

Communication of Air Quality Data and Information: Operational Report for November 2001 to January 2002

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

Andrew Kent
Paul Willis

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Executive Summary

The objective of the Air Quality Communications project is to collate and disseminate air quality information and data in line with the Air Quality Strategy for England, Scotland, Wales and Northern Ireland, and the EC Directive on Air Quality Management and Assessment and associated Daughter Directives. This first quarterly report details the project progress made from 1st November 2001 to 31st January 2002.

Development of the new Air Quality Archive web site commenced in mid-October 2001 following agreement of the specification for the new database set out in the report AEAT/ENV/R0813/Issue1.

The areas of development during this period were as follows:

- Loading all the UK automatic air pollution monitoring data onto the database.
- Commencing the upload of all the non-automatic monitoring data to the database.
- Development of the functionality for the Research Reports and Research Contracts databases.
- Draft design of the home page and style of the new Web Site.
- Draft design of the data query pages.
- Further review of the existing web site content
- Development and validation of scripts for calculation of statistics.
- Development of a drill-down map to present latest bulletins and forecasts.

The design work is being carried out with reference to the government e-guidelines for publication of Web sites.

During this period the existing Air Quality Communications systems continued to deliver data to a high success rate:

Freephone 0800 556677	– 98.5% transmission success rate.
TELETEXT page 155	– 90% transmission success rate.
E-mail bulletins	– 98.9% transmission success rate.

The number of monthly averaged hits per day on the air quality archive web site varied between 9,730 and 14,347 during this period. There were a total of 295 enquiries to the aqinfo@aeat.co.uk e-mail address during this period.

An average of fifty-five people per day called the Freephone number for air quality information for their area, whilst an average hundred and thirty five callers per day requested information for another area of the UK.

There were two breakdowns in the service which took longer than the specified time for repair:

- **23rd November 2001** – TELETEXT failed to update due to a hard disk failure on one of the Bulletin Dissemination System machines. As a result, the system was offline for 21 hours between 21.00 on Thursday 22nd November and 18.00 on Friday 23rd November.
- **1st to 2nd January 2002** - An incoming data file from SEIPH contained an inconsistency that caused the benzene data file to expand and fill the hard disk on the Bulletin Dissemination System machine. As a result, no emails could be received or transmitted between 04.00 January 1st and 10.00 on January 2nd 2002.

Contents

1	INTRODUCTION	1
2	NEW DEVELOPMENTS DURING THIS PERIOD	2
3	USAGE STATISTICS FOR WEB SITE AND FREEPHONE	5
4	BREAKDOWNS IN THE SERVICE	8
	4.1 List of all detected faults	8
	4.2 Faults which led to non-compliance with service level agreements for the repair of systems	8
5	PERFORMANCE STATISTICS FOR THE AIR QUALITY COMMUNICATIONS SYSTEMS	9
	5.1 Freephone Service, 0800 556677	9
	5.2 TELETEXT page 155	9
	5.3 E-mail Bulletins	9
6	AD-HOC SERVICES PROVIDED	9
7	FORWARD WORK PLAN FOR FEBRUARY TO APRIL 2002	10
8	ANNUAL TIMETABLE FOR DATA SUBMISSIONS	11
9	HARDWARE AND SOFTWARE INVENTORY	11

Appendices

APPENDIX 1	GRAPHS OF AIR QUALITY FREEPHONE STATISTICS
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1 INTRODUCTION

Air pollution and its impacts on human health and the natural environment continue to be a major policy issue for the Department for Environment, Food and Rural Affairs, The Scottish Executive, The National Assembly for Wales and DoE Northern Ireland. This is the first operational report on the Communication of Air Quality Data and Information contract which these organisations have let to AEA Technology's National Environmental Technology Centre (NETCEN).

The objective of this project is to collate and disseminate air quality information and data in line with the Air Quality Strategy for England, Scotland, Wales and Northern Ireland, and the EC Directive on Air Quality Management and Assessment and associated Daughter Directives. This report details the progress of the project made from 1st November 2001 to 31st January 2002.

The objective of the project involves 4 principal elements:

1. Management of air quality data from monitoring networks
2. Dissemination of air quality data from monitoring networks
3. Provisional statistical summaries of air quality data
4. Maintenance and development of the National Air Quality Archive

The dissemination of air quality information is achieved through the use of the Air Quality Information System (figure 1) which is able to present a large volume of wide-ranging and regularly updated information to the end user via a number of different media:

1. *Freephone 0800 556677.*

This service is updated hourly via the bulletin dissemination system and is widely available to members of the public.

2. *Teletext page 155*

This is updated hourly by the bulletin dissemination system and provides air quality information via the television making it widely accessible from people's homes.

3. *Email bulletin*

Emails are currently dispatched daily to over 100 recipients. The service is available on request and bulletins can be tailored the specific needs of the recipient.

4. *Web based access to archive*

The web site is updated hourly via the bulletin dissemination system and is a very effective mechanism for providing both large data volumes and more meaningful summaries and statistics. A wide variety of data can be stored here allowing the end user to select the information most appropriate to them in a number of formats (graphical, numerical)

This provides a diverse range of people with access to up to date air quality information that is most appropriate to their individual needs. The AQ Information System contains back up servers and systems to allow for full fault tolerance. The result is a highly reliable information dissemination system.

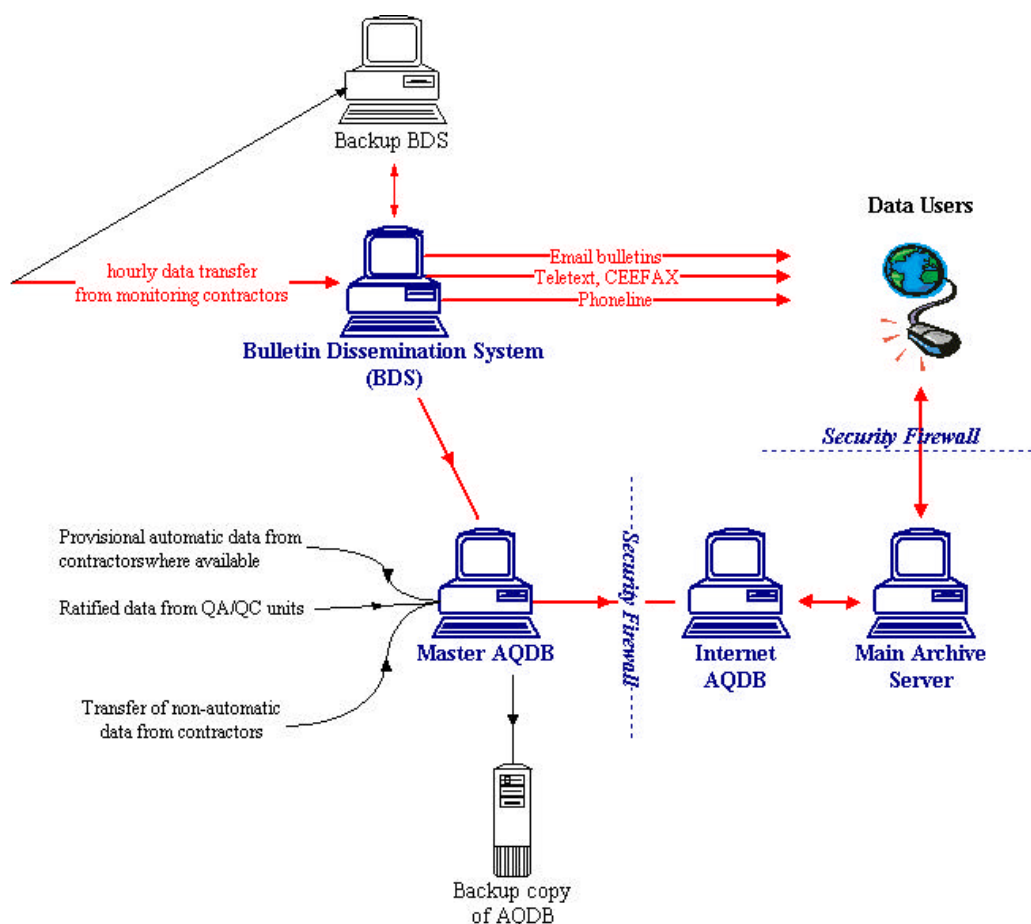


Figure 1. Air Quality Information System

2 NEW DEVELOPMENTS DURING THIS PERIOD

During this period there were a number of developments to the new Air Quality Archive Web site going on in parallel. These were presented at progress meetings with the Department on November 14th 2001, December 6th 2001, January 16th 2002 and January 25th 2002.

