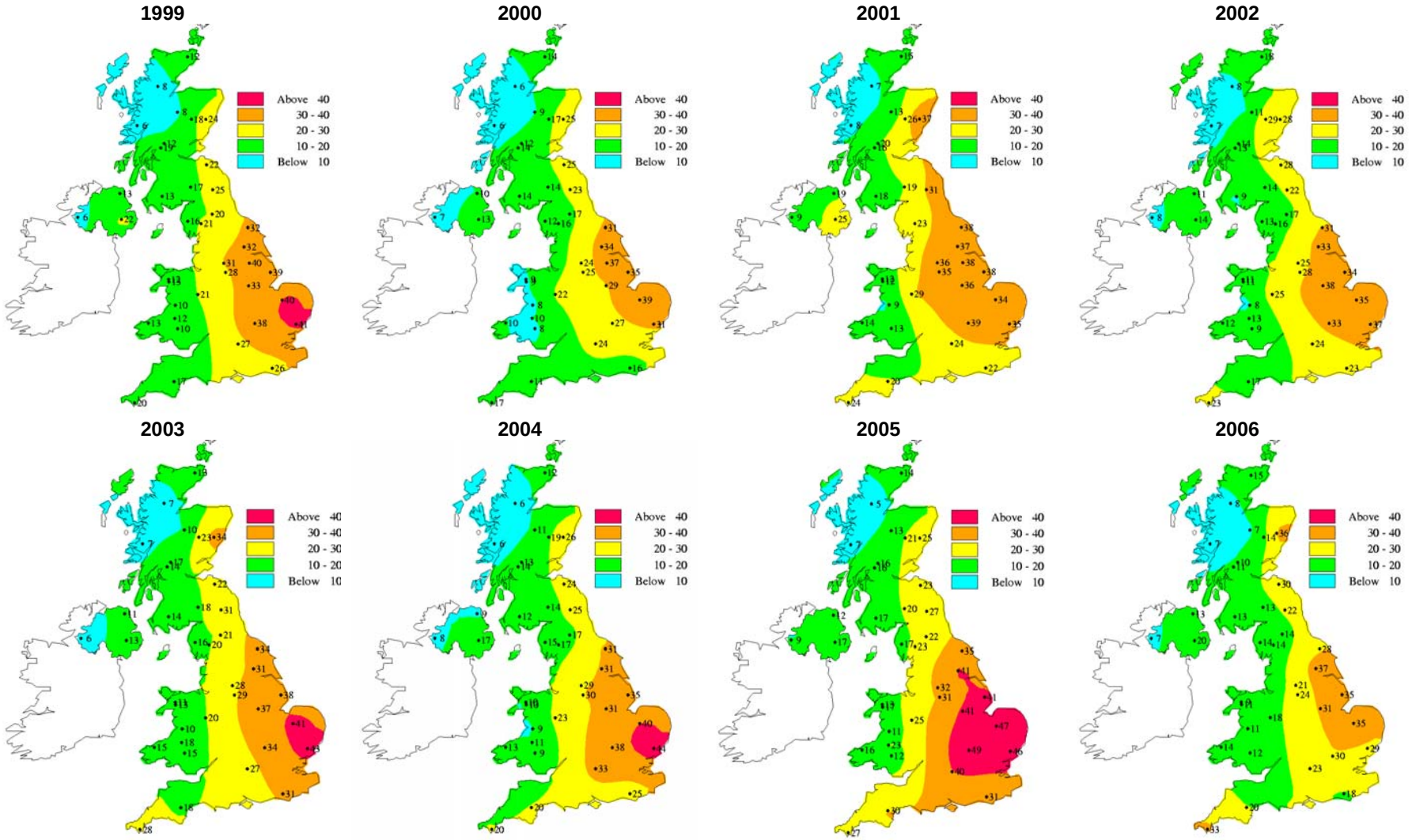


Figure 3-6 Precipitation-weighted Concentration Maps of Nitrate (in µeq l^{-1}) for 1999-2006

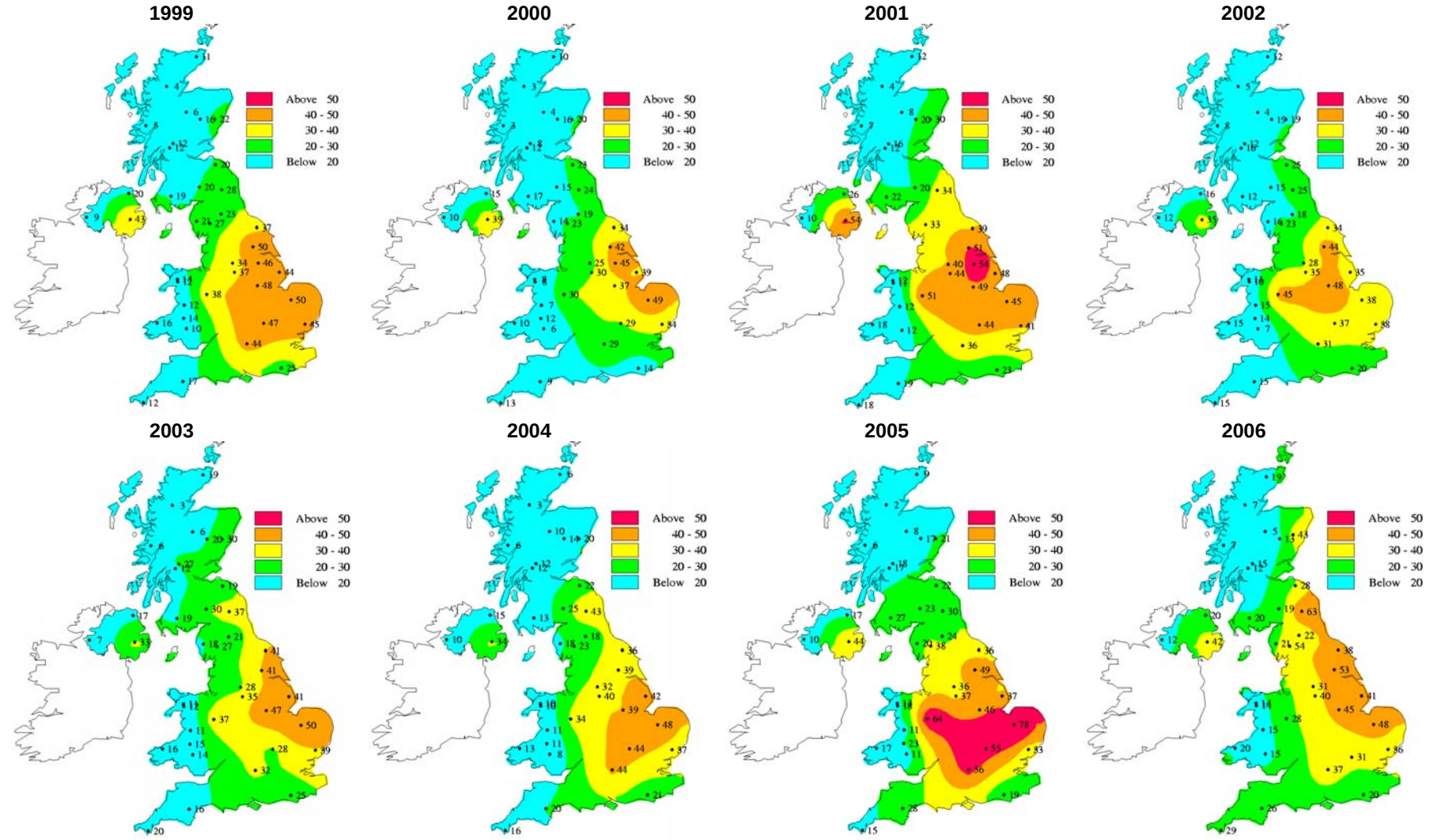


Figure 3-7 Precipitation-weighted Concentration Maps of Ammonium (in µeq l^{-1}) for 1999-2006

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
	1 < ratio < 2	+	Significant trend detected
	2 < ratio < 5	++	Moderate trend detected
	5 < ratio < 10	+++	Strong trend detected
	10 < ratio < 20	++++	Very strong trend detected
	ratio > 20	+++++	Exceptionally strong trend detected

Table 3-2 Summary of the Trend Analysis for nss-Sulphate and Nitrate Observed at the Acid Deposition Monitoring Network Sites and its Significance

Sampling site	Site Code	Sulphate			Nitrate		
		µeql year^{-1}	% change per year	Trend Status	µeql year^{-1}	% change per year	Trend Status
Achanarras	5140	-0.95	-3.23	++++	-0.43	-1.96	++
Allt a' Mharcaidh	5103	-0.84	-2.84	+++	-0.07	-0.46	-
Balquhidder	5152	-1.28	-2.80	++++	-0.08	-0.41	-
Bannisdale	5111	-1.09	-2.39	+++	-0.26	-0.92	-
Barcombe Mills	5007	-1.20	-3.76	+++	-0.18	-1.32	+
Bottesford	5121	-3.28	-3.63	+++++	-0.46	-1.11	+++++
Compton	5129	-2.87	-3.71	++++	-0.60	-1.58	++
Cow Green Res	5113	-1.41	-3.34	++++	-0.18	-0.80	-
Driby	5136	-2.57	-3.21	++++++	-0.56	-1.19	++
Eskdalemuir	5002	-1.05	-3.08	+++++	-0.09	-0.48	+++++
Flatford Mill	5024	-2.49	-3.32	++++	-0.29	-0.69	-
Glen Dye	5011	-1.66	-3.19	+++	-0.25	-0.75	-
Goonhilly	5003	-0.42	-1.46	+	0.24	1.17	-
High Muffles	5009	-2.50	-3.21	++++++	-0.66	-1.50	+++
Hillsborough Forest	5149	-1.87	-3.55	++++	-0.32	-1.36	-
Jenny Hurn	5118	-4.13	-3.77	++++	-0.54	-1.15	+
Llyn Brianne	5124	-0.82	-2.76	+++	0.08	0.54	-
Llyn Llydaw	5153	-0.98	-2.94	+++	-0.16	-0.94	-
Loch Dee	5107	-0.52	-2.74	++++	-0.06	-0.61	-
Lough Navar	5006	-0.75	-3.61	++++	-0.22	-2.09	+
Polloch	5151	-2.20	-3.53	+++	-0.43	-1.39	-
Preston Montford	5024	-0.82	-3.18	+++	-0.20	-1.50	-
Pumlumon	5150	-1.79	-3.31	++++	-0.33	-1.02	+
Redesdale	5109	-0.68	-3.15	+++	0.00	-0.01	-
Stoke Ferry	5004	-2.62	-3.26	+++++	-0.44	-0.96	+++++
Strathvaich Dam	5010	-0.42	-2.80	++	-0.11	-1.19	-
Thorganby	5117	-2.94	-3.08	++++	-0.60	-1.33	++
Tycanol Wood	5123	-0.54	-2.00	+++	0.00	0.00	-
Wardlow Hay Cop	5121	-2.79	-3.13	++++++	-0.23	-0.69	-
Whiteadder	5106	-1.73	-3.26	++++	-0.55	-1.58	++
Woburn	5127	-2.63	-3.45	+++++	-0.12	-0.31	+++++
Yarner Wood	5008	-0.59	-2.03	++	0.17	0.92	-

3.4 Particulate Sulphate Measurements

Daily sulphate concentrations continue to be measured at five sites. Measurements at Strathvaich Dam, Glen Dye and Stoke Ferry were discontinued in 2001. Daily sulphate measurements are a key input for epidemiological time series studies of different particulate matter components:

- Secondary Inorganic Aerosol (SIA), of which particulate sulphate is a component, remains an important component of atmospheric particulate matter, especially as precursor emissions from shipping may increase in the future, while land based emissions of primary particulate matter and SIA precursors are controlled;
- Daily sulphate measurements used within the particulate matter receptor model are used by the Department's Airborne Particulate Expert Group to verify the scaling coefficients used for the secondary inorganic aerosol contribution;
- AQEG has recommended time-resolved measurements of sulphate, nitrate, elemental and organic carbon and $PM_{2.5}$ in rural urban and roadside locations. The aim of these measurements is to approach mass closure for PM measurements and examine the magnitudes of the urban and roadside increments of the different components. Mass closure is an important prerequisite for robust policy development studies.
- Although the measurements from the expanded nitric acid monitoring network will become the primary source of data for mapping particulate sulphate (and other components), the denuder measurements also provide useful ways to generalise the results of the time-resolved measurements at the few sites with time-resolved measurements. Daily sulphate measurements from the daily particulate sulphate programme will also enable some extrapolation of the denuder measurements.
- Retention of the long running daily sulphate dataset is recommended for this key component of $PM_{2.5}$. Measurements of sulphate go back as far as 1973 at Eskdalemuir. It would be counterproductive to stop these measurements when concern is focussed on the long-term health effects of PM and there is considerable uncertainty surrounding the importance of recent and long-term exposure and the time lag of effects.

High frequency particulate sulphate measurements are also of particular interest to EMEP.

3.4.1 Trends in Particulate Sulphate

Figure 3-8 shows the monthly mean and running annual mean concentrations of particulate sulphate at Eskdalemuir. The decrease in the concentration of particulate sulphate is much less marked than that of sulphur dioxide over the corresponding period (Hayman *et al*, 2007a). There is more variation around the running annual mean and an apparent increase in sulphate concentrations from 1978 to 1984. This is then followed by a decrease in annual mean concentrations from 1992 to 2004, and a very slight increase to the end of 2006. The higher concentrations noted in 2003 are evident in this figure. Over the period from 1978 to 2006 the annual average concentration declined from around 1.0 µg [SO_4 as S] m^{-3} to about 0.4 µg [SO_4 as S] m^{-3} in 2006.

Figure 3-9 shows a time-series of the annual mean concentration at the five currently operational sites: Eskdalemuir, Lough Navar, Barcombe Mills, Yarner Wood and High Muffles. Concentrations have been consistently highest at Barcombe Mills and lowest at Lough Navar, reflecting the proximity of these sites to the European mainland. The relative concentrations at each site are seen to follow a similar trend over the years; the mean concentrations at all sites decreased until about 1992, remained somewhat steady until about 1996 and then decreased rapidly until about 1999, where they remained more or less constant until 2002. 2003 was a photochemically active year, when a number of periods of elevated concentrations were experienced, thus influencing the annual mean concentrations. Annual mean concentrations were noticeably lower in 2004, before rising slightly at most sites in 2005, and again 2006.

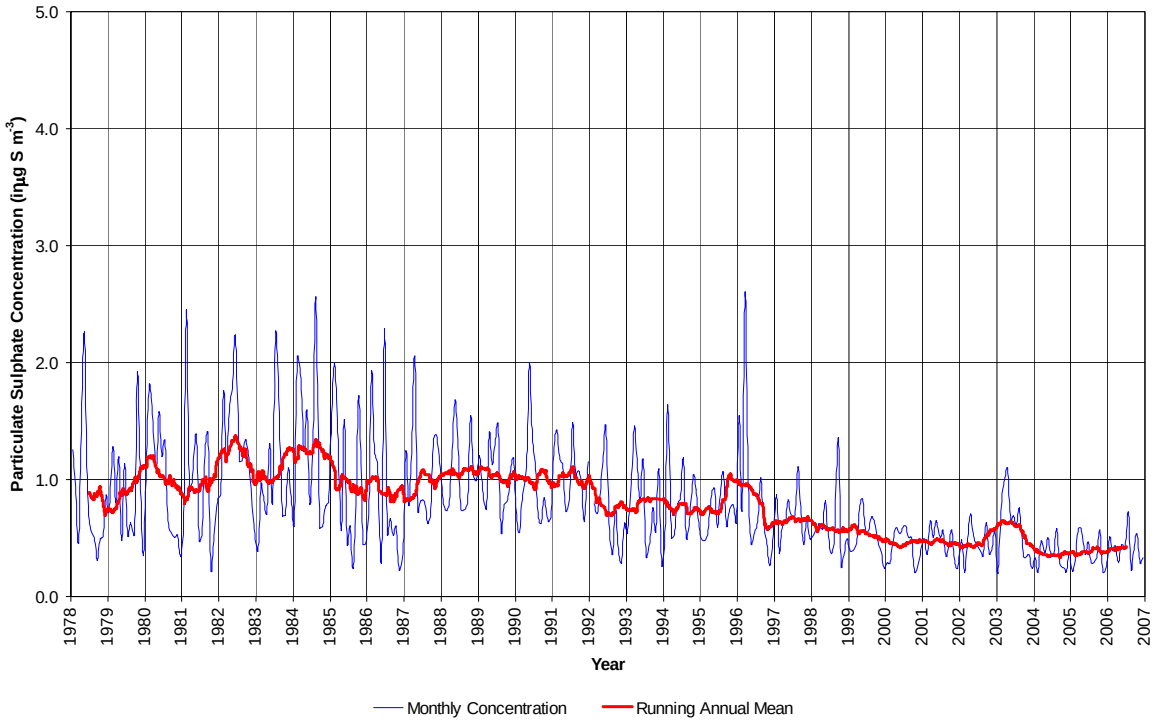


Figure 3-8 Trends in Particulate Sulphate Concentrations observed at Eskdalemuir since 1978

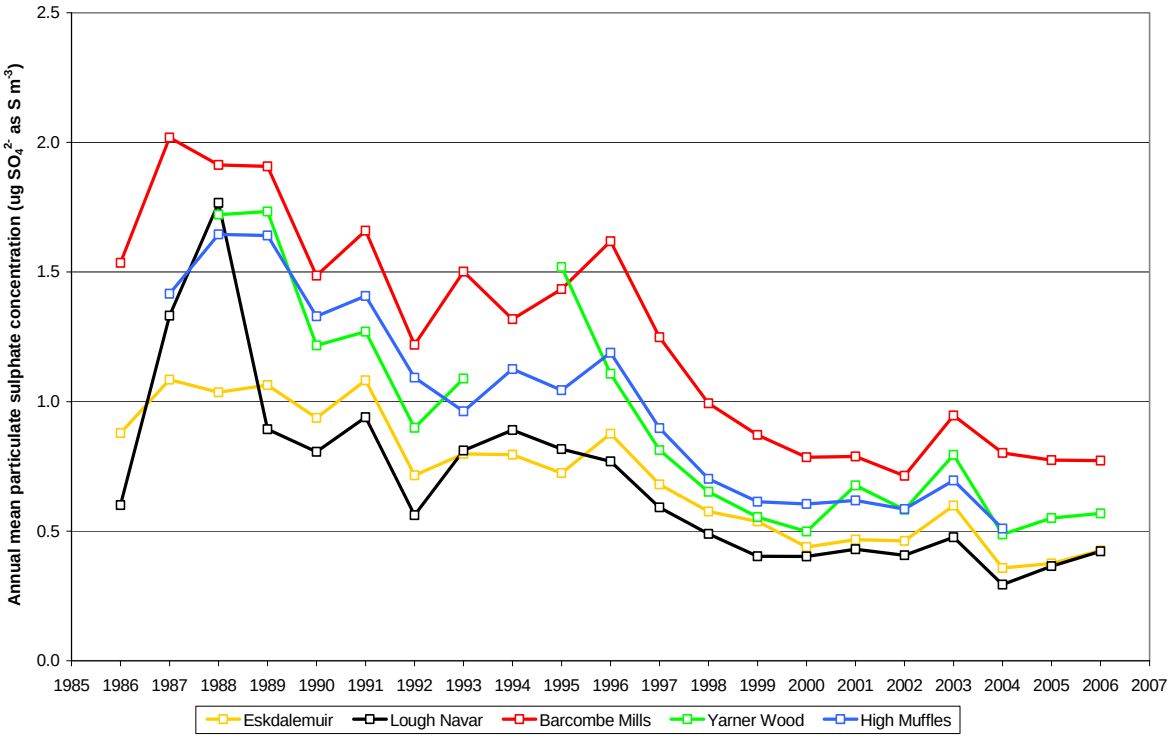


Figure 3-9 Annual mean concentrations of particulate sulphate at the daily sites, from 1986 to 2006 (ug SO_4^{2-} as S m^{-3})

3.5 Nitrogen Dioxide

3.5.1 The 2006 Measurements

The determination of nitrogen dioxide at rural locations in the acid rain network provides a key input to the mapping of nitrogen dioxide in the United Kingdom [Stedman, 1997]. The individual and annual mean nitrogen dioxide diffusion tube measurements made in 2006 are presented in Appendix 4.

3.5.2 Triplicate Measurements

Exposure of triplicate diffusion tubes has commenced at three sites where there are (or will be) co-located automatic analysers. Triplicate measurements commenced at Yarner Wood and Eskdalemuir in 2006. Triplicate exposures at Harwell began in January 2007, coinciding with the relocation of the rain collector and diffusion tube from Compton.

Diffusion tube precision and accuracy of the triplicate measurements were determined using the DiffTPAB_v03.xls spreadsheet (updated Nov 2006)[5]. The spreadsheet calculates the annual mean, standard deviation, Coefficient of Variation (CV) and the 95% confidence intervals of the mean.

The CV of the diffusion tube triplicates represents their precision. This value is used to carry out a data quality check on the replicates for each period. When the CV of a single period is above 20%, the period measurement is considered of poor precision. All others (below 20%) are considered of good precision. The average CV of the different monitoring periods is used to assess the overall precision of the survey. If the average CV is above 10%, the survey is considered to be of poor precision.

Diffusion tube measurements at Eskdalemuir were considered of “good precision” for all but one monitoring period in 2006. For this period, there was one obvious outlier; this point was removed from the dataset. With the measurement removed, the resultant CV for the whole survey was <10 % and considered of good precision. In order to determine the accuracy of the measurements, the diffusion tube annual mean was compared with the annual mean measured by the co-located automatic analyser. Table 3-3 overleaf shows that the Eskdalemuir diffusion tube annual mean of 3.8 μgm^{-3} compares very well with the automatic annual mean of 3.7 μgm^{-3}.

For Yarner Wood, all diffusion tube measurements were of good precision except one, which was considered borderline. Overall, the Yarner Wood diffusion tube survey was considered of “good precision”. Table 3-3 shows that the accuracy of the measurements was also good.

Individual diffusion tube measurements from the triplicate sites are also presented in Appendix 4.

3.5.3 Comparison with Other Measurements

Since 2004, nitrogen dioxide measurements have been made using automatic monitoring instruments at a number of rural locations in the UK, primarily in England. Three of these analysers are currently co-located with Acid Deposition monitoring sites: Eskdalemuir, Yarner Wood and High Muffles. In addition, two rural automatic analysers are located sufficiently closely to acid deposition sites that the measurements can also be compared (Compton acid deposition and Harwell automatic, and Barcombe Mills acid deposition and Lullington Heath automatic). Table 3-3 compares the annual mean concentrations determined at these sites for 2006. From January 2007, monitoring equipment at Compton will be moved to Harwell, thus co-locating these measurements for direct comparison in future years.

Table 3-3 overleaf shows the very good agreement seen between the pairs of measurements at all co-located sites, particularly at those undertaking triplicate diffusion tube monitoring. Diffusion tube measurements are generally higher than those made by the automatic analysers. In 2005, this over-read was in the order of 20-25%, although this bias is not so evident from 2006 measurements.

[5] Available from the UK Air Quality Archive – LAQM Tools: http://www.airquality.co.uk/archive/laqm/tools.php

Table 3-3 Comparison of the 2006 Annual Mean NO_2 Concentrations (µg NO_2 m^{-3})		
Site	Diffusion Tube	Automatic
Eskdalemuir *	3.8	3.7
Yarner Wood *	5.6	5.2
High Muffles	8.8	7.5
Compton / Harwell	14.2	11.5
Barcombe Mills / Lullington Heath	10.8	10.8

* Triplicate diffusion tube monitoring undertaken at these sites

3.5.4 Trends in Nitrogen Dioxide

Figure 3-10 presents the annual average concentrations for nitrogen dioxide determined at eight monitoring sites in the network between 1997 and 2006. The figure shows six current sites and also Stoke Ferry and Glen Dye, which were operational to the end of 2005. Nitrogen dioxide concentrations in 2006 were generally lower than those measured in 2005 and the particularly high pollution year of 2003, although not as low as those observed in 2004.

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 diffusion tube method at low concentrations, the fall in nitrogen dioxide concentrations is most clearly observed at the relatively high concentration sites such as High Muffles and Barcombe Mills, although lower concentration sites such as Yarner Wood, Strathvaich Dam Eskdalemuir also show evidence of a decline.

3.5.5 Concentration Maps

Diffusion tube measurements have been used to produce a map of the UK rural nitrogen dioxide concentrations for 2006, as shown in Figure 3-11 (bottom right-hand panel). The figure also shows the 1999 to 2005 maps for comparison. The highest concentrations in 2006 were observed in the south east of England with annual mean concentrations of 7.2 ppb and 7.4 ppb measured at Flatford Mill and Compton respectively. In the main, this reflects the proximity to the sampling sites of roads and other aspects of urbanisation. The 2006 map does not include concentrations from Woburn (Buckinghamshire), the highest concentration site in 2005 (11.2 ppb), as this site was closed at the end of 2005. The maps show little difference in the spatial patterns between 1999 and 2006 and some evidence of a decrease in nitrogen dioxide concentrations across the UK.

Historically, these UK maps, based on diffusion tube measurements, defined the rural nitrogen dioxide concentration field upon which urban contributions were superimposed. With the introduction of automatic analysers, mainly in England, a hybrid approach is now adopted in the mapping work (Kent *et al.*, 2006). The preparation of the urban-enhanced maps is undertaken under another contract (*Pollution Climate Mapping*). The measurements have been provided to the Pollution Climate Mapping project team.

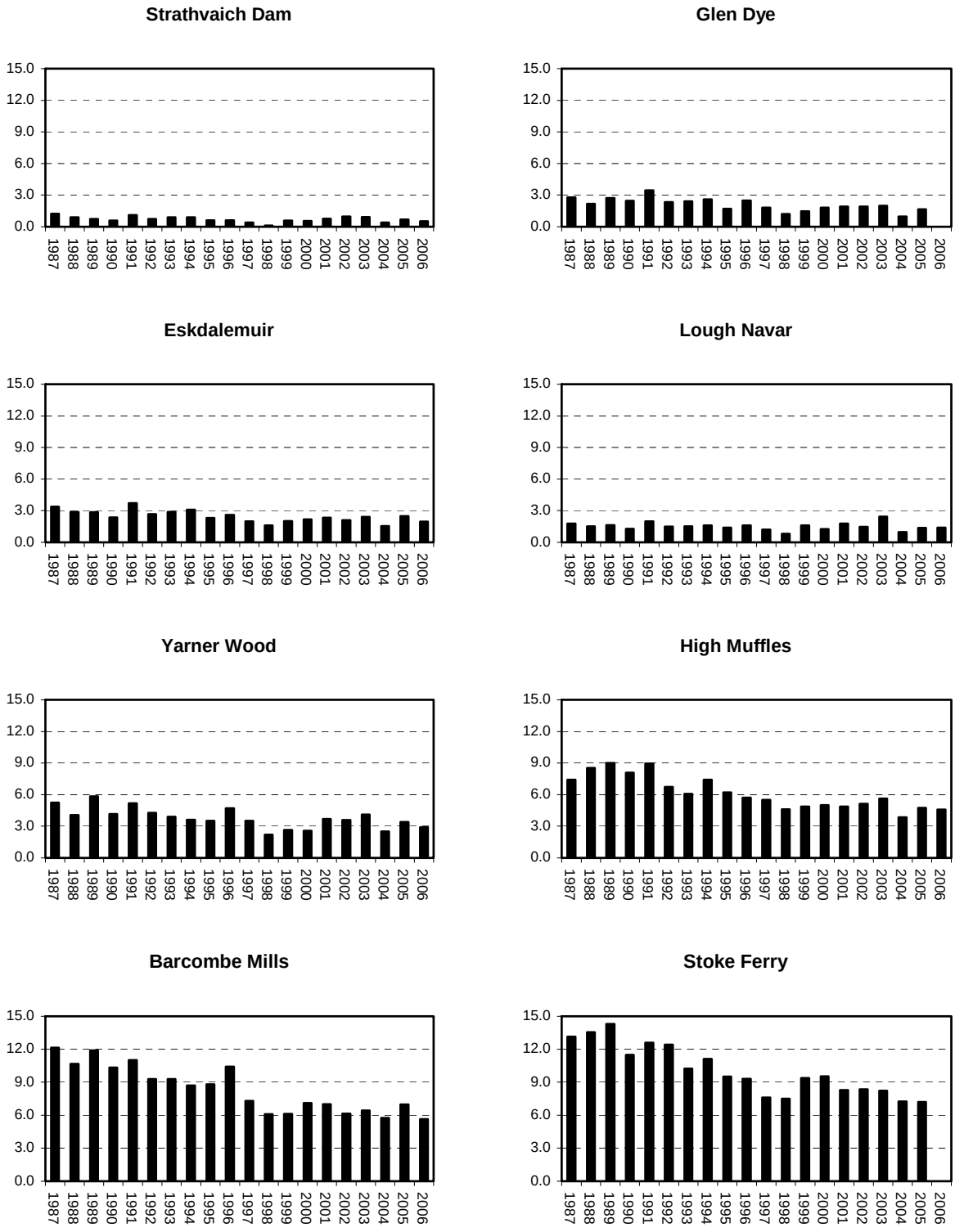


Figure 3-10 Time Series of Annual Average Nitrogen Dioxide Concentrations (ppb) (Glen Dye and Stoke Ferry now closed)

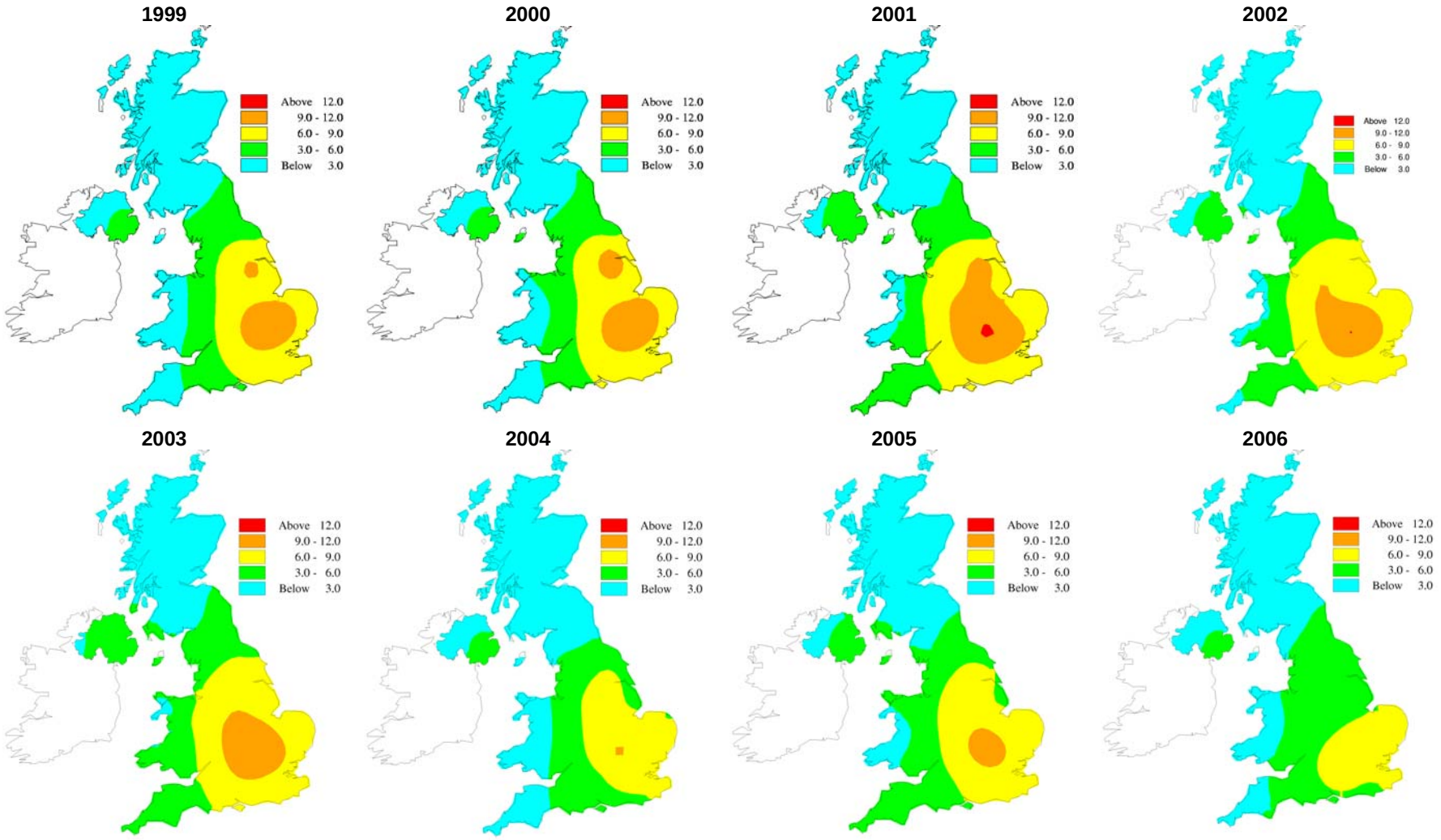


Figure 3-11 Interpolated Concentration Maps of Nitrogen Dioxide (in ppb) for 1999 – 2006

4 Nitric Acid Monitoring Network

4.1 Introduction

The UK Nitric Acid Monitoring Network has been in operation since September 1999, providing data on nitric acid, particulate nitrate and other species as part of the UK Acid Deposition Monitoring Network. The aim of these measurements is to explore spatial patterns, compare results with dispersion models, seasonality and contribute to national nitrogen deposition estimates.

In the first phase of the network, monitoring was implemented on a monthly basis at 12 sites using the CEH DELTA denuder system in an integrated fashion with the UK National Ammonia Monitoring Network (NAMN). To improve on the national spatial coverage, the HNO_3 monitoring network was increased from 12 to 30 sites in the second phase of the network, starting January 2006.

In this section, the sampling methods and measurement data from the new expanded 30-site network for 2006 are summarised and the measurements compared against previous years.

A map of the HNO_3 monitoring network is shown in Figure 4-1, where nitric acid and related species are monitored on a monthly basis at (A) 12 locations (from September 1999) and (B) 30 locations (from January 2006). Details of the sites are summarised in Table 4-1.

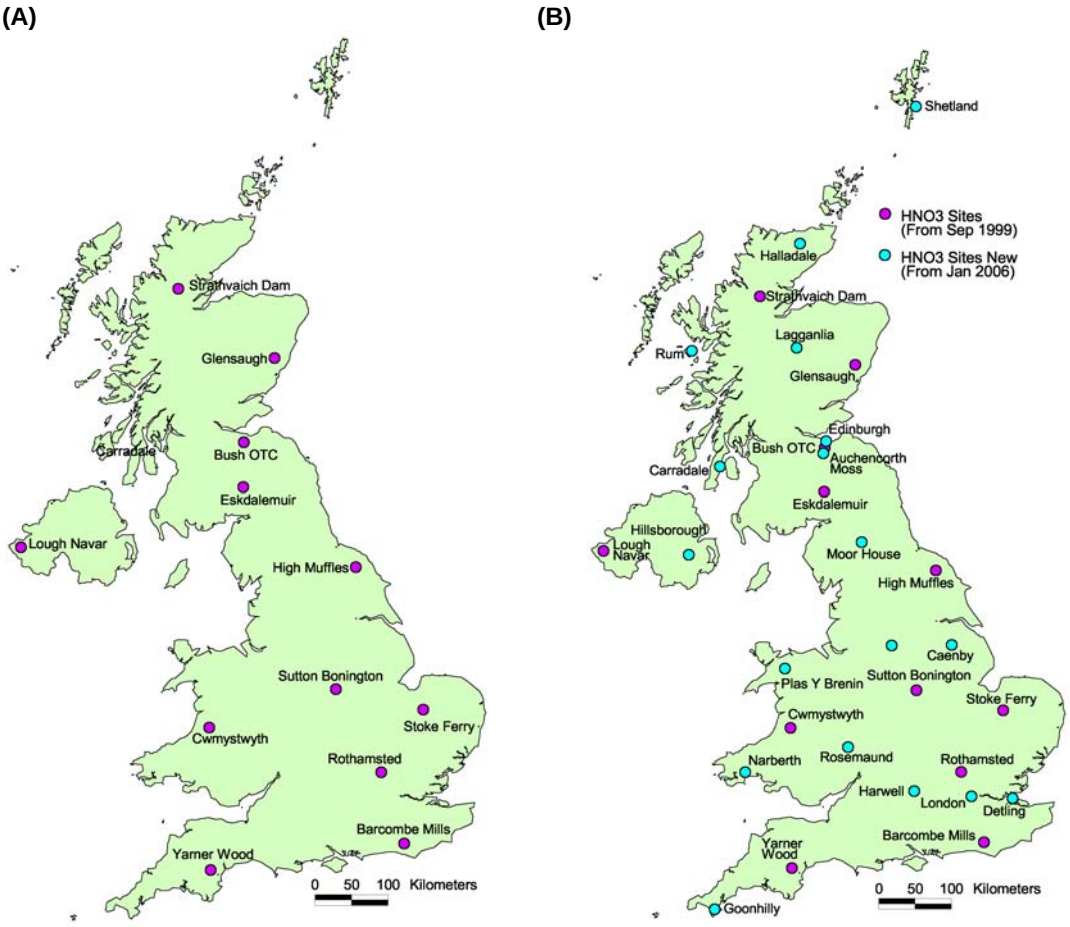


Figure 4-1 Map of (A) the original 12 monitoring sites and (B) the expanded 30 site network

Table 4-1 Sites in the HNO3 network using an extension of the DELTA system at NAMN sites

Site code	Site name	OS Grid Ref	Start date	Local Site Operating Body
1	Bush OTC	NT243642	Sept 1999	CEH Edinburgh
21	Glensaugh	NO664789	Sept 1999	MLURI
24	Rothamsted	TL123129	Sept 1999	IACR
30	Strathvaich Dam	NH348750	Sept 1999	CLOVA Environmental Research
31	Eskdalemuir	NT235030	Sept 1999	The Met Office
32	High Muffles	SE776939	Sept 1999	Forest Research
33	Stoke Ferry	TL700988	Sept 1999	Borough Council of Kings Lynn & West. Norfolk
34	Yarner Wood	SX789788	Sept 1999	Natural England
40	Sutton Bonington	SK505268	Sept 1999	Univ. of Nottingham
45	Lough Navar	IH065545	Sept 1999	DARDNI
70	Cwmystwyth	SN771742	Sept 1999	ADAS
83	Barcombe Mills	TQ438149	Sept 1999	South East Water
6B	Rosemaund	SO564476	Jan 2006	ADAS
8C	Narberth	SN146127	Jan 2006	Pembrokeshire County Council
12	Halladale	NC902488	Jan 2006	Fountain Forestry
18	Auchencorth Moss	NT221562	Jan 2006	CEH Edinburgh
19	Shetland	HU500400	Jan 2006	Lerwick Met. Office
22	Moor House	NY751334	Jan 2006	CEH Lancaster
36C	Cromwell Rd	TQ266791	Jan 2006	CG Images
41	Lagganlia	NH856037	Jan 2006	CEH Banchory
44	Hillsborough	IJ243577	Jan 2006	DANI
47	Rum	NM408992	Feb 2006	Scottish Natural Heritage
60C	Edinburgh St Leonards	NT262731	Jan 2006	Edinburgh Council
77	Carradale	NR798378	Jan 2006	SEPA
97	Detling	TQ801597	Feb 2006	Maidstone Environmental Health
98	Harwell	SU474863	May 2006	AEA Technology
99	Ladybower	SK164892	Feb 2006	Nick Hewitt
100	Plas Y Brenin	SH716578	May 2006	Countryside Council for Wales (CCW)
102	Caenby	SK993900	Feb 2006	West Lindsey District Council
103	Goonhilly	SW723214	Jan 2006	BT

4.2 Method and Data Collection

The sampling train used in the CEH DELTA denuder system is shown in 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 coated filter papers in a 2-stage filter-pack at the end of the sampling train collect the aerosol components: NO_3^-, SO_4^{2-}, Cl^- and NH_4^+.

Returned samples are stored in a cold room at 4 ºC until analysis. The carbonate-coated denuders and filters are extracted into 5 ml of 0.05 % H_2O_2. The initial uncoated short length of Teflon inlet is however not extracted, as this serves to develop a laminar flow through the coated denuders only. (Tests have shown that <1% of the total is captured in this portion.) Aqueous extracts from the denuders and filters are sent to Harwell Scientifics Ltd on a monthly basis for IC analysis. Denuder sample extracts are analysed for NO_3^-, SO_4^{2-} and Cl^- and filter sample extracts are analysed for NO_3^-, SO_4^{2-}, Cl^-, Na^+, Mg^{2+} and Ca^{2+}.

The acid coated denuders and filters are analysed for NH_4^+ as part of the UK National Ammonia Monitoring Network (NAMN) and are reported separately under that contract. However, data on NH_3 and NH_4^+ are used in this report to aid interpretation of data obtained under the Nitric Acid Monitoring Network.

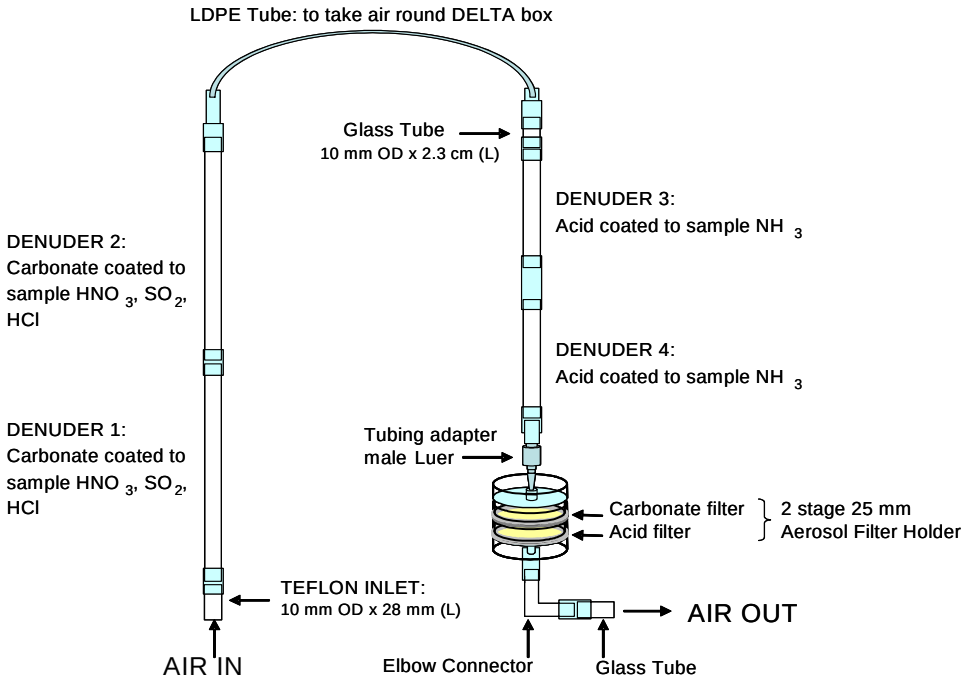


Figure 4-2 CEH DEnuder for Long-Term Atmospheric sampling (DELTA) for monthly measurements of nitric acid, nitrate and associated acids and aerosols

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

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

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

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

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

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

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

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

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

4.3 Nitric Acid Network Measurements

4.3.1 Denuder Capture Efficiency

The use of 2 glass denuders in series allows the capture efficiency of every sample to be assessed, by comparing the amount of HNO_3/SO_2/HCl in both tubes. A collection efficiency correction is applied to the measurement based on the capture efficiency. Where less than 75% of the total captured is recorded in the first denuder, data are marked as being less certain. The monthly averaged denuder capture efficiencies from the 30 monitoring sites for HNO_3, SO_2 and HCl are shown in Figure 4-3. The quality control using a double denuder system confirms that the capture efficiency in the denuders is adequate and that the correction factors are small (typically ~ 5 %).

At the Bush OTC monitoring site (NT243642), two DELTA systems are operated in parallel to provide an ongoing assessment of the precision of the DELTA approach. Excellent agreement was achieved with the replicate sampling (e.g. an annual average difference of ± 2 % in HNO_3).

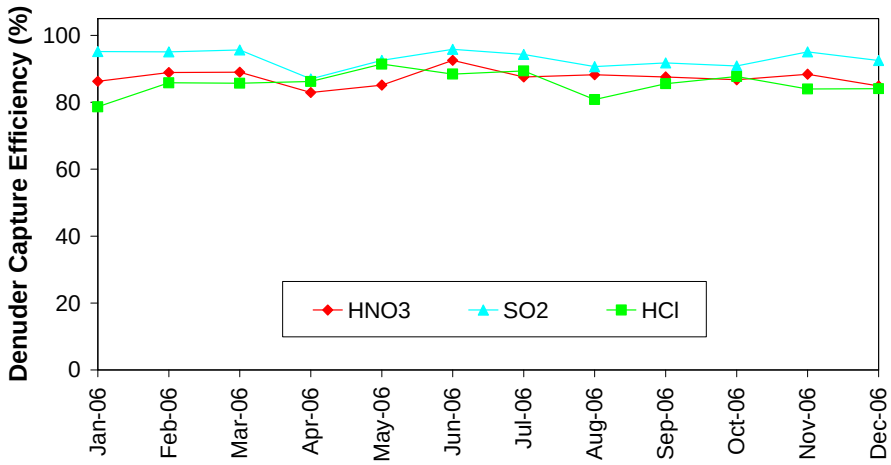
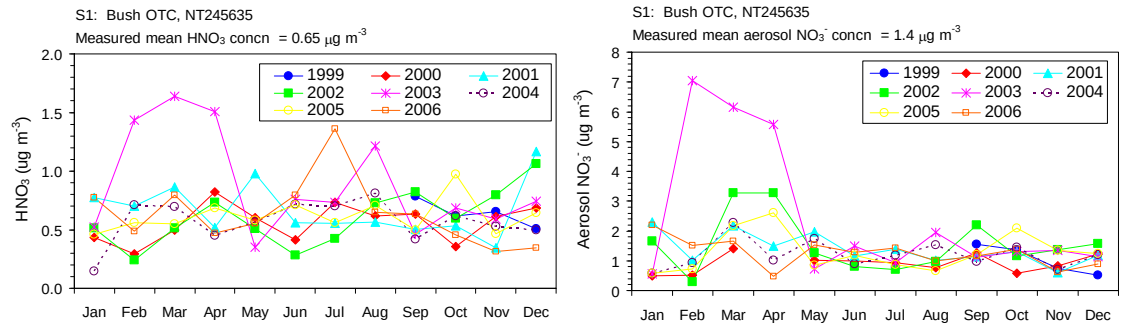


Figure 4-3 Monthly mean denuder capture efficiency for NH_3, HNO_3, SO_2 and HCl from the 30 monitoring sites (= amount in 1st denuder / (Amounts captured in 1st + 2nd denuders)*100 %)

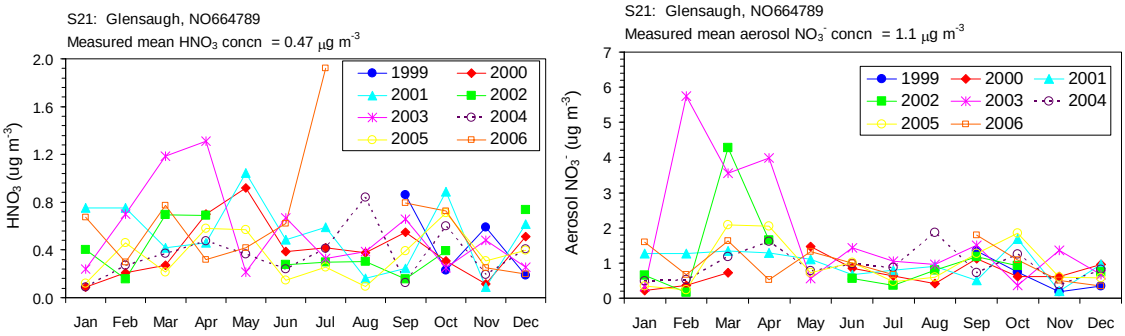
4.3.2 The 2006 Measurements

Graphs of the monthly monitored concentrations of HNO_3 and NO_3^- at each site are shown in Figure 4-4. The complete set of monthly measurements and statistical summaries of the acid gases and acidic and base cation aerosol components made in 2006 can be found in Appendix 5.

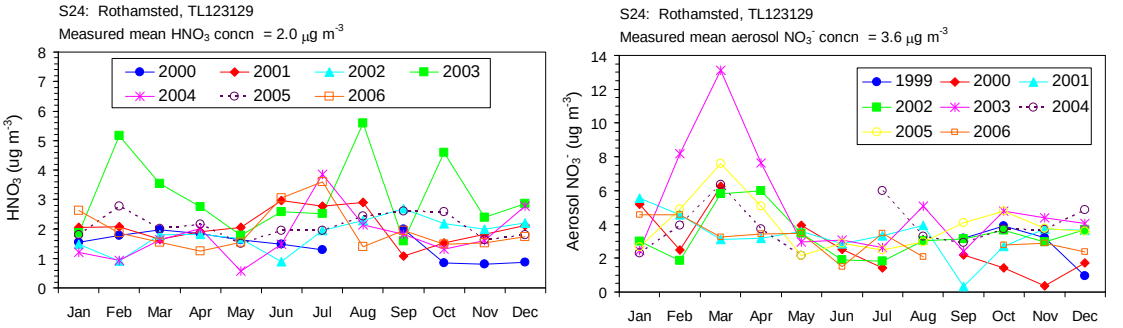
Figure 4-4 Measurements of gaseous HNO_3 and aerosol NO_3^- made in the Nitric Acid Monitoring Network between 1999 and 2006



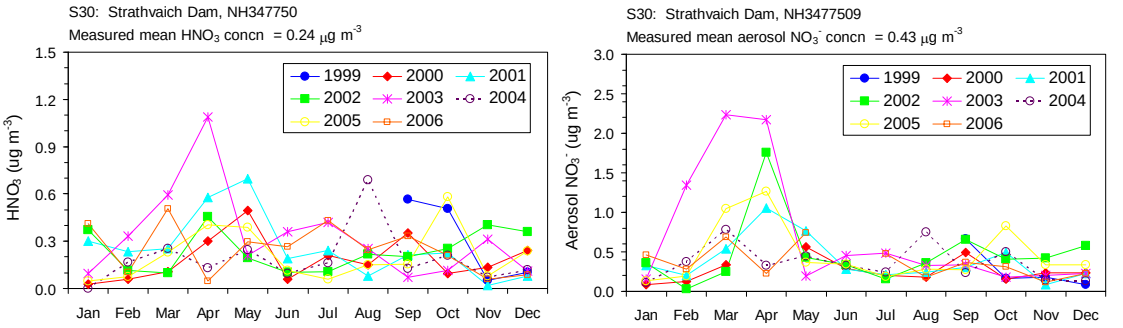
(i) Bush OTC



(ii) Glensaugh

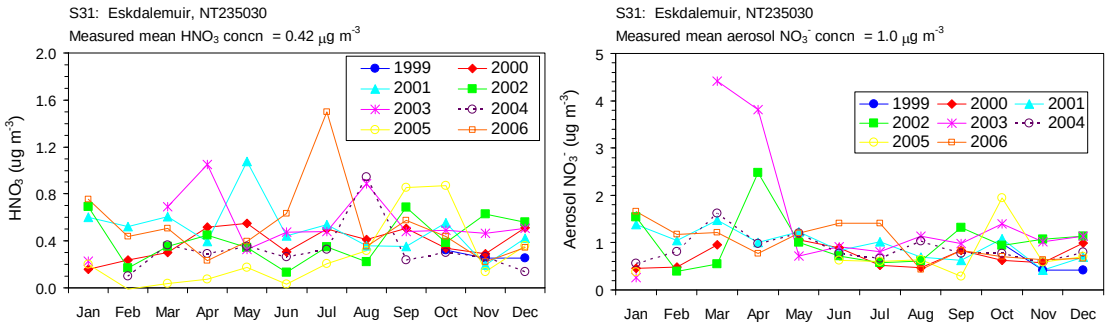


(iii) Rothamsted

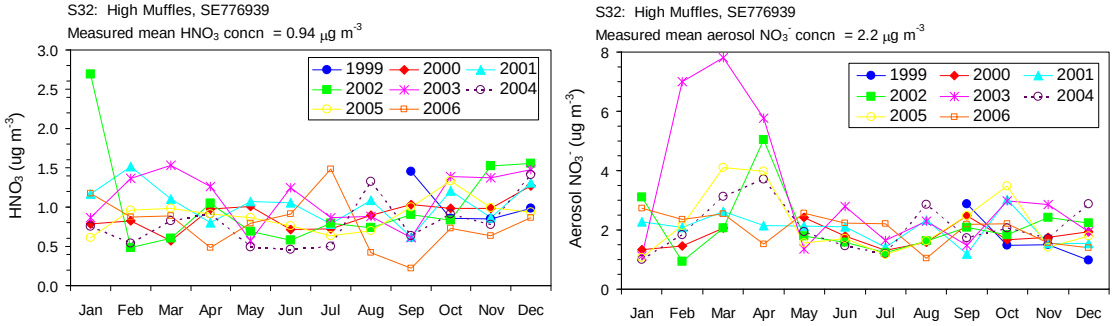


(iv) Strathvaich Dam

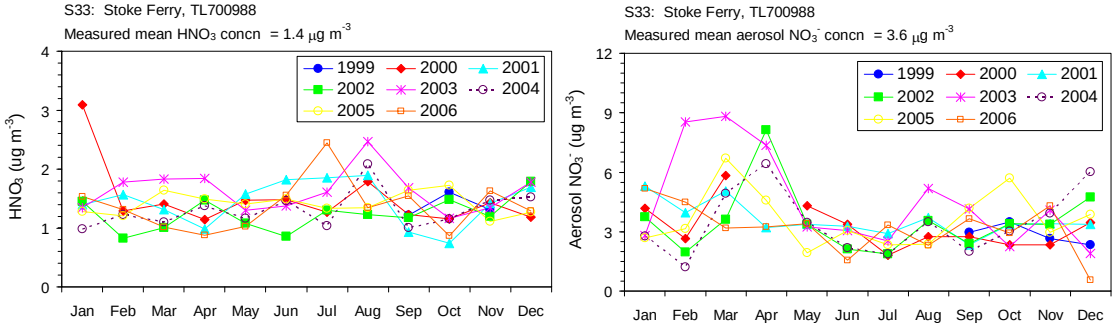
Figure 4-4 Measurements of gaseous HNO_3 and aerosol NO_3^- made in the Nitric Acid Monitoring Network between 1999 and 2006 *(continued)*



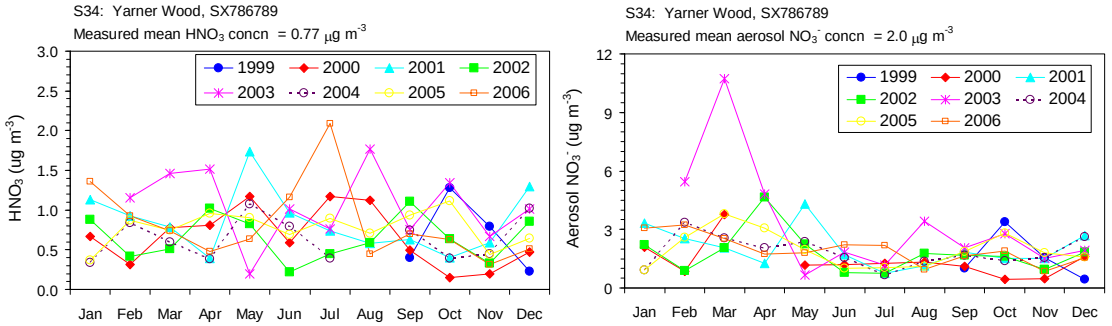
(v) Eskdalemuir



(vi) High Muffles

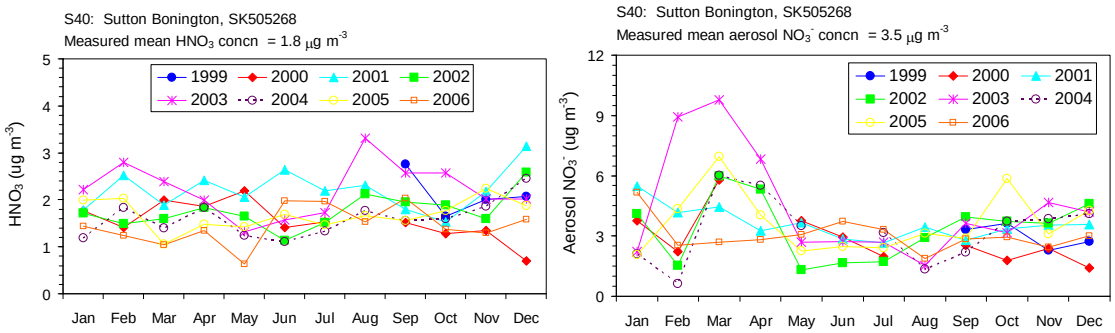


(vii) Stoke Ferry

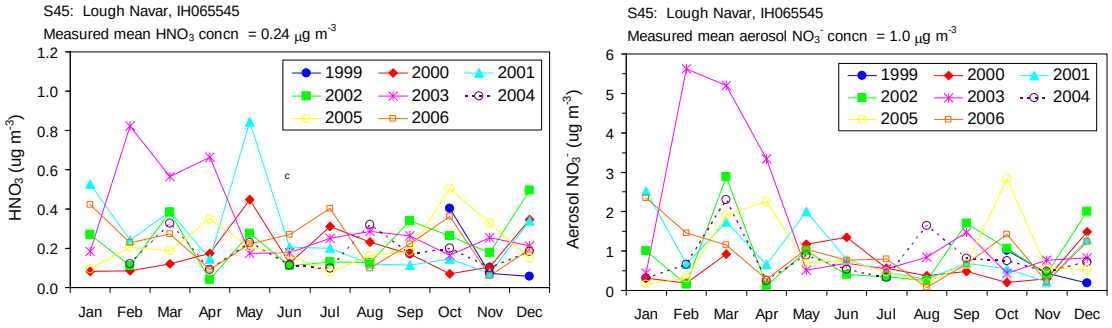


(viii) Yarner Wood

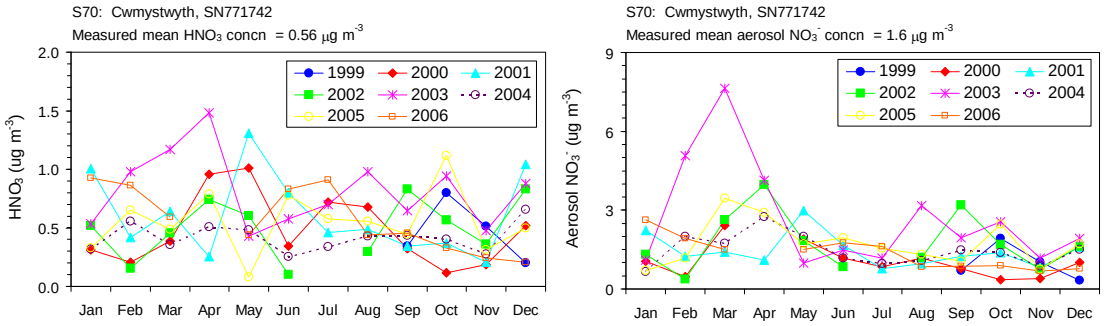
Figure 4-4 Measurements of gaseous HNO_3 and aerosol NO_3^- made in the Nitric Acid Monitoring Network between 1999 and 2006 *(continued)*



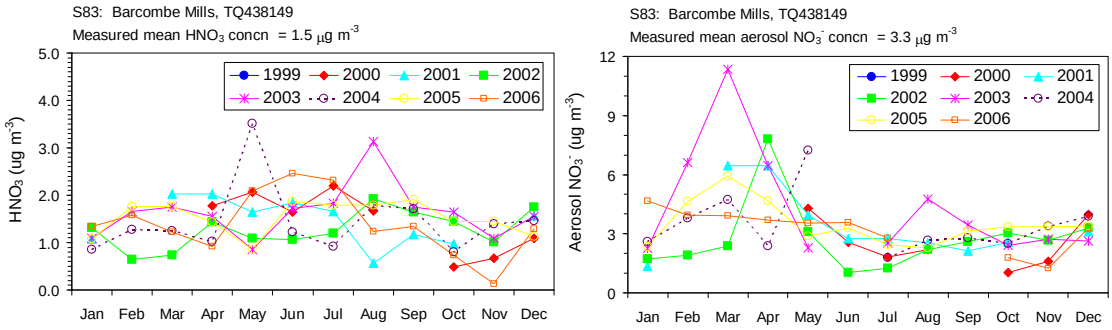
(ix) Sutton Bonington



(x) Lough Navar

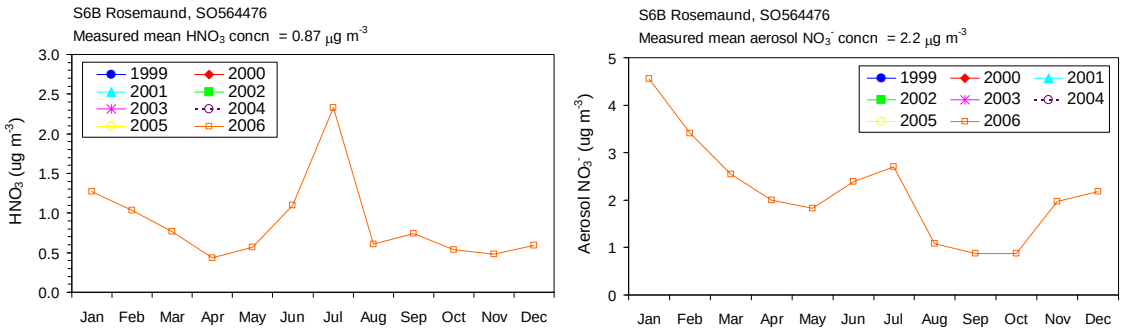


(xi) Cwmystwyth

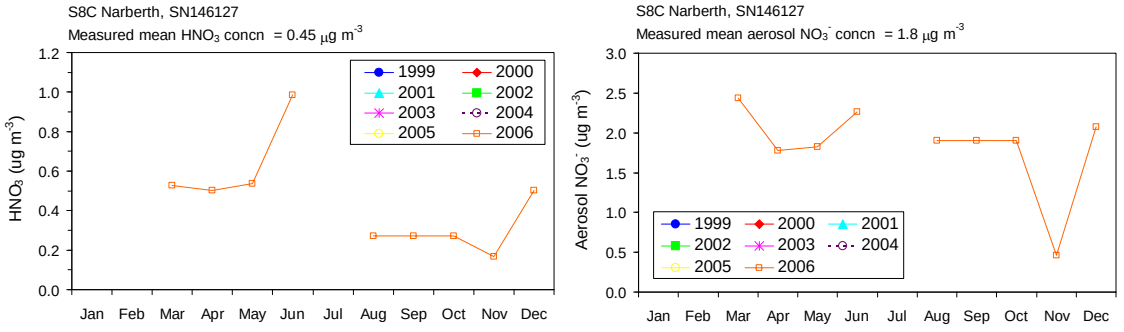


(xii) Barcombe Mills

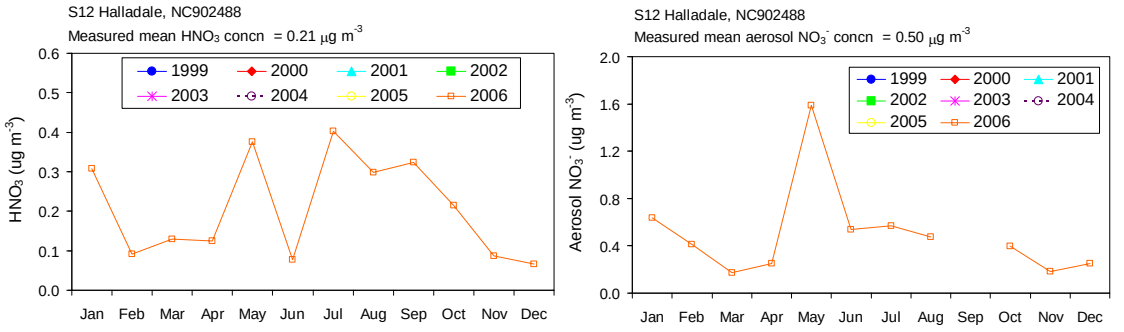
Figure 4-4 Measurements of gaseous HNO_3 and aerosol NO_3^- made in the Nitric Acid Monitoring Network between 1999 and 2006 *(continued)*



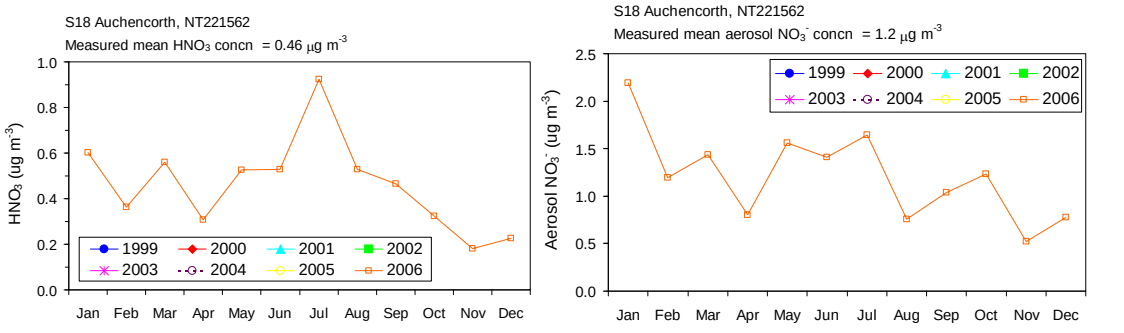
(xiii) Rosemaund



(xiv) Narberth

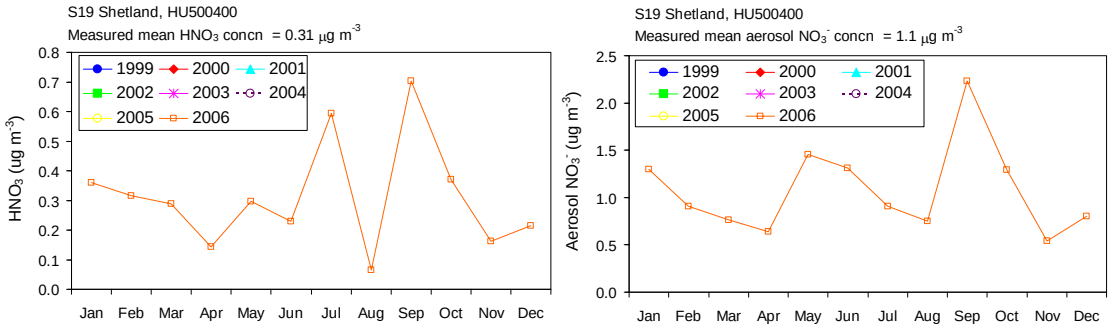


(xv) Halladale

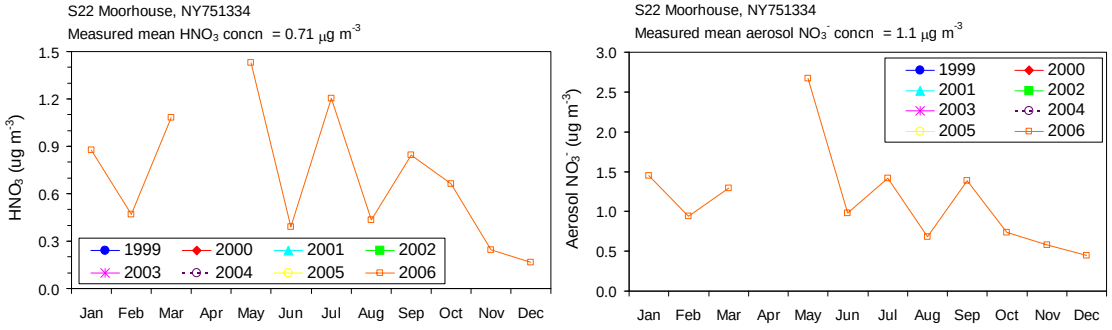


(xvi) Auchencorth Moss

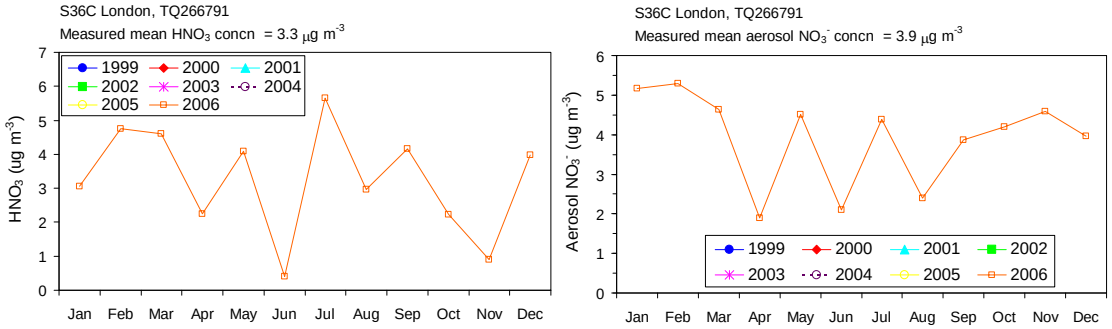
Figure 4-4 Measurements of gaseous HNO_3 and aerosol NO_3^- made in the Nitric Acid Monitoring Network between 1999 and 2006 *(continued)*



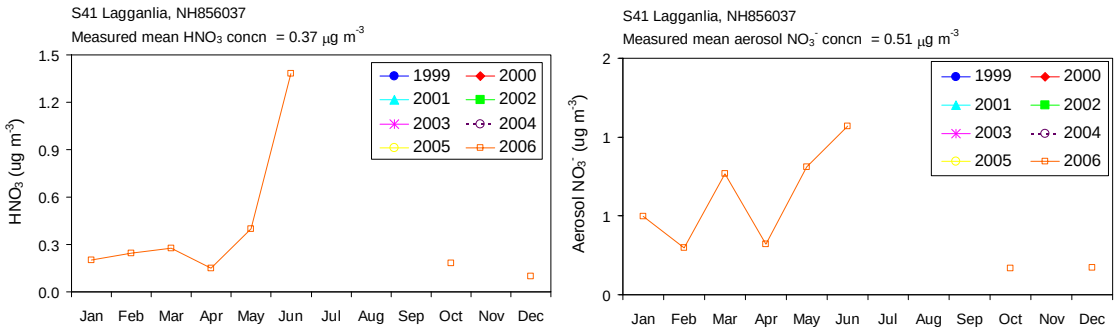
(vxii) Shetland



(xviii) Moorhouse

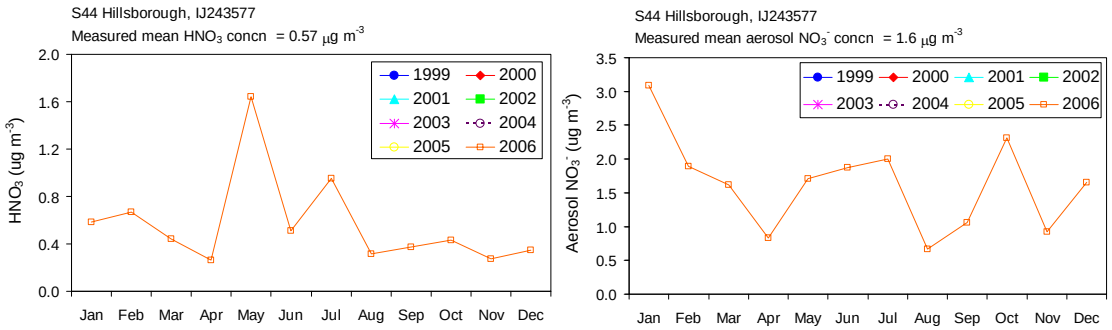


(xix) London Cromwell Road

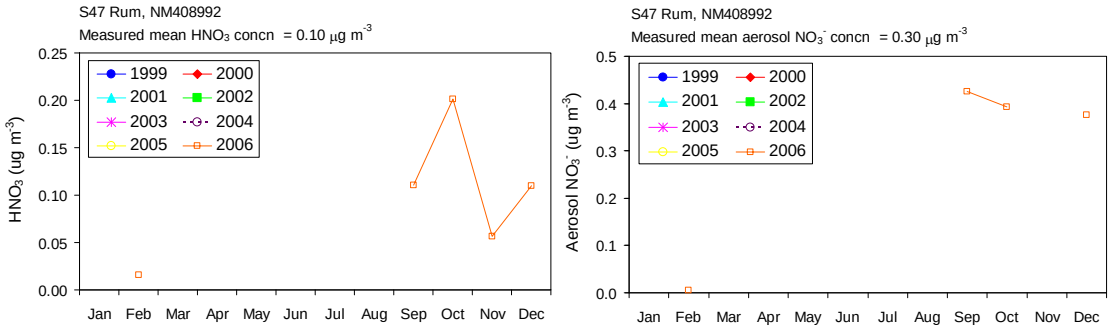


(xx) Lagganlia

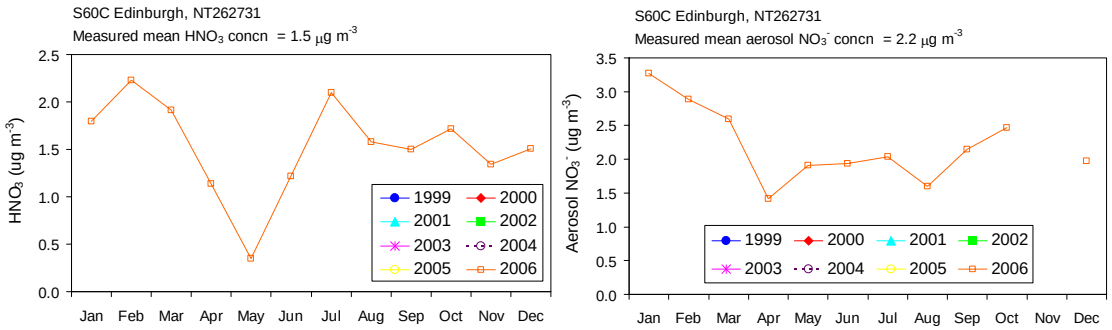
Figure 4-4 Measurements of gaseous HNO_3 and aerosol NO_3^- made in the Nitric Acid Monitoring Network between 1999 and 2006 *(continued)*



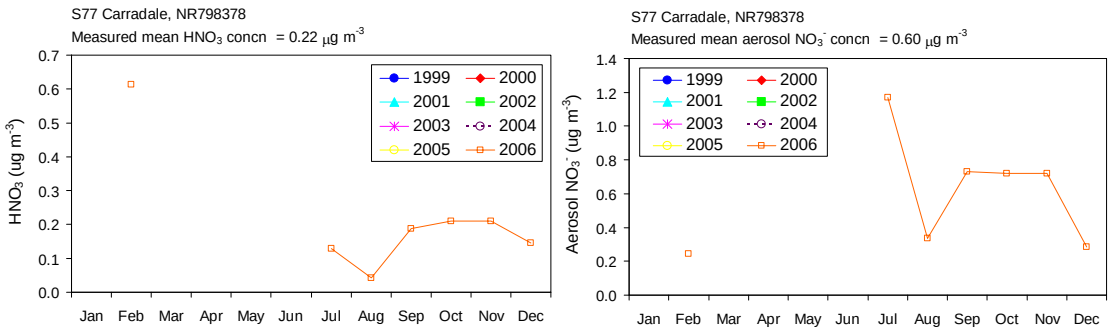
(xxi) Hillsborough



(xxii) Rum

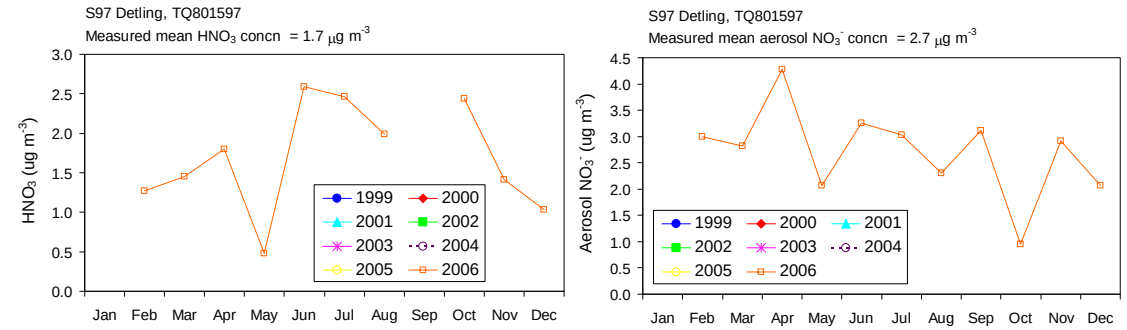


(xxiii) Edinburgh St Leonards

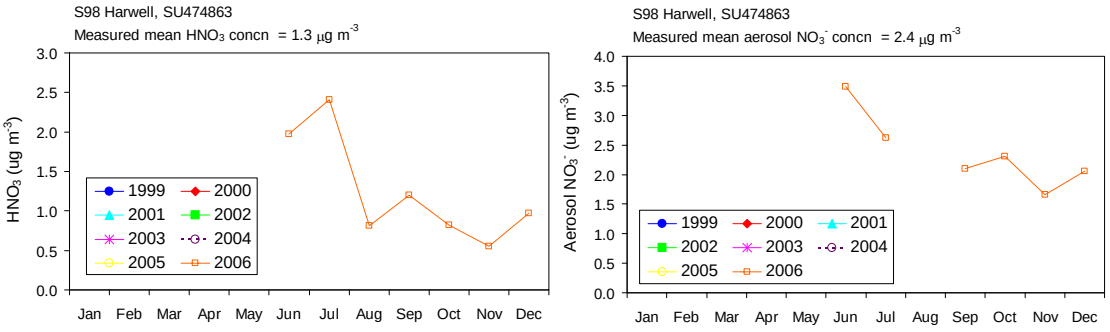


(xxiv) Carradale

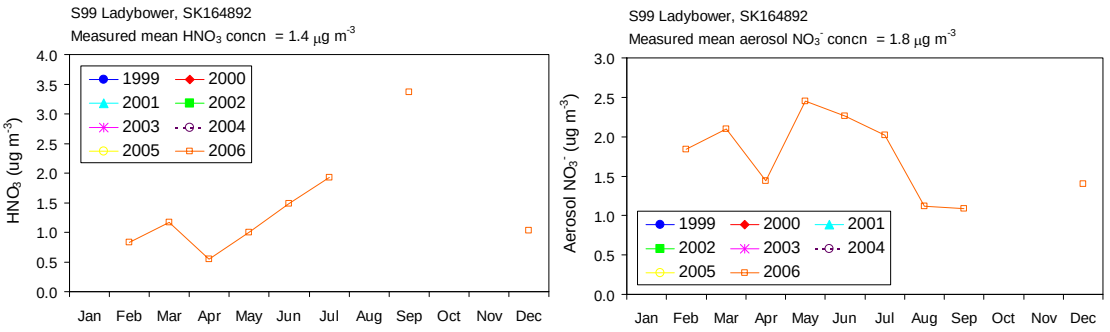
Figure 4-4 Measurements of gaseous HNO_3 and aerosol NO_3^- made in the Nitric Acid Monitoring Network between 1999 and 2006 *(continued)*



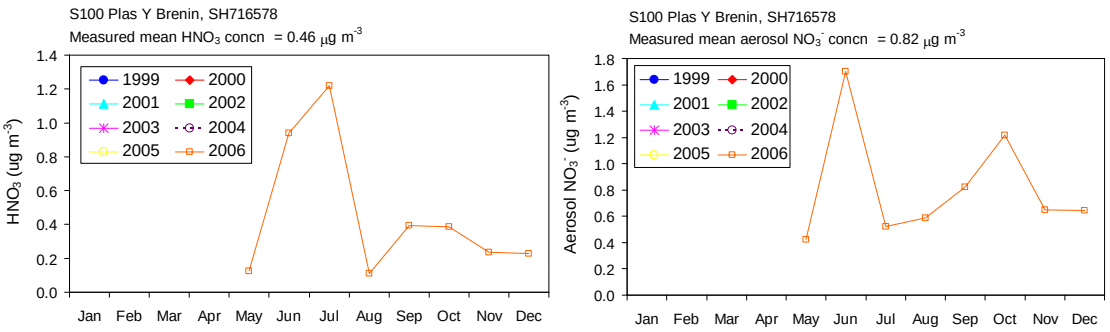
(xxv) Detling



(xxvi) Harwell

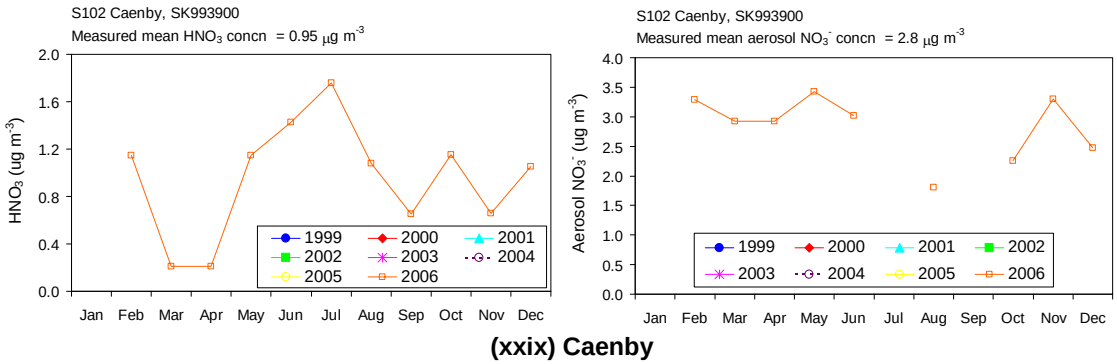


(xxvii) Ladybower

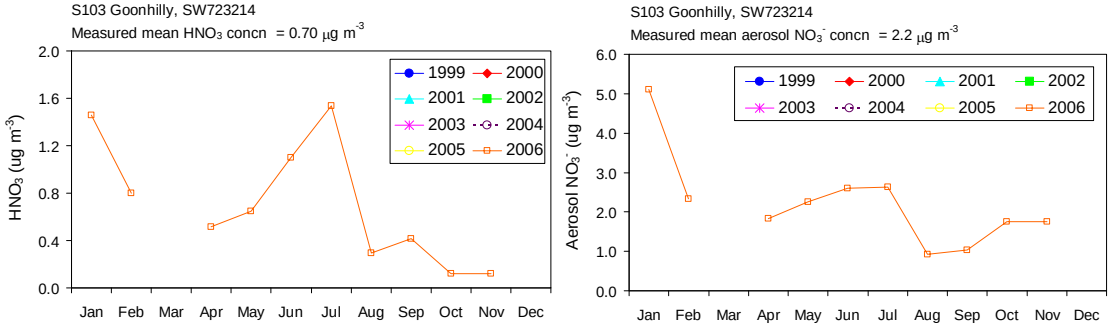


(xxviii) Plas Y Brenin

Figure 4-4 Measurements of gaseous HNO_3 and aerosol NO_3^- made in the Nitric Acid Monitoring Network between 1999 and 2006 *(continued)*



(xxix) Caenby



(xxx) Goonhilly

The plots in Figure 4-4 show that the concentrations of both species are relatively invariant at a monthly level and have a weak seasonal variability. The annual cycle for HNO_3 and NO_3^- has an observed maximum during late spring and early summer, which may be related to increased ozone concentrations during the season and an enhancement of HNO_3 formation. During the winter months, low temperature and high humidity favour the formation of NH_4NO_3 from the gas phase NH_3 and HNO_3. Coupled to changes in boundary layer conditions, this produces the winter minimum in the cycle. The ratio of the concentrations of HNO_3 and NO_3^- is similar throughout the year; fluctuations in the ratio are influenced by the loss of HNO_3 due to dry deposition.

