BALLYMONEY
BOROUGH COUNCIL

Air Quality Updating and

Screening Assessment

April 2006

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Executive Summary

Ballymoney Borough Council has completed its first round of review and assessment of air quality for the Borough. The purpose of the assessment was to determine whether the objectives set by the government for the seven pollutants considered as being of most concern to public health and as detailed in the National Air Quality Strategy were being achieved. The seven pollutants are Benzene, 1,3-butadine, Lead, Carbon Monoxide, Nitrogen Dioxide, fine particles (PM_{10}) and Sulphur Dioxide.

As a result an Air Quality Management Area was declared in Ballymoney Borough Council as the review and assessment found that the levels of PM_{10} were exceeding the set daily mean objective. A further detailed assessment (stage 4) is currently proceeding within the AQMA.

This report is Ballymoney Borough Council's Updating and Screening Assessment (USA), which is the start of the second round of review and assessment of air quality in the Borough, in accordance with the requirements of the Technical Guidance TG (03) and LAQM.TG(03) Update January 2006.

The USA builds upon the phased approach of the last round of review and assessment. It takes into account any changes that may have occurred in the Borough and any improvements that have been made in the methods in predicting air quality.

The USA indicates that the objective will not be met for the daily mean PM_{10} objective within the AQMA but will be achieved elsewhere within the Borough, The Stage 4 assessment will confirm this and provide information to develop an action plan to improve air quality.

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Introduction

The Air Quality Issue

Although air quality has been improving in recent years in Northern Ireland, the issue continues to be important due to concern about the environment and improved scientific knowledge about pollutants and their effect on health. Councils in Northern Ireland are under a statutory obligation to review and assess air quality from time to time. This is known as local air quality management (LAQM)

Phased Approach to LAQM

Councils in Northern Ireland have already completed the first round of review and assessment of local air quality, and are now undertaking the second round. A phased approach is used to review and assess air quality. The first stage of the review and assessment process is an updating and screening assessment. This identifies any changes that have occurred since the first round which may have an affect on air quality and which require a more detailed assessment. Where an updating and screening assessment has identified a risk that an air quality objective will be exceeded at a location with relevant public exposure then the council is required to undertake a detailed assessment.

Legislative Background

The Environment (Northern Ireland) Order 2002

The Environment (Northern Ireland) Order 2002 introduced a statutory obligation on councils to carry out a review and assessment of their local air quality known as local air quality management (LAQM). The process requires the current and

likely future quality of air to be assessed and compared against nationally prescribed air quality objectives. The process is set out in the Department of the Environment's Local Air Quality Management Technical Guidance LAQM. TG(03).

National Air Quality Strategy

The Environment Act 1995 – Part IV Section 80 required the Secretary of State to publish a strategy containing policies with respect to the assessment and management of the quality of air, i.e. a National Air Quality Strategy (NAQS). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland was published in January 2000. The primary objective of the strategy is to ensure that everyone is able to enjoy a level of ambient air quality in public places which poses no significant risk to health and quality of life. It sets out air quality objectives for 8 pollutants, the date by which they should be achieved and the policy framework which is to be adopted to achieve the objectives. Pollutants covered by the strategy are: benzene, 1,3 butadiene, carbon monoxide, lead, oxides of nitrogen, particulate matter (as PM_{10}) and sulphur dioxide.

Air Quality Regulations (Northern Ireland) 2003

In Northern Ireland the air quality objectives contained in the strategy are incorporated into the Air Quality Regulations (Northern Ireland) 2003. This provides the statutory basis for the system of LAQM.

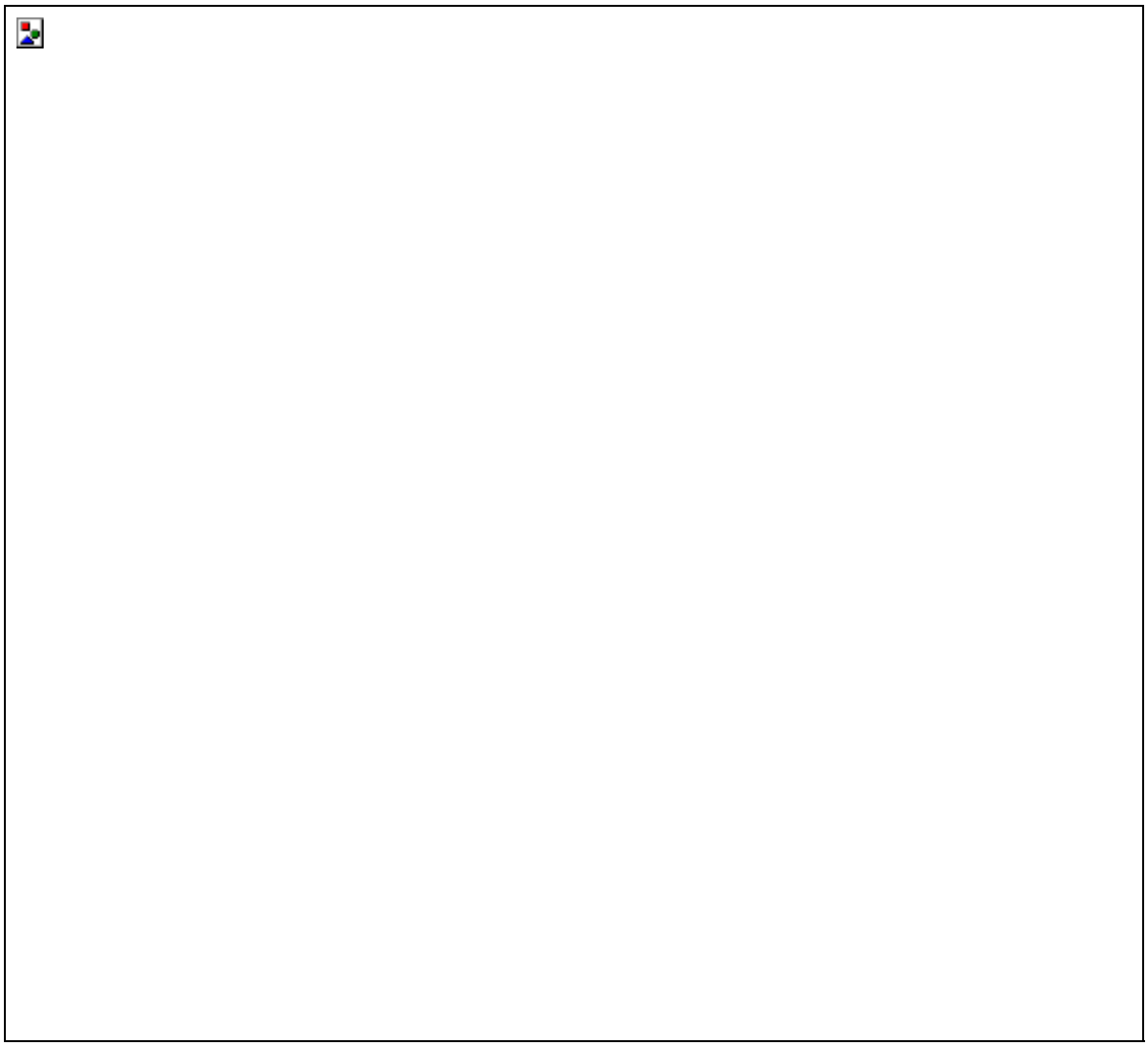
The Air Quality Regulations specify the following objectives:

Table 1 **Air Quality Objective Levels**

Pollutant	*Air Quality objective levels**	*Date to be achieved by*
(1)	*(2)*	*(3)*
Benzene	16.25µg/m^3 (5ppb) when expressed as a running annual mean	31 December 2003
	3.25µg/m^3 when expressed as a running annual mean	31 December 2010
1,3-butadiene	2.25µg/m^3 (1ppb) when expressed as a running annual mean	31 December 2003
Carbon monoxide	10mg/m^3 (8.6ppm) when expressed as a maximum daily running 8 hour mean	31 December 2003
Lead	0.5µg/m^3 when expressed as an annual mean	31 December 2004
	0.25mg/m3 when expressed as an annual mean	31 December 2008
Nitrogen dioxide	200µg/m^3 (105ppb) when expressed as a 1 hour mean, not to be exceeded more than 18 times a year	31 December 2005
	40µg/m^3 (21ppb) when expressed as an annual mean	31 December 2005
Sulphur dioxide	35µg/m^3 (132ppb) when expressed as a 1 hour mean, not to be exceeded more than 24 times a year	31 December 2004
	125µg/m^3 (47ppb) when expressed as a 24 hour mean, not to be exceeded more than 3 times a year	31 December 2004
	266µg/m^3 (100ppb) when expressed as a 15 minute mean, not to be exceeded more than 35 times a year	31 December 2005
Particles (PM_{10})	50µg/m^3 when expressed as a 24 hour mean, not to be exceeded more than 35 times a year	31 December 2004
	40µg/m^3 when expressed as an annual mean	31 December 2004

*µg/m^3: micrograms per cubic metre

Map of Council Area



Review and Assessment for Carbon Monoxide

Carbon monoxide (CO) is a pollutant gas generated by combustion sources. The dominant source is road transport, although domestic and other combustion processes contribute. At very high concentrations (such as may occur inside a building with a faulty heating appliance), it can be a dangerous asphyxiant. Whilst outdoor concentrations do not generally reach dangerous levels, they may still have adverse health effects for vulnerable people. As CO is a component of vehicle emissions, the highest outdoor concentrations occur near busy roads.

Table 2 Carbon Monoxide Objective

Pollutant	Objective	To be achieved by
Carbon Monoxide	10mg/m^3 (8.6ppm) when expressed as a maximum daily running 8 hour mean	31 December 2003

Conclusion from the first round of review and assessment

The Stage 1 Review and Assessment concluded that:

"There are no significant sources of Carbon Monoxide in the Ballymoney area and there are no proposals for developments likely to emit this pollutant. The objective for carbon monoxide is likely to be achieved at all locations within the Ballymoney area".

Background Concentrations

Estimated annual mean background concentrations for 2001 have been mapped for the UK and have been downloaded from the following website – www.airquality.co.uk. The 2001 concentrations have been adjusted using the Year Adjustment Calculator, also found on the aforementioned website.
The adjusted background concentrations for 2006 within the boundaries of the Borough indicate that the predicted levels will not exceed 0.11mg/m^3.

Summary of the Updating Screening and Assessment Checklist approach for Carbon Monoxide

The following checklist, derived from Technical Guidance LAQM. TG(03), has been used to determine whether or not a detailed assessment is required in respect of carbon monoxide.

Table 3 USA Checklist for Carbon Monoxide

Carbon Monoxide		
Ref No.	**Source, location or data that need to be assessed**	**Status**
A	Monitoring Data	No Exceedances
B	Very busy roads	No Exceedances

A. Monitoring Data

The Technical Guidance states that the Authority's focus for review and assessment should be on all locations where members of the public might be regularly exposed, such as building facades of residential properties, schools and hospitals, as well as gardens of residential properties where public exposure is likely.

Ballymoney Borough Council does not monitor for Carbon Monoxide. The nearest automatic monitoring stations (AUN) are operated by Belfast City Council and Derry City Council.

Table 4 – Monitoring data from Belfast and Derry City Councils.

Site	Site Classification	Maximum daily running 8-hour mean concentration (mg/m^3)				
		2001	2002	2003	2004	2005
Belfast	Urban Centre	N/A	4.6	3.5	4.1	6.3
Derry	Urban Centre	4.9	3.0	2.3	2.4	3.4

The maximum daily running 8-hour mean concentrations measured at both Belfast and Derry are below the objective of 10mg/m^3. These are both urban sites and are not representative of Ballymoney Borough Council, which is predominately rural; consequently lower concentrations would be expected.

B. Very Busy Roads or Junctions in Built-Up Areas.

The updating and screening checklist for Carbon Monoxide, Box 2.2 in the Technical Guidance states that a Local Authority should:

"Identify 'very busy' roads and junctions in areas where the 2003 background is expected to be above 1mg/m^3".

As indicated above the predicted background level for 2006 is not expected to be above 0.11mg/m^3. Hence, there are no areas where the expected background concentration will be above 1mg/m^3 and therefore it is not necessary to proceed any further with the assessment for road traffic.

In addition to the above the guidance states that the 'very busy' road is defined as having an annual average daily traffic flow (AADT) that exceeds 80,000 vehicles per day on single carriageway roads, 120,000 on dual carriageway roads, 140,000 vehicles per day on motorways, where there has been a significant increase (<10% AADT) in traffic flow, or where there is new relevant exposure i.e. a relevant receptor within 10m of kerb. No roads within the Borough fulfill these criteria.

Conclusion for Carbon Monoxide

It can be concluded that the objective of 10mg/m^3 as a maximum daily running 8-hour mean continues to be met and it will not be necessary to proceed to a Detailed Assessment for carbon monoxide.

Review and Assessment for Benzene

Benzene is a known human carcinogen (cancer causing substance), and also contributes to the formation of ground-level ozone (summer smog). The main sources of benzene emissions in the UK are petrol vehicles, petrol refining, and the fuel distribution from petrol stations without vapour recovery systems. National benzene concentrations have declined in recent years, mainly due to the increasing use of three-way catalytic converters and the introduction of vapour recovery systems in petrol stations (Stage 1 and 2 control).

Since January 2000, EU legislation has reduced the maximum benzene content of petrol to1%, from a previous upper limit of 5%. The European Auto-Oil programme will further reduce emissions for cars and light-duty vehicles, and emissions of benzene from the storage and distribution of petrol (LAQM.TG (03)).

Table 5 Benzene Objective

Pollutant	Objective	To be achieved by
Benzene	16.25µg/m^3 (5ppb) when expressed as a running annual mean	31 December 2003
Benzene	3.25µg/m^3 when expressed as a running annual mean	31 December 2010

Conclusion from the first round of review and assessment

The Stage 1 Review and Assessment concluded that:

"There are no significant sources of benzene in the Ballymoney area or in neighbouring areas and there are no proposals for developments likely to emit this pollutant. Road transport represents the most significant source of this pollutant in the area...national policies are expected to deliver the air quality objective by the end of 2003".

Update Screening and assessment Checklist

The following checklist, derived from Technical Guidance LAQM. TG(03), has been used to determine whether or not a detailed assessment is required in respect of Benzene.