All the ratified UK automatic air pollution monitoring data were uploaded to the database. Once loaded, all these measurements were validated against the existing data files in order to confirm that the data were loaded correctly. This validation did in fact throw-up inconsistencies with the date fields on a couple of the current data files which have now been corrected.

The upload of all the non-automatic monitoring data to the database was commenced. This includes NO₂ diffusion tube data, smoke and sulphur dioxide and metals data. The values in the new database were then validated against the old data files. A total of over 80 million data values has now been loaded and checked so far.

The functionality of the Research Reports and Research Contracts databases continued to be developed. This included:

- Defining the list of categories into which the reports are to be grouped.
- Setting up the links between the contracts and reports.
- Enabling searches to be carried out across financial years.
- Adding contract variations to the contract values.
- Setting up search facilities for the research reports database. e.g. by author, subject, keywords and organisation.

A draft design of the Home Page was produced, and the style of the new Web Site was discussed with the Department on January 16th and January 25th 2002. Figure 2 shows a screen shot of the new Home Page design. The idea is that there is a simple interface to greet the public when they visit the site. On the left hand side there are four simple questions about air pollution to which they may wish to find answers. In addition, a simple drill-down map on the right-hand side of the home page allows users to view the latest air pollution summary for their area of the UK.

From the home page users are able to access the main technical areas of the site via buttons at the top and bottom of the page. These sections of the web site cover:

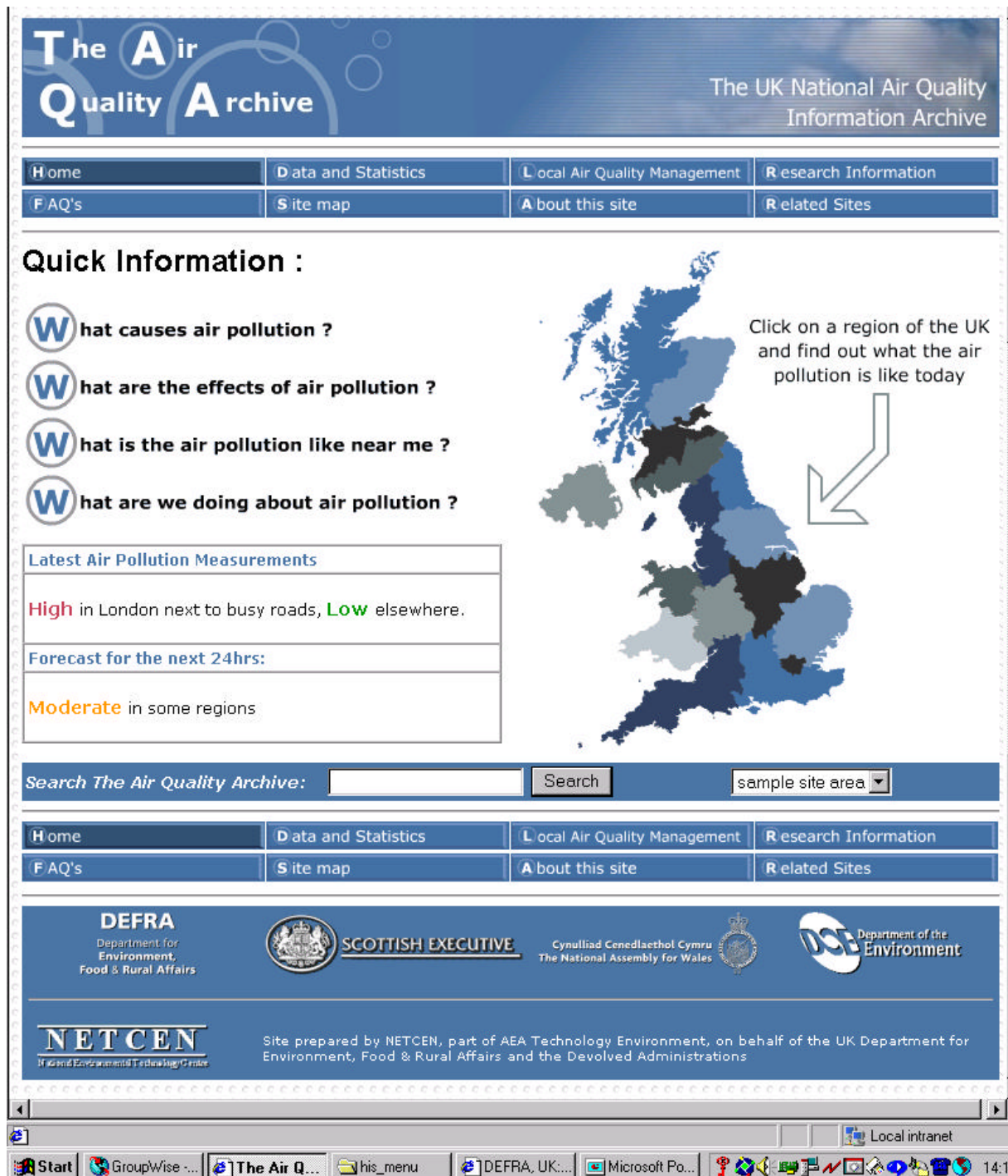
- Data and Statistics
- Local Air Quality Management
- Research Information

Further information on the site content can be accessed via the buttons on:

- FAQs
- Site Map
- About this Site
- Related Sites

In addition there will be searches by keywords and pre-defined categories at the bottom of the Home Page.

Figure 2. Draft Design of The Air Quality Archive Home Page



Work has also been undertaken on the design of the data query pages, which will enable users to extract all the raw data and statistics from the new database. A draft design of the step-by-step data selector was demonstrated and discussed with the Department at meetings with the Department on January 16th and January 25th 2002. This is illustrated in Figure 3.

Figure 3. Draft Design of the data query pages.

The screenshot shows the draft design for the data query pages of 'The Air Quality Archive'. The header features the site's logo and the text 'The UK National Air Quality Information Archive'. A navigation menu includes links for Home, Data and Statistics, Local Air Quality Management, Research Information, FAQ's, Site map, About this site, and Related Sites. A 'helpdesk:' section contains instructions: 'Please complete the following steps to select the data and statistics you require:'. Below this, there are two dropdown menus: 'Select a Region' (set to 'Local Authority') and 'Select a Parameter' (showing a list with 'ps', 'SO2-S', 'SO3', 'NO', and 'NO2'). A 'Step 2' button is positioned below the parameter list. At the bottom, a search bar is labeled 'Search The Air Quality Archive:' and includes a 'Search' button and a 'sample site area' dropdown menu.