The average seasonal variations across all sites in species measured in the nitric acid monitoring network are shown in Figure 4-5. This shows that the temporal patterns for the gaseous components are reproducible between years. For the particulate components, the temporal patterns are also similar between years. One notable exception is the large peak in aerosol nitrate and sulphate in the early spring of 2003.

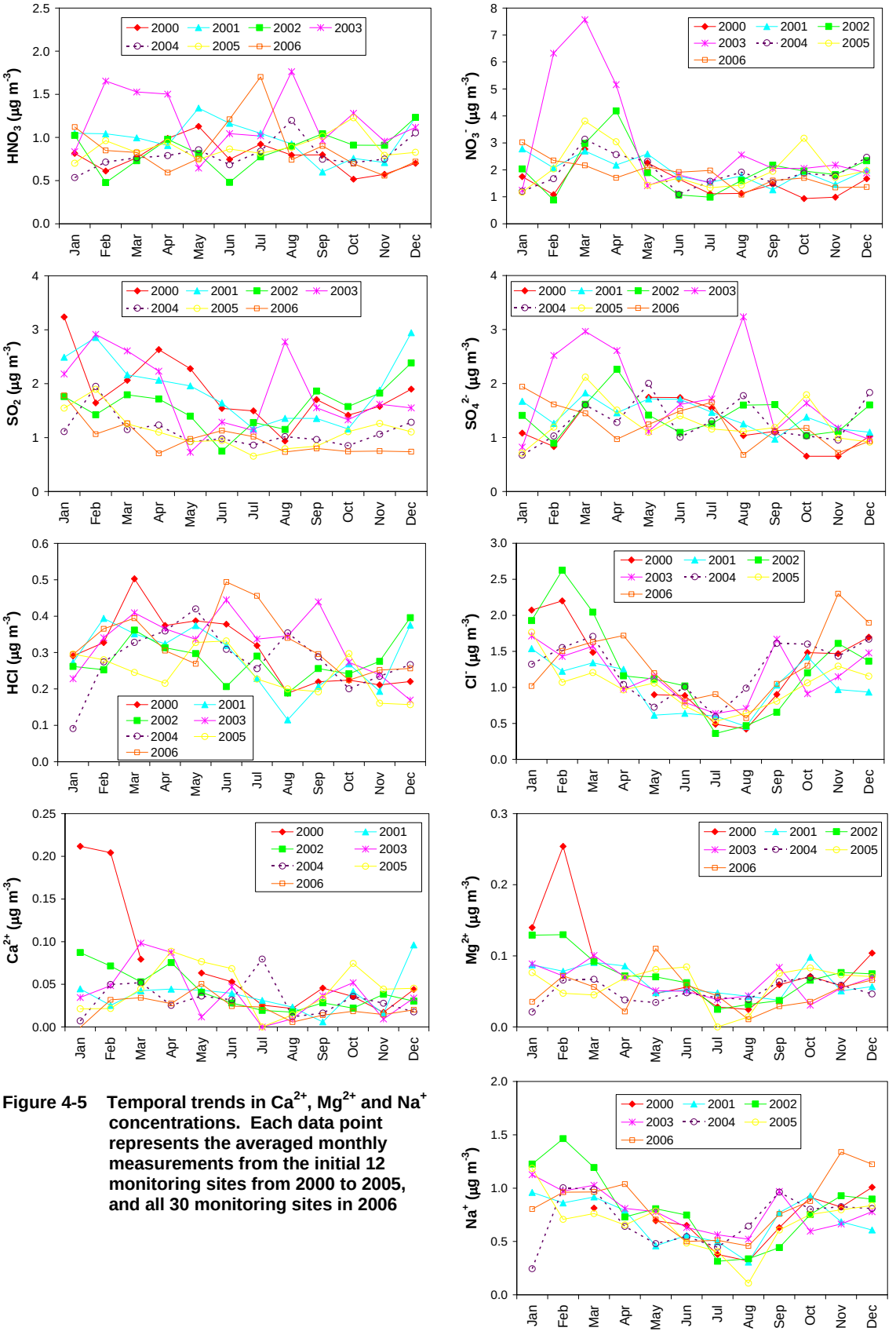
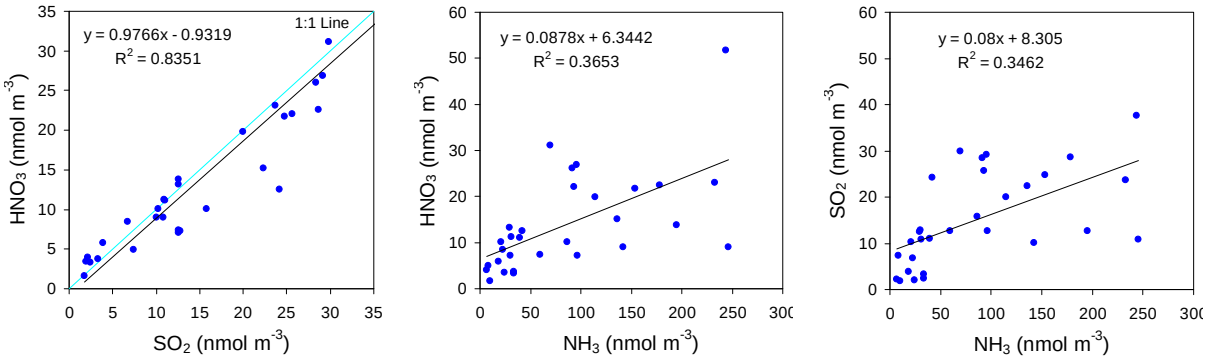


Figure 4-5 Temporal trends in Ca^{2+}, Mg^{2+} and Na^{+} concentrations. Each data point represents the averaged monthly measurements from the initial 12 monitoring sites from 2000 to 2005, and all 30 monitoring sites in 2006

Scatter plots of the concentration of gas and aerosol phases of the different components show that there are significant spatial correlations between the concentrations of the different pollutants (Figure 4-6)[6]. 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.

(A) Gaseous Components



(B) Particulate Components

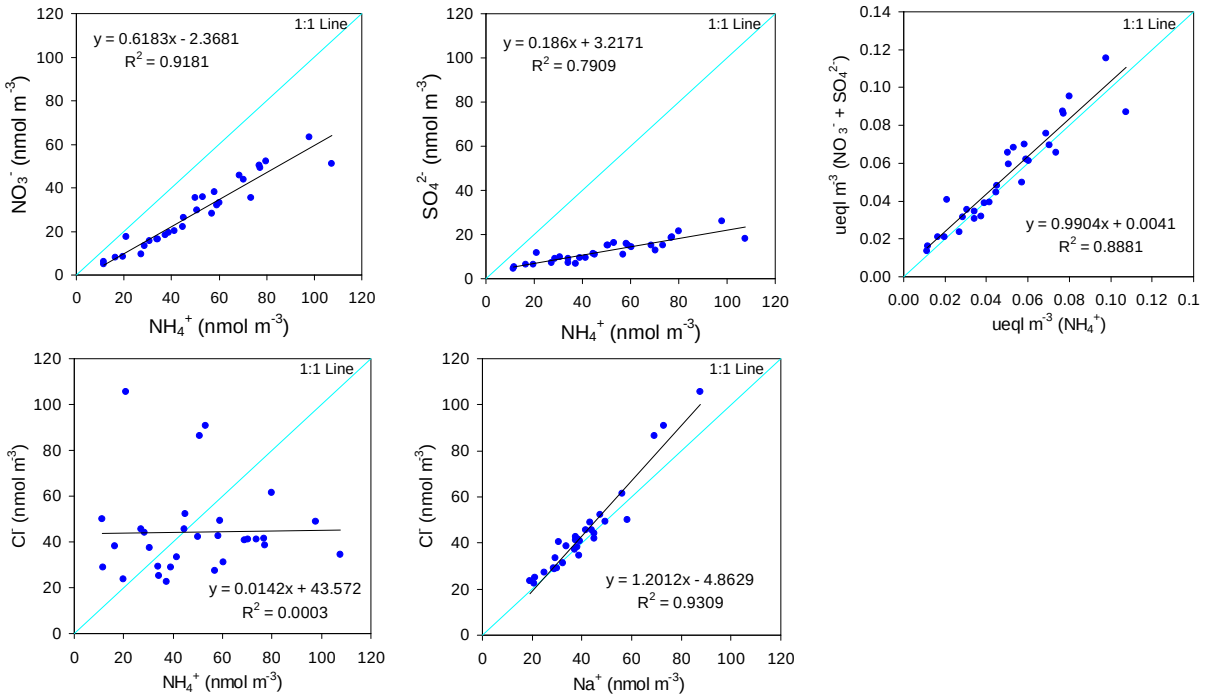


Figure 4-6 Scatter plots showing the relationships between concentrations of HNO_3, SO_2, NH_3, NO_3^-, SO_4^{2-}, NH_4^+, Cl^- and Na^+ from the monthly measurements in 2006 at all 30 sites

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

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 a molar basis), while SO_2 concentration is comparable to HNO_3. For the aerosol components, the close coupling between acidic (NO_3^-, SO_4^{2-}) and basic (NH_4^+) aerosol components is demonstrated by the high correlations. As with the gases, reduced nitrogen (NH_4^+) is in molar excess over SO_4^{2-} and NO_3^-. However, aerosol NO_3^- is in molar excess over SO_4^{2-} and is even somewhat larger in terms of equivalents of H^+. Whilst there is no discernible relationship between particulate Cl^- and NH_4^+, there is a near 1:1 relationship between Cl^- and Na^+, suggesting that the particulate Cl^- is of marine origin.

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

4.3.3 Concentration Maps for 2006

Interpolated concentration fields for 2006 across the UK from the 30 monitoring sites are shown in Figure 4-7. A bilinear interpolation procedure was used to provide the mean concentration field at a grid resolution of 10 km x 10 km. The spatial distributions of HNO_3 and NO_3^- are seen to be rather different to that of HCl and Cl^-. Both the nitrogen species are largest in central and southeast 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. The increase in number of sites in the network to improve on the spatial concentration field does appear to confirm the higher spatial variability in gaseous HNO_3.

A separate Defra monitoring network, the UK Rural SO_2 Monitoring Network[7], was dedicated to measurement of SO_2 concentrations. However, monitoring ceased at the end of 2005, as future SO_2 measurements would be available from the expanded Nitric Acid monitoring network. Recent intercomparisons of measurements from the DELTA denuder system and filter pack sampler at sites where the instruments were co-located (e.g. Eskdalemuir, Lough Navar) have shown good agreement – both samplers demonstrate the same qualitative behaviour with time, although denuder measurements were generally found to be slightly higher (Hayman *et al.*, 2007b).

The distribution of annual mean SO_2 concentrations for 2006 is shown in Figure 4-7. The largest concentrations derived from the DELTA measurements occurred at the two urban sites in the network, Edinburgh St Leonards and London Cromwell Road, with annual mean concentrations of 4.0 and 4.6 µg SO_2 m^{-3}, respectively. SO_2 concentrations generally decreased towards the west and north of the UK, with the lowest concentrations of < 0.5 µg SO_2 m^{-3} in northern Scotland. SO_2 is seen to be more spatially variable than SO_4^{2-} aerosol, reflecting the long atmospheric residence time of the latter.

HCl and Cl^- concentrations are largest in the south east and south west of England (Barcombe Mills, Yarner Wood) and lowest in the west of the country (Lough Navar, Eskdalemuir and Cwmystwyth) and most of Scotland (with the exception of Shetland). The distribution may reflect the dual contribution to atmospheric Cl^- from both anthropogenic and marine sources. The highest HCl concentrations in the south may be derived from emissions or reactions with HNO_3, producing HCl. In contrast, the larger concentration of Cl^- in the south west is likely to reflect a marine contribution to the aerosol.

The concentration of base cations varies greatly depending on the species. The concentration map for Na^+ is similar to Cl^-, showing the close coupling between the two species.

[7] Part of Defra's *Acid Deposition Processes in the UK* contracts: most recently EPG 1/3/166 and RMP 2125

4.4 Discussion

Monthly values from the expanded 30 site network have provided an improved spatial concentration field across the UK, as well as their main seasonal and inter-annual trends.

The main features of the spatial distribution in the pollutants measured are shown in the annual maps (Figure 4-7). In general, there is a reasonable correlation between the concentrations of the different pollutants at the 30 monthly monitoring sites, and for some species there are very high spatial correlations. In the case of the gases, this can be attributed to the regional distribution of sources being similar, while for aerosol the chemistry must obviously balance between major cations and anions. Figure 4-6 shows that there is, in general, a low correlation between concentrations of gaseous NH_3 and those of SO_2 and HNO_3; this may be attributed to the different sources of these pollutants, with NH_3 derived predominantly from agricultural sources and SO_2 and HNO_3 from combustion sources.

It should be noted that the maps of the acid gas and aerosol concentrations shown in Figure 4-7 are constructed using bi-linear interpolation. This is because the number of sites is not sufficient to permit more sophisticated interpolation methods (*e.g.* kriging) and provides no estimate of uncertainty in the interpolation. It is clear however, from the maps that each part of the country is fully dependent on only one point in the interpolation and that, while there is a high correlation between the pollutants measured at the sites, there are major differences in concentrations between all adjacent sites. The increase in density of the network thus would allow interpolation uncertainties to be quantified and could also be expected to change the estimates of regional dry deposition budgets. The UK deposition budgets for HNO_3, using interpolated concentrations from the 12 sites in the monitoring network for 2000-2005 are shown in Table 4-2 below. The variation between years is due to the inter-annual variability in HNO_3 concentrations.

Table 4-2 UK Annual Deposition Budgets for HNO_3

Year	2000	2001	2002	2003	2004	2005
Annual deposition Budgets for HNO_3 (ktN)	57	73	62	87	57	63

The monthly site data provide information on the overall seasonal behaviour of the different pollutants, and inter-annual trends. Figure 4-4 illustrates the monthly changes at each site, and after seven full years of monitoring, the seasonal trends are distinctive and replicated for each site. Figure 4-5 shows the average seasonal changes for 2000 to 2006 from all sites, and indicates more clearly the main differences for the pollutants. HNO_3, HCl and NO_3^- have a maximum during late spring and early summer, which may reflect the importance of photochemical production processes. Conversely, SO_2, Na^+ and Cl^- have maxima during winter, reflecting the importance of combustion processes for SO_2 and marine sources in winter for sea salt. The reasons for the observed seasonal trends in SO_4^{2-}, Mg^{2+} and Ca^{2+} are less clear.

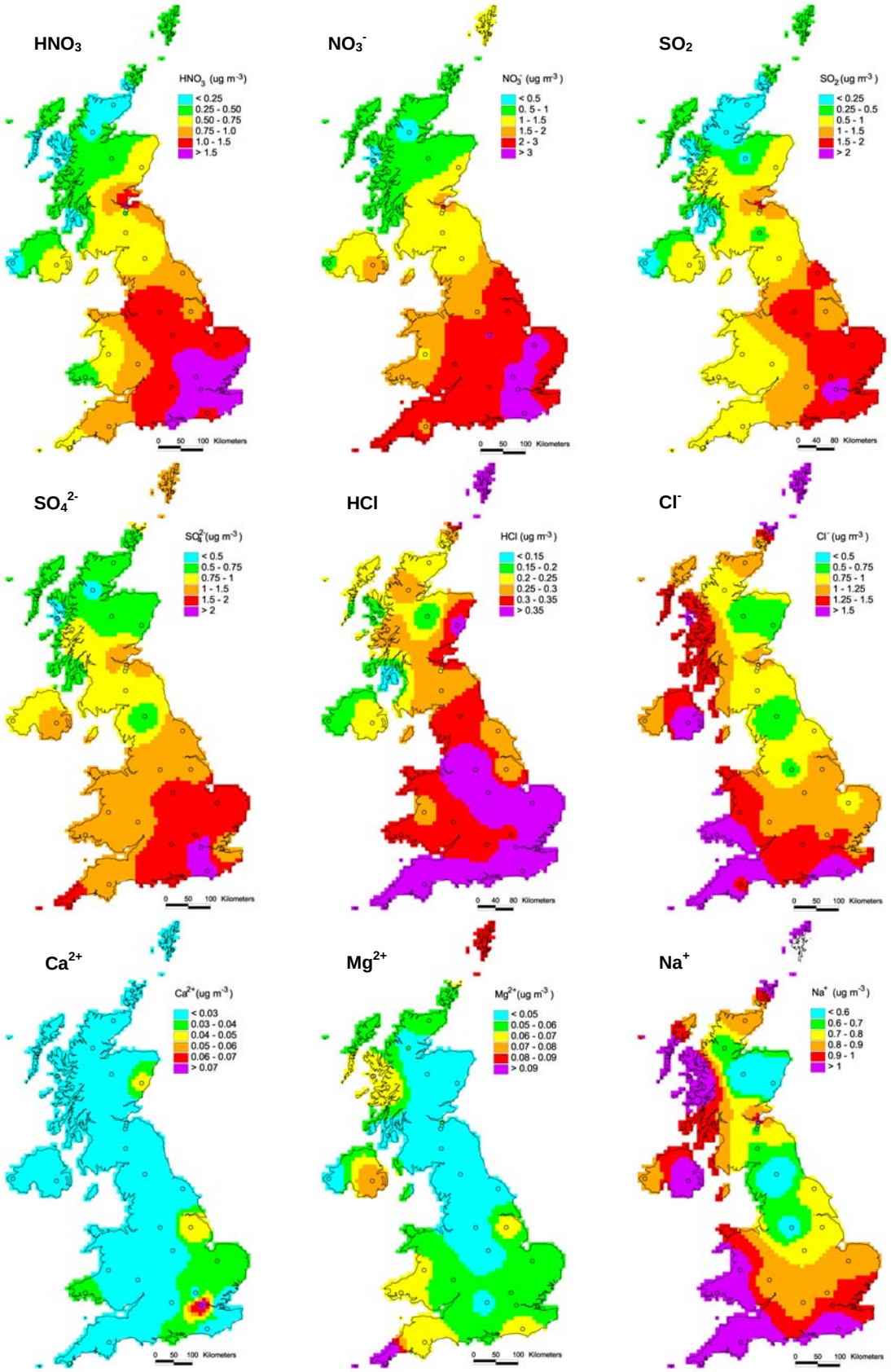


Figure 4-7 **Spatial patterns of HNO_3, SO_2, HCl and of aerosols NO_3^-, SO_4^{2-}, Cl^-, Ca^{2+}, Mg^{2+} and Na^+ concentrations in the UK from averaged monthly measurements made in 2006**

5 Other Activities

5.1 EMEP Intercomparison

5.1.1 Results of the 24th EMEP Intercomparison

An important data quality assessment is organised annually by the EMEP Chemical Co-ordinating Centre (CCC) at the Norwegian Institute for Air Research (NILU). Each July, samples are sent to about 36 analytical laboratories in Europe and about 25 other internationally recognised analytical laboratories. The intercomparison exercise is required as part of the EMEP monitoring programme – such a fundamental check on analytical performance is essential if response to emission reductions can be observed consistently throughout Europe. 2006 was the 24th time such an intercomparison took place, in which Harwell Scientifics again participated. The samples provided by the CCC included nitrogen dioxide in absorbing solution and synthetic rainwater samples. The results were submitted to the CCC in October 2006 with the expected results provided in December 2006.

Table 5-1 compares the expected and measured concentrations for different components of the rainwater samples. Following the 23rd intercomparison, which showed significant discrepancies between expected and measured values for a number of ions, a number of improvements were identified by Harwell Scientifics to ensure that the sensitivity problems would not occur again. These included:

1) Introduction of a limit of quantification solution (LOQ) to ensure that the instrument sensitivity criteria are met;
2) Expansion of the range of data recorded in the column efficiency logs to improve the way instrument performance is monitored;
3) Increasing the coefficient of determination (R^2) for the calibration from 0.99 to at least 0.999. The calibration of the ion chromatography instrument uses a parabolic regression analysis. This method of calibration allowed the lowest calibrating standard to have a disproportionately large influence on the calibration- particularly at low concentration levels. The previous R^2 value of 0.99 was too lax to ensure a sufficiently rigorous calibration.

Analysis of the components of rainwater is UKAS accredited. The method improvements outlined above will require an update of the UKAS accreditation.

These improvements have produced a slight improvement in the overall analysis. There is excellent agreement between expected and measured concentrations of sulphate, nitrate and pH for all samples, as well as ammonium, magnesium, sodium, chloride and calcium for samples G1 and G3.

However, agreement between measured and expected concentrations of ammonium, magnesium, sodium, chloride and calcium concentrations for samples G2 and G4 is poor. Harwell Scientifics has carried out a detailed investigation of analytical procedures. These tests initially investigated the sampling vials, but during the course of the investigation it was shown that there was an issue with the septa used to protect the sampling vial.

Sampling vials
The testing of the vials involved carrying out a series of analytical runs involving the original plastic vials, Dionex glass vials and uncapped vials. From these tests it was determined that the actual plastic vial being used for analysis (supplied by Chromos Express) were free from contamination and were therefore not likely to affect the quality of the data.

Breakage from the septa protecting the vials
There has been an issue with the quality of the septa used to seal the top of the plastic vials. The septum is present to prevent evaporation of sample and contaminant ingression, both of which would cause increased reporting levels. The issue was related to the structural quality of the septa: it is believed that very small fragments of septa were breaking off when penetrated by the injection needle. This phenomenon was suggested as a possibility by the technical department at Dionex UK Ltd and leads to the following two problems:

1) Any contamination on top of the septa is in danger of being pushed down into the solution within the vial, possibly giving increased levels of ions under investigation.

2) Fragments of septa would sometimes be trapped within the injection needle and would then be carried towards the injection valve of the chromatography system. As the injection valve is a rheodyne system with very narrow bore entry points to the actual injection loop, it is believed that these fragments were then preventing the injection loop to either become fully loaded or to efficiently empty upon switching to the injection position. This then causes a reduced injection volume and a subsequently lower than expected response (i.e. under-reporting). To test this, multiple QC injections from multiple vials were carried out. On some occasions the solution injected from an individual vial would not always give a value within the precision of the instrument and the response would be lowered.

To rectify this issue, Harwell Scientifics now purchase vials with no septa pre-inserted into the vial cap. The septa are now made "in-house" using cleaned aluminum foil. This method, whilst being more time consuming, results in a higher certainty that the septa are not contaminated and also overcomes the issue of the septa breaking up. The analysts have yet to have a case of the foil breaking off and blocking the injection needle or valve. Since switching to foil septa, the reproducibility (precision) of QC data throughout any given analytical run has improved. The number of QC failures for rainwater analyses has also decreased noticeably, likely as a result of injection volumes being more stable (i.e. less fragments of septa in the system).

Table 5-2 presents the results from the nitrogen dioxide in absorbing solution intercomparison. In each case the measured concentration is less than the expected concentration. Samples C1 and C3 are analysed well, sample C2 however is rather low. Harwell Scientifics suggest that such deviations are acceptable within the uncertainty of the method at the relatively low concentrations.

5.2 World Meteorological Organisation Intercomparison

In addition to the EMEP intercomparison, Harwell Scientifics are involved in an intercomparison of precipitation chemistry laboratories that are participants in the Global Atmospheric Watch Program. This programme has been in operation through its predecessor, the Background Air Pollution Monitoring Network (BAPMoN) since 1978. Since 1996, coordination of the intercomparisons has been conducted by the Quality Assurance / Science Activity Centre for the Americas (QA/SAC Americas) using test samples prepared by the Precipitation Chemistry Reference Laboratory (PCRL) at the Illinois State Water Survey (SWS) in Champaign, Illinois. Three samples of simulated rainwater are sent to the participating laboratories twice a year. The reference number for Harwell Scientifics is 700130. The results for the latest intercomparison (35th WMO-GAW Acid Rain Performance Survey, 2006O) can be obtained from the QA/SAC Americas web site[8].

Table 5-3 summarises how well the measured concentrations were predicted when compared to the expected concentration for the 35th intercomparison. Overall, the agreement between the measured and expected concentrations is much better than that seen for the 24th EMEP intercomparison. The sulphate and nitrate concentrations showed excellent agreement with the measured concentrations – within 5 % of the expected value. There is still an underestimation for the ammonium concentration, although much smaller than that observed for sample G2 from the EMEP intercomparison.

[8] http://mica.asrc.cestm.albany.edu/qasac/lab_ic/reslt06O.html

Table 5-1 Comparison of Expected and Measured Concentrations of the Major Ions in Rainwater

Species	Sample code	Expected concentration µeq l^{-1}	Measured concentration µeq l^{-1}	Absolute Mean difference (%)
Sulphate	G1	95.6	97.3	1.7
	G2	110.2	116.2	5.3
	G3	61.3	62.8	2.4
	G4	73.8	77.5	4.9
Nitrate	G1	34.2	35.6	4.0
	G2	30.8	30.9	0.5
	G3	45.5	47.3	3.8
	G4	52.9	55.1	4.0
Ammonium	G1	20.0	19.3	-3.9
	G2	12.9	1.9	-149.6
	G3	28.6	28.8	0.7
	G4	34.4	28.8	-17.7
Magnesium	G1	7.0	6.5	-7.5
	G2	7.6	9.6	23.0
	G3	8.9	8.6	-4.1
	G4	11.5	12.3	7.4
Sodium	G1	11.1	11.5	3.5
	G2	14.7	30.8	70.7
	G3	25.0	25.7	2.7
	G4	28.7	36.5	23.9
Chloride	G1	4.1	4.3	4.2
	G2	4.9	11.8	82.4
	G3	13.1	13.7	5.0
	G4	14.7	17.3	16.2
Calcium	G1	8.6	8.3	-3.2
	G2	10.5	14.7	33.0
	G3	12.4	12.2	-2.1
	G4	14.3	16.4	13.5
Potassium	G1	7.2	6.3	-12.6
	G2	8.1	7.6	-6.1
	G3	4.9	4.7	-5.6
	G4	4.6	4.7	3.2
pH	G1	4.1	4.0	-1.4
	G2	4.0	4.0	0.0
	G3	4.4	4.4	-0.8
	G4	4.3	4.3	-1.1

Table 5-2 Comparison of Expected and Measured Concentrations of Nitrogen Dioxide in Absorbing Solution

Sample code	Expected concentration µg NO_2-N/ml	Measured concentration µg NO_2-N/ml	Absolute Mean difference (%)
C1	0.084	0.08	-5.3
C2	0.051	0.043	-16.3
C3	0.108	0.1	-7.7
C4	0.118	*	*

***** Sample C4 was lost in transit

Table 5-3 Comparison of Expected (TRUVAL) and Measured Concentrations from the 35th WMO-GAW Acid Rain Performance Survey

	Sample code	TRUVAL concentration µeq l^{-1}	Measured concentration µeq l^{-1}	Mean Difference (%)
Sulphate	1	40.4	38.9	3.8
	2	58.6	57.6	1.8
	3	30.6	29.3	4.4
Nitrate	1	15.8	15.5	1.8
	2	27.7	26.6	3.9
	3	10.3	10.1	1.4
Ammonium	1	21.2	24.3	-13.8
	2	39.6	44.3	-11.1
	3	14.0	16.2	-14.7
Magnesium	1	9.8	9.1	7.0
	2	17.4	16.4	5.9
	3	6.4	6.4	0.0
Sodium	1	48.9	52.0	-6.1
	2	62.3	65.2	-4.5
	3	23.4	26.1	-10.9
Chloride	1	57.4	55.0	4.3
	2	64.3	61.8	4.0
	3	22.7	20.4	10.6
Calcium	1	13.5	11.3	17.3
	2	23.2	20.6	11.9
	3	8.5	8.4	1.2
Potassium	1	5.6	5.3	6.1
	2	7.5	7.1	5.2
	3	2.9	2.9	0.0
pH	1	4.8	4.6	4.3
	2	5.6	5.1	9.0
	3	5.0	4.6	6.7

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Appendices

Appendix 1

Bulk Precipitation Data 2006 – Fortnightly Measurements

Notes to Appendix 1.1

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

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

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

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

A phosphate concentration was also determined for each rainwater sample. A phosphate concentration > 0.1 mg P l^{-1} (or > 9.7 µeq l^{-1}) was taken as evidence of contamination by birds. Although all these samples have been included in the tables, they were not included in the calculation of annual means. The rainfall totals presented in Appendix 2, Table 10 include all samples collected and are therefore sometimes higher than the totals presented in this section.

Goonhilly

2006

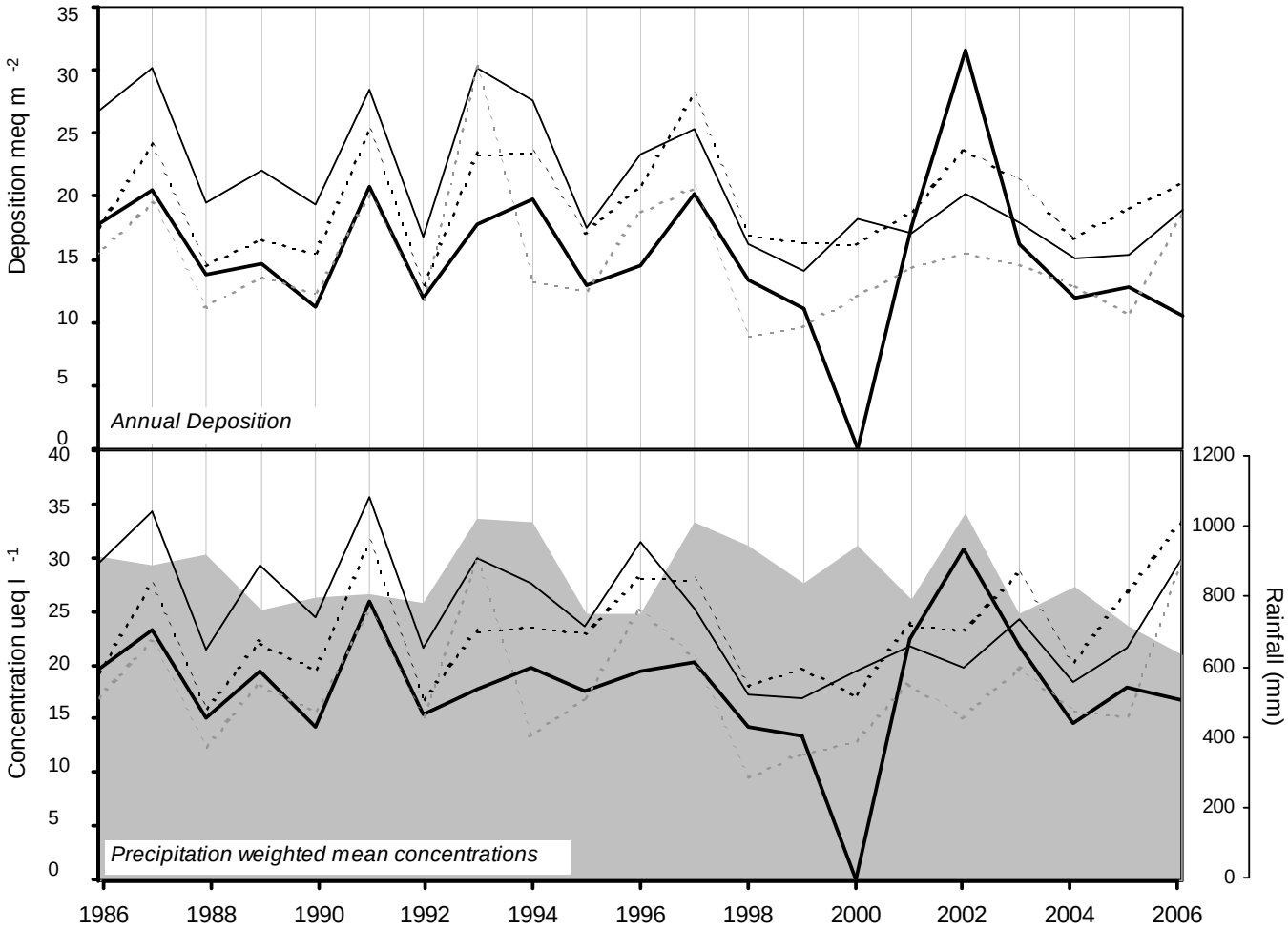
Site Code:	**5003**
Easting:	**1723**
Northing:	**214**
Latitude:	**50 02 54 N**
Longitude:	**05 10 52 W**
Altitude (m):	**108**
Rainfall (mm):	**973**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, Satellite tracking station

Other measurements:
DT, HNO3 Denuder

Site Operator:
BT



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

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

hydrogen ion
0.02 ueq/l (0.11 %/year): 20 years' data
\- No significant trend detected

non-marine sulphate
-0.42 ueq/l (-1.46 %/year): 21 years' data
\+ Significant trend detected

nitrate
0.24 ueq/l (1.17 %/year): 21 years' data
\- No significant trend detected

ammonium
0.01 ueq/l (0.05 %/year): 21 years' data
\- No significant trend detected

(5003) Goonhilly

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
04/Jan/2006	16/Jan/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
16/Jan/2006	26/Jan/2006	4.7	70.6	29.6	16.3	372.8	74.9	18.7	423.8	15.1	<1.0	25.7	18.6	69.0	15.5
26/Jan/2006	08/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
08/Feb/2006	24/Feb/2006	4.8	41.4	23.9	12.7	245.1	50.7	12.9	281.1	4.5	<1.0	11.9	16.6	54.8	49.6
24/Feb/2006	08/Mar/2006	4.9	41.8	26.6	27.8	160.5	35.8	15.0	169.5	6.5	<1.0	22.5	13.2	32.4	19.7
08/Mar/2006	04/Apr/2006	4.6	90.1	69.1	66.5	446.4	102.4	31.2	473.0	12.4	<1.0	36.3	26.9	88.0	67.1
04/Apr/2006	21/Apr/2006	4.5	65.3	25.7	32.4	233.2	52.9	21.5	209.5	6.7	<1.0	37.2	31.6	50.7	18.1
21/Apr/2006	03/May/2006	5.7	57.5	36.5	30.1	129.5	31.2	55.2	115.4	4.6	<1.0	41.9	2.2	28.0	4.5
03/May/2006	18/May/2006	7.4	121.1	68.8	463.4	160.4	32.8	35.4	144.7	52.6	77.3	101.8	0.0	87.0	11.4
18/May/2006	01/Jun/2006	6.0	61.1	8.3	57.4	306.6	60.2	12.6	384.5	16.4	28.1	24.1	1.1	56.6	32.1
01/Jun/2006	15/Jun/2006	7.8	959.6	163.6	3487.5	322.5	70.2	40.0	567.1	451.4	1582.5	920.8	0.0	607.0	4.1
15/Jun/2006	29/Jun/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
29/Jun/2006	14/Jul/2006	4.6	79.1	49.1	56.8	233.5	53.2	26.3	266.8	7.0	<1.0	51.0	26.9	57.5	12.8
14/Jul/2006	26/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
26/Jul/2006	02/Aug/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
02/Aug/2006	24/Aug/2006	6.2	39.7	20.2	85.9	143.1	21.8	16.2	153.2	17.7	22.6	22.5	0.6	31.0	41.1
24/Aug/2006	05/Sep/2006	4.8	75.3	27.4	12.8	410.1	90.2	2.2	473.6	6.5	3.8	25.9	17.0	70.5	10.1
05/Sep/2006	21/Sep/2006	4.4	341.1	486.3	139.1	1407.4	299.9	144.4	1362.7	37.4	5.0	171.6	39.8	-	1.6
21/Sep/2006	12/Oct/2006	4.7	75.0	37.9	19.2	247.9	43.7	15.4	314.5	7.1	<1.0	45.2	20.0	43.3	73.0
12/Oct/2006	02/Nov/2006	7.0	90.2	28.9	604.5	189.7	15.5	7.5	212.0	86.0	194.9	67.3	0.1	112.6	84.7
02/Nov/2006	16/Nov/2006	4.7	92.1	59.3	55.2	424.1	76.1	28.7	434.6	8.5	<1.0	41.0	20.0	-	12.1
16/Nov/2006	05/Dec/2006	5.1	17.7	9.0	9.2	535.8	99.3	24.6	135.6	8.8	<1.0	0.0	7.8	91.7	81.5
05/Dec/2006	15/Dec/2006	5.4	66.0	7.5	7.1	559.3	111.5	26.8	586.9	9.2	<1.0	0.0	4.1	81.7	23.8
15/Dec/2006	28/Dec/2006	4.4	69.7	74.2	78.7	279.0	63.5	17.7	281.7	7.7	<1.0	36.1	39.8	-	14.3
28/Dec/2006	10/Jan/2007	5.2	74.0	11.6	30.8	570.5	121.0	30.2	630.5	3.9	<1.0	5.3	5.8	89.5	54.1
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5003			62.0	33.2	29.4	393.9	80.3	23.0	353.1	8.0	0.6	29.8	16.7		632.0

Yarner Wood

2006

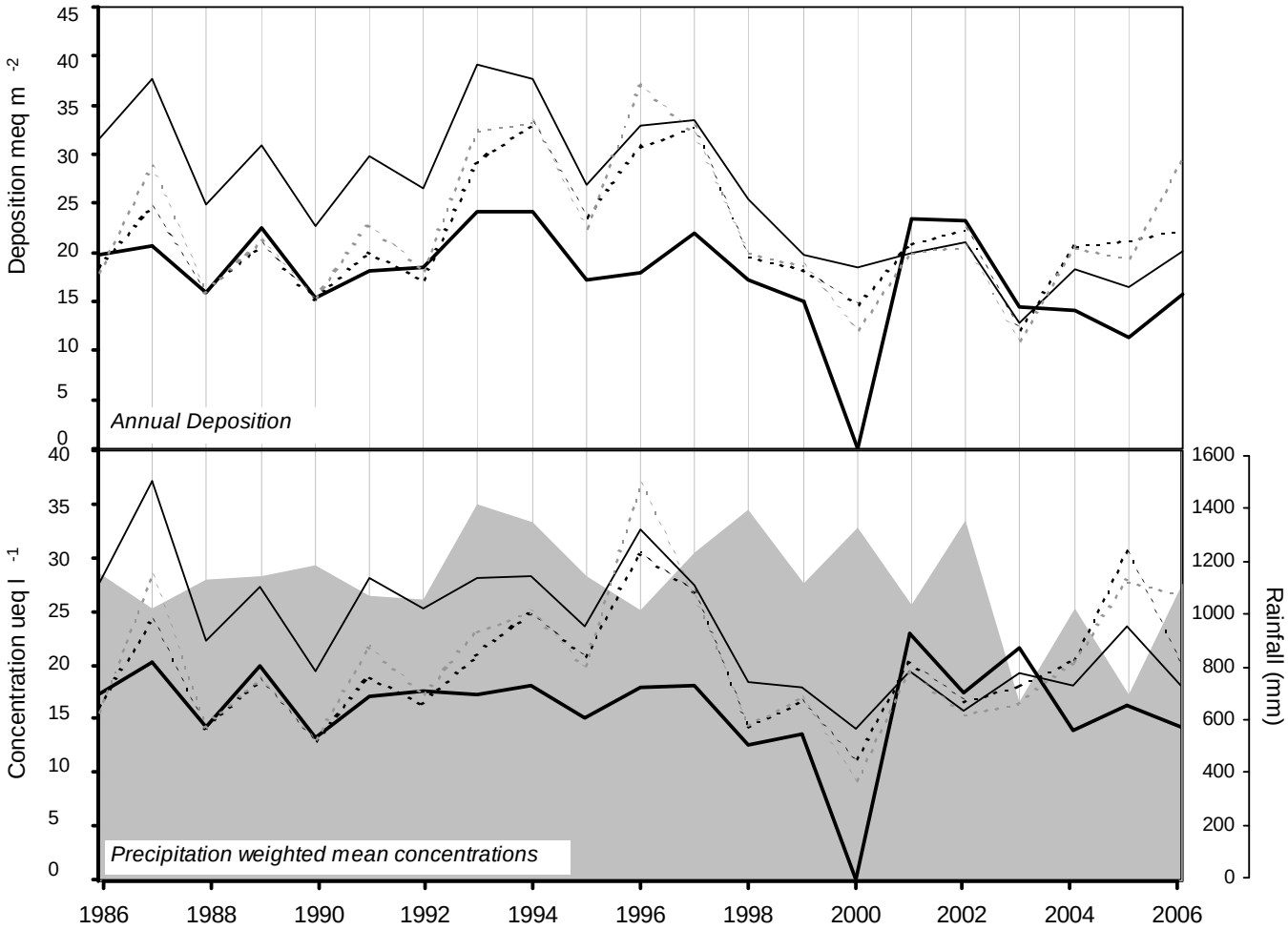
Site Code:	**5008**
Easting:	**2786**
Northing:	**789**
Latitude:	**50 35 48 N**
Longitude:	**03 42 56 W**
Altitude (m):	**119**
Rainfall (mm):	**1377**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, nature reserve

Other measurements:
DT (triplicate), Daily SO4, HNO3 Denuder, ozone, EMEP

Site Operator:
Natural England



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

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

hydrogen ion
-0.03 ueq/l (-0.16 %/year): 20 years' data
- No significant trend detected

non-marine sulphate
-0.59 ueq/l (-2.03 %/year): 21 years' data
++ Moderately strong trend detected

nitrate
0.17 ueq/l (0.92 %/year): 21 years' data
- No significant trend detected

ammonium
0.10 ueq/l (0.52 %/year): 21 years' data
- No significant trend detected

(5008) Yarner Wood

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
11/Jan/2006	25/Jan/2006	7.6	121.7	56.5	437.7	214.9	31.2	18.2	216.2	51.0	127.9	95.8	0.0	108.8	9.8
25/Jan/2006	08/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
08/Feb/2006	22/Feb/2006	6.4	32.9	14.8	15.8	97.0	19.9	17.2	109.3	10.4	32.9	21.2	0.4	29.3	67.9
22/Feb/2006	07/Mar/2006	5.0	28.9	25.3	32.0	84.0	19.7	14.2	93.4	3.4	<1.0	18.8	11.0	21.8	29.2
07/Mar/2006	22/Mar/2006	4.5	66.5	30.6	38.6	274.4	62.6	16.5	281.8	6.7	<1.0	33.4	32.4	58.0	23.6
22/Mar/2006	06/Apr/2006	4.8	35.2	25.7	32.9	146.3	32.8	10.8	148.9	3.8	<1.0	17.5	14.8	31.5	96.7
06/Apr/2006	19/Apr/2006	5.9	45.6	22.6	<0.7	<0.9	<0.8	<1.0	141.2	0.1	3.8	45.7	1.3	29.4	5.1
19/Apr/2006	02/May/2006	4.8	78.6	63.1	66.0	97.9	26.8	35.2	86.7	6.2	<1.0	66.8	15.8	30.8	12.3
19/Apr/2006	03/May/2006	4.8	78.6	63.1	66.0	97.9	26.8	35.2	86.7	6.2	<1.0	66.8	15.8	30.8	12.3
03/May/2006	17/May/2006	4.2	94.2	64.4	79.6	26.4	9.4	23.5	25.5	4.2	<1.0	91.1	57.5	38.1	24.8
17/May/2006	31/May/2006	5.3	6.6	2.6	1.5	24.5	5.6	1.9	27.9	1.0	<1.0	3.6	4.9	6.6	97.4
31/May/2006	14/Jun/2006	5.0	28.3	36.0	46.8	36.6	13.3	45.2	19.4	7.4	<1.0	23.9	10.0	-	1.8
14/Jun/2006	28/Jun/2006	4.6	44.4	55.9	67.5	22.0	9.4	17.7	15.6	2.4	<1.0	41.8	26.9	22.7	38.9
28/Jun/2006	18/Jul/2006	4.7	47.0	60.6	71.7	17.5	5.6	21.4	15.7	4.8	<1.0	44.9	19.5	22.6	23.0
18/Jul/2006	26/Jul/2006	4.7	39.2	57.3	10.2	43.1	13.4	45.5	24.9	8.5	<1.0	34.0	20.0	-	2.7
26/Jul/2006	09/Aug/2006	5.1	18.9	9.9	10.6	56.6	14.6	17.6	56.7	3.4	<1.0	12.1	7.2	13.0	7.0
09/Aug/2006	23/Aug/2006	5.1	23.6	20.0	28.8	46.9	10.1	11.6	44.1	3.9	<1.0	17.9	7.8	11.5	8.5
23/Aug/2006	06/Sep/2006	4.7	30.6	17.4	9.1	89.5	18.4	11.0	89.1	4.3	<1.0	19.8	22.4	21.5	10.5
06/Sep/2006	20/Sep/2006	4.6	67.9	53.2	62.4	54.3	12.6	24.1	51.2	2.8	<1.0	61.3	24.5	28.0	11.6
20/Sep/2006	04/Oct/2006	5.0	28.2	12.3	11.2	131.4	24.5	12.4	138.0	5.3	<1.0	12.3	10.5	22.8	54.9
04/Oct/2006	18/Oct/2006	5.1	43.4	33.0	54.5	74.4	16.0	23.1	77.5	4.6	<1.0	34.4	7.2	19.3	38.5
18/Oct/2006	01/Nov/2006	5.0	29.5	17.7	28.3	102.4	20.4	7.6	114.2	2.8	<1.0	17.1	10.7	20.3	113.9
01/Nov/2006	15/Nov/2006	4.7	48.6	38.6	51.3	125.8	28.7	17.4	130.2	4.0	<1.0	33.4	20.0	-	11.4
15/Nov/2006	29/Nov/2006	4.9	29.3	8.2	11.8	180.2	36.6	10.6	189.0	3.9	<1.0	7.6	12.3	33.3	125.3
29/Nov/2006	13/Dec/2006	5.0	54.8	9.6	24.5	447.4	90.2	19.4	466.2	8.8	<1.0	0.9	11.0	70.5	98.6
13/Dec/2006	10/Jan/2007	4.8	28.9	11.0	14.6	155.9	32.5	9.4	163.9	3.5	<1.0	10.1	14.5	27.7	183.7
Precipitation<weighted annual means for site(samples containing phosphate are excluded)															Total rainfall
5008			35.7	20.1	26.5	146.2	30.8	12.7	153.3	4.1	0.5	18.1	14.1		1109.5

Barcombe Mills

2006

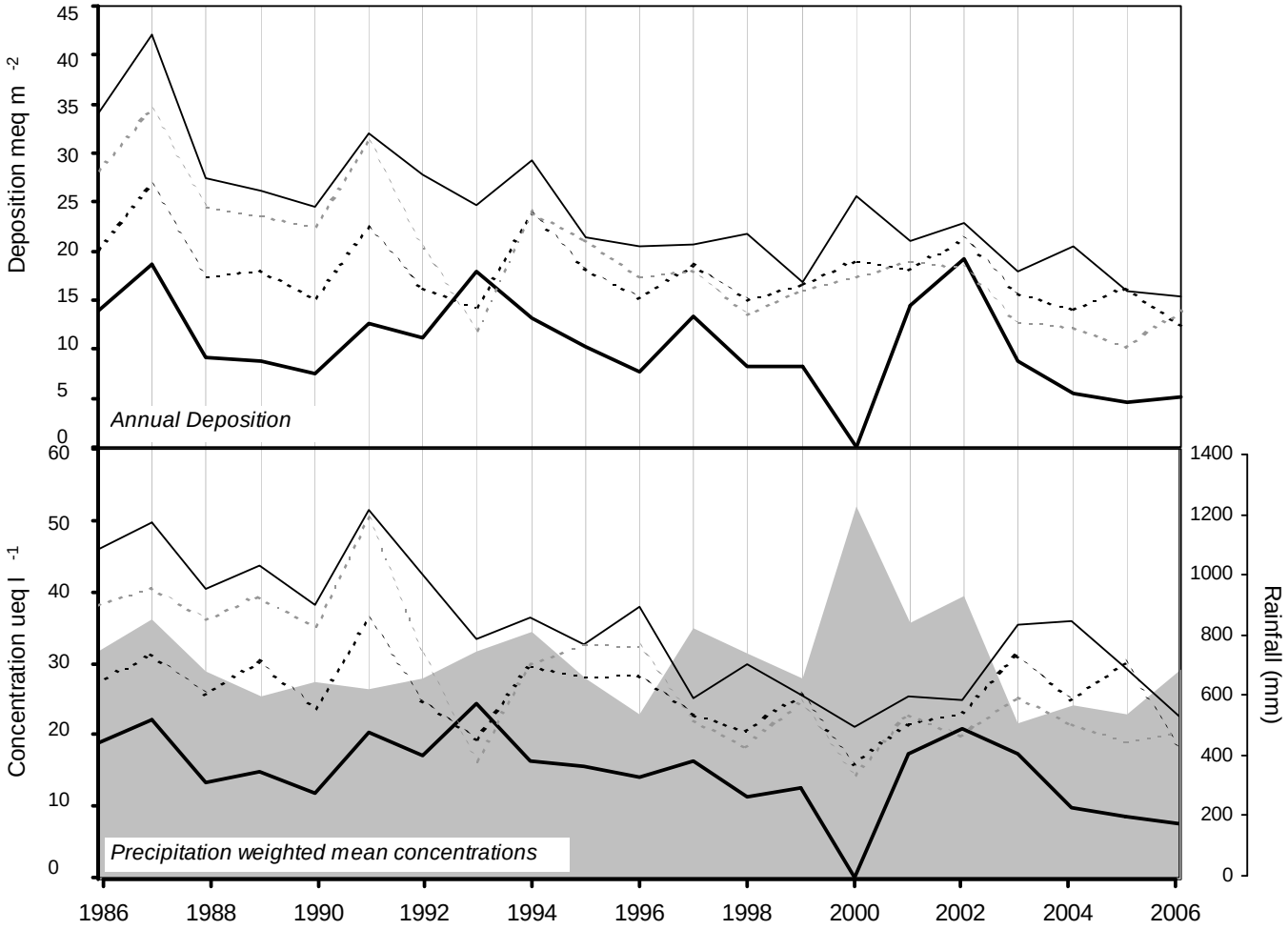
Site Code:	**5007**
Easting:	**5437**
Northing:	**1149**
Latitude:	**50 54 54 N**
Longitude:	**00 02 40 E**
Altitude (m):	**10**
Rainfall (mm):	**876**

[30 year mean 1940 - 1971]

Site Environment:
Water pumping site

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

Site Operator:
South East Water



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

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

hydrogen ion
-0.34 ueq/l (-1.80 %/year): 20 years' data
\+ Significant trend detected

non-marine sulphate
-1.09 ueq/l (-2.39 %/year): 21 years' data
+++ Strong trend detected

nitrate
-0.26 ueq/l (-0.92 %/year): 21 years' data
\- No significant trend detected

ammonium
-1.17 ueq/l (-2.94 %/year): 21 years' data
+++ Strong trend detected

(5007) Barcombe Mills

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
04/Jan/2006	18/Jan/2006	4.4	61.5	59.8	36.8	212.7	45.2	17.7	250.4	6.9	<1.0	35.9	43.7	55.5	18.3
18/Jan/2006	01/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
01/Feb/2006	15/Feb/2006	5.8	30.4	20.3	18.7	146.7	27.4	15.2	163.7	4.1	<1.0	12.8	1.4	30.1	25.5
15/Feb/2006	01/Mar/2006	4.8	52.9	45.9	52.2	144.6	37.4	25.6	165.9	5.2	<1.0	35.5	14.8	34.3	20.8
01/Mar/2006	15/Mar/2006	4.9	6.5	5.6	11.2	95.6	21.2	24.4	23.8	2.7	<1.0	0.0	13.5	22.6	10.4
15/Mar/2006	29/Mar/2006	5.4	31.7	29.8	34.5	96.9	18.8	23.1	89.2	3.9	<1.0	20.0	4.0	18.4	24.2
29/Mar/2006	12/Apr/2006	5.3	13.8	6.1	14.0	51.1	15.8	6.7	45.8	3.4	<1.0	7.6	5.4	21.8	48.2
12/Apr/2006	26/Apr/2006	5.1	49.5	51.7	50.0	38.6	17.9	31.1	32.4	12.0	<1.0	44.8	8.5	22.7	8.6
26/Apr/2006	10/May/2006	6.2	35.2	37.4	57.1	42.6	15.7	21.1	38.7	33.8	11.1	30.1	0.6	23.7	31.8
10/May/2006	25/May/2006	5.1	44.5	<1.4	<0.7	127.3	34.0	30.9	134.3	38.3	13.1	29.1	8.3	17.0	57.4
25/May/2006	09/Jun/2006	5.8	28.3	<0.7	<0.7	71.1	17.8	15.3	79.0	39.2	9.5	19.8	1.8	17.5	20.5
09/Jun/2006	21/Jun/2006	5.8	52.0	35.0	12.1	34.4	20.7	51.1	31.6	32.0	<1.0	47.9	1.6	19.7	10.6
21/Jun/2006	05/Jul/2006	6.2	144.5	3.1	63.0	48.0	64.7	116.8	69.2	124.6	9.7	138.7	0.6	42.9	7.1
05/Jul/2006	19/Jul/2006	6.9	115.5	2.4	1.8	73.8	135.8	298.2	108.0	129.3	7.1	106.7	0.1	69.3	2.9
19/Jul/2006	02/Aug/2006	6.3	99.8	108.7	78.7	78.1	27.0	144.1	69.4	19.8	<1.0	90.4	0.5	43.3	8.1
02/Aug/2006	16/Aug/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
16/Aug/2006	30/Aug/2006	4.6	86.3	68.9	1396.2	26.1	71.6	206.3	43.8	185.9	381.3	83.2	27.5	244.0	68.4
30/Aug/2006	13/Sep/2006	6.3	80.8	81.9	100.5	124.7	32.8	89.0	137.2	21.8	12.4	65.8	0.5	49.9	8.3
13/Sep/2006	27/Sep/2006	5.8	36.5	12.3	4.2	25.2	8.0	25.2	29.0	16.5	<1.0	33.5	1.5	11.0	49.8
27/Sep/2006	11/Oct/2006	5.1	39.3	4.7	0.7	178.0	36.9	23.3	193.8	11.8	<1.0	17.8	7.2	31.9	67.0
11/Oct/2006	25/Oct/2006	5.7	41.4	17.3	29.9	139.9	31.1	32.7	150.2	6.8	1.7	24.6	2.1	26.8	55.4
25/Oct/2006	08/Nov/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
08/Nov/2006	23/Nov/2006	6.0	79.1	18.8	36.5	374.4	95.1	73.1	450.1	39.6	<1.0	34.0	0.9	71.1	37.2
23/Nov/2006	06/Dec/2006	4.8	71.7	14.5	26.8	491.5	98.8	28.8	551.6	16.9	7.2	12.5	15.1	86.4	58.2
06/Dec/2006	20/Dec/2006	5.0	73.3	10.2	9.5	579.6	130.0	33.4	618.3	13.4	<1.0	3.5	11.2	84.4	44.8
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5007			47.7	18.1	20.2	213.2	48.6	31.5	233.5	14.6	1.8	22.6	7.6		684.3

Compton

2006

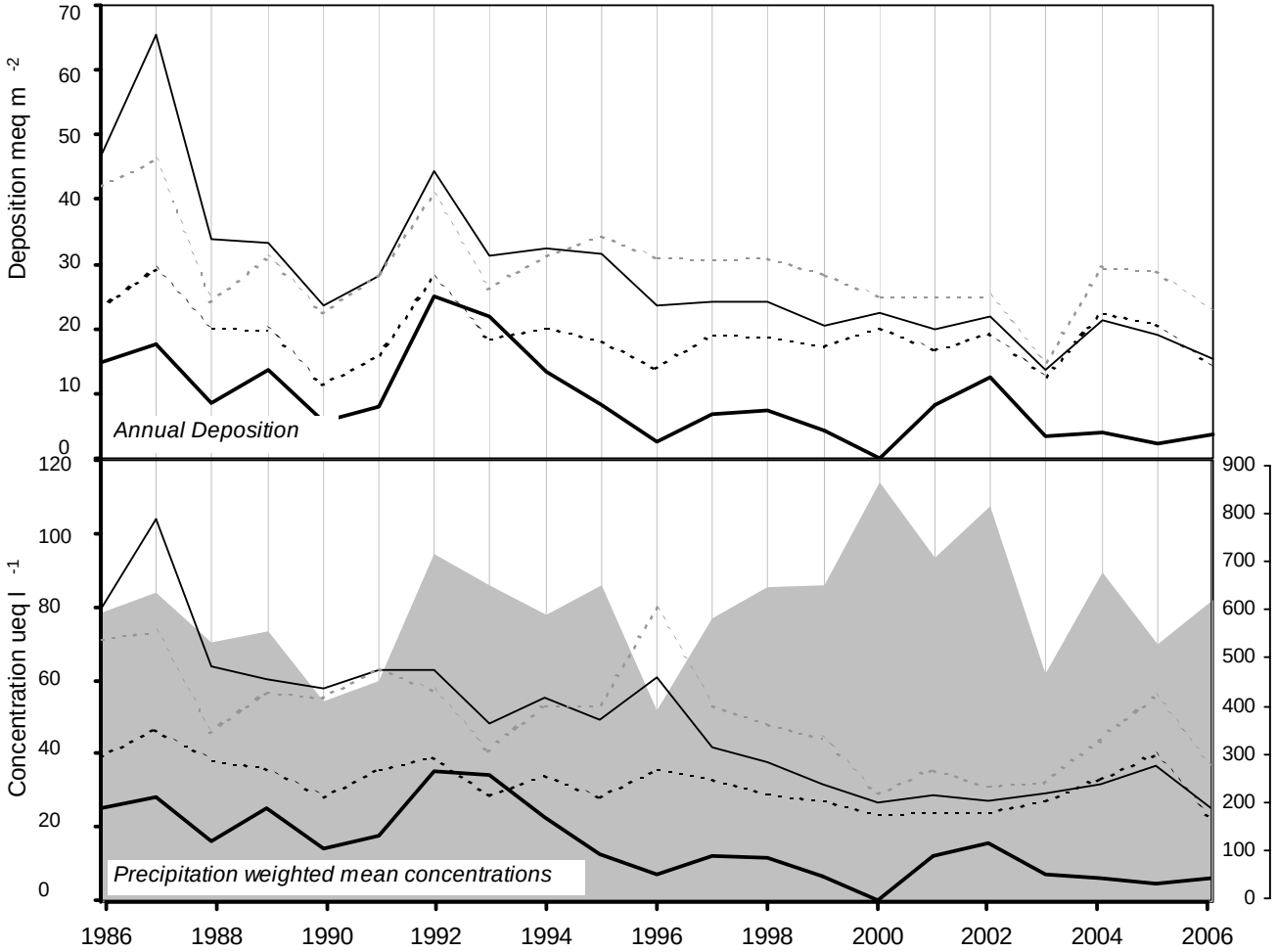
Site Code:	**5129**
Easting:	**4512**
Northing:	**1804**
Latitude:	**51 31 11 N**
Longitude:	**01 15 43 W**
Altitude (m):	**105**
Rainfall (mm):	**707**

[30 year mean 1940 - 1971]

Site Environment:
Rough meadow, near pumping station

Other measurements:
DT

Site Operator:
AEA Technology



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

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

hydrogen ion
-1.07 ueq/l (-4.05 %/year): 20 years' data
++ Moderately strong trend detected

non-marine sulphate
-2.87 ueq/l (-3.71 %/year): 21 years' data
++++ Very strong trend detected

nitrate
-0.60 ueq/l (-1.58 %/year): 21 years' data
++ Moderately strong trend detected

ammonium
-1.39 ueq/l (-2.16 %/year): 21 years' data
++ Moderately strong trend detected

(5129) Compton

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
09/Jan/2006	24/Jan/2006	5.6	65.2	54.2	81.6	101.5	18.6	17.9	99.4	3.7	<1.0	53.0	2.8	30.6	8.4
24/Jan/2006	06/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
06/Feb/2006	20/Feb/2006	5.6	25.0	20.6	40.5	65.2	10.5	4.9	58.9	0.3	<1.0	17.1	2.3	14.9	37.4
20/Feb/2006	06/Mar/2006	4.7	106.2	72.3	88.1	144.8	41.1	39.7	167.1	4.2	<1.0	88.7	19.5	44.1	6.1
06/Mar/2006	03/Apr/2006	6.2	36.7	24.1	44.8	78.0	14.0	51.5	73.7	2.9	<1.0	27.3	0.6	9.1	39.8
03/Apr/2006	19/Apr/2006	6.3	35.7	17.3	56.3	45.1	6.9	20.9	48.0	11.0	<1.0	30.2	0.5	19.4	8.1
19/Apr/2006	02/May/2006	6.3	57.7	60.1	112.2	28.8	9.1	35.3	27.6	6.4	<1.0	54.3	0.5	23.1	13.9
02/May/2006	16/Jun/2006	4.7	38.9	29.5	24.9	44.2	12.9	25.0	46.4	3.5	<1.0	33.5	20.4	20.8	91.9
16/Jun/2006	26/Jun/2006	5.9	84.3	104.0	87.3	76.9	28.7	124.4	69.9	13.8	<1.0	75.0	1.3	43.1	5.3
26/Jun/2006	10/Jul/2006	6.7	75.2	84.0	37.2	92.5	24.6	21.5	18.9	7.0	<1.0	64.0	0.2	31.8	7.8
10/Jul/2006	24/Jul/2006	6.1	50.4	51.4	49.0	12.8	6.7	58.7	11.6	6.6	<1.0	48.8	0.8	16.9	15.4
24/Jul/2006	07/Aug/2006	6.3	420.5	188.9	73.0	61.0	13.4	79.5	120.7	17.2	161.0	413.2	0.5	27.1	7.3
07/Aug/2006	21/Aug/2006	5.8	3.7	2.6	5.0	4.4	1.7	2.7	5.9	2.1	<1.0	3.2	1.7	9.3	26.9
21/Aug/2006	04/Sep/2006	4.7	15.6	11.8	7.8	15.6	4.0	18.3	19.6	1.6	<1.0	13.7	20.9	9.4	21.5
04/Sep/2006	18/Sep/2006	4.9	40.7	31.4	41.8	9.8	1.8	18.0	7.4	1.9	<1.0	39.5	11.7	11.4	31.5
18/Sep/2006	02/Oct/2006	5.7	22.8	12.1	22.4	52.4	8.1	9.2	60.3	2.7	<1.0	16.5	1.9	11.7	42.6
02/Oct/2006	16/Oct/2006	5.8	23.6	20.8	34.7	18.1	4.0	9.9	20.9	3.3	<1.0	21.4	1.8	7.9	38.8
16/Oct/2006	06/Nov/2006	5.4	22.1	12.4	19.4	42.3	7.5	8.5	62.8	2.5	1.7	17.0	4.0	12.0	59.3
06/Nov/2006	27/Nov/2006	5.4	25.9	12.4	32.4	75.4	13.4	9.2	82.6	3.9	1.4	16.8	4.2	16.4	65.0
27/Nov/2006	02/Jan/2007	6.0	31.0	14.5	54.2	124.9	19.3	7.1	140.0	7.0	1.9	16.0	1.0	24.7	87.1
					Precipitation<	weighted annual means for site					(samples containing phosphate are excluded)				Total rainfall
5129			31.9	22.7	36.6	58.4	11.3	17.9	63.0	3.8	0.9	24.9	6.2		614.1

Crai Reservoir

2006

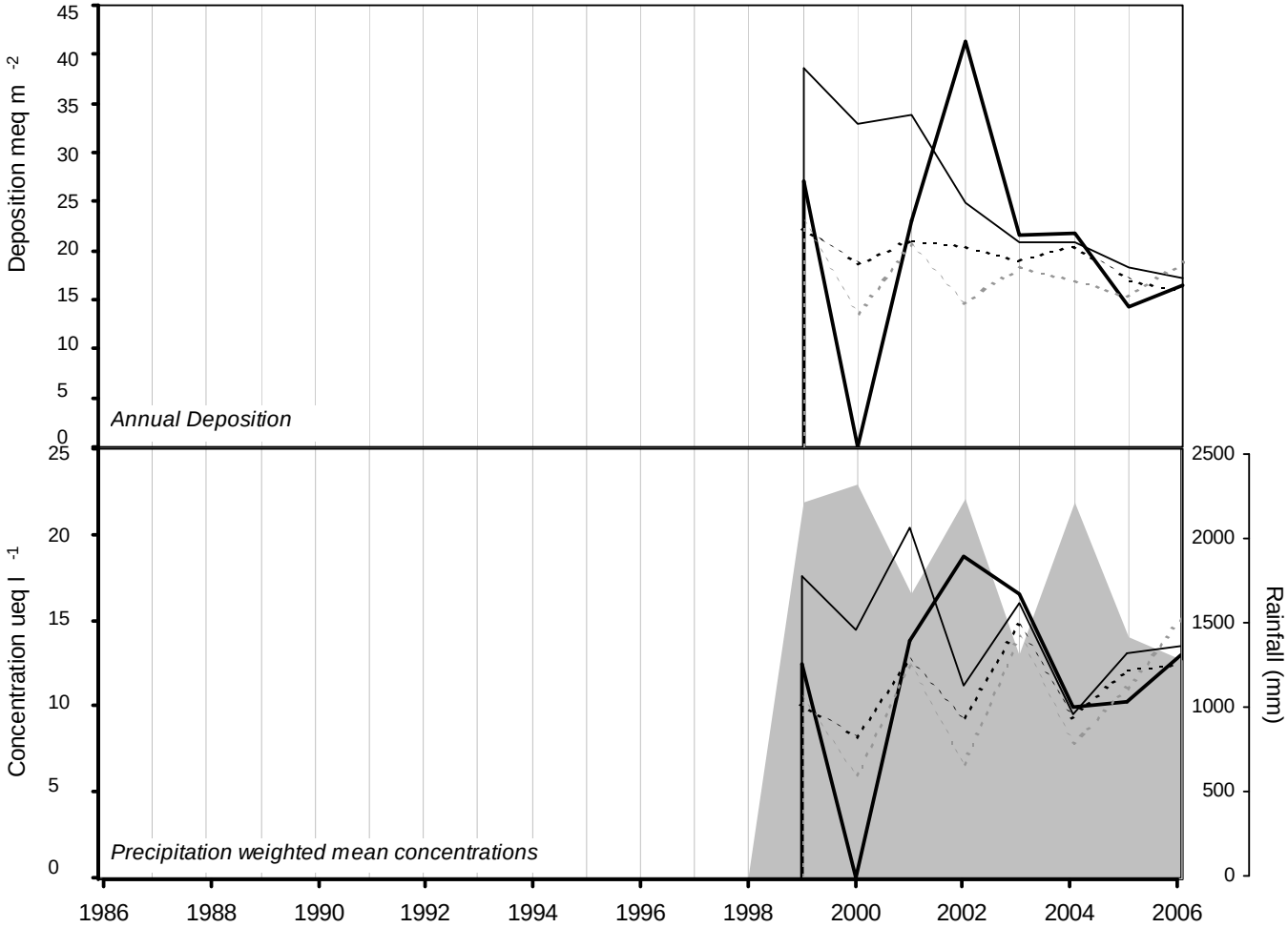
Site Code:	**5154**
Easting:	**2882**
Northing:	**2219**
Latitude:	**51 53 25 N**
Longitude:	**03 37 10 W**
Altitude (m):	**310**
Rainfall (mm):	**-**