Table 6 USA Checklist for Benzene

Source, location or data that need to be assessed	Status
A) Monitoring data	No Exceedances
B) Very Busy Roads/Junctions	No Exceedances
C) Industrial Sources	No Exceedances
D) Petrol Stations	No Exceedances
E) Major fuel storage depots (petrol only)	No Exceedances

Benzene within Ballymoney Borough Council

A Monitoring Data

Ballymoney Borough Council does not monitor for benzene. The nearest monitoring occurs in Belfast City Council by benzene pumped tube data, however, this is an urban location and would not be representative of Ballymoney Borough Council which is predominately rural.

B Very Busy Roads or Junctions in Built-Up Areas

The updating and screening checklist for Benzene, Box 3.2 in Technical Guidance states that Local Authorities should:

"Identify 'very busy' roads and junctions in areas where the 2010 background is expected to be above 2µg/m^3".

It was ascertained from the website www.airquality.co.uk that the predicted background level for benzene in 2010 is not expected to be above 0.227µg/m^3.

C Industrial Sources

Using the checklist in Annex 2 of the Technical Guidance it has been concluded that there are no processes within the boundaries of the Borough that are likely to release significant quantities of benzene.

D Petrol Stations

There is a potential for benzene to be emitted from petrol stations during loading and distribution of petrol.

The Technical Guidance states that studies have concluded that the presence of a petrol station is unlikely to have a significant influence on the concentrations of benzene close to residential properties where:

- ► The throughput of petrol is less than 2million litres/annum
- ► The distribution pumps are more than 10m from residential properties.

There are three petrol stations in the Borough that operate stage 1 vapour recovery systems to recover vapours that are displaced when filling underground tanks. All other petrol stations have a throughput of petrol that is less than 2 million litres/annum. All of the petrol stations have distribution pumps more than 10m away from residential properties.

E Major Fuel Storage Depots (petrol only)

There are no major fuel storage depots handling petrol within or near to the boundary of the Borough.

Conclusion for Benzene

Ballymoney Borough Council is unlikely to exceed the benzene objective set for 2010; therefore it will not be necessary to proceed to a detailed assessment.

Review and Assessment for 1, 3 Butadiene

1,3-Butadiene is a suspected human carcinogen (cancer causing substance). The major source of 1,3-butadiene nationally is motor vehicle emissions, with other major sources being industrial processes (such as petrochemical and rubber processes). As with benzene, the fitting of catalytic converters to petrol vehicles reduces their emissions of 1,3-butadiene. Recently agreed reductions in vehicle emissions and improvements to fuel quality (in the framework of the Auto-Oil programme), are expected to further reduce emissions of 1,3-butadiene from vehicle exhausts (LAQM.TG03).

Table 7 1,3-butadine Objective

Pollutant	Objective	To be achieved by
1, 3 Butadiene	2.25µg/m^3 (1ppb) when expressed as a running annual mean	31 December 2003

Conclusion from the first round of review and assessment

"The guidance concludes that if there are no significant Part A and/or B processes existing or planned in the Ballymoney area then the risk of the air quality objective for 1,3 butadiene being exceeded by the end of 2005 is considered to be negligible. There are no significant sources of 1,3 butadiene in the Ballymoney area or in neighbouring areas and there are no proposals for developments likely to emit this pollutant. The objective for 1,3 butadiene is likely to be achieved at all locations within the Ballymoney area".

Update Screening and assessment Checklist

The following checklist, derived from Technical Guidance LAQM. TG(03), has been used to determine whether or not a detailed assessment is required in respect of 1, 3 Butadiene.

Table 8 USA Checklist for 1,3-butadine

Source, location or data that need to be assessed	Status
A) Monitoring data	No Exceedances
B) New Industrial Sources	No Exceedances
C) Industrial Sources with Substantially Increased Emissions	No Exceedances

A Monitoring Data

Ballymoney Borough Council does not monitor for 1,3 butadiene. The nearest monitoring occurs in Belfast City Council by use of diffusion tubes at two sites. However, the following data is not representative of Ballymoney Borough Council, which is a predominately rural area.

Table 9 Monitoring Data from Belfast City Council

Site	Max Running Annual Mean Concentration (µmg/m^3)		
	2003	2004	2005
Belfast Centre	0.43	0.16	0.02
Belfast Roadside	0.16	0.14	0.11

Background concentrations taken from the NETCEN website have estimated mean annual concentrations of no more than 0.0597µmg/m^3 for Ballymoney for 2003 which are well below the current objective.

B New Industrial Sources

Using the checklist in Annex 2 of the Technical Guidance it can be concluded that there are no new industrial sources within the boundaries of the Borough which are likely to release significant quantities of 1,3 butadiene.

C Existing Industrial Sources with significantly increased emissions

There are no authorised processes within the Borough or in neighbouring areas that emit 1,3 butadiene.

Conclusion for 1,3 butadiene

Ballymoney Borough Council is continuing to meet the 2003 objective set for 1,3 butadiene, therefore it will not be necessary to proceed to a detailed assessment.

Review and Assessment for Lead

Lead has been identified as causing acute and chronic damage to the nervous system, effects on the kidneys, joints and reproductive system. Historically, the major source of lead has been motor vehicle emissions, with other major sources being metal industries and power generation. The agreement reached between the European Parliament and the Environment Council on the Directive on the Quality of Petrol and Diesel Fuels has led to the ban on sales of leaded petrol in the United Kingdom with effect from 1 January 2000. Emissions of lead are now restricted to a variety of industrial activities, such as battery manufacture, pigments in paints and glazes, alloys, radiation shielding, tank lining and piping (LAQM.TG (03)).

Table 10 Lead Objectives

Pollutant	Objective	To be achieved by
Lead	0.5µg/m^3 when expressed as an annual mean	31 December 2004
Lead	0.25mg/m3 when expressed as an annual mean	31 December 2008

Conclusion from first round of review and assessment

"The guidance concludes that if there are no significant Part A and/or B processes existing or planned in the Ballymoney area then the risk of the air quality objective for lead being exceeded by the end of 2005 is considered to be negligible. There are no significant sources of lead in the Ballymoney area or in neighbouring areas and there are no proposals for developments likely to emit this pollutant. The objective for lead is likely to be achieved at all locations within the Ballymoney area".

Update Screening and assessment Checklist

The following checklist, derived from Technical Guidance LAQM. TG(03), has been used to determine whether or not a detailed assessment is required in respect of lead.

Table 11 USA Checklist for Lead

Source, location or data that need to be assessed	Status
A) Monitoring data outside an AQMA	No exceedances
B) New Industrial Sources	No exceedances
C) Industrial Sources with Substantially Increased Emissions	No exceedances

A Monitoring Data outside an AQMA

Ballymoney Borough Council does not monitor for lead and there are no national network sites located in close vicinity of the Borough.

B New Industrial sources and sources with substantially increased emissions

The first round of review and assessment concluded that there were no industrial processes within the boundaries of the Borough or within neighbouring authorities, which were likely to emit concentrations of lead that would breach the objective.

There have been no new industrial processes within this Borough or neighbouring authorities, or existing sources with substantially increased emissions.

Conclusion for Lead

Ballymoney Borough Council is unlikely to exceed the lead objectives set for 2008. It can therefore be concluded that it will not be necessary to proceed to a detailed assessment for lead.

Review and Assessment for Nitrogen Dioxide

Nitrogen dioxide is a respiratory irritant associated with both acute (short-term) and chronic (long-term) effects on human health, particularly in people with asthma. Nitrogen dioxide (NO_2) and nitric oxide (NO) are both oxides of nitrogen, and are collectively referred to as nitrogen oxides (NO_x). All combustion processes produce NO_x emissions, largely in the form of nitric oxide, which is then converted to nitrogen dioxide, mainly as a result of reaction with ozone in the atmosphere. It is nitrogen dioxide that is associated with adverse effects upon human health.