At the meetings on January 16th and January 25th 2002 a further detailed review of the existing web site content was carried out, based on the tables of information published in the first quarterly report of this contract. The outcome of this review has been incorporated into the ongoing design of the new Web site.

The scripts for calculation of statistics including percentiles and exceedences were developed and validated. Up to the end of January a total of 90 million statistics had already been calculated and databased.

Working on the functionality of the drill-down map on the home page has begun. This will present latest air quality bulletins and forecasts to the users.

The design work is being carried out with reference to the government e-guidelines for publication of Web sites. A discussion of the issues surrounding the e-guidelines was presented in the first quarterly report of this contract.

3 USAGE STATISTICS FOR WEB SITE AND FREEPHONE

The updated statistics on hits on the Air Quality Archive Web site are available from the home page of this service and are updated monthly. The summary for the November 2001 to January 2002 period was as follows:

Monthly averages of daily web site hits:

Nov: 9730
 Dec: 10574
 Jan: 14347

Total number of hits since 1 Jan 99: 7,281,214

There were several interesting events during this quarter. The highest peak was 29,985 daily hits recorded on 28th January 2002 right at the end of the quarter but there were other high peaks earlier on. On 6th November 2001 there was a peak of 21,985 daily hits, which may be associated with public concern over air quality immediately prior to bonfire night festivities. Another peak of 28,947 daily hits occurred on December 7th, which again is likely to have been linked to public concern over air quality at the beginning of what became a pronounced pollution event (7th to 18th December 2001) involving several pollutants.

The full daily and monthly statistics are presented in Figures 3 and 4 below.

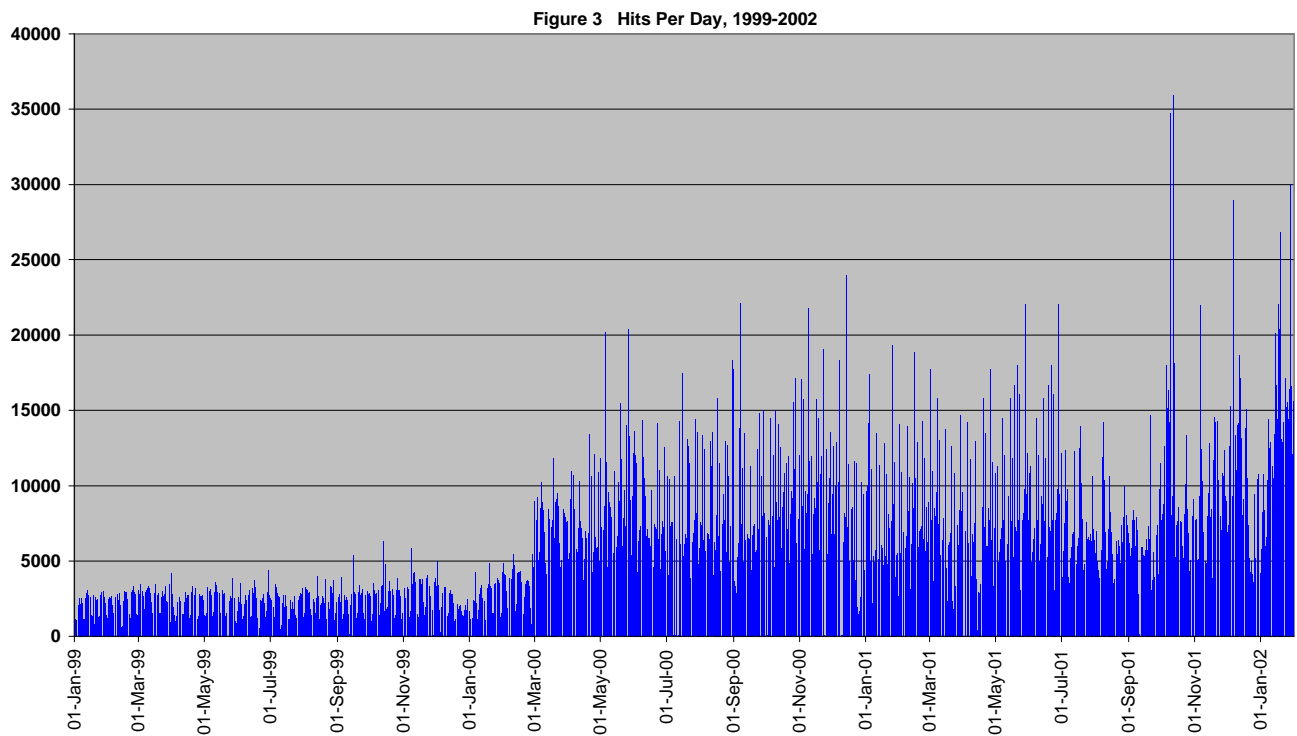
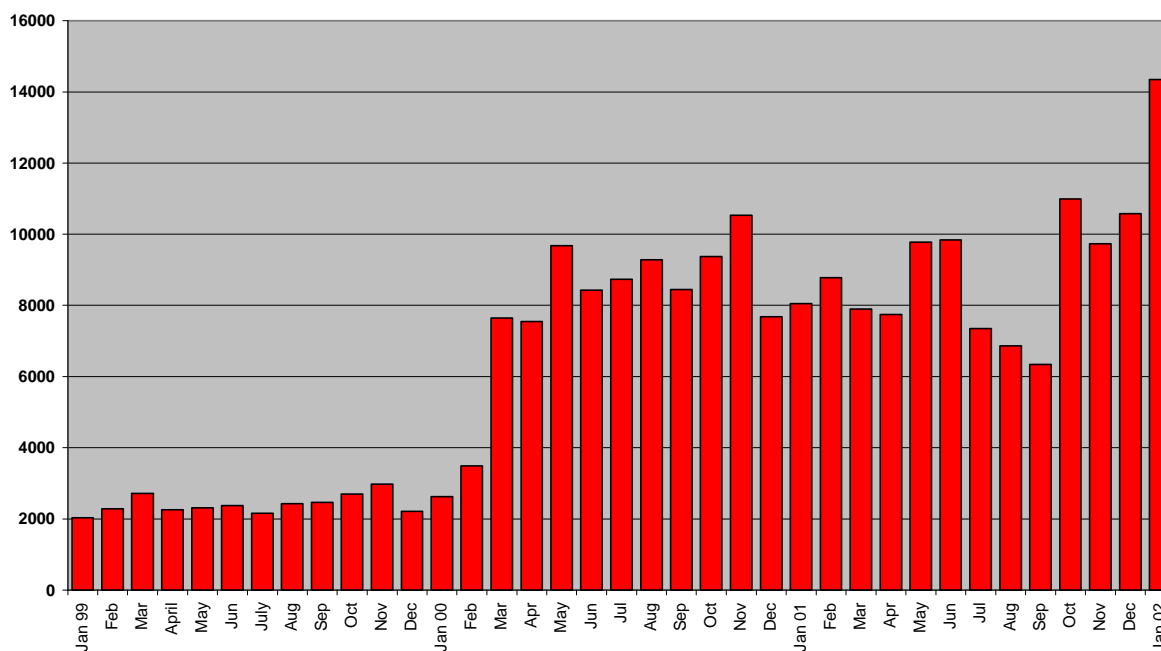


Figure 4 Monthly Average Hits per day, 1999-2002



The monthly averages of the daily web hits throughout the quarter remained at around 10,000, with January 2002 recording the highest average number of daily web hits to date (14,347). This represents an increase of some 36% from the average of 10,574 recorded in December 2001.