[30 year mean 1940 - 1971]

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

Other measurements:

Site Operator:
Welsh Water



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

long-term trends in concentration (+x = increase; -x = decrease)
hydrogen ion
non-marine sulphate
nitrate
ammonium

(5154) Crai Reservoir

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
30/Jan/2006	28/Feb/2006	4.8	28.6	20.4	22.1	101.3	22.3	8.4	115.4	1.9	<1.0	16.4	15.5	26.1	106.5
28/Feb/2006	31/Mar/2006	5.2	22.1	11.7	12.8	127.5	25.5	7.1	116.9	3.4	<1.0	6.8	6.0	21.8	88.6
31/Mar/2006	28/Apr/2006	5.2	17.9	8.2	15.2	39.6	8.1	9.3	37.4	4.2	<1.0	13.1	5.9	5.0	73.1
28/Apr/2006	26/May/2006	4.8	28.2	15.8	15.0	56.2	14.9	8.9	54.9	1.9	<1.0	21.4	16.6	16.8	212.9
26/May/2006	29/Jun/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
29/Jun/2006	28/Jul/2006	4.8	37.3	37.7	29.9	29.7	9.2	13.8	29.1	2.8	<1.0	33.7	16.6	14.5	28.9
28/Jul/2006	31/Aug/2006	4.7	22.8	12.7	13.3	55.1	10.5	7.9	55.7	3.7	<1.0	16.2	19.1	14.3	177.2
31/Aug/2006	29/Sep/2006	4.7	32.5	22.4	15.5	71.3	13.8	14.2	76.9	5.3	<1.0	23.9	19.1	17.4	55.6
29/Sep/2006	27/Oct/2006	4.9	23.9	11.1	18.3	97.5	19.8	10.8	103.4	3.4	<1.0	12.1	12.3	17.9	246.6
27/Oct/2006	29/Dec/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
29/Dec/2006	29/Jan/2007	5.1	23.1	4.8	9.1	157.9	30.9	7.2	170.4	3.0	<1.0	4.1	8.5	25.9	279.0
					Precipitation< weighted annual means for site (samples containing phosphate are excluded)										Total rainfall
5154			24.9	12.5	14.9	94.3	19.5	9.0	98.6	3.1	0.5	13.5	13.0		1268.5

Flatford Mill

2006

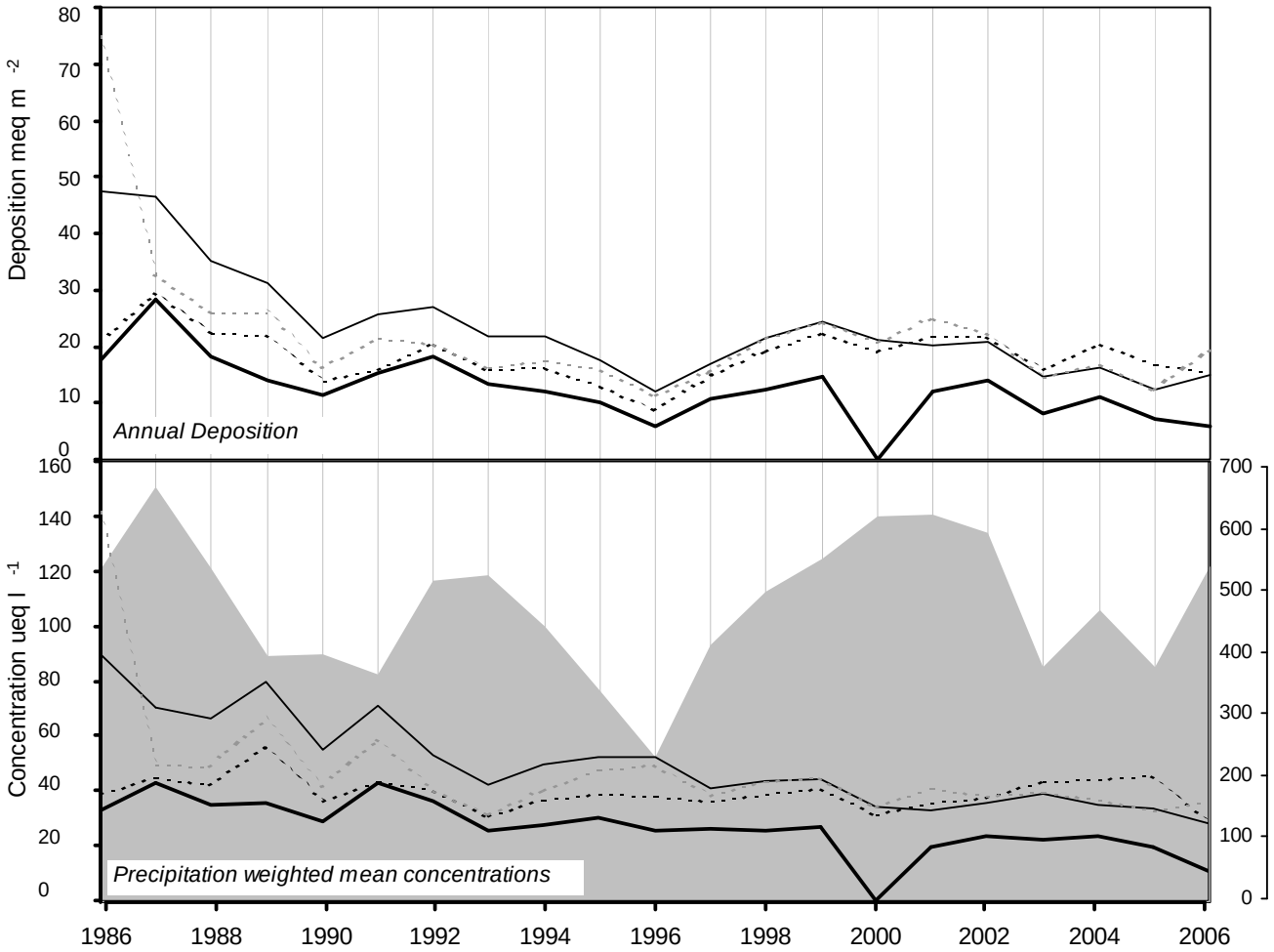
Site Code:	**5024**
Easting:	**6077**
Northing:	**2333**
Latitude:	**51 57 32 N**
Longitude:	**01 01 24 E**
Altitude (m):	**5**
Rainfall (mm):	**599**

[30 year mean 1940 - 1971]

Site Environment:
Open meadow near River Stour

Other measurements:
DT

Site Operator:
Field Studies Council



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

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

hydrogen ion
-1.05 ueq/l (-2.75 %/year): 20 years' data
+++ Strong trend detected

non-marine sulphate
-2.49 ueq/l (-3.32 %/year): 21 years' data
++++ Very strong trend detected

nitrate
-0.29 ueq/l (-0.69 %/year): 21 years' data
- No significant trend detected

ammonium
-0.93 ueq/l (-1.77 %/year): 20 years' data
++ Moderately strong trend detected

(5024) Flatford Mill

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
05/Jan/2006	24/Jan/2006	4.3	79.5	104.9	97.8	112.5	28.6	24.0	113.6	5.0	<1.0	66.0	52.5	50.6	8.3
24/Jan/2006	08/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
08/Feb/2006	21/Feb/2006	4.7	42.7	40.1	37.7	88.5	18.8	7.7	97.1	1.1	<1.0	32.1	21.4	29.4	15.3
21/Feb/2006	07/Mar/2006	5.1	83.1	63.1	73.7	284.6	59.4	41.4	292.1	10.1	<1.0	48.9	7.4	58.0	7.7
07/Mar/2006	23/Mar/2006	4.5	50.1	50.3	59.5	57.9	13.2	12.7	62.4	3.4	<1.0	43.1	32.4	29.7	15.0
23/Mar/2006	06/Apr/2006	5.6	39.1	31.4	56.6	78.2	17.7	15.4	73.6	5.1	<1.0	29.7	2.4	20.9	14.9
06/Apr/2006	18/Apr/2006	6.3	70.8	47.8	129.7	59.4	11.2	16.8	55.3	4.8	<1.0	63.6	0.5	26.6	9.4
18/Apr/2006	05/May/2006	5.1	60.3	59.5	82.0	59.6	24.1	32.0	57.4	8.0	<1.0	53.1	8.5	19.5	14.7
05/May/2006	16/May/2006	5.8	11.1	16.0	23.6	4.4	5.1	11.3	6.0	2.1	<1.0	10.6	1.7	5.7	49.1
16/May/2006	30/May/2006	4.8	23.8	15.7	16.1	25.8	6.7	5.9	28.8	4.0	<1.0	20.7	16.2	13.6	36.3
30/May/2006	13/Jun/2006	5.4	89.3	102.3	32.0	112.0	41.9	91.9	93.2	24.8	16.5	75.8	3.6	40.4	2.9
13/Jun/2006	28/Jun/2006	4.8	46.1	60.1	42.1	34.3	14.5	36.4	39.6	14.5	1.9	42.0	15.8	23.8	11.7
28/Jun/2006	11/Jul/2006	4.9	69.7	81.6	43.5	26.5	16.8	81.4	30.0	20.3	8.2	66.5	13.2	29.1	6.7
11/Jul/2006	25/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/Jul/2006	08/Aug/2006	6.1	46.4	52.7	79.8	55.8	18.6	37.6	54.9	19.8	9.3	39.6	0.9	25.3	22.0
08/Aug/2006	22/Aug/2006	5.4	25.7	27.2	36.0	32.7	7.3	12.1	35.0	4.0	3.9	21.8	4.2	11.7	42.6
22/Aug/2006	05/Sep/2006	4.5	19.8	18.8	13.3	11.3	3.3	9.3	14.7	4.0	<1.0	18.4	29.5	13.2	39.9
05/Sep/2006	19/Sep/2006	5.5	45.2	53.4	53.7	20.0	5.4	30.1	16.9	4.8	<1.0	42.7	3.4	15.7	14.5
19/Sep/2006	03/Oct/2006	5.5	32.9	20.2	14.7	37.6	10.3	28.1	39.6	4.4	<1.0	28.4	3.3	10.9	31.1
03/Oct/2006	17/Oct/2006	5.2	21.1	15.8	32.2	15.7	6.0	16.4	10.4	3.1	<1.0	19.2	6.3	7.8	29.9
17/Oct/2006	31/Oct/2006	5.7	17.6	10.9	15.2	39.7	8.6	20.6	40.6	3.5	2.4	12.8	2.2	9.8	58.2
31/Oct/2006	14/Nov/2006	4.7	55.4	37.6	57.3	100.4	23.4	24.4	101.4	5.2	<1.0	43.3	20.0	-	8.8
14/Nov/2006	28/Nov/2006	5.5	67.5	16.2	26.7	133.4	33.4	33.9	154.7	41.2	<1.0	51.5	3.5	33.5	29.8
28/Nov/2006	12/Dec/2006	4.8	43.8	18.5	29.7	186.6	38.7	16.1	207.7	9.0	2.4	21.3	15.5	37.0	23.3
12/Dec/2006	09/Jan/2007	4.7	35.7	32.4	41.9	72.6	16.3	11.1	76.6	3.7	<1.0	27.0	22.4	23.7	41.3
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5024			34.9	28.8	36.3	55.0	13.9	19.2	58.5	7.3	1.6	28.2	11.0		533.6

Woburn

2006

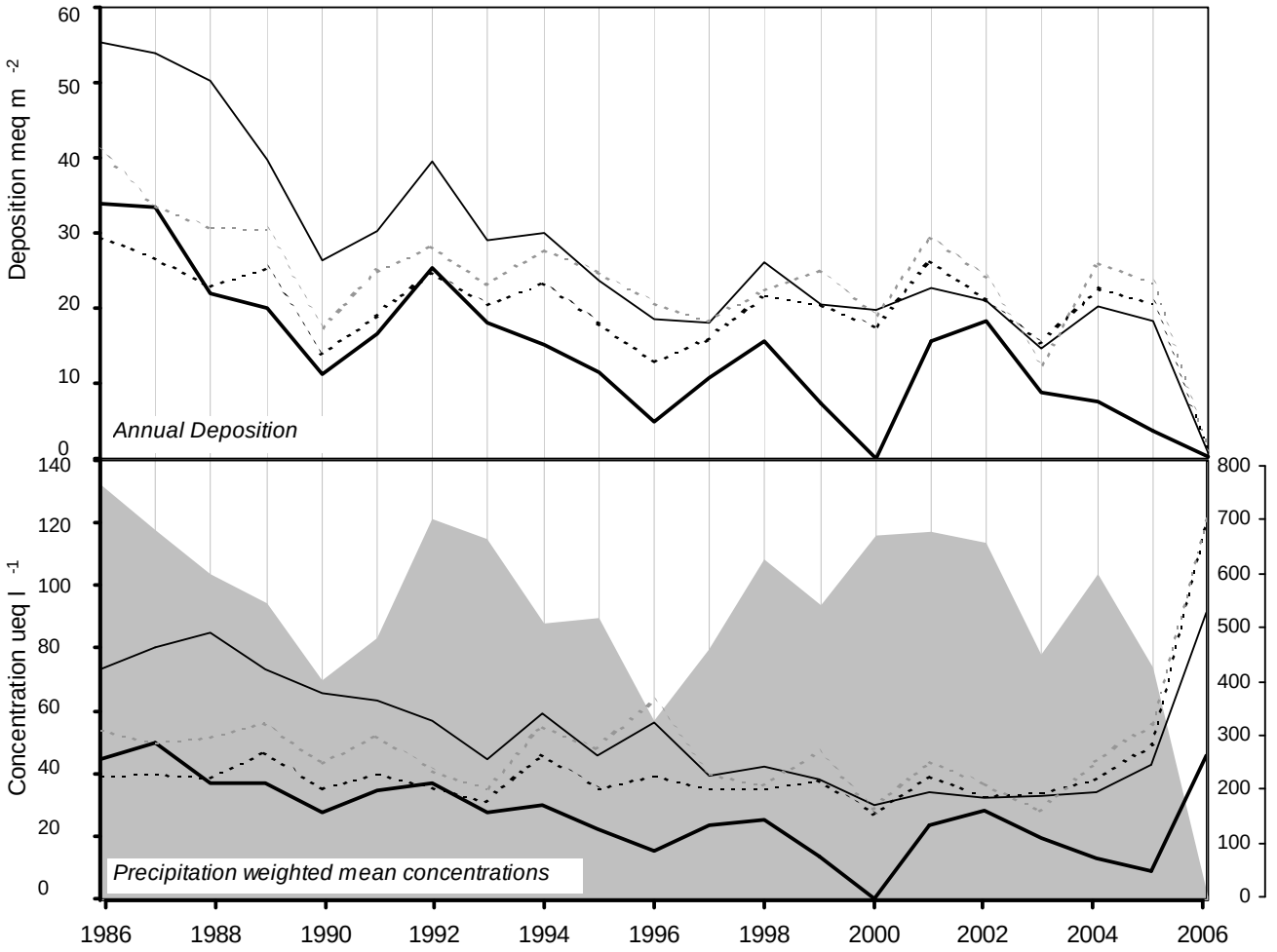
Site Code:	**5127**
Easting:	**4964**
Northing:	**2361**
Latitude:	**52 00 52 N**
Longitude:	**00 35 43 W**
Altitude (m):	**89**
Rainfall (mm):	**646**

[30 year mean 1940 - 1971]

Site Environment:
Pasture

Other measurements:
N/A

Site Operator:
N/A



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

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

hydrogen ion
-1.58 ueq/l (-3.77 %/year): 19 years' data
++++ Very strong trend detected

non-marine sulphate
-2.63 ueq/l (-3.45 %/year): 20 years' data
++++ Very strong trend detected

nitrate
-0.12 ueq/l (-0.31 %/year): 20 years' data
++++ Very strong trend detected

ammonium
-0.65 ueq/l (-1.26 %/year): 20 years' data
++++ Very strong trend detected

(5127) Woburn

Site closed Jan 2006 – replaced by (5165) Rothamsted

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	nss (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
05/Jan/2006	11/Jan/2006	4.3	102.0	120.7	120.5	86.1	12.8	12.4	75.3	7.4	<1.0	91.6	45.7	55.9	7.9
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5127			102.0	120.7	120.5	86.1	12.8	12.4	75.3	7.4	0.5	91.6	45.7		7.9

Rothamsted

2006

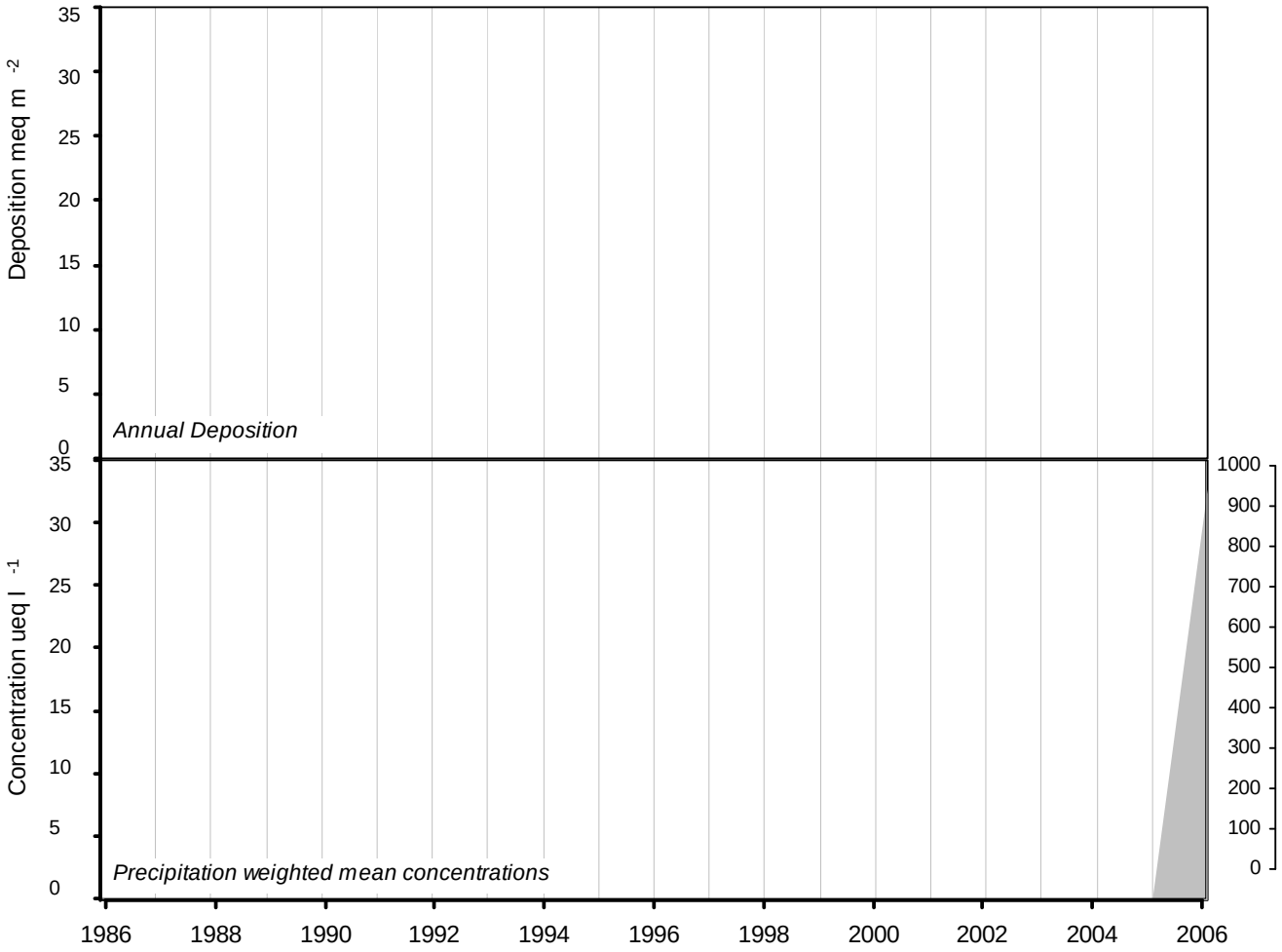
Site Code:	**5165**
Easting:	**5131**
Northing:	**2132**
Latitude:	**51 48 23 N**
Longitude:	**00 27 37 W**
Altitude (m):	**130**
Rainfall (mm):	**0**

[30 year mean 1940 - 1971]

Site Environment:
Pasture

Other measurements:
ECN, HNO3 Denuder

Site Operator:
Rothamsted Experimental Station



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

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

hydrogen ion
non-marine sulphate
nitrate
ammonium

(5165) Rothamsted

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
06/Jan/2006	26/Jan/2006	4.8	60.4	69.7	56.7	64.0	15.0	30.7	67.8	2.4	<1.0	52.7	16.6	30.1	11.0
26/Jan/2006	09/Feb/2006	5.2	113.6	135.7	99.3	263.0	40.3	61.1	244.5	7.3	<1.0	81.9	6.0	61.2	1.7
09/Feb/2006	23/Feb/2006	5.1	26.2	24.1	26.4	57.7	12.6	9.3	60.6	0.5	<1.0	19.3	8.7	16.9	27.4
23/Feb/2006	09/Mar/2006	4.9	31.0	29.1	26.3	50.1	10.9	19.4	51.1	5.5	<1.0	24.9	13.8	16.5	22.9
09/Mar/2006	23/Mar/2006	5.1	76.9	54.4	48.1	273.2	55.4	50.9	280.4	9.6	<1.0	44.0	7.4	55.4	3.6
23/Mar/2006	06/Apr/2006	5.9	35.0	26.9	56.2	102.2	18.8	14.6	96.0	4.1	<1.0	22.7	1.3	19.5	28.9
06/Apr/2006	20/Apr/2006	6.6	56.2	29.9	108.0	93.0	14.7	19.5	83.6	5.3	<1.0	45.0	0.3	27.8	10.8
20/Apr/2006	04/May/2006	6.0	49.9	43.6	81.8	30.5	11.4	27.4	20.4	5.7	<1.0	46.2	1.0	19.5	16.9
04/May/2006	18/May/2006	7.1	98.7	58.8	580.9	60.4	22.3	130.6	40.7	56.5	41.8	91.5	0.1	37.1	20.9
18/May/2006	01/Jun/2006	4.9	22.2	18.6	20.7	41.6	13.9	11.9	38.2	1.6	<1.0	17.2	14.1	14.7	49.7
01/Jun/2006	15/Jun/2006	5.8	108.4	161.5	148.1	25.8	19.1	139.0	19.0	13.2	<1.0	105.3	1.5	45.3	2.1
15/Jun/2006	29/Jun/2006	6.5	49.0	32.4	151.8	58.8	14.2	3.9	55.9	26.2	44.7	41.9	0.3	7.3	28.9
29/Jun/2006	13/Jul/2006	4.8	38.5	48.1	45.6	8.4	7.0	25.7	8.7	7.2	<1.0	37.5	16.6	18.5	36.3
13/Jul/2006	27/Jul/2006	4.6	123.7	252.0	136.9	57.2	28.7	212.1	17.0	14.0	<1.0	116.8	25.7	61.4	3.4
27/Jul/2006	10/Aug/2006	5.4	71.6	80.9	90.9	59.2	14.6	55.5	55.5	16.4	<1.0	64.5	4.3	27.8	8.2
10/Aug/2006	24/Aug/2006	4.7	26.5	22.0	28.7	16.8	4.8	<1.0	15.9	3.5	<1.0	24.5	20.0	9.6	81.4
24/Aug/2006	07/Sep/2006	5.1	34.2	28.4	18.6	13.1	5.5	14.5	24.2	3.7	<1.0	32.7	7.6	11.9	13.5
07/Sep/2006	21/Sep/2006	4.9	34.5	39.2	29.1	25.2	5.4	29.9	25.0	4.3	<1.0	31.5	11.7	12.9	284.6
21/Sep/2006	05/Oct/2006	5.3	21.6	14.8	16.0	54.1	9.7	10.1	60.2	2.6	<1.0	15.1	5.5	11.5	44.4
05/Oct/2006	19/Oct/2006	7.1	171.9	30.8	1510.7	87.6	6.6	10.5	63.4	87.7	250.0	161.4	0.1	153.8	31.1
19/Oct/2006	02/Nov/2006	5.4	26.2	17.5	31.3	78.8	14.3	9.1	89.3	2.6	<1.0	16.7	3.8	16.3	42.3
02/Nov/2006	16/Nov/2006	4.8	32.8	28.3	34.6	49.3	9.7	16.3	48.6	1.8	<1.0	26.9	15.5	16.6	21.3
16/Nov/2006	30/Nov/2006	5.0	2.1	1.7	2.1	16.8	3.1	1.5	8.7	0.3	<1.0	0.1	10.5	14.1	63.8
30/Nov/2006	14/Dec/2006	5.0	24.8	13.5	18.2	118.6	22.2	10.7	126.8	2.8	<1.0	10.6	10.7	22.7	30.5
14/Dec/2006	04/Jan/2007	4.6	25.7	23.3	24.5	54.8	12.1	7.2	55.9	1.4	<1.0	19.1	24.5	17.3	48.8
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5165			30.6	30.3	30.7	41.4	9.2	18.9	41.2	3.6	0.5	25.6	12.0		934.1

Tycanol Wood

2006

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

[30 year mean 1940 - 1971]

Site Environment:
Open moorland

Other measurements:
DT

Site Operator:
Countryside Council for Wales

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

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

hydrogen ion
-0.18 ueq/l (-1.03 %/year): 20 years' data
- No significant trend detected

non-marine sulphate
-0.54 ueq/l (-2.00 %/year): 21 years' data
+++ Strong trend detected

nitrate
0.00 ueq/l (0.00 %/year): 21 years' data
- No significant trend detected

ammonium
0.11 ueq/l (0.77 %/year): 21 years' data
- No significant trend detected

(5123) Tycanol Wood

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
06/Jan/2006	11/Jan/2006	4.7	37.1	15.8	13.4	123.5	24.5	7.8	128.0	4.8	<1.0	22.2	22.4	28.0	46.6
11/Jan/2006	25/Jan/2006	4.5	36.6	15.6	16.1	97.7	21.4	7.4	105.7	2.1	<1.0	24.8	29.5	30.9	58.7
25/Jan/2006	08/Feb/2006	5.6	106.1	123.2	153.3	552.6	109.6	43.3	435.2	17.4	<1.0	39.5	2.3	85.8	3.2
08/Feb/2006	22/Feb/2006	4.9	31.8	24.2	23.5	141.3	27.8	9.5	154.4	2.1	<1.0	14.8	14.1	30.1	69.6
22/Feb/2006	13/Mar/2006	5.2	39.0	24.1	37.1	116.6	28.5	13.6	129.3	4.3	<1.0	24.9	5.9	20.7	72.0
13/Mar/2006	22/Mar/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
22/Mar/2006	05/Apr/2006	4.9	27.6	6.9	7.1	137.5	29.6	7.7	138.2	3.4	<1.0	11.1	12.9	25.2	111.1
05/Apr/2006	19/Apr/2006	5.2	32.9	10.5	32.7	122.9	25.8	10.1	121.0	4.7	<1.0	18.1	6.9	24.7	25.2
19/Apr/2006	03/May/2006	4.7	53.2	26.3	35.0	118.7	29.1	23.0	106.5	4.7	<1.0	38.9	19.1	28.8	25.6
03/May/2006	16/May/2006	4.5	72.0	51.3	75.1	43.2	11.4	21.2	41.9	3.5	<1.0	66.8	31.6	28.1	22.9
16/May/2006	31/May/2006	5.0	30.2	15.9	6.4	109.9	22.2	22.1	105.4	3.4	<1.0	17.0	9.5	21.1	6.5
31/May/2006	14/Jun/2006	4.6	32.5	12.6	5.2	114.0	24.7	12.1	114.6	3.0	<1.0	18.8	25.1	27.3	108.8
14/Jun/2006	28/Jun/2006	4.8	69.9	30.1	82.9	96.5	33.1	18.0	103.3	15.9	13.8	58.3	15.1	31.5	15.8
28/Jun/2006	12/Jul/2006	5.2	40.3	31.5	23.9	37.8	10.0	17.1	33.9	9.0	10.9	35.7	6.3	12.1	74.8
12/Jul/2006	26/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
26/Jul/2006	09/Aug/2006	6.6	99.9	30.2	409.5	133.6	26.8	11.7	144.8	63.7	118.7	83.8	0.2	83.0	26.2
09/Aug/2006	29/Aug/2006	5.3	29.6	21.9	28.6	51.5	10.9	8.1	56.9	2.5	<1.0	23.4	4.7	14.2	49.9
29/Aug/2006	06/Sep/2006	4.6	37.4	21.7	18.4	102.9	22.7	16.5	105.5	3.6	<1.0	25.0	26.9	25.0	43.9
06/Sep/2006	20/Sep/2006	4.6	33.0	20.7	10.3	105.2	21.5	14.9	100.3	3.6	<1.0	20.3	24.5	23.8	10.6
20/Sep/2006	04/Oct/2006	5.2	40.2	15.9	5.5	40.1	8.9	3.8	171.0	0.8	<1.0	35.4	6.3	29.8	75.8
04/Oct/2006	18/Oct/2006	4.8	38.0	15.1	23.7	154.7	31.0	10.2	166.4	3.3	1.4	19.3	14.5	29.7	127.0
18/Oct/2006	01/Nov/2006	4.7	45.2	22.4	35.2	147.4	30.4	12.8	155.4	5.3	1.7	27.4	20.0	-	8.2
01/Nov/2006	15/Nov/2006	4.6	13.2	3.5	17.8	207.3	43.3	11.5	84.4	4.6	<1.0	0.0	27.5	39.1	144.5
15/Nov/2006	29/Nov/2006	4.7	38.3	9.2	15.5	206.3	45.1	13.1	223.1	4.5	3.4	13.5	18.6	37.2	91.0
29/Nov/2006	13/Dec/2006	5.0	51.6	6.7	26.0	428.6	82.9	18.3	443.9	6.5	<1.0	0.0	9.3	66.1	189.9
13/Dec/2006	05/Jan/2007	4.7	38.1	11.9	14.2	208.3	45.3	13.2	220.3	4.7	1.9	13.0	19.5	40.9	158.8
Precipitation<weighted annual means for site(samples containing phosphate are excluded)															Total rainfall
5123			36.4	13.7	19.6	181.0	37.6	12.1	182.5	4.0	0.9	20.6	16.9		1566.7

Llyn Brianne

2006

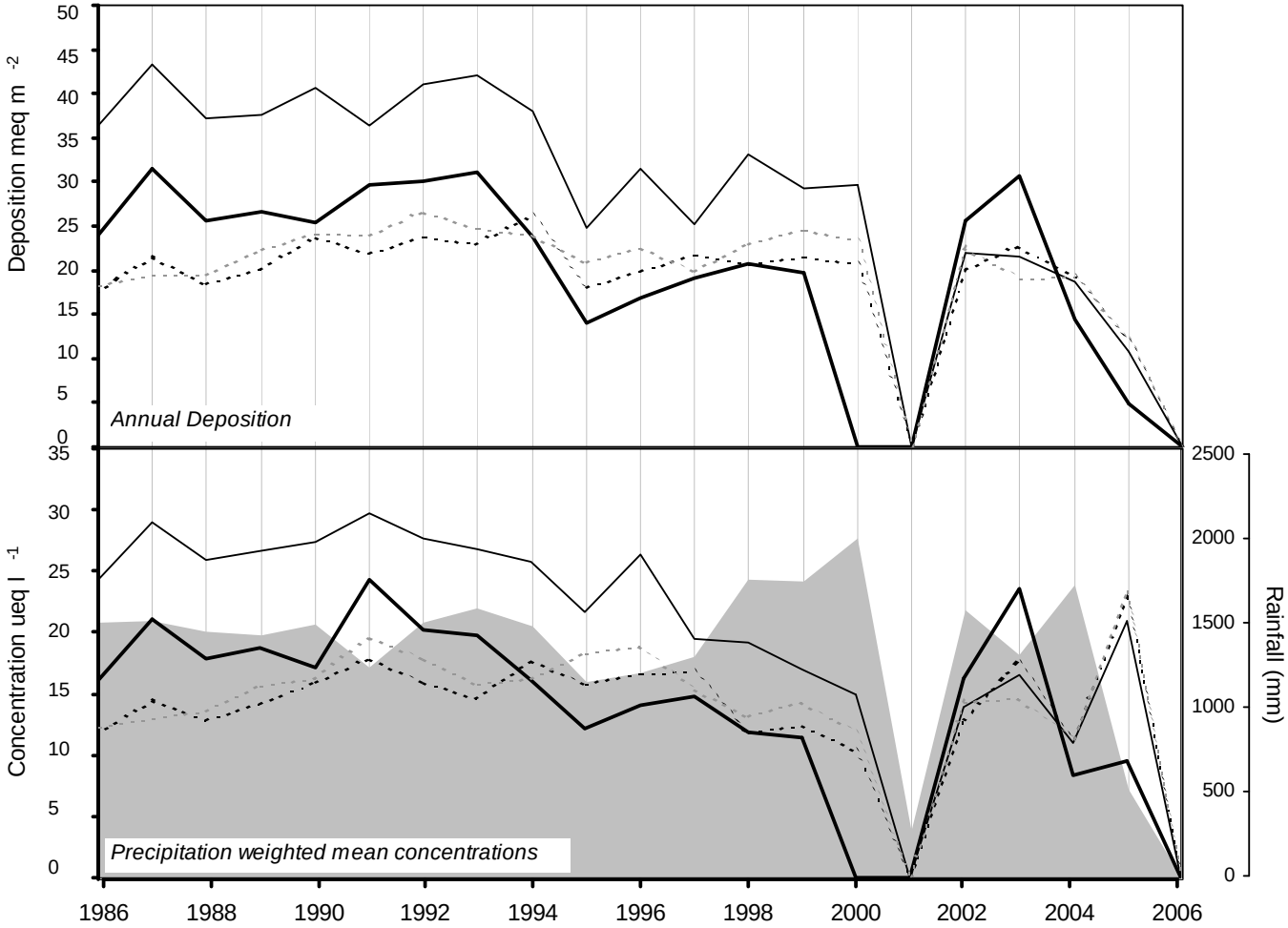
Site Code:	**5124**
Easting:	**2807**
Northing:	**2492**
Latitude:	**52 07 32 N**
Longitude:	**03 44 34 W**
Altitude (m):	**372**
Rainfall (mm):	**1774**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, upland hill farming

Other measurements:
DT, UKAWMN (nearby), Met

Site Operator:
Environment Agency



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

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

hydrogen ion
-0.41 ueq/l (-2.08 %/year): 18 years' data
\+ Significant trend detected

non-marine sulphate
-0.82 ueq/l (-2.76 %/year): 19 years' data
+++ Strong trend detected

nitrate
0.08 ueq/l (0.54 %/year): 19 years' data
\- No significant trend detected

ammonium
0.05 ueq/l (0.33 %/year): 19 years' data
\- No significant trend detected

(5124) Llyn Brianne

No measurements made in 2006

	Precipitation< weighted annual means for site(samples containing phosphate are excluded)	Total rainfall
5124		

Pumlumon

2006

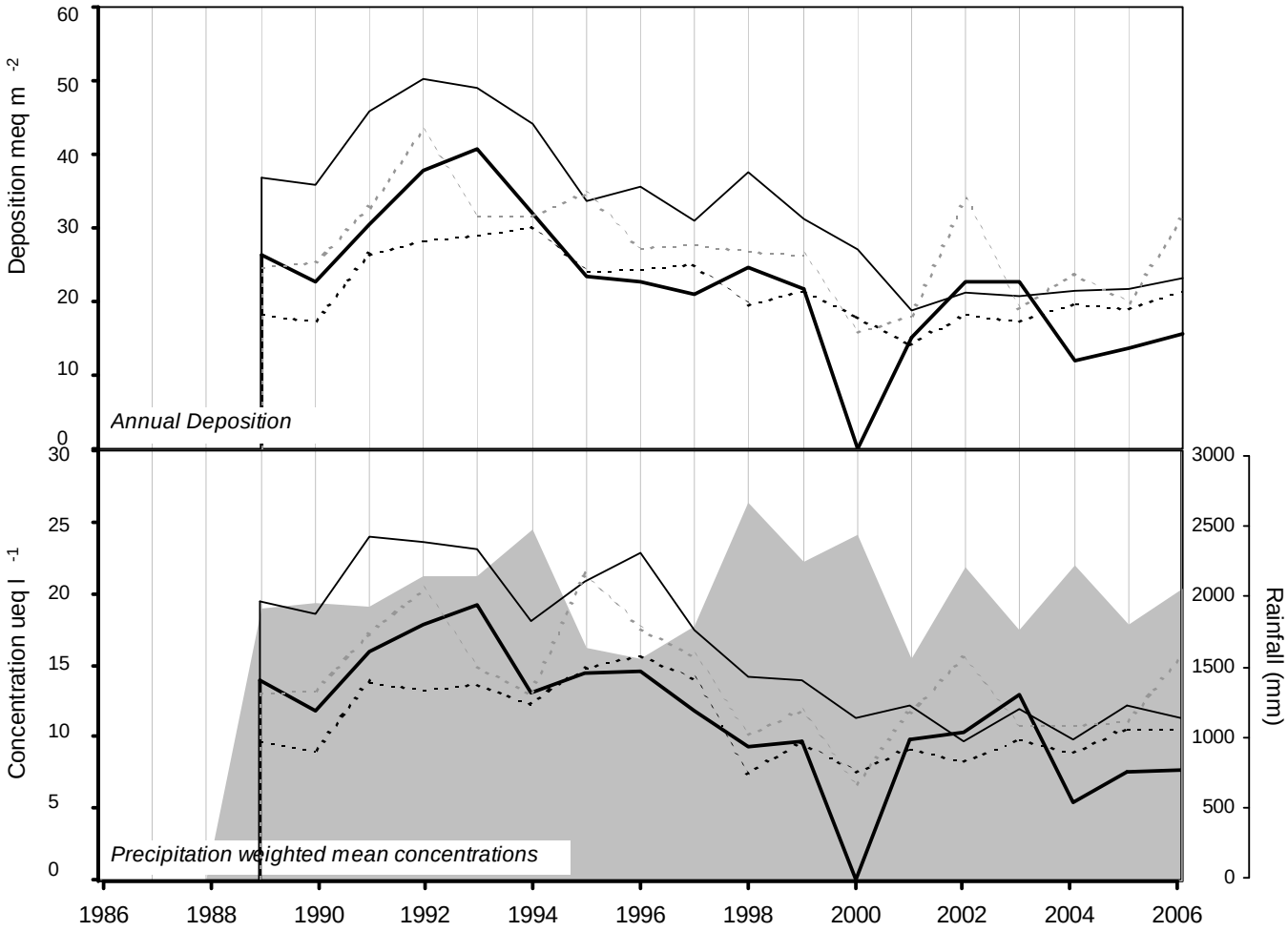
Site Code:	**5150**
Easting:	**2823**
Northing:	**2854**
Latitude:	**52 27 13 N**
Longitude:	**03 43 56 W**
Altitude (m):	**390**
Rainfall (mm):	**2182**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, upland hill farming

Other measurements:
DT, UKAWMN (nearby)

Site Operator:
Centre for Ecology and Hydrology (Bangor)



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

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

hydrogen ion
-0.52 ueq/l (-2.89 %/year): 17 years' data
++ Moderately strong trend detected

non-marine sulphate
-0.82 ueq/l (-3.18 %/year): 18 years' data
+++ Strong trend detected

nitrate
-0.20 ueq/l (-1.50 %/year): 18 years' data
- No significant trend detected

ammonium
-0.27 ueq/l (-1.60 %/year): 18 years' data
- No significant trend detected

(5150) Pumlumon

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
11/Jan/2006	24/Jan/2006	5.1	16.8	9.7	11.0	39.3	9.1	4.5	43.3	1.1	<1.0	12.0	7.9	11.0	67.8
24/Jan/2006	07/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
07/Feb/2006	21/Feb/2006	5.6	18.6	10.8	16.4	70.3	14.9	6.1	80.1	0.6	<1.0	10.1	2.3	15.4	106.5
21/Feb/2006	07/Mar/2006	5.5	39.2	24.5	32.2	110.4	25.5	11.1	122.7	2.7	<1.0	25.9	3.0	27.3	28.2
07/Mar/2006	21/Mar/2006	5.2	25.3	11.0	19.9	114.7	23.3	9.8	114.1	3.4	<1.0	11.5	6.0	21.1	90.7
21/Mar/2006	04/Apr/2006	5.5	21.7	11.3	17.1	109.6	20.6	6.9	105.9	2.3	<1.0	8.5	3.0	19.4	149.6
04/Apr/2006	18/Apr/2006	5.7	20.6	7.3	22.6	74.0	13.8	5.0	75.0	1.8	<1.0	11.6	2.0	14.6	65.4
18/Apr/2006	02/May/2006	5.0	25.8	13.3	20.8	27.4	6.9	6.9	24.8	0.9	<1.0	22.5	9.8	10.0	54.1
02/May/2006	16/May/2006	5.0	38.5	37.8	64.7	12.7	13.9	17.7	11.6	1.9	<1.0	36.9	10.0	15.9	37.6
16/May/2006	30/May/2006	5.1	14.2	6.0	4.7	51.6	11.6	4.8	59.7	3.8	<1.0	8.0	8.5	11.7	149.3
30/May/2006	13/Jun/2006	4.7	71.0	154.3	93.8	83.7	28.9	104.2	38.1	15.7	11.8	60.9	20.0	-	2.4
13/Jun/2006	27/Jun/2006	5.2	36.6	29.8	46.0	19.6	5.7	30.3	79.6	2.7	<1.0	34.2	5.9	9.4	23.2
27/Jun/2006	11/Jul/2006	4.6	28.9	26.4	11.1	31.8	8.3	12.3	39.6	2.7	<1.0	25.0	24.5	17.0	24.6
11/Jul/2006	25/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/Jul/2006	08/Aug/2006	6.5	38.4	10.9	111.9	100.9	23.3	16.0	105.1	24.9	33.5	26.2	0.3	32.6	28.0
08/Aug/2006	22/Aug/2006	4.9	28.0	24.0	24.4	22.7	5.8	6.1	25.5	6.3	2.4	25.3	14.1	12.4	92.7
22/Aug/2006	05/Sep/2006	5.6	21.2	8.3	33.1	32.3	4.2	2.1	32.7	2.5	<1.0	17.3	2.5	8.1	129.3
05/Sep/2006	26/Sep/2006	4.7	39.6	28.8	25.2	74.6	13.2	12.3	67.2	4.2	<1.0	30.6	20.4	19.3	35.2
26/Sep/2006	03/Oct/2006	5.1	13.3	8.0	8.2	57.1	9.1	2.1	58.1	3.0	<1.0	6.4	8.5	10.6	74.4
03/Oct/2006	17/Oct/2006	5.0	19.5	11.1	10.5	60.5	11.9	7.9	69.8	1.9	1.4	12.3	9.5	11.6	104.0
17/Oct/2006	31/Oct/2006	4.8	20.9	13.4	18.4	71.6	13.6	6.4	72.0	2.4	<1.0	12.3	15.5	14.5	114.7
31/Oct/2006	14/Nov/2006	5.5	22.0	8.6	20.2	108.2	17.0	5.7	99.6	2.1	<1.0	8.9	3.5	17.1	72.8
14/Nov/2006	28/Nov/2006	5.1	19.1	4.2	9.1	120.7	24.2	7.1	126.7	2.2	<1.0	4.5	7.2	20.4	170.0
28/Nov/2006	12/Dec/2006	5.3	43.5	4.8	1.3	351.3	74.3	15.6	384.6	5.7	<1.0	1.2	4.7	55.6	272.6
12/Dec/2006	02/Jan/2007	4.9	24.3	6.3	10.9	127.2	25.4	7.5	135.8	2.8	<1.0	9.0	14.1	24.4	143.4
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5150			24.9	10.6	15.4	112.6	23.1	8.1	120.3	3.0	0.6	11.3	7.7		2036.4

Stoke Ferry

2006

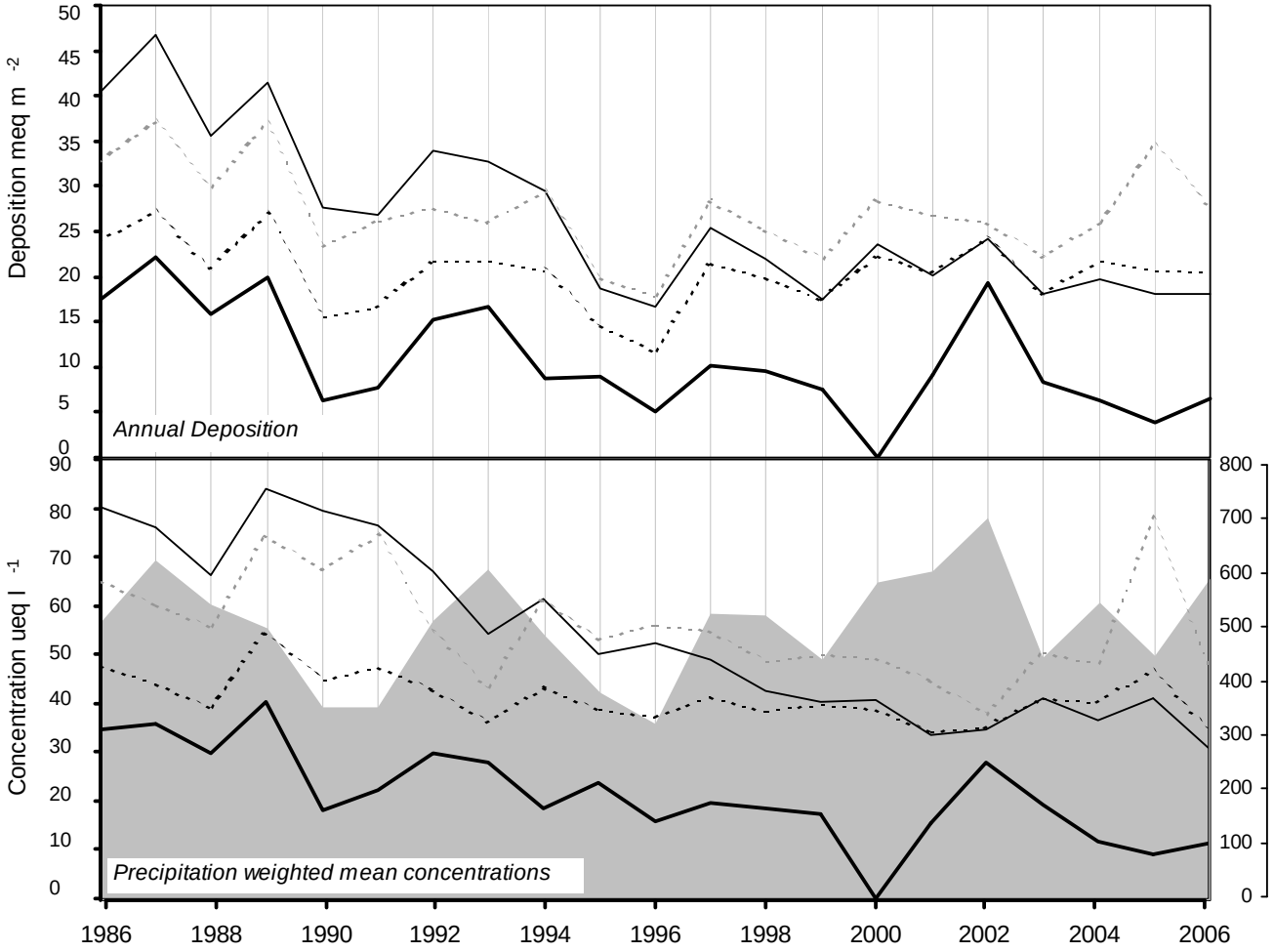
Site Code:	**5004**
Easting:	**5700**
Northing:	**2988**
Latitude:	**52 33 36 N**
Longitude:	**00 30 29 E**
Altitude (m):	**15**
Rainfall (mm):	**629**

[30 year mean 1940 - 1971]

Site Environment:
Grassed land at water treatment works

Other measurements:
HNO3 Denuder, WF, EMEP, TOMPs

Site Operator:
BC of King's Lynn & West Norfolk



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

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

hydrogen ion
-1.08 ueq/l (-3.29 %/year): 20 years' data
++++ Very strong trend detected

non-marine sulphate
-2.62 ueq/l (-3.26 %/year): 21 years' data
++++ Very strong trend detected

nitrate
-0.44 ueq/l (-0.96 %/year): 21 years' data
++++ Very strong trend detected

ammonium
-0.78 ueq/l (-1.23 %/year): 21 years' data
++++ Very strong trend detected

(5004) Stoke Ferry

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
04/Jan/2006	10/Jan/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
10/Jan/2006	25/Jan/2006	4.9	61.5	67.2	67.6	109.0	17.0	20.9	93.4	6.8	<1.0	48.4	12.0	31.6	4.0
25/Jan/2006	07/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
07/Feb/2006	23/Feb/2006	5.4	39.7	38.1	47.0	78.5	14.7	9.3	87.0	1.5	<1.0	30.3	4.2	23.3	23.7
23/Feb/2006	08/Mar/2006	5.9	72.8	55.6	72.3	135.3	28.6	58.7	146.4	4.4	<1.0	56.6	1.2	35.5	8.1
08/Mar/2006	21/Mar/2006	4.7	49.0	48.2	62.1	47.9	11.3	16.7	45.6	2.8	<1.0	43.3	20.0	25.0	14.6
21/Mar/2006	05/Apr/2006	6.5	46.6	32.0	34.8	117.4	20.3	80.4	110.3	6.0	<1.0	32.5	0.3	31.7	9.2
05/Apr/2006	18/Apr/2006	4.7	57.5	29.7	<0.7	<0.9	<0.8	<1.0	89.9	0.4	<1.0	57.6	20.0	-	0.9
18/Apr/2006	02/May/2006	6.4	66.6	47.0	91.1	49.8	25.0	43.3	51.2	5.7	<1.0	60.6	0.4	26.0	11.1
02/May/2006	17/May/2006	5.4	42.2	53.5	80.1	4.6	3.8	21.7	5.4	2.9	<1.0	41.7	3.7	16.2	36.8
17/May/2006	31/May/2006	7.8	38.0	6.3	307.7	22.5	14.6	16.0	27.7	36.5	88.3	35.3	0.0	114.5	40.5
31/May/2006	14/Jun/2006	5.8	38.9	59.2	25.0	25.9	12.3	73.5	24.1	1.7	<1.0	35.7	1.8	17.5	15.8
14/Jun/2006	28/Jun/2006	6.3	71.3	142.1	38.9	105.5	34.2	207.3	97.8	12.6	<1.0	58.6	0.5	64.6	3.9
28/Jun/2006	12/Jul/2006	6.3	52.9	106.8	77.9	20.1	13.3	162.2	20.1	8.3	55.4	50.5	0.6	34.9	18.3
12/Jul/2006	25/Jul/2006	7.0	682.2	280.5	5280.4	421.1	118.0	617.2	889.5	1115.7	145.3	631.5	0.1	895.0	2.7
25/Jul/2006	09/Aug/2006	6.3	69.3	44.3	46.9	42.2	22.5	149.2	41.3	9.9	116.6	64.2	0.5	35.5	77.4
09/Aug/2006	22/Aug/2006	4.7	25.6	17.6	24.8	45.2	11.0	7.6	49.3	2.4	<1.0	20.2	22.4	15.0	105.1
22/Aug/2006	06/Sep/2006	4.8	30.2	37.1	42.6	19.2	4.8	13.5	21.5	3.6	<1.0	27.9	17.0	15.1	28.2
06/Sep/2006	19/Sep/2006	4.6	47.6	76.4	83.8	13.9	4.8	35.6	13.6	2.8	<1.0	45.9	25.1	24.2	32.6
19/Sep/2006	04/Oct/2006	5.8	22.1	22.0	28.6	23.1	3.6	15.6	22.9	3.9	<1.0	19.3	1.5	8.7	32.6
04/Oct/2006	18/Oct/2006	5.2	33.1	26.8	42.1	28.0	6.7	16.4	30.2	2.1	1.2	29.7	6.0	14.0	14.6
18/Oct/2006	01/Nov/2006	5.1	28.9	21.1	37.8	59.5	12.0	10.0	64.9	3.0	1.6	21.8	7.6	14.6	18.1
01/Nov/2006	15/Nov/2006	4.7	67.9	41.0	82.4	153.0	28.7	30.9	144.3	5.7	<1.0	49.5	20.0	-	10.7
15/Nov/2006	28/Nov/2006	5.6	20.5	14.4	32.1	58.0	10.4	7.2	59.6	2.6	<1.0	13.6	2.6	13.2	40.2
28/Nov/2006	12/Dec/2006	5.7	43.3	21.4	48.3	143.9	27.8	15.0	165.1	4.1	<1.0	26.0	2.2	29.9	13.3
12/Dec/2006	20/Dec/2006	4.7	60.2	55.0	78.7	91.9	21.4	19.0	101.7	6.6	<1.0	49.1	20.0	-	4.3
20/Dec/2006	10/Jan/2007	5.8	64.8	33.8	88.0	79.7	16.6	16.2	93.5	6.7	4.0	55.2	1.6	28.1	18.1
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5004			37.1	35.1	47.6	50.3	11.5	21.3	53.3	3.3	0.7	31.1	11.3		584.8

Preston Montford

2006

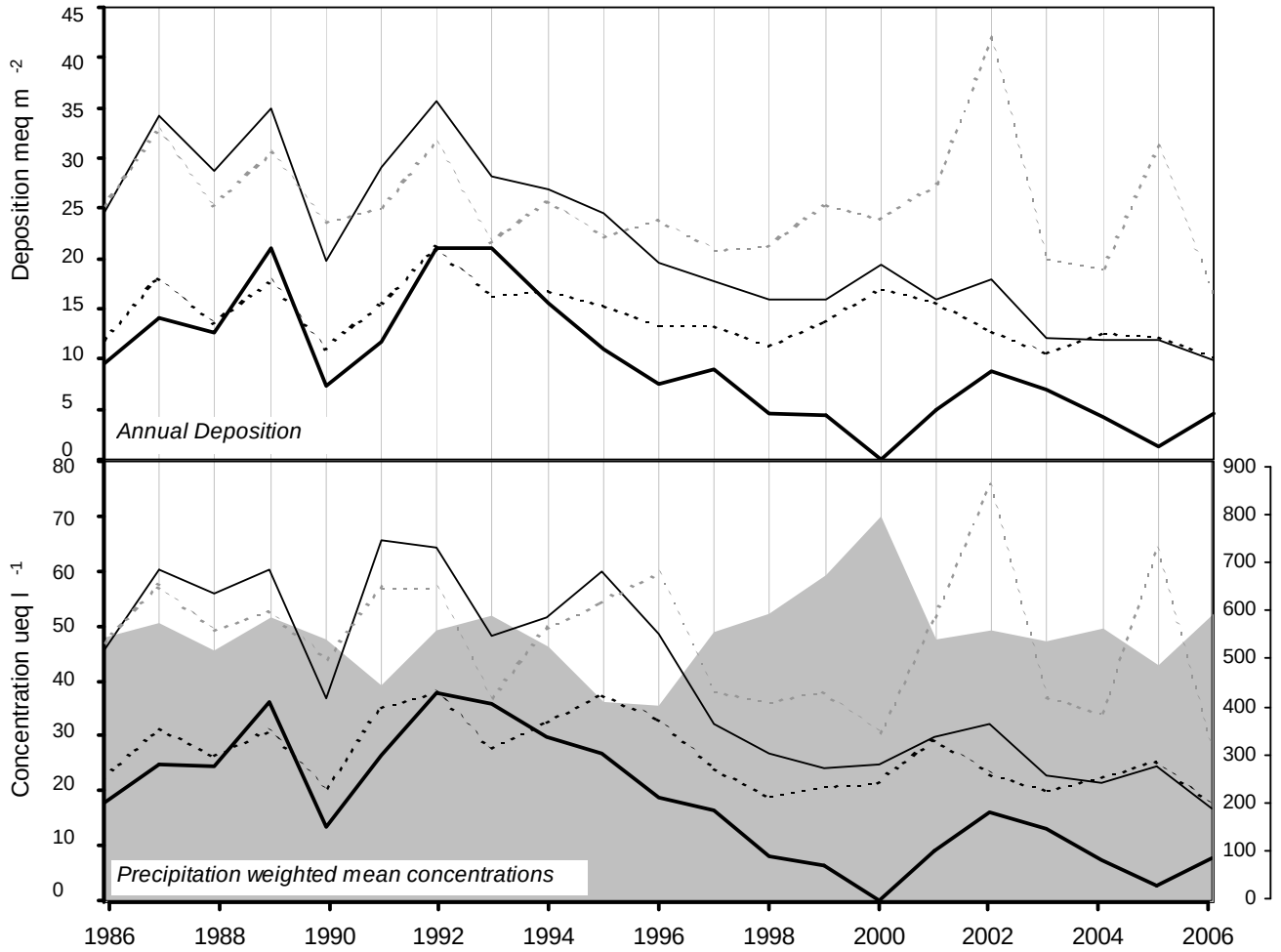
Site Code:	**5023**
Easting:	**3432**
Northing:	**3143**
Latitude:	**52 43 23 N**
Longitude:	**02 50 17 W**
Altitude (m):	**70**
Rainfall (mm):	**695**

[30 year mean 1940 - 1971]

Site Environment:
Field adjacent to Study Centre

Other measurements:
Met

Site Operator:
Field Studies Council



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

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

hydrogen ion
-1.17 ueq/l (-3.85 %/year): 20 years' data
++ Moderately strong trend detected

non-marine sulphate
-2.20 ueq/l (-3.53 %/year): 21 years' data
+++ Strong trend detected

nitrate
-0.43 ueq/l (-1.39 %/year): 21 years' data
- No significant trend detected

ammonium
-0.69 ueq/l (-1.30 %/year): 21 years' data
- No significant trend detected

(5023) Preston Montford

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
08/Jan/2006	22/Jan/2006	6.1	30.1	24.5	57.4	52.4	5.6	6.0	49.5	12.0	<1.0	23.8	0.8	16.2	9.0
22/Jan/2006	05/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
05/Feb/2006	19/Feb/2006	6.2	64.2	30.0	83.6	134.5	20.8	21.2	150.7	9.6	<1.0	48.0	0.6	31.7	10.6
19/Feb/2006	19/Mar/2006	5.4	41.0	24.8	53.3	66.2	14.5	12.4	68.1	2.9	<1.0	33.0	4.0	19.2	45.0
19/Mar/2006	02/Apr/2006	5.8	22.6	19.6	40.4	63.0	13.0	8.4	61.2	4.5	<1.0	15.0	1.8	15.2	27.5
02/Apr/2006	16/Apr/2006	6.1	23.7	11.9	37.2	92.3	17.6	14.3	78.1	8.2	<1.0	12.6	0.7	17.8	11.3
16/Apr/2006	30/Apr/2006	5.9	19.9	17.0	37.8	36.2	6.5	6.5	32.7	2.6	<1.0	15.6	1.2	10.0	15.5
30/Apr/2006	14/May/2006	4.6	69.7	80.6	101.0	11.6	6.6	29.7	13.3	10.5	<1.0	68.3	27.5	28.2	32.9
14/May/2006	28/May/2006	5.0	10.6	7.7	7.8	16.1	4.8	2.8	18.4	2.7	<1.0	8.7	9.5	7.7	53.7
28/May/2006	11/Jun/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
11/Jun/2006	25/Jun/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/Jun/2006	02/Jul/2006	6.8	82.8	4.3	1477.5	47.4	10.5	17.2	40.5	94.8	145.3	77.1	0.2	210.0	10.0
02/Jul/2006	09/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
09/Jul/2006	23/Jul/2006	5.9	41.1	36.1	16.3	43.3	11.6	45.5	22.7	19.8	<1.0	35.8	1.3	17.2	6.8
23/Jul/2006	06/Aug/2006	5.9	20.4	11.5	<0.7	71.0	15.9	1.1	70.3	5.6	<1.0	11.9	1.1	16.3	17.3
06/Aug/2006	21/Aug/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
21/Aug/2006	03/Sep/2006	4.7	11.9	15.5	<0.7	11.0	5.3	14.6	13.1	0.8	<1.0	10.6	20.9	7.4	69.3
03/Sep/2006	17/Sep/2006	5.7	7.2	6.6	17.1	9.7	1.5	9.5	6.3	5.7	<1.0	6.1	1.9	5.3	15.4
17/Sep/2006	01/Oct/2006	5.5	14.0	10.6	12.8	32.7	5.5	8.4	33.3	4.2	<1.0	10.1	3.1	8.3	25.5
01/Oct/2006	15/Oct/2006	5.1	19.9	25.6	23.8	35.6	7.3	17.2	41.9	5.1	<1.0	15.7	7.9	11.1	28.2
15/Oct/2006	29/Oct/2006	4.9	22.8	19.6	23.1	24.4	5.8	8.8	25.5	1.4	1.4	19.8	11.5	11.4	42.9
29/Oct/2006	12/Nov/2006	4.7	32.4	9.9	56.0	105.9	14.2	13.7	113.4	10.5	1.9	19.6	20.0	-	8.4
12/Nov/2006	26/Nov/2006	6.1	13.3	5.2	19.2	63.2	7.3	5.0	69.4	18.8	1.4	5.7	0.9	13.7	46.9
26/Nov/2006	10/Dec/2006	5.7	35.3	4.3	26.5	274.6	54.7	17.3	293.2	9.7	<1.0	2.2	2.2	44.9	40.6
10/Dec/2006	23/Dec/2006	5.6	18.0	8.4	20.1	55.3	6.7	5.0	57.3	7.4	<1.0	11.4	2.6	12.1	26.0
23/Dec/2006	08/Jan/2007	5.5	19.6	6.6	21.8	112.2	20.2	6.6	122.2	5.7	<1.0	6.1	3.0	20.8	43.8
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5023			24.3	17.6	27.7	62.7	12.4	11.2	66.0	6.2	0.6	16.7	7.8		587.1

Bottesford

2006

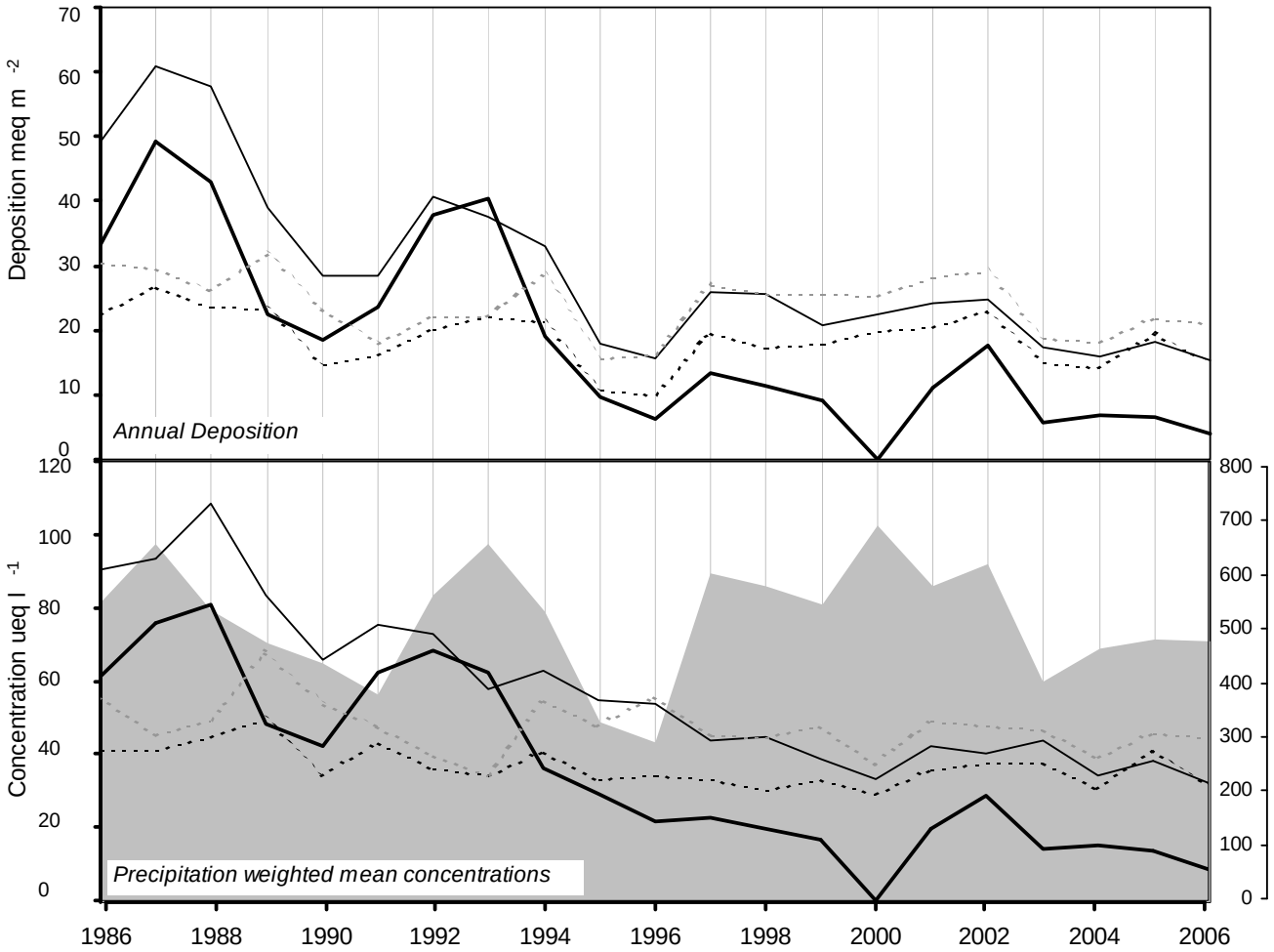
Site Code:	**5121**
Easting:	**4797**
Northing:	**3376**
Latitude:	**52 55 46 N**
Longitude:	**00 48 51 W**
Altitude (m):	**32**
Rainfall (mm):	**561**

[30 year mean 1940 - 1971]

Site Environment:
Rural pasture

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

Site Operator:
E.ON



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

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

hydrogen ion
-3.25 ueq/l (-4.70 %/year): 20 years' data
++++ Very strong trend detected

non-marine sulphate
-3.28 ueq/l (-3.63 %/year): 21 years' data
++++ Very strong trend detected

nitrate
-0.46 ueq/l (-1.11 %/year): 21 years' data
++++ Very strong trend detected

ammonium
-0.46 ueq/l (-0.88 %/year): 21 years' data
++++ Very strong trend detected

(5121) Bottesford

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
20/Jan/2006	07/Feb/2006	-	214.3	97.7	166.6	432.5	61.8	89.4	429.3	12.7	<1.0	162.2	-	-	1.6
07/Feb/2006	24/Feb/2006	5.1	44.3	30.1	57.4	92.5	20.4	18.7	85.4	3.0	<1.0	33.2	7.9	22.4	26.6
24/Feb/2006	02/Mar/2006	5.6	59.1	34.0	53.3	169.7	30.8	29.7	178.9	4.3	<1.0	38.7	2.7	34.4	7.3
07/Mar/2006	24/Apr/2006	5.0	43.6	29.8	46.7	59.9	13.8	15.3	65.3	2.8	<1.0	36.4	10.2	19.7	60.6
24/Apr/2006	22/May/2006	5.2	43.7	42.2	61.7	18.7	8.4	23.9	23.5	3.5	<1.0	41.4	6.2	17.0	54.1
22/May/2006	06/Jun/2006	4.6	22.0	19.0	26.2	21.4	13.3	19.0	21.7	2.2	<1.0	19.5	24.5	18.2	15.9
06/Jun/2006	26/Jun/2006	6.1	115.9	135.4	179.8	35.4	23.0	95.3	28.7	17.3	8.4	111.6	0.8	42.8	6.7
26/Jun/2006	21/Jul/2006	4.2	85.1	97.0	13.2	34.2	21.1	132.6	29.1	11.3	<1.0	81.0	67.6	45.0	9.0
21/Jul/2006	22/Aug/2006	5.6	40.9	37.3	54.5	13.9	6.7	22.8	16.1	5.6	<1.0	39.2	2.4	12.5	88.1
22/Aug/2006	04/Sep/2006	5.6	9.7	10.1	35.0	16.6	3.6	9.3	9.0	3.2	<1.0	7.7	2.6	8.6	18.5
04/Sep/2006	21/Sep/2006	5.0	51.3	52.9	54.6	18.0	8.1	40.4	13.2	4.7	<1.0	49.1	9.3	17.3	10.6
21/Sep/2006	04/Oct/2006	5.2	14.9	14.2	9.0	15.8	3.1	6.2	13.6	2.5	<1.0	13.0	6.5	6.0	51.6
04/Oct/2006	31/Oct/2006	5.1	31.0	28.1	36.5	45.8	9.1	23.3	43.1	2.4	<1.0	25.4	8.7	13.1	44.0
31/Oct/2006	14/Nov/2006	4.7	86.6	34.8	103.5	145.9	28.1	39.7	152.1	10.2	1.9	69.0	20.0	-	3.6
14/Nov/2006	30/Nov/2006	5.4	17.3	11.8	26.0	34.8	13.0	5.9	39.4	1.5	1.8	13.1	3.9	9.8	39.0
30/Nov/2006	13/Dec/2006	4.9	36.2	12.6	26.1	144.3	30.8	19.3	162.8	5.6	2.2	18.8	11.5	28.8	11.5
13/Dec/2006	03/Jan/2007	4.9	31.6	23.4	48.5	30.6	7.1	6.5	33.1	2.4	<1.0	28.0	14.1	14.5	26.0
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5121			36.9	31.0	44.5	39.7	10.9	20.9	41.0	3.8	0.8	32.2	8.4		474.8

Llyn Llagi

2006

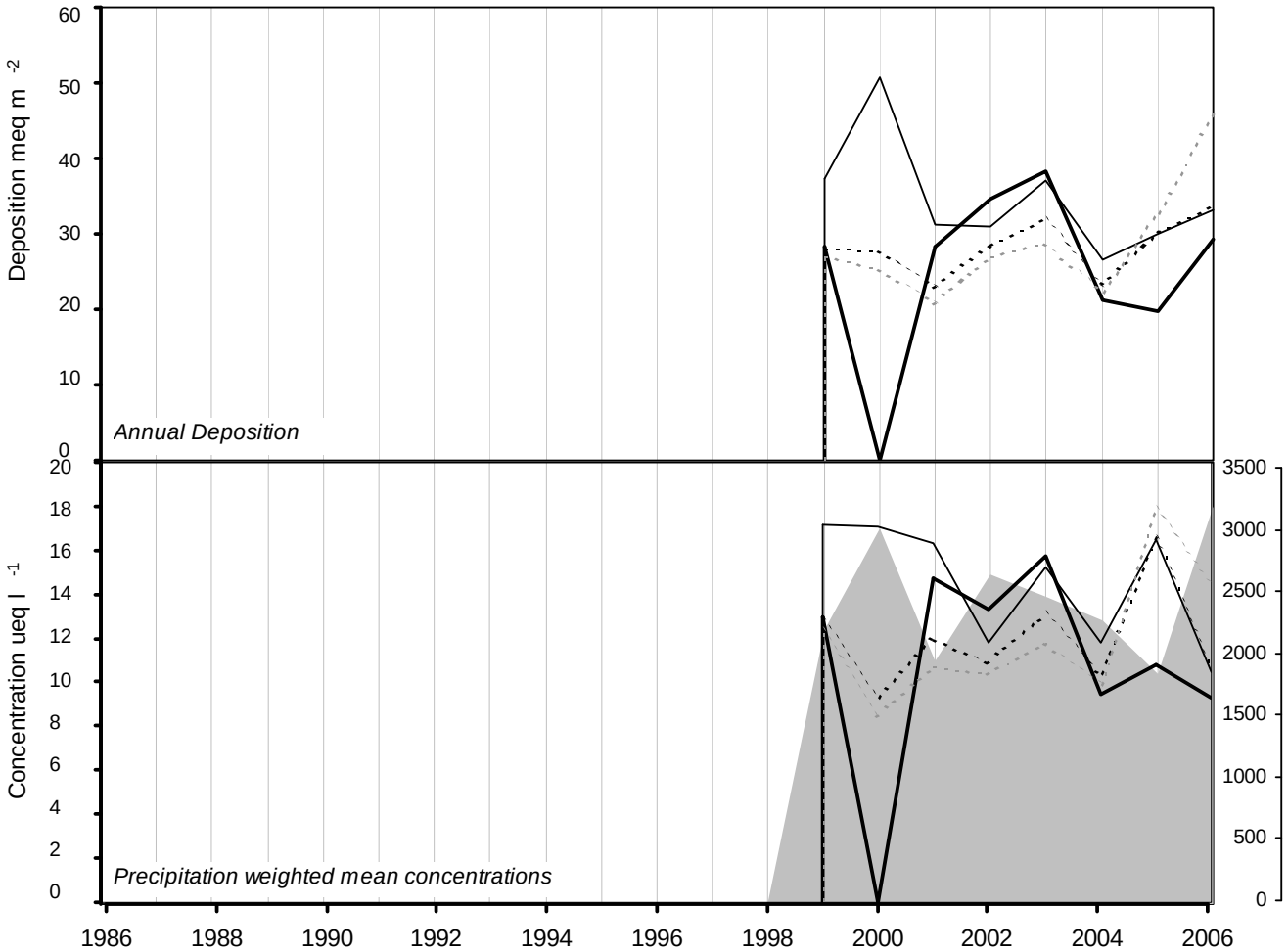
Site Code:	**5160**
Easting:	**2647**
Northing:	**3483**
Latitude:	**53 01 48 N**
Longitude:	**04 01 82 W**
Altitude (m):	**380**
Rainfall (mm):	**-**

[30 year mean 1940 - 1971]

Site Environment:
Grassland and moorland

Other measurements:
UKAWMN, Lakewater chemistry.