The principal source of nitrogen oxides emissions is road transport, which accounted for about 49% of total UK emissions in 2000 (LAQM.TG (03)). Major roads carrying large volumes of high-speed traffic are a predominant source, as are conurbations and city centres with congested traffic. The contribution of road transport to nitrogen oxides emissions has declined significantly in recent years as a result of various policy measures. At a national level, urban traffic nitrogen oxides emissions were estimated to fall by about 20% between 2000 and 2005, and by 46% between 2000 and 2010 (Stedman et al, 2001). Other significant sources of nitrogen oxides emissions include the electricity supply industry and other industrial and commercial sectors. Emissions from both sources have also declined dramatically, due to the fitting of low nitrogen oxides burners, and the increased use of natural gas. Industrial sources make only a very small contribution to annual mean nitrogen dioxide levels.

Table 12 Nitrogen Dioxide Objective

Pollutant	Objective	To be achieved by
Nitrogen Dioxide	200µg/m^3 (105ppb) when expressed as a 1 hour mean, not to be exceeded more than 18 times a year	31 December 2005
Nitrogen Dioxide	40µg/m^3 (21ppb) when expressed as an annual mean	31 December 2005

Conclusion from first round of review and assessment

At the first stage of the review and assessment process is was concluded that *"There are four road junctions and possibly seven busy shopping streets and 84 sensitive property facades (8 streets/roads) where there may be risk of exceeding the objective)".*

The second stage of the review and assessment was completed by consultants NETCEN, AEA Technology and the conclusion of this report was that the air quality objective for Nitrogen Dioxide was likely to be met and that a third stage review was not required.

Update Screening and assessment Checklist

The following checklist, derived from Technical Guidance LAQM. TG(03), has been used to determine whether or not a detailed assessment is required in respect of Nitrogen Dioxide.

Table 13 USA Checklist for Nitrogen Dioxide

Source, location or data that need to be assessed	Status
A) Monitoring data outside an AQMA	No Exceedances
B) Monitoring data inside an AQMA	No Exceedances
C) Narrow congested streets with residential properties close to the kerb	No Exceedances
D) Junctions	No Exceedances
E) Busy streets where people may spend 1hour or more close to traffic	No Exceedances
F) Roads with a high flow of buses and/or HGVs	No Exceedances
G) New roads constructed or proposed since the first round of R&A (	No Exceedances
H) Roads close to the objective during the first round of R&A	No Exceedances

I) Roads with significantly changed traffic flows	No Exceedances
J) Bus stations	No Exceedances
K) New Industrial Sources	No Exceedances
L) Industrial Sources with Substantially Increased Emissions	No Exceedances
M) Aircraft	No Exceedances

Nitrogen Dioxide within Ballymoney Borough Council

A Monitoring Data

Ballymoney Borough Council carry out monitoring of NO_2 by diffusion tubes at six sites within the Borough. Four of the sites are included within the UK NO_2 network.

Table 14 Diffusion Tube Monitoring Site Details in Ballymoney

Site Ref	Site Detail	Location
1N*	Kerbside	19 Linenhall St, Ballymoney
2N*	Kerbside	8 Ballybogey Road, Ballymoney
3N*	Urban Background	Opposite 16 Armour Ave, Ballymoney
4N*	Urban Background	2-4 Semicock Ave, Ballymoney
6N	Kerbside	31 Charles Street, Ballymoney
7N	Kerbside	Opposite 51 Queen Street, Ballymoney

* NO_2 Network Site

Kerbside = 1-5m from kerb, urban background = at least 50m from the kerb of any major road.

The diffusion tubes are analysed by Lambeth Scientific Services Limited (LSSL). They participate in the Analytical Laboratory Performance Testing Scheme, which is run by NETCEN at AEA Technology. The tubes are prepared by impregnating discs with triethanolamine/acetone before being placed in coloured caps. The tubes are completed by placing a white cap on one end of the tube

and a coloured cap containing the impregnated discs on the other end. The tubes are analysed using uv/visible (uv/vis) sphectrophotometer after complexing with N-1-naphthylethylenediamine dihydrochloride (NEDA) and sulphalinamide.

Diffusion tubes frequently exhibit bias (over- or under-read) relative to the chemiluminescence analyser (the reference technique for NO_2), and the Guidance states that it is necessary to correct for any such bias, when using diffusion tube results for review and assessment purposes. As Ballymoney Borough Council does not have any permanent automatic NO_2 monitoring sites, they are not able to carry out the necessary intercomparison locally. Instead, information can be obtained from other sources. Data was obtained from a summary spreadsheet of Local Authority co-location studies prepared by Air Quality Consultants and available via the Air Quality Review and Assessment website, at http://www.uwe.ac.uk/aqm/review.

Annual mean NO_2 concentrations at these sites for future years were estimated using the approach specified in the Guidance LAQM TG (03), and the adjustment factors in boxes 6.6 and 6.7 of the Guidance. A Table showing annual mean concentration from 2001 to 2005 can be found in Appendix 1, along with predicted annual mean concentrations for 2010.

Appendix 2 shows a graph charting annual mean Nitrogen Dioxide concentrations in ugm^3. This demonstrates that in all locations, except one, concentrations have decreased.

B Narrow Congested Streets with residential properties close to the kerb.

There are no streets in Ballymoney Borough Council, which fulfil the criteria detailed in the Technical Guidance, hence it will not be necessary to proceed to a detailed assessment for nitrogen dioxide.

C Junctions

Box 6.2 in Chapter 6 of the Technical Guidance states that a “busy” junction can be taken as one with more than 10,000 vehicles per day. Using Annual Average Daily Traffic (AADT) count data supplied by the Department of Environment Roads Service (Appendix 3) it was determined that no junctions in Ballymoney Borough Council fulfil this criteria.

D Busy Streets where people may spend 1 hour or more close to traffic

A bust street where people spend 1 hour or more close to traffic is defined in the Technical Guidance as having more than 10,000 vehicles a day and where members of the public may be exposed within 5m of the kerb for 1 hour or more. There are no such streets in Ballymoney Borough Council.

E Roads with high flow of buses and/or HGVs.

Roads with a high flow of buses and/or HGVs are defined in the Technical Guidance as having greater than 25% composition buses or HGVs, and are within 10m of relevant exposure. There are no such roads, which meet these criteria in Ballymoney Borough Council.

F New roads constructed or proposed since first round of review and assessment.

Since the first round of review and assessment there have been no new roads proposed or constructed.

G Roads close to objective during the first round of review and assessment

There are no roads that met this criterion in Ballymoney Borough Council.

H Roads with significantly changed traffic flows

The Technical Guidance defines a ‘large’ increase in traffic as being more than 25% since the last review and assessment. On examining the Annual Average Daily Traffic Flows it was noted that the A44 experienced a 27% increase in traffic flow between 2002 and 2003. However, this is not in excess of 10,000 vehicles per day with an AADT of 3020 in 2003.

I Bus Stations

The Technical Guidance states that for a bus station to cause a significant impact there need to be a flow of vehicles greater than 1000 buses per day. There are no such sites in Ballymoney Borough Council.