During the November 2001 to January 2002 period we dealt with a total of 295 enquiries to the aqinfo@aeat.co.uk e-mail information point, by which we provide further help on the Web site content.

The number of calls to the Freephone service are shown graphically in the Appendix to this report. The figures track a call through the system, so do not give a true representation of the number of individual callers entering the system. In summary the figures for this quarter show;

- On average around 55 calls per day come in to the service and access the air quality bulletin for their area.
- On average 135 callers then swap to another region to get further information. This graph interestingly shows a strong weekly cycle with more callers during the week than at the weekends.
- 9 calls per day access the full national air quality forecasts and 8 calls access the health information.
- Around 4 calls per day requested leaflets during this period, and 6 calls per day accessed the section with details on other sources of information.
- There were 184 calls a day on average, of which an average of 85 were hangups (people who quit before getting to the end of the introductory message)
- The average call duration over the period was 76 seconds.

4 BREAKDOWNS IN THE SERVICE

4.1 List of all detected faults

5th November 2001 – The telephone information service was prevented from updating successfully when there was an interruption to the supply of data from Stanger. During this time a stock error message was presented to users explaining that there was a problem. The problem was resolved quickly and normal service resumed.

22nd November 2001 – The loading of backdated data from Stanger (Bonfire night) prevented the update of some PM₁₀ sites in the air quality archive. When the system was fixed it was also updated to prevent a repeat of this problem.

23rd November 2001 – TELETEXT failed to update due to a hard disk failure on one of the Bulletin Dissemination System machines. As a result, the system was offline for 21 hours between 21.00 on Thursday 22nd November and 18.00 on Friday 23rd November.

3rd December 2001 – Problems were experienced in accessing the archive. These were caused by a process failure on the AEA Technology web server but were resolved before midday.

4th December 2001 – A further problem accessing the AEA Technology web server occurred around 18.00 but was only brief.

6th to 7th December 2001 – Updates to the freephone information service were interrupted for 12 hours as an upgrade to the AEAT security system did not interface with system running the telephone service properly.

1st to 2nd January 2002 – An incoming data file from SEIPH contained an inconsistency that caused the benzene data file to expand and fill the hard disk on the Bulletin Dissemination System machine. As a result, no emails could be received or transmitted between 04.00 January 1st and 10.00 on January 2nd 2002.

1st to 7th January 2002 – The old archive had to be manually updated to allow users access to the 2002 data files.

4.2 Faults which led to non-compliance with service level agreements for the repair of systems

During normal working hours any faults with the Air Quality Communications systems should be fixed within 6 hours, or within 18 hours at any other time.

Many of the faults detected during this period were rectified within the specified period. Faults which only affect a minority of users or a small section of the Web site are often difficult to diagnose, and as listed in section 4.1 a number of these took longer than the specified time to correct.

There were however two major faults which took longer than the required 18 hours to be corrected, the explanations for these are as follows:

- **23rd November 2001** – TELETEXT failed to update due to a hard disk failure on one of the Bulletin Dissemination System machines. As a result, the system was offline for 21 hours between 21.00 on Thursday 22nd November and 18.00 on Friday 23rd November.
- **1st to 2nd January 2002** - An incoming data file from SEIPH contained an inconsistency that caused the benzene data file to expand and fill the hard disk on the Bulletin Dissemination System machine. As a result, no emails could be received or transmitted between 04.00 January 1st and 10.00 on January 2nd 2002.

5 PERFORMANCE STATISTICS FOR THE AIR QUALITY COMMUNICATIONS SYSTEMS

5.1 Freephone Service, 0800 556677

There was almost a 100% success rate for delivering bulletins to IMS for publication during this period. In November there was a 100% success rate, December 2001 was 99.7% successful and in January 2002 there was a 96% success rate.

5.2 TELETEXT page 155

Around 90% of hourly updates were successfully transmitted to TELETEXT during this period. The majority of these failures were due to dropped lines or bad connections.

5.3 E-mail Bulletins

The e-mail bulletin service operated to a 100% success rate during November and December 2001. The success rate was 96.8% for January when the Bulletin Dissemination System was affected by a fault on an incoming data file that caused the benzene data file to expand and fill the hard disk. As a result, no emails could be received or transmitted between 04.00 January 1st and 10.00 on January 2nd 2002.

6 AD-HOC SERVICES PROVIDED

During this quarter a number of services were prepared under the ad-hoc section of the contract. These were typically Parliamentary Questions and queries and are listed here:

- Teeside PQ (November 16th 2001)
- Rural PQ (November 28th 2001)

- Air Quality enquiry from Israel (January 2002)
- Buckinghamshire PQ (January 16th 2002)
- Brochure Maps, provided by Tony Bush (January/ February 2002)
- Lullington Heath PQ (January 31st 2002)

7 FORWARD WORK PLAN FOR FEBRUARY TO APRIL 2002

As well as the routine air quality data dissemination activities during this period, we are expecting to carry out the following tasks:

- Complete the development, validation and population of the new internet air quality database.
- Complete the design of the new air quality archive web site in terms of its style and content.
- Complete the development of the new Research Reports and Research Contracts databases.
- Complete the development of the new LAQM section of the web site.
- Complete the development and validation of all the information in the Data and Statistics section of the new Web site.
- Upgrade the bulletin system to report air quality information for 16 zones and 16 agglomerations. This includes Teletext, Freephone and e-mail services.
- Launch the new Web site and air quality bulletins services. Proposed to be at the end of March 2002.
- Monthly progress meetings with DEFRA.
- Publish the February to April quarterly report on the Air Quality Archive Web Site.
- Continue to respond to e-mail enquiries from the public to the web site, and to deal with ad-hoc data enquiries from the Department.

8 ANNUAL TIMETABLE FOR DATA SUBMISSIONS

As discussed at a recent project review meeting, we are working to the following annual timetable for submission of UK data to government and the European Commission.

Submission of UK data to government and the European Commission

Annual Time Table of Work Program

Time Specific Objectives	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Headline indicator statistics												
Provision of Ozone data to EC												
Provision of Ozone data to EC - Annual stats												
Provision of NO ₂ data to EC												
EC Questionnaire completion												
Provision of data to AIRBASE												

9 HARDWARE AND SOFTWARE INVENTORY

The Department will own two UNIX database servers at the end of this contract. These are being acquired on a lease-purchase agreement.

All the software developed as part of the Air Quality Communications contract will be owned by the Department.

The software for the New Air Quality Archive will be fully documented, and design and operational manuals made available to the Department.