Site Operator:
Centre for Ecology and Hydrology (Bangor)



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

long-term trends in concentration (+x = increase; -x = decrease)
hydrogen ion
non-marine sulphate
nitrate
ammonium

(5160) Llyn Llagi

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
09/Jan/2006	23/Jan/2006	5.0	18.9	10.7	8.7	54.3	11.0	5.1	55.4	1.6	<1.0	12.4	10.5	13.4	228.4
23/Jan/2006	06/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
06/Feb/2006	20/Feb/2006	5.0	25.4	21.6	24.8	99.2	19.1	1.1	109.5	0.4	<1.0	13.4	9.5	22.2	148.2
20/Feb/2006	06/Mar/2006	5.0	37.0	20.7	25.9	147.1	32.8	12.4	168.1	3.7	<1.0	19.2	10.0	29.7	29.7
06/Mar/2006	21/Mar/2006	5.1	24.7	13.5	19.5	93.0	18.9	6.1	101.3	2.1	<1.0	13.5	7.6	19.2	138.0
21/Mar/2006	03/Apr/2006	5.5	25.8	10.7	13.1	184.8	39.0	9.5	176.7	3.7	<1.0	3.5	3.2	28.5	241.6
03/Apr/2006	19/Apr/2006	5.8	27.0	9.3	25.3	128.3	24.3	12.0	125.9	3.3	<1.0	11.6	1.5	21.9	89.6
19/Apr/2006	03/May/2006	5.5	32.1	19.1	44.8	44.0	23.4	7.2	41.8	4.4	<1.0	26.8	2.9	6.9	59.4
03/May/2006	15/May/2006	4.7	54.6	47.2	74.6	27.3	7.7	14.2	25.3	2.3	<1.0	51.3	20.0	22.8	26.4
15/May/2006	31/May/2006	5.7	21.3	6.6	8.8	90.2	19.9	10.4	86.7	2.5	<1.0	10.4	2.1	5.1	192.8
31/May/2006	12/Jun/2006	6.2	114.7	89.8	373.4	59.4	17.4	35.6	57.0	57.2	205.0	107.6	0.6	66.9	7.4
12/Jun/2006	26/Jun/2006	4.9	36.5	15.8	23.0	90.6	25.9	18.2	84.7	3.2	<1.0	25.6	12.6	20.2	69.3
26/Jun/2006	10/Jul/2006	6.5	44.0	21.5	40.5	79.7	17.6	23.4	81.1	3.4	64.4	34.4	0.3	29.0	70.1
10/Jul/2006	24/Jul/2006	6.3	73.4	52.5	176.9	63.9	14.3	13.2	55.5	29.4	67.9	65.7	0.5	38.3	14.7
24/Jul/2006	07/Aug/2006	4.9	30.4	11.4	5.8	115.4	24.7	12.5	117.3	5.5	2.7	16.5	13.2	22.7	33.6
07/Aug/2006	21/Aug/2006	4.6	30.0	26.1	35.8	28.0	7.0	5.4	31.1	2.0	<1.0	26.7	25.1	13.8	98.2
21/Aug/2006	04/Sep/2006	4.9	17.2	6.5	3.7	45.1	9.1	8.0	48.6	1.6	<1.0	11.8	12.9	10.6	287.7
04/Sep/2006	18/Sep/2006	4.5	38.6	21.2	19.6	39.8	8.7	11.5	38.8	1.6	<1.0	33.8	34.7	18.7	52.4
18/Sep/2006	02/Oct/2006	5.0	17.6	9.6	7.3	75.2	11.8	7.8	71.0	4.1	<1.0	8.6	11.0	12.2	79.3
02/Oct/2006	16/Oct/2006	5.0	22.1	10.6	8.9	97.4	18.9	13.0	109.0	4.1	<1.0	10.4	10.5	15.5	144.2
16/Oct/2006	30/Oct/2006	4.9	19.1	11.8	16.4	62.1	13.2	7.0	68.1	2.3	<1.0	11.6	14.1	13.8	209.9
30/Oct/2006	13/Nov/2006	5.2	34.2	15.8	43.9	152.3	29.5	8.4	148.4	3.5	<1.0	15.9	5.8	26.0	102.1
13/Nov/2006	27/Nov/2006	5.2	27.3	4.0	11.5	190.0	38.3	10.5	202.6	3.7	<1.0	4.4	5.8	30.7	192.7
27/Nov/2006	13/Dec/2006	5.2	41.3	5.1	5.5	337.2	72.3	15.6	360.2	5.2	<1.0	0.7	6.6	51.8	318.7
13/Dec/2006	08/Jan/2007	5.1	29.4	5.1	7.1	228.3	46.3	9.7	226.0	3.0	<1.0	1.9	8.5	33.6	320.9
						Precipitation<weighted annual means for site(samples containing phosphate are excluded)									Total rainfall
5160			26.8	10.6	14.5	135.5	28.4	9.4	139.6	3.0	0.5	10.5	9.3		3155.2

Llyn Llydaw

2006

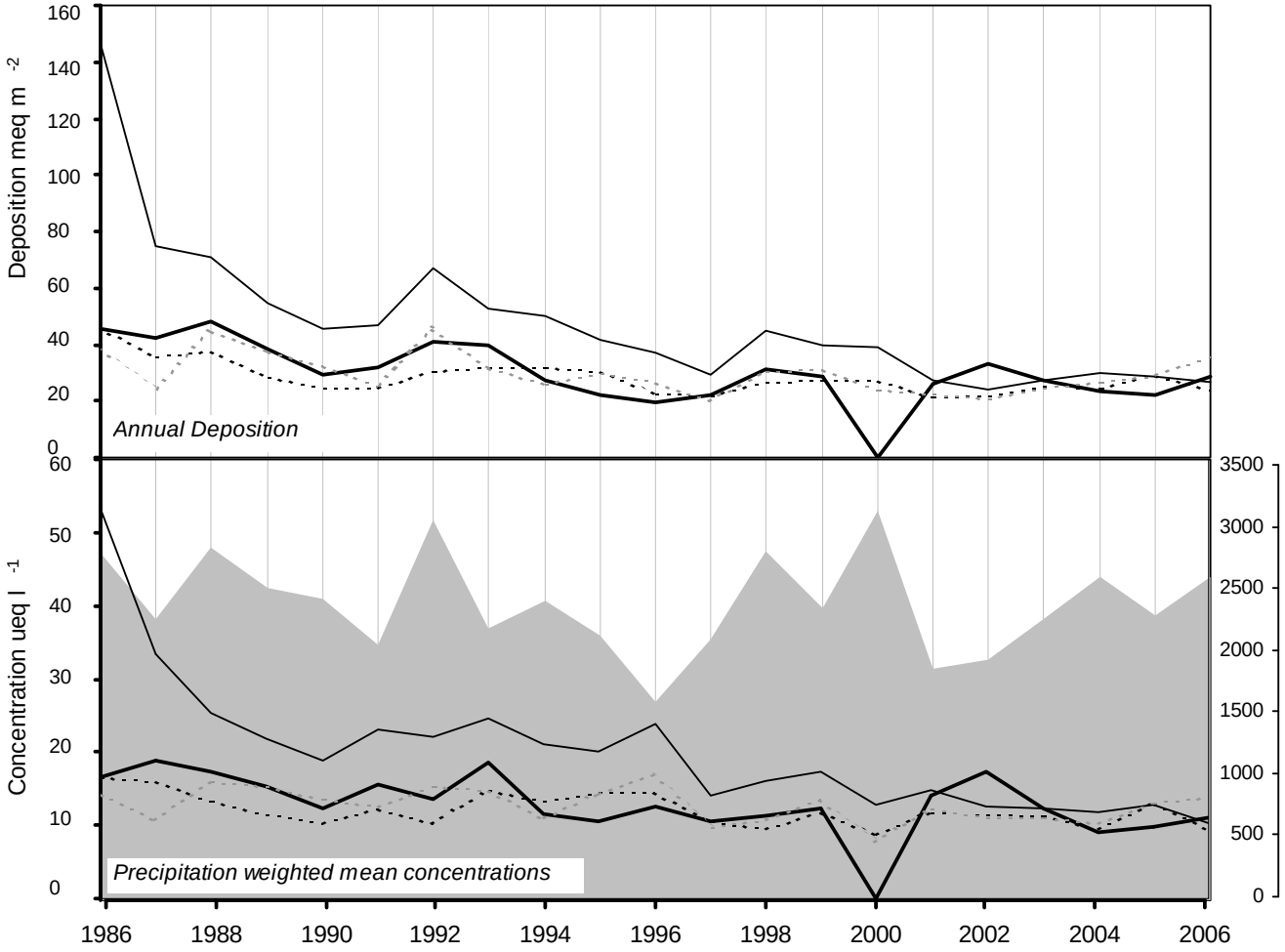
Site Code:	**5153**
Easting:	**2638**
Northing:	**3549**
Latitude:	**53 04 35 N**
Longitude:	**04 01 42 W**
Altitude (m):	**490**
Rainfall (mm):	**2417**

[30 year mean 1940 - 1971]

Site Environment:
Very open moorland in Snowdon Horseshoe

Other measurements:
DT

Site Operator:
Countryside Council for Wales



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

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

hydrogen ion
-0.30 ueq/l (-1.80 %/year): 20 years' data
++ Moderately strong trend detected

non-marine sulphate
-1.20 ueq/l (-3.76 %/year): 21 years' data
+++ Strong trend detected

nitrate
-0.18 ueq/l (-1.32 %/year): 21 years' data
+ Significant trend detected

ammonium
-0.10 ueq/l (-0.76 %/year): 21 years' data
- No significant trend detected

(5153) Llyn Llydaw

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
11/Jan/2006	25/Jan/2006	4.8	24.2	13.9	15.8	67.9	14.8	5.7	66.1	2.3	<1.0	16.0	14.8	16.5	82.9
25/Jan/2006	08/Feb/2006	5.6	56.8	61.0	67.8	144.9	25.0	14.0	138.5	7.7	<1.0	39.3	2.7	34.6	10.0
08/Feb/2006	22/Feb/2006	5.3	11.5	9.7	18.1	47.5	10.2	6.2	50.5	1.3	<1.0	5.8	4.9	8.9	116.2
22/Feb/2006	08/Mar/2006	5.5	20.6	14.2	13.6	67.4	12.9	10.3	65.1	3.6	<1.0	12.5	2.9	12.7	60.0
08/Mar/2006	22/Mar/2006	5.2	32.5	14.9	26.5	113.8	25.0	13.0	113.4	2.9	<1.0	18.8	6.6	22.4	93.5
22/Mar/2006	05/Apr/2006	5.6	18.4	8.7	9.6	55.1	10.6	3.2	93.5	1.5	15.6	11.7	2.7	14.8	260.6
05/Apr/2006	19/Apr/2006	5.7	19.6	7.3	22.2	72.5	14.8	8.6	69.5	2.7	<1.0	10.8	2.0	12.0	97.8
19/Apr/2006	03/May/2006	5.1	25.1	15.9	21.2	48.7	11.0	16.3	56.9	2.5	<1.0	19.3	7.4	13.1	33.9
03/May/2006	17/May/2006	4.6	68.1	72.9	102.7	24.9	7.0	18.1	24.6	9.0	<1.0	65.1	26.3	26.9	38.5
17/May/2006	31/May/2006	4.8	14.3	5.1	2.0	49.4	10.5	2.8	51.4	1.5	<1.0	8.3	14.8	12.6	199.0
31/May/2006	14/Jun/2006	5.2	62.1	90.5	82.4	49.2	17.2	59.8	34.6	8.7	11.0	56.2	6.8	30.1	4.6
14/Jun/2006	12/Jul/2006	5.2	11.7	10.3	19.5	34.2	3.0	2.0	28.3	18.6	<1.0	7.6	6.8	4.9	63.8
12/Jul/2006	26/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
26/Jul/2006	09/Aug/2006	5.0	25.2	9.2	12.9	73.3	12.9	7.5	72.2	6.5	<1.0	16.3	10.7	14.6	36.0
09/Aug/2006	23/Aug/2006	6.3	25.3	15.4	81.1	40.8	4.9	1.7	47.0	8.2	21.4	20.4	0.5	16.7	87.0
23/Aug/2006	06/Sep/2006	4.8	12.2	5.0	0.8	26.0	5.0	4.1	27.8	1.2	<1.0	9.1	15.5	6.9	193.0
06/Sep/2006	20/Sep/2006	4.8	17.7	13.1	17.2	42.7	8.6	7.1	37.8	1.2	<1.0	12.5	15.1	13.9	41.7
20/Sep/2006	04/Oct/2006	4.8	25.0	12.0	11.8	54.1	8.6	5.2	54.4	4.4	<1.0	18.5	16.2	12.1	105.4
04/Oct/2006	18/Oct/2006	5.0	23.1	15.4	27.0	49.7	11.9	22.9	50.8	2.8	<1.0	17.1	9.3	12.1	101.2
18/Oct/2006	01/Nov/2006	4.8	17.3	9.6	10.8	78.9	14.9	6.7	79.8	2.0	<1.0	7.8	15.5	14.6	149.2
01/Nov/2006	15/Nov/2006	4.8	23.1	10.3	19.1	84.8	17.2	7.9	81.4	1.9	<1.0	12.8	15.8	16.6	76.0
15/Nov/2006	29/Nov/2006	4.9	23.2	4.6	11.4	149.1	29.7	7.5	158.8	2.7	<1.0	5.3	13.8	26.0	182.5
29/Nov/2006	13/Dec/2006	5.3	24.7	3.4	9.1	189.9	37.8	10.0	201.2	3.7	<1.0	1.8	5.6	29.1	281.5
13/Dec/2006	03/Jan/2007	4.9	17.9	5.4	7.4	101.8	20.9	6.9	107.7	2.2	<1.0	5.7	11.7	17.2	250.6
					Precipitation< weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5153			20.9	9.4	13.9	87.5	17.6	8.0	90.4	3.1	0.5	10.3	11.2		2565.0

River Etherow

2006

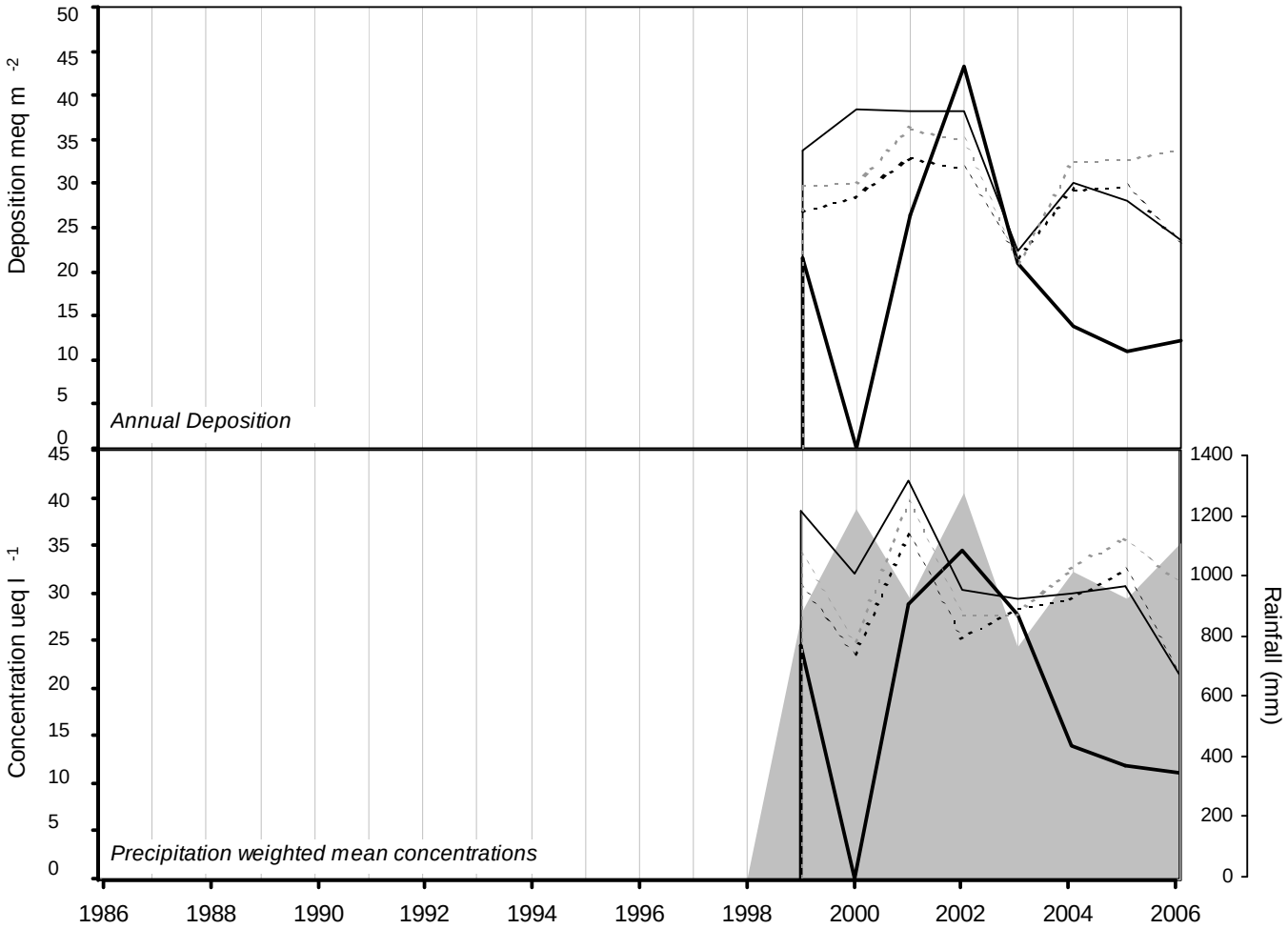
Site Code:	**5158**
Easting:	**4125**
Northing:	**3986**
Latitude:	**53 48 39 N**
Longitude:	**01 81 31 W**
Altitude (m):	**485**
Rainfall (mm):	**-**

[30 year mean 1940 - 1971]

Site Environment:
Moorland

Other measurements:
UKAWMN. Streamwater and soil chemistry

Site Operator:
ENSIS



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

long-term trends in concentration (+x = increase; -x = decrease)
hydrogen ion
non-marine sulphate
nitrate
ammonium

(5158) River Etherow

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
09/Jan/2006	22/Jan/2006	4.9	31.4	28.7	29.0	73.5	14.0	9.7	74.3	4.4	<1.0	22.6	12.9	20.5	25.6
22/Jan/2006	06/Feb/2006	3.9	430.0	375.6	564.6	320.7	60.1	98.7	306.7	15.6	<1.0	391.3	114.8	172.4	3.4
06/Feb/2006	20/Feb/2006	5.5	25.6	21.8	30.6	52.7	11.1	3.4	55.8	0.6	<1.0	19.3	3.2	15.4	39.6
20/Feb/2006	06/Mar/2006	4.5	65.8	39.4	48.6	115.5	27.7	17.3	134.7	3.5	<1.0	51.9	30.2	33.7	28.5
06/Mar/2006	19/Mar/2006	4.7	36.6	26.7	28.8	52.4	11.0	9.8	50.1	1.7	<1.0	30.3	19.5	20.7	56.1
19/Mar/2006	03/Apr/2006	5.4	22.8	18.3	30.2	50.5	10.4	9.9	47.7	1.8	<1.0	16.7	3.8	12.4	92.5
03/Apr/2006	20/Apr/2006	5.6	37.7	17.9	42.5	75.8	18.1	14.4	73.9	2.8	<1.0	28.5	2.6	21.9	47.9
20/Apr/2006	02/May/2006	4.9	73.3	64.5	70.3	79.0	22.3	62.3	68.0	5.1	<1.0	63.8	14.1	31.1	7.2
02/May/2006	16/May/2006	4.5	97.9	100.7	114.9	22.0	11.7	52.0	17.6	4.7	<1.0	95.3	35.5	40.7	24.0
16/May/2006	30/May/2006	5.1	7.7	3.7	4.8	8.7	1.5	2.0	12.2	1.7	<1.0	6.7	7.9	5.3	94.1
30/May/2006	11/Jun/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
11/Jun/2006	26/Jun/2006	6.1	34.3	27.5	60.6	43.0	9.2	16.9	41.1	2.7	<1.0	29.1	0.7	25.4	28.5
26/Jun/2006	12/Jul/2006	4.8	59.6	80.7	79.1	22.4	19.8	46.7	22.2	4.5	<1.0	56.9	14.8	25.5	7.1
12/Jul/2006	24/Jul/2006	8.0	394.2	74.8	2409.3	125.4	54.5	92.2	90.0	210.7	528.7	379.1	0.0	345.0	16.5
24/Jul/2006	08/Aug/2006	6.2	33.0	23.0	63.9	73.7	10.7	13.3	72.5	8.5	8.9	24.1	0.7	20.1	28.1
08/Aug/2006	22/Aug/2006	7.5	69.4	27.4	810.1	78.7	6.7	10.8	43.6	65.9	145.3	59.9	0.0	133.6	38.9
22/Aug/2006	05/Sep/2006	5.4	14.6	10.0	22.9	22.9	3.6	3.4	25.0	1.9	<1.0	11.9	4.1	6.9	109.0
05/Sep/2006	18/Sep/2006	4.6	9.5	9.1	54.0	19.3	7.3	24.8	2.1	3.2	<1.0	7.1	23.4	19.4	17.8
18/Sep/2006	03/Oct/2006	4.9	25.8	29.0	17.3	40.7	7.7	17.5	37.4	2.5	<1.0	20.9	12.3	11.8	42.4
03/Oct/2006	16/Oct/2006	4.9	23.5	16.6	21.8	50.7	9.5	8.8	58.2	2.4	<1.0	17.4	13.5	12.5	72.2
16/Oct/2006	30/Oct/2006	4.6	28.9	26.6	28.5	35.2	7.9	6.8	44.7	1.3	<1.0	24.7	23.4	18.2	63.3
30/Oct/2006	13/Nov/2006	5.0	42.5	25.3	41.4	197.1	42.9	18.6	192.1	4.6	<1.0	18.7	10.7	34.4	28.3
13/Nov/2006	27/Nov/2006	4.9	26.6	12.5	22.7	105.4	21.9	11.1	111.1	3.5	<1.0	14.0	11.7	21.6	63.8
27/Nov/2006	11/Dec/2006	5.5	23.1	8.0	<0.7	155.1	29.6	15.6	159.5	2.4	1.5	4.4	3.1	24.8	63.0
11/Dec/2006	27/Dec/2006	4.7	32.4	28.9	35.8	76.7	17.4	9.4	81.2	1.9	<1.0	23.1	22.4	20.8	35.2
27/Dec/2006	08/Jan/2007	5.0	27.4	9.0	20.1	134.6	26.2	9.8	144.4	3.3	<1.0	11.2	10.0	24.5	64.4
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5158			29.5	21.4	31.0	66.1	13.8	11.7	68.4	2.6	0.8	21.5	11.2		1097.4

Wardlow Hay Cop

2006

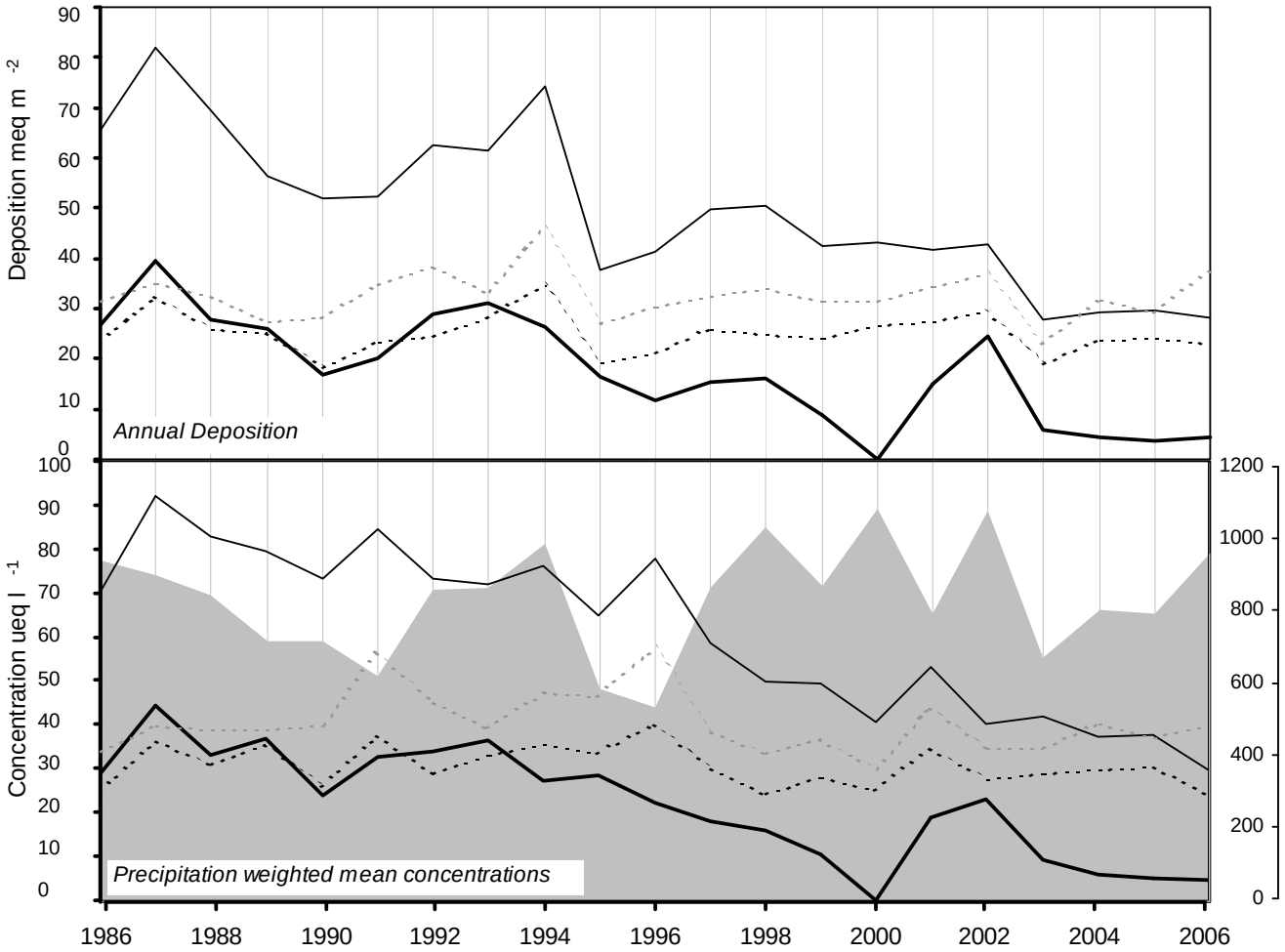
Site Code:	**5120**
Easting:	**4177**
Northing:	**3739**
Latitude:	**53 55 41 N**
Longitude:	**01 44 05 W**
Altitude (m):	**350**
Rainfall (mm):	**1081**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland

Other measurements:
DT, Met

Site Operator:
Natural England



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

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

hydrogen ion
-1.66 ueq/l (-4.24 %/year): 20 years' data
++++ Very strong trend detected

non-marine sulphate
-2.79 ueq/l (-3.13 %/year): 21 years' data
++++ Very strong trend detected

nitrate
-0.23 ueq/l (-0.69 %/year): 21 years' data
- No significant trend detected

ammonium
-0.25 ueq/l (-0.57 %/year): 21 years' data
- No significant trend detected

(5120) Wardlow Hay Cop

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
08/Jan/2006	22/Jan/2006	5.5	43.0	29.2	43.8	54.6	10.8	22.5	55.3	2.2	<1.0	36.5	3.3	18.7	27.4
22/Jan/2006	05/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
05/Feb/2006	19/Feb/2006	6.4	31.2	18.2	35.3	50.4	7.8	21.9	58.2	<0.3	<1.0	25.2	0.4	18.8	33.2
19/Feb/2006	05/Mar/2006	4.8	67.4	37.5	39.4	118.2	30.7	45.2	131.4	3.1	<1.0	53.2	14.5	31.1	32.9
05/Mar/2006	26/Mar/2006	4.7	52.2	45.2	64.4	51.5	11.9	33.1	46.9	3.5	<1.0	46.0	21.4	23.7	61.9
26/Mar/2006	02/Apr/2006	6.0	21.1	15.7	37.4	57.5	7.4	8.8	47.1	10.7	<1.0	14.2	1.1	11.9	50.6
02/Apr/2006	23/Apr/2006	6.1	46.3	19.0	51.0	64.2	13.2	34.3	59.1	4.1	<1.0	38.6	0.8	18.4	50.6
23/Apr/2006	30/Apr/2006	6.7	78.9	43.1	66.1	102.2	25.9	107.1	89.8	7.6	<1.0	66.6	0.2	35.5	5.8
30/Apr/2006	28/May/2006	6.2	31.6	24.3	37.1	17.3	11.7	24.3	17.7	1.9	<1.0	29.6	0.6	29.7	117.1
28/May/2006	11/Jun/2006	4.7	65.8	47.0	72.1	156.9	36.7	55.2	163.3	9.8	<1.0	47.0	20.0	-	2.0
11/Jun/2006	02/Jul/2006	6.0	65.6	55.9	70.2	37.6	12.2	77.3	39.1	6.3	<1.0	61.1	0.9	26.5	33.9
02/Jul/2006	09/Jul/2006	6.4	128.0	183.9	154.3	51.0	31.6	229.5	56.6	12.4	<1.0	121.9	0.4	59.7	1.8
09/Jul/2006	23/Jul/2006	6.2	53.2	61.6	65.3	20.9	17.7	114.6	13.9	8.3	<1.0	50.6	0.6	24.8	15.6
23/Jul/2006	06/Aug/2006	6.1	35.1	18.9	43.2	88.7	15.7	31.7	88.6	5.5	<1.0	24.4	0.9	22.2	27.0
06/Aug/2006	20/Aug/2006	6.2	39.5	29.7	34.3	24.6	7.9	51.9	35.5	4.8	<1.0	36.5	0.7	13.0	30.7
20/Aug/2006	10/Sep/2006	5.7	22.3	13.3	32.4	31.6	3.8	17.1	29.5	1.5	<1.0	18.5	1.9	8.9	64.3
10/Sep/2006	17/Sep/2006	4.9	30.5	27.8	39.6	6.8	2.2	16.0	3.6	1.9	<1.0	29.7	12.9	10.9	44.5
17/Sep/2006	01/Oct/2006	5.7	23.1	20.9	22.9	24.0	5.0	18.8	24.5	2.2	<1.0	20.2	1.9	8.9	41.3
01/Oct/2006	15/Oct/2006	5.1	27.4	20.6	28.8	48.6	9.3	14.6	55.7	1.9	<1.0	21.6	7.6	13.7	49.1
15/Oct/2006	29/Oct/2006	5.1	28.5	25.9	37.9	30.5	7.0	14.0	32.5	1.5	<1.0	24.8	7.8	12.6	61.7
29/Oct/2006	12/Nov/2006	6.2	76.5	22.7	57.8	253.5	51.3	106.7	254.5	6.5	13.6	45.9	0.6	53.7	13.1
12/Nov/2006	26/Nov/2006	5.8	25.5	11.1	25.9	78.2	14.4	17.1	83.5	2.1	<1.0	16.1	1.7	15.8	53.6
26/Nov/2006	10/Dec/2006	5.8	35.8	9.9	29.7	155.3	27.5	18.1	173.0	4.3	3.8	17.1	1.7	27.4	49.4
10/Dec/2006	24/Dec/2006	5.7	38.0	17.8	29.3	39.5	8.7	27.6	45.3	1.8	<1.0	33.2	1.9	13.4	33.5
24/Dec/2006	07/Jan/2007	5.4	41.9	11.5	40.7	159.2	31.8	15.5	172.8	3.7	<1.0	22.7	3.8	29.6	48.9
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5120			36.4	24.3	39.8	56.3	12.6	27.3	58.6	3.3	0.7	29.6	4.5		949.8

Driby

2006

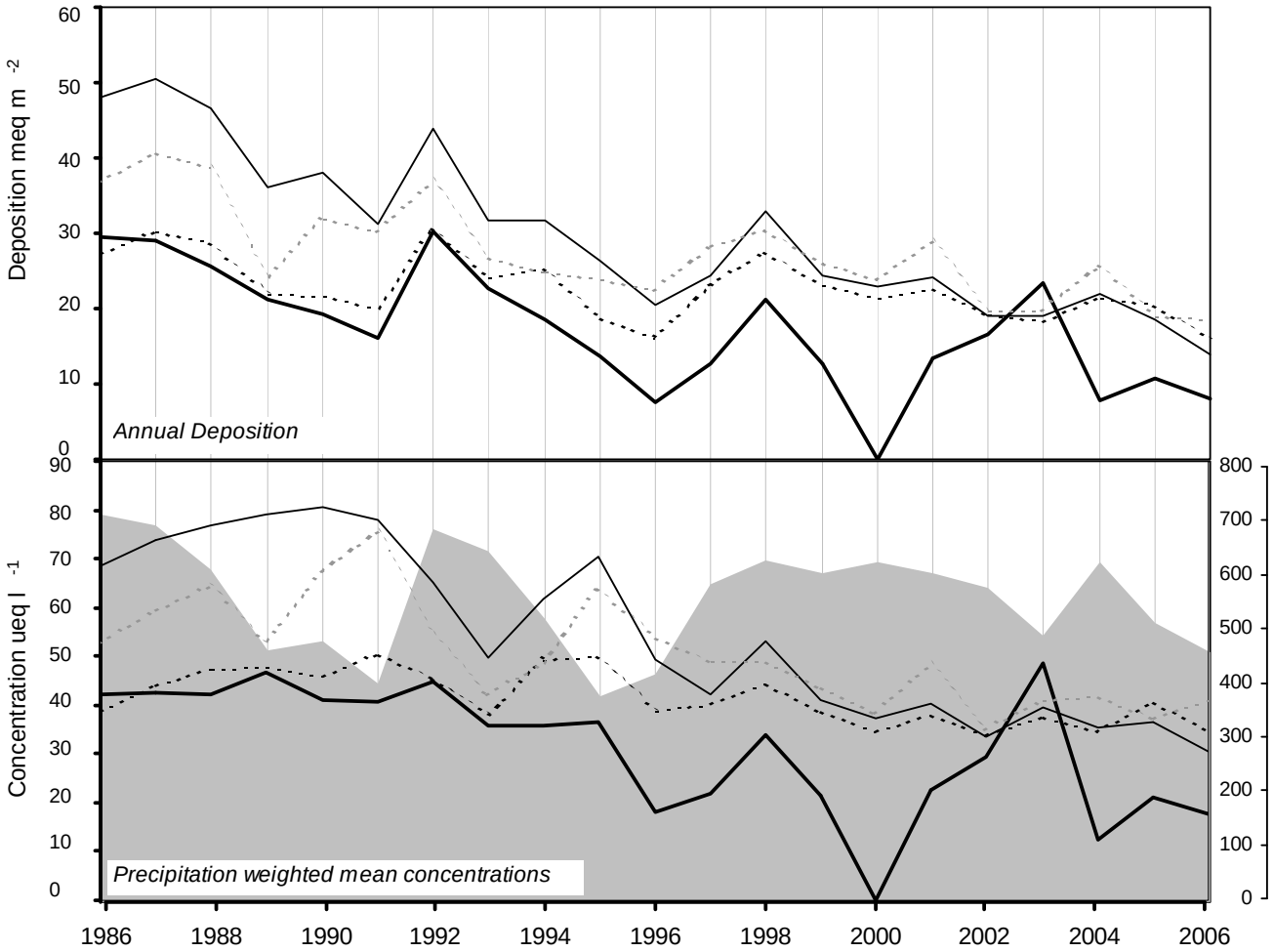
Site Code:	**5136**
Easting:	**5386**
Northing:	**3744**
Latitude:	**53 14 54 N**
Longitude:	**00 04 39 E**
Altitude (m):	**47**
Rainfall (mm):	**737**

[30 year mean 1940 - 1971]

Site Environment:
Sheep pasture

Other measurements:
DT, Met

Site Operator:
Anglian Water



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

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

hydrogen ion
-1.24 ueq/l (-2.76 %/year): 20 years' data
++ Moderately strong trend detected

non-marine sulphate
-2.57 ueq/l (-3.21 %/year): 21 years' data
++++ Very strong trend detected

nitrate
-0.56 ueq/l (-1.19 %/year): 21 years' data
++ Moderately strong trend detected

ammonium
-1.29 ueq/l (-2.03 %/year): 21 years' data
++ Moderately strong trend detected

(5136) Driby

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
11/Jan/2006	25/Jan/2006	4.7	73.6	73.3	67.2	137.6	24.2	23.6	140.2	9.3	<1.0	57.0	20.0	-	1.3
25/Jan/2006	10/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
10/Feb/2006	01/Mar/2006	4.5	55.1	34.9	32.9	163.3	39.7	27.6	163.3	4.6	<1.0	35.5	33.1	39.3	32.6
01/Mar/2006	08/Mar/2006	6.1	54.0	48.8	90.3	49.7	9.9	18.1	49.2	2.5	<1.0	48.1	0.9	21.4	7.7
08/Mar/2006	22/Mar/2006	4.9	79.6	56.6	82.1	168.0	35.3	20.9	165.2	5.8	<1.0	59.3	14.1	44.3	11.5
22/Mar/2006	05/Apr/2006	5.9	32.6	24.9	59.9	55.6	10.9	9.0	52.6	2.7	<1.0	25.9	1.2	16.6	14.6
05/Apr/2006	03/May/2006	5.7	74.5	66.3	104.8	72.4	16.0	29.8	70.4	10.8	<1.0	65.8	2.1	29.7	6.1
03/May/2006	17/May/2006	4.7	67.9	94.0	112.5	13.6	7.8	30.1	13.9	6.3	<1.0	66.2	22.4	29.0	29.8
17/May/2006	31/May/2006	5.1	15.5	17.2	18.1	26.1	11.8	10.4	25.3	1.1	<1.0	12.4	7.4	11.5	57.5
31/May/2006	14/Jun/2006	4.7	97.0	112.0	94.2	55.4	30.7	88.3	46.1	7.7	<1.0	90.3	20.0	39.5	8.7
14/Jun/2006	05/Jul/2006	6.5	84.9	61.7	13.4	71.7	20.1	18.5	97.8	2.4	19.8	76.2	0.3	59.6	5.6
05/Jul/2006	13/Jul/2006	4.3	80.4	92.5	68.9	8.3	8.2	31.1	21.6	6.5	<1.0	79.4	55.0	38.9	9.3
13/Jul/2006	16/Aug/2006	6.0	53.8	42.3	76.4	61.4	13.8	28.6	61.5	7.1	2.8	46.4	1.0	22.7	5.7
16/Aug/2006	30/Aug/2006	5.1	29.0	26.3	40.5	16.9	3.1	12.8	16.6	2.7	<1.0	27.0	8.1	10.9	32.3
30/Aug/2006	16/Sep/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
16/Sep/2006	27/Sep/2006	5.4	21.0	21.4	13.8	10.8	4.7	16.7	9.5	1.5	<1.0	19.7	4.5	7.6	38.6
27/Sep/2006	13/Oct/2006	5.9	35.0	32.6	39.2	36.3	8.6	39.6	40.2	4.0	1.4	30.7	1.3	14.3	36.9
13/Oct/2006	28/Nov/2006	4.4	25.5	24.3	21.4	61.5	13.9	13.6	62.5	1.1	<1.0	18.1	36.3	20.7	97.7
28/Nov/2006	20/Dec/2006	4.8	37.4	26.1	36.8	98.3	22.1	15.6	106.3	3.2	<1.0	25.6	15.1	23.7	26.1
20/Dec/2006	17/Jan/2007	4.9	38.3	28.4	45.8	84.8	17.8	10.6	90.1	2.6	<1.0	28.1	13.5	23.8	32.1
					Precipitation< weighted annual means for site (samples containing phosphate are excluded)										Total rainfall
5136			37.3	35.1	41.0	56.8	14.5	19.9	57.9	3.0	0.6	30.4	17.7		454.0

Thorganby

2006

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:

Site Operator:
Selby District Council

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

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

hydrogen ion
-3.95 ueq/l (-4.62 %/year): 20 years' data
++++ Very strong trend detected

non-marine sulphate
-2.94 ueq/l (-3.08 %/year): 21 years' data
++++ Very strong trend detected

nitrate
-0.60 ueq/l (-1.33 %/year): 21 years' data
++ Moderately strong trend detected

ammonium
-1.70 ueq/l (-2.26 %/year): 20 years' data
+ Significant trend detected

(5117) Thorganby

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
11/Jan/2006	25/Jan/2006	6.7	77.2	48.4	89.4	101.4	26.7	31.1	75.5	14.4	<1.0	65.0	0.2	29.6	4.8
25/Jan/2006	08/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
08/Feb/2006	22/Feb/2006	5.6	3.4	1.1	30.6	54.1	12.8	14.3	5.8	7.5	<1.0	0.0	2.8	16.2	9.9
22/Feb/2006	08/Mar/2006	5.5	43.1	27.4	48.1	110.5	25.1	19.3	126.7	2.5	<1.0	29.8	3.1	28.7	23.3
08/Mar/2006	22/Mar/2006	4.4	72.9	89.7	82.6	79.6	21.7	34.3	76.4	5.9	<1.0	63.3	44.7	44.4	16.9
22/Mar/2006	05/Apr/2006	5.9	27.5	16.3	44.0	22.9	5.6	8.0	27.1	0.8	<1.0	24.8	1.2	16.5	53.7
05/Apr/2006	19/Apr/2006	6.3	61.2	27.8	44.9	77.0	19.9	40.2	100.9	9.0	<1.0	51.9	0.5	30.3	10.1
19/Apr/2006	03/May/2006	5.9	72.1	47.1	106.5	24.2	12.7	35.9	34.4	3.8	<1.0	69.2	1.3	31.0	16.1
03/May/2006	17/May/2006	4.6	71.4	67.1	77.1	8.2	8.7	40.3	12.3	4.6	<1.0	70.5	23.4	27.9	42.9
17/May/2006	31/May/2006	5.8	52.6	14.3	59.9	43.9	16.8	14.5	38.6	7.1	18.7	47.4	1.5	15.4	53.2
31/May/2006	14/Jun/2006	6.1	122.7	153.8	48.5	55.5	49.0	276.4	59.4	25.2	<1.0	116.0	0.7	53.7	2.9
14/Jun/2006	26/Jun/2006	6.2	74.5	44.4	22.4	93.9	33.4	94.3	102.1	29.0	<1.0	63.2	0.6	36.3	5.5
26/Jun/2006	12/Jul/2006	6.0	142.3	181.0	196.9	45.6	28.9	127.3	39.9	32.7	<1.0	136.8	1.1	51.9	5.7
12/Jul/2006	26/Jul/2006	6.0	61.2	57.7	94.1	11.7	10.7	44.7	12.0	11.1	<1.0	59.8	1.0	20.7	19.9
26/Jul/2006	09/Aug/2006	6.7	119.8	17.1	387.8	195.0	34.9	46.4	137.6	88.1	111.4	96.3	0.2	92.4	33.2
09/Aug/2006	23/Aug/2006	5.1	54.9	43.7	107.9	60.7	13.3	33.1	71.1	28.3	22.3	47.6	8.5	30.1	43.6
23/Aug/2006	06/Sep/2006	5.2	20.0	13.9	<0.7	<0.9	<0.8	<1.0	14.0	<0.5	<1.0	20.1	6.8	7.2	48.6
06/Sep/2006	20/Sep/2006	5.3	62.0	43.3	76.4	21.3	9.1	41.0	15.9	6.4	<1.0	59.4	4.6	19.7	9.3
20/Sep/2006	04/Oct/2006	6.2	47.8	21.9	70.5	56.9	4.6	7.3	59.4	20.8	20.5	40.9	0.6	12.2	42.5
04/Oct/2006	03/Nov/2006	6.1	53.8	26.4	286.7	59.0	4.0	3.7	57.0	36.7	66.2	46.7	0.8	51.3	50.7
03/Nov/2006	15/Nov/2006	5.4	58.5	18.5	47.1	112.0	26.5	24.6	126.1	5.2	<1.0	45.1	4.5	27.7	12.8
15/Nov/2006	29/Nov/2006	4.7	30.6	16.6	33.3	53.3	12.3	12.0	58.0	2.1	1.7	24.1	20.0	-	24.5
29/Nov/2006	13/Dec/2006	5.0	42.3	13.3	30.7	95.4	23.1	17.5	108.5	4.3	2.5	30.8	11.0	22.7	15.4
13/Dec/2006	03/Jan/2007	5.7	66.3	29.5	92.5	48.1	7.5	8.8	57.0	19.9	46.8	60.5	2.1	23.2	32.4
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5117			47.9	37.2	52.6	41.2	12.7	26.9	46.4	4.9	0.7	44.5	9.5		577.8

High Muffles

2006

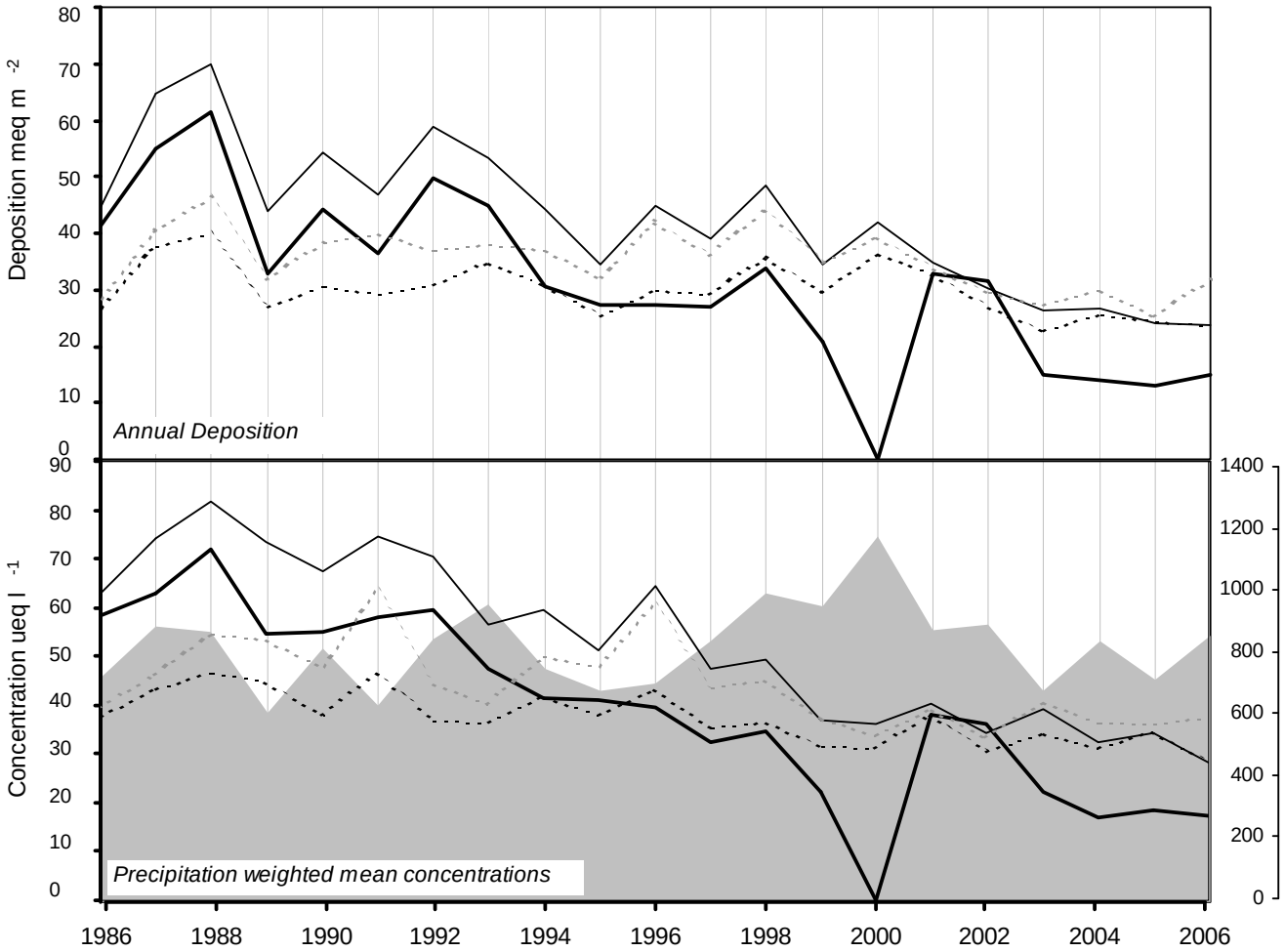
Site Code:	**5009**
Easting:	**4776**
Northing:	**4939**
Latitude:	**54 20 05 N**
Longitude:	**00 48 23 W**
Altitude (m):	**267**
Rainfall (mm):	**897**

[30 year mean 1940 - 1971]

Site Environment:
Forestry plantation

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

Site Operator:
Forest Research



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

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

hydrogen ion
-2.46 ueq/l (-3.75 %/year): 20 years' data
++++ Very strong trend detected

non-marine sulphate
-2.50 ueq/l (-3.21 %/year): 21 years' data
++++ Very strong trend detected

nitrate
-0.66 ueq/l (-1.50 %/year): 21 years' data
+++ Strong trend detected

ammonium
-0.80 ueq/l (-1.53 %/year): 21 years' data
++ Moderately strong trend detected

(5009) High Muffles

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
11/Jan/2006	25/Jan/2006	5.0	48.5	57.2	60.7	66.6	14.5	15.1	54.2	2.6	<1.0	40.5	11.0	38.5	12.1
25/Jan/2006	08/Feb/2006	5.3	59.7	49.8	33.6	225.5	41.4	40.1	230.4	8.2	<1.0	32.5	4.8	43.5	7.8
08/Feb/2006	22/Feb/2006	4.8	56.8	31.9	40.3	171.8	37.4	16.3	200.9	3.6	<1.0	36.1	14.8	40.0	21.5
22/Feb/2006	08/Mar/2006	4.5	57.8	49.3	39.3	200.2	47.7	24.5	238.2	5.9	<1.0	33.7	30.2	43.3	24.8
08/Mar/2006	22/Mar/2006	4.3	61.4	72.9	68.0	98.0	23.6	13.6	96.7	3.9	<1.0	49.6	56.2	45.5	39.9
22/Mar/2006	06/Apr/2006	5.2	27.4	25.6	41.7	42.3	9.1	5.3	41.2	1.4	<1.0	22.3	6.8	14.9	89.6
06/Apr/2006	19/Apr/2006	5.8	22.6	15.7	39.6	46.4	8.1	20.2	47.3	2.1	<1.0	17.0	1.5	23.1	17.3
19/Apr/2006	03/May/2006	5.7	81.2	60.7	118.1	58.0	17.4	37.2	58.8	5.5	<1.0	74.2	2.1	27.1	6.1
03/May/2006	17/May/2006	4.6	70.1	74.6	109.2	9.6	5.8	23.4	11.2	4.2	<1.0	69.0	22.9	26.1	52.6
17/May/2006	31/May/2006	5.0	11.4	4.8	5.2	9.4	3.3	3.7	10.9	2.0	<1.0	10.3	9.3	7.3	75.2
31/May/2006	14/Jun/2006	6.5	27.0	31.4	21.0	13.0	7.4	60.7	14.1	8.2	<1.0	25.4	0.3	35.7	9.3
14/Jun/2006	28/Jun/2006	6.1	51.0	36.1	59.1	58.4	17.8	40.1	54.0	6.7	<1.0	44.0	0.8	21.4	7.9
28/Jun/2006	12/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
12/Jul/2006	26/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
26/Jul/2006	09/Aug/2006	5.5	24.6	11.1	29.8	58.4	15.0	12.5	53.6	6.1	<1.0	17.5	3.0	12.6	56.1
09/Aug/2006	23/Aug/2006	4.6	31.8	17.9	17.0	89.2	20.2	10.5	98.4	3.1	<1.0	21.1	25.1	22.7	62.6
23/Aug/2006	07/Sep/2006	4.7	17.8	10.6	14.3	8.4	2.5	4.8	9.2	1.8	<1.0	16.8	18.6	7.5	61.1
07/Sep/2006	20/Sep/2006	4.9	73.4	63.9	77.0	29.7	11.5	40.7	20.3	5.4	0.7	69.8	14.1	24.0	4.6
20/Sep/2006	04/Oct/2006	4.6	34.4	27.7	29.3	17.7	3.2	7.5	17.3	3.6	<1.0	32.3	26.3	15.2	56.2
04/Oct/2006	18/Oct/2006	4.6	41.3	40.2	44.9	32.3	9.4	28.7	23.7	7.5	1.5	37.5	23.4	17.3	33.2
18/Oct/2006	01/Nov/2006	5.2	35.6	20.3	26.7	120.8	28.9	21.9	130.2	4.5	<1.0	21.1	5.8	23.1	56.5
01/Nov/2006	15/Nov/2006	4.7	39.3	18.9	44.5	173.2	36.5	13.6	173.6	3.9	<1.0	18.4	19.5	31.9	15.8
15/Nov/2006	29/Nov/2006	4.8	31.1	23.7	31.0	53.9	13.2	11.3	54.7	2.2	<1.0	24.6	17.8	18.0	53.2
29/Nov/2006	13/Dec/2006	4.9	44.2	16.0	41.4	172.3	37.1	13.4	187.2	4.6	<1.0	23.4	12.3	33.9	39.6
13/Dec/2006	03/Jan/2007	4.5	39.0	27.7	38.7	55.9	13.5	9.5	60.2	2.0	<1.0	32.3	34.7	20.7	43.5
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5009			36.1	28.1	37.5	65.1	15.4	13.8	68.5	3.5	0.5	28.2	17.5		846.3

Bannisdale

2006

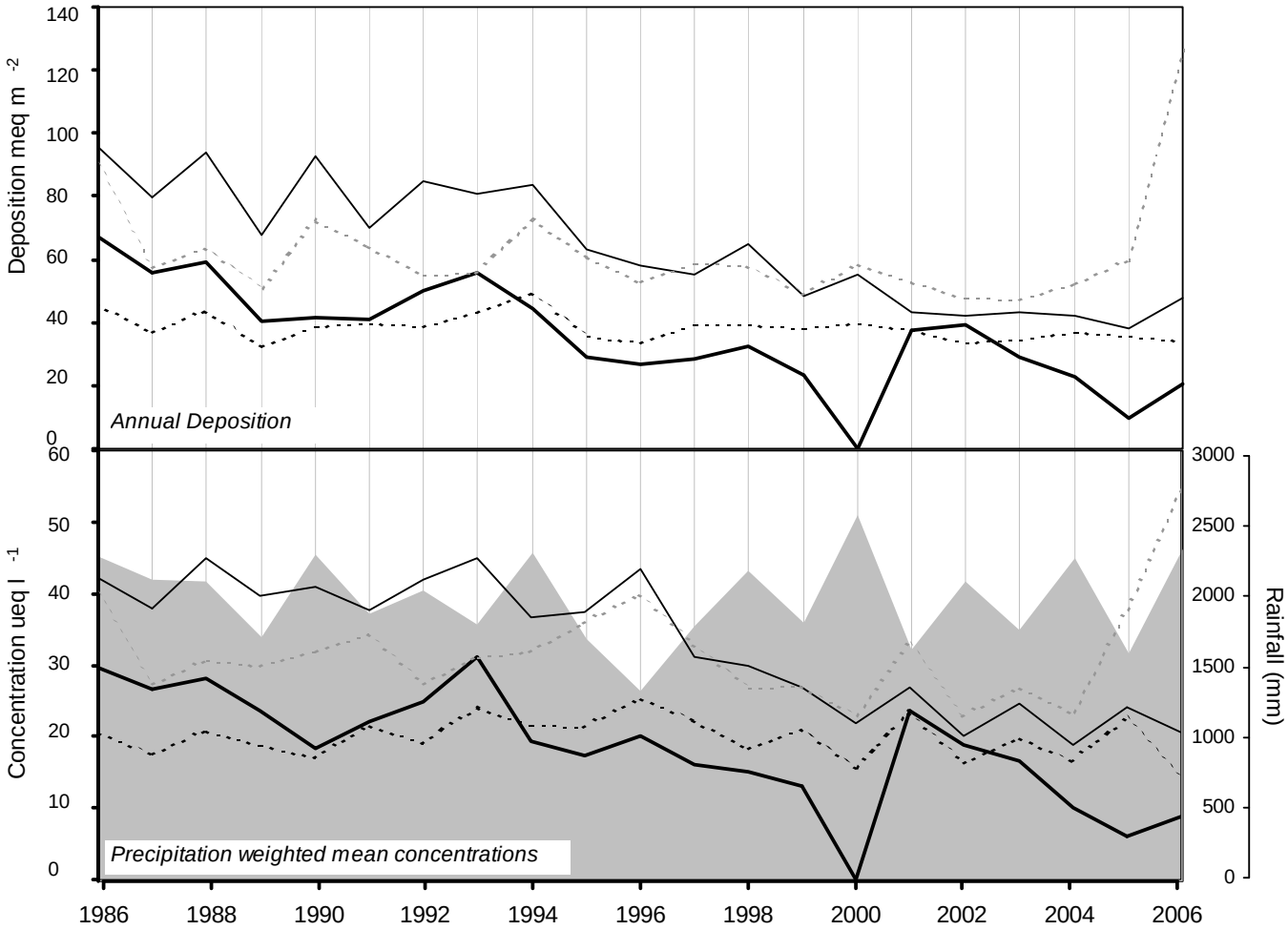
Site Code:	**5111**
Easting:	**3515**
Northing:	**5043**
Latitude:	**54 25 54 N**
Longitude:	**02 44 52 W**
Altitude (m):	**265**
Rainfall (mm):	**1972**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, sheep grazing

Other measurements:
DT

Site Operator:
Mr. R Newport



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

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

hydrogen ion
-0.89 ueq/l (-3.16 %/year): 20 years' data
+++ Strong trend detected

non-marine sulphate
-1.28 ueq/l (-2.80 %/year): 21 years' data
++++ Very strong trend detected

nitrate
-0.08 ueq/l (-0.41 %/year): 21 years' data
- No significant trend detected

ammonium
0.15 ueq/l (0.49 %/year): 21 years' data
- No significant trend detected

(5111) Bannisdale

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
11/Jan/2006	25/Jan/2006	4.7	48.6	36.1	47.8	89.1	18.7	9.4	97.0	2.3	<1.0	37.8	20.0	28.7	67.6
25/Jan/2006	08/Feb/2006	6.0	70.9	65.3	109.2	147.8	25.8	15.5	148.0	4.7	<1.0	53.1	1.1	38.9	11.3
08/Feb/2006	22/Feb/2006	5.4	39.3	24.4	49.1	119.3	23.7	4.7	143.6	2.4	<1.0	24.9	4.2	27.3	78.6
22/Feb/2006	08/Mar/2006	5.2	42.8	36.4	33.7	119.0	28.6	23.3	133.3	3.8	<1.0	28.4	7.1	27.4	21.9
08/Mar/2006	22/Mar/2006	4.7	45.2	42.1	54.6	58.3	12.4	11.5	53.6	2.2	<1.0	38.2	20.9	24.6	37.7
22/Mar/2006	05/Apr/2006	5.2	12.0	11.5	23.5	76.0	15.0	5.7	42.4	1.9	<1.0	2.9	5.8	15.9	183.8
05/Apr/2006	19/Apr/2006	6.0	3.5	1.6	14.9	14.0	3.3	1.7	22.0	0.7	<1.0	1.8	1.0	28.4	53.0
19/Apr/2006	03/May/2006	6.1	43.6	30.3	76.7	39.8	7.6	21.6	38.0	4.9	<1.0	38.9	0.8	17.8	25.7
03/May/2006	17/May/2006	4.6	48.4	47.9	71.4	12.2	4.9	15.0	11.9	1.8	<1.0	46.9	22.9	22.0	46.3
17/May/2006	31/May/2006	5.0	22.0	12.0	13.2	55.4	13.1	6.8	53.1	4.1	<1.0	15.3	9.5	13.7	103.2
31/May/2006	14/Jun/2006	5.7	37.8	39.6	54.5	13.7	6.5	30.3	11.4	4.9	<1.0	36.1	1.8	15.0	17.0
14/Jun/2006	28/Jun/2006	[6.0]	[14.6]	[7.6]	[41.2]	[82.6]	[21.2]	[12.5]	[56.3]	[2.3]	[<1.0]	[4.6]	[1.0]	17.2	[73.5]
28/Jun/2006	12/Jul/2006	4.9	27.5	26.5	32.7	14.0	4.7	10.4	18.8	2.3	<1.0	25.8	12.6	12.5	65.0
12/Jul/2006	26/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
26/Jul/2006	09/Aug/2006	5.6	23.0	10.6	22.9	67.8	7.0	5.8	54.1	28.5	<1.0	14.8	2.7	12.5	88.4
09/Aug/2006	23/Aug/2006	4.8	17.1	21.0	22.8	11.7	3.2	5.8	12.0	2.1	<1.0	15.7	15.1	8.1	50.4
23/Aug/2006	06/Sep/2006	5.2	19.4	8.8	15.1	33.3	4.3	2.9	33.1	3.2	<1.0	15.4	6.5	9.1	46.9
06/Sep/2006	20/Sep/2006	5.0	21.8	12.7	13.8	47.9	6.1	5.4	49.8	5.7	<1.0	16.0	10.0	9.3	126.1
20/Sep/2006	04/Oct/2006	7.1	88.5	12.9	559.3	82.0	3.0	0.8	68.4	84.6	<145.3	78.6	0.1	68.3	112.1
04/Oct/2006	18/Oct/2006	5.0	42.2	26.5	47.5	80.2	17.2	20.3	94.0	3.4	<1.0	32.5	9.1	19.5	82.0
18/Oct/2006	01/Nov/2006	4.8	22.5	13.8	18.7	87.8	17.7	5.9	97.4	2.5	<1.0	11.9	15.8	18.3	144.7
01/Nov/2006	15/Nov/2006	5.0	35.1	17.7	32.1	128.8	26.0	12.6	143.2	4.3	1.0	19.6	10.7	26.6	78.8
15/Nov/2006	29/Nov/2006	5.1	38.6	13.8	29.2	181.6	37.0	12.6	193.1	4.0	<1.0	16.7	8.9	33.2	183.3
29/Nov/2006	13/Dec/2006	4.9	11.2	1.3	20.0	303.2	63.2	15.8	87.2	6.0	<1.0	0.0	11.5	49.9	282.6
13/Dec/2006	27/Dec/2006	5.1	34.9	9.1	24.4	244.0	48.5	12.8	251.2	5.2	<1.0	5.5	8.5	39.7	79.5
27/Dec/2006	10/Jan/2007	5.3	27.1	7.3	23.2	149.1	28.1	7.5	158.5	4.1	<1.0	9.2	4.6	25.4	253.5
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5111			29.5	14.7	54.6	122.4	23.8	9.5	96.5	8.8	4.1	20.6	8.9		2313.0

Hillsborough Forest

2006

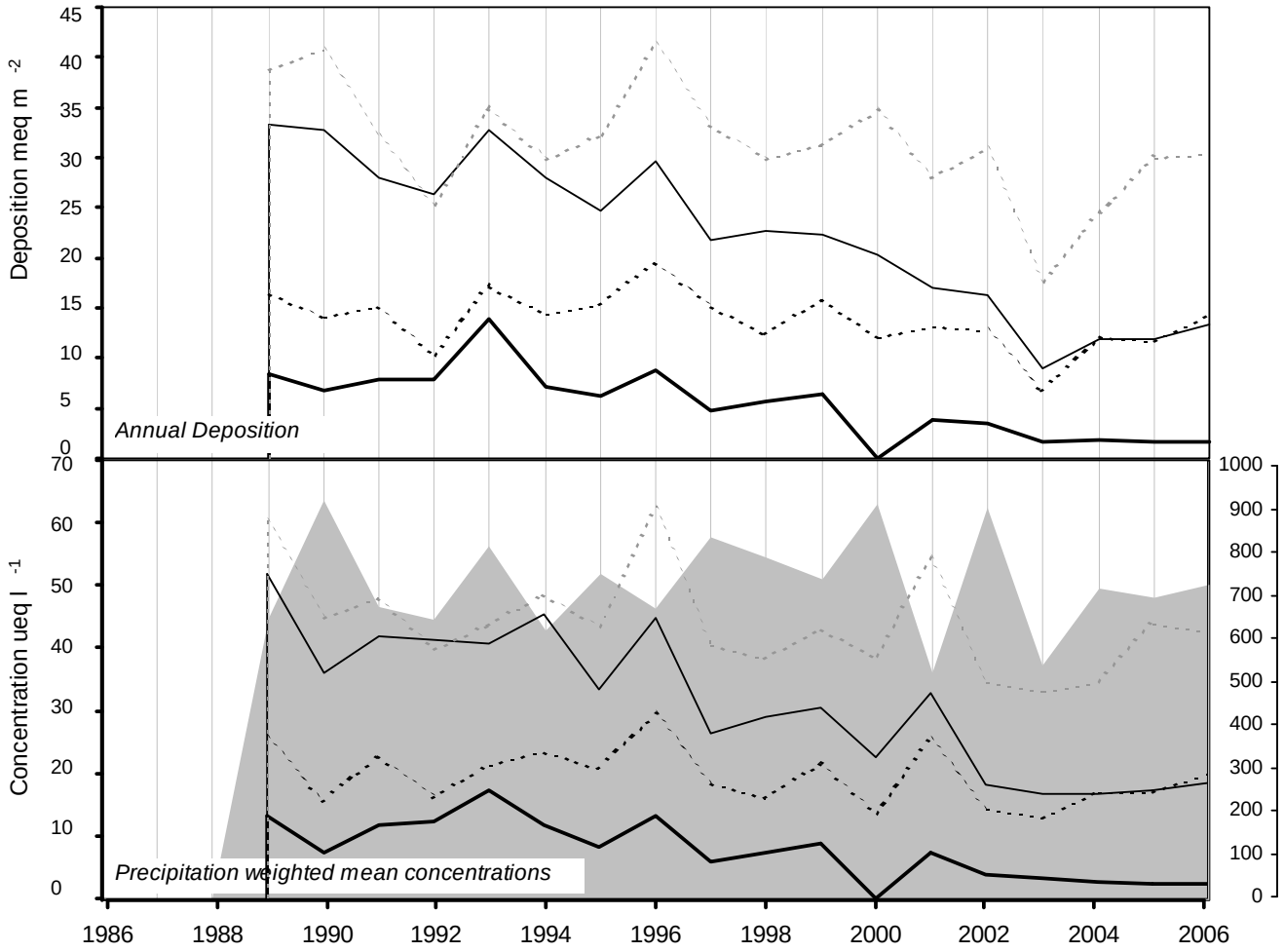
Site Code:	**5149**
Easting:	**1349**
Northing:	**5156**
Latitude:	**54 27 09 N**
Longitude:	**06 05 03 W**
Altitude (m):	**120**
Rainfall (mm):	**863**

[30 year mean 1940 - 1971]

Site Environment:
Open arable, cows graze in summer

Other measurements:
DT, HNO3 Denuder

Site Operator:
Agri-Food and Biosciences Institute, NI



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

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

hydrogen ion
-0.66 ueq/l (-4.23 %/year): 17 years' data
+++ Strong trend detected

non-marine sulphate
-1.87 ueq/l (-3.55 %/year): 18 years' data
++++ Very strong trend detected

nitrate
-0.32 ueq/l (-1.36 %/year): 18 years' data
- No significant trend detected

ammonium
-0.71 ueq/l (-1.36 %/year): 18 years' data
- No significant trend detected

(5149) Hillsborough Forest

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
11/Jan/2006	25/Jan/2006	5.8	42.8	19.3	33.3	214.0	38.1	13.4	231.3	5.0	<1.0	17.1	1.5	38.7	14.6
25/Jan/2006	09/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
09/Feb/2006	27/Feb/2006	7.3	361.3	5.9	3421.3	90.9	26.3	18.9	168.6	345.8	523.2	350.4	0.1	459.0	23.3
27/Feb/2006	08/Mar/2006	6.4	0.8	12.2	62.2	77.8	9.3	10.9	86.5	6.0	<1.0	0.0	0.4	17.2	19.3
08/Mar/2006	24/Mar/2006	6.0	36.6	29.3	54.4	100.9	19.7	20.4	97.8	3.0	<1.0	24.4	1.0	24.1	54.3
24/Mar/2006	05/Apr/2006	6.0	15.7	14.2	33.9	38.5	6.1	2.5	36.8	1.3	<1.0	11.1	1.0	9.6	54.6
05/Apr/2006	24/Apr/2006	6.1	32.8	9.9	56.8	130.7	22.2	11.2	134.6	4.2	<1.0	17.0	0.7	27.5	21.2
24/Apr/2006	03/May/2006	5.9	11.1	3.6	14.6	39.1	11.2	19.7	40.7	3.5	<1.0	6.4	1.2	15.1	19.7
03/May/2006	17/May/2006	5.9	58.8	54.9	108.8	27.6	12.4	20.7	25.7	3.2	<1.0	55.5	1.3	23.0	41.7
17/May/2006	31/May/2006	5.1	8.9	4.4	8.6	16.1	4.2	2.5	21.1	0.6	<1.0	6.9	7.4	7.2	35.7
31/May/2006	14/Jun/2006	5.0	107.7	156.6	132.4	130.5	59.8	168.4	119.6	17.8	<1.0	91.9	10.0	-	1.6
14/Jun/2006	28/Jun/2006	6.1	23.2	13.3	69.3	82.4	11.6	9.8	78.8	3.7	<1.0	13.2	0.7	18.1	19.5
28/Jun/2006	11/Jul/2006	6.1	28.6	20.4	79.8	9.4	12.9	57.9	22.9	6.4	<1.0	27.5	0.8	12.1	17.5
11/Jul/2006	26/Jul/2006	5.7	46.6	74.8	96.8	15.1	5.4	24.3	12.4	6.3	1.3	44.8	2.0	19.4	19.5
26/Jul/2006	09/Aug/2006	6.3	11.1	6.1	20.0	29.1	3.0	3.7	26.9	8.2	<1.0	7.6	0.5	6.4	58.9
09/Aug/2006	23/Aug/2006	4.0	27.9	214.9	33.5	19.8	38.9	112.4	41.1	58.7	22.8	25.5	100.0	59.6	39.0
23/Aug/2006	06/Sep/2006	5.6	12.6	7.2	19.5	28.9	4.6	12.0	31.7	0.8	<1.0	9.1	2.3	9.3	58.8
06/Sep/2006	20/Sep/2006	5.8	19.1	15.5	32.9	65.9	10.2	11.7	70.5	11.3	<1.0	11.1	1.5	12.7	19.5
20/Sep/2006	04/Oct/2006	5.3	24.2	14.5	23.7	95.8	15.7	5.9	98.6	3.6	<1.0	12.7	5.1	16.1	72.5
04/Oct/2006	19/Oct/2006	6.3	34.8	32.3	43.4	48.9	12.2	16.0	57.3	2.3	1.4	28.9	0.5	24.9	36.6
19/Oct/2006	02/Nov/2006	5.4	18.3	15.2	27.9	45.5	6.8	7.8	46.5	1.6	<1.0	12.8	4.0	9.2	48.5
02/Nov/2006	15/Nov/2006	6.5	26.4	5.4	211.0	141.8	15.1	4.4	85.6	18.8	17.8	9.3	0.3	52.5	18.8
15/Nov/2006	03/Jan/2007	5.3	53.2	34.6	81.9	174.6	35.4	11.2	191.4	4.7	<1.0	32.2	5.4	36.2	19.9
					Precipitation< weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5149			25.1	20.0	42.5	61.3	11.7	12.5	63.6	3.7	0.6	18.6	2.3		715.1

Lough Navar

2006

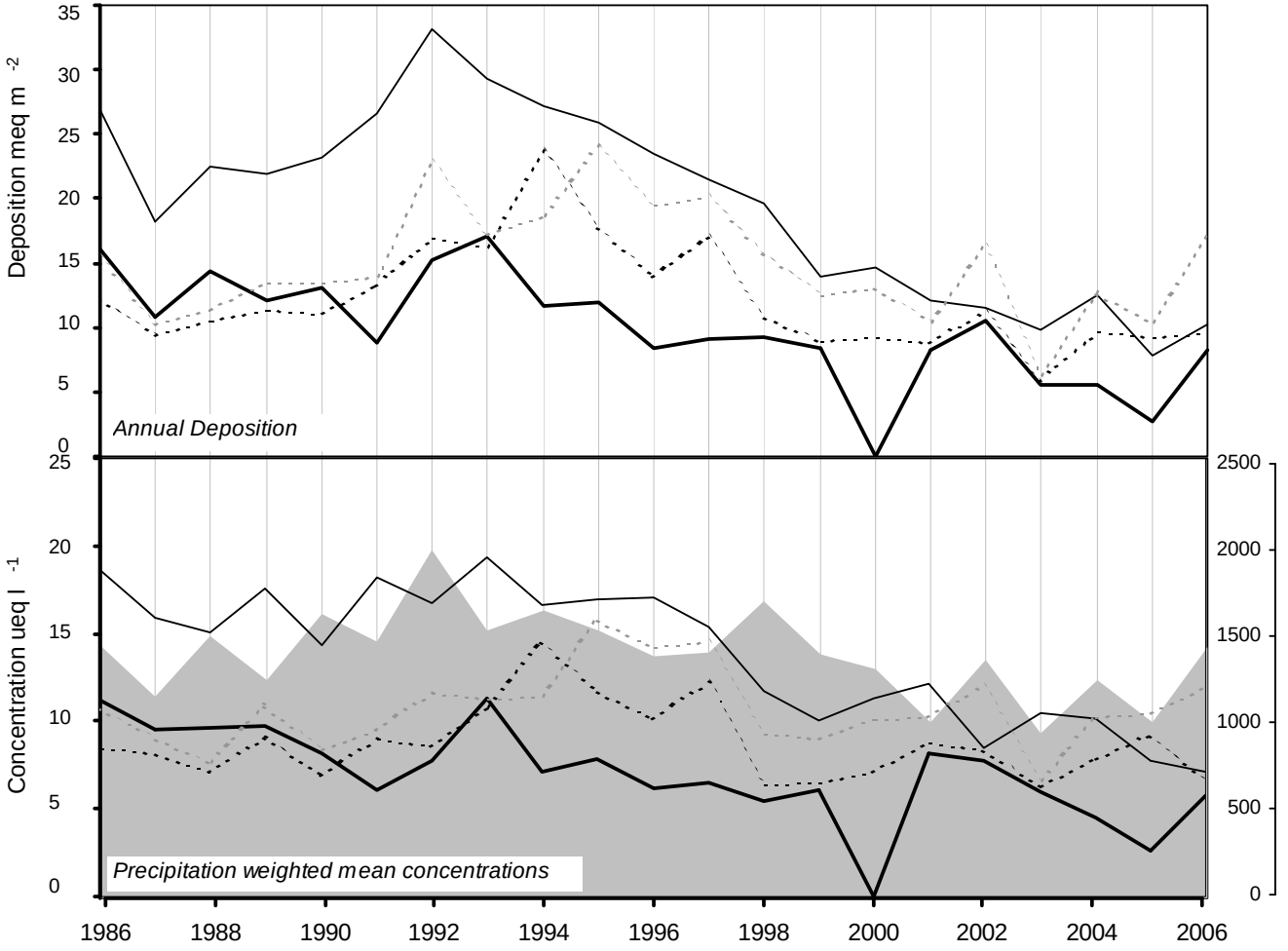
Site Code:	**5006**
Easting:	**192**
Northing:	**5212**
Latitude:	**54 26 20 N**
Longitude:	**07 54 00 W**
Altitude (m):	**130**
Rainfall (mm):	**1412**