J New Industrial Sources

Using the checklist in Annex 2 of the Technical Guidance it can be concluded that there are no new processes within the boundaries of the Borough, which are likely to release significance quantities of nitrogen dioxide.

K Industrial Sources with substantially increased emissions

There have been no industrial sources within the Borough or surrounding areas which have substantially increased their emissions of nitrogen dioxide.

L Aircraft

There are no airports located within the Borough.

Conclusion for Nitrogen Dioxide

Ballymoney Borough Council is continuing to meet the 2005 objective set for nitrogen dioxide, therefore it will not be necessary to proceed to a detailed assessment.

Review and Assessment for Sulphur Dioxide

Sulphur dioxide is an acute respiratory irritant, hence the short averaging time for its objective. The main source of sulphur dioxide in the UK is power stations, which accounted for more than 71% of emissions in 2000. There are also significant emissions from other industrial combustion sources. Domestic sources now only account for 4% of emissions, but can be locally much more significant. Road transport currently accounts for less than 1% of emissions (LAQM.TG03).

Table 15 Sulphur Dioxide Objective

Pollutant	Objective	To be achieved by
Sulphur Dioxide	35µg/m^3 (132ppb) when expressed as a 1 hour mean, not to be exceeded more than 24 times a year	31 December 2004
Sulphur Dioxide	125µg/m^3 (47ppb) when expressed as a 24 hour mean, not to be exceeded more than 3 times a year	31 December 2004
Sulphur Dioxide	266µg/m^3 (100ppb) when expressed as a 15 minute mean, not to be exceeded more than 35 times a year	31 December 2005

Conclusion from first round of review and assessment

The first stage of the review and assessment process concluded that: -

"There is a need to undertake a second stage review and assessment for SO_2 for domestic combustion and one industrial combustion system".

The second stage of the review and assessment process concluded that: -

"From the monitoring data ... it can be seen that all objectives for SO_2 were met during 2002 and 2003 to date".

The air quality review and assessment report submitted in April 2005 concluded that the objectives for SO_2 continued to be met throughout 2004.

Update Screening and assessment Checklist

The following checklist, derived from Technical Guidance LAQM. TG(03), has been used to determine whether or not a detailed assessment is required in respect of sulphur dioxide.

Table 16 USA Checklist for Sulphur Dioxide

Source, location or data that need to be assessed	Status
A) Monitoring data outside an AQMA	No exceedances
B) Monitoring data inside an AQMA	No exceedances
C) New Industrial Sources	No exceedances
D) Industrial Sources with Substantially Increased Emissions	No exceedances
E) Areas of Domestic Coal Burning	No exceedances
F) Small Boilers > 5 $MW_{(thermal)}$	No exceedances
G) Shipping	No exceedances
H) Railway Locomotives	No exceedances

A Monitoring Data

Ballymoney Borough Council does not have a real time SO_2 monitor. However, there was an 8-port bubbler, which was analysed by using the net acidity titration procedure. This site was decommissioned at the beginning of January 2006.

The Technical Guidance states that where the net acidity measurements are made then the measured maximum daily mean concentration should be multiplied by 1.25 to take account of a general tendency for bubblers to under-read at high concentrations. The results of the bubbler with the correction factor applied are shown in Table 17 below: -

Table 17 **SO_2 Maximum-Daily Means ($\mu g/m^3$)**

MONTH	2001	2002	2003	2004	2005
January	25	16	25	16	16
February	43	18	25	16	16
March	25	25	25	16	16
April	35	25	25	16	18
May	34	24	16	16	16
June	**50**	24	**56**	16	25
July	25	33	25	16	16
August	25	25	33	**34**	16
September	25	**25**	16	24	25
October	25	24	16	16	**65**
November	25	16	16	16	25
December	25	16	16	16	16

The Technical Guidance also details correction factors that can be used to convert the maximum daily mean to the 15-minute and 1 hour objectives, as detailed below: -

99.9^{th} percentile of 15-minute means = 1.8962 x maximum daily mean

99.7^{th} percentile of 1-hour means = 1.3691 x maximum daily mean

Table 18 **Daily mean corrections**

	Max Daily Mean ($\mu g/m^3$) Objective: 125$\mu g/m^3$	Max 15 min Mean ($\mu g/m^3$) Objective: 266$\mu g/m^3$	Max 1 hour Mean ($\mu g/m^3$) Objective: 350$\mu g/m^3$
2005	65	123	89

The maximum figure for 2005 occurred on the 23rd October 2005 and is not likely to have arisen as a result of domestic emissions. This results also appears to be an anomaly in comparison with the entire data set.

B New Industrial Sources

Using the checklist in Annex 2 of the Technical Guidance it can be concluded that there are no new processes within the boundaries of the Borough, which are likely to release significance quantities of sulphur dioxide.

C Industrial Sources with substantially increased emissions

There have been no industrial sources within the Borough or surrounding areas which have substantially increased their emissions of sulphur dioxide. A major industrial source has closed since the first round of review and assessment.

D Domestic Sources

The first stage report identified that a 1km^2 area, Glebeside Estate, contained a total of 850 houses of which 45% burned coal. To progress the second stage review and assessment process, an 8-port smoke and SO_2 apparatus was located on the periphery of the area. A further survey carried out in October 2005 revealed the percentage of houses using solid fuel as their primary fuel type had reduced to 21%. The Northern Ireland Housing Executive have also proposed a conversion scheme for 160 homes in the area from solid fuel to gas or oil by the end of 2006.

E Boilers

The first round of review and assessment confirmed that boiler plant greater than 5MW$_{(thermal)}$ can give rise to high short term concentrations of sulphur dioxide. No boiler plant greater than 5MW$_{(thermal)}$ have been identified within the boundaries of Ballymoney Borough Council.

F Railway Locomotives (Diesel and Coal-Fired locomotives)

Ballymoney Borough Council has a small railway station, however, there would not be any occasions where diesel or steam locomotives would be regularly stationary for periods of 15mins or more.

Conclusion

From the monitoring data above it can be seen that all objectives for SO_2 are currently being met.

Review and Assessment for Particulate Matter (PM_{10})

Particulate matter is of major health concern, as it has been linked with both increased morbidity and premature mortality. A wide range of emission sources contribute to PM10 concentrations in the UK. Research studies have confirmed that these sources can be divided into 3 main categories (APEG, 1999):
I) *Primary particle* emissions are derived directly from combustion sources, including road traffic, power generation, industrial processes etc. (II) *Secondary particles* are formed by chemical reactions in the atmosphere, and comprise principally of sulphates and nitrates. (III) *Coarse particles* comprise of emissions from a wide range of sources, including resuspended dusts from road traffic, construction works, mineral extraction processes, wind-blown dusts and soils, sea salt and biological particles. The expected reduction in national particle emissions in future years is different for each source type. For example, emissions from road transport will be governed by legislation on vehicle emission standards; emissions of secondary particles will be largely governed by controls on power generation, industrial and transport SO_2 and NO_x emissions, both in the UK and in Europe; emissions of coarse particles are largely uncontrolled, and in general are not expected to decline in future years (LAQM.TG (03)).