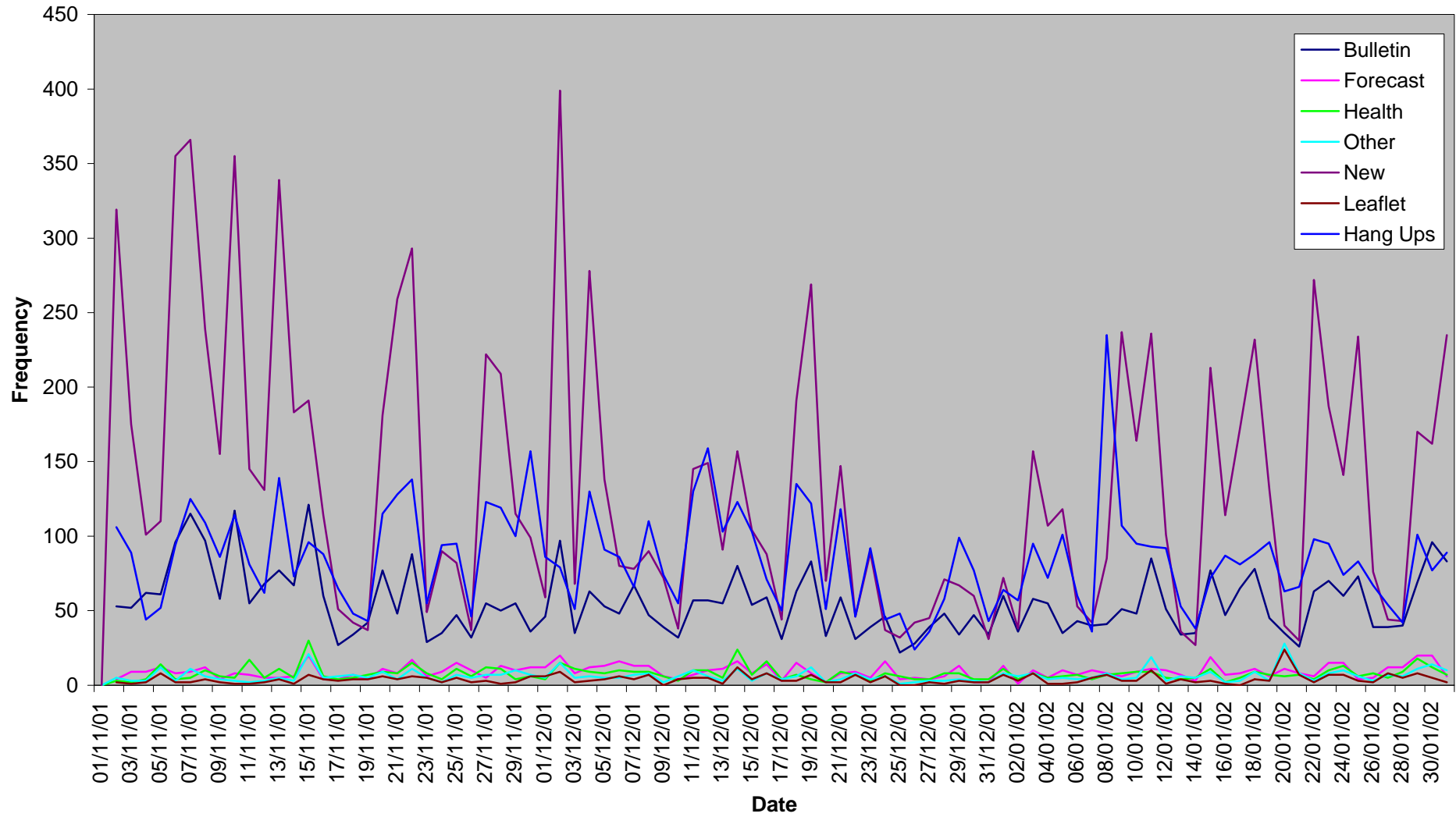
Appendix 1

Air Quality Freephone Statistics

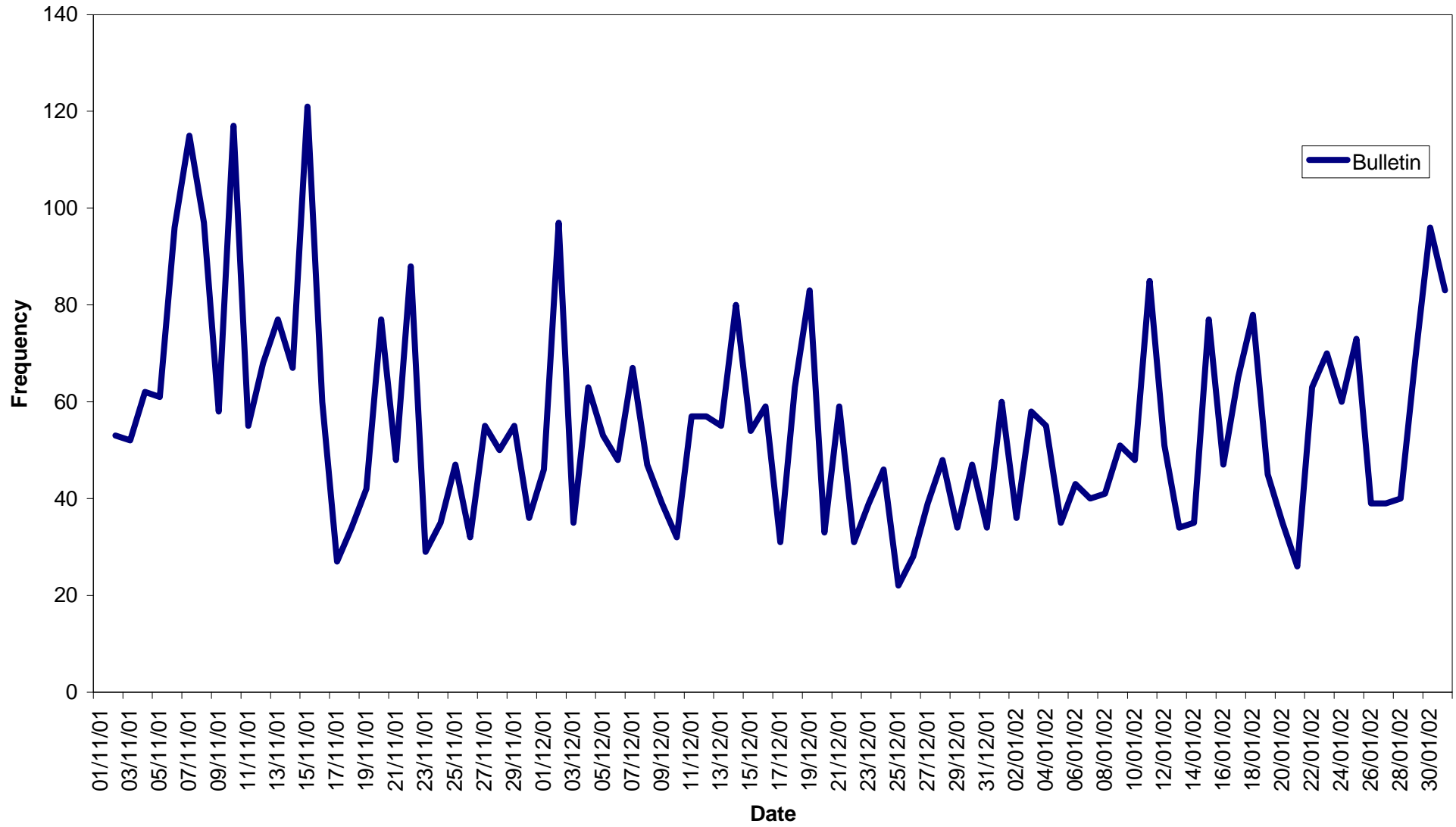
CONTENTS

1	Chart of total access to the Freephone
2	Number of people accessing bulletins
3	Number of people accessing forecasts
4	Number of people accessing health information
5	Number of people accessing other sources of information
6	Number of people accessing data for new regions
7	Number of people ordering leaflets
8	Average duration of call
9	Number of 'hangups' (people quitting before the end of the introductory message)