[30 year mean 1940 - 1971]

Site Environment:
Clearing near Forestry Offices

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

Site Operator:
Forestry Service, NI



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

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

hydrogen ion
-0.26 ueq/l (-2.62 %/year): 20 years' data
++ Moderately strong trend detected

non-marine sulphate
-0.52 ueq/l (-2.74 %/year): 21 years' data
++++ Very strong trend detected

nitrate
-0.06 ueq/l (-0.61 %/year): 21 years' data
- No significant trend detected

ammonium
0.03 ueq/l (0.25 %/year): 21 years' data
- No significant trend detected

(5006) Lough Navar

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
09/Jan/2006	23/Jan/2006	5.5	18.8	4.5	6.9	155.6	27.7	7.9	146.2	4.9	<1.0	0.1	3.2	22.2	63.8
23/Jan/2006	06/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
06/Feb/2006	20/Feb/2006	5.7	13.6	2.9	3.3	86.2	16.3	6.9	113.2	2.1	<1.0	3.2	2.2	19.5	53.9
20/Feb/2006	06/Mar/2006	5.5	28.1	6.2	10.6	152.2	32.5	13.0	168.8	3.7	<1.0	9.8	3.0	25.4	22.7
06/Mar/2006	20/Mar/2006	5.5	17.3	4.0	5.3	122.8	23.2	11.0	121.9	3.7	<1.0	2.5	2.9	19.4	78.6
20/Mar/2006	03/Apr/2006	5.9	15.2	14.8	26.0	53.1	9.2	8.0	50.0	2.2	<1.0	8.8	1.4	11.3	71.7
03/Apr/2006	17/Apr/2006	7.3	18.4	1.4	18.6	85.8	30.4	231.9	85.2	9.1	81.5	8.1	0.1	49.3	46.3
17/Apr/2006	01/May/2006	6.3	22.7	6.5	<0.7	<0.9	<0.8	<1.0	84.4	0.4	<1.0	22.8	0.5	16.0	26.8
01/May/2006	15/May/2006	5.4	26.1	21.1	36.1	23.1	6.3	14.5	22.0	1.6	<1.0	23.3	3.8	11.2	54.9
15/May/2006	29/May/2006	5.2	15.1	5.3	5.7	72.2	15.6	5.9	75.5	2.5	<1.0	6.4	6.0	14.2	92.8
29/May/2006	12/Jun/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
12/Jun/2006	26/Jun/2006	6.8	38.3	4.9	43.4	266.0	58.2	43.8	291.3	8.8	<1.0	6.2	0.2	45.6	19.3
26/Jun/2006	10/Jul/2006	6.2	20.1	17.7	70.1	66.1	21.8	75.6	20.0	10.7	<1.0	12.2	0.6	11.0	33.3
10/Jul/2006	24/Jul/2006	6.8	47.3	49.6	60.6	96.6	26.6	124.8	89.1	14.9	8.3	35.7	0.2	38.1	3.6
24/Jul/2006	07/Aug/2006	5.6	17.3	5.8	10.3	63.9	10.4	17.1	60.3	5.7	<1.0	9.6	2.6	12.7	26.3
07/Aug/2006	21/Aug/2006	4.6	25.2	17.3	15.0	77.8	16.5	8.7	85.6	3.3	<1.0	15.8	25.7	19.8	43.5
21/Aug/2006	04/Sep/2006	5.0	13.4	2.3	1.4	58.1	10.8	6.4	62.4	1.6	<1.0	6.4	11.0	10.9	82.5
04/Sep/2006	18/Sep/2006	5.2	11.5	7.8	5.3	23.1	3.8	9.9	24.5	1.9	<1.0	8.7	6.5	6.8	8.8
18/Sep/2006	02/Oct/2006	5.2	9.7	5.2	2.1	33.5	4.9	4.4	34.5	1.1	<1.0	5.7	6.9	6.8	94.5
02/Oct/2006	16/Oct/2006	5.2	12.6	1.4	11.4	43.2	7.9	16.1	41.7	3.7	<1.0	7.3	6.5	6.6	70.0
16/Oct/2006	30/Oct/2006	5.0	14.5	15.9	21.4	48.0	9.3	8.0	50.3	2.1	<1.0	8.7	10.7	12.0	81.5
30/Oct/2006	13/Nov/2006	5.4	48.6	11.1	15.8	409.2	62.1	19.6	428.7	8.6	<1.0	0.0	3.9	64.4	24.2
13/Nov/2006	27/Nov/2006	5.4	25.8	2.1	8.5	215.4	42.3	15.5	226.2	4.3	<1.0	0.0	3.8	33.6	126.7
27/Nov/2006	11/Dec/2006	5.3	21.6	2.5	5.9	180.0	38.5	11.6	186.1	3.7	<1.0	0.0	5.2	28.2	132.8
11/Dec/2006	25/Dec/2006	5.1	22.3	2.3	2.1	166.9	32.1	9.4	184.0	3.1	<1.0	2.2	8.1	27.2	53.4
25/Dec/2006	08/Jan/2007	5.3	31.1	4.1	10.6	253.2	51.2	14.8	277.2	1.4	<1.0	0.6	5.0	42.9	117.4
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5006			20.2	6.6	11.9	120.8	23.9	12.8	127.7	3.2	0.5	7.1	5.7		1429.4

Cow Green Reservoir

2006

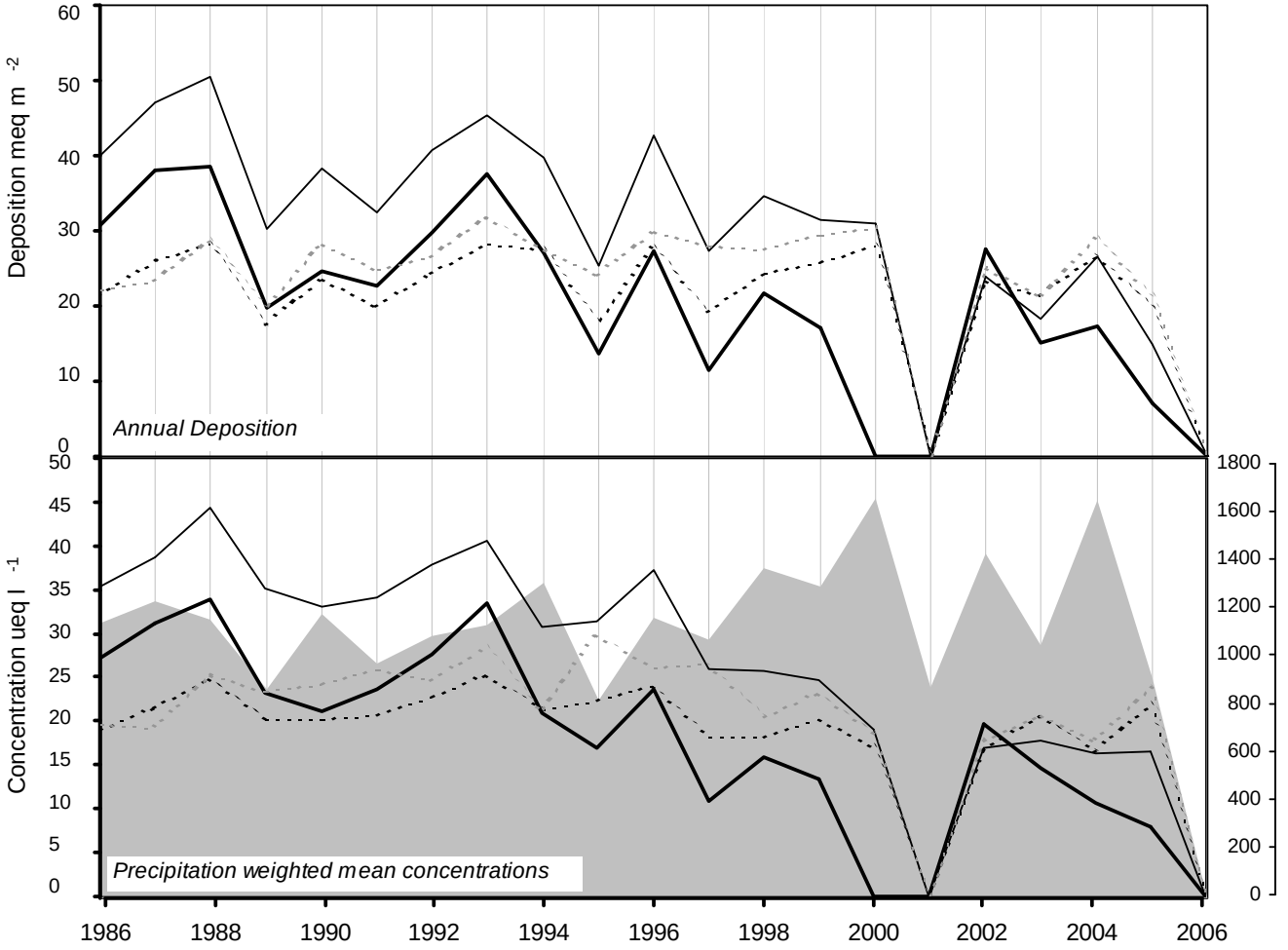
Site Code:	**5113**
Easting:	**3817**
Northing:	**5298**
Latitude:	**54 39 46 N**
Longitude:	**02 17 01 W**
Altitude (m):	**510**
Rainfall (mm):	**2175**

[30 year mean 1940 - 1971]

Site Environment:
Very open moorland

Other measurements:
N/A

Site Operator:
N/A



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

long-term trends in concentration (+x = increase; -x = decrease)
hydrogen ion
non-marine sulphate
nitrate
ammonium

(5113) Cow Green Reservoir

Site closed Jan 2006 – replaced by (5167) Moorhouse

	Precipitation<weighted annual means for site(samples containing phosphate are excluded)	Total rainfall
5113		

Moorhouse

2006

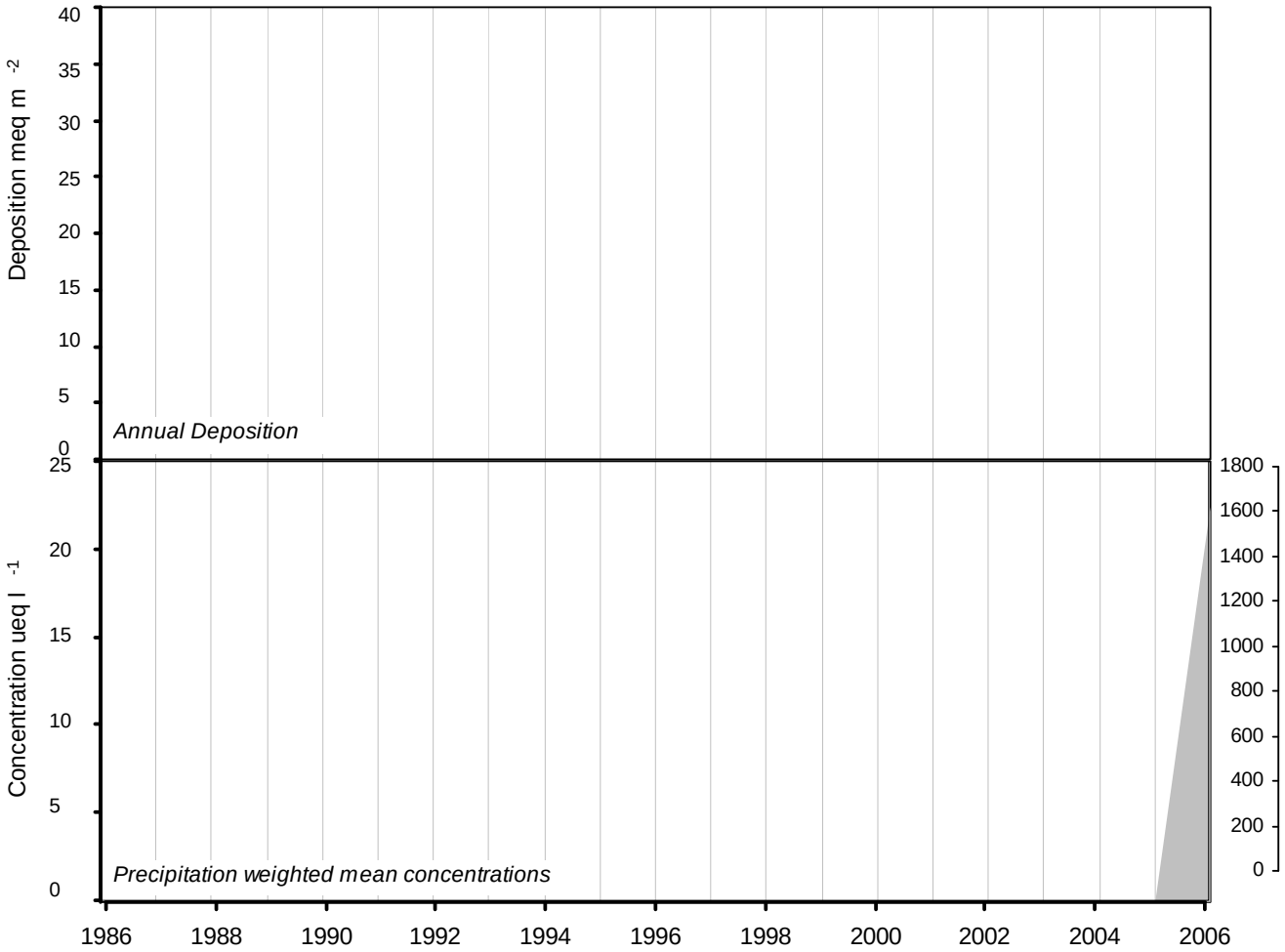
Site Code:	**5167**
Easting:	**3758**
Northing:	**5328**
Latitude:	**54 41 23 N**
Longitude:	**02 22 37 W**
Altitude (m):	**570**
Rainfall (mm):	**0**

[30 year mean 1940 - 1971]

Site Environment:
Very open moorland

Other measurements:
DT, HNO3 Denuder, ECN, Met

Site Operator:
Centre for Ecology and Hydrology (Lancaster)



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

long-term trends in concentration (+x = increase; -x = decrease)
hydrogen ion
non-marine sulphate
nitrate
ammonium

(5167) Moorhouse

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
08/Feb/2006	22/Feb/2006	5.5	23.8	15.4	46.4	85.8	16.9	8.5	108.4	3.9	<1.0	13.5	3.0	9.6	67.8
22/Feb/2006	08/Mar/2006	4.8	29.4	20.2	10.8	107.7	24.3	12.4	116.4	6.8	<1.0	16.4	14.8	23.2	26.4
08/Mar/2006	22/Mar/2006	4.6	31.3	33.8	29.0	95.2	20.6	12.9	76.4	3.7	<1.0	19.9	22.9	27.0	17.4
22/Mar/2006	05/Apr/2006	5.6	13.2	14.3	17.0	44.1	8.2	4.2	37.6	1.8	<1.0	7.9	2.3	3.2	127.3
05/Apr/2006	19/Apr/2006	5.9	20.7	8.1	24.8	89.2	16.7	7.8	83.8	3.5	<1.0	10.0	1.2	19.4	55.8
19/Apr/2006	03/May/2006	6.2	40.0	34.7	58.6	86.7	18.1	26.2	77.8	4.9	<1.0	29.5	0.6	21.6	12.7
03/May/2006	17/May/2006	5.1	11.7	17.4	22.1	4.9	3.0	2.7	6.5	0.8	<1.0	11.2	8.5	6.7	59.2
17/May/2006	31/May/2006	5.1	22.5	10.7	13.5	58.4	16.1	12.0	57.9	2.5	<1.0	15.4	7.6	12.7	94.7
31/May/2006	14/Jun/2006	6.8	51.8	5.5	172.0	201.9	27.5	6.2	237.9	21.5	55.5	27.5	0.2	53.5	39.9
14/Jun/2006	28/Jun/2006	5.1	19.8	14.5	121.3	42.6	5.6	5.9	39.1	13.9	<1.0	14.6	7.2	10.3	40.3
28/Jun/2006	12/Jul/2006	4.3	44.1	52.5	46.2	12.3	6.0	24.7	13.1	2.6	<1.0	42.6	46.8	32.0	32.1
12/Jul/2006	26/Jul/2006	6.8	353.2	157.4	-	-	-	-	94.6	-	289.9	5587.9	0.2	-	1.7
26/Jul/2006	09/Aug/2006	6.6	28.5	7.7	96.2	21.3	2.3	1.1	23.9	7.6	60.7	25.9	0.3	22.2	71.5
09/Aug/2006	23/Aug/2006	4.7	21.7	22.6	22.9	16.1	5.2	7.6	19.0	1.6	<1.0	19.7	20.4	10.7	39.3
23/Aug/2006	06/Sep/2006	5.2	6.2	4.4	8.5	20.1	2.2	6.0	15.8	1.4	<1.0	3.7	6.9	5.3	66.1
06/Sep/2006	20/Sep/2006	4.6	34.1	29.9	27.4	25.3	5.5	18.7	31.0	2.8	2.3	31.1	22.9	16.3	33.9
20/Sep/2006	04/Oct/2006	4.8	24.9	25.1	19.9	21.6	4.9	6.5	20.2	2.3	<1.0	22.3	17.8	11.6	60.2
04/Oct/2006	19/Oct/2006	4.6	26.4	28.8	37.1	37.8	8.9	16.6	36.2	2.6	<1.0	21.8	23.4	15.5	69.0
19/Oct/2006	01/Nov/2006	4.8	16.8	13.3	15.1	34.1	6.7	7.2	37.0	1.1	1.4	12.7	17.4	10.0	91.8
01/Nov/2006	14/Nov/2006	4.9	28.3	18.1	22.7	143.7	29.0	10.9	153.4	2.9	2.2	11.0	11.7	27.5	35.3
14/Nov/2006	28/Nov/2006	5.4	13.9	1.3	16.8	482.7	88.6	23.2	134.0	10.9	<1.0	0.0	3.6	71.2	28.2
28/Nov/2006	06/Dec/2006	5.0	25.1	10.8	18.2	115.8	25.0	9.8	119.5	2.5	<1.0	11.1	10.2	21.7	132.3
06/Dec/2006	13/Dec/2006	5.3	28.5	5.2	12.8	189.1	37.0	12.3	205.5	3.8	<1.0	5.7	5.1	30.3	203.5
13/Dec/2006	27/Dec/2006	5.2	11.8	5.6	7.8	73.9	13.1	6.0	75.8	1.6	<1.0	2.9	5.9	12.5	50.8
27/Dec/2006	10/Jan/2007	5.2	17.7	5.8	13.5	97.8	18.7	5.9	101.1	2.2	<1.0	5.9	5.9	17.5	154.3
					Precipitation<	weighted annual means for site(samples containing phosphate are excluded)									Total rainfall
5167			21.6	13.6	22.4	87.5	17.6	9.6	84.3	3.0	0.6	12.2	9.9		1611.5

Scoat Tarn

2006

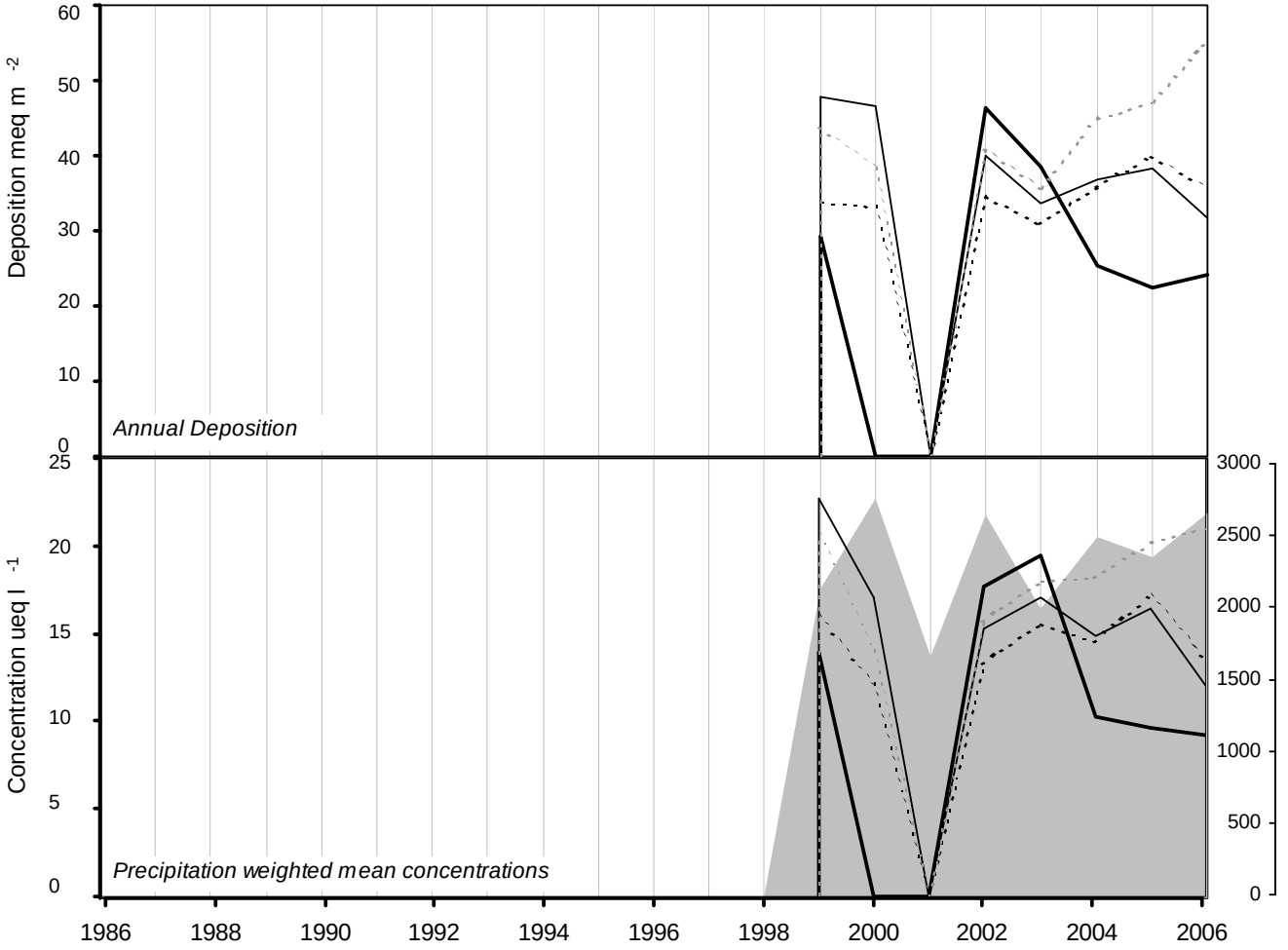
Site Code:	**5159**
Easting:	**3158**
Northing:	**5103**
Latitude:	**54 48 10 N**
Longitude:	**03 30 10 W**
Altitude (m):	**595**
Rainfall (mm):	**-**

[30 year mean 1940 - 1971]

Site Environment:
Grassland

Other measurements:
UKAWMN. Lakewater and soil chemistry

Site Operator:
ENSIS



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

long-term trends in concentration (+x = increase; -x = decrease)
hydrogen ion
non-marine sulphate
nitrate
ammonium

(5159) Scoat Tarn

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
23/Jan/2006	07/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
07/Feb/2006	21/Feb/2006	5.3	18.7	18.3	32.2	79.3	14.3	18.7	71.6	8.7	<1.0	9.1	4.9	17.1	92.2
21/Feb/2006	07/Mar/2006	5.7	1.3	21.6	32.1	127.4	21.5	10.5	133.0	9.1	<1.0	0.0	1.8	23.1	23.1
07/Mar/2006	20/Mar/2006	5.4	23.5	18.6	23.4	36.6	9.6	10.4	34.6	5.0	<1.0	19.1	4.1	11.6	38.7
20/Mar/2006	04/Apr/2006	5.2	19.5	14.1	17.7	88.8	20.5	7.2	85.3	2.1	<1.0	8.8	6.9	16.9	220.4
04/Apr/2006	21/Apr/2006	5.7	31.1	12.4	36.1	143.8	28.8	10.5	145.9	5.3	<1.0	13.8	2.1	20.9	87.7
21/Apr/2006	03/May/2006	5.3	24.3	22.2	36.7	42.8	9.3	11.8	37.9	2.1	<1.0	19.1	4.8	10.2	63.6
03/May/2006	17/May/2006	5.0	39.3	38.4	59.9	15.7	4.7	11.2	14.6	4.4	<1.0	37.4	11.2	15.7	88.7
17/May/2006	31/May/2006	5.2	13.6	6.8	13.5	51.9	10.8	3.3	55.4	1.3	<1.0	7.3	6.2	11.8	110.4
31/May/2006	12/Jun/2006	5.7	46.7	86.0	54.2	40.9	17.5	55.8	18.9	2.4	<1.0	41.8	1.9	22.8	7.8
12/Jun/2006	27/Jun/2006	5.7	32.6	14.6	46.3	114.0	21.0	7.4	107.1	3.2	<1.0	18.9	1.8	21.0	92.6
27/Jun/2006	11/Jul/2006	4.9	30.6	18.6	25.0	49.9	10.1	7.7	49.1	2.3	<1.0	24.5	13.8	15.9	83.6
11/Jul/2006	25/Jul/2006	5.1	37.6	49.7	55.2	77.1	18.8	38.0	42.9	15.4	<1.0	28.4	8.9	13.9	16.8
25/Jul/2006	04/Aug/2006	5.0	1.7	1.1	5.3	4.5	1.3	1.1	8.1	0.9	<1.0	1.2	9.1	15.0	40.6
04/Aug/2006	23/Aug/2006	4.8	14.8	14.4	15.8	27.2	4.5	8.2	26.4	4.4	<1.0	11.5	17.0	8.2	117.4
23/Aug/2006	04/Sep/2006	5.0	12.7	5.0	7.9	61.8	7.8	5.9	48.0	5.6	<1.0	5.3	9.3	8.7	183.0
04/Sep/2006	19/Sep/2006	4.9	23.0	16.7	3.5	295.8	1.7	2.5	49.6	2.0	<1.0	0.0	12.3	9.6	123.5
19/Sep/2006	03/Oct/2006	4.8	29.4	15.7	21.1	45.5	7.6	4.8	45.7	2.0	<1.0	23.9	14.5	12.5	127.4
03/Oct/2006	17/Oct/2006	4.9	24.8	17.2	21.6	75.1	14.8	10.7	81.5	4.3	<1.0	15.8	12.0	15.1	163.7
17/Oct/2006	31/Oct/2006	5.1	16.7	8.3	13.7	76.3	14.6	7.4	79.0	2.1	<1.0	7.5	8.3	13.7	250.2
31/Oct/2006	14/Nov/2006	4.7	36.5	22.9	38.9	166.7	34.3	12.6	163.9	4.5	<1.0	16.4	18.2	31.3	93.6
14/Nov/2006	28/Nov/2006	4.9	31.1	10.9	18.6	163.8	33.2	13.2	170.7	3.6	<1.0	11.4	12.6	27.7	165.3
28/Nov/2006	12/Dec/2006	5.2	29.7	5.5	15.7	219.0	45.7	12.8	229.6	4.2	<1.0	3.4	6.2	35.1	199.3
12/Dec/2006	27/Dec/2006	5.1	30.3	7.7	2.9	234.8	48.6	12.5	245.2	4.0	<1.0	2.0	8.1	36.8	76.3
27/Dec/2006	09/Jan/2007	5.1	27.3	8.2	18.8	169.2	33.7	8.2	179.6	3.9	<1.0	7.0	7.6	29.6	161.4
					Precipitation<	weighted annual means for site(samples containing phosphate are excluded)									Total rainfall
5159			24.0	13.6	21.0	110.4	19.4	9.2	99.6	3.7	0.5	12.1	9.2		2627.4

Loch Dee

2006

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

[30 year mean 1940 - 1971]

Site Environment:
Open moorland

Other measurements:
DT

Site Operator:
SEPA West Region

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

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

hydrogen ion
-0.57 ueq/l (-2.64 %/year): 20 years' data
++ Moderately strong trend detected

non-marine sulphate
-0.98 ueq/l (-2.94 %/year): 21 years' data
+++ Strong trend detected

nitrate
-0.16 ueq/l (-0.94 %/year): 21 years' data
- No significant trend detected

ammonium
-0.33 ueq/l (-1.36 %/year): 21 years' data
- No significant trend detected

(5107) Loch Dee

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
12/Jan/2006	26/Jan/2006	4.8	40.4	24.1	22.1	160.1	33.5	8.5	177.6	3.5	<1.0	21.1	17.4	35.0	131.2
26/Jan/2006	08/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
08/Feb/2006	22/Feb/2006	5.2	25.3	17.1	21.7	104.6	20.7	4.2	122.8	3.2	<1.0	12.7	6.5	22.8	82.7
22/Feb/2006	08/Mar/2006	5.0	17.9	15.6	17.6	50.9	11.9	5.8	57.2	1.0	<1.0	11.8	9.8	13.9	34.7
08/Mar/2006	22/Mar/2006	4.6	42.4	27.9	38.7	102.5	21.9	8.1	105.0	2.8	<1.0	30.1	27.5	29.4	58.4
22/Mar/2006	05/Apr/2006	5.1	15.0	17.8	21.8	47.0	10.6	7.6	40.2	2.4	<1.0	9.4	8.1	11.4	110.4
05/Apr/2006	20/Apr/2006	5.7	19.3	4.7	20.6	97.2	17.7	14.0	99.7	3.1	<1.0	7.6	1.8	17.5	82.2
20/Apr/2006	03/May/2006	5.6	26.9	19.1	34.3	57.5	13.1	16.5	56.1	3.4	<1.0	20.0	2.6	13.0	33.1
03/May/2006	09/May/2006	4.9	46.6	29.8	50.3	92.5	23.0	16.2	96.3	3.8	<1.0	35.4	11.7	26.0	24.1
09/May/2006	24/May/2006	6.4	34.2	14.4	62.5	47.6	11.8	7.6	46.3	17.1	38.8	28.4	0.4	5.6	79.5
24/May/2006	07/Jun/2006	7.1	39.4	9.1	211.2	86.9	14.4	6.7	90.7	27.8	59.5	28.9	0.1	46.8	14.3
07/Jun/2006	21/Jun/2006	6.0	14.3	7.0	19.6	29.9	8.8	6.2	27.8	4.1	18.0	10.7	1.0	2.8	17.9
21/Jun/2006	06/Jul/2006	6.2	36.5	14.7	98.3	18.8	11.5	138.6	47.9	11.1	44.9	34.2	0.6	22.0	113.1
06/Jul/2006	12/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
12/Jul/2006	26/Jul/2006	5.5	44.2	54.4	26.5	55.9	18.3	1.2	37.1	23.5	14.2	37.5	2.9	22.4	4.6
26/Jul/2006	09/Aug/2006	4.9	15.8	8.8	6.7	54.0	6.3	9.7	53.3	13.4	<1.0	9.3	11.5	9.7	48.8
09/Aug/2006	22/Aug/2006	4.5	25.5	20.9	18.7	66.3	13.4	5.8	69.1	2.0	<1.0	17.5	30.9	19.6	38.4
22/Aug/2006	18/Sep/2006	5.1	7.1	5.1	14.8	58.1	1.8	4.9	5.3	1.8	<1.0	0.1	7.2	6.5	40.3
18/Sep/2006	12/Oct/2006	6.7	78.4	13.5	463.3	87.1	4.8	1.5	103.9	45.2	126.3	68.0	0.2	71.5	184.2
12/Oct/2006	26/Oct/2006	7.3	55.3	20.2	151.5	23.7	<0.8	<1.0	82.1	12.0	104.9	52.4	0.1	72.6	99.4
26/Oct/2006	06/Nov/2006	6.6	49.1	7.3	174.5	108.9	6.7	1.8	105.9	41.2	63.8	36.0	0.3	40.9	34.3
06/Nov/2006	21/Nov/2006	7.0	66.3	6.7	506.8	184.6	10.7	2.4	200.1	73.6	146.4	44.0	0.1	109.7	183.2
21/Nov/2006	05/Dec/2006	7.8	171.2	4.7	1028.9	313.2	23.7	4.8	317.5	273.5	404.8	133.5	0.0	213.0	165.3
05/Dec/2006	15/Dec/2006	5.4	12.4	3.6	15.0	118.6	20.0	6.7	83.1	2.3	<1.0	0.0	4.4	19.9	185.4
15/Dec/2006	10/Jan/2007	5.0	27.9	8.0	14.5	175.9	34.1	8.7	194.4	3.8	<1.0	6.7	11.2	30.3	184.2
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5107			23.9	13.3	20.0	110.7	21.2	8.3	109.2	3.4	0.5	13.3	10.5		1949.9

Beaghs Burn

2006

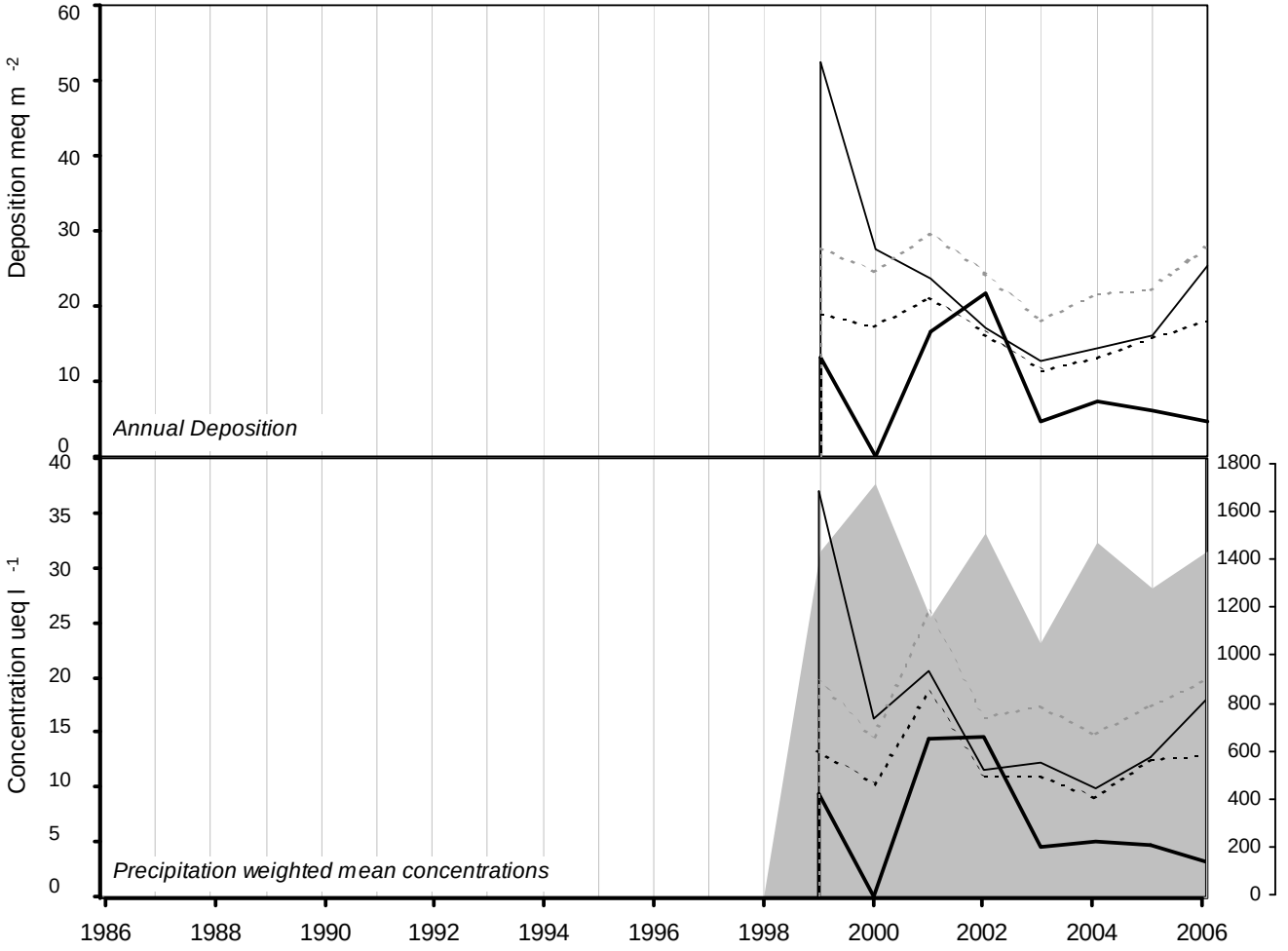
Site Code:	**5155**
Easting:	**1345**
Northing:	**5865**
Latitude:	**55 05 00 N**
Longitude:	**00 06 11 W**
Altitude (m):	**250**
Rainfall (mm):	**-**

[30 year mean 1940 - 1971]

Site Environment:
Turbary, open peat cutting.

Other measurements:
UKAWMN

Site Operator:
Agri-Food and Biosciences Institute, NI



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

long-term trends in concentration (+x = increase; -x = decrease)
hydrogen ion
non-marine sulphate
nitrate
ammonium

(5155) Beaghs Burn

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
03/Jan/2006	10/Jan/2006	5.4	45.8	76.9	57.0	82.1	14.6	4.4	56.3	4.3	<1.0	35.9	4.5	22.2	7.8
10/Jan/2006	24/Jan/2006	5.6	20.9	7.5	14.9	114.3	21.1	7.1	126.0	3.0	<1.0	7.1	2.5	20.9	81.3
24/Jan/2006	07/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
07/Feb/2006	21/Feb/2006	6.0	18.4	3.9	16.8	118.1	16.7	2.1	133.3	0.8	<1.0	4.2	0.9	20.2	47.1
21/Feb/2006	07/Mar/2006	5.5	6.9	1.3	3.4	47.2	9.5	5.3	58.3	1.4	<1.0	1.3	3.5	25.5	39.6
07/Mar/2006	21/Mar/2006	5.4	5.2	3.6	7.3	15.4	3.2	4.3	15.0	1.6	<1.0	3.4	4.1	10.3	82.5
21/Mar/2006	04/Apr/2006	5.4	25.3	26.9	41.6	85.0	16.1	5.5	82.1	2.3	<1.0	15.0	4.5	18.9	90.8
04/Apr/2006	19/Apr/2006	6.0	14.6	1.8	13.7	84.1	17.3	7.0	80.7	3.1	<1.0	4.5	1.0	36.4	60.8
19/Apr/2006	02/May/2006	6.6	18.4	9.6	68.7	82.9	23.7	20.4	71.3	5.0	<1.0	8.4	0.3	11.0	41.7
02/May/2006	16/May/2006	5.4	41.6	31.9	65.6	52.7	19.1	16.0	48.5	3.3	<1.0	35.3	3.7	19.1	38.4
16/May/2006	30/May/2006	5.3	16.0	6.3	14.0	59.5	11.8	4.2	61.8	2.3	<1.0	8.9	4.6	12.6	65.7
30/May/2006	13/Jun/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
13/Jun/2006	27/Jun/2006	5.8	22.5	4.4	23.3	145.8	25.4	10.2	145.8	3.3	<1.0	5.0	1.5	23.4	49.6
27/Jun/2006	10/Jul/2006	6.1	26.2	22.2	29.3	26.0	5.5	6.3	22.6	2.9	<1.0	23.1	0.7	12.1	14.9
10/Jul/2006	25/Jul/2006	5.4	44.4	55.7	83.8	39.0	14.3	34.3	37.3	4.7	<1.0	39.7	4.5	21.2	16.5
25/Jul/2006	08/Aug/2006	6.3	69.4	5.7	593.8	54.8	4.2	1.8	50.7	53.8	105.4	62.8	0.5	85.2	60.7
08/Aug/2006	22/Aug/2006	4.9	28.2	11.2	4.8	107.8	21.4	8.5	113.9	3.3	<1.0	15.2	12.3	25.7	52.4
22/Aug/2006	04/Sep/2006	5.4	11.8	5.2	10.6	53.7	8.6	4.4	55.9	0.5	<1.0	5.4	3.6	8.8	62.9
04/Sep/2006	19/Sep/2006	5.5	11.2	10.3	17.9	27.2	3.2	5.7	27.5	1.3	<1.0	8.0	3.2	7.4	43.8
19/Sep/2006	03/Oct/2006	5.2	20.9	15.8	18.7	64.7	11.8	4.2	66.5	2.4	<1.0	13.1	5.9	12.7	113.4
03/Oct/2006	17/Oct/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
17/Oct/2006	31/Oct/2006	6.8	148.0	34.8	3.0	392.7	309.3	389.4	239.5	28.1	4.7	100.7	0.2	148.2	135.5
31/Oct/2006	14/Nov/2006	5.7	42.4	12.6	42.8	345.3	70.1	15.4	353.6	6.9	<1.0	0.8	1.9	52.2	25.2
14/Nov/2006	28/Nov/2006	5.6	19.0	3.1	10.5	142.1	27.3	10.5	141.4	2.8	<1.0	1.8	2.8	22.8	145.3
28/Nov/2006	12/Dec/2006	5.8	20.0	3.0	18.5	151.7	26.5	7.5	155.4	3.5	<1.0	1.8	1.7	24.4	13.8
12/Dec/2006	29/Dec/2006	5.4	20.6	11.3	22.4	82.2	14.9	6.0	86.2	2.4	<1.0	10.7	4.2	15.7	51.0
29/Dec/2006	09/Jan/2007	5.8	30.2	4.5	20.2	235.0	44.6	11.1	256.6	5.2	<1.0	1.9	1.4	34.8	74.9
					Precipitation< weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5155			33.2	12.8	19.8	127.8	48.0	46.1	115.0	5.3	0.9	17.8	3.2		1415.3

Redesdale

2006

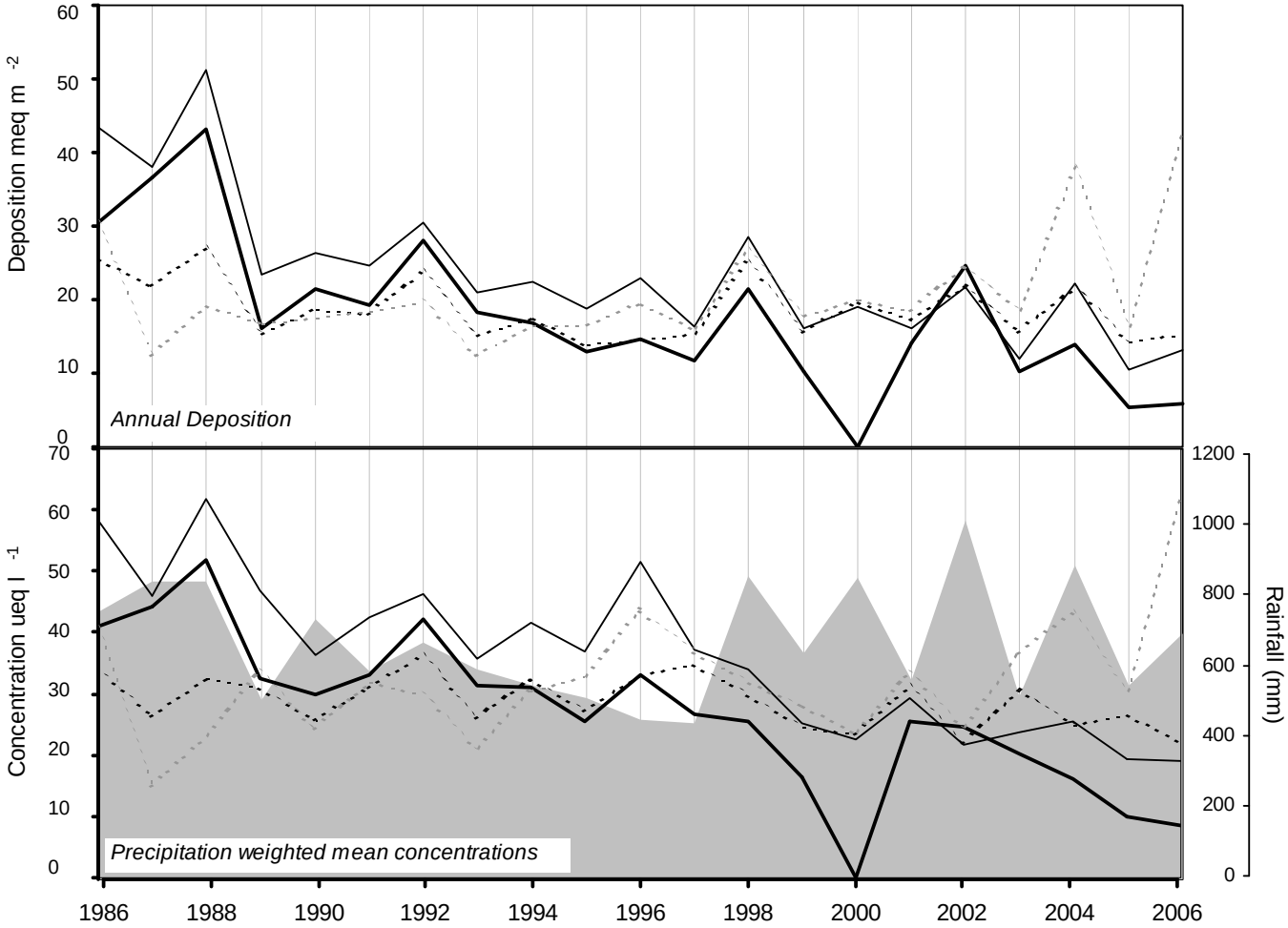
Site Code:	**5109**
Easting:	**3833**
Northing:	**5954**
Latitude:	**55 14 59 N**
Longitude:	**02 15 46 W**
Altitude (m):	**240**
Rainfall (mm):	**875**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, very open sheep farming land

Other measurements:
DT

Site Operator:
ADAS Redesdale



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

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

hydrogen ion
-1.57 ueq/l (-3.59 %/year): 20 years' data
++++ Very strong trend detected

non-marine sulphate
-1.79 ueq/l (-3.31 %/year): 21 years' data
++++ Very strong trend detected

nitrate
-0.33 ueq/l (-1.02 %/year): 21 years' data
\+ Significant trend detected

ammonium
0.72 ueq/l (2.85 %/year): 21 years' data
\- No significant trend detected

(5109) Redesdale

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
10/Jan/2006	24/Jan/2006	5.3	17.0	17.4	21.1	49.5	8.4	5.3	47.6	2.1	<1.0	11.1	4.8	12.2	27.1
24/Jan/2006	07/Feb/2006	5.0	64.1	53.4	56.8	258.0	52.1	21.5	286.0	6.9	<1.0	33.1	9.3	57.9	2.1
07/Feb/2006	21/Feb/2006	5.7	19.9	15.2	21.1	76.8	14.1	2.9	87.7	0.5	<1.0	10.7	2.2	16.9	32.5
21/Feb/2006	07/Mar/2006	5.0	46.4	21.2	21.1	298.6	64.6	18.9	330.7	7.0	<1.0	10.4	10.0	49.9	12.6
07/Mar/2006	21/Mar/2006	4.3	60.0	62.2	59.4	77.4	18.8	12.3	74.3	2.8	<1.0	50.7	49.0	38.2	24.4
21/Mar/2006	05/Apr/2006	5.0	18.4	27.8	30.2	38.7	8.1	4.2	35.4	1.2	<1.0	13.7	10.7	14.2	68.0
05/Apr/2006	18/Apr/2006	5.5	25.7	10.5	24.0	212.2	49.6	17.8	110.7	5.2	<1.0	0.1	3.0	21.6	11.8
18/Apr/2006	02/May/2006	5.6	106.5	105.9	212.0	188.1	44.2	45.2	181.7	8.2	<1.0	83.8	2.7	54.5	5.9
02/May/2006	16/May/2006	4.8	43.9	55.9	73.9	15.1	6.1	17.7	13.9	2.5	<1.0	42.1	17.8	20.5	39.3
16/May/2006	31/May/2006	5.3	6.9	5.3	10.5	13.8	3.4	1.7	19.0	2.9	<1.0	5.2	5.2	5.1	39.6
31/May/2006	16/Jun/2006	5.0	45.5	55.8	52.2	24.9	9.2	27.0	14.2	3.3	<1.0	42.5	10.0	-	2.0
16/Jun/2006	27/Jun/2006	6.1	22.0	21.2	46.2	45.9	6.8	5.4	44.6	5.6	9.0	16.5	0.8	14.2	18.4
27/Jun/2006	11/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
11/Jul/2006	25/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
25/Jul/2006	08/Aug/2006	5.7	18.8	13.9	21.5	30.6	6.7	9.6	32.0	3.7	4.7	15.1	2.2	8.4	22.7
08/Aug/2006	22/Aug/2006	6.9	67.9	20.3	207.4	11.6	1.7	0.8	12.1	35.1	145.3	66.5	0.1	34.9	26.1
22/Aug/2006	05/Sep/2006	5.2	11.9	11.1	17.4	14.6	3.0	4.3	15.6	2.1	<1.0	10.1	7.1	6.2	44.9
05/Sep/2006	19/Sep/2006	6.9	107.6	46.1	1628.3	9.5	55.8	115.4	36.1	156.2	198.5	106.5	0.1	227.0	24.5
19/Sep/2006	03/Oct/2006	7.0	64.4	41.5	729.2	61.9	4.6	2.9	109.3	140.9	<145.3	56.9	0.1	104.7	25.0
03/Oct/2006	17/Oct/2006	4.9	41.3	37.1	46.6	85.4	18.1	13.6	98.9	4.3	1.4	31.0	12.0	22.0	26.4
17/Oct/2006	31/Oct/2006	7.7	322.0	5.6	4319.0	163.5	101.6	348.8	45.2	426.6	318.0	302.3	0.0	593.0	71.0
31/Oct/2006	14/Nov/2006	7.6	11.8	11.3	7.3	52.9	10.2	6.3	43.4	1.7	<1.0	5.4	0.0	3004.0	11.5
14/Nov/2006	28/Nov/2006	5.7	21.2	12.1	30.3	91.9	16.5	9.0	96.2	3.1	2.9	10.1	2.0	17.8	52.8
28/Nov/2006	12/Dec/2006	5.0	11.3	3.3	14.3	179.9	29.9	8.0	88.5	3.8	<1.0	0.0	10.5	29.4	58.8
12/Dec/2006	22/Dec/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
22/Dec/2006	09/Jan/2007	5.6	24.8	10.0	28.7	150.2	27.8	7.9	163.0	3.9	<1.0	6.7	2.4	26.6	39.5
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5109			25.7	22.3	62.5	80.4	15.4	8.3	73.7	9.1	4.4	19.1	8.4		686.8

Eskdalemuir

2006

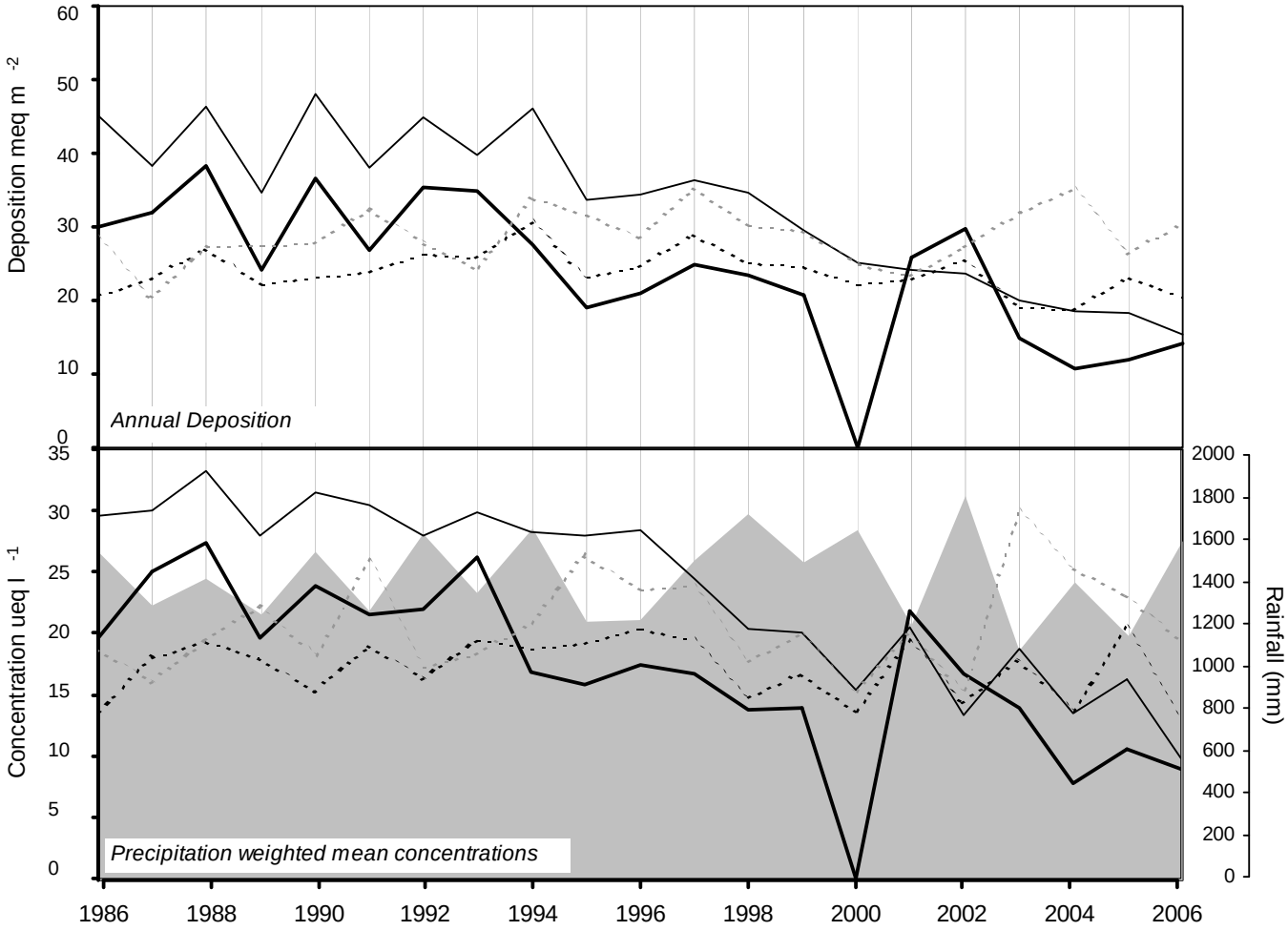
Site Code:	**5002**
Easting:	**3235**
Northing:	**6030**
Latitude:	**55 18 54 N**
Longitude:	**03 12 20 W**
Altitude (m):	**259**
Rainfall (mm):	**1745**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, Met Office Observatory

Other measurements:
Daily Bulk, DT (triplicate), Daily SO4, HNO3 Denuder, ozone, Met, EMEP

Site Operator:
Met Office



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

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

hydrogen ion
-0.73 ueq/l (-2.88 %/year): 20 years' data
++++ Very strong trend detected

non-marine sulphate
-1.05 ueq/l (-3.08 %/year): 21 years' data
++++ Very strong trend detected

nitrate
-0.09 ueq/l (-0.48 %/year): 21 years' data
++++ Very strong trend detected

ammonium
0.14 ueq/l (0.73 %/year): 21 years' data
++++ Very strong trend detected

(5002) Eskdalemuir

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
11/Jan/2006	25/Jan/2006	4.8	26.3	24.1	21.6	63.2	12.8	6.6	67.0	1.8	<1.0	18.7	14.5	18.3	60.0
25/Jan/2006	08/Feb/2006	5.9	65.2	67.7	105.5	141.9	25.8	9.2	146.1	5.2	<1.0	48.1	1.2	38.1	12.0
08/Feb/2006	22/Feb/2006	5.5	22.1	18.3	29.5	77.3	16.5	5.9	88.1	0.8	<1.0	12.8	3.5	17.8	63.6
22/Feb/2006	08/Mar/2006	4.9	34.3	31.3	31.3	155.4	32.9	15.0	171.0	4.2	<1.0	15.6	11.7	31.3	26.4
08/Mar/2006	22/Mar/2006	4.4	33.8	36.1	39.9	42.5	10.7	7.8	38.5	3.0	<1.0	28.6	38.9	29.9	21.6
22/Mar/2006	05/Apr/2006	5.1	12.3	16.6	19.4	32.1	5.9	3.0	31.7	0.6	<1.0	8.4	7.9	8.6	123.9
05/Apr/2006	19/Apr/2006	5.9	26.8	7.1	29.2	137.7	25.5	9.2	137.0	4.0	<1.0	10.2	1.2	23.9	27.3
19/Apr/2006	03/May/2006	5.8	8.2	3.3	12.1	5.8	13.5	5.3	14.9	0.7	<1.0	7.5	1.7	7.8	31.7
03/May/2006	17/May/2006	4.6	55.0	60.9	72.4	21.6	7.9	24.1	18.6	4.2	<1.0	52.4	25.7	24.5	24.3
17/May/2006	31/May/2006	5.0	17.2	9.8	10.6	57.5	12.3	5.3	55.6	1.9	<1.0	10.2	9.8	12.7	56.4
31/May/2006	14/Jun/2006	7.5	126.3	68.8	818.0	65.1	20.3	21.3	54.4	112.3	201.0	118.4	0.0	126.4	5.8
14/Jun/2006	28/Jun/2006	6.4	34.8	14.7	95.9	62.1	7.0	2.7	69.3	9.0	38.5	27.3	0.4	7.0	39.2
28/Jun/2006	12/Jul/2006	6.1	36.5	29.4	78.8	22.4	2.9	2.8	24.0	8.8	13.3	33.8	0.8	13.6	47.9
12/Jul/2006	26/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
26/Jul/2006	09/Aug/2006	5.6	16.7	12.5	24.0	45.0	8.4	6.9	42.6	5.3	<1.0	11.3	2.5	10.4	33.9
09/Aug/2006	23/Aug/2006	4.8	13.2	16.5	14.5	12.3	2.8	4.8	12.1	1.2	<1.0	11.8	15.8	7.5	33.8
23/Aug/2006	06/Sep/2006	5.0	10.3	7.7	8.5	18.0	3.2	3.4	19.5	1.7	<1.0	8.1	9.8	5.5	63.0
06/Sep/2006	20/Sep/2006	4.9	21.3	16.8	20.3	33.5	5.9	7.4	33.2	1.7	2.5	17.3	14.1	12.4	44.4
20/Sep/2006	04/Oct/2006	4.9	15.4	17.5	23.6	28.2	3.0	8.4	32.8	9.6	<1.0	12.0	11.5	8.6	77.5
04/Oct/2006	18/Oct/2006	4.8	29.2	26.6	35.2	69.8	14.7	24.1	74.9	3.1	1.5	20.8	14.5	16.9	20.1
18/Oct/2006	01/Nov/2006	5.0	13.4	11.7	12.8	38.4	7.6	3.8	42.5	1.2	<1.0	8.8	11.2	9.8	81.7
01/Nov/2006	15/Nov/2006	4.9	17.6	11.1	17.8	81.0	15.3	6.7	75.3	1.9	<1.0	7.8	13.5	16.5	76.1
15/Nov/2006	29/Nov/2006	5.1	15.9	6.8	13.0	83.7	16.9	5.8	87.1	2.1	<1.0	5.8	8.7	15.2	160.9
29/Nov/2006	13/Dec/2006	5.3	22.5	5.3	13.7	158.6	31.6	9.9	165.8	4.5	1.9	3.4	4.7	25.6	184.0
13/Dec/2006	27/Dec/2006	5.1	19.7	9.1	19.8	105.0	20.8	7.8	109.5	2.4	<1.0	7.0	7.8	18.3	79.1
27/Dec/2006	10/Jan/2007	5.3	17.8	5.8	15.6	112.6	20.7	5.8	118.4	2.7	<1.0	4.2	5.1	19.8	182.5
Precipitation<weighted annual means for site(samples containing phosphate are excluded)															Total rainfall
5002			19.2	12.9	19.4	78.2	15.6	7.0	81.6	2.8	0.7	9.8	9.0		1577.2

Whiteadder

2006

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

[30 year mean 1940 - 1971]

Site Environment:
Open moorland

Other measurements:
DT

Site Operator:
East of Scotland Water

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

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

hydrogen ion
-1.41 ueq/l (-3.26 %/year): 19 years' data
+++ Strong trend detected

non-marine sulphate
-1.73 ueq/l (-3.26 %/year): 20 years' data
++++ Very strong trend detected

nitrate
-0.55 ueq/l (-1.58 %/year): 20 years' data
++ Moderately strong trend detected

ammonium
-0.29 ueq/l (-1.05 %/year): 20 years' data
- No significant trend detected

(5106) Whiteadder

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
22/Jan/2006	13/Feb/2006	4.8	43.5	48.0	40.6	88.9	19.2	11.3	80.4	3.9	<1.0	32.8	14.5	27.3	3.8
13/Feb/2006	20/Feb/2006	5.1	29.7	27.7	24.3	95.5	22.1	12.2	100.9	2.9	<1.0	18.2	8.5	21.7	13.7
20/Feb/2006	20/Mar/2006	4.4	67.7	37.3	27.7	280.2	65.4	27.4	290.4	7.5	<1.0	34.0	38.9	60.4	56.4
20/Mar/2006	03/Apr/2006	4.7	28.7	40.8	42.3	53.9	12.4	6.8	52.7	2.0	<1.0	22.2	22.4	21.8	52.9
03/Apr/2006	13/Jul/2006	4.3	44.9	41.3	16.7	70.6	17.5	15.8	82.2	2.5	<1.0	36.4	49.0	31.0	43.4
13/Jul/2006	27/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
27/Jul/2006	10/Aug/2006	5.6	16.3	11.0	15.7	27.4	13.2	9.8	25.6	5.2	<1.0	13.0	2.8	7.3	18.2
10/Aug/2006	02/Sep/2006	4.5	32.6	36.6	38.8	18.3	4.8	12.0	20.3	2.7	<1.0	30.4	33.9	16.5	21.5
02/Sep/2006	14/Sep/2006	5.0	17.8	15.4	25.6	14.8	1.5	6.4	11.9	2.7	<1.0	16.0	11.0	7.5	25.1
14/Sep/2006	28/Sep/2006	4.5	45.3	38.9	42.7	13.0	2.4	7.2	14.8	2.7	<1.0	43.8	30.2	19.6	46.3
28/Sep/2006	13/Oct/2006	4.7	36.1	31.7	32.5	50.2	11.4	15.7	57.2	7.6	<1.0	30.0	21.9	10.2	6.0
13/Oct/2006	25/Oct/2006	4.7	24.1	25.6	23.8	21.2	7.5	13.1	24.2	1.8	<1.0	21.6	22.4	12.9	65.9
25/Oct/2006	09/Nov/2006	-	-	-	-	-	-	-	-	-	<1.0	0.0	-	-	7.2
09/Nov/2006	23/Nov/2006	4.9	3.0	2.9	8.6	40.2	10.8	4.8	9.7	1.4	<1.0	0.0	11.7	16.7	13.8
23/Nov/2006	07/Dec/2006	5.0	19.8	16.0	20.5	92.7	18.3	6.5	98.1	3.1	5.7	8.6	9.5	18.8	28.4
07/Dec/2006	23/Dec/2006	4.7	21.6	7.3	8.4	178.5	19.7	8.3	152.6	4.8	<1.0	0.1	20.0	-	6.9
23/Dec/2006	04/Jan/2007	4.7	28.1	33.9	32.6	118.3	25.9	14.8	124.0	3.8	<1.0	13.8	20.0	-	2.3
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5106			34.7	30.4	28.1	78.1	18.3	12.4	80.4	3.3	0.8	26.2	25.6		411.7

Loch Chon

2006

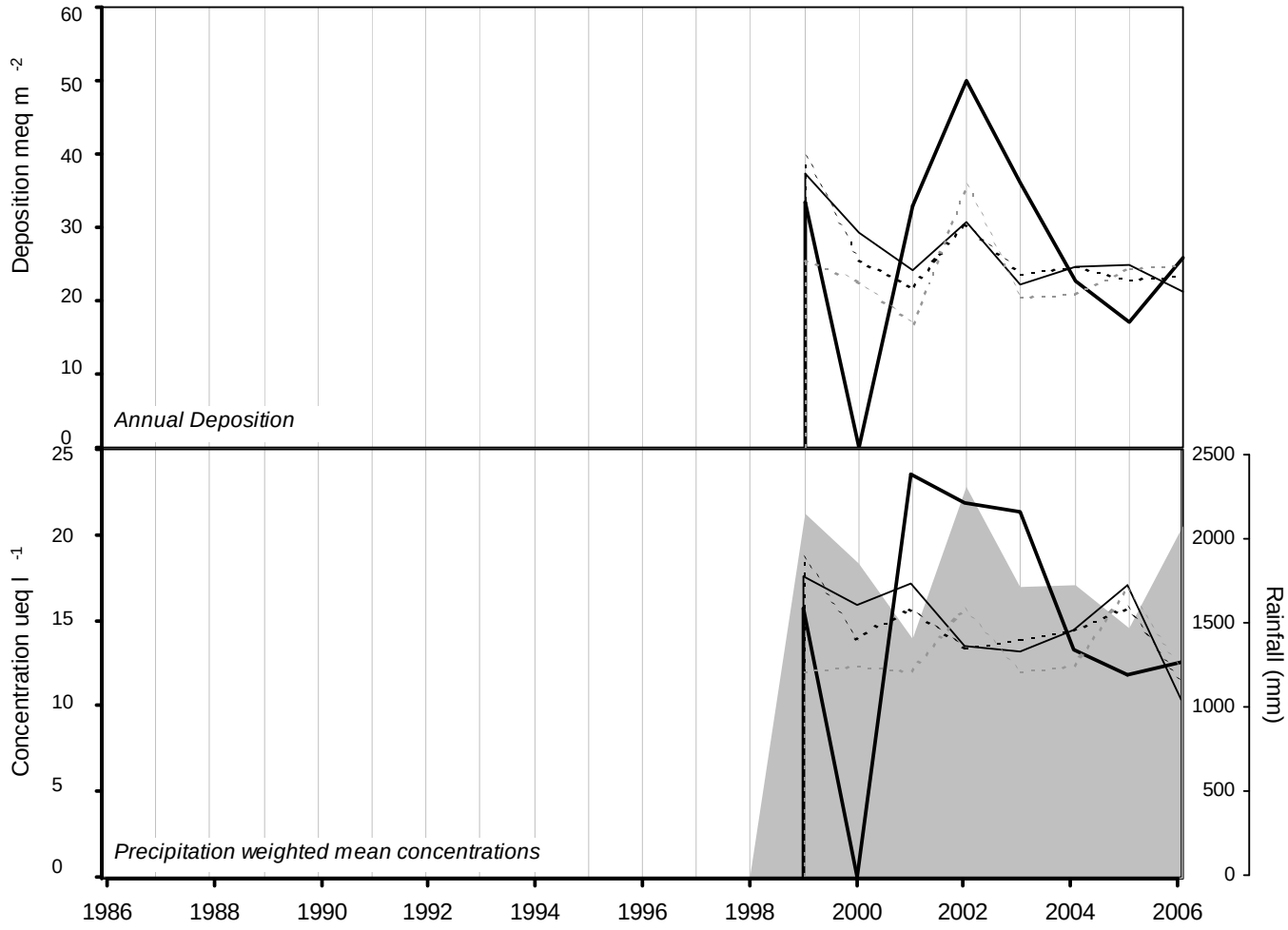
Site Code:	**5156**
Easting:	**2429**
Northing:	**7084**
Latitude:	**56 14 52 N**
Longitude:	**04 32 09 W**
Altitude (m):	**150**
Rainfall (mm):	**-**

[30 year mean 1940 - 1971]

Site Environment:
Moorland overlooking Loch Katrine

Other measurements:
UKAWMN

Site Operator:
Fisheries Research Services



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

long-term trends in concentration (+x = increase; -x = decrease)
hydrogen ion
non-marine sulphate
nitrate
ammonium

(5156) Loch Chon

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
11/Jan/2006	25/Jan/2006	4.7	32.4	17.8	17.4	99.3	20.1	7.5	102.5	2.3	<1.0	20.4	18.6	24.7	137.9
25/Jan/2006	08/Feb/2006	4.6	31.4	26.5	18.6	58.2	13.4	6.5	60.3	2.4	<1.0	24.4	24.5	20.6	30.0
08/Feb/2006	22/Feb/2006	5.5	17.3	8.6	15.2	80.8	13.0	0.2	91.4	0.3	<1.0	7.5	3.2	16.2	55.4
22/Feb/2006	08/Mar/2006	4.7	23.5	42.0	29.8	87.8	20.5	10.0	91.0	2.5	<1.0	13.0	19.5	24.2	18.3
08/Mar/2006	22/Mar/2006	4.5	36.0	31.4	29.3	20.4	6.4	5.0	19.0	0.7	<1.0	33.6	35.5	22.4	62.9
22/Mar/2006	05/Apr/2006	5.3	19.0	19.5	15.0	38.6	9.6	5.0	33.4	1.8	<1.0	14.3	4.9	4.5	107.8
05/Apr/2006	14/Apr/2006	5.4	22.4	3.0	7.3	146.8	29.9	11.4	159.3	3.2	<1.0	4.8	3.7	14.3	70.0
14/Apr/2006	03/May/2006	5.2	23.5	12.5	18.7	66.3	14.5	9.2	64.9	2.0	<1.0	15.5	6.6	11.8	57.0
03/May/2006	17/May/2006	7.2	166.5	56.7	1227.5	63.3	19.9	6.8	39.7	104.7	300.3	158.9	0.1	176.5	76.2
17/May/2006	31/May/2006	7.3	44.5	4.9	328.4	56.0	10.4	2.2	59.4	42.5	126.0	37.8	0.1	34.7	90.0
31/May/2006	14/Jun/2006	8.2	836.5	<1.4	15839.9	897.8	392.2	314.0	272.4	2682.9	2146.7	728.4	0.0	3910.0	10.3
14/Jun/2006	28/Jun/2006	8.1	461.1	1.3	6386.7	210.4	135.3	60.0	195.8	544.7	145.3	435.7	0.0	758.0	83.0
28/Jun/2006	12/Jul/2006	7.0	36.6	2.8	490.8	12.8	74.0	30.3	24.6	40.2	250.5	35.1	0.1	312.0	67.8
12/Jul/2006	26/Jul/2006	4.7	53.4	83.6	69.3	90.0	20.6	46.6	83.3	11.4	<1.0	42.5	20.0	-	2.0
26/Jul/2006	09/Aug/2006	5.2	15.9	10.5	19.3	37.5	8.9	6.2	37.3	2.0	<1.0	11.4	7.1	10.0	51.3
09/Aug/2006	23/Aug/2006	4.9	23.8	33.5	23.7	17.7	4.5	15.7	20.2	2.9	<1.0	21.7	14.1	12.0	22.2
23/Aug/2006	06/Sep/2006	4.8	14.1	5.5	<0.7	31.0	5.4	4.6	27.5	6.1	<1.0	10.3	14.8	8.0	92.0
06/Sep/2006	20/Sep/2006	5.0	2.3	1.4	8.8	30.7	3.2	4.2	5.8	0.9	<1.0	0.0	9.3	8.2	86.0
20/Sep/2006	04/Oct/2006	6.1	33.7	12.0	48.6	33.9	5.8	0.7	38.2	8.9	22.7	29.6	0.8	12.9	148.8
04/Oct/2006	18/Oct/2006	4.5	27.9	26.4	25.6	45.0	11.1	18.8	45.8	2.2	1.4	22.5	29.5	17.9	76.1
18/Oct/2006	01/Nov/2006	4.7	10.9	10.2	6.3	21.1	4.8	10.3	34.0	1.0	1.7	8.4	21.9	8.8	124.6
01/Nov/2006	15/Nov/2006	5.0	31.1	6.3	10.9	254.6	53.2	12.5	258.8	4.5	<1.0	0.5	10.0	38.4	80.5
15/Nov/2006	29/Nov/2006	5.1	15.3	5.2	6.3	110.7	22.2	6.0	108.8	2.1	<1.0	1.9	8.3	19.5	230.9
29/Nov/2006	13/Dec/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
13/Dec/2006	27/Dec/2006	4.9	14.0	5.4	5.0	90.7	17.1	6.3	94.3	2.4	<1.0	3.1	12.6	15.8	56.4
27/Dec/2006	10/Jan/2007	5.2	17.4	5.5	9.2	113.8	21.9	6.4	120.7	2.4	<1.0	3.6	5.9	20.0	215.6
Precipitation<weighted annual means for site(samples containing phosphate are excluded)															Total rainfall
5156			19.7	11.5	12.1	82.9	16.8	7.6	84.3	2.3	0.6	10.3	12.6		2053.1