Table 19 PM10 Objectives

Pollutant	Objective	To be achieved by
Particulate Matter	50µg/m^3 when expressed as a 24 hour mean, not to be exceeded more than 35 times a year	31 December 2004
Particulate Matter	40µg/m^3 when expressed as an annual mean	31 December 2004

Conclusion from first round of review and assessment

The first round of review and assessment concluded that:

"Ballymoney Borough Council has monitored exceedances of the PM_{10} 2004 daily objective in the relevant year, at a relevant location. Ballymoney Borough Council will proceed to declare an Air Quality Management Area (AQMA) for PM_{10}. Ballymoney will also carry out further, more detailed studies in order to better define the full extent and source apportionment of the exceeding concentrations. Such information will then be used for informing the action plan that will need to be compiled following declaration of an AQMA."

An Air Quality Management Area was declared in September 2005 and a Stage 4 review and assessment is currently being undertaken. Further information will be included as an addendum to this section once it becomes available.

Update Screening and assessment Checklist

The following checklist, derived from Technical Guidance LAQM. TG(03), has been used to determine whether or not a detailed assessment is required in respect of particulate matter.

Table 20 USA Checklist for PM10

Source, location or data that need to be assessed	Status
A) Monitoring data outside an AQMA	No Exceedances
B) Monitoring data inside an AQMA	Exceedances
D) Junctions	No Exceedances
E) Roads with a high flow of buses and/or HGVs	No Exceedances
F) New roads constructed or proposed since the first round of R&A	No Exceedances
G) Roads close to the objective during the first round of R&A	No Exceedances

H) Roads with significantly changed traffic flows	No Exceedances
I) New Industrial Sources	No Exceedances
J) Industrial Sources with Substantially Increased Emissions	No Exceedances
K) Areas of Domestic Coal Burning	No Exceedances
L) Quarries/landfill sites/opencast coal/handling of dusty cargoes at ports etc.	No Exceedances
M) Aircraft	No Exceedances

A&B Monitoring Data

A Met One BAM 1020 analyser located within the Glebeside residential development in Ballymoney carries out continuous monitoring of PM_{10}. Monitoring commenced at the station in December 2003. The analyser is housed within a secure air-conditioned unit.

QA/QC and data management was carried out by NPL from December 2003 – December 2004 and is currently carried out by NETCEN who validate and ratify the raw data and provide the Council with results on a bi-annual basis. Data reports are also provided on a daily basis via e-mail, however this data is not validated.

A summary of the PM_{10} concentrations monitored between December 2003 and December 2005 are presented in Appendix 4.

In 2004 the annual average was 37µg m^3, which is approaching the annual mean objective of 40µg m^3. There were 56 monitored exceedances of the daily objective of 50µg m^3. Data Capture was 70.2%, which is below the recommended 75%. Much of the missing data was during the summer periods with data capture over the winter coal burning periods being relatively good.

In 2005 an annual mean of 27μgm^3 was monitored with 46 exceedances of the daily mean objective of 50μgm^3, calculated as 90.4%ile of available daily averages.

The question of BAM's producing high data has further been explored in the Air Quality Expert Group (AQEG) report 'Particulate Matter in the UK' (2004). LAQM.TG (03) guidance states that BAM data is suitable for model verification at the detailed assessment level in review and assessment.

C Junctions

The Technical Guidance states that a "busy" junction can be taken as one with more than 10,000 vehicles per day. Using Annual Average Daily Traffic (AADT) count data supplied by the Department of Environment Roads Service (Appendix 3) it was determined that no junctions in Ballymoney Borough Council fulfil this criteria.

D New roads constructed or proposed since last round of review and assessment

Since the first round of review and assessment there have been no new roads proposed or constructed.

E New industrial sources

Using the checklist in Annex 2 of the Technical Guidance it can be concluded that there are no new processes within the boundaries of the Borough, which are likely to release significance quantities of PM_{10}.

F Industrial Sources with substantially increased emissions

There have been no industrial sources within the Borough or surrounding areas which have substantially increased their emissions of sulphur dioxide.

G Areas of domestic solid fuel burning

Areas where domestic coal burning still takes place were identified amongst a number of the villages within the Borough and 500 x 500m sections were taken in the areas of highest housing density. Information was obtained from the Northern Ireland Housing Executive as to the number of properties within the grid in their ownership and a total number of these dwellings that used solid fuel as the primary heat source. The number of private dwellings within the grid using solid fuel as the primary heat source was calculated based on professional judgement and the NISRA Continuous Household Survey 2004/2005 Table 4.1 “Households with consumer desirables, central heating and cars” which states that 95% of households had full central heating. A summary table of this information can be found in Appendix 5.

No areas of significant coal burning were noted, i.e. none of the areas examined had more than 50 houses burning solid fuel as their primary source of heating.

H Quarries/landfill sites/open-cast etc

There are also no new landfill sites, quarries or other sources of fugitive emissions of PM_{10}, which have nearby relevant exposure, however, as mentioned in the 2005 Progress Report, the landfill site at Crosstagherty has closed and the site is now used as a transfer station. The site is located four miles southeast of the town centre.

M Aircraft

There are no airports located within the Borough.

Conclusion for PM10

Based on current information it will not be necessary to proceed to a further detailed review and assessment for PM_{10}. As highlighted previously work is currently being progressed on a stage 4 review and assessment for PM_{10}, the results of which when completed will be added to this section as an addendum.

Conclusions

Summary of Conclusions

Table 20 Summary of Conclusions

Pollutant	Detailed Assessment Required
Carbon Monoxide	Yes/**No**
Benzene	Yes/**No**
1,3 Butadiene	Yes/**No**
Lead	Yes/**No**
Nitrogen Dioxide	Yes/**No**
Sulphur Dioxide	Yes/**No**
Particulate Matter	Yes/**No**

Bibliography

The Environment (Northern Ireland) Order 2002

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2000

Department of the Environment's Local Air Quality Management Technical Guidance LAQM. TG(03).