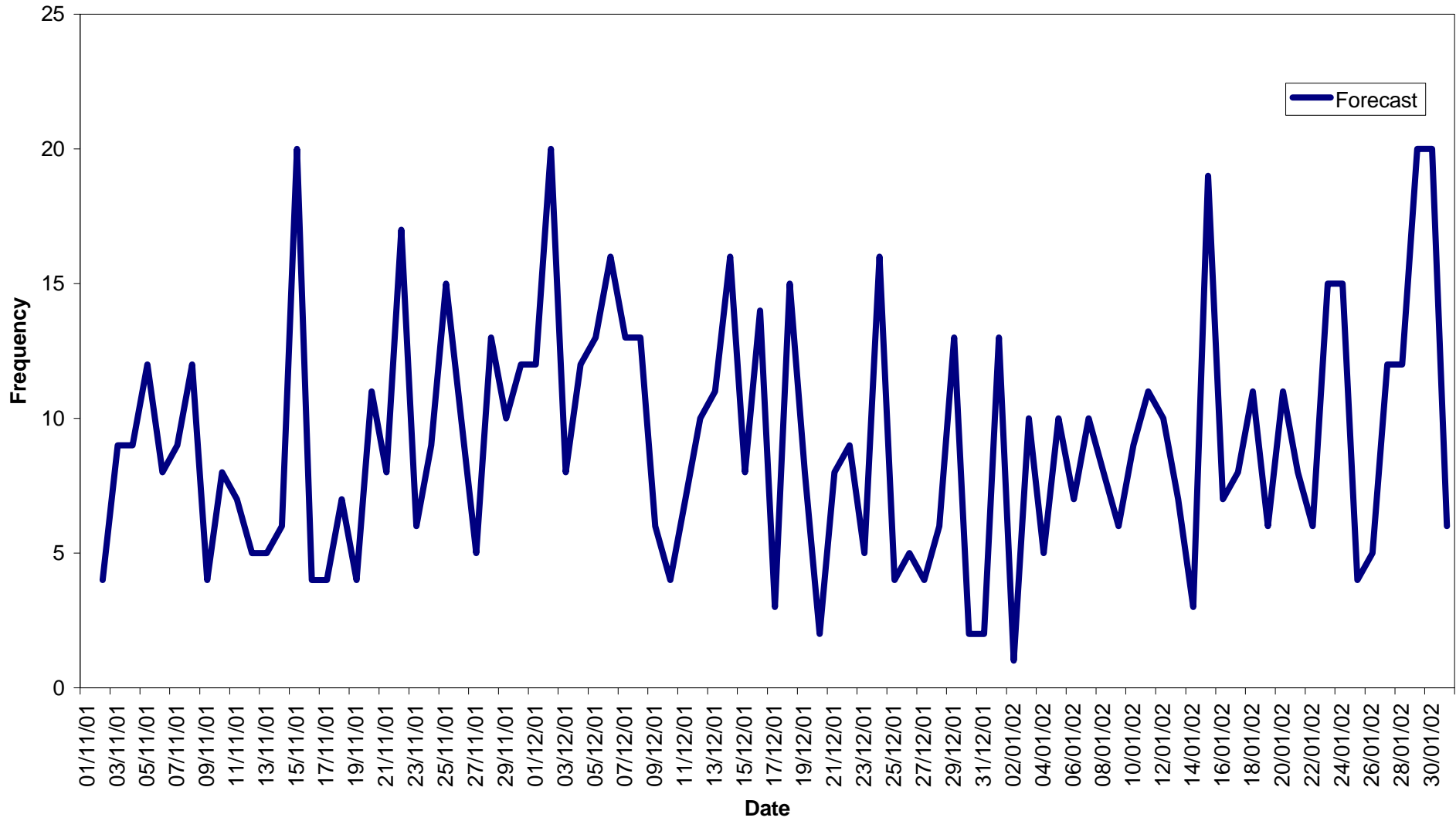
All Calls



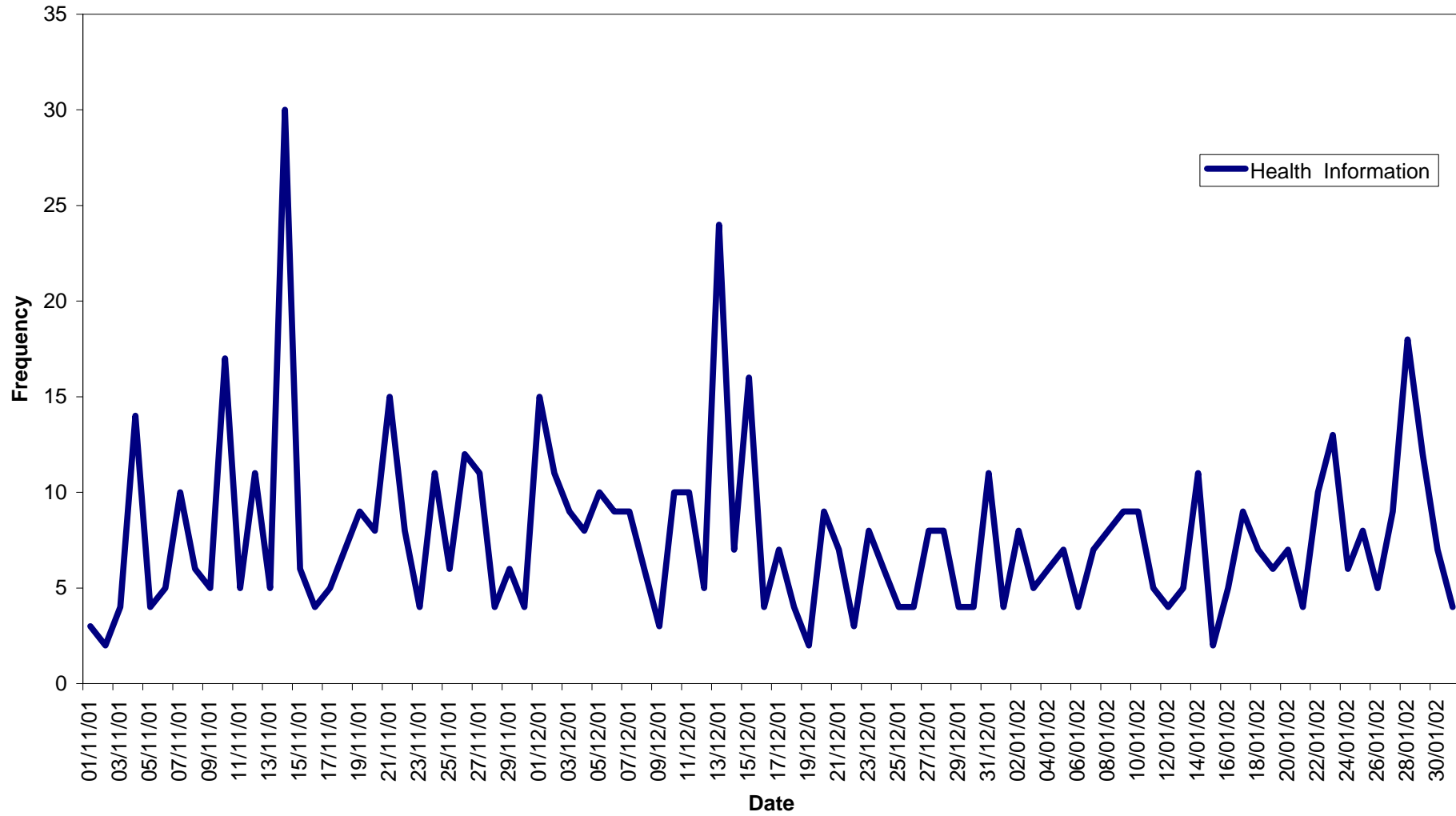
Bulletins



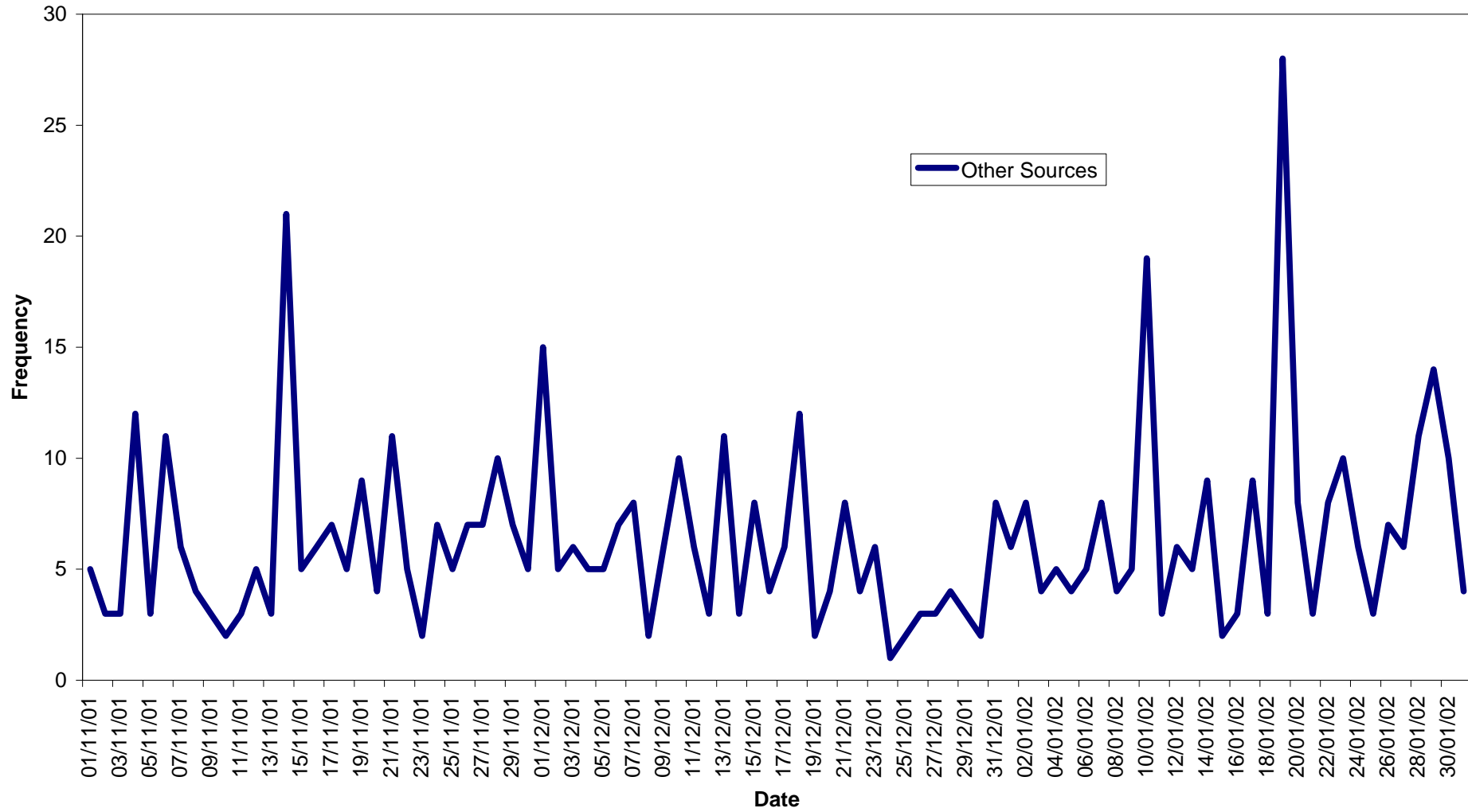