Balquhidder

2006

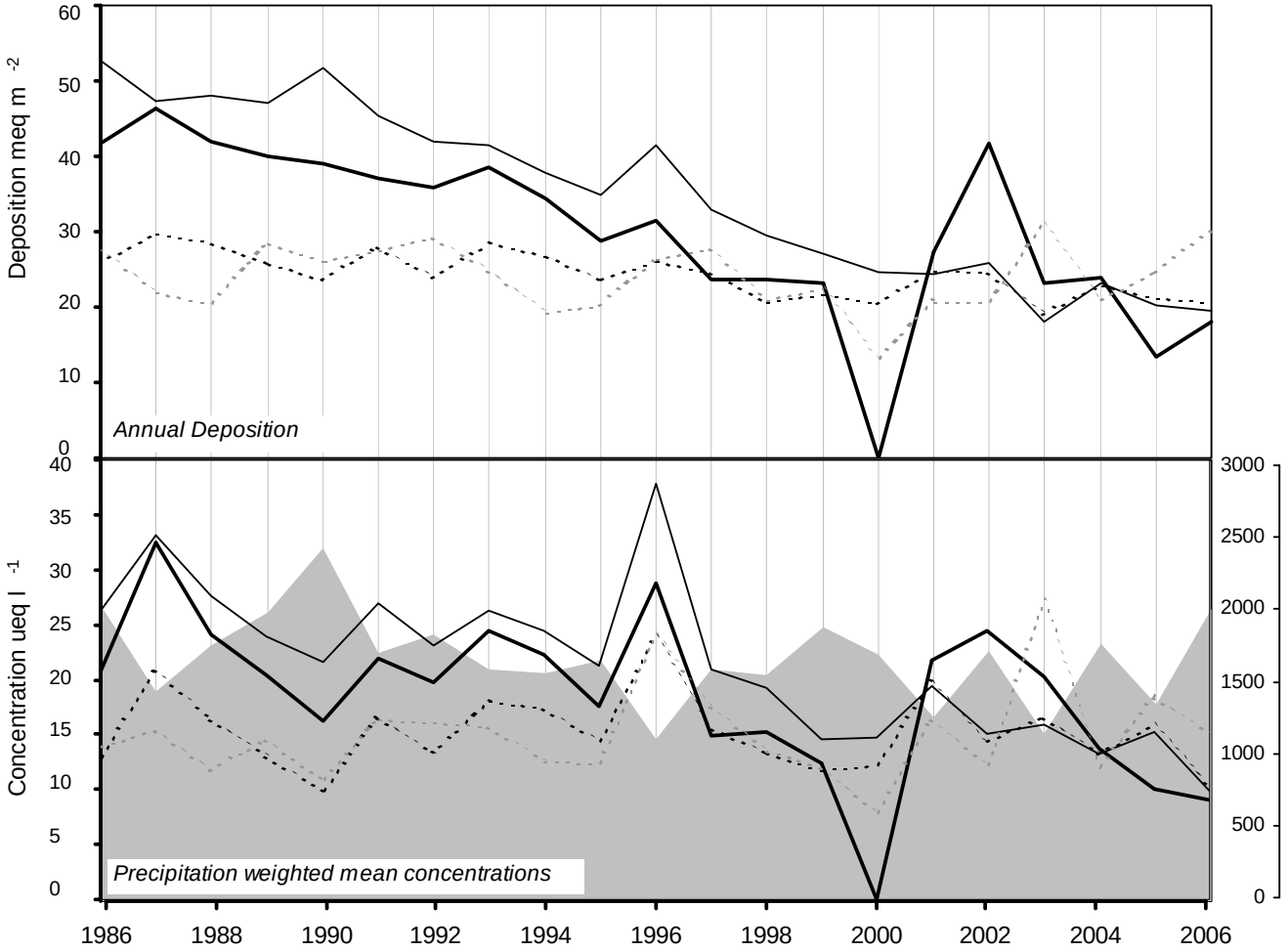
Site Code:	**5152**
Easting:	**2521**
Northing:	**7206**
Latitude:	**56 21 17 N**
Longitude:	**04 23 38 W**
Altitude (m):	**135**
Rainfall (mm):	**2245**

[30 year mean 1940 - 1971]

Site Environment:
Open sheep pasture at loch-side

Other measurements:
DT, Met

Site Operator:
Mountain Environments



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

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

hydrogen ion
-0.53 ueq/l (-2.15 %/year): 20 years' data
\+ Significant trend detected

non-marine sulphate
-0.84 ueq/l (-2.84 %/year): 21 years' data
+++ Strong trend detected

nitrate
-0.07 ueq/l (-0.46 %/year): 21 years' data
\- No significant trend detected

ammonium
0.15 ueq/l (1.09 %/year): 21 years' data
\- No significant trend detected

(5152) Balquhidder

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
09/Jan/2006	23/Jan/2006	4.9	26.5	13.4	18.6	99.4	19.2	6.8	93.2	6.0	<1.0	14.5	13.8	20.4	124.2
23/Jan/2006	06/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
06/Feb/2006	20/Feb/2006	5.4	13.7	7.3	10.7	52.0	8.7	0.4	60.9	<0.2	<1.0	7.5	4.3	12.4	92.5
20/Feb/2006	06/Mar/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
06/Mar/2006	20/Mar/2006	4.9	9.1	10.6	11.7	5.1	2.8	2.2	7.9	0.4	<1.0	8.5	13.5	7.1	72.5
20/Mar/2006	03/Apr/2006	4.8	18.3	20.5	16.6	46.7	9.3	3.5	47.2	1.0	<1.0	12.7	17.8	14.5	80.2
03/Apr/2006	20/Apr/2006	5.4	30.4	4.7	15.3	201.1	39.9	18.3	206.8	5.5	<1.0	6.2	3.9	33.5	46.8
20/Apr/2006	02/May/2006	5.0	29.6	22.4	112.1	90.5	21.4	94.3	74.5	5.4	<1.0	18.7	10.5	20.0	14.3
02/May/2006	15/May/2006	4.8	49.2	45.1	81.9	36.2	21.9	18.3	34.7	7.5	<1.0	44.8	15.5	22.4	57.7
15/May/2006	31/May/2006	5.0	13.6	6.8	11.5	33.8	7.5	3.3	35.1	1.4	<1.0	9.6	10.5	12.8	81.1
31/May/2006	11/Jun/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
11/Jun/2006	27/Jun/2006	5.1	12.3	8.9	55.6	22.9	5.6	14.3	39.3	2.8	<1.0	9.6	7.2	10.2	43.3
27/Jun/2006	13/Jul/2006	5.2	18.6	15.2	8.6	39.5	8.1	11.3	28.1	1.9	<1.0	13.9	6.6	9.6	42.4
13/Jul/2006	10/Aug/2006	6.3	30.9	18.6	123.6	21.8	2.9	2.1	26.7	15.1	19.0	28.3	0.5	15.7	44.8
10/Aug/2006	21/Aug/2006	4.9	15.9	16.4	24.5	5.7	1.2	9.4	3.1	1.3	<1.0	15.2	12.9	7.5	23.8
21/Aug/2006	29/Sep/2006	6.2	22.9	9.7	7.7	23.9	4.4	11.0	24.8	6.8	<1.0	20.0	0.6	8.4	262.9
29/Sep/2006	17/Oct/2006	4.6	28.5	32.6	30.0	29.3	8.6	8.0	31.7	1.5	<1.0	25.0	25.1	18.1	78.2
17/Oct/2006	30/Oct/2006	4.6	9.7	11.9	7.9	19.5	3.6	2.8	20.9	0.6	1.3	7.4	23.4	11.2	78.9
30/Oct/2006	22/Nov/2006	5.1	17.5	4.7	7.6	133.5	25.9	7.2	139.3	2.7	<1.0	1.4	8.7	23.2	226.4
22/Nov/2006	19/Dec/2006	5.0	25.4	5.1	9.2	171.2	34.7	9.1	183.8	3.5	<1.0	4.8	9.1	27.1	306.4
19/Dec/2006	16/Jan/2007	5.3	28.1	5.3	10.0	230.9	46.2	9.2	240.0	3.5	<1.0	0.3	4.8	34.9	316.5
					Precipitation< weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5152			22.5	10.4	15.1	105.5	21.6	8.8	110.2	3.4	0.5	9.8	9.1		1992.8

Polloch

2006

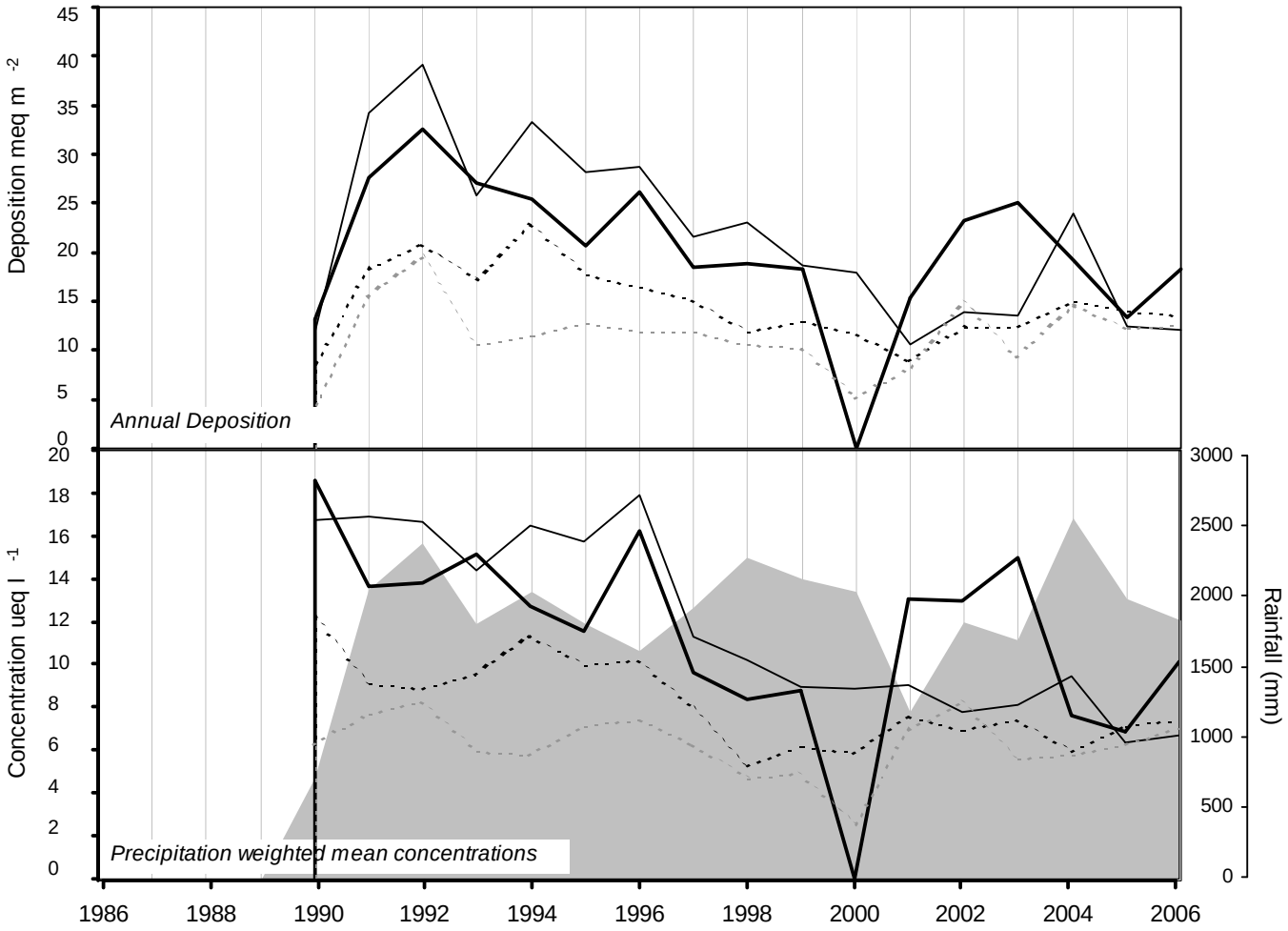
Site Code:	**5151**
Easting:	**1792**
Northing:	**7689**
Latitude:	**56 45 34 N**
Longitude:	**05 36 46 W**
Altitude (m):	**30**
Rainfall (mm):	**2170**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, in forest area

Other measurements:
DT, UKAWMN

Site Operator:
Mr. J Kirby



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

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

hydrogen ion
-0.32 ueq/l (-2.04 %/year): 15 years' data
\+ Significant trend detected

non-marine sulphate
-0.75 ueq/l (-3.61 %/year): 16 years' data
++++ Very strong trend detected

nitrate
-0.22 ueq/l (-2.09 %/year): 16 years' data
\+ Significant trend detected

ammonium
-0.05 ueq/l (-0.75 %/year): 16 years' data
\- No significant trend detected

(5151) Polloch

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
10/Jan/2006	22/Jan/2006	5.1	26.3	9.0	9.5	138.4	25.7	8.8	149.2	6.0	<1.0	9.6	7.6	25.5	186.2
22/Jan/2006	07/Feb/2006	4.4	52.3	34.1	26.6	139.6	28.5	14.5	153.7	3.6	<1.0	35.5	36.3	38.7	27.1
07/Feb/2006	21/Feb/2006	5.3	12.2	4.4	4.1	67.3	11.0	0.1	73.8	<0.3	<1.0	4.1	4.6	12.8	125.8
21/Feb/2006	07/Mar/2006	5.1	29.5	8.9	7.0	187.0	40.2	11.7	213.3	4.0	<1.0	6.9	7.6	29.0	17.4
07/Mar/2006	21/Mar/2006	4.8	12.2	10.8	5.6	14.8	2.9	1.7	15.3	0.7	<1.0	10.4	17.0	11.1	58.4
21/Mar/2006	04/Apr/2006	5.1	14.6	14.4	10.9	75.4	16.6	5.8	69.2	2.2	<1.0	5.5	8.9	14.8	13.4
04/Apr/2006	18/Apr/2006	5.3	33.0	4.7	8.0	263.7	55.9	18.5	289.3	5.7	<1.0	1.2	5.2	39.9	29.8
18/Apr/2006	02/May/2006	5.7	19.4	8.0	2.7	87.3	18.0	14.0	81.3	2.1	<1.0	8.9	1.9	15.0	9.6
02/May/2006	16/May/2006	4.7	34.4	32.5	42.3	29.8	8.7	14.6	28.8	2.5	<1.0	30.8	19.5	18.4	64.9
16/May/2006	30/May/2006	5.2	13.7	2.9	<0.7	82.5	17.5	4.5	85.6	2.2	<1.0	3.8	6.3	15.1	144.4
30/May/2006	13/Jun/2006	6.8	35.4	26.0	116.2	71.8	14.5	7.4	53.2	14.3	42.2	26.8	0.2	30.0	4.6
13/Jun/2006	27/Jun/2006	5.1	18.8	4.3	3.4	106.2	21.2	5.6	105.5	2.9	<1.0	6.0	7.4	18.6	78.0
27/Jun/2006	11/Jul/2006	6.5	19.7	10.1	9.2	65.0	13.5	16.1	44.0	8.6	11.0	11.8	0.3	12.5	6.1
11/Jul/2006	25/Jul/2006	4.5	59.6	35.4	35.4	80.3	18.8	17.2	80.3	6.5	<1.0	49.9	29.5	29.5	9.1
25/Jul/2006	08/Aug/2006	5.5	12.1	<1.4	<0.7	25.1	7.0	10.1	24.3	6.4	<1.0	9.1	3.1	5.5	53.1
08/Aug/2006	22/Aug/2006	5.3	49.6	3.7	6.5	341.8	69.3	32.0	382.3	14.6	<1.0	8.4	5.6	55.6	13.9
22/Aug/2006	05/Sep/2006	5.0	17.0	3.1	<0.7	86.6	16.7	7.3	92.3	2.9	<1.0	6.5	11.2	15.3	71.7
05/Sep/2006	19/Sep/2006	4.8	9.9	7.5	4.0	24.0	3.3	4.7	24.8	1.1	<1.0	7.0	14.8	7.2	79.1
19/Sep/2006	04/Oct/2006	5.2	9.4	6.5	4.9	32.1	3.2	1.7	32.8	3.5	<1.0	5.6	6.2	5.7	134.2
04/Oct/2006	17/Oct/2006	5.1	17.9	5.0	14.2	92.4	16.7	18.5	102.3	3.6	<1.0	6.7	7.9	15.1	70.9
17/Oct/2006	31/Oct/2006	5.1	20.0	6.1	<0.7	161.7	32.3	10.1	167.5	3.6	<1.0	0.5	7.6	24.3	108.8
31/Oct/2006	14/Nov/2006	5.0	63.1	12.8	10.4	590.5	94.1	24.9	614.8	11.0	<1.0	0.0	9.8	82.9	85.4
14/Nov/2006	28/Nov/2006	4.7	34.2	5.4	9.0	282.5	58.6	13.5	299.2	5.7	4.6	0.1	20.0	-	170.1
28/Nov/2006	12/Dec/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
12/Dec/2006	26/Dec/2006	5.0	41.5	4.6	<0.7	373.6	73.5	16.9	386.5	5.8	<1.0	0.0	9.8	56.2	83.5
26/Dec/2006	09/Jan/2007	5.1	26.2	4.3	4.5	199.0	37.0	8.9	214.7	3.4	<1.0	2.2	7.8	32.8	168.1
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5151			24.3	7.5	7.0	155.6	29.4	9.5	164.3	4.0	0.9	6.7	10.1		1813.5

Lochnagar

2006

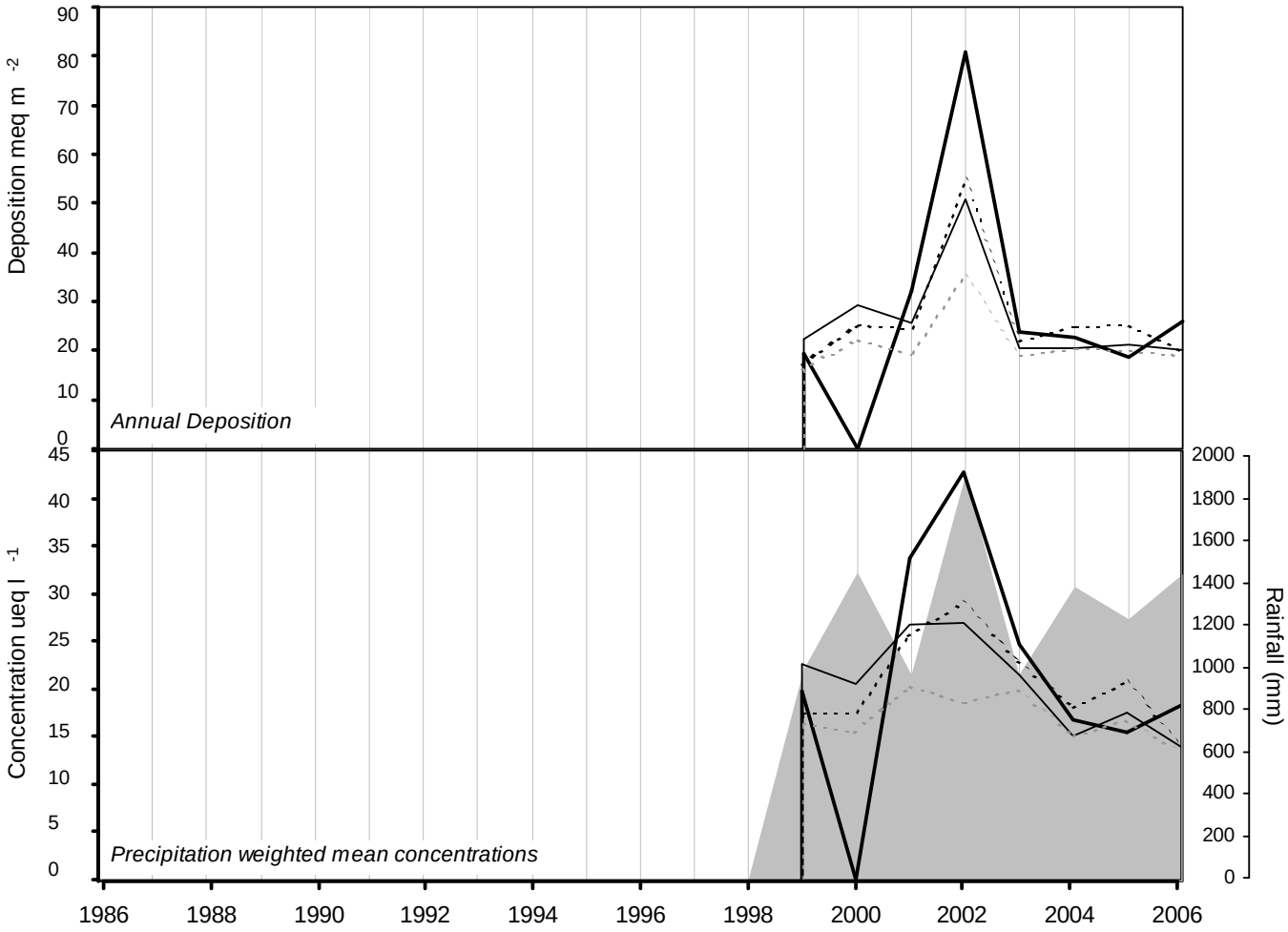
Site Code:	**5157**
Easting:	**3252**
Northing:	**7859**
Latitude:	**56 57 29N**
Longitude:	**03 13 51 W**
Altitude (m):	**785**
Rainfall (mm):	**-**

[30 year mean 1940 - 1971]

Site Environment:
Heathland 60% and bare ground 40%

Other measurements:
UKAWMN, Automatic weather station

Site Operator:
ENSIS



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

long-term trends in concentration (+x = increase; -x = decrease)
hydrogen ion
non-marine sulphate
nitrate
ammonium

(5157) Lochnagar

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
12/Jan/2006	25/Jan/2006	4.6	33.2	24.4	21.6	30.6	7.1	4.0	29.1	1.0	<1.0	29.5	26.3	16.9	68.8
25/Jan/2006	09/Feb/2006	4.9	43.3	34.5	17.7	142.5	24.6	11.0	116.2	4.8	<1.0	26.1	12.6	30.2	7.5
09/Feb/2006	22/Feb/2006	4.9	20.6	17.3	19.1	36.5	9.6	5.4	38.0	1.2	<1.0	16.2	14.1	13.5	31.3
22/Feb/2006	21/Mar/2006	4.5	34.7	33.4	29.9	83.7	18.9	7.2	81.6	3.0	<1.0	24.6	29.5	27.5	22.2
21/Mar/2006	06/Apr/2006	4.7	19.5	20.8	15.7	31.6	8.5	4.1	29.7	1.3	<1.0	15.7	19.1	14.7	49.7
06/Apr/2006	19/Apr/2006	5.4	20.0	4.0	5.9	131.0	27.9	10.1	131.1	3.1	<1.0	4.2	4.2	21.7	7.3
19/Apr/2006	04/May/2006	5.2	36.9	23.5	39.1	76.3	16.7	15.2	68.3	3.0	<1.0	27.8	7.1	19.5	33.3
04/May/2006	17/May/2006	4.6	42.0	60.7	60.6	17.8	7.4	21.8	15.8	5.3	<1.0	39.9	23.4	21.9	35.0
17/May/2006	02/Jun/2006	5.0	9.3	6.6	9.0	19.7	5.0	2.8	19.6	0.9	<1.0	7.0	9.8	9.5	84.6
02/Jun/2006	14/Jun/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
14/Jun/2006	28/Jun/2006	4.9	10.8	4.8	4.0	13.3	3.8	3.9	13.1	0.5	<1.0	9.2	11.5	6.0	54.8
28/Jun/2006	12/Jul/2006	4.9	20.0	14.6	14.9	7.7	2.9	5.3	8.0	2.1	1.4	19.1	13.8	8.5	53.3
12/Jul/2006	27/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
27/Jul/2006	10/Aug/2006	4.7	22.8	14.4	18.1	27.0	4.8	5.2	28.5	5.4	<1.0	19.6	21.9	10.2	19.6
10/Aug/2006	24/Aug/2006	4.3	26.4	36.2	33.4	6.0	1.7	4.6	8.2	1.3	<1.0	25.7	46.8	16.3	78.2
24/Aug/2006	06/Sep/2006	4.9	8.5	5.3	<0.7	18.3	3.2	3.2	18.4	1.0	<1.0	6.3	12.3	5.1	36.7
06/Sep/2006	21/Sep/2006	4.6	26.8	18.1	15.9	12.6	2.6	5.6	17.1	2.1	<1.0	25.3	24.5	10.8	123.6
21/Sep/2006	04/Oct/2006	4.7	19.7	16.9	13.8	10.7	2.1	2.6	13.6	2.1	<1.0	18.4	20.4	9.3	74.2
04/Oct/2006	19/Oct/2006	4.7	48.8	56.5	60.9	28.5	9.2	10.6	31.6	4.5	10.6	45.3	20.9	19.7	45.9
19/Oct/2006	03/Nov/2006	4.6	8.7	9.2	3.5	15.9	3.0	3.4	15.4	1.0	<1.0	6.7	24.0	8.7	113.7
03/Nov/2006	16/Nov/2006	4.9	12.8	6.7	4.4	73.8	13.4	5.6	70.4	1.1	<1.0	3.9	12.9	12.8	44.5
16/Nov/2006	29/Nov/2006	4.8	16.3	10.0	7.3	56.9	14.4	10.6	58.3	1.3	<1.0	9.5	16.6	14.9	13.9
29/Nov/2006	14/Dec/2006	4.9	11.8	5.1	4.9	44.8	8.4	5.1	45.6	1.1	<1.0	6.4	12.9	9.5	280.1
14/Dec/2006	27/Dec/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
27/Dec/2006	25/Jan/2007	5.0	13.9	6.1	9.5	70.0	14.2	4.0	69.7	0.9	<1.0	5.4	11.2	14.1	148.7
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5157			18.1	14.1	13.3	34.4	7.3	5.3	34.6	1.5	0.5	14.0	18.2		1427.6

Glen Dye

2006

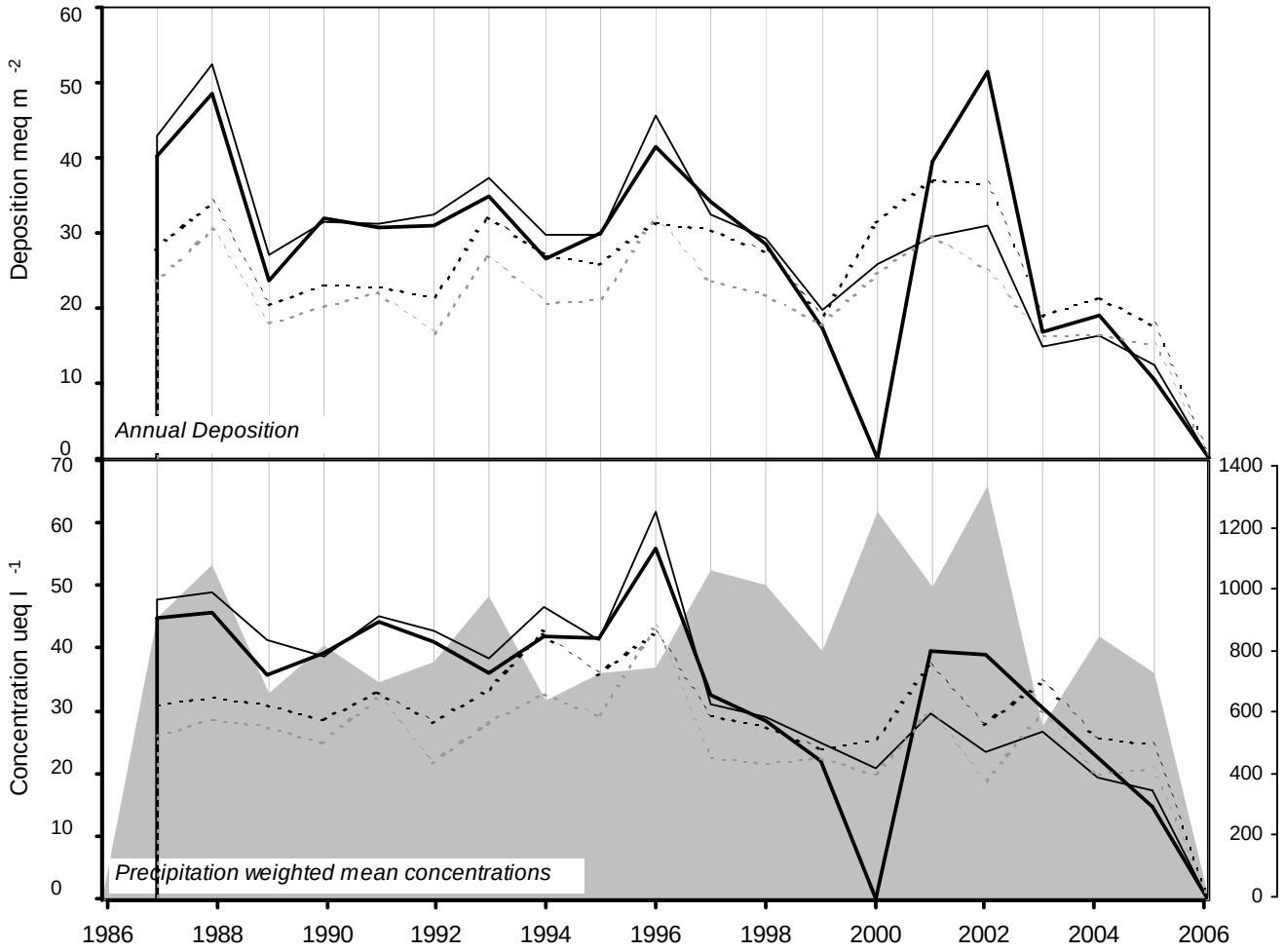
Site Code:	**5011**
Easting:	**3642**
Northing:	**7864**
Latitude:	**56 58 03 N**
Longitude:	**02 35 20 W**
Altitude (m):	**185**
Rainfall (mm):	**1311**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland

Other measurements:
N/A

Site Operator:
N/A



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

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

hydrogen ion
-1.12 ueq/l (-2.37 %/year): 18 years' data
++ Moderately strong trend detected

non-marine sulphate
-1.66 ueq/l (-3.19 %/year): 19 years' data
+++ Strong trend detected

nitrate
-0.25 ueq/l (-0.75 %/year): 19 years' data
- No significant trend detected

ammonium
-0.37 ueq/l (-1.22 %/year): 19 years' data
- No significant trend detected

(5011) Glen Dye

Site closed Jan 2006 – replaced by (5164) Glensaugh

	Precipitation<weighted annual means for site(samples containing phosphate are excluded)	Total rainfall
5011		

Glensaugh

2006

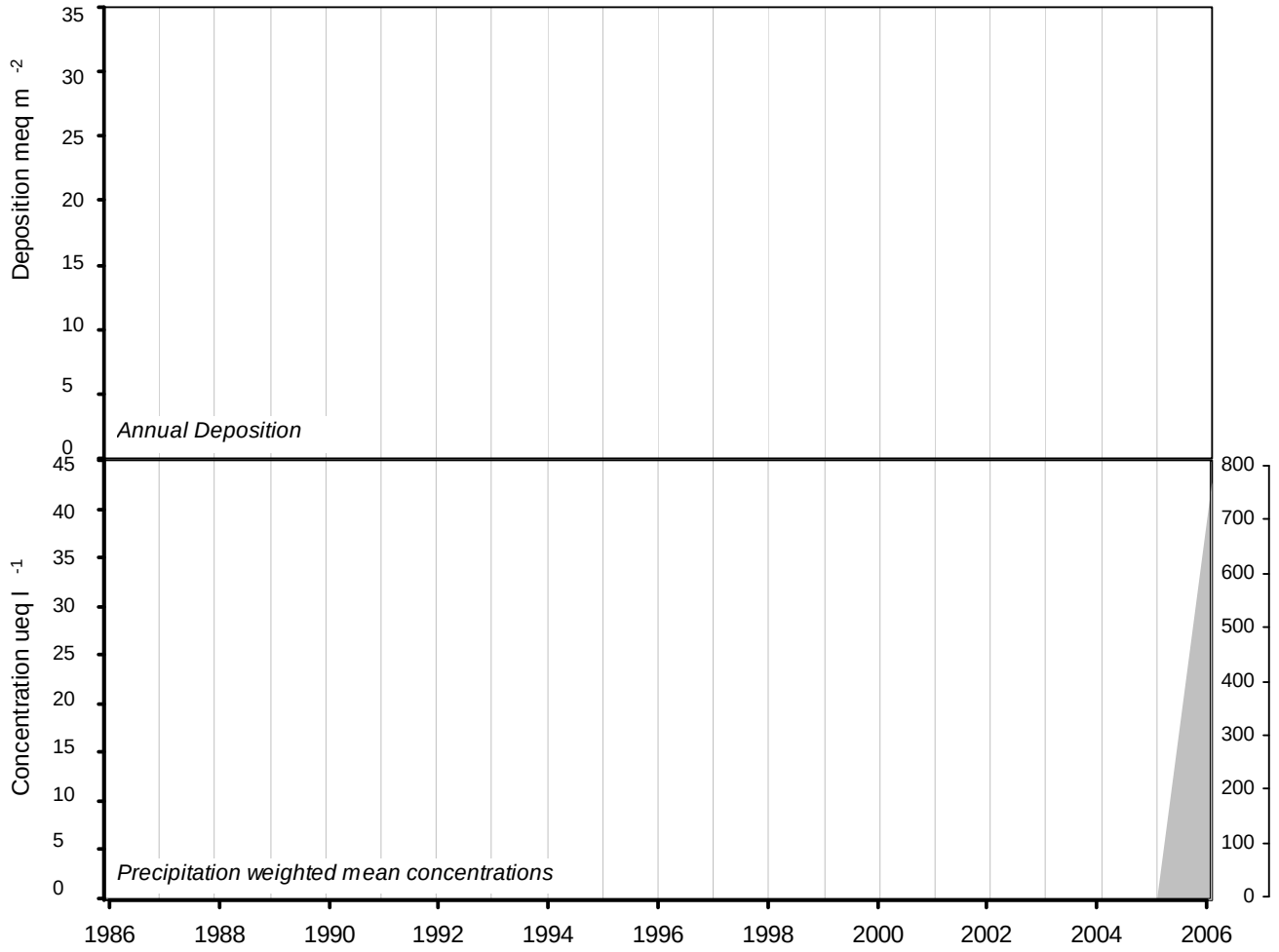
Site Code:	**5164**
Easting:	**3602**
Northing:	**7967**
Latitude:	**56 54 25 N**
Longitude:	**02 33 33 W**
Altitude (m):	**242**
Rainfall (mm):	**0**

[30 year mean 1940 - 1971]

Site Environment:
Moorland

Other measurements:
DT, ECN, HNO3 Denuder

Site Operator:
Macaulay Land Use Research Institute



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

long-term trends in concentration (+x = increase; -x = decrease)
hydrogen ion
non-marine sulphate
nitrate
ammonium

(5164) Glensaugh

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
18/Jan/2006	25/Jan/2006	6.1	43.4	41.6	43.4	49.4	9.7	28.6	52.2	8.1	<1.0	37.5	0.8	20.1	4.0
25/Jan/2006	08/Feb/2006	4.5	75.0	61.9	40.6	228.2	49.1	16.2	243.5	5.8	<1.0	47.5	30.2	52.3	5.1
08/Feb/2006	22/Feb/2006	4.8	31.9	29.8	32.7	86.1	19.0	9.1	98.9	1.8	<1.0	21.5	16.6	25.9	38.3
22/Feb/2006	08/Mar/2006	4.6	32.3	18.6	26.3	234.1	51.0	15.0	162.0	4.8	<1.0	4.1	23.4	47.9	11.6
08/Mar/2006	22/Mar/2006	4.0	138.0	119.0	116.6	325.1	75.1	20.8	341.5	12.2	<1.0	98.9	100.0	103.8	27.4
22/Mar/2006	05/Apr/2006	4.6	34.9	50.8	59.8	69.6	14.8	6.8	64.2	3.5	<1.0	26.5	26.9	27.9	97.2
05/Apr/2006	19/Apr/2006	5.6	23.5	12.8	15.8	95.7	21.2	11.3	104.3	3.2	<1.0	12.0	2.8	17.9	5.9
19/Apr/2006	03/May/2006	5.0	64.3	37.7	60.5	162.4	38.8	25.1	158.4	4.8	<1.0	44.7	10.0	33.6	14.0
03/May/2006	17/May/2006	4.6	56.5	71.7	68.7	53.1	15.2	25.8	45.2	3.7	<1.0	50.1	26.9	31.7	15.1
17/May/2006	02/Jun/2006	4.8	19.5	20.4	17.5	39.2	11.2	8.2	34.5	1.5	<1.0	14.8	14.5	13.6	51.2
02/Jun/2006	14/Jun/2006	5.0	22.5	20.9	23.4	18.7	4.8	6.6	16.8	3.8	<1.0	20.2	9.3	10.9	7.5
14/Jun/2006	11/Jul/2006	5.0	21.7	20.4	57.3	44.0	6.0	3.1	17.3	8.3	<1.0	16.4	10.7	9.6	99.6
11/Jul/2006	26/Jul/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
26/Jul/2006	09/Aug/2006	6.1	33.6	19.0	38.4	44.2	8.2	7.1	42.9	17.4	4.3	28.2	0.8	13.6	28.9
09/Aug/2006	22/Aug/2006	4.2	34.9	58.7	49.1	13.5	3.4	6.0	15.6	1.9	<1.0	33.3	60.3	24.4	28.9
22/Aug/2006	05/Sep/2006	6.4	42.0	19.0	119.9	33.4	2.7	1.5	36.9	17.4	39.6	38.0	0.4	26.4	11.5
05/Sep/2006	20/Sep/2006	6.8	60.9	53.1	314.7	49.1	21.1	17.5	51.6	53.5	92.9	54.9	0.2	59.9	9.1
20/Sep/2006	04/Oct/2006	6.5	64.2	37.9	21.5	51.4	11.0	8.5	58.1	21.0	15.5	58.0	0.3	29.8	31.1
04/Oct/2006	18/Oct/2006	4.1	76.6	119.0	93.3	72.7	17.5	17.0	77.5	5.9	1.5	67.9	83.2	48.2	38.6
18/Oct/2006	01/Nov/2006	4.9	21.5	17.4	9.3	71.3	14.4	7.8	84.7	14.2	2.1	12.9	14.1	17.5	51.4
01/Nov/2006	16/Nov/2006	4.9	21.1	15.8	24.3	51.4	9.3	6.4	49.7	2.5	<1.0	14.9	12.3	12.3	6.1
16/Nov/2006	29/Nov/2006	5.8	27.9	27.4	53.4	104.9	18.0	7.8	107.0	4.4	1.6	15.2	1.6	22.2	11.5
29/Nov/2006	13/Dec/2006	4.7	29.8	18.7	24.5	109.8	24.5	8.8	117.0	2.5	<1.0	16.6	19.1	22.6	57.7
13/Dec/2006	24/Jan/2007	4.9	21.8	11.8	16.0	100.3	18.4	5.4	101.8	1.9	1.5	9.7	11.7	19.0	108.3
					Precipitation< weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5164			35.5	36.0	42.7	84.8	17.8	8.8	82.1	5.5	1.0	25.2	24.0		759.8

Allt a' Mharcaidh

2006

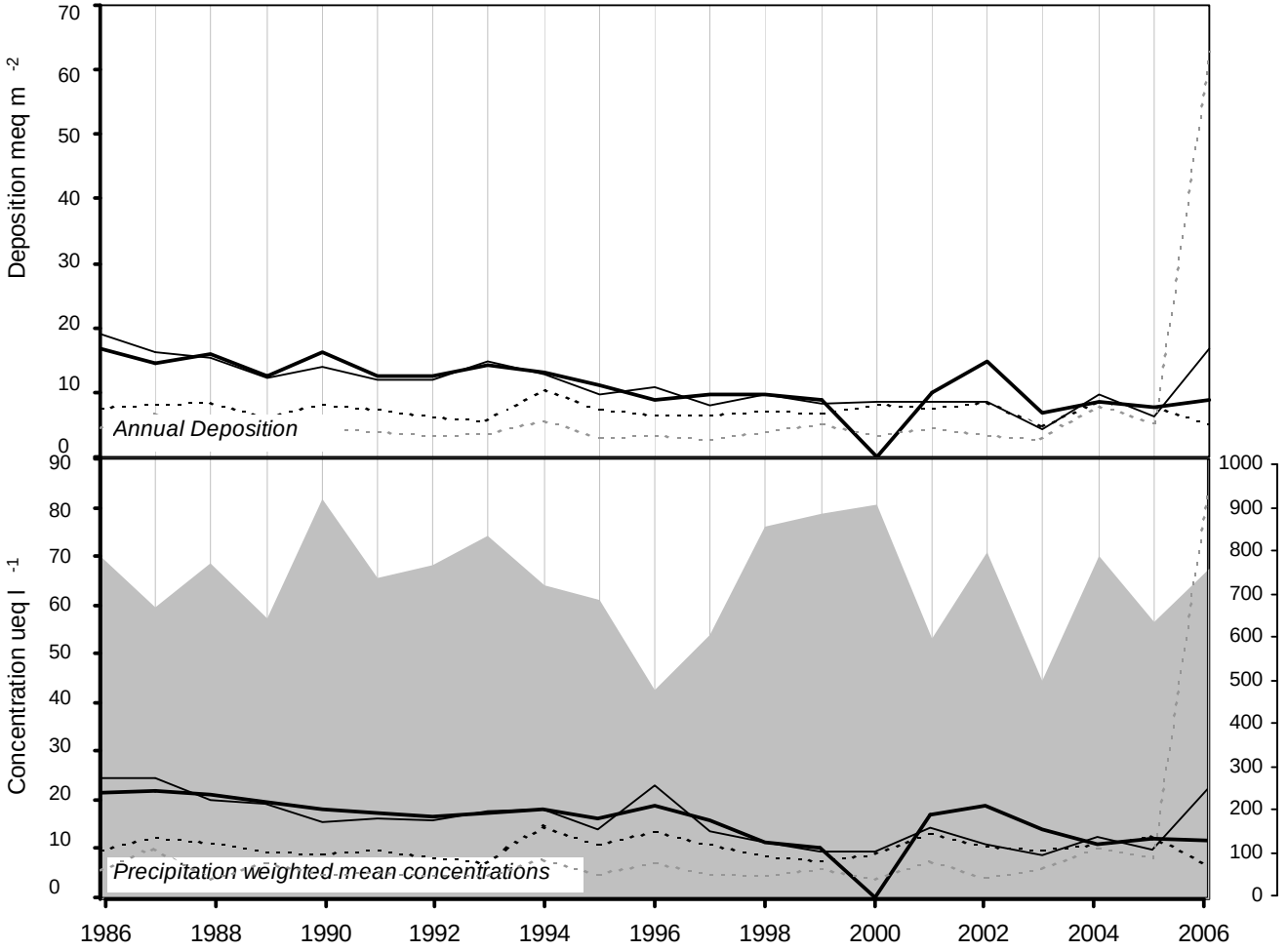
Site Code:	**5103**
Easting:	**2876**
Northing:	**8052**
Latitude:	**57 07 27 N**
Longitude:	**03 51 24 W**
Altitude (m):	**274**
Rainfall (mm):	**1221**

[30 year mean 1940 - 1971]

Site Environment:
Moorland, in forestry SW Cairngorms

Other measurements:
DT, UKAWMN

Site Operator:
Fisheries Research Services



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

long-term trends in concentration (+x = increase; -x = decrease)
hydrogen ion
non-marine sulphate
nitrate
ammonium

(5103) Allt a' Mharcaidh

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
09/Jan/2006	23/Jan/2006	5.0	17.2	9.9	3.1	76.3	14.9	6.6	76.0	1.9	<1.0	8.0	10.0	15.3	22.3
23/Jan/2006	06/Feb/2006	4.5	59.6	56.2	27.2	160.9	29.5	59.8	142.7	7.9	<1.0	40.2	33.1	4.4	2.5
06/Feb/2006	20/Feb/2006	4.8	18.6	12.8	3.7	37.6	8.9	1.6	45.3	<0.9	<1.0	14.0	15.8	14.2	19.5
20/Feb/2006	06/Mar/2006	4.9	30.6	15.8	8.0	159.5	31.8	12.7	185.8	5.8	<1.0	11.4	13.8	28.8	22.8
06/Mar/2006	20/Mar/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0
20/Mar/2006	03/Apr/2006	6.3	106.7	19.2	640.7	91.1	15.0	3.3	84.0	97.3	219.6	95.7	0.5	95.1	30.1
03/Apr/2006	17/Apr/2006	7.1	130.0	3.7	1099.6	167.5	12.5	2.3	183.9	129.9	331.8	109.8	0.1	71.1	27.2
17/Apr/2006	01/May/2006	7.8	860.5	16.0	6040.9	404.5	221.8	43.6	572.1	1079.1	<1.0	811.8	0.0	1117.0	7.3
01/May/2006	15/May/2006	8.2	830.8	77.1	6529.9	277.8	151.5	70.2	285.3	653.4	1536.1	797.3	0.0	798.0	3.4
15/May/2006	29/May/2006	8.2	964.3	3.7	7462.5	310.9	98.7	57.9	342.7	942.6	484.6	926.8	0.0	1268.0	12.5
29/May/2006	12/Jun/2006	8.3	2986.2	<1.4	12741.0	792.0	117.9	80.1	893.8	1538.3	1695.6	2890.8	0.0	1966.0	10.1
12/Jun/2006	26/Jun/2006	8.0	231.9	4.7	2832.3	80.7	37.1	17.4	86.3	236.9	513.2	222.2	0.0	403.0	23.5
26/Jun/2006	10/Jul/2006	8.3	633.5	2.1	10733.3	175.9	29.9	30.5	156.3	624.4	145.3	612.3	0.0	743.0	35.5
10/Jul/2006	24/Jul/2006	4.2	15.0	1.5	1.8	7.9	8.7	17.9	17.2	2.3	12.2	14.1	63.1	24.4	2.2
24/Jul/2006	07/Aug/2006	4.8	9.5	10.4	16.8	43.5	4.0	13.1	13.7	12.9	<1.0	4.3	16.6	7.1	28.1
07/Aug/2006	21/Aug/2006	4.7	17.3	19.7	18.0	14.6	4.5	5.9	14.5	3.5	4.5	15.6	18.6	38.7	26.1
21/Aug/2006	04/Sep/2006	4.8	6.7	3.9	13.8	20.3	4.6	4.8	21.7	1.9	<1.0	4.2	14.5	5.3	17.3
04/Sep/2006	18/Sep/2006	4.7	8.7	10.3	5.7	5.7	3.0	9.6	2.2	2.3	<1.0	8.0	21.9	5.4	44.1
18/Sep/2006	02/Oct/2006	6.8	35.5	11.4	92.9	13.5	3.6	<1.0	17.5	11.9	32.6	33.9	0.1	19.7	43.5
02/Oct/2006	16/Oct/2006	4.6	15.4	15.2	7.4	21.6	5.1	7.3	24.8	2.7	<1.0	12.8	22.9	8.9	27.4
16/Oct/2006	30/Oct/2006	4.7	1.1	2.3	7.6	16.2	4.9	5.8	2.0	1.0	<1.0	0.0	21.4	11.2	48.6
30/Oct/2006	13/Nov/2006	5.1	14.3	3.3	<0.7	129.1	22.6	10.2	121.2	2.2	<1.0	0.0	8.7	19.0	31.4
13/Nov/2006	27/Nov/2006	5.9	18.5	5.0	<0.7	105.9	12.7	8.4	88.2	0.4	2.1	5.7	1.4	14.8	51.5
27/Nov/2006	11/Dec/2006	5.2	3.0	2.0	1.1	59.8	10.5	4.7	14.9	1.7	<1.0	0.0	6.2	10.0	99.5
11/Dec/2006	28/Dec/2006	5.2	11.6	1.8	<0.7	93.4	16.4	7.0	96.7	1.6	<1.0	0.4	6.3	14.4	68.4
28/Dec/2006	08/Jan/2007	5.1	7.1	3.0	0.9	39.3	5.7	2.3	37.1	3.8	<1.0	2.4	8.3	7.1	43.3
						Precipitation<weighted annual means for site(samples containing phosphate are excluded)									Total rainfall
5103			22.1	6.7	83.4	65.3	13.4	7.6	56.1	16.7	0.8	22.3	11.6		749.2

Strathvaich Dam

2006

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

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, deer

Other measurements:
DT, HNO3 Denuder, NOx, ozone, EMEP

Site Operator:
CLOVA Environmental Research and Testing Services

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

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

hydrogen ion
-0.33 ueq/l (-2.13 %/year): 19 years' data
++ Moderately strong trend detected

non-marine sulphate
-0.42 ueq/l (-2.80 %/year): 20 years' data
++ Moderately strong trend detected

nitrate
-0.11 ueq/l (-1.19 %/year): 20 years' data
- No significant trend detected

ammonium
0.02 ueq/l (0.45 %/year): 20 years' data
- No significant trend detected

(5010) Strathvaich Dam

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
02/Jan/2006	13/Jan/2006	5.3	26.2	6.5	<0.7	196.3	36.5	9.9	219.3	4.4	<1.0	2.6	5.0	32.4	37.3
13/Jan/2006	23/Jan/2006	5.6	22.5	3.6	<0.7	180.7	30.7	10.5	195.8	4.5	<1.0	0.7	2.5	29.3	41.8
23/Jan/2006	04/Feb/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4
04/Feb/2006	21/Feb/2006	5.3	13.9	5.6	1.9	74.8	12.0	5.1	84.2	0.0	<1.0	4.9	5.2	15.0	45.0
21/Feb/2006	08/Mar/2006	4.8	33.7	10.6	3.3	227.1	49.9	14.6	239.7	5.9	<1.0	6.4	15.5	38.3	21.1
08/Mar/2006	19/Mar/2006	4.6	25.1	18.2	13.5	34.8	8.3	6.9	25.2	1.6	<1.0	20.9	27.5	17.6	10.4
19/Mar/2006	01/Apr/2006	4.9	13.4	16.7	11.9	53.2	18.7	6.7	51.0	2.9	<1.0	6.9	13.5	13.5	48.3
01/Apr/2006	16/Apr/2006	5.1	29.5	3.5	<0.7	244.2	49.5	13.8	254.4	5.6	<1.0	0.1	7.6	35.6	123.0
16/Apr/2006	01/May/2006	5.2	27.5	7.0	9.4	197.1	1.7	<1.0	208.7	21.5	<1.0	3.7	6.5	29.6	52.9
01/May/2006	14/May/2006	4.6	71.5	83.3	87.7	65.0	20.3	37.4	63.9	6.1	<1.0	63.7	28.2	35.0	16.8
14/May/2006	02/Jun/2006	4.9	16.3	8.7	2.3	79.1	16.3	7.3	72.6	3.2	<1.0	6.7	12.6	17.1	76.7
02/Jun/2006	12/Jun/2006	5.1	9.8	8.4	3.1	10.8	9.4	9.5	11.8	0.7	<1.0	8.5	8.1	6.6	6.7
12/Jun/2006	22/Jun/2006	4.9	10.1	4.4	1.2	27.3	5.7	3.7	28.2	1.2	<1.0	6.8	12.6	8.8	49.5
22/Jun/2006	09/Jul/2006	4.9	50.0	39.8	36.8	89.3	17.5	12.8	103.3	6.4	<1.0	39.3	12.9	23.3	6.9
09/Jul/2006	23/Jul/2006	4.5	56.6	62.8	63.0	99.8	19.8	24.6	94.1	10.5	1.1	44.6	29.5	36.7	12.2
23/Jul/2006	06/Aug/2006	5.3	9.2	10.0	15.1	14.7	3.0	5.8	14.2	3.2	<1.0	7.5	5.6	5.2	61.2
06/Aug/2006	21/Aug/2006	4.7	26.9	12.7	12.5	131.2	17.7	8.0	143.9	3.4	<1.0	11.1	20.4	25.2	31.3
21/Aug/2006	06/Sep/2006	5.0	13.4	3.8	1.7	62.6	11.7	6.5	63.5	2.2	<1.0	5.8	11.2	10.9	24.9
06/Sep/2006	19/Sep/2006	5.0	7.3	8.2	121.4	16.1	3.1	6.7	12.9	21.8	<1.0	5.3	9.3	5.7	35.1
19/Sep/2006	02/Oct/2006	5.0	9.4	8.4	0.7	12.4	2.0	0.9	15.5	<0.5	<1.0	7.9	10.7	5.5	54.9
02/Oct/2006	15/Oct/2006	5.1	12.6	6.7	<0.7	1587.8	11.0	13.4	74.3	239.0	<1.0	0.0	8.9	11.5	33.7
15/Oct/2006	01/Nov/2006	4.7	13.7	11.2	5.2	70.6	14.4	4.7	77.9	1.7	<1.0	5.2	20.9	15.8	150.4
01/Nov/2006	11/Nov/2006	5.1	34.0	9.8	<0.7	302.1	43.4	17.8	314.3	3.9	<1.0	0.0	8.1	46.2	31.4
11/Nov/2006	28/Nov/2006	5.4	38.2	4.8	3.6	328.0	67.8	15.0	350.2	6.1	4.0	0.0	4.3	50.0	34.9
28/Nov/2006	14/Dec/2006	5.3	11.9	2.5	<0.7	94.0	17.7	5.7	101.3	2.0	<1.0	0.6	5.4	14.9	260.0
14/Dec/2006	28/Dec/2006	5.2	26.8	3.2	<0.7	211.2	41.5	10.7	222.9	3.5	<1.0	1.4	6.0	33.3	37.7
28/Dec/2006	14/Jan/2007	5.3	45.9	2.3	<0.7	419.5	79.4	19.9	440.6	2.8	<1.0	0.0	5.0	61.1	192.7
					Precipitation<weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5010			22.5	7.7	7.3	189.0	28.5	9.5	163.3	9.4	0.6	5.5	9.5		1498.1

Achanarras

2006

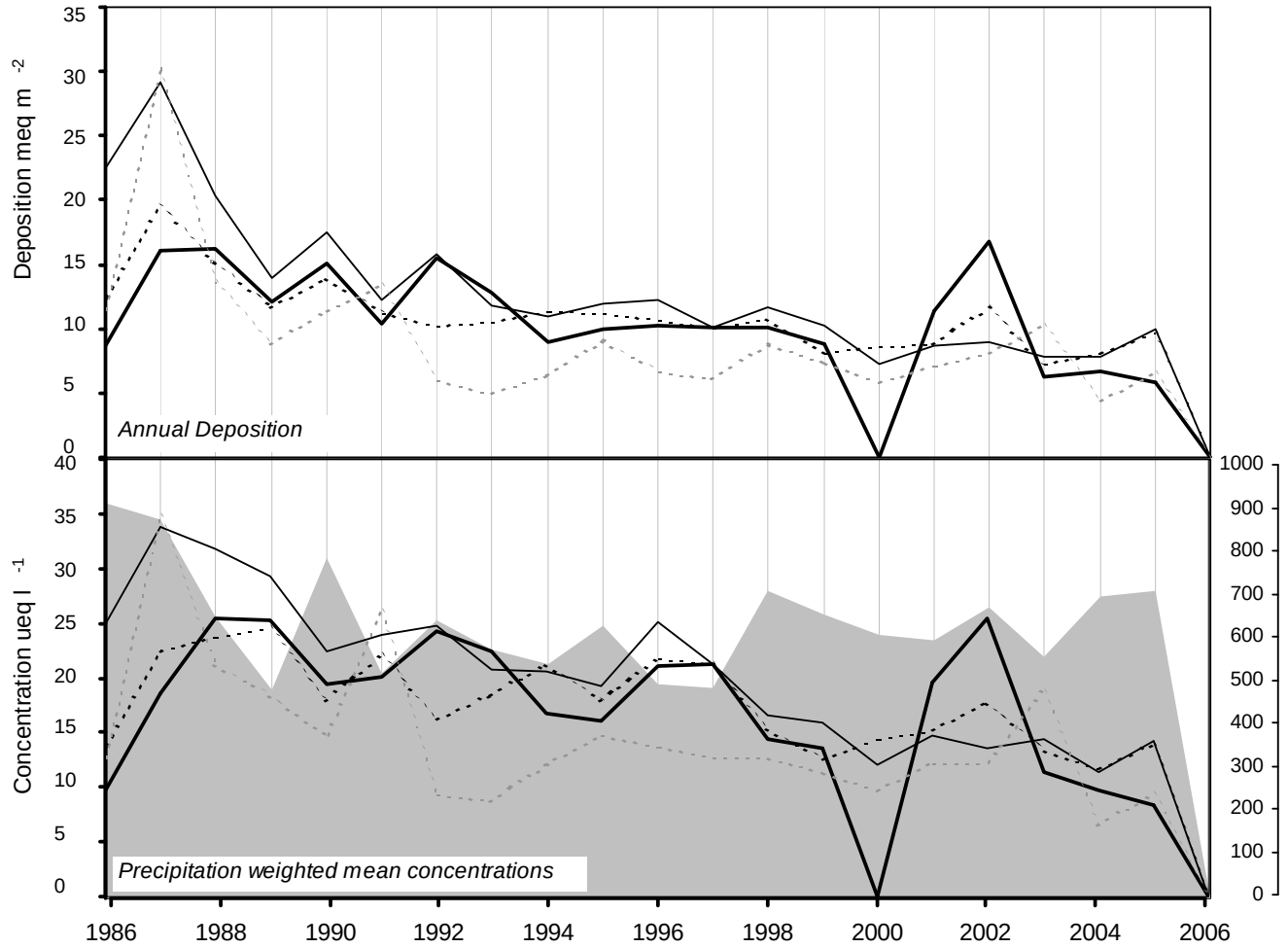
Site Code:	**5140**
Easting:	**3151**
Northing:	**9550**
Latitude:	**58 28 31 N**
Longitude:	**03 27 21 W**
Altitude (m):	**98**
Rainfall (mm):	**973**

[30 year mean 1940 - 1971]

Site Environment:
Open moorland, farm pastures

Other measurements:
N/A

Site Operator:
N/A



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

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

hydrogen ion
-0.39 ueq/l (-1.79 %/year): 19 years' data
\- No significant trend detected

non-marine sulphate
-0.95 ueq/l (-3.23 %/year): 20 years' data
++++ Very strong trend detected

nitrate
-0.43 ueq/l (-1.96 %/year): 20 years' data
++ Moderately strong trend detected

ammonium
-0.57 ueq/l (-2.86 %/year): 20 years' data
\+ Significant trend detected

(5140) Achanarras

Site closed Jan 2006 – replaced by (5166) Forsinain2

	Precipitation<weighted annual means for site(samples containing phosphate are excluded)	Total rainfall
5140		

Forsinain2

2006

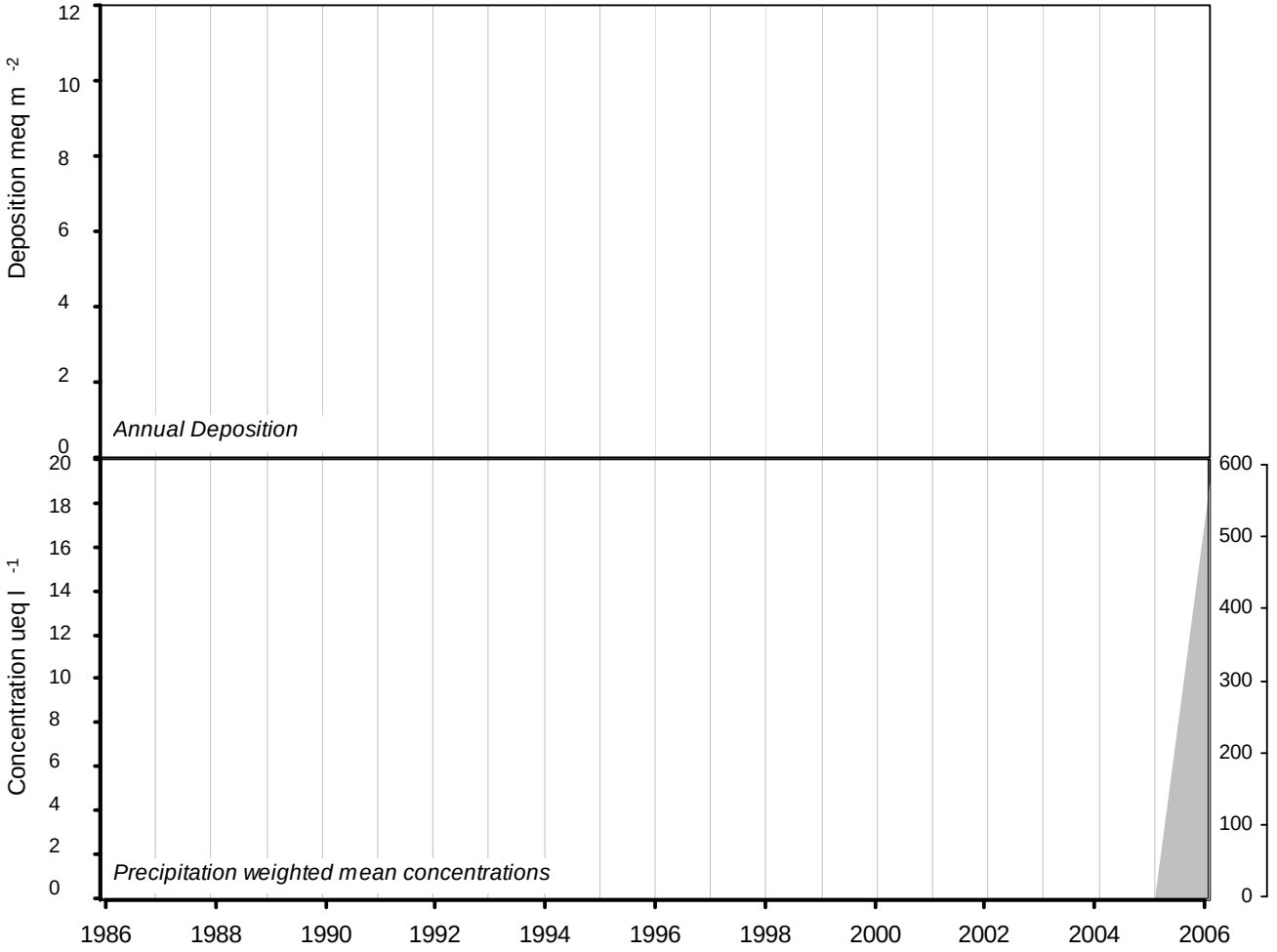
Site Code:	**5166**
Easting:	**2906**
Northing:	**9486**
Latitude:	**58 24 50 N**
Longitude:	**03 52 10 W**
Altitude (m):	**70**
Rainfall (mm):	**0**

[30 year mean 1940 - 1971]

Site Environment:
0

Other measurements:
DT, HNO3 Denuder

Site Operator:
Fountain Forestry Ltd



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

long-term trends in concentration (+x = increase; -x = decrease)
hydrogen ion
non-marine sulphate
nitrate
ammonium

(5166) Forsinain 2

Start Date	End Date	pH	SO4 (µeq/l)	NO3 (µeq/l)	NH4 (µeq/l)	Na (µeq/l)	Mg (µeq/l)	Ca (µeq/l)	Cl (µeq/l)	K (µeq/l)	PO4 (µeq/l)	Nss SO4 (µeq/l)	H+ (µeq/l)	Conductivity (S/cm)	Rainfall (mm)
01/Feb/2006	13/Feb/2006	5.9	38.6	24.3	20.9	219.8	38.3	15.9	249.0	10.0	<1.0	12.1	1.2	39.5	4.5
13/Feb/2006	27/Feb/2006	5.2	82.9	37.2	54.4	490.9	104.3	30.0	534.2	21.3	<1.0	23.8	6.9	82.4	3.9
27/Feb/2006	13/Mar/2006	4.3	120.2	27.8	59.2	565.8	126.7	31.0	630.1	14.8	<1.0	52.1	53.7	110.7	28.9
13/Mar/2006	27/Mar/2006	4.8	53.6	48.9	47.6	266.2	56.3	14.2	265.8	8.7	<1.0	21.5	17.0	51.8	28.2
27/Mar/2006	10/Apr/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
10/Apr/2006	24/Apr/2006	6.2	25.0	2.7	<0.7	134.3	30.6	15.9	143.0	7.1	13.4	8.8	0.7	44.7	35.8
24/Apr/2006	07/May/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6
07/May/2006	22/May/2006	6.1	53.9	45.2	55.6	167.8	33.8	38.1	158.4	18.8	<1.0	33.7	0.7	37.3	6.6
22/May/2006	15/Jun/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
15/Jun/2006	29/Jun/2006	6.0	53.9	82.6	179.2	36.1	24.1	101.7	61.1	17.4	11.4	49.6	1.0	28.6	10.9
29/Jun/2006	10/Jul/2006	5.5	17.0	2.9	22.2	41.1	9.0	14.2	60.9	1.9	<1.0	12.1	3.5	11.6	5.6
10/Jul/2006	24/Jul/2006	7.3	206.1	42.5	2492.4	37.3	52.7	20.0	72.3	229.0	552.4	201.6	0.1	433.0	20.7
24/Jul/2006	07/Aug/2006	6.4	38.7	11.7	46.9	105.7	35.0	19.8	117.8	24.5	23.5	26.0	0.4	25.3	54.4
07/Aug/2006	21/Aug/2006	6.4	47.6	22.1	90.7	91.8	17.8	14.6	100.3	45.2	55.9	36.5	0.4	50.2	30.6
21/Aug/2006	11/Sep/2006	6.8	53.9	13.4	181.7	338.5	47.0	21.0	376.4	45.4	7.4	13.1	0.2	78.0	4.8
11/Sep/2006	25/Sep/2006	5.3	27.0	23.2	30.6	55.9	5.1	4.0	39.4	12.1	<1.0	20.3	4.6	10.8	5.8
25/Sep/2006	09/Oct/2006	5.2	17.8	11.8	16.5	72.4	12.5	7.7	79.3	6.0	<1.0	9.1	6.2	13.6	58.0
09/Oct/2006	23/Oct/2006	4.7	14.0	21.2	13.3	31.3	6.8	4.8	32.0	1.5	<1.0	10.2	18.2	11.8	33.4
23/Oct/2006	06/Nov/2006	5.5	75.1	10.6	4.0	780.3	126.7	26.8	761.8	12.6	<1.0	0.0	3.3	107.4	85.0
06/Nov/2006	20/Nov/2006	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
20/Nov/2006	04/Dec/2006	5.1	56.1	9.1	6.6	513.3	104.1	24.9	523.7	9.1	<1.0	0.0	7.4	76.9	54.9
04/Dec/2006	12/Dec/2006	5.4	29.0	4.2	4.0	228.9	46.4	13.1	256.9	4.4	<1.0	1.4	4.2	36.1	25.3
12/Dec/2006	14/Jan/2007	5.6	46.4	4.4	10.5	420.2	85.7	17.2	462.1	6.6	<1.0	0.0	2.3	58.6	70.4
					Precipitation< weighted annual means for site(samples containing phosphate are excluded)										Total rainfall
5166			51.3	14.8	18.9	397.6	74.6	18.6	410.5	9.1	0.6	17.7	9.7		568.5

Appendix 2

Tables of Annual Mean Concentrations and Total Rainfall 1986 – 2006

Notes to Tables A.2.1 to A.2.10:

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

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

Table II.1. Precipitation-weighted annual mean acidity, 1986 to 2006 (ueq/l)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Goonhilly	19.7	23.3	15.1	19.4	14.3	25.9	15.4	17.7	19.8	17.5	19.5	20.3	14.2	13.3	0.0	22.5	30.8	21.8	14.6	17.9	16.7
Yarner Wood	17.2	20.3	14.2	20.0	13.1	17.1	17.6	17.2	18.1	15.1	17.9	18.0	12.5	13.6	0.0	22.9	17.3	21.7	13.9	16.2	14.1
Barcombe Mills	18.9	22.1	13.4	14.7	11.9	20.3	17.1	24.3	16.4	15.6	14.2	16.3	11.3	12.5	0.0	17.4	20.8	17.3	9.8	8.6	7.6
Compton	25.3	28.0	16.2	25.0	14.2	17.6	35.3	34.2	22.7	12.5	6.8	12.0	11.4	6.6	0.0	12.0	15.5	7.2	6.0	4.6	6.2
Crai Reservoir														12.4	0.0	13.9	18.7	16.5	10.0	10.2	13.0
Flatford Mill	33.0	43.0	34.5	35.4	29.1	42.5	35.9	25.6	27.2	30.4	25.1	26.1	25.3	27.0	0.0	19.6	23.6	22.0	23.6	19.3	11.0
Woburn	44.8	49.6	37.0	37.0	27.8	34.8	36.7	27.6	29.9	22.2	15.1	23.6	25.1	13.5	0.0	23.3	28.0	19.6	12.7	8.5	45.7
Rothamsted																					12.0
Tycanol Wood	15.7	16.8	15.1	18.4	13.8	21.0	20.7	17.7	14.2	14.4	15.8	12.6	11.0	11.3	0.0	14.1	15.8	17.8	12.0	11.9	16.9
Llyn Brianne	16.1	21.1	17.8	18.8	17.2	24.3	20.2	19.8	16.2	12.2	14.0	14.7	11.9	11.4	0.0	0.0	16.3	23.5	8.4	9.5	
Pumlumon				13.9	11.8	16.0	17.8	19.2	13.1	14.5	14.5	11.9	9.3	9.7	0.0	9.8	10.3	12.9	5.4	7.6	7.7
Stoke Ferry	34.6	35.8	29.7	40.4	18.2	22.3	29.8	27.7	18.4	23.7	15.7	19.5	18.4	17.4	0.0	15.3	27.7	19.2	11.8	8.9	11.3
Preston Montford	17.6	24.7	24.5	36.3	13.5	26.5	37.8	35.9	29.8	26.9	18.8	16.4	7.9	6.5	0.0	9.1	16.0	13.1	7.5	2.7	7.8
Bottesford	61.1	75.8	81.0	48.2	42.3	62.4	68.1	62.2	36.0	29.2	21.5	22.5	19.8	16.7	0.0	19.4	28.6	14.1	14.9	13.6	8.4
Llyn Llagi														13.0	0.0	14.7	13.3	15.8	9.5	10.8	9.3
Llyn Llydaw	16.6	18.8	17.2	15.4	12.3	15.6	13.7	18.5	11.6	10.5	12.4	10.5	11.2	12.3	0.0	14.1	17.2	12.3	9.1	9.8	11.2
River Etherow														24.6	0.0	28.8	34.4	27.7	13.8	11.9	11.2
Wardlow Hay Cop	28.8	44.5	33.2	36.8	23.7	32.6	33.9	36.5	27.0	28.3	22.1	18.1	16.0	10.3	0.0	19.0	22.8	9.0	5.7	4.9	4.5
Driby	42.1	42.5	42.4	46.6	41.0	40.6	44.9	35.6	35.9	36.6	18.2	21.8	34.1	21.4	0.0	22.5	29.2	48.7	12.6	21.0	17.7
Jenny Hurn	88.7	99.9	82.3	63.5	53.7	79.9	80.6	67.9	38.6	58.2	53.8	55.2	45.0	33.2	0.0	30.8					
Thorganby	75.1	69.0	88.0	83.5	63.7	55.4	81.5	80.9	44.4	51.3	43.5	28.8	43.0	16.2	0.0	25.8	30.2	16.8	15.5	9.7	9.5
High Muffles	58.2	62.9	71.9	54.7	55.0	58.1	59.4	47.5	41.5	40.9	39.6	32.5	34.6	22.1	0.0	38.0	36.0	22.4	16.9	18.5	17.5
Bannisdale	29.7	26.6	28.2	23.7	18.3	22.0	24.8	31.2	19.4	17.3	20.1	16.1	15.0	13.0	0.0	23.6	18.8	16.6	10.1	6.1	8.9
Hillsborough Forest				13.2	7.4	11.9	12.4	17.3	11.7	8.3	13.3	5.8	7.2	8.9	0.0	7.4	3.9	3.1	2.5	2.5	2.3
Lough Navar	11.2	9.5	9.6	9.7	8.1	6.0	7.7	11.2	7.1	7.8	6.1	6.5	5.5	6.1	0.0	8.2	7.8	6.0	4.5	2.6	5.7
Cow Green Reservoir	27.1	31.3	33.9	23.1	21.2	23.6	27.6	33.5	20.9	17.0	23.7	11.0	16.0	13.4	0.0	0.0	19.6	14.6	10.6	7.9	
Moorhouse																					9.9
Scoat Tarn														13.9	0.0	0.0	17.7	19.4	10.3	9.6	9.2
Loch Dee	28.9	23.3	18.6	14.6	15.2	18.5	16.6	22.3	15.2	13.4	19.3	11.4	10.0	11.6	0.0	19.2	13.2	14.4	11.8	9.4	10.5
Beaghs Burn														9.3	0.0	14.4	14.6	4.6	5.0	4.7	3.2
Redesdale	40.9	44.2	51.9	32.5	29.8	33.1	42.2	31.2	30.9	25.4	33.1	26.8	25.4	16.3	0.0	25.5	24.5	20.2	16.0	10.0	8.4
Eskdalemuir	19.6	25.0	27.3	19.6	23.9	21.5	21.9	26.2	16.9	15.8	17.4	16.7	13.8	14.0	0.0	21.9	16.7	14.0	7.7	10.6	9.0
Whiteadder	39.7	36.0	47.1	35.0	30.7	36.5	45.3	34.6	32.5	32.0	30.7	31.6	22.6	19.1	0.0	0.0	34.5	21.4	20.5	18.2	25.6
Loch Chon														15.7	0.0	23.5	21.9	21.4	13.3	11.8	12.6
Balquhidder	20.7	32.4	24.1	20.4	16.2	22.0	19.8	24.5	22.3	17.6	28.8	15.0	15.3	12.4	0.0	21.8	24.4	20.3	13.7	10.1	9.1
Polloch					18.6	13.7	13.8	15.1	12.7	11.5	16.3	9.7	8.4	8.8	0.0	13.1	13.0	15.0	7.6	6.8	10.1
Lochnagar														19.8	0.0	33.6	42.8	24.7	16.7	15.5	18.2
Glen Dye		44.7	45.6	35.8	39.4	44.4	40.9	36.0	41.8	41.5	56.0	32.4	28.5	21.8	0.0	39.5	39.0	30.4	22.6	14.6	
Glensaugh																					24.0
Allt a' Mharcaidh	21.6	21.7	20.9	19.6	17.9	17.2	16.7	17.2	18.2	16.2	18.8	16.0	11.4	10.2	0.0	16.9	18.8	13.9	10.8	12.2	11.6
Strathvaich Dam		15.7	16.1	12.9	11.2	15.4	19.9	13.4	10.6	10.4	12.9	12.0	9.7	9.5	0.0	11.9	13.4	11.3	9.9	6.4	9.5
Forsinain2																					9.7
Achanarras	9.7	18.6	25.4	25.3	19.5	20.1	24.3	22.5	16.8	16.1	21.1	21.3	14.4	13.6	0.0	19.5	25.4	11.4	9.7	8.4	