Air Quality Regulations (Northern Ireland) 2003

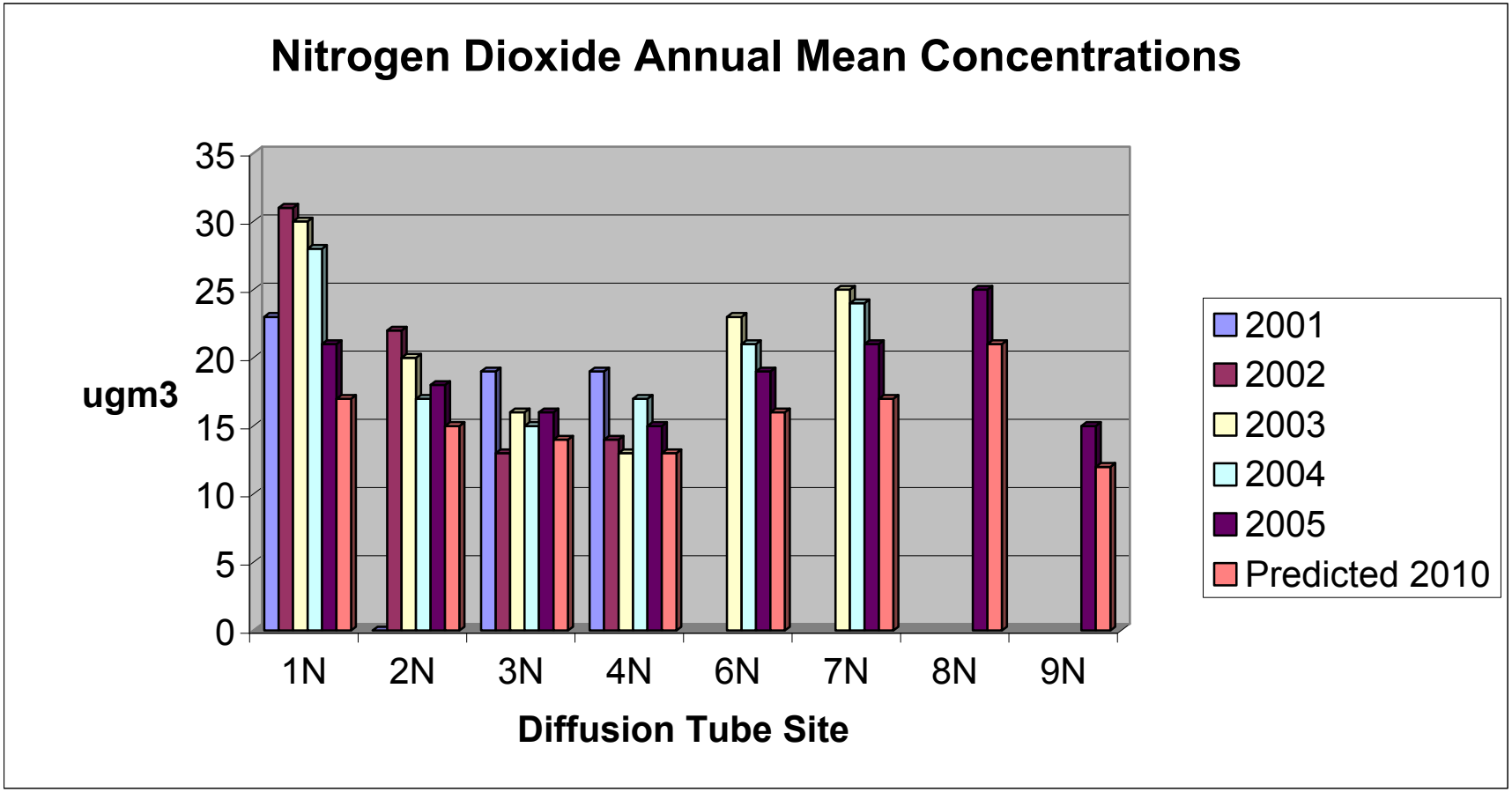
Local Air Quality Management Policy Guidance LAQM.PGNI(03) (EHS)

Appendix 1

Nitrogen Dioxide Annual Mean Concentrations

			Bias Corrected					
Site	**Site Type**	**Site Location**	**2001**	**2002**	**2003**	**2004**	**2005**	**Predicted 2010**
1N	Kerbside	19 Linenhall Street	23	31	30	28	21	17
2N	Kerbside	8 Ballybogey Road	n/a	22	20	17	18	15
3N	Urban Background	Opposite 16 Armour Avenue	19	13	16	15	16	14
4N	Urban Background	2-4 Semicock Avenue	19	14	13	17	15	13
6N	Kerbside	31 Charles Street			23	21	19	19
7N	Kerbside	Opposite 51 Queen Street			25	24	21	17
8N	Kerbside	Meeting House Street					25	21
9N	Kerbside	Castle Street					15	12

Appendix 2


Nitrogen Dioxide Annual Mean Concentrations
ugm3
35
30
25
20
15
10
5
0
1N
2N
3N
4N
6N
7N
8N
9N
Diffusion Tube Site
2001
2002
2003
2004
2005
Predicted 2010

Appendix 3 – Traffic Data

All data has been provided by the Roads Service of the D.O.E.

Table – Abstract from Annual Traffic Census Report, D.O.E, Roads Service, 2003.

Road No.	Census Point No.	Location	24 hr AADT	Mean Peak Hour (Hour Beginning)				HGV%
				AM		PM		
A26	316	Ballymoney By-Pass	15660	1450	8	1510	17	-
A26	317	Ballymoney – Ballymena, S.E of Ballymoney	-	-	-	-	-	-
A44	328	Ballymena – Ballycastle, north of A26	3020	220	8	310	17	-
B62	315	Ballymoney – Portrush, north of A26	6320	600	8	600	17	7
B66	314	Ballymoney – Limavady, east of B62	3700	300	8	360	17	5

24 Hour AADT – 24 Hour Annual Average Daily Traffic based on a 7 day week.

The percentage of HGV's (Heavy Goods Vehicles) is given where available.

Table – Comparison of Annual Average Daily Traffic Flows from 1998 to 2003.

Road No.	Census Point No.	Average Vehicle Counts Per Day										
		1998	%+ or -	1999	%+ or -	2000	%+ or -	2001	%+ or -	2002	%+ or -	2003
A26	316	13370	505	14100	-4.7	13440	8.3	14560	2.6	14940	4.8	15660
A26	317	11040	7.4	11860	-1.0	11740	7.6	12360	1.8	12860	-	-
A44	328	-	-	2190	0.5	2200	5.0	2310	3.0	2380	26.9	3020
B62	315	5498	9.7	6030	-	-	-	-	-	6070	4.1	6320
B66	314	3288	-2.7	3200	-	-	-	-	-	3520	5.1	3700

Appendix 4

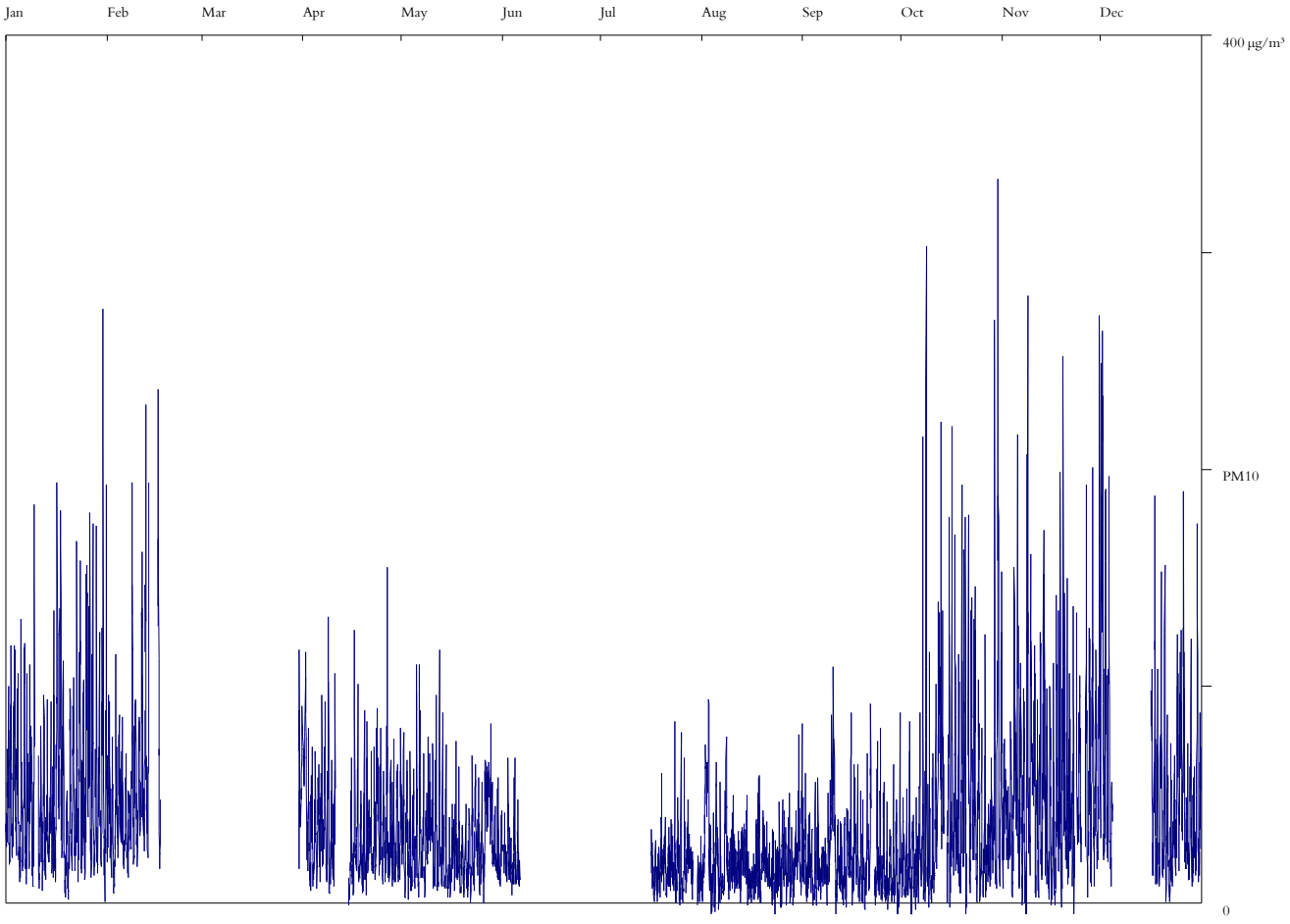
BALLYMONEY
01 January to 31 December 2004