Forecasts



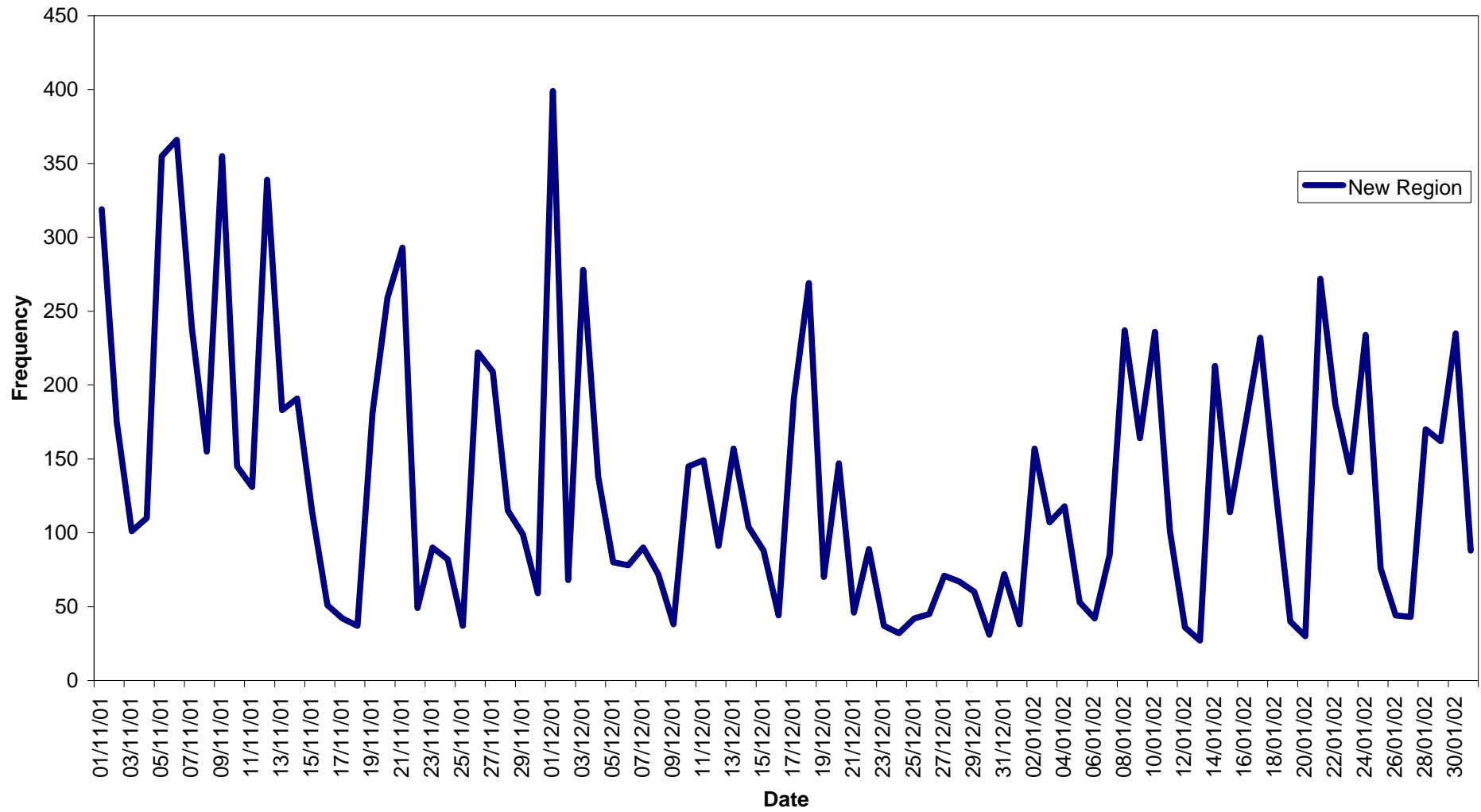
Health Information



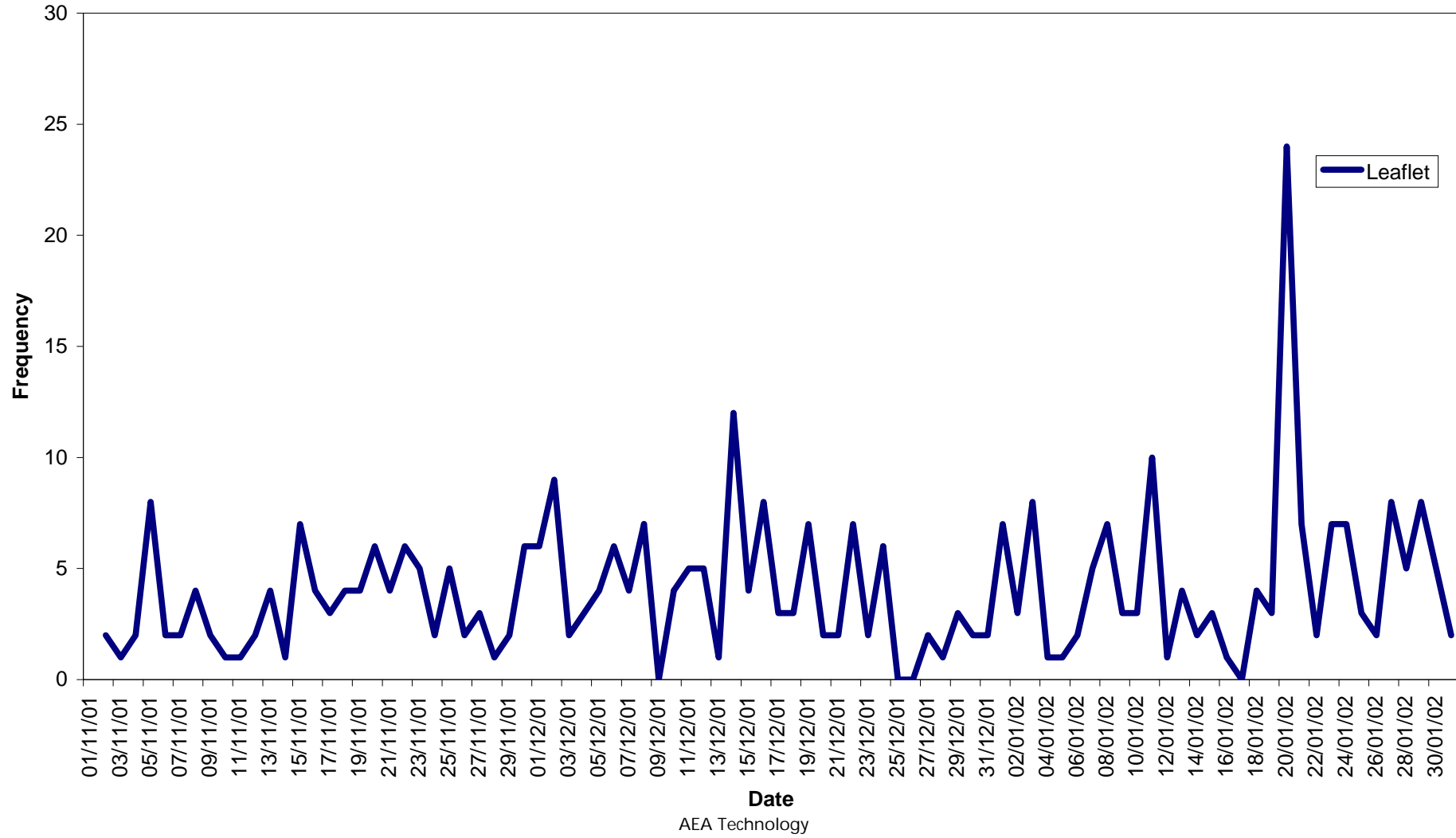
Other Sources of information