Table II.2. Precipitation-weighted annual mean non-marine sulphate, 1986 to 2006 (ueq/l)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Goonhilly	30	34	21	29	25	36	22	30	28	24	31	25	17	17	19	22	20	24	18	22	30
Yarner Wood	27	37	22	27	19	28	25	28	28	24	33	27	18	18	14	19	16	19	18	24	18
Barcombe Mills	46	50	40	44	38	52	43	33	36	33	38	25	30	26	21	25	25	35	36	29	23
Compton	79	104	64	60	58	63	63	48	55	49	61	42	38	32	26	28	27	29	32	37	25
Crai Reservoir														18	14	20	11	16	10	13	14
Flatford Mill	90	71	66	80	55	71	53	42	50	52	52	41	43	44	34	33	35	39	35	33	28
Woburn	73	80	85	73	66	63	57	44	59	46	56	39	42	38	30	34	32	33	34	43	92
Rothamsted																					26
Tycanol Wood	27	26	23	26	22	31	27	23	23	24	27	19	18	21	16	19	15	15	17	18	21
Llyn Brianne	24	29	26	27	27	30	28	27	26	22	26	20	19	17	15	0	14	17	11	21	
Pumlumon				19	19	24	24	23	18	21	23	17	14	14	11	12	10	12	10	12	11
Stoke Ferry	80	76	66	84	79	77	67	54	61	50	52	49	42	40	41	34	35	41	37	41	31
Preston Montford	45	60	56	60	37	66	64	48	52	60	49	32	27	24	25	30	32	23	21	24	17
Bottesford	90	93	109	83	66	75	73	58	63	55	54	43	45	39	33	42	40	44	34	38	32
Llyn Llagi														17	17	16	12	15	12	16	10
Llyn Llydaw	53	33	25	22	19	23	22	25	21	20	24	14	16	17	13	15	13	12	12	13	10
River Etherow														39	32	42	30	29	30	31	22
Wardlow Hay Cop	70	92	83	80	73	85	73	72	76	65	78	59	50	49	41	53	40	42	37	38	30
Driby	69	74	77	79	80	78	65	50	62	70	49	42	53	41	37	40	33	40	36	37	30
Jenny Hurn	110	106	121	98	88	83	77	61	80	65	81	58	70	54	51	53					
Thorganby	85	79	88	87	82	119	87	79	72	56	69	62	60	50	45	51	41	50	40	41	44
High Muffles	63	74	82	73	67	75	71	56	60	51	65	47	49	37	36	40	34	39	32	34	28
Bannisdale	42	38	45	40	41	38	42	45	37	37	44	31	30	27	22	27	20	25	19	24	21
Hillsborough Forest				52	36	42	41	41	45	33	45	26	29	30	23	33	18	17	17	17	19
Lough Navar	19	16	15	18	14	18	17	19	17	17	17	15	12	10	11	12	8	10	10	8	7
Cow Green Reservoir	35	39	44	35	33	34	38	41	31	31	37	26	26	25	19	0	17	18	16	16	
Moorhouse																					12
Scoat Tarn														23	17	0	15	17	15	16	12
Loch Dee	32	35	36	24	26	28	27	29	25	24	36	18	19	19	19	22	11	15	18	17	13
Beaghs Burn														37	16	21	11	12	10	13	18
Redesdale	58	46	62	47	36	43	46	36	42	37	51	37	34	25	23	29	22	24	26	19	19
Eskdalemuir	30	30	33	28	32	30	28	30	28	28	28	24	20	20	15	21	13	19	14	16	10
Whiteadder	53	48	61	47	33	45	50	37	40	43	44	33	27	24	24	0	28	19	23	26	26
Loch Chon														18	16	17	14	13	14	17	10
Balquhidder	26	33	28	24	22	27	23	26	24	21	38	21	19	15	15	19	15	16	13	15	10
Polloch					17	17	17	14	17	16	18	11	10	9	9	9	8	8	9	6	7
Lochnagar														23	20	27	27	21	15	18	14
Glen Dye		48	49	41	39	45	43	39	47	41	62	31	29	25	21	29	23	27	19	17	
Glensaugh																					25
Allt a' Mharcaidh	24	24	20	19	15	16	16	18	18	14	23	13	11	9	9	14	11	9	12	10	22
Strathvaich Dam		16	14	12	10	13	18	14	10	11	16	12	9	7	7	7	7	7	7	11	5
Forsinain2																					18
Achanarras	25	34	32	29	23	24	25	21	21	19	25	21	17	16	12	15	14	14	11	14	

Table II.3. Precipitation-weighted annual mean nitrate, 1986 to 2006 (ueq/l)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Goonhilly	19	27	16	22	20	32	17	23	24	23	28	28	18	20	17	24	23	28	20	27	33
Yarner Wood	16	24	14	19	13	19	16	21	25	21	31	27	14	17	11	20	17	18	20	30	20
Barcombe Mills	27	31	26	30	24	36	25	19	29	28	28	23	21	25	16	22	23	31	25	30	18
Compton	39	46	38	36	28	36	39	29	34	28	36	33	29	27	24	24	24	27	33	40	23
Crai Reservoir														10	8	13	9	15	9	12	12
Flatford Mill	39	45	42	56	36	44	40	31	37	39	38	36	39	41	31	35	37	43	44	46	29
Woburn	39	40	39	47	35	40	36	31	47	35	39	35	35	38	27	39	33	34	38	49	121
Rothamsted																					30
Tycanol Wood	12	15	12	15	11	18	14	12	16	15	18	16	11	13	10	14	12	15	13	16	14
Llyn Brianne	12	14	13	14	16	18	16	15	18	16	17	17	12	12	10	0	13	18	11	23	
Pumlumon				10	9	14	13	14	12	15	16	14	7	10	8	9	8	10	9	11	11
Stoke Ferry	48	44	39	55	45	48	43	36	43	39	37	41	38	40	39	34	35	41	40	47	35
Preston Montford	22	32	26	31	20	35	38	28	32	38	33	24	19	21	22	29	23	20	23	25	18
Bottesford	41	41	45	50	34	43	36	34	40	33	34	33	30	33	29	36	38	37	31	41	31
Llyn Llagi														13	9	12	11	13	10	17	11
Llyn Llydaw	17	16	13	11	10	12	10	15	13	15	15	11	10	12	9	12	11	11	10	13	9
River Etherow														31	24	36	25	28	29	32	21
Wardlow Hay Cop	25	36	31	36	26	38	29	33	35	33	40	30	24	28	25	35	28	29	30	31	24
Driby	39	44	48	48	46	50	46	38	49	50	39	40	45	39	35	38	34	38	35	41	35
Jenny Hurn	44	48	44	51	43	45	42	34	47	42	45	38	45	40	37	38					
Thorganby	41	42	42	49	40	50	42	46	40	37	38	38	34	32	34	37	33	31	31	41	37
High Muffles	38	43	47	45	38	47	37	37	42	38	43	35	36	32	31	38	31	34	31	35	28
Bannisdale	20	18	21	19	17	22	19	24	22	21	25	22	18	21	16	23	16	20	17	23	15
Hillsborough Forest				26	16	23	16	21	23	21	29	19	16	22	13	25	14	13	17	17	20
Lough Navar	8	8	7	9	7	9	9	11	15	12	10	12	6	6	7	9	8	6	8	9	7
Cow Green Reservoir	19	22	25	20	20	21	23	25	21	22	24	18	18	20	17	0	17	21	17	22	
Moorhouse																					14
Scoat Tarn														16	12	0	13	16	15	17	14
Loch Dee	14	19	18	14	14	16	15	19	18	16	22	14	13	13	14	18	9	14	12	17	13
Beaghs Burn														13	10	19	11	11	9	12	13
Redesdale	34	26	33	31	26	31	36	26	33	27	33	35	30	25	23	31	22	31	25	27	22
Eskdalemuir	14	18	19	18	15	19	16	19	19	19	20	20	15	17	14	19	14	18	14	20	13
Whiteadder	34	29	42	34	23	32	35	30	34	31	35	30	24	22	25	0	28	22	24	23	30
Loch Chon														19	14	16	13	14	14	16	11
Balquhidder	13	21	16	13	10	17	13	18	17	14	24	16	13	12	12	20	14	17	13	16	10
Polloch					12	9	9	10	11	10	10	8	5	6	6	8	7	7	6	7	7
Lochnagar														18	17	26	29	23	18	21	14
Glen Dye		31	32	31	29	33	28	33	42	36	42	29	27	24	25	37	28	34	26	25	
Glensaugh																					36
Allt a' Mharcaidh	10	12	11	10	9	10	8	7	15	11	14	11	9	8	9	13	11	10	11	13	7
Strathvaich Dam		10	8	7	6	9	9	9	9	9	10	10	6	8	6	7	8	7	6	5	8
Forsinain2																					15
Achanarras	14	22	24	25	18	22	16	18	21	18	22	21	15	12	14	15	18	13	12	14	

Table II.4. Precipitation-weighted annual mean ammonium, 1986 to 2006 (ueq/l)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Goonhilly	17	22	12	18	16	25	15	30	13	17	25	21	10	12	13	18	15	20	16	15	29
Yarner Wood	16	28	14	19	13	22	17	23	25	20	37	26	14	17	9	19	15	16	20	28	27
Barcombe Mills	38	41	36	39	35	50	31	16	30	33	32	22	18	25	14	23	20	25	21	19	20
Compton	71	73	46	57	55	63	57	41	53	53	79	53	48	44	29	36	31	32	44	56	37
Crai Reservoir														10	6	12	7	14	8	11	15
Flatford Mill	141	50	49	66	41	59	40	32	40	48	49	38	43	45	34	41	38	39	37	33	36
Woburn	54	50	52	56	43	52	41	35	55	48	63	40	36	47	29	44	37	28	44	55	120
Rothamsted																					31
Tycanol Wood	13	15	13	15	14	19	13	12	15	18	22	15	12	16	10	18	15	16	13	17	20
Llyn Brianne	12	13	14	16	16	20	18	16	16	18	19	15	13	14	12	0	14	15	11	23	
Pumlumon				13	13	17	20	15	13	21	18	16	10	12	7	12	15	11	11	11	15
Stoke Ferry	65	60	56	75	67	75	54	43	61	53	56	55	49	50	49	45	38	50	48	78	48
Preston Montford	47	57	49	53	44	57	57	37	50	54	60	38	36	38	30	51	76	37	34	64	28
Bottesford	56	45	49	68	54	48	40	34	55	48	56	45	45	48	37	49	48	47	39	46	45
Llyn Llagi														12	8	11	10	12	10	18	14
Llyn Llydaw	14	11	16	15	14	13	15	15	11	14	17	10	11	14	8	12	11	11	10	13	14
River Etherow														34	25	40	28	28	32	36	31
Wardlow Hay Cop	34	40	39	39	40	57	45	39	47	46	58	38	33	37	30	44	35	35	40	37	40
Driby	53	60	64	53	67	76	55	42	48	64	54	49	49	44	39	49	35	41	42	37	41
Jenny Hurn	64	51	53	64	64	65	45	28	55	50	66	53	61	46	45	54					
Thorganby	59	55	61	65	80	124	82	65	57	60	57	59	53	50	42	51	44	41	39	49	53
High Muffles	40	46	54	53	48	64	44	40	50	48	61	44	45	37	34	39	34	41	36	36	38
Bannisdale	40	27	31	30	32	34	27	31	32	36	40	33	27	27	23	33	23	27	23	38	55
Hillsborough Forest				60	45	48	40	44	49	43	63	40	38	43	39	54	35	33	34	44	42
Lough Navar	11	9	8	11	8	10	12	11	11	16	14	14	9	9	10	10	12	7	10	10	12
Cow Green Reservoir	20	19	25	23	24	26	25	29	21	30	26	27	20	23	19	0	18	21	18	24	
Moorhouse																					22
Scoat Tarn														21	14	0	16	18	18	20	21
Loch Dee	21	34	22	20	21	24	28	22	23	19	27	17	17	19	17	22	12	19	13	27	20
Beaghs Burn														20	15	26	16	17	15	17	20
Redesdale	41	15	23	34	24	32	30	21	30	33	44	37	32	28	24	34	25	37	43	30	63
Eskdalemuir	19	16	20	22	18	26	17	18	21	26	24	24	18	20	15	20	15	30	25	23	19
Whiteadder	30	20	35	32	17	30	27	22	24	28	33	24	21	20	23	0	25	19	22	22	28
Loch Chon														12	12	12	16	12	12	17	12
Balquhidder	14	15	12	14	11	16	16	16	12	12	24	18	14	12	8	16	12	27	12	18	15
Polloch					6	8	8	6	6	7	7	6	5	5	3	7	8	6	6	6	7
Lochnagar														16	16	20	19	20	15	17	13
Glen Dye		26	29	28	25	32	22	28	33	29	43	23	22	22	20	30	19	30	20	21	
Glensaugh																					43
Allt a' Mharcaidh	6	10	4	7	5	5	4	4	8	5	7	5	5	6	4	8	4	6	10	8	83
Strathvaich Dam		4	3	4	3	5	5	4	4	5	5	6	4	4	3	4	5	3	3	2	7
Forsinain2																					19
Achanarras	13	35	21	18	15	26	9	9	12	15	14	13	13	11	10	12	12	19	6	9	

Table II.5. Precipitation-weighted annual mean sodium, 1986 to 2006 (ueq/l)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Goonhilly	264	206	212	276	506	327	238	228	265	270	313	284	292	292	299	226	283	223	298	236	394
Yarner Wood	98	125	150	166	245	141	104	101	123	128	127	118	127	88	104	91	204	111	131	99	146
Barcombe Mills	186	255	156	204	357	137	128	99	147	176	195	164	154	177	199	91	203	131	153	155	213
Compton	55	67	70	84	129	71	40	55	64	64	76	77	58	55	45	37	62	43	45	53	58
Crai Reservoir														96	103	79	122	101	106	70	94
Flatford Mill	99	60	54	79	85	70	57	55	73	79	76	60	59	49	63	49	67	60	51	69	55
Woburn	71	65	50	60	87	54	28	41	56	51	61	58	36	46	34	31	41	48	43	59	86
Rothamsted																					41
Tycanol Wood	116	90	104	232	232	163	120	120	164	157	146	159	145	151	144	103	166	146	146	113	181
Llyn Brianne	94	68	83	112	152	111	72	97	90	84	94	96	90	103	90	0	116	111	106	88	
Pumlumon				104	141	102	72	70	73	79	81	113	95	85	92	69	136	96	82	66	113
Stoke Ferry	74	49	50	58	86	75	57	53	54	46	71	55	56	55	44	60	37	53	49	57	50
Preston Montford	86	38	86	39	100	164	38	66	58	64	35	80	40	54	33	31	58	44	48	53	63
Bottesford	82	35	59	47	62	54	35	36	39	49	58	27	33	39	25	29	41	39	40	50	40
Llyn Llagi														110	90	75	116	99	133	90	136
Llyn Llydaw	126	78	122	135	194	162	95	112	98	129	97	107	88	104	70	72	82	67	90	65	87
River Etherow														60	46	47	65	64	102	68	66
Wardlow Hay Cop	70	52	90	57	140	131	57	95	94	66	82	60	65	70	40	50	58	67	91	52	56
Driby	95	53	64	98	94	103	67	71	83	100	121	58	77	65	62	74	79	68	60	88	57
Jenny Hurn	97	47	74	68	104	55	37	47	53	54	73	36	61	51	30	39					
Thorganby	74	51	52	69	90	96	50	52	52	51	59	45	67	53	33	44	35	40	30	42	41
High Muffles	61	63	67	95	92	103	78	111	88	113	153	82	106	76	61	76	57	98	55	90	65
Bannisdale	122	62	133	116	161	182	91	107	95	129	95	156	101	131	76	73	88	78	127	73	122
Hillsborough Forest				89	140	107	72	87	125	108	107	78	97	90	90	70	65	74	99	104	61
Lough Navar	248	102	317	139	261	192	133	188	174	125	116	131	136	171	152	98	151	173	125	121	121
Cow Green Reservoir	74	40	69	76	90	84	74	72	77	93	91	99	89	100	55	0	73	71	70	66	
Moorhouse																					88
Scoat Tarn														85	71	0	76	71	80	70	110
Loch Dee	116	54	136	132	147	123	86	79	92	106	91	109	91	124	101	56	103	92	94	96	111
Beaghs Burn														171	150	128	139	172	161	192	128
Redesdale	114	44	66	91	67	80	59	73	76	75	93	55	65	65	49	45	59	62	73	58	80
Eskdalemuir	86	37	62	81	86	102	53	63	77	88	63	66	76	102	61	85	63	66	73	62	78
Whiteadder	112	53	83	92	78	59	79	104	120	100	121	93	80	86	93	0	81	119	49	93	78
Loch Chon														112	69	71	128	88	63	77	83
Balquhidder	122	45	59	110	102	89	61	146	120	71	122	87	81	122	83	59	84	95	67	102	105
Polloch					173	213	118	205	155	168	148	127	161	194	150	139	234	159	154	191	156
Lochnagar														39	33	35	76	45	40	38	34
Glen Dye		52	73	83	81	78	65	89	108	98	121	112	91	83	71	77	89	72	52	88	
Glensaugh																					85
Allt a' Mharcaidh	90	37	45	88	62	46	57	143	92	57	66	70	65	83	63	40	44	75	57	96	65
Strathvaich Dam		83	109	126	175	147	121	212	154	102	130	116	122	180	153	95	105	235	125	165	189
Forsinain2																					398
Achanarras	231	145	217	277	215	235	186	225	217	169	219	167	202	249	251	186	216	340	196	339	

Table II.6. Precipitation-weighted annual mean magnesium, 1986 to 2006 (ueq/l)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Goonhilly	61	48	49	63	119	77	57	55	64	73	86	82	87	93	73	50	63	48	57	50	80
Yarner Wood	23	30	35	38	58	32	26	29	33	38	37	35	41	37	24	20	45	24	28	21	31
Barcombe Mills	44	62	36	49	84	34	33	29	40	48	58	48	48	58	47	21	46	30	38	34	49
Compton	14	19	21	21	31	18	11	15	18	20	25	26	26	27	10	8	14	10	11	12	11
Crai Reservoir														40	24	19	27	23	21	15	20
Flatford Mill	32	17	16	23	23	19	15	16	18	20	21	17	20	18	16	12	16	14	12	17	14
Woburn	9	12	13	18	24	14	9	13	15	15	18	18	13	19	8	8	10	11	10	13	13
Rothamsted																					9
Tycanol Wood	27	21	24	53	54	39	29	31	43	45	43	45	48	54	32	22	36	30	31	23	38
Llyn Brianne	21	16	20	27	36	27	19	27	25	24	29	27	32	41	20	0	25	24	21	17	
Pumlumon				24	32	23	19	20	23	25	25	33	35	37	21	15	29	20	17	14	23
Stoke Ferry	20	12	13	16	23	18	16	16	16	12	21	16	19	22	11	14	9	13	11	14	11
Preston Montford	21	11	22	11	24	43	11	18	20	42	15	25	25	27	9	7	12	9	9	10	12
Bottesford	26	11	18	16	18	16	11	10	12	14	16	10	14	17	6	8	11	11	11	11	11
Llyn Llagi														40	21	16	25	21	28	18	28
Llyn Llydaw	29	18	26	31	44	37	24	30	28	37	31	32	33	41	16	16	18	14	18	13	18
River Etherow														21	11	11	15	14	23	14	14
Wardlow Hay Cop	17	15	25	17	35	32	15	25	27	18	24	18	23	27	9	12	14	15	20	12	13
Driby	24	14	19	27	27	26	18	23	22	26	34	18	23	23	15	17	19	17	14	19	14
Jenny Hurn	36	16	29	25	34	21	14	16	22	19	24	13	22	20	10	13					
Thorganby	22	16	17	23	27	31	16	15	19	15	19	16	23	27	10	13	12	14	9	12	13
High Muffles	15	17	19	23	29	27	19	30	23	29	39	21	30	26	15	18	13	23	13	21	15
Bannisdale	29	15	33	27	38	44	23	28	27	35	27	41	32	48	17	16	18	18	27	15	24
Hillsborough Forest				21	31	24	20	25	36	34	29	27	42	38	21	15	14	14	20	18	12
Lough Navar	57	24	80	32	60	47	34	49	48	38	37	40	53	63	43	21	32	37	25	24	24
Cow Green Reservoir	17	10	17	18	22	20	19	20	22	25	25	29	29	41	13	0	16	16	15	13	
Moorhouse																					18
Scoat Tarn														32	16	0	16	15	16	14	19
Loch Dee	29	12	31	31	35	29	22	23	25	31	28	34	35	48	27	12	22	19	20	19	21
Beaghs Burn														64	46	28	30	35	33	49	48
Redesdale	26	12	19	23	18	19	15	20	21	21	27	17	21	26	13	10	13	13	16	12	15
Eskdalemuir	20	9	15	20	21	25	14	18	22	26	20	20	30	41	16	14	13	14	15	13	16
Whiteadder	26	13	22	23	20	15	19	27	33	26	31	26	25	33	22	0	18	25	11	20	18
Loch Chon														40	16	16	28	19	14	16	17
Balquhidder	29	11	14	26	25	21	16	38	31	22	33	24	28	52	18	13	18	19	14	21	22
Polloch					40	48	30	53	40	46	41	37	54	68	35	29	50	34	32	40	29
Lochnagar														17	8	8	17	10	9	9	7
Glen Dye		12	18	22	21	19	16	23	26	25	30	28	26	28	16	18	20	16	13	19	
Glensaugh																					18
Allt a' Mharcaidh	21	8	12	20	15	11	14	35	24	16	20	19	23	35	16	9	10	16	12	20	13
Strathvaich Dam		20	25	28	39	32	31	52	42	31	40	33	42	68	40	20	22	44	26	35	29
Forsinain2																					75
Achanarras	55	37	46	64	49	54	46	56	58	45	59	43	61	83	57	41	47	71	41	77	

Table II.7. Precipitation-weighted annual mean calcium, 1986 to 2006 (ueq/l)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Goonhilly	16	15	14	18	31	22	18	19	19	24	23	21	27	30	20	14	15	19	17	15	23
Yarner Wood	11	15	12	13	17	15	12	13	18	18	16	16	20	22	10	8	13	9	12	10	13
Barcombe Mills	20	29	22	30	33	32	22	20	28	29	37	25	49	43	20	16	23	21	39	36	31
Compton	26	51	33	22	32	30	23	21	34	41	55	34	61	36	15	13	14	26	20	21	18
Crai Reservoir														18	8	17	8	10	8	8	9
Flatford Mill	33	21	27	37	24	24	18	21	25	21	22	18	25	25	15	13	17	23	17	19	19
Woburn	23	30	38	28	32	24	19	19	24	21	34	23	28	33	11	12	13	21	16	22	12
Rothamsted																					19
Tycanol Wood	12	9	9	31	17	13	11	11	14	17	16	15	19	26	10	9	9	10	10	11	12
Llyn Brianne	7	8	9	10	15	10	10	11	12	12	12	11	17	19	7	0	8	11	8	9	
Pumlumon				7	11	11	9	8	9	12	10	12	14	17	7	6	7	7	6	6	8
Stoke Ferry	31	22	24	28	43	33	32	26	30	22	35	34	33	39	16	16	16	27	19	28	21
Preston Montford	14	19	19	14	14	37	18	17	24	76	28	18	34	28	9	10	10	11	10	10	11
Bottesford	36	33	50	33	23	29	19	18	23	29	25	21	31	31	10	14	14	28	18	20	21
Llyn Llagi														16	9	6	7	7	11	7	9
Llyn Llydaw	9	10	13	9	12	11	11	11	14	18	13	11	14	16	6	6	6	6	6	7	8
River Etherow														22	10	14	9	12	14	14	12
Wardlow Hay Cop	45	59	56	55	75	57	55	52	64	55	69	64	89	92	28	39	27	40	31	30	27
Driby	18	19	27	34	33	27	18	19	28	35	30	21	26	26	12	14	17	23	15	17	20
Jenny Hurn	56	45	75	48	49	39	27	26	60	31	35	23	44	38	19	21					
Thorganby	25	25	30	37	35	67	27	24	67	29	32	33	53	57	18	29	18	37	22	21	27
High Muffles	13	21	23	27	20	23	21	20	25	26	23	21	20	28	10	14	12	19	13	15	14
Bannisdale	13	12	14	13	15	16	15	14	16	17	16	17	20	28	8	8	8	11	11	10	10
Hillsborough Forest				13	14	17	16	15	24	25	24	21	36	34	11	11	8	8	9	9	13
Lough Navar	17	11	21	12	18	25	19	24	27	26	25	23	29	33	15	11	10	13	9	11	13
Cow Green Reservoir	7	8	12	12	13	11	13	12	13	16	14	13	16	23	7	0	7	11	7	8	
Moorhouse																					10
Scoat Tarn														16	7	0	5	6	6	6	9
Loch Dee	10	9	11	9	11	10	11	10	11	14	10	12	23	19	10	5	5	6	7	7	8
Beaghs Burn														61	37	8	7	17	8	45	46
Redesdale	12	10	20	18	11	14	13	11	18	13	16	13	13	19	8	7	6	9	16	8	8
Eskdalemuir	7	5	8	21	8	10	8	10	14	13	8	10	17	17	6	6	4	6	7	7	7
Whiteadder	14	14	20	16	11	13	12	12	18	19	15	13	14	19	9	0	8	9	7	11	12
Loch Chon														13	5	6	7	7	5	9	8
Balquhidder	8	5	6	9	8	11	8	12	10	9	10	9	16	19	7	6	6	7	6	8	9
Polloch					9	16	13	13	14	13	12	11	20	24	9	7	10	9	9	12	10
Lochnagar														10	4	5	5	6	5	6	5
Glen Dye		7	10	11	10	9	10	11	12	10	10	10	10	15	6	6	6	11	6	9	
Glensaugh																					9
Allt a' Mharcaidh	10	8	7	8	7	6	9	12	12	7	11	9	13	17	6	5	4	6	6	6	8
Strathvaich Dam		7	7	8	13	9	10	14	14	11	15	11	16	20	11	6	5	10	8	10	10
Forsinain2																					19
Achanarras	16	15	20	20	21	17	17	19	18	17	18	15	20	28	14	11	12	18	14	18	

Table II.8. Precipitation-weighted annual mean chloride, 1986 to 2006 (ueq/l)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Goonhilly	311	242	253	322	595	373	265	256	296	313	368	320	324	325	353	266	320	222	332	255	353
Yarner Wood	118	152	180	190	291	161	122	117	139	147	149	133	143	98	124	108	230	123	142	113	153
Barcombe Mills	226	310	190	252	425	161	156	116	166	202	230	187	180	200	237	111	235	157	184	171	234
Compton	55	92	94	110	159	89	54	73	74	81	91	89	68	64	55	45	75	51	52	58	63
Crai Reservoir														116	125	94	139	115	115	73	99
Flatford Mill	109	80	70	99	101	88	71	68	79	95	90	68	69	57	75	58	77	68	59	75	58
Woburn	82	82	61	75	109	69	38	51	64	61	66	64	41	52	40	36	48	51	49	62	75
Rothamsted																					41
Tycanol Wood	141	109	123	266	268	190	135	135	178	184	171	178	162	169	173	121	187	167	167	123	182
Llyn Brianne	107	83	99	131	178	129	81	110	100	95	107	106	101	117	105	0	131	125	119	101	
Pumlumon				124	165	118	83	77	83	91	95	127	108	97	110	80	152	108	92	77	120
Stoke Ferry	95	65	66	73	103	89	72	64	62	57	86	62	63	62	51	71	44	58	54	64	53
Preston Montford	109	56	114	59	123	203	50	84	72	84	46	94	47	63	42	37	66	53	58	57	66
Bottesford	115	58	100	78	97	85	62	63	55	67	74	37	42	43	32	37	51	47	47	54	41
Llyn Llagi														124	106	87	132	113	149	101	140
Llyn Llydaw	154	83	137	156	225	185	107	128	105	149	112	120	99	120	85	84	95	74	94	73	90
River Etherow														69	57	56	76	73	76	72	68
Wardlow Hay Cop	97	85	131	84	183	163	78	122	113	87	104	74	78	80	50	59	69	72	104	60	59
Driby	128	76	90	126	135	123	88	85	98	125	144	69	90	78	75	88	91	80	68	93	58
Jenny Hurn	169	99	146	123	170	124	86	84	83	99	111	72	89	68	47	57					
Thorganby	140	100	121	139	166	180	123	107	96	96	90	64	107	73	49	59	49	51	41	51	46
High Muffles	89	96	106	131	146	140	110	139	108	146	187	98	126	88	73	92	68	110	63	100	69
Bannisdale	148	75	168	141	193	213	107	125	109	151	113	178	114	149	88	85	100	90	145	83	96
Hillsborough Forest				106	165	123	84	102	140	130	123	89	110	102	106	83	78	85	105	106	64
Lough Navar	293	125	409	166	298	222	153	215	191	144	135	150	155	188	179	118	172	197	139	139	128
Cow Green Reservoir	91	52	85	91	107	98	86	85	89	108	105	117	100	113	66	0	83	76	82	73	
Moorhouse																					84
Scoat Tarn														95	83	0	87	80	88	77	100
Loch Dee	152	67	159	159	173	144	96	90	106	121	106	123	102	138	120	65	121	104	102	109	109
Beaghs Burn														194	178	151	158	207	163	203	115
Redesdale	133	54	84	112	83	97	72	92	86	89	108	62	74	73	60	54	69	64	83	63	74
Eskdalemuir	105	47	76	97	103	118	65	72	85	101	74	74	87	113	73	98	73	76	85	69	82
Whiteadder	129	64	100	110	93	69	93	118	132	115	139	104	91	97	112	0	93	128	54	105	80
Loch Chon														129	82	82	146	100	73	90	84
Balquhidder	146	58	70	131	125	104	70	167	135	83	146	100	92	140	98	69	97	105	78	118	110
Polloch					205	249	135	227	169	191	176	143	183	226	180	163	275	174	175	211	164
Lochnagar														43	39	41	85	50	45	42	35
Glen Dye		64	86	98	98	91	78	103	124	115	146	124	103	93	83	94	102	77	59	97	
Glensaugh																					82
Allt a' Mharcaidh	104	39	52	104	72	53	65	158	99	66	76	82	75	93	73	46	51	87	67	104	56
Strathvaich Dam		101	129	148	207	168	138	228	169	116	149	131	138	201	179	114	118	265	141	226	163
Forsinain2																					411
Achanarras	279	174	253	317	251	272	209	255	245	195	246	189	225	280	302	220	244	381	228	352	

Table II.9. Precipitation-weighted annual mean sulphate, 1986 to 2006 (ueq/l)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Goonhilly	61	59	47	63	85	75	50	57	58	56	69	59	52	51	55	49	54	47	51	50	62
Yarner Wood	39	52	40	47	49	44	38	40	43	39	48	41	34	28	27	30	40	33	32	36	36
Barcombe Mills	68	80	59	68	81	68	58	45	54	54	61	45	48	47	45	36	49	51	54	48	48
Compton	85	112	72	70	73	71	67	55	63	57	70	51	45	38	32	33	35	34	37	43	32
Crai Reservoir														29	27	30	26	28	22	22	25
Flatford Mill	102	78	73	89	65	79	60	49	58	62	61	48	50	50	42	39	43	46	41	42	35
Woburn	82	86	91	81	76	70	60	49	66	52	63	46	46	44	34	38	37	39	39	50	102
Rothamsted																					31
Tycanol Wood	41	37	36	54	50	51	41	37	42	40	45	38	36	39	34	31	35	33	35	32	36
Llyn Brianne	36	37	36	40	46	43	36	39	37	32	38	31	30	29	26	0	28	30	24	31	
Pumlumon				32	36	35	32	31	27	30	33	31	26	23	22	20	25	23	19	19	25
Stoke Ferry	89	82	72	91	90	86	74	61	68	56	61	55	49	47	46	41	39	47	43	48	37
Preston Montford	56	65	66	65	49	85	69	56	59	68	53	42	31	30	29	33	39	28	27	31	24
Bottesford	100	98	116	89	73	82	77	62	67	61	61	47	49	43	36	46	45	48	39	44	37
Llyn Llagi														30	28	25	26	27	26	27	27
Llyn Llydaw	61	39	41	38	42	43	34	38	32	35	35	27	27	30	21	23	23	20	21	20	21
River Etherow														46	38	48	38	37	36	39	29
Wardlow Hay Cop	79	98	94	87	90	100	80	83	87	73	88	66	58	58	45	59	47	50	48	44	36
Driby	80	80	85	91	91	91	73	58	72	82	64	49	62	49	45	49	43	48	43	47	37
Jenny Hurn	121	112	130	107	100	90	81	66	86	72	90	62	78	60	55	57					
Thorganby	94	85	94	96	93	126	94	85	78	62	76	68	69	56	49	56	46	54	44	45	48
High Muffles	70	82	90	85	78	87	80	70	70	65	83	57	62	46	44	50	41	51	39	45	36
Bannisdale	57	45	61	54	60	60	53	58	48	53	55	50	42	38	31	36	31	34	34	33	30
Hillsborough Forest				63	53	55	50	51	60	46	58	36	41	41	33	41	26	26	29	28	25
Lough Navar	49	28	34	34	46	41	33	41	37	31	31	31	28	30	29	24	26	30	24	22	20
Cow Green Reservoir	44	43	53	44	44	44	47	49	40	43	48	38	36	34	26	0	26	26	24	24	
Moorhouse																					22
Scoat Tarn														33	26	0	24	26	25	25	24
Loch Dee	47	41	52	39	43	43	37	38	36	37	47	31	29	34	31	29	23	26	26	29	24
Beaghs Burn														58	34	36	28	33	26	36	33
Redesdale	72	51	70	58	44	52	53	44	51	46	63	44	42	33	28	35	29	31	34	26	26
Eskdalemuir	40	35	41	38	42	43	34	37	38	38	36	32	30	31	23	28	21	27	22	24	19
Whiteadder	66	55	72	58	42	52	59	50	54	55	58	44	37	35	35	0	38	34	29	37	35
Loch Chon														26	24	26	29	24	22	26	20
Balquhidder	41	39	35	37	34	38	31	44	38	30	52	31	29	29	25	26	25	27	21	27	22
Polloch					36	42	31	39	34	33	36	26	30	32	27	26	36	26	23	29	24
Lochnagar														27	24	31	36	27	20	22	18
Glen Dye		54	58	51	49	54	51	49	60	53	76	44	40	35	30	39	34	35	26	28	
Glensaugh																					35
Allt a' Mharcaidh	35	29	26	29	23	22	23	33	29	21	31	22	19	19	17	19	16	17	17	20	22
Strathvaich Dam		26	27	27	31	30	33	35	28	22	32	26	24	25	26	18	19	30	21	28	22
Forsinain2																					51
Achanarras	52	50	57	63	48	52	47	48	45	40	51	41	41	46	42	37	40	52	34	52	

Table II.10. Annual volume of rain samples collected (multi-day bulk rain), 1986 to 2006 (ueq/l)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Goonhilly	907	879	910	753	790	800	776	1008	999	744	743	1000	936	831	934	787	1025	743	819	711	632
Yarner Wood	1150	1016	1123	1131	1174	1058	1049	1398	1333	1135	1007	1218	1383	1106	1315	1026	1342	668	1012	697	1110
Barcombe Mills	740	849	678	597	639	620	654	739	806	652	539	818	733	655	1215	834	923	506	568	538	684
Compton	589	629	530	550	407	449	709	644	585	647	392	576	642	644	855	701	805	466	671	525	614
Crai Reservoir														2190	2292	1659	2207	1305	2187	1403	1268
Flatford Mill	528	660	532	392	393	362	510	518	438	335	231	409	493	546	613	615	586	372	465	373	534
Woburn	758	672	592	540	400	478	694	656	505	515	328	456	620	537	662	670	651	448	595	423	8
Rothamsted																					934
Tycanol Wood	1508	1318	1385	1340	1437	1422	1572	1692	1460	1320	1366	1589	1576	1246	1734	1287	1808	1246	1324	1107	1567
Llyn Brianne	1491	1497	1434	1417	1483	1224	1488	1573	1474	1143	1195	1296	1737	1725	1983	286	1567	1303	1709	520	
Pumlumon				1896	1936	1908	2129	2124	2445	1622	1554	1780	2641	2230	2410	1547	2193	1752	2204	1793	2036
Stoke Ferry	503	617	537	495	348	350	508	601	479	375	318	519	517	435	577	597	694	440	539	444	585
Preston Montford	539	570	514	580	538	443	555	585	520	409	403	550	590	666	789	535	554	534	560	485	587
Bottesford	545	651	531	469	434	377	557	651	526	327	289	596	573	540	682	572	614	400	461	478	475
Llyn Llagi														2177	2979	1925	2608	2431	2239	1827	3155
Llyn Llydaw	2758	2231	2794	2480	2394	2028	3014	2152	2375	2097	1574	2068	2777	2313	3086	1831	1916	2238	2573	2258	2565
River Etherow														876	1205	914	1261	758	1002	915	1097
Wardlow Hay Cop	928	889	837	708	711	617	850	853	977	581	530	853	1018	860	1068	786	1066	665	793	786	950
Driby	702	685	605	457	473	398	676	636	514	375	415	578	620	598	616	597	568	483	617	507	454
Jenny Hurn	518	652	390	443	351	354	505	546	451	460	301	423	530	554	610	511					
Thorganby	503	625	516	364	434	329	511	485	496	395	348	477	448	597	703	542	609	441	605	475	578
High Muffles	711	875	855	599	806	626	836	947	740	670	693	827	980	936	1160	861	879	670	826	704	846
Bannisdale	2259	2101	2091	1699	2270	1857	2027	1794	2289	1690	1328	1771	2167	1798	2552	1606	2082	1756	2247	1583	2313
Hillsborough Forest				642	909	668	635	802	614	742	662	824	777	730	900	515	893	532	709	685	715
Lough Navar	1439	1144	1492	1242	1617	1459	1978	1517	1631	1521	1373	1395	1686	1383	1297	1004	1358	941	1237	999	1429
Cow Green Reservoir	1129	1216	1138	858	1165	957	1073	1118	1293	807	1149	1058	1353	1275	1633	860	1411	1033	1627	899	
Moorhouse																					1612
Scoat Tarn														2110	2727	1651	2618	1980	2467	2325	2627
Loch Dee	2373	2311	2619	2001	2574	2196	2659	1950	2393	2036	1928	2269	2473	2373	1438	1249	2055	1646	1990	1303	1950
Beaghs Burn														1417	1695	1148	1494	1044	1458	1270	1415
Redesdale	745	828	832	499	724	581	662	585	541	507	444	437	843	632	842	553	1002	509	874	538	687
Eskdalemuir	1523	1276	1396	1236	1528	1248	1609	1330	1630	1202	1211	1487	1700	1479	1628	1180	1780	1070	1381	1132	1577
Whiteadder	585	718	712	489	721	569	665	722	566	473	395	546	750	583	817	499	722	416	544	292	412
Loch Chon														2123	1838	1399	2278	1696	1706	1454	2053
Balquhidder	2008	1428	1736	1967	2398	1683	1815	1575	1547	1637	1096	1579	1540	1863	1674	1254	1704	1138	1746	1335	1993
Polloch					707	2021	2355	1790	2012	1788	1606	1904	2250	2098	2011	1171	1800	1675	2520	1963	1814
Lochnagar														987	1436	956	1885	959	1367	1215	1428
Glen Dye		898	1067	659	809	691	759	968	637	724	740	1049	1005	792	1238	998	1320	554	840	722	
Glensaugh																					760
Allt a' Mharcaidh	778	664	761	638	907	729	757	826	714	678	477	601	846	874	895	593	786	496	781	628	749
Strathvaich Dam		959	1205	1357	1713	1396	1609	1148	1273	1282	885	1200	1458	1444	1383	997	1173	1129	1395	1230	1498
Forsinain2																					569
Achanarras	901	864	642	476	776	512	635	567	535	622	488	478	700	646	598	586	663	548	686	698	

Appendix 3

Particulate Sulphate Measurements 2006

Monthly and Annual Mean Concentrations of Particulate Sulphate in 2006
Concentration in Air (µg SO_4 [as S] m^{-3})

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean
Eskdalemuir	0.52	0.39	0.44	0.29	0.45	0.44	0.73	0.23	0.43	0.54	0.29	0.33	0.43
Lough Navar	0.56	0.55	0.38	0.27	0.44	0.43	0.41	0.42	-	-	-	0.45	0.42
Barcombe Mills	1.29	-	-	0.61	0.69	0.86	1.08	0.60	0.66	0.66	0.48	-	0.77
Yarner Wood	-	-	-	0.56	0.61	0.87	0.90	0.36	0.46	-	0.27	0.59	0.57
High Muffles	0.85	0.59	-	-	-	-	-	0.34	0.84	0.71	0.41	0.46	-

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

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

Daily measurements - Summary for January 2006 to December 2006

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.09	1.93	0.10	0.22	0.10	0.38	0.82	0.21	0.17	0.20	0.17	0.19
2 - 3	0.21	0.86	0.14	0.22	0.44	0.42	1.60	0.24	0.16	0.15	0.14	0.17
3 - 4	0.11	0.68	0.33	0.17	0.31	0.35	1.30	0.21	0.11	0.17	0.26	0.27
4 - 5	0.24	0.50	0.42	0.16	1.02	0.36	1.01	0.18	0.15	0.15	0.32	0.23
5 - 6	0.58	1.20	0.10	0.18	0.25	0.48	1.84	0.45	0.17	0.22	0.47	0.16
6 - 7	0.77	1.00	0.25	0.19	0.87	0.59	0.93	0.03	0.09	0.16	0.62	0.16
7 - 8	1.11	0.30	0.30	0.22	1.27	N	0.24	0.20	0.15	0.21	0.54	0.17
8 - 9	1.25	0.14	0.24	0.09	1.36	N	0.24	0.18	0.34	0.27	0.22	0.10
9 - 10	0.86	0.14	0.20	0.12	0.84	N	0.20	N	0.59	0.14	0.20	0.14
10 - 11	0.09	0.19	1.09	0.19	0.46	N	0.32	N	0.97	0.60	0.28	0.12
11 - 12	0.21	0.43	0.82	0.26	0.76	N	0.26	N	0.72	0.55	0.20	0.26
12 - 13	0.65	0.12	0.57	0.35	0.72	N	0.30	0.22	0.33	0.29	0.21	0.32
13 - 14	0.90	0.38	0.67	0.18	0.25	N	0.27	0.22	0.88	0.66	1.40	N
14 - 15	0.28	0.10	1.37	0.15	0.51	0.47	0.19	0.23	0.20	1.43	0.25	0.13
15 - 16	0.69	0.16	1.19	0.30	0.40	0.94	0.22	0.17	0.27	2.59	0.29	0.19
16 - 17	N	0.23	0.93	0.20	0.59	0.68	0.39	0.40	1.80	2.78	0.16	0.20
17 - 18	0.11	0.11	0.86	0.19	0.55	0.46	0.56	0.86	0.44	1.56	0.17	0.12
18 - 19	0.14	0.03	0.36	0.22	0.33	0.51	0.89	0.35	0.24	0.12	0.19	0.11
19 - 20	0.21	0.47	0.26	0.28	0.22	0.18	0.85	0.30	0.30	1.37	0.24	0.23
20 - 21	0.16	0.40	0.21	0.60	0.30	0.22	1.86	0.30	0.95	0.89	0.25	0.63
21 - 22	0.17	0.20	0.22	0.72	0.23	0.16	1.62	0.13	0.54	0.35	0.18	0.84
22 - 23	0.75	0.23	0.34	1.03	0.16	0.28	1.89	0.19	0.29	0.34	0.16	0.56
23 - 24	1.25	0.18	0.64	0.20	0.16	0.20	0.38	0.15	0.81	0.25	0.17	0.52
24 - 25	1.29	0.58	0.69	0.59	0.18	0.37	0.58	0.09	0.34	0.33	0.18	0.29
25 - 26	0.25	0.22	0.26	0.28	0.19	0.27	1.01	0.20	0.37	0.19	0.18	0.65
26 - 27	0.13	0.04	0.24	0.19	0.17	0.25	0.87	0.26	0.23	0.06	0.19	0.47
27 - 28	0.29	0.13	0.16	0.36	0.26	0.40	0.45	0.13	0.53	0.11	0.31	0.84
28 - 29	0.31	0.11	0.13	0.34	0.21	0.98	0.45	0.09	0.19	0.12	0.22	0.65
29 - 30	0.51		0.20	0.38	0.30	0.58	0.54	0.14	0.20	0.12	0.35	0.42
30 - 31	0.37		0.09	0.24	0.18	0.52	0.27	0.12	0.39	0.17	0.30	0.44
31 - 1	1.47		0.18		0.25		0.15	0.20		0.09		0.44
Arithmetic Mean (3)	0.52	0.39	0.44	0.29	0.45	0.44	0.73	0.23	0.43	0.54	0.29	0.33
Standard Deviation (3)	0.42	0.42	0.35	0.20	0.33	0.22	0.55	0.15	0.36	0.70	0.24	0.22
Sample Size	30	28	31	30	31	23	31	28	30	31	30	30

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%.

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

Daily measurements - Summary for January 2006 to December 2006

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.21	1.77	0.10	0.15	0.23	0.42	0.40	0.35	0.67	N	N	0.19
2 - 3	0.20	2.15	0.14	0.22	0.24	0.23	0.27	0.27	0.52	N	N	0.14
3 - 4	0.13	1.18	0.19	0.16	0.39	0.12	0.36	0.30	0.89	N	N	0.19
4 - 5	0.64	0.75	0.09	0.20	0.57	0.42	1.14	0.42	N	N	N	0.16
5 - 6	1.06	2.24	0.08	0.13	0.34	0.87	0.72	0.30	N	N	N	0.11
6 - 7	0.82	0.96	0.24	0.34	0.46	0.54	0.33	0.52	N	N	N	0.13
7 - 8	1.18	0.28	0.69	0.22	0.61	1.58	0.17	0.69	N	N	N	0.08
8 - 9	1.01	0.14	0.12	0.11	1.45	0.68	0.16	0.54	N	N	N	0.12
9 - 10	0.49	0.18	0.18	0.13	1.35	0.57	0.19	0.57	N	N	N	0.28
10 - 11	0.13	0.38	0.15	0.18	0.93	1.12	N	0.43	N	N	N	0.14
11 - 12	0.16	0.28	0.11	0.26	0.90	0.47	N	0.45	N	N	N	0.20
12 - 13	0.19	0.22	0.27	0.39	0.52	0.50	N	0.51	N	N	N	0.37
13 - 14	0.15	0.26	0.16	0.18	0.67	0.25	N	0.51	N	N	N	0.09
14 - 15	0.21	0.18	0.05	0.18	0.59	0.30	N	0.54	N	N	N	0.07
15 - 16	0.27	0.12	0.77	0.31	0.63	0.29	N	0.24	N	N	0.26	0.16
16 - 17	0.19	0.08	0.86	0.62	0.34	0.28	N	0.20	N	N	0.10	0.11
17 - 18	0.20	0.12	1.27	0.17	0.49	0.48	0.17	0.28	N	N	0.15	0.17
18 - 19	0.15	0.17	0.93	0.19	0.19	0.13	0.57	0.63	N	N	0.29	0.23
19 - 20	0.15	0.56	0.48	0.17	0.18	0.17	0.62	0.65	N	N	0.18	0.28
20 - 21	0.19	0.57	0.42	0.43	0.16	0.25	0.96	0.31	N	N	0.13	0.45
21 - 22	0.29	0.21	0.37	0.35	0.15	0.31	0.39	0.66	N	N	0.18	0.89
22 - 23	0.48	0.48	0.82	0.20	0.23	0.22	0.27	0.30	N	N	0.23	0.82
23 - 24	1.09	0.22	0.88	0.23	0.15	0.23	0.14	0.21	N	N	0.12	1.27
24 - 25	1.09	0.72	1.11	0.31	0.18	0.34	0.52	0.29	N	N	0.25	1.75
25 - 26	0.73	0.46	0.28	0.22	0.22	0.23	0.60	0.28	N	N	0.19	1.94
26 - 27	0.43	0.30	0.21	0.53	0.20	0.26	0.45	0.24	N	N	0.28	1.38
27 - 28	0.53	0.17	0.15	0.41	0.30	0.43	0.29	0.25	N	N	0.23	0.61
28 - 29	0.45	0.15	0.19	0.49	0.31	0.43	0.26	0.72	N	N	0.27	0.98
29 - 30	0.72		0.20	0.26	0.21	N	0.25	0.30	N	N	0.52	0.22
30 - 31	2.41		0.18	0.29	0.21	0.35	0.29	0.41	N	N	0.19	0.18
31 - 1	1.39		0.13		0.26		0.31	0.62		N		0.22
Arithmetic Mean (3)	0.56	0.55	0.38	0.27	0.44	0.43	0.41	0.42	-	-	-	0.45
Standard Deviation (3)	0.51	0.60	0.35	0.13	0.33	0.31	0.25	0.16	-	-	-	0.51
Sample Size	31	28	31	30	31	29	24	31	3	0	16	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%.

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

Daily measurements - Summary for January 2006 to December 2006

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.29	3.26	N	0.47	0.42	0.90	1.75	0.47	0.73	0.43	0.39	0.65
2 - 3	0.62	0.19	N	0.45	0.54	0.88	1.52	0.41	0.50	0.35	0.15	0.39
3 - 4	0.46	2.90	N	0.32	0.74	0.80	1.14	0.81	0.75	0.26	0.34	0.35
4 - 5	0.96	1.52	N	0.36	1.08	0.69	1.00	0.74	0.53	0.23	0.66	0.42
5 - 6	1.76	1.56	N	0.33	0.96	1.02	1.83	0.85	0.77	0.36	0.90	0.54
6 - 7	1.54	N	N	0.34	0.36	0.84	1.49	0.78	0.63	0.40	0.96	0.57
7 - 8	3.97	0.66	N	0.56	0.71	0.95	0.64	0.73	0.48	0.23	0.95	0.34
8 - 9	N	N	N	0.31	1.05	0.93	0.39	0.34	0.41	0.36	1.20	0.17
9 - 10	N	N	N	0.39	0.81	1.14	0.48	0.70	0.52	N	0.19	0.24
10 - 11	N	N	N	0.33	1.52	1.24	0.87	0.25	0.58	N	0.44	0.38
11 - 12	2.83	N	N	0.59	0.56	1.52	0.73	0.37	0.81	0.89	0.36	0.29
12 - 13	0.65	N	N	0.47	0.88	1.45	0.53	0.97	0.76	0.36	0.36	0.31
13 - 14	0.67	N	N	0.94	1.48	0.02	0.82	0.57	1.11	0.41	0.27	0.49
14 - 15	0.75	N	N	0.92	1.46	0.28	0.43	1.49	0.76	1.59	0.40	0.47
15 - 16	1.47	N	N	1.72	1.36	0.48	0.64	1.23	1.20	2.82	0.97	0.96
16 - 17	0.59	N	2.53	0.96	0.64	0.77	0.54	0.82	3.72	2.00	0.28	0.33
17 - 18	0.36	N	1.82	0.34	0.72	0.99	0.75	0.61	0.10	1.36	0.32	0.33
18 - 19	N	N	2.56	0.39	0.52	1.89	1.32	0.48	0.05	1.12	0.21	0.67
19 - 20	N	N	1.28	0.71	0.27	0.84	1.29	0.58	0.05	0.61	0.22	0.90
20 - 21	1.32	N	1.01	0.40	0.24	0.46	1.94	0.74	0.33	0.47	0.30	N
21 - 22	0.69	N	0.61	0.58	0.39	0.55	1.90	0.36	0.56	0.36	0.27	N
22 - 23	3.87	N	0.42	0.55	0.33	0.38	1.68	0.36	0.36	0.39	0.45	N
23 - 24	1.84	N	0.87	0.18	0.24	0.47	1.07	0.52	0.39	0.31	0.29	N
24 - 25	3.18	N	0.61	1.47	0.30	0.77	0.73	0.53	0.49	0.49	0.48	N
25 - 26	N	N	0.54	1.18	0.50	1.38	1.78	0.37	0.42	0.47	0.35	N
26 - 27	0.36	N	0.54	0.72	0.69	1.10	2.40	0.40	0.64	0.46	0.54	N
27 - 28	0.06	N	0.47	0.75	0.68	0.61	1.43	0.40	0.41	0.25	0.58	N
28 - 29	0.63	N	0.49	0.43	0.48	0.69	0.86	0.28	0.62	0.73	0.43	N
29 - 30	1.56		0.59	0.40	0.29	0.75	0.56	0.23	0.52	0.37	0.41	N
30 - 31	0.95		0.69	0.77	0.42	0.99	0.59	0.28	0.50	0.61	0.63	N
31 - 1	0.90		0.79		N		0.47	0.87		0.59		N
Arithmetic Mean (3)	1.29	-	-	0.61	0.69	0.86	1.08	0.60	0.66	0.66	0.48	-
Standard Deviation (3)	1.09	-	-	0.36	0.38	0.39	0.55	0.29	0.63	0.59	0.27	-
Sample Size	25	6	16	30	30	30	31	31	30	29	30	19

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%.

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

Daily measurements - Summary for January 2006 to December 2006

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	N	N	N	0.26	0.20	0.46	2.43	0.33	0.32	0.31	0.11	0.30
2 - 3	N	N	N	0.30	0.57	0.39	2.03	0.43	0.19	0.31	0.19	0.21
3 - 4	N	N	N	0.28	0.62	0.38	2.03	0.59	0.18	0.14	0.17	0.27
4 - 5	N	N	N	0.45	1.49	0.28	0.38	0.44	0.30	N	0.28	0.28
5 - 6	N	N	N	0.23	0.41	0.69	0.03	0.57	0.47	N	0.46	0.29
6 - 7	N	N	N	0.25	0.78	1.10	2.45	0.41	0.75	N	0.48	0.13
7 - 8	N	N	N	0.31	0.29	1.41	0.23	0.31	0.23	N	0.57	0.29
8 - 9	N	N	N	0.23	0.59	1.59	0.36	0.64	0.57	N	0.51	0.20
9 - 10	N	N	N	0.24	0.55	1.16	0.26	0.30	0.67	N	0.19	0.17
10 - 11	N	N	N	0.26	1.41	1.12	0.32	0.32	1.17	0.62	0.37	0.17
11 - 12	N	N	N	0.27	2.17	1.04	0.26	0.29	0.98	0.39	0.09	0.11
12 - 13	N	N	N	0.39	2.14	1.08	0.30	0.30	0.88	0.29	0.43	0.21
13 - 14	N	N	N	0.26	1.27	0.55	0.49	0.31	1.04	0.66	0.07	0.22
14 - 15	N	N	N	0.28	1.19	1.27	0.49	0.46	0.44	1.76	0.24	0.20
15 - 16	N	N	N	0.90	1.48	0.67	0.71	0.47	0.32	2.22	0.91	0.60
16 - 17	N	N	N	0.56	0.54	1.24	0.68	0.49	0.21	N	0.11	0.11
17 - 18	N	N	N	0.56	0.88	1.58	0.86	0.42	0.23	N	0.10	0.08
18 - 19	N	N	N	0.90	0.24	1.06	1.15	0.26	0.24	1.13	0.09	0.14
19 - 20	N	N	N	0.70	0.11	0.32	1.35	0.50	0.26	0.33	0.11	0.47
20 - 21	N	N	N	0.84	0.17	0.41	1.58	0.30	0.25	0.27	0.20	0.52
21 - 22	N	N	N	0.72	0.04	0.24	2.38	0.17	0.17	N	0.18	1.01
22 - 23	N	N	0.52	1.57	0.16	0.26	1.79	0.29	0.61	0.19	0.23	0.99
23 - 24	N	N	0.86	1.09	0.14	0.39	0.44	0.21	0.30	0.14	0.21	1.63
24 - 25	N	N	0.34	1.38	0.18	0.48	0.42	0.35	1.14	0.17	0.25	1.57
25 - 26	N	N	0.31	0.51	0.21	0.56	1.32	0.24	0.22	0.29	0.12	2.25
26 - 27	N	N	0.50	0.37	0.07	0.90	1.63	0.30	0.37	0.26	0.26	2.29
27 - 28	N	N	0.35	0.53	0.10	0.60	0.34	0.32	0.51	0.17	0.38	1.54
28 - 29	N	N	0.30	0.55	0.34	2.76	0.36	0.26	0.21	0.35	0.14	N
29 - 30	N		0.37	0.82	0.29	1.32	0.37	0.22	0.22	0.57	0.02	N
30 - 31	N		0.55	0.65	0.35	0.82	0.25	0.24	0.35	0.46	0.58	N
31 - 1	N		0.58		0.06		0.19	0.44		0.31		0.27
Arithmetic Mean (3)	-	-	-	0.56	0.61	0.87	0.90	0.36	0.46	-	0.27	0.59
Standard Deviation (3)	-	-	-	0.35	0.60	0.55	0.77	0.12	0.31	-	0.20	0.66
Sample Size	0	0	10	30	31	30	31	31	30	22	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%.

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

Daily measurements - Summary for January 2006 to December 2006

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DATE												
1 - 2	0.03	N	0.69	N	N	N	N	N	0.25	0.60	0.37	0.40
2 - 3	0.03	1.22	0.43	N	N	N	N	0.29	0.14	N	0.32	0.23
3 - 4	0.03	N	0.21	N	0.42	1.06	N	0.28	0.18	N	0.24	0.21
4 - 5	0.58	N	0.31	N	1.43	0.45	N	0.36	0.16	0.23	0.42	0.19
5 - 6	0.72	N	0.02	N	1.14	1.26	0.09	0.26	0.39	0.37	0.60	0.11
6 - 7	1.13	2.89	0.18	N	1.15	0.81	N	0.35	0.36	0.24	1.00	0.17
7 - 8	1.95	N	0.23	N	1.57	0.80	N	0.17	0.17	0.24	1.37	0.20
8 - 9	1.06	1.78	N	N	1.79	3.33	N	0.32	0.34	0.44	0.89	0.10
9 - 10	1.37	0.35	N	N	1.33	1.52	N	0.15	0.77	0.29	0.20	0.09
10 - 11	0.48	0.40	N	N	0.59	1.32	N	0.12	1.84	0.86	0.41	0.30
11 - 12	0.27	0.41	N	N	0.71	1.56	N	0.29	1.41	0.72	0.16	0.21
12 - 13	N	0.03	N	N	N	0.15	0.46	0.18	0.08	0.44	0.25	0.30
13 - 14	N	0.33	N	N	N	1.22	0.91	0.30	0.95	0.90	N	0.39
14 - 15	1.89	0.04	N	N	N	0.48	0.57	0.35	1.30	2.19	N	0.31
15 - 16	0.93	0.84	N	N	N	0.64	2.45	0.22	0.94	3.36	0.83	0.23
16 - 17	1.16	0.04	N	N	N	1.16	N	0.74	N	2.88	0.24	0.13
17 - 18	0.23	0.36	N	N	1.20	0.76	N	0.82	N	1.48	0.19	0.12
18 - 19	0.21	0.03	N	N	0.32	0.48	N	0.42	N	0.95	0.20	0.33
19 - 20	0.23	1.14	N	N	0.21	N	0.69	0.68	N	0.60	0.27	0.74
20 - 21	0.18	0.24	N	N	0.47	N	1.58	0.48	0.78	0.35	0.27	0.34
21 - 22	N	0.36	N	N	0.47	N	3.78	0.73	0.73	0.39	0.16	0.50
22 - 23	1.98	0.76	N	N	0.23	N	0.37	0.28	0.49	0.31	0.30	0.36
23 - 24	0.96	0.37	N	N	N	N	N	0.50	0.29	0.35	0.21	0.51
24 - 25	N	0.17	N	N	0.87	N	N	0.39	1.03	0.31	0.40	0.48
25 - 26	0.33	1.07	N	N	0.30	N	1.59	0.37	3.39	0.37	0.19	2.12
26 - 27	N	0.01	N	N	0.76	N	1.38	0.36	2.28	0.18	0.42	2.26
27 - 28	2.55	N	N	N	N	N	0.77	0.15	1.77	0.38	0.35	0.87
28 - 29	0.17	0.15	N	N	N	2.95	0.13	0.10	0.95	0.29	0.28	0.86
29 - 30	2.00		N	N	N	1.70	0.34	0.16	0.32	0.26	0.52	0.71
30 - 31	N		N	N	N	4.69	1.34	0.21	0.53	0.30	0.32	0.14
31 - 1	N		N		N		0.25	0.25		0.23		0.22
Arithmetic Mean (3)	0.85	0.59	-	-	-	-	-	0.34	0.84	0.71	0.41	0.46
Standard Deviation (3)	0.76	0.69	-	-	-	-	-	0.19	0.78	0.80	0.29	0.51
Sample Size	24	22	7	0	18	19	16	30	26	29	28	31

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

Appendix 4

Nitrogen Dioxide Measurements 2006

(1) Measurements from single tube sites
(2) Measurements from triplicate tube sites (Yarner Wood and Eskdalemuir)
(3) Time series of NO_2 measurements from all sites

Nitrogen Dioxide
Concentration in Air (ppb)

Monthly measurements, collection-day - non standard
Summary for January 2006 to December 2006

Site	Sampling Period	Start Date	End Date		Concentration (in ppb)
Goonhilly	1	07-Dec-2005	04-Jan-2006		N
	2	04-Jan-2006	24-Feb-2006	*	5.07
	3	24-Feb-2006	04-Apr-2006		3.46
	4	04-Apr-2006	26-Apr-2006		3.07
	5	26-Apr-2006	18-May-2006		2.91
	6	18-May-2006	15-Jun-2006		2.24
	7	15-Jun-2006	23-Jul-2006		2.16
	8	23-Jul-2006	24-Aug-2006		1.31
	9	24-Aug-2006	05-Sep-2006		2.70
	10	05-Sep-2006	12-Oct-2006		3.61
	11	12-Oct-2006	02-Nov-2006		2.86
	12	02-Nov-2006	05-Dec-2006		2.06
	13	05-Dec-2006	24-Jan-2007	*	2.56
	14				
		Annual Mean Concentration =			2.97
Yarner Wood	1	27-Dec-2005	24-Jan-2006		5.76
	2	24-Jan-2006	22-Feb-2006		5.47
	3	22-Feb-2006	22-Mar-2006		4.08
	4	22-Mar-2006	19-Apr-2006		1.44
	5	19-Apr-2006	17-May-2006		N
	6	17-May-2006	14-Jun-2006		2.04
	7	14-Jun-2006	12-Jul-2006		1.82
	8	12-Jul-2006	09-Aug-2006		1.72
	9	09-Aug-2006	06-Sep-2006		1.55
	10	06-Sep-2006	04-Oct-2006		2.40
	11	04-Oct-2006	01-Nov-2006		2.90
	12	01-Nov-2006	29-Nov-2006		2.31
	13	29-Nov-2006	27-Dec-2006		3.88
	14	27-Dec-2006	24-Jan-2007		1.85
		Annual Mean Concentration =			2.91
Compton	1	28-Nov-2005	09-Jan-2006	*	11.61
	2	09-Jan-2006	24-Jan-2006		10.05
	3	24-Jan-2006	20-Feb-2006		11.08
	4	20-Feb-2006	03-Apr-2006	*	4.99
	5	03-Apr-2006	19-Apr-2006		6.90
	6	19-Apr-2006	15-May-2006		10.06
	7	15-May-2006	12-Jun-2006		N
	8	12-Jun-2006	10-Jul-2006		4.55
	9	10-Jul-2006	07-Aug-2006		5.14
	10	07-Aug-2006	04-Sep-2006		4.99
	11	04-Sep-2006	02-Oct-2006		7.19
	12	02-Oct-2006	10-Nov-2006		8.45
	13	10-Nov-2006	27-Nov-2006		6.89
	14	27-Nov-2006	02-Jan-2007		8.85
		Annual Mean Concentration =			7.41

Site	Sampling Period	Start Date/Time	End Date/Time		Concentration (in ppb)
Flatford Mill	1	29-Nov-2005	05-Jan-2006		10.76
	2	05-Jan-2006	24-Jan-2006		11.42
	3	24-Jan-2006	21-Feb-2006		10.15
	4	21-Feb-2006	23-Mar-2006		6.27
	5	23-Mar-2006	18-Apr-2006		6.31
	6	18-Apr-2006	16-May-2006		6.95
	7	16-May-2006	13-Jun-2006		5.30
	8	13-Jun-2006	11-Jul-2006		3.74
	9	11-Jul-2006	08-Aug-2006		3.80
	10	08-Aug-2006	05-Sep-2006		5.34
	11	05-Sep-2006	03-Oct-2006		5.91
	12	03-Oct-2006	31-Oct-2006		8.23
	13	31-Oct-2006	28-Nov-2006		9.99
	14	28-Nov-2006	09-Jan-2007	*	10.43
		Annual Mean Concentration =			7.21
Tycanol Wood	1	30-Nov-2005	06-Jan-2006		3.61
	2	06-Jan-2006	25-Jan-2006		6.22
	3	25-Jan-2006	22-Feb-2006		2.09
	4	22-Feb-2006	22-Mar-2006		2.35
	5	22-Mar-2006	19-Apr-2006		1.19
	6	19-Apr-2006	15-May-2006		N
	7	15-May-2006	07-Jun-2006		1.51
	8	07-Jun-2006	12-Jul-2006		1.04
	9	12-Jul-2006	09-Aug-2006		0.47
	10	09-Aug-2006	06-Sep-2006		2.95
	11	06-Sep-2006	04-Oct-2006		2.67
	12	04-Oct-2006	01-Nov-2006		0.46
	13	01-Nov-2006	29-Nov-2006		0.92
	14	29-Nov-2006	05-Jan-2007		2.59
		Annual Mean Concentration =			1.95
Llyn Brianne	1	No measurements in 2006		#	
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				
	11				
	12				
	13				
	14				
		Annual Mean Concentration =			

Notes: * denotes extended sampling period (greater than 40 days). N denotes missing or excluded sample. Annual mean concentration only given if the data capture is greater than 75%

Nitrogen Dioxide
Concentration in Air (ppb)

Monthly measurements, collection-day - non standard
Summary for January 2006 to December 2006

Site	Sampling Period	Start Date	End Date		Concentration (in ppb)
Pumlumon	1	27-Dec-2005	24-Jan-2006		4.70
	2	24-Jan-2006	21-Feb-2006		5.42
	3	21-Feb-2006	21-Mar-2006		3.77
	4	21-Mar-2006	18-Apr-2006		1.77
	5	18-Apr-2006	16-May-2006		1.31
	6	16-May-2006	20-Jun-2006		0.85
	7	20-Jun-2006	11-Jul-2006		1.57
	8	11-Jul-2006	08-Aug-2006		1.18
	9	08-Aug-2006	05-Sep-2006		0.83
	10	05-Sep-2006	17-Oct-2006	*	1.79
	11	17-Oct-2006	31-Oct-2006		2.39
	12	31-Oct-2006	28-Nov-2006		1.26
	13	28-Nov-2006	02-Jan-2007		2.20
	14				
		Annual Mean Concentration =			2.17
Llyn Llydaw	1	01-Jan-2006	19-Apr-2006	*	N
	2	19-Apr-2006	14-Jun-2006	*	0.95
	3	14-Jun-2006	12-Jul-2006		N
	4	12-Jul-2006	09-Aug-2006		1.05
	5	09-Aug-2006	06-Sep-2006		1.37
	6	06-Sep-2006	04-Oct-2006		1.13
	7	04-Oct-2006	01-Nov-2006		1.28
	8	01-Nov-2006	29-Nov-2006		0.81
	9	29-Nov-2006	10-Jan-2007	*	0.90
	10				
	11				
	12				
	13				
	14				
		Annual Mean Concentration =			
Driby	1	14-Dec-2005	11-Jan-2006		11.49
	2	11-Jan-2006	01-Mar-2006	*	4.98
	3	01-Mar-2006	22-Mar-2006		4.41
	4	22-Mar-2006	20-Apr-2006		5.42
	5	20-Apr-2006	17-May-2006		N
	6	17-May-2006	14-Jun-2006		2.93
	7	14-Jun-2006	13-Jul-2006		1.60
	8	13-Jul-2006	16-Aug-2006		2.26
	9	16-Aug-2006	13-Sep-2006		4.62
	10	13-Sep-2006	13-Oct-2006		6.07
	11	13-Oct-2006	28-Nov-2006	*	8.26
	12	28-Nov-2006	20-Dec-2006		8.05
	13	20-Dec-2006	22-Jan-2007		7.85
	14				
		Annual Mean Concentration =			5.27

Site	Sampling Period	Start Date/Time	End Date/Time		Concentration (in ppb)
High Muffles	1	30-Nov-2005	04-Jan-2006		7.53
	2	04-Jan-2006	25-Jan-2006		7.79
	3	25-Jan-2006	22-Feb-2006		7.40
	4	22-Feb-2006	22-Mar-2006		3.61
	5	22-Mar-2006	19-Apr-2006		3.23
	6	19-Apr-2006	17-May-2006		3.40
	7	17-May-2006	14-Jun-2006		2.49
	8	14-Jun-2006	12-Jul-2006		N
	9	12-Jul-2006	09-Aug-2006		2.16
	10	09-Aug-2006	07-Sep-2006		2.61
	11	07-Sep-2006	04-Oct-2006		3.97
	12	04-Oct-2006	01-Nov-2006		5.35
	13	01-Nov-2006	29-Nov-2006		7.41
	14	29-Nov-2006	03-Jan-2007		5.68
		Annual Mean Concentration =			4.57
Bannisdale	1	28-Dec-2005	25-Jan-2006		6.83
	2	25-Jan-2006	22-Feb-2006		3.70
	3	22-Feb-2006	22-Mar-2006		3.21
	4	22-Mar-2006	19-Apr-2006		2.22
	5	19-Apr-2006	17-May-2006		2.89
	6	17-May-2006	14-Jun-2006		1.69
	7	14-Jun-2006	12-Jul-2006		2.00
	8	12-Jul-2006	09-Aug-2006		1.84
	9	09-Aug-2006	04-Oct-2006	*	2.20
	10	04-Oct-2006	01-Nov-2006		4.06
	11	01-Nov-2006	29-Nov-2006		4.75
	12	29-Nov-2006	27-Dec-2006		4.20
	13	27-Dec-2006	24-Jan-2007		2.15
	14				
		Annual Mean Concentration =			3.17
Hillsborough Forest	1	16-Dec-2005	11-Jan-2006		5.28
	2	11-Jan-2006	25-Jan-2006		4.17
	3	25-Jan-2006	27-Feb-2006		6.30
	4	27-Feb-2006	24-Mar-2006		4.77
	5	24-Mar-2006	18-May-2006	*	1.34
	6	18-May-2006	14-Jun-2006		3.02
	7	14-Jun-2006	11-Jul-2006		3.46
	8	11-Jul-2006	09-Aug-2006		3.31
	9	09-Aug-2006	06-Sep-2006		3.30
	10	06-Sep-2006	04-Oct-2006		3.07
	11	04-Oct-2006	02-Nov-2006		5.87
	12	02-Nov-2006	04-Dec-2006		4.68
	13	04-Dec-2006	03-Jan-2007		3.83
	14				
		Annual Mean Concentration =			3.81

Notes: * denotes extended sampling period (greater than 40 days). N denotes missing or excluded sample. Annual mean concentration only given if the data capture is greater than 75%

Nitrogen Dioxide
Concentration in Air (ppb)

Monthly measurements, collection-day - non standard
Summary for January 2006 to December 2006

Site	Sampling Period	Start Date	End Date		Concentration (in ppb)
Lough Navar	1	28-Nov-2005	02-Jan-2006		1.74
	2	02-Jan-2006	30-Jan-2006		2.07
	3	30-Jan-2006	20-Feb-2006		2.42
	4	20-Feb-2006	20-Mar-2006		1.08
	5	20-Mar-2006	17-Apr-2006		< 0.33
	6	17-Apr-2006	15-May-2006		2.09
	7	15-May-2006	12-Jun-2006		1.07
	8	12-Jun-2006	10-Jul-2006		1.47
	9	10-Jul-2006	09-Aug-2006		1.08
	10	09-Aug-2006	04-Sep-2006		0.73
	11	04-Sep-2006	02-Oct-2006		1.23
	12	02-Oct-2006	30-Oct-2006		1.53
	13	30-Oct-2006	04-Dec-2006		2.04
	14	04-Dec-2006	25-Dec-2006		1.28
		Annual Mean Concentration =			1.40
Moorhouse	1	26-Apr-2006	17-May-2006		2.72
	2	17-May-2006	09-Aug-2006	*	N
	3	09-Aug-2006	06-Sep-2006		1.58
	4	06-Sep-2006	04-Oct-2006		2.81
	5	04-Oct-2006	01-Nov-2006		3.38
	6	01-Nov-2006	29-Nov-2006		2.96
	7	29-Nov-2006	27-Dec-2006		2.13
	8	27-Dec-2006	21-Feb-2007	*	2.45
	9				
	10				
	11				
	12				
	13				
	14				
		Annual Mean Concentration =			
Loch Dee	1	01-Dec-2005	09-Jan-2006		2.73
	2	09-Jan-2006	01-Feb-2006		3.14
	3	01-Feb-2006	01-Mar-2006		1.25
	4	01-Mar-2006	01-May-2006	*	1.42
	5	01-May-2006	03-Jul-2006	*	0.93
	6	03-Jul-2006	01-Sep-2006	*	0.83
	7	01-Sep-2006	03-Oct-2006		0.97
	8	03-Oct-2006	01-Nov-2006		1.27
	9	01-Nov-2006	01-Dec-2006		1.38
	10	01-Dec-2006	08-Jan-2007		1.69
	11				
	12				
	13				
	14				
		Annual Mean Concentration =			1.33

Site	Sampling Period	Start Date/Time	End Date/Time		Concentration (in ppb)
Redesdale	1	29-Nov-2005	04-Jan-2006		4.23
	2	04-Jan-2006	24-Jan-2006		5.25
	3	24-Jan-2006	21-Feb-2006		2.00
	4	21-Feb-2006	21-Mar-2006		4.08
	5	21-Mar-2006	18-Apr-2006		N
	6	18-Apr-2006	16-May-2006		2.40
	7	16-May-2006	13-Jun-2006		1.39
	8	13-Jun-2006	11-Jul-2006		1.79
	9	11-Jul-2006	09-Aug-2006		1.87
	10	09-Aug-2006	05-Sep-2006		1.66
	11	05-Sep-2006	03-Oct-2006		2.99
	12	03-Oct-2006	31-Oct-2006		4.44
	13	31-Oct-2006	28-Nov-2006		5.26
	14	28-Nov-2006	22-Dec-2006		2.09
		Annual Mean Concentration =			2.89
Whiteadder	1	23-Jan-2006	20-Mar-2006	*	2.97
	2	20-Mar-2006	10-Aug-2006	*	N
	3	10-Aug-2006	10-Sep-2006		N
	4	10-Sep-2006	25-Oct-2006	*	N
	5	25-Oct-2006	09-Nov-2006		2.38
	6	09-Nov-2006	23-Nov-2006		2.14
	7	23-Nov-2006	22-Dec-2006		2.20
	8	22-Dec-2006	04-Jan-2007		N
	9				
	10				
	11				
	12				
	13				
	14				
		Annual Mean Concentration =			
Balquhidder 2	1	28-Nov-2005	09-Jan-2006	*	3.25
	2	09-Jan-2006	20-Feb-2006	*	1.72
	3	20-Feb-2006	20-Mar-2006		1.63
	4	20-Mar-2006	17-Apr-2006		1.18
	5	17-Apr-2006	15-May-2006		1.35
	6	15-May-2006	06-Jun-2006		0.99
	7	06-Jun-2006	13-Jul-2006		0.93
	8	13-Jul-2006	10-Aug-2006		0.94
	9	10-Aug-2006	29-Sep-2006	*	1.11
	10	29-Sep-2006	17-Oct-2006		1.25
	11	17-Oct-2006	30-Oct-2006		1.70
	12	30-Oct-2006	19-Dec-2006	*	0.77
	13	19-Dec-2006	16-Jan-2007		1.83
	14				
		Annual Mean Concentration =			1.26

Notes: * denotes extended sampling period (greater than 40 days). N denotes missing or excluded sample. Annual mean concentration only given if the data capture is greater than 75%

Nitrogen Dioxide
Concentration in Air (ppb)

Monthly measurements, collection-day - non standard
Summary for January 2006 to December 2006