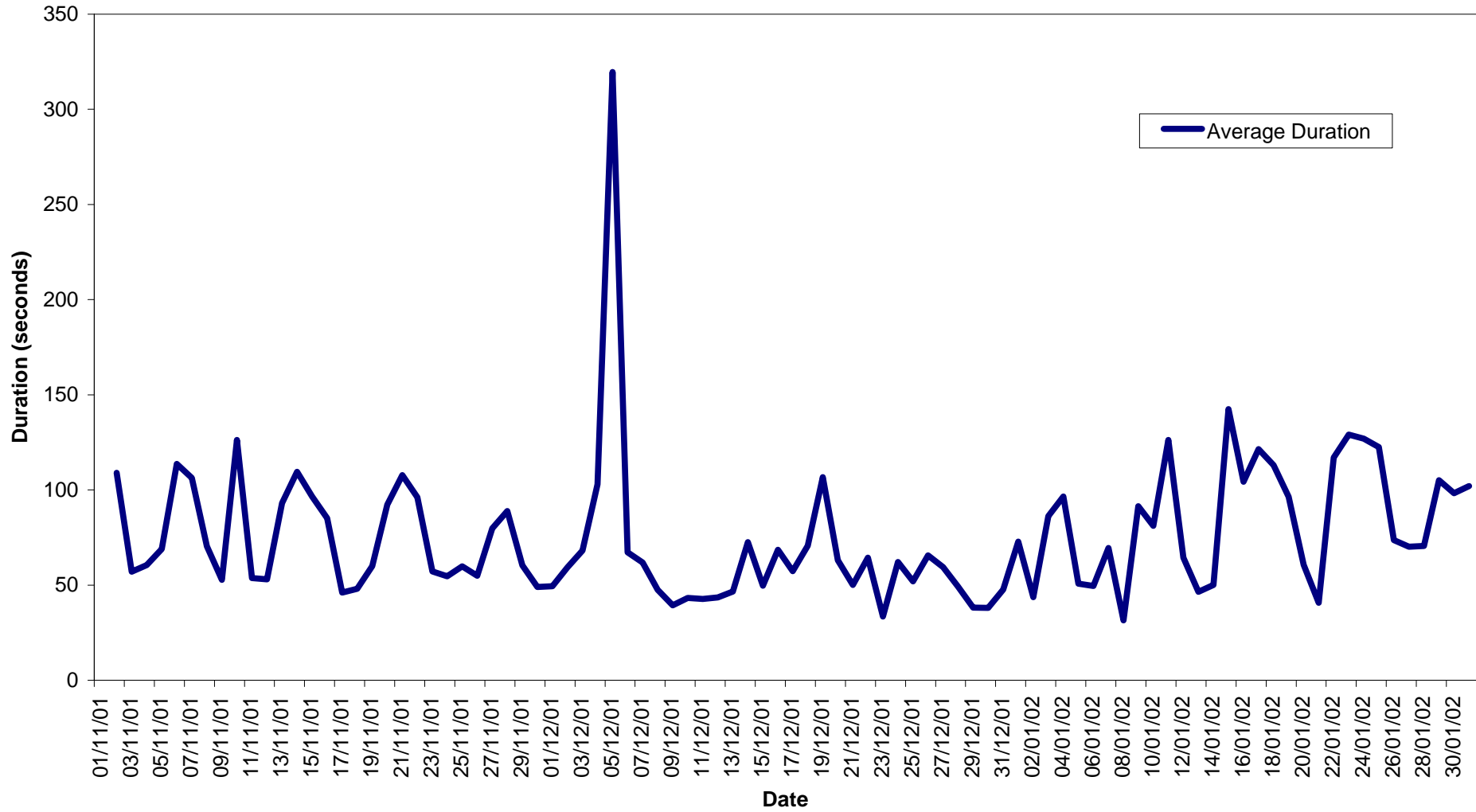
Selecting a new region



Leaflet Requests



Average Duration of Calls



Hang Ups