Site	Sampling Period	Start Date	End Date		Concentration (in ppb)
Polloch	1	27-Dec-2005	22-Jan-2006		1.44
	2	22-Jan-2006	21-Feb-2006		0.59
	3	21-Feb-2006	21-Mar-2006		0.70
	4	21-Mar-2006	18-Apr-2006		N
	5	18-Apr-2006	16-May-2006		0.40
	6	16-May-2006	13-Jun-2006		0.43
	7	13-Jun-2006	11-Jul-2006		0.34
	8	11-Jul-2006	08-Aug-2006		0.49
	9	08-Aug-2006	05-Sep-2006		N
	10	05-Sep-2006	04-Oct-2006		0.50
	11	04-Oct-2006	31-Oct-2006		0.74
	12	31-Oct-2006	28-Nov-2006		0.62
	13	28-Nov-2006	26-Dec-2006		0.96
	14	26-Dec-2006	23-Jan-2007		0.58
		Annual Mean Concentration =			0.64
Glensaugh	1	01-Feb-2006	22-Feb-2006		2.34
	2	22-Feb-2006	12-Apr-2006	*	1.13
	3	12-Apr-2006	19-Apr-2006		1.27
	4	19-Apr-2006	17-May-2006		1.26
	5	17-May-2006	14-Jun-2006		0.96
	6	14-Jun-2006	11-Jul-2006		1.25
	7	11-Jul-2006	09-Aug-2006		1.27
	8	09-Aug-2006	30-Aug-2006		1.22
	9	30-Aug-2006	04-Oct-2006		2.30
	10	04-Oct-2006	01-Nov-2006		3.04
	11	01-Nov-2006	29-Nov-2006		2.59
	12	29-Nov-2006	10-Jan-2007	*	1.97
	13				
	14				
		Annual Mean Concentration =			

Site	Sampling Period	Start Date/Time	End Date/Time		Concentration (in ppb)
Strathvaich Dam	1	29-Nov-2005	02-Jan-2006		0.69
	2	02-Jan-2006	23-Jan-2006		1.08
	3	23-Jan-2006	21-Feb-2006		N
	4	21-Feb-2006	19-Mar-2006		0.72
	5	19-Mar-2006	16-Apr-2006		0.55
	6	16-Apr-2006	14-May-2006		0.48
	7	14-May-2006	12-Jun-2006		< 0.32
	8	12-Jun-2006	09-Jul-2006		< 0.34
	9	09-Jul-2006	06-Aug-2006		0.40
	10	06-Aug-2006	06-Sep-2006		0.38
	11	06-Sep-2006	02-Oct-2006		0.71
	12	02-Oct-2006	01-Nov-2006		0.68
	13	01-Nov-2006	28-Nov-2006		0.60
	14	28-Nov-2006	28-Dec-2006		0.47
		Annual Mean Concentration =			0.52
Allt a' Mharcaidh	1	28-Nov-2005	09-Jan-2006	*	1.78
	2	09-Jan-2006	06-Feb-2006		0.86
	3	06-Feb-2006	20-Feb-2006		0.88
	4	20-Feb-2006	20-Mar-2006		0.87
	5	20-Mar-2006	17-Apr-2006		0.64
	6	17-Apr-2006	15-May-2006		0.76
	7	15-May-2006	12-Jun-2006		0.50
	8	12-Jun-2006	10-Jul-2006		0.49
	9	10-Jul-2006	07-Aug-2006		0.51
	10	07-Aug-2006	04-Sep-2006		0.72
	11	04-Sep-2006	02-Oct-2006		1.07
	12	02-Oct-2006	30-Oct-2006		0.94
	13	30-Oct-2006	11-Dec-2006	*	0.69
	14	11-Dec-2006	28-Dec-2006		0.90
		Annual Mean Concentration =			0.77

Notes: * denotes extended sampling period (greater than 40 days). N denotes missing or excluded sample. Annual mean concentration only given if the data capture is greater than 75%

Nitrogen Dioxide - Triplicate Diffusion Tubes
Concentration in Air (ppb)

Monthly measurements, collection-day - non standard
Summary for January 2006 to December 2006

5002 Eskdalemuir

StartDate	EndDate	Concentration NO2 (ppb)	Period Mean (ppb)
30/11/2005	04/01/2006	3.32	3.32
04/01/2006	25/01/2006	3.31	3.31
25/01/2006	22/02/2006	2.41	2.41
22/02/2006	23/03/2006	1.99	1.99
23/03/2006	19/04/2006	2.33	2.33
19/04/2006	17/05/2006	1.6	1.6
17/05/2006	14/06/2006	-999	-999
17/05/2006	14/06/2006	-999	
17/05/2006	14/06/2006	-999	
14/06/2006	12/07/2006	1.21	1.21
12/07/2006	09/08/2006	1.42	1.42
09/08/2006	06/09/2006	1.45	1.47
09/08/2006	06/09/2006	1.53	
09/08/2006	06/09/2006	1.42	
06/09/2006	04/10/2006	1.85	2.0
06/09/2006	04/10/2006	2.1	
06/09/2006	04/10/2006	2.06	
04/10/2006	01/11/2006	2.56	2.36
04/10/2006	01/11/2006	2.25	
04/10/2006	01/11/2006	2.28	
01/11/2006	30/11/2006	1.94	1.82
01/11/2006	30/11/2006	*0.64 **	
01/11/2006	30/11/2006	1.7	
30/11/2006	27/12/2006	1.88	1.74
30/11/2006	27/12/2006	1.79	
30/11/2006	27/12/2006	1.54	
27/12/2006	24/01/2007	1.85	1.9
27/12/2006	24/01/2007	1.84	
27/12/2006	24/01/2007	2.01	

** outlier - not included in period mean*

Annual mean concentration = 1.96

5008 Yarner Wood

StartDate	EndDate	Concentration NO2 (ppb)	Period Mean (ppb)
27/12/2005	24/01/2006	5.76	5.76
24/01/2006	22/02/2006	5.47	5.47
22/02/2006	22/03/2006	4.08	4.08
22/03/2006	19/04/2006	1.44	1.44
19/04/2006	17/05/2006	-999	-999
19/04/2006	17/05/2006	-999	
19/04/2006	17/05/2006	-999	
17/05/2006	14/06/2006	2.54	2.04
17/05/2006	14/06/2006	1.79	
17/05/2006	14/06/2006	1.79	
14/06/2006	12/07/2006	1.82	1.82
12/07/2006	09/08/2006	1.72	1.72
09/08/2006	06/09/2006	1.61	1.55
09/08/2006	06/09/2006	1.67	
09/08/2006	06/09/2006	1.36	
06/09/2006	04/10/2006	2.48	2.4
06/09/2006	04/10/2006	1.99	
06/09/2006	04/10/2006	2.73	
04/10/2006	01/11/2006	2.44	2.9
04/10/2006	01/11/2006	3.35	
04/10/2006	01/11/2006	2.9	
01/11/2006	29/11/2006	2.19	2.31
01/11/2006	29/11/2006	2.35	
01/11/2006	29/11/2006	2.38	
29/11/2006	27/12/2006	3.63	3.88
29/11/2006	27/12/2006	4.51	
29/11/2006	27/12/2006	3.49	
27/12/2006	24/01/2007	1.79	1.85
27/12/2006	24/01/2007	1.93	
27/12/2006	24/01/2007	1.83	

Annual mean concentration = 2.91

Time Series of Historic Nitrogen Dioxide Annual Mean Concentrations (ppb) for the years 1987 – 2006

Site	Site Code	Easting	Northing	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Eskdalemuir	5002	3235	6030	3.37	2.87	2.86	2.36	3.72	2.68	2.88	3.1	2.3	2.6	2.0	1.6	2.01	2.17	2.32	2.11	2.41	1.53	2.50	1.96
Goonhilly	5003	1723	214	3.61	2.82	4.66	4.03	4.92	4.06	-999	4.1	-999	4.6	3.2	1.9	-999	2.20	3.61	2.70	4.32	2.07	-999	2.97
Stoke Ferry	5004	5700	2988	13.14	13.54	14.31	11.49	12.60	12.42	10.24	11.1	9.5	9.3	7.6	7.5	9.38	9.52	8.29	8.36	8.22	7.25	7.21	closed
Ludlow	5005	3570	2741	12.05	9.33	8.05	closed																
Lough Navar	5006	192	5212	1.77	1.53	1.62	1.27	1.98	1.48	1.51	1.6	1.4	1.6	1.2	0.8	1.61	1.25	1.78	1.46	2.43	0.97	1.36	1.40
Barcombe Mills	5007	5437	1149	12.13	10.66	11.90	10.34	11.00	9.29	9.29	8.7	8.8	10.4	7.3	6.1	6.13	7.10	7.01	6.14	6.43	5.75	6.97	5.64
Yarner Wood	5008	2786	789	5.24	4.06	5.83	4.16	5.18	4.27	3.89	3.6	3.5	4.7	3.5	2.2	2.64	2.58	3.69	3.60	4.11	2.51	3.40	2.91
High Muffles	5009	4776	4939	7.42	8.53	9.00	8.10	8.94	6.73	6.08	7.4	6.2	5.7	5.5	4.6	4.87	4.99	4.87	5.13	5.64	3.85	4.73	4.57
Strathvaich Dam	5010	2347	8750	1.22	0.88	0.74	0.57	1.10	0.74	0.88	0.9	0.6	0.6	0.4	0.1	0.56	0.54	0.76	0.96	0.93	0.39	0.68	0.52
Glen Dye	5011	3642	7864	2.77	2.18	2.72	2.46	3.46	2.32	2.40	2.6	1.7	2.5	1.8	1.2	1.47	1.82	1.91	1.92	2.00	0.96	1.64	closed
Preston Montford	5023	3432	3143	10.42	9.51	10.24	8.40	7.85	7.28	6.81	8.48	7.6	8.0	5.8	4.9	-999	4.14	7.73	8.02	7.51	3.88	5.13	closed
Flatford Mill	5024	6077	2333	15.14	13.61	-999	-999	9.85	9.92	7.78	11.4	9.2	9.8	9.0	7.9	8.72	8.81	8.75	8.14	8.19	7.25	-999	7.21
River Mharcaidh	5103	2876	8052	2.37	1.48	-999	-999	1.23	1.29	1.40	1.34	1.0	1.0	0.7	0.5	-999	0.82	1.08	1.06	1.16	0.71	1.16	0.77
Whiteadder	5106	3664	6633									2.4	2.9	2.2	2.0	2.73	2.97	2.82	2.99	2.98	2.16	2.33	-999
Loch Dee	5107	2468	5779	3.77	2.99	3.39	2.80	2.18	2.22	2.97	3.93	2.4	2.0	2.1	1.4	1.93	1.75	2.23	2.31	2.69	1.39	-999	1.33
Redesdale	5109	3833	5954									3.6	3.9	3.5	2.3	3.10	3.07	3.06	3.66	3.60	2.08	2.86	2.89
Bannisdale	5111	3515	5043	6.47	7.24	6.92	5.76	5.63	4.96	4.74	5.37	5.0	5.0	-999	3.3	4.09	3.75	4.61	3.78	3.80	2.96	2.94	3.17
Cow Green Reservoir	5113	3817	5298	6.56	6.28	6.18	5.32	4.51	4.06	5.04	4.02	5.0	3.2	3.8	-999	-999	4.14	3.20	4.08	4.06	2.55	3.22	closed
Thorganby	5117	4676	4428	13.93	14.57	16.39	13.61	12.97	11.04	11.15	11.52	9.7	9.0	8.3	7.6	8.10	9.56	8.57	7.84	8.82	6.89	7.72	closed
Jenny Hurn	5118	4816	3986	15.77	16.19	18.84	16.57	14.03	12.63	10.82	12.22	11.4	10.8	9.4	9.7	10.02	10.66	10.35	closed				
Beddgelert	5119	2556	3518	4.96	3.78	4.01	3.31	3.17	2.97	1.91	4.0	-999	closed										
Wardlow Hay Cop	5120	4177	3739	15.02	14.60	14.18	12.26	11.17	10.43	10.67	11.3	11.0	9.7	9.2	7.5	7.66	7.23	8.36	9.14	8.56	6.70	7.16	closed
Bottesford	5121	4797	3376	16.04	15.56	15.93	14.13	11.41	11.15	10.11	10.0	10.5	10.5	9.2	7.9	8.19	7.95	9.31	7.92	8.92	7.65	8.13	closed
Plynlimon	5122	2822	2841	6.29	4.30	closed																	
Tycanol Wood	5123	2093	2364	5.96	4.09	5.16	3.51	3.85	3.11	3.43	3.68	3.0	3.6	2.9	1.8	-999	2.08	2.43	2.93	3.07	1.56	2.31	1.95
Llyn Brianne	5124	2807	2492	6.26	4.90	-999	-999	5.12	3.75	4.86	3.36	-999	-999	2.2	-999	2.06	2.23	0.00	3.55	3.54	2.01	-999	closed
Woburn	5127	4964	2361	18.68	19.35	-999	-999	16.96	15.47	13.26	14.41	13.2	14.2	12.3	11.0	11.43	11.23	12.84	12.50	12.34	9.46	11.24	closed
Compton	5129	4512	1804	15.56	14.44	15.45	13.91	13.02	13.04	11.36	11.87	11.6	9.7	9.5	7.8	7.98	8.39	10.06	9.41	9.52	6.01	7.13	7.41
Driby	5136	5386	3744	11.84	13.09	12.84	11.08	12.71	8.56	8.21	9.03	6.8	7.9	6.4	6.4	6.71	7.08	7.52	6.49	6.87	5.10	5.24	5.27
Achanarras	5140	3151	9550	2.91	1.88	2.49	1.95	1.42	0.96	1.68	1.95	1.3	1.3	1.2	0.8	0.90	1.14	1.34	1.43	1.52	0.84	1.34	closed
Hillsborough Forest	5149	1349	5156									5.8	5.3	4.5	3.2	3.77	4.08	5.48	4.88	6.04	4.10	4.63	3.81
Pumlumon	5150	2823	2854			-999	-999	3.62	3.35	3.60	3.43	3.0	3.7	2.2	1.7	2.16	1.93	2.82	2.88	3.19	1.71	2.16	2.17
Polloch	5151	1792	7689									0.8	0.9	0.6	0.2	0.64	0.40	0.68	0.78	1.02	0.45	0.80	0.64
Balquhidder 2	5152	2545	7207								2.3	2.3	-999	2.5	1.4	-999	1.53	1.67	1.88	2.05	1.13	1.59	1.26
Llyn Llydaw	5153	2638	3549										-999	-999	-999	1.91	1.77	2.14	2.57	2.60	1.22	-999	-999
Balquhidder	5200	2521	7206	3.34	2.91	3.61	2.33	2.50	1.64	1.85	2.3	closed											
Forsinard	5332	2890	9425									1.2	1.4	0.9	0.4	-999	0.98	1.27	1.12	1.31	0.56	1.02	closed
Glensaugh	5164	3602	7967																				1.72
Forsinain 2	5166	2906	9486																				0.98
Moorhouse	5167	3758	5328																				-999

Notes:
(1) -999 indicates insufficient data capture to give a valid annual mean

Notes for 2006:
(1) Stoke Ferry, Preston Montford, Thorganby, Wardlow Hay Cop, Bottesford, Llyn Brianne, Woburn, and Achanarras diffusion tube sites were closed at the end of 2005
(2) Glen Dye, Cow Green Reservoir and Forsinard diffusion tubes were moved to Glensaugh, Moorhouse and Forsinain 2 respectively, early 2006.

Appendix 5

Nitric Acid Denuder Measurements 2006

Tables A5-1 and A5-2 below show the original, 12 denuder sites and locations, and the 18 new sites that were added to the Nitric Acid Denuder Network in 2006.

Tables A5-3 to A5-11 provide the measurements and the summary statistics of the monthly concentrations of HNO_3, SO_2 and HCl in the gas phase, and of NO_3^-, SO_4^{2-}, Cl^-, Na^+, Mg^{2+} and Ca^{2+} in the aerosol phase.

Table A5-1 Original 12 Denuder Sites

Site code	Site name	OS Grid Ref
1	Bush OTC	NT243642
21	Glensaugh	NO664789
24	Rothamsted	TL123129
30	Strathvaich Dam	NH348750
31	Eskdalemuir	NT235030
32	High Muffles	SE776939
33	Stoke Ferry	TL700988
34	Yarner Wood	SX789788
40	Sutton Bonington	SK505268
45	Lough Navar	IH065545
70	Cwmystwyth	SN771742
83	Barcombe Mills	TQ438149

Table A5-2 New (2006) Denuder Sites

Site code	Site name	OS Grid Ref
6B	Rosemaund	SO564476
8C	Narberth	SN146127
12	Halladale	NC902488
18	Auchencorth Moss	NT221562
19	Shetland	HU500400
22	Moor House	NY751334
36C	Cromwell Rd	TQ266791
41	Lagganlia	NH856037
44	Hillsborough	IJ243577
47	Rum	NM408992
60C	Edinburgh St Leonards	NT262731
77	Carradale	NR798378
97	Detling	TQ801597
98	Harwell	SU474863
99	Ladybower	SK164892
100	Plas Y Brenin	SH716578
102	Caenby	SK993900
103	Goonhilly	SW723214

Table A5-3 Monthly Nitric Acid Measurements from the 30 monitoring sites in the HNO_3 Monitoring Network (Gaseous HNO_3 (µg HNO_3 m^{-3}))

Month	Site 1	Site 21	Site 24	Site 30	Site 31	Site 32	Site 33	Site 34	Site 83	Site 40	Site 45	Site 70	Site 6B	Site 8C	Site 12
Jan	0.77	0.67	2.63	0.41	0.75	1.17	1.54	1.36	1.34	1.44	0.42	0.93	1.27	NS	0.31
Feb	0.49	0.30	1.87	0.10	0.44	0.87	1.31	0.93	1.57	1.24	0.23	0.86	1.04	NS	0.09
Mar	0.79	0.77	1.55	0.51	0.51	0.89	1.02	0.74	1.22	1.05	0.27	0.59	0.77	0.53	0.13 [2]
Apr	0.47 [2]	0.32	1.24	0.05	0.23	0.48	0.88	0.48	0.92	1.35	0.09	ND [4]	0.43	0.50	0.12
May	0.56	0.42	1.54	0.30	0.40	0.79	1.03	0.63	2.10	0.63	0.22	0.44	0.57	0.54	0.38
Jun	0.80	0.62 [2]	3.06	0.27	0.64	0.91	1.55	1.16	2.46	1.97	0.27	0.83	1.09	0.98	0.08
Jul	1.36 [2]	1.92 [2]	3.59	0.43	1.50	1.49	2.45	2.09	2.31 [2]	1.97	0.40	0.91	2.33	ND [4]	0.40
Aug	0.65	ND [1]	1.40	0.24	0.35	0.42	1.35	0.44	1.23	1.53	0.10	0.44	0.61	0.27 [3]	0.30
Sep	0.63	0.79	1.96	0.33	0.57	0.23	1.54	0.70	1.34	2.04	0.22	0.46	0.74 [2]	0.27 [3]	0.32
Oct	0.46	0.73	1.47	0.21	0.44	0.73	0.87	0.63	0.74 [2]	1.38	0.36	0.33	0.54 [2]	0.27 [3]	0.21
Nov	0.31	0.25	1.53	0.06	0.22	0.64	1.63 [2]	0.31	0.13	1.29	0.06	0.24	0.48	0.17	0.09
Dec	0.35	0.20	1.74	0.09	0.34	0.86	1.29	0.51	1.29	1.58	0.19	0.21	0.59	0.50	0.07
Mean	0.64	0.64	1.96	0.25	0.53	0.79	1.37	0.83	1.39	1.46	0.24	0.57	0.87	0.45	0.21
Min	0.31	0.20	1.24	0.05	0.22	0.23	0.87	0.31	0.13	0.63	0.06	0.21	0.43	0.17	0.07
Max	1.36	1.92	3.59	0.51	1.50	1.49	2.45	2.09	2.46	2.04	0.42	0.93	2.33	0.98	0.40
SD	0.28	0.48	0.74	0.15	0.34	0.34	0.43	0.50	0.66	0.41	0.12	0.27	0.53	0.25	0.13
CV (%)	44.1	75.4	37.6	61.5	64.2	42.6	31.6	59.9	47.7	28.0	49.9	48.1	60.8	54.7	61.0
N	12	11	12	12	12	12	12	12	12	12	12	11	12	9	12

Month	Site 18	Site 19	Site 22	Site 36	Site 41	Site 44	Site 47	Site 60	Site 77	Site 97	Site 98	Site 99	Site 100	Site 102	Site 103
Jan	0.60	0.36	0.88	3.05	0.20	0.59	NS	1.80	NS	NS	NS	NS	NS	NS	1.46 [2]
Feb	0.36	0.31	0.47	4.76	0.25	**0.67**	0.02	2.23 [2]	0.61	1.27	NS	0.83	NS	1.15	0.80 [2]
Mar	0.56	0.29	1.08 [2]	4.60	0.28	0.44	ND [2]	1.92	ND [3,7]	1.46	NS	1.17	NS	0.21 [3]	ND [1]
Apr	0.31	0.14	ND [4]	2.25 [2]	0.15	0.26	ND [1]	1.14	ND [3,7]	1.80	NS	0.54	NS	0.21 [3]	0.52
May	0.53	0.30	1.43 [2]	4.08	0.40	1.64 [2]	ND [1,3]	**0.35** [8]	ND [7]	**0.48**	NS	1.00	0.13	1.15	0.65 [2]
Jun	0.53	0.23	0.39 [2]	0.41 [2]	1.38 [2]	0.51	ND [1,3]	1.22	ND [7]	2.59	1.97	1.49	0.94	1.42	1.10
Jul	0.92	0.59	**1.20**	5.66	ND [1]	0.95	ND [1,3]	2.10	0.13	2.46	2.41	1.93	1.22	1.76	1.54
Aug	0.53	0.07	0.43	2.97	ND [1]	0.31	ND [1]	1.58	0.04	1.99	0.81	ND [4]	**0.11**	1.08	0.30
Sep	0.47	0.70	0.84	4.17	ND [1]	0.38	0.11	1.50	0.19	ND [4]	1.20	3.37	0.40	**0.65**	0.42
Oct	0.32	0.37	0.66	2.23	0.18 [2]	0.43	0.20	1.72	0.21 [3]	2.44	0.82	ND [1]	0.39	1.15	**0.12** [3]
Nov	0.18	0.16	0.24	0.90 [2]	ND [1]	0.27	0.06	1.34	0.21 [3]	1.41	0.55	ND [1]	0.24	**0.66** [2]	**0.12** [3]
Dec	0.23	0.22	0.16	3.98	0.10	0.35	0.11	1.51	0.14	1.03	0.97	1.03	0.23	1.05	ND [1]
Mean	0.46	0.31	0.71	3.25	0.37	0.57	0.10	1.64	0.22	1.69	1.25	1.42	0.46	0.95	0.70
Min	0.18	0.07	0.16	0.41	0.10	0.26	0.02	1.14	0.04	0.48	0.55	0.54	0.11	0.21	0.12
Max	0.92	0.70	1.43	5.66	1.38	1.64	0.20	2.23	0.61	2.59	2.41	3.37	1.22	1.76	1.54
SD	0.20	0.18	0.41	1.59	0.42	0.39	0.06	0.35	0.18	0.69	0.68	0.89	0.41	0.48	0.52
CV (%)	43.4	58.5	58.1	48.8	114.6	69.0	62.8	21.3	83.7	40.6	54.8	62.8	89.2	50.2	73.8
N	12	12	11	12	8	12	6	11	7	10	7	8	8	11	10

Notes:

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

Table A5-4 Monthly Sulphur Dioxide data at the 30 monitoring sites in the HNO_3 Monitoring Network (Gaseous SO_2 (µg m^{-3}))

Month	Site 1	Site 21	Site 24	Site 30	Site 31	Site 32	Site 33	Site 34	Site 83	Site 40	Site 45	Site 70	Site 6B	Site 8C	Site 12
Jan	0.99	1.04	3.72	**0.34**	0.65	3.40	**2.30**	1.94	1.69	3.21	0.29	1.82	1.52	NS	0.18
Feb	0.96	0.47	2.54	0.09	0.60	**2.38**	**1.77**	0.95	2.24	1.76	0.23	0.91	2.21	NS	0.19
Mar	1.89	1.21	1.53	0.27	0.81	1.99	1.57	0.99	1.85	1.49	0.41	1.18	1.00	0.73	0.16 [2]
Apr	**1.33** [2]	0.13	1.36	0.04	0.37	ND[8]	0.85	0.46	1.36	1.77	0.12	ND [4]	0.45	1.03	0.08
May	1.90	0.43	1.56	0.15	0.38	1.11	1.20	0.61	**3.37**	0.50	0.14	0.34	0.40	1.24	0.32
Jun	0.87	0.40 [2]	2.48	0.12	0.36	1.46	1.55	0.97	2.51	2.06	0.18	0.61	0.87	1.21	0.06
Jul	0.78 [2]	0.97 [2]	2.30	0.16	0.68	1.83	1.53	1.18	1.83 [2]	1.15	**0.21**	0.64	1.03	ND [4]	0.17
Aug	1.55	ND[1]	1.35	0.07	0.23	0.65	1.66	0.26	0.98	1.05	0.10	0.16	0.29	0.52 [3]	**0.17**
Sep	0.57	0.94	1.53	0.21	0.40	**0.28**	**1.39**	0.61	1.47	**1.53**	0.20	0.45	0.50	0.52 [3]	0.22
Oct	0.59	0.74	1.48	0.12	0.34	1.01	1.10	0.57	1.03 [2]	1.20	0.37	0.36	0.46	0.52 [3]	0.19
Nov	0.33	0.52	1.73	0.05	0.17	1.51	2.44 [2]	0.32	0.27	1.25	0.09	0.34	0.47	0.46	0.06
Dec	0.37	0.37	1.35	0.06	0.19	1.41	1.61	0.77	1.11	1.19	0.18	0.27	0.48	1.02	0.07
Mean	1.01	0.66	1.91	0.14	0.43	1.55	1.58	0.80	1.64	1.51	0.21	0.64	0.81	0.81	0.16
Min	0.33	0.13	1.35	0.04	0.17	0.28	0.85	0.26	0.27	0.50	0.09	0.16	0.29	0.46	0.06
Max	1.90	1.21	3.72	0.34	0.81	3.40	2.44	1.94	3.37	3.21	0.41	1.82	2.21	1.24	0.32
SD	0.55	0.34	0.72	0.09	0.21	0.86	0.45	0.46	0.81	0.67	0.10	0.49	0.57	0.32	0.08
CV (%)	54.0	52.2	37.7	67.4	47.7	55.2	28.5	56.8	49.4	44.3	48.7	76.7	70.6	39.6	49.3
N	12	11	12	12	12	11	12	12	12	12	12	11	12	9	12

Month	Site 18	Site 19	Site 22	Site 36	Site 41	Site 44	Site 47	Site 60	Site 77	Site 97	Site 98	Site 99	Site 100	Site 102	Site 103
Jan	0.78	0.43	1.10	3.86	0.12	0.76	NS	1.38	NS	NS	NS	NS	NS	NS	1.48 [2]
Feb	1.10	0.83	0.63	3.58	0.28	0.80	0.05	1.76 [2]	0.20	2.56	NS	1.73	NS	2.26	0.78 [2]
Mar	1.25	0.66	1.29 [2]	2.12	0.23	0.79	ND [2]	2.23	ND[3,7]	2.20	NS	2.96	NS	**0.72** [3]	ND[1]
Apr	0.56	0.40	ND [4]	1.71 [2]	**0.12**	0.41	ND[1]	1.32	ND[3,7]	2.51	NS	0.93	NS	**0.72** [3]	0.55
May	1.65	0.55	1.05 [2]	1.97	0.27	1.99	ND[1,3]	**0.06** [8]	ND[7]	0.46	NS	1.68	0.30	1.96	0.80 [2]
Jun	0.47	0.46	0.58 [2]	1.85 [2]	0.64 [2]	**0.52**	ND[1,3]	1.40	ND[7]	3.36	2.55	1.70	1.35	2.17	0.91
Jul	1.62	0.86	**0.78**	4.56	ND[1]	0.67	ND[1,3]	3.93	0.02	1.60	2.33	1.83	1.44	1.94	1.29
Aug	0.98	0.27	0.27	1.06	ND[1]	0.38	ND[1]	1.97	0.05	1.97	0.60	ND[4]	0.11	1.82	0.34
Sep	0.48	**0.06**	0.65	2.05	ND[1]	0.36	0.16	1.73	0.11	ND[4]	1.15	2.66	0.81	0.28	0.62
Oct	0.37	0.74	0.71	1.41	0.16 [2]	0.56	0.20	1.60	0.19 [3]	0.24	0.77	ND[1]	1.21	1.40	0.15 [3]
Nov	0.18	0.24	0.34	2.72 [2]	ND[7]	0.55	0.05	0.72	0.19 [3]	2.19	0.62	ND[1]	0.59	0.73 [2]	0.15 [3]
Dec	0.22	0.19	0.27	2.03	0.16	0.48	0.12	1.90	0.10	1.56	0.93	1.17	0.74	1.70	ND[1]
Mean	0.81	0.47	0.70	2.41	0.25	0.69	0.11	1.81	0.12	1.87	1.28	1.83	0.82	1.43	0.71
Min	0.18	0.06	0.27	1.06	0.12	0.36	0.05	0.72	0.02	0.24	0.60	0.93	0.11	0.28	0.15
Max	1.65	0.86	1.29	4.56	0.64	1.99	0.20	3.93	0.20	3.36	2.55	2.96	1.44	2.26	1.48
SD	0.51	0.26	0.34	1.06	0.17	0.44	0.07	0.81	0.07	0.95	0.82	0.68	0.49	0.69	0.44
CV (%)	63.7	54.7	48.9	44.0	69.1	63.7	57.7	44.5	58.8	51.1	64.0	37.2	59.3	48.6	62.8
N	12	12	11	12	8	12	5	11	7	10	7	8	8	11	10

Notes:

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

Table A5-5 Monthly Hydrochloric Acid data at the 30 monitoring sites in the HNO_3 Monitoring Network (Gaseous HCl (µg m^{-3}))

Month	Site 1	Site 21	Site 24	Site 30	Site 31	Site 32	Site 33	Site 34	Site 83	Site 40	Site 45	Site 70	Site 6B	Site 8C	Site 12
Jan	0.29	0.30	0.37	**0.32**	**0.32**	0.22	0.40	**0.24**	**0.40**	**0.19**	0.17	0.32	**0.35**	NS	0.12
Feb	0.32	0.21	0.41	**0.38**	**0.36**	0.37	0.33	**0.87**	0.46	0.27	0.17	0.25	0.33	NS	0.24
Mar	0.41	0.54	0.40	0.35	0.34	0.39	0.35	0.39	0.67	0.35	0.14	0.41	0.33	0.61	0.07 [2]
Apr	0.46 [2]	0.20	0.29	0.15	0.20	0.22	0.24	0.31	0.79	0.39	0.11	ND [4]	0.22	0.56	0.13
May	0.26	0.36	0.25	0.18	0.23	0.33	0.44	0.27	**0.59**	0.20	0.15	0.23	0.23	0.28	0.32
Jun	0.30	0.46 [2]	0.43	0.24	0.27	0.35	1.07	0.50	0.53	1.20	0.21	0.36	0.29	0.34	**0.20**
Jul	**0.29 [2]**	0.80 [2]	0.41	0.29	0.29	0.33	0.34	0.39	0.52 [2]	1.13	0.30	0.39	0.41	ND [4]	0.27
Aug	0.25	ND[1]	0.24	**0.45**	0.37	0.35	0.52	0.39	**0.45**	0.25	0.20	0.29	0.51	0.22 [3]	**0.39**
Sep	0.22	0.34	0.34	0.21	**0.34**	**0.06**	0.37	0.42	0.42	0.43	0.11	0.31	0.37 [2]	0.22 [3]	0.27
Oct	0.10	0.34	0.27	0.23	**0.24**	0.17	0.21	0.25	0.22 [2]	0.20	0.23	0.24	0.16 [2]	0.22 [3]	0.28
Nov	0.35	0.23	0.31	0.20	**0.24**	0.22	0.37 [2]	0.19	**0.16**	0.49	0.07	0.19	0.19	0.35	0.19
Dec	**0.30**	0.18	0.33	0.23	0.16	0.22	0.33	0.38	0.46	0.18	0.09	0.22	0.27	0.35	0.14
Mean	0.30	0.36	0.34	0.27	0.28	0.27	0.41	0.38	0.47	0.44	0.16	0.29	0.31	0.35	0.22
Min	0.10	0.18	0.24	0.15	0.16	0.06	0.21	0.19	0.16	0.18	0.07	0.19	0.16	0.22	0.07
Max	0.46	0.80	0.43	0.45	0.37	0.39	1.07	0.87	0.79	1.20	0.30	0.41	0.51	0.61	0.39
SD	0.09	0.18	0.07	0.09	0.07	0.10	0.22	0.18	0.17	0.35	0.07	0.07	0.10	0.15	0.09
CV (%)	30.8	51.3	19.6	33.5	23.7	36.9	53.9	46.3	36.6	80.4	40.4	24.9	32.7	41.8	43.5
N	12	11	12	12	12	12	12	12	12	12	12	11	12	9	12

Month	Site 18	Site 19	Site 22	Site 36	Site 41	Site 44	Site 47	Site 60	Site 77	Site 97	Site 98	Site 99	Site 100	Site 102	Site 103
Jan	0.24	0.78	0.42	0.45	0.17	0.17	NS	**0.51**	NS	NS	NS	NS	NS	NS	0.56 [2]
Feb	0.19	0.64	0.26	0.50	0.17	0.13	**0.10**	0.45 [2]	0.00	1.80	NS	0.39	NS	0.49	0.56 [2]
Mar	**0.44**	0.59	0.55 [2]	0.55	0.10	0.22	ND [2]	0.49	ND[3,7]	0.58	NS	0.42	NS	**0.22 [3]**	ND[1]
Apr	0.21	0.30	ND [4]	0.31 [2]	0.10	0.17	ND[1]	0.27	ND[3,7]	0.43	NS	0.27	NS	**0.22 [3]**	0.39
May	0.30	0.43	0.57 [2]	0.30	0.11	**0.37**	ND[1,3]	**0.10 [8]**	ND[7]	0.14	NS	0.30	0.29	0.37	0.66 [2]
Jun	0.30	0.48	0.62 [2]	0.45 [2]	0.39 [2]	0.23	ND[1,3]	0.34	ND[7]	0.54	0.32	0.43	0.41	0.47	0.69
Jul	0.42	0.43	**0.24**	0.55	ND[1]	0.37	ND[1,3]	0.42	0.15	0.49	0.34	0.40	0.58	0.35	0.78
Aug	0.36	**0.10**	0.13	**0.35**	ND[1]	0.11	ND[1]	0.28	0.08	0.39	0.49	ND[4]	**0.08**	0.21	0.32
Sep	0.19	0.65	0.29	0.42	ND[1]	0.30	0.24	0.22	0.22	ND[4]	0.36	0.89	0.34	**0.06**	0.51
Oct	0.18	0.56	0.48	**0.34**	0.21 [2]	0.20	0.20	0.27	0.17 [3]	**0.11**	0.24	ND[1]	0.29	0.26	0.15 [3]
Nov	0.10	0.26	0.15	0.18 [2]	ND[7]	0.15	0.11	0.29	0.17 [3]	0.38	0.22	ND[1]	0.22	**0.10 [2]**	0.15 [3]
Dec	0.13	0.49	0.08	0.40	0.08	0.18	0.18	0.29	0.17	0.74	0.36	0.31	0.21	0.23	ND[1]
Mean	0.25	0.48	0.34	0.40	0.17	0.22	0.17	0.35	0.14	0.56	0.33	0.43	0.30	0.27	0.48
Min	0.10	0.10	0.08	0.18	0.08	0.11	0.10	0.22	0.00	0.11	0.22	0.27	0.08	0.06	0.15
Max	0.44	0.78	0.62	0.55	0.39	0.37	0.24	0.51	0.22	1.80	0.49	0.89	0.58	0.49	0.78
SD	0.11	0.19	0.19	0.11	0.10	0.09	0.06	0.10	0.07	0.48	0.09	0.20	0.15	0.14	0.22
CV (%)	42.8	39.5	55.3	27.4	61.6	39.5	36.0	28.6	53.8	84.8	27.4	46.3	49.4	51.3	46.1
N	12	12	11	12	8	12	5	11	7	10	7	8	8	11	10

Notes:

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

Table A5-6 Monthly Aerosol Nitrate data at the 30 monitoring sites in the HNO_3 Monitoring Network (Particulate NO_3^- (µg m^{-3}))

Month	Site 1	Site 21	Site 24	Site 30	Site 31	Site 32	Site 33	Site 34	Site 83	Site 40	Site 45	Site 70	Site 6B	Site 8C	Site 12
Jan	2.20	1.59	4.58	0.46	1.65	2.72	5.16	3.08	4.65	5.17	2.35	2.63	4.56	NS	0.64
Feb	1.50	0.66	4.57	0.28	1.18	2.36	4.49	3.23	3.94	2.54	1.46	1.93	3.41	NS	0.41
Mar	1.65	1.64	3.24	0.69	1.22	2.55	3.16	2.54	3.93	2.69	1.15	1.51	2.55	2.44	0.17 [2]
Apr	0.47 [2]	0.52	3.45	0.22	0.77	1.53	3.24	1.73	3.69	2.81	0.28	ND[4]	2.00	1.78	0.25
May	1.54	1.33	3.46	0.75	1.20	2.57	3.40	1.80	3.54	3.08	1.04	1.51	1.83	1.83	1.59
Jun	1.28	1.00 [2]	1.50	4.20 [8]	1.42	2.22	1.56	2.23	3.57	3.71	0.77	1.77	2.39	2.26	0.54
Jul	1.43 [2]	0.68 [2]	3.47	0.47	1.42	2.21	3.34	2.19	2.78 [2]	3.31	0.79	1.62	2.71	ND[4]	0.57
Aug	0.99	ND[1]	2.07	0.18	0.43	1.04	2.31	0.95	0.34 [5]	1.89	0.08	0.85	1.08	1.90 [3]	0.48
Sep	1.16	1.80	0.06 [5]	0.36	0.84	2.19	3.64	1.65	0.08 [5]	2.85	0.67	0.87	0.88 [2]	1.90 [3]	ND[4]
Oct	1.39	1.09	2.79	0.31	0.70	2.21	2.93	1.90	1.80 [2]	2.95	1.43	0.88	0.88 [2]	1.90 [3]	0.40
Nov	0.62	0.50	2.89	0.12	0.63	1.57	4.31 [2]	0.87	1.26	2.45	0.22	0.68	1.97	0.47	0.18
Dec	0.88	0.35	2.39	0.23	0.67	1.39	0.56	1.56	3.30	2.99	1.24	0.78	2.19	2.08	0.25
Mean	1.26	1.01	3.13	0.37	1.01	2.04	3.18	1.98	3.25	3.04	0.96	1.37	2.20	1.84	0.50
Min	0.47	0.35	1.50	0.12	0.43	1.04	0.56	0.87	1.26	1.89	0.08	0.68	0.88	0.47	0.17
Max	2.20	1.80	4.58	0.75	1.65	2.72	5.16	3.23	4.65	5.17	2.35	2.63	4.56	2.44	1.59
SD	0.48	0.51	0.95	0.20	0.38	0.53	1.26	0.73	1.03	0.81	0.64	0.61	1.06	0.56	0.39
CV (%)	37.8	50.6	30.4	55.0	38.1	26.1	39.7	37.0	31.8	26.6	66.6	44.7	48.2	30.4	79.4
N	12	11	11	11	12	12	12	12	10	12	12	11	12	9	11

Month	Site 18	Site 19	Site 22	Site 36	Site 41	Site 44	Site 47	Site 60	Site 77	Site 97	Site 98	Site 99	Site 100	Site 102	Site 103
Jan	2.19	1.30	1.45	5.17	0.50	3.09	NS	3.27	ND[7]	NS	NS	NS	NS	NS	5.11 [2]
Feb	1.20	0.91	0.94	5.29	0.30	1.89	0.01	2.89 [2]	0.24	3.00	NS	1.84	NS	3.29	2.33 [2]
Mar	1.43	0.77	1.29 [2]	4.63	0.77	1.62	ND[1]	2.59	ND[3,7]	2.82	NS	2.10	NS	2.92 [3]	ND[1]
Apr	0.80	0.64	ND[4]	1.90	0.32	0.83	ND[1]	1.42	ND[3,7]	4.28	NS	1.44	NS	2.92 [3]	1.83
May	1.56	1.45	2.67 [2]	4.52	0.81	1.71 [2]	ND[1,3]	1.91	ND[7]	2.07	NS	2.45	0.42	3.43	2.25 [2]
Jun	1.41	1.32	0.98 [2]	2.10	1.07 [2]	1.87	ND[1,3]	1.94	ND[7]	3.25	3.49	2.27	1.70	3.02	2.60
Jul	1.64	0.91	1.41	4.39	ND[1]	2.00	ND[1,3]	2.04	1.17	3.03	2.62	2.02	0.52	ND[5]	2.64
Aug	0.76	0.75	0.68	2.39	ND[1]	0.67	ND[1]	1.60	0.34	2.30	ND[5]	1.12	0.59	1.81	0.93
Sep	1.04	2.23	1.39	3.87	ND[1]	1.06	0.43	2.15	0.73	3.11	2.10	1.09	0.82	ND[5]	1.03
Oct	1.23	1.29	0.74	4.20	0.17 [2]	2.31	0.39	2.47	0.72 [3]	0.95	2.30	ND[1]	1.22	2.25	1.75 [3]
Nov	0.52	0.54	0.58	4.59	ND[7]	0.92	-0.03 [5]	ND[5]	0.72 [3]	2.92	1.66	ND[1]	0.65	3.30 [2]	1.75 [3]
Dec	0.78	0.80	0.45	3.97	0.17	1.66	0.38	1.97	0.28	2.07	2.06	1.41	0.64	2.47	ND[1]
Mean	1.21	1.08	1.14	3.92	0.51	1.64	0.30	2.20	0.60	2.71	2.37	1.75	0.82	2.82	2.22
Min	0.52	0.54	0.45	1.90	0.17	0.67	0.01	1.42	0.24	0.95	1.66	1.09	0.42	1.81	0.93
Max	2.19	2.23	2.67	5.29	1.07	3.09	0.43	3.27	1.17	4.28	3.49	2.45	1.70	3.43	5.11
SD	0.47	0.47	0.62	1.16	0.34	0.69	0.20	0.55	0.33	0.85	0.63	0.50	0.43	0.54	1.17
CV (%)	38.7	43.8	54.1	29.6	65.3	42.2	65.8	25.1	55.4	31.4	26.6	28.7	52.5	19.1	52.7
N	12	12	11	12	8	12	4	11	7	11	6	9	8	9	10

Notes:

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

Table A5-7 Monthly Aerosol Sulphate data at the 30 monitoring sites in the HNO_3 Monitoring Network (Particulate SO_4^{2-} (µg m^{-3}))

Month	Site 1	Site 21	Site 24	Site 30	Site 31	Site 32	Site 33	Site 34	Site 83	Site 40	Site 45	Site 70	Site 6B	Site 8C	Site 12
Jan	1.22	0.85	2.64	0.70	1.15	1.83	3.10	1.60	3.12	3.99	1.43	1.67	2.40	NS	0.74
Feb	0.97	0.56	2.64	0.48	1.04	1.80	2.70	2.26	2.70	1.50	1.23	1.48	2.40	NS	0.87
Mar	0.89	0.98	1.74	0.66	0.74	1.79	1.68	1.61	2.44	1.50	2.19	1.14	1.41	1.83	0.30 [2]
Apr	0.54 [2]	0.37	1.62	0.43	0.59	0.94	1.41	1.09	1.77	1.38	0.55	ND[4]	1.23	1.13	0.45
May	1.00	0.68	1.77	0.73	0.97	1.18	1.43	1.39	2.13	1.61	1.00	1.02	1.43	1.45	1.16
Jun	1.30	0.96 [2]	1.51	2.72 [8]	1.29	1.62	1.26	1.89	1.77	2.37	0.94	1.50	1.58	2.29	0.76
Jul	1.27 [2]	0.41 [2]	2.57	0.63	1.60	2.00	2.09	2.36	2.27 [2]	2.22	0.94	1.46	2.47	ND[4]	0.81
Aug	0.56	ND[1]	1.23	0.31	0.38	0.64	1.35	0.72	0.20 [5]	0.98	0.09	0.55	0.81	1.32 [3]	0.55
Sep	0.94	1.44	**ND [5]**	0.34	0.88	1.36	1.89	1.23	-0.10 [5]	1.64	0.61	0.90	0.61 [2]	1.32 [3]	ND[4]
Oct	1.03	0.74	1.50	0.49	0.74	1.56	1.71	1.37	1.41 [2]	1.69	1.08	0.79	0.50 [2]	1.32 [3]	0.47
Nov	0.46	0.28	1.03	0.30	0.52	0.80	1.81 [2]	0.65	0.85	1.02	0.43	0.47	1.06	0.84	0.35
Dec	0.71	0.24	1.33	0.38	0.56	0.84	0.22	1.27	2.21	1.64	0.92	0.86	1.32	1.47	0.39
Mean	0.91	0.68	1.78	0.50	0.87	1.37	1.72	1.45	2.07	1.79	0.95	1.08	1.44	1.44	0.62
Min	0.46	0.24	1.03	0.30	0.38	0.64	0.22	0.65	0.85	0.98	0.09	0.47	0.50	0.84	0.30
Max	1.30	1.44	2.64	0.73	1.60	2.00	3.10	2.36	3.12	3.99	2.19	1.67	2.47	2.29	1.16
SD	0.29	0.36	0.58	0.16	0.36	0.47	0.73	0.53	0.65	0.80	0.54	0.41	0.68	0.41	0.27
CV (%)	31.8	53.2	32.5	32.8	41.1	34.4	42.3	36.7	31.4	44.5	56.3	37.9	47.4	28.8	42.8
N	12	11	11	11	12	12	12	12	10	12	12	11	12	9	11

Month	Site 18	Site 19	Site 22	Site 36	Site 41	Site 44	Site 47	Site 60	Site 77	Site 97	Site 98	Site 99	Site 100	Site 102	Site 103
Jan	1.34	1.19	0.60	3.37	0.41	1.53	NS	1.73	ND[7]	NS	NS	NS	NS	NS	3.12 [2]
Feb	0.80	1.10	0.62	3.03	0.60	1.34	0.11	1.56 [2]	0.32	1.23	NS	0.93	NS	1.46	1.00 [2]
Mar	0.81	1.08	0.77 [2]	2.50	0.59	0.96	ND[1]	1.29	ND[3,7]	1.41	NS	1.15	NS	2.20 [3]	ND[1]
Apr	0.74	0.85	ND[4]	0.98 [2]	0.36	0.74	ND[1]	1.00	ND[3,7]	1.48	NS	0.91	NS	2.20 [3]	1.21
May	1.04	1.39	0.94 [2]	2.81	0.85	**1.04**	ND[1,3]	1.21	ND[7]	1.19	NS	1.21	0.58	1.27	1.50 [2]
Jun	1.28	1.26	0.71 [2]	1.50 [2]	1.50 [2]	1.25	ND[1,3]	1.71	ND[7]	1.85	2.34	1.39	1.57	1.47	2.05
Jul	1.65	1.12	1.08	3.66	ND[1]	1.35	ND[1,3]	1.92	1.08	1.60	2.02	1.29	0.62	ND[5]	2.12
Aug	0.63	0.79	0.36	1.89	ND[1]	0.52	ND[1]	0.89	0.42	1.02	ND[5]	0.57	0.61	0.88	0.89
Sep	0.79	1.59	0.86	2.66	ND[1]	0.65	0.55	1.56	0.73	1.42	1.29	1.11	0.87	ND[5]	0.90
Oct	1.01	1.31	0.53	2.82	0.29 [2]	1.49	0.78	1.62	0.85 [3]	0.61	1.30	ND[1]	1.26	0.96	1.43 [3]
Nov	0.41	0.80	0.36	2.44 [2]	ND[7]	0.66	0.10	ND[5]	0.85 [3]	1.06	0.79	ND[1]	0.62	1.36 [2]	1.43 [3]
Dec	0.57	0.98	0.23	2.52	0.29	0.98	0.60	1.27	0.49	0.81	1.40	0.79	0.83	1.25	ND[1]
Mean	0.92	1.12	0.64	2.51	0.61	1.04	0.43	1.43	0.68	1.24	1.52	1.04	0.87	1.45	1.56
Min	0.41	0.79	0.23	0.98	0.29	0.52	0.10	0.89	0.32	0.61	0.79	0.57	0.58	0.88	0.89
Max	1.65	1.59	1.08	3.66	1.50	1.53	0.78	1.92	1.08	1.85	2.34	1.39	1.57	2.20	3.12
SD	0.36	0.24	0.26	0.76	0.41	0.35	0.31	0.32	0.27	0.36	0.56	0.26	0.36	0.47	0.70
CV (%)	38.7	21.8	41.1	30.1	66.4	33.5	72.0	22.5	40.2	28.9	36.9	25.1	41.6	32.5	44.6
N	12	12	11	12	8	12	5	11	7	11	6	9	8	9	10

Notes:

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

Table A5-8 Monthly Aerosol Chloride data at the 30 monitoring sites in the HNO_3 Monitoring Network (Particulate Cl^- (µg m^{-3}))

Month	Site 1	Site 21	Site 24	Site 30	Site 31	Site 32	Site 33	Site 34	Site 83	Site 40	Site 45	Site 70	Site 6B	Site 8C	Site 12
Jan	1.04	0.96	1.39	0.67	0.50	0.68	1.15	1.26	1.27	1.31	0.88	1.11	1.27	NS	0.80
Feb	1.48	0.85	1.79	1.01	1.24	1.56	1.48	1.60	2.19	1.77	1.35	1.76	1.66	NS	2.56
Mar	1.05	1.25	2.07	0.63	0.92	1.53	1.88	2.32	2.80	1.78	1.13	2.22	1.62	5.10	0.57 [2]
Apr	1.77 [2]	1.04	1.47	1.88	1.65	1.65	1.30	2.03	2.47	1.33	2.32	ND[4]	1.93	2.57	2.02
May	1.26	0.98	0.81	0.94	1.21	1.19	0.76	1.63	1.75	0.95	1.57	1.30	1.44	2.38	1.50
Jun	0.81	0.61 [2]	0.94	0.68	0.74	0.66	0.91	1.06	0.70	0.67	1.00	0.99	0.85	1.55	0.70
Jul	0.57 [2]	0.24 [2]	0.90	0.58	0.89	0.61	0.80	0.97	1.62 [2]	1.32	1.04	1.32	0.82	ND[4]	0.94
Aug	0.57	ND[1]	0.58	0.46	0.37	0.51	0.60	0.87	-0.08 [5]	0.55	0.40	0.81	0.81	2.25 [3]	0.86
Sep	0.81	1.10	ND [5]	0.51	0.69	0.77	1.15	2.12	-0.51 [5]	0.88	1.14	1.30	0.88 [2]	2.25 [3]	ND[4]
Oct	1.04	0.85	1.70	1.51	0.74	1.14	1.45	1.71	1.32 [2]	1.53	1.36	1.25	1.32 [2]	2.25 [3]	1.85
Nov	2.30	1.21	2.23	1.95	1.95	1.60	2.96 [2]	2.23	4.09	2.26	2.11	2.72	2.49	5.40	1.92
Dec	1.57	0.73	2.35	1.43	1.50	1.34	0.28	3.17	3.68	2.07	1.59	3.06	2.44	3.87	1.22
Mean	1.19	0.89	1.48	1.02	1.03	1.10	1.23	1.75	2.19	1.37	1.32	1.62	1.46	3.07	1.36
Min	0.57	0.24	0.58	0.46	0.37	0.51	0.28	0.87	0.70	0.55	0.40	0.81	0.81	1.55	0.57
Max	2.30	1.25	2.35	1.95	1.95	1.65	2.96	3.17	4.09	2.26	2.32	3.06	2.49	5.40	2.56
SD	0.52	0.29	0.61	0.54	0.48	0.43	0.70	0.67	1.09	0.54	0.53	0.73	0.59	1.38	0.65
CV (%)	43.3	32.5	41.1	52.6	46.6	39.3	56.7	38.2	49.7	39.5	39.7	45.2	40.7	45.0	48.1
N	12	11	11	12	12	12	12	12	10	12	12	11	12	9	11

Month	Site 18	Site 19	Site 22	Site 36	Site 41	Site 44	Site 47	Site 60	Site 77	Site 97	Site 98	Site 99	Site 100	Site 102	Site 103
Jan	0.93	4.11	0.58	1.44	0.65	1.72	NS	1.39	NS	NS	NS	NS	NS	NS	1.22 [2]
Feb	1.39	4.32	0.68	2.38	0.66	1.85	0.40	2.06 [2]	<lod	2.12	NS	1.06	NS	1.68	4.34 [2]
Mar	0.92	3.55	1.08 [2]	2.46	0.92	1.81	ND[1]	1.73	ND[3,7]	2.31	NS	1.01	NS	1.58 [3]	ND1
Apr	1.69	4.20	ND[4]	1.54 [2]	1.24	2.31	ND[1]	2.42	ND[3,7]	0.94	NS	1.55	NS	1.58 [3]	2.82
May	0.97	3.40	1.09 [2]	0.86	0.61	**2.27**	ND[1,3]	1.65	ND[7]	0.98	NS	0.91	1.93	1.05	2.82 [2]
Jun	0.84	2.54	0.69 [2]	1.55 [2]	0.38 [2]	1.16	ND[1,3]	1.00	ND[7]	0.60	0.62	0.57	0.87	0.73	2.00
Jul	0.54	1.95	0.48	1.06	ND[1]	1.33	ND[1,3]	0.94	1.51	1.13	0.89	0.93	0.26	ND[5]	2.12
Aug	0.48	1.54	0.32	0.43	ND[1]	0.89	ND[1]	0.74	0.47	0.58	ND[5]	0.57	0.95	0.73	2.90
Sep	0.64	2.82	0.65	1.11	ND[1]	1.67	1.32	1.05	1.49	1.07	1.11	0.64	1.23	ND[5]	3.37
Oct	1.14	4.81	0.54	2.73	1.42 [2]	2.34	2.17	1.52	1.50 [2]	0.57	1.70	ND[1]	1.86	1.19	5.32 [3]
Nov	1.61	6.12	1.38	2.02 [2]	ND[7]	2.59	1.32	ND[5]	1.50 [2]	2.25	2.51	ND[1]	2.42	2.52 [2]	5.32 [3]
Dec	1.19	5.60	1.31	3.25	0.81	2.38	3.65	1.92	3.25	3.45	2.28	1.49	3.04	1.93	ND[1]
Mean	1.03	3.75	0.80	1.74	0.84	1.86	1.77	1.49	1.62	1.45	1.51	0.97	1.57	1.44	3.22
Min	0.48	1.54	0.32	0.43	0.38	0.89	0.40	0.74	0.47	0.57	0.62	0.57	0.26	0.73	1.22
Max	1.69	6.12	1.38	3.25	1.42	2.59	3.65	2.42	3.25	3.45	2.51	1.55	3.04	2.52	5.32
SD	0.39	1.40	0.35	0.84	0.35	0.54	1.22	0.53	0.90	0.94	0.77	0.36	0.91	0.58	1.38
CV (%)	38.3	37.3	44.2	48.4	41.3	28.9	69.0	35.2	55.5	64.7	50.9	37.4	58.0	40.4	42.9
N	12	12	11	12	8	12	5	11	6	11	6	9	8	9	10

Notes:

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

Table A5-9 Monthly Calcium data at the 30 monitoring sites in the HNO_3 Monitoring Network (Ca^{2+} (µg m^{-3}))

Month	Site 1	Site 21	Site 24	Site 30	Site 31	Site 32	Site 33	Site 34	Site 83	Site 40	Site 45	Site 70	Site 6B	Site 8C	Site 12
Jan	-0.01	-0.02	0.00	-0.01	-0.01	0.00	0.00	0.01	0.01	0.01	0.01	-0.01	0.00	NS	-0.01
Feb	0.02	0.01	0.04	0.01	0.02	0.03	0.05	0.02	0.05	0.08	0.02	0.03	0.03	NS	-0.01
Mar	0.02	0.01	0.04	0.00	0.02	0.02	0.09	0.03	0.09	0.03	0.02	0.02	0.05	0.18	0.18 [2]
Apr	-0.04 [2]	0.22	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	ND[4]	0.00	0.02	0.00
May	0.04	0.25	0.03	0.03	0.02	0.05	0.04	0.03	0.04	0.04	0.03	0.02	0.06	0.03	0.03
Jun	0.02	0.00 [2]	0.04	0.01	0.01	0.03	0.04	0.03	0.03	0.04	0.02	0.02	0.03	0.02	0.01
Jul	0.01 [2]	-0.03 [2]	0.08	0.02	0.01	0.00	0.05	0.03	0.02 [2]	0.03	0.02	0.02	0.03	ND[4]	0.00
Aug	0.00	ND[1]	0.02	0 [8]	-0.01	0.00	0.02	0.00	0.01	0.01	-0.01	0.02	0.00	0.01 [3]	0.00
Sep	-0.01	0 [8]	0.03	0.01	0.00	0.02	0.03	0.02	0.03	0.01	0.01	0.02	0.00 [2]	0.01 [3]	ND[4]
Oct	0.02	0.01	0.02	0.01	0.01	0.03	0.02	0.01	0.01 [2]	0.03	0.01	0.02	-0.01 [2]	0.01 [3]	0.01
Nov	0.01	0.01	0.02	0.01	0.02	0.02	0.03 [2]	0.02	0 [8]	0 [8]	0.01	0.02	0.03	0.04	0.02
Dec	0.01	0.00	0.03	0.01	0.01	0.02	0.02	0.05	0.04	0.02	0.02	0.02	0.02	0.00	0.02
Mean	0.01	0.04	0.03	0.01	0.01	0.02	0.03	0.02	0.03	0.03	0.02	0.02	0.02	0.04	0.02
Min	-0.04	-0.03	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	0.01	-0.01
Max	0.04	0.25	0.08	0.03	0.02	0.05	0.09	0.05	0.09	0.08	0.03	0.03	0.06	0.18	0.18
SD	0.02	0.10	0.02	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.02	0.06	0.05
CV (%)	304.5	223.4	71.0	86.3	95.8	84.8	64.9	62.2	86.7	73.3	56.6	53.7	104.3	156.0	241.7
N	12	11	12	12	12	12	12	12	12	12	12	11	12	8	11

Month	Site 18	Site 19	Site 22	Site 36	Site 41	Site 44	Site 47	Site 60	Site 77	Site 97	Site 98	Site 99	Site 100	Site 102	Site 103
Jan	-0.01	0.04	-0.03	0.06	-0.02	0.00	NS	-0.02	NS	NS	NS	NS	NS	NS	-0.01 [2]
Feb	0.02	0.02	-0.05	0.06	-0.01	-0.02	-0.02	-0.00 [2]	-0.02	-0.03	NS	-0.03	NS	-0.01	-0.06 [2]
Mar	0.04	0.05	0.08 [2]	0.12	0.07	0.02	ND[1]	0.04	ND[3,7]	0.06	NS	0.04	NS	0.14 [3]	ND[1]
Apr	0.01	0.03	ND[4]	-0.01 [2]	0.00	0.03	ND[1]	0.04	ND[3,7]	0.01	NS	0.01	NS	0.14 [3]	0.01
May	0 [8]	0.01	0.04 [2]	0.06	0.01	**0.03**	ND[1,3]	0.04	ND[7]	0.02	NS	0.04	0.01	0.01	0.04 [2]
Jun	0.02	0.02	0.02 [2]	0.06 [2]	0.01 [2]	0.01	ND[1,3]	0.04	ND[7]	0.02	0.04	0.02	0.02	0.02	0.04
Jul	0.01	-0.01	0.01	0.17	ND[1]	0.07	ND[1,3]	0.04	0 [5]	0.03	0.03	0.03	0.03	0.13	0.03
Aug	0.00	0.01	0.00	0.06	ND[1]	0.00	ND[1]	0.03	0 [5]	0.00	0.02	0.00	0.01	0.00	0.01
Sep	0.01	0.01	0.01	0.08	ND[1]	0.04	0.01	ND[5]	0.01	ND[5]	0.03	0.01	0.01	0.01	0.00
Oct	0.01	0.00	0.01	0.08	0.02 [2]	0 [8]	0.02	0 [8]	0.01 [3]	0.01	0.01	ND[1]	0.02	0 [8]	0.05 [3]
Nov	0.01	0.02	0.01	0.06 [2]	ND[7]	0.03	0.04	0.04	0.01 [3]	0.02	0.03	ND[1]	0.03	0.03 [2]	0.05 [3]
Dec	0.02	0.01	0.01	0.06	0.01	0.02	0.01	0.02	0.05	0.06	0.03	0.03	0.03	0.03	ND[1]
Mean	0.01	0.02	0.01	0.07	0.01	0.02	0.02	0.02	0.01	0.02	0.03	0.02	0.02	0.05	0.02
Min	-0.01	-0.01	-0.05	-0.01	-0.02	-0.02	0.01	-0.02	-0.02	-0.03	0.01	-0.03	0.01	-0.01	-0.06
Max	0.04	0.05	0.08	0.17	0.07	0.07	0.04	0.04	0.05	0.06	0.04	0.04	0.03	0.14	0.05
SD	0.01	0.02	0.03	0.04	0.03	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.06	0.03
CV (%)	115.8	94.8	336.3	55.9	246.3	111.5	63.9	92.2	193.6	122.5	29.2	131.8	34.0	123.1	197.6
N	12	12	11	12	8	12	4	11	5	10	7	9	8	10	10

Notes:

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

Table A5-10 Monthly Magnesium data at the 30 monitoring sites in the HNO_3 Monitoring Network (Mg^{2+} (µg m^{-3}))

Month	Site 1	Site 21	Site 24	Site 30	Site 31	Site 32	Site 33	Site 34	Site 83	Site 40	Site 45	Site 70	Site 6B	Site 8C	Site 12
Jan	0.03	0.02	0.03	0.02	0.02	0.03	0.04	0.06	0.05	0.04	0.05	0.04	0.04	NS	0.03
Feb	0.05	0.04	0.08	0.06	0.06	0.08	0.08	0.07	0.11	0.09	0.06	0.08	0.07	NS	0.06
Mar	0.03	0.04	0.07	0.02	0.04	0.04	0.07	0.07	0.11	0.06	0.04	0.07	0.06	0.20	0.07 [2]
Apr	0 [2]	0.02	0.00	0.04	0.00	0.02	0.03	0.02	0.05	0.01	0.04	ND[4]	0.01	0.04	0.01
May	0.10	0.11	0.09	0.10	0.10	0.13	0.10	0.12	0.13	0.10	0.11	0.12	0.14	0.12	0.16
Jun	0.07	0 [2]	0.06	0.06	0.05	0.06	0.08	0.07	0.07	0.06	0.06	0.07	0.06	0.02	0.05
Jul	0.01 [2]	0 [2]	0.16	0.11	0.02	0.02	0.03	0.03	0.04 [2]	0.03	0.03	0.04	0.03	ND[4]	0.01
Aug	0.01	ND[1]	0.02	0.01	0.00	0.01	0.02	0.02	0.02	0.01	0.01	0.00	0.01	0.02 [3]	0.02
Sep	0.00	0 [8]	0.03	0.02	0.02	0.03	0.04	0.06	0.05	0.02	0.03	0.04	0.03 [2]	0.02 [3]	ND[4]
Oct	0.03	0.02	0.04	0.05	0.03	0.04	0.03	0.03	0.03 [2]	0.04	0.03	0.05	0.01 [2]	0.02 [3]	0.04
Nov	0.06	0.04	0.05	0.06	0.06	0.06	0.07 [2]	0.07	0.04	0.02	0.05	0.08	0.08	0.10	0.06
Dec	0.03	0.02	0.07	0.06	0.04	0.06	0.07	0.14	0.11	0.05	0.05	0.09	0.07	0.06	0.07
Mean	0.04	0.03	0.06	0.05	0.04	0.05	0.06	0.06	0.07	0.04	0.05	0.06	0.05	0.07	0.05
Min	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.02	0.02	0.01	0.01	0.00	0.01	0.02	0.01
Max	0.10	0.11	0.16	0.11	0.10	0.13	0.10	0.14	0.13	0.10	0.11	0.12	0.14	0.20	0.16
SD	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.02	0.03	0.04	0.06	0.04
CV (%)	87.5	118.1	68.1	60.5	74.1	68.2	48.8	57.3	55.3	67.1	50.1	52.3	72.7	90.5	76.6
N	12	11	12	12	12	12	12	12	12	12	12	11	12	9	11

Month	Site 18	Site 19	Site 22	Site 36	Site 41	Site 44	Site 47	Site 60	Site 77	Site 97	Site 98	Site 99	Site 100	Site 102	Site 103
Jan	0.02	0.18	0.02	0.05	0.02	0.05	NS	0.04	NS	NS	NS	NS	NS	NS	0.05 [2]
Feb	0.07	0.13	-0.01	0.06	0.01	0.02	0.00	0.03 [2]	0.00	0.04	NS	0.01	NS	0.03	0.08 [2]
Mar	0.04	0.12	0.06 [2]	0.09	0.05	0.05	0 [2]	0.05	ND[3,7]	0.08	NS	0.04	NS	0.10 [3]	ND[1]
Apr	0.02	0.10	ND[4]	0 [2,8]	0.00	0.06	ND[1]	0.05	ND[3,7]	0.02	NS	0.03	NS	0.10 [3]	0.05
May	0 [8]	0.07	0 [8]	0.10	0.07	0.17 [2]	ND[1,3]	0.12	ND[7]	0.12	NS	0.14	0.17	0.09	0.19 [2]
Jun	0.06	0.11	0 [2]	0 [2]	0 [2]	0.05	ND[1,3]	0.08	ND[7]	0.07	0.05	0.06	0.06	0.07	0.11
Jul	0.01	0.06	0.02	0.05	ND[1]	0.21	ND[1,3]	0.04	0 [5]	0.03	0.03	0.03	0.03	0.03	0.08
Aug	0.01	0.04	0.00	0.02	ND[1]	0.02	ND[1]	0.01	0 [5]	0.01	0.01	0.00	0.02	0 [8]	0.02
Sep	0.02	0.07	0.02	0.04	ND[1]	0.06	0.03	ND[5]	0.04	ND[5]	0.05	0.02	0.04	0.02	0.03
Oct	0.03	0.04	0.02	0.07	0.03 [2]	<lod	0.07	0.00	0.05 [3]	0.01	0.03	ND[1]	0.05	0 [8]	0.22 [3]
Nov	0.05	0.08	0.05	0.08 [2]	ND[7]	0.09	0.15	0.08	0.05 [3]	0.06	0.09	ND[1]	0.09	0.06 [2]	0.22 [3]
Dec	0.04	0.07	0.03	0.09	0.02	0.07	0.07	0.05	0.11	0.11	0.08	0.07	0.10	0.07	ND[1]
Mean	0.03	0.09	0.02	0.06	0.03	0.08	0.07	0.05	0.05	0.06	0.05	0.04	0.07	0.06	0.11
Min	0.00	0.04	-0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.02	0.02
Max	0.07	0.18	0.06	0.10	0.07	0.21	0.15	0.12	0.11	0.12	0.09	0.14	0.17	0.10	0.22
SD	0.02	0.04	0.02	0.04	0.02	0.06	0.06	0.03	0.04	0.04	0.03	0.04	0.05	0.03	0.08
CV (%)	71.8	45.9	105.5	63.5	88.1	77.7	85.7	66.1	85.4	69.8	57.4	90.8	68.8	48.7	73.6
N	12	12	11	12	8	11	5	11	5	10	7	9	8	9	10

Notes:

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

Table A5-11 Monthly Sodium data at the 30 monitoring sites in the HNO_3 Monitoring Network (Na^+ (µg m^{-3}))

Month	Site 1	Site 21	Site 24	Site 30	Site 31	Site 32	Site 33	Site 34	Site 83	Site 40	Site 45	Site 70	Site 6B	Site 8C	Site 12
Jan	0.78	0.53	0.91	0.68	0.48	0.56	0.93	1.10	1.20	0.73	0.77	0.96	0.91	NS	0.70
Feb	0.90	0.54	1.15	0.78	0.84	1.00	0.94	1.05	1.38	1.03	0.80	1.13	1.02	NS	1.63
Mar	0.60	0.76	1.13	0.48	0.58	0.88	1.15	1.30	1.72	1.03	0.67	1.26	0.88	2.77	0.18 [2]
Apr	1.10 [2]	0.61	0.91	1.16	0.93	0.95	0.78	1.31	1.49	0.75	1.42	ND[4]	1.05	1.63	1.28
May	0.74	0.38	0.49	0.61	0.78	0.94	0.41	0.99	1.04	0.49	0.93	0.67	0.70	1.39	0.99
Jun	0.50	0.33 [2]	0.54	0.31	0.45	0.48	0.55	0.73	0.51	0.41	0.62	0.57	0.55	0.93	0.47
Jul	0.02 [2]	0 [2]	0.60	0.43	0.53	0.55	0.61	0.65	0.75 [2]	0.59	0.65	0.74	0.61	ND[4]	0.63
Aug	0.33	ND[1]	0.41	0.32	0.18	0.38	0.51	0.75	0.60	0.34	0.67	0.53	0.56	0.84 [3]	0.70
Sep	0.32	ND [5]	0.71	0.33	0.53	0.56	0.83	1.34	1.46	0.65	0.72	0.88	0.59 [2]	0.84 [3]	ND[4]
Oct	0.78	0.64	1.09	0.93	0.74	0.73	0.92	1.08	0.83 [2]	0.94	0.73	1.13	0.68 [2]	0.84 [3]	1.06
Nov	1.25	0.72	1.30	1.18	1.22	0.96	1.58 [2]	1.32	2.53	1.31	1.21	1.49	1.47	3.10	1.16
Dec	0.75	0.34	1.33	0.83	1.05	0.94	1.52	2.02	1.98	1.07	1.06	1.80	1.32	2.02	0.85
Mean	0.67	0.49	0.88	0.67	0.69	0.74	0.90	1.14	1.29	0.78	0.86	1.02	0.86	1.60	0.88
Min	0.02	0.00	0.41	0.31	0.18	0.38	0.41	0.65	0.51	0.34	0.62	0.53	0.55	0.84	0.18
Max	1.25	0.76	1.33	1.18	1.22	1.00	1.58	2.02	2.53	1.31	1.42	1.80	1.47	3.10	1.63
SD	0.34	0.23	0.32	0.31	0.29	0.22	0.37	0.37	0.60	0.30	0.25	0.40	0.31	0.87	0.40
CV (%)	51.1	47.1	36.8	46.6	41.7	30.2	41.5	32.4	46.3	38.8	29.6	39.1	35.7	54.5	46.0
N	12	10	12	12	12	12	12	12	12	12	12	11	12	9	11

Month	Site 18	Site 19	Site 22	Site 36	Site 41	Site 44	Site 47	Site 60	Site 77	Site 97	Site 98	Site 99	Site 100	Site 102	Site 103
Jan	0.61	2.91	0.46	1.19	0.46	1.20	NS	1.32	NS	NS	NS	NS	NS	NS	1.03 [2]
Feb	0.89	2.37	0.31	1.30	0.41	0.94	0.27	1.20 [2]	0.24	1.18	NS	0.65	NS	0.96	2.46 [2]
Mar	0.54	1.97	0.34 [2]	1.49	0.43	0.89	ND[1]	0.98	ND[3,7]	1.34	NS	0.56	NS	1.05 [3]	ND1
Apr	1.04	2.46	ND[4]	0.85 [2]	0.69	1.40	ND[1]	1.49	ND[3,7]	0.54	NS	0.99	NS	1.05 [3]	1.75
May	ND [5]	0.42	0.10 [2]	0.55	0.36	**1.28**	ND[1,3]	1.00	ND[7]	0.56	NS	0.53	1.04	0.61	1.84 [2]
Jun	0.52	1.40	0.38 [2]	0.89 [2]	0.25 [2]	0.59	ND[1,3]	0.62	ND[7]	0.41	0.42	0.34	0.53	0.40	1.22
Jul	0.34	1.26	0.33	0.71	ND[1]	0.87	ND[1,3]	0.87	ND [5]	0.75	0.52	0.59	0.81	ND[5]	1.46
Aug	0.33	1.11	0.24	0.47	ND[1]	0.63	ND[1]	0.52	ND [5]	0.51	0.41	0.33	0.66	ND[5]	1.64
Sep	0.45	1.81	0.47	0.72	ND[1]	1.02	0.82	ND[5]	0.84	ND[5]	0.87	0.37	0.78	0.61	2.51
Oct	0.72	1.75	0.58	1.32	0.63 [2]	1.52	1.38	1.00	0.92 [3]	0.49	1.01	ND[1]	1.14	ND[5]	1.44 [3]
Nov	0.98	3.54	0.84	0.76 [2]	ND[7]	1.53	2.35	1.45	0.92 [3]	1.40	1.50	ND[1]	1.63	0.89 [2]	1.44 [3]
Dec	0.86	3.15	1.23	1.72	0.30	1.18	1.90	0.96	1.86	1.85	1.29	0.77	1.70	0.86	ND[1]
Mean	0.66	2.01	0.48	1.00	0.44	1.09	1.34	1.04	0.96	0.90	0.86	0.57	1.04	0.71	1.68
Min	0.33	0.42	0.10	0.47	0.25	0.59	0.27	0.52	0.24	0.41	0.41	0.33	0.53	-0.06	1.03
Max	1.04	3.54	1.23	1.72	0.69	1.53	2.35	1.49	1.86	1.85	1.50	0.99	1.70	1.05	2.51
SD	0.25	0.91	0.31	0.40	0.15	0.32	0.83	0.31	0.58	0.50	0.43	0.22	0.43	0.36	0.49
CV (%)	38.0	45.3	65.4	39.7	34.4	29.3	61.6	29.8	60.7	55.3	50.5	38.0	41.8	51.3	28.9
N	11	12	11	12	8	12	5	11	5	10	7	9	8	9	10

Notes:

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

Appendix 6

Geostatistics

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

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

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

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

Exponential

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

Spherical

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

Linear

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

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

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

The models fitted to the experimental points in the variogram for $\log_e$ [acidity], non-marine sulphate, nitrate and ammonium are listed in Table A6-1.

Table A6-1 – Variogram Models fitted to 2006 Annual Mean Concentrations of the Major Ions

Ion	Model	Sill $(\mu eq\ l^{-1})^2$	Range (km)
Acidity ($\log_e$ transformed)	Exponential	0.5	200
Non-marine sulphate	Exponential	140	180
Nitrate	Exponential	180	300
Ammonium	Exponential	400	220