POLLUTANT	PM_{10} *
Number Very High	16
Number High	21
Number Moderate	541
Number Low	5431
Maximum hourly mean	334 µg m^{-3}
Maximum running 8-hour mean	193 µg m^{-3}
Maximum running 24-hour mean	137 µg m^{-3}
Maximum daily mean	133 µg m^{-3}
Average	37 µg m^{-3}
90.4%ile daily means	64 µg m^{-3}
Data capture	70.2 %

* PM_{10} in gravimetric units
All mass units are at 20'C and 1013mb

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedences	Days
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	56	56
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 40 µg m^{-3}	0	-

Ballymoney Air Monitoring
Hourly Mean Data for 01 January to 31 December 2004



Lynne,

I attach a file containing the ratified data from January to December 2004. These data have been compiled in the absence of any instrument calibrations or service/repair reports other than those checks carried out by NPL.

The NPL checks have shown that the flow rate maintained by the analyser was within acceptable limits, and that the analyser sensitivity, when measured with an independent calibration plate, was correctly set. The instrument was not leaking. No data have, therefore, been lost as a result of issues to do with the analyser calibration.

As we have seen before, and has been noted previously, the ambient data seem high in comparison to those which are commonly seen throughout the United Kingdom, using TEOM analysers. Whether this is an artefact of the measurement method, or a true indication of PM10 concentrations in a predominantly coal burning residential area, is not clear.

As part of the CEN work on standardisation of particle monitoring methods, NPL have compared data from TEOM, BAM, and manual weighing samplers over a 16 week period (January to May 03) in Teddington. For daily average measurements, there was reasonable agreement between BAM and manual weighing methods, but the TEOM analyser under-read the manual method by approximately one half. Given these findings it is not surprising that higher concentrations were measured by your BAM analyser compared with network measurements using TEOMs. From the comparison with manual methods, though, it could be argued that the network data are too low.

While there are such large discrepancies between what are considered to be well tested measurement methods, it is clear that PM10 measurements have, at this stage, far larger uncertainties than we would hope for.

You will note that there are some data which are negative, down to -5 ug/m3. This, we believe, due to analyser noise. If these data were deleted, this would bias the resultant averaged data upwards. If -5 ug/m3 wre used as an offset this would have a larger systematic effect on the data. We believe that the most reliable way to treat these negative data, in the absense of any information to the contrary, is to assume they are due to signal noise at low concentrations, and as such to include them as we would other data.

The data summary is as follows:

Summary data for Ballymoney PM10 Automatic Monitoring Site for January to December 2004

Annual mean PM10 =	35.9 ugm-3
number of daily averages > 50 ugm-3 =	55
maximum hourly average =	334 ugm-3
maximum daily average =	129 ugm-3
data capture =	70 %

BALLYMONEY

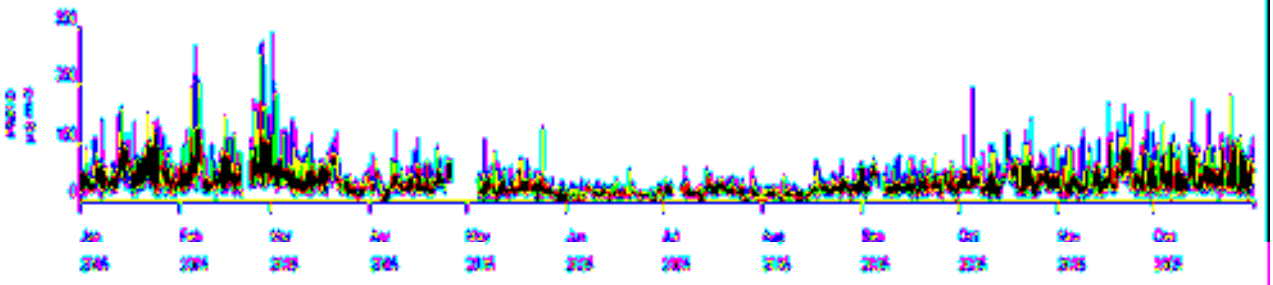
01 January to 31 December 2005

These data have been fully ratified by netcen

[illegible]	PM_{10}
Maximum daily mean	88 µg m^{-3}
90.4%ile daily mean	46µg m^{-3}
Average	26 µg m^{-3}
Data capture	96.2 %

PM_{10} in gravimetric units
PM_{10} instrument is an unheated BAM
All mass units are at 20°C and 1013mb
NO_2 mass units are NO_2 as NO_2

Pollutant	Air Quality Regulations (Northern Ireland) 2003	Exceedances	Days
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	23	23
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 40 µg m^{-3}	0	-



Appendix 5

Street/Estate	House Numbers	No. NIHE Dwellings	No. private Dwellings	NIHE solid fuel Users	Private Solid Fuel Users	Total Solid Fuel Users
Balnamore						
Millicent Avenue	1-28	15	13	5		
Burnside Park	1-20	8	12	1		
Lime Park	1-11	11	3	6		
Beechwood Drive	1-22	11	11	1		
Grove Park	1-35	9	26	6		
Royal Terrace	1-17	15	1	8		
Hunter Park	1-4	1	3	0		
Esdale Terrace	1-6	0	6	0		
TOTAL	**145**	**70**	**75**	***27***	***4***	***31***

Rasharkin						
Sunnyside Drive	9-21	4	9	1		
Wallace Park	1-30	6	24	2		
Main Street	24-30	0	6	0		
Rosetta Terrace	1-4	1	3	1		
Orangefield Place	1-4	1	3	1		
Churchill Crescent	2-12	1	9	0		
Bamford Park	1-28	12	16	3		
TOTAL	**95**	**25**	**70**	***8***	***4***	***12***

Street/Estate	House Numbers	No. NIHE Dwellings	No. private Dwellings	NIHE solid fuel Users	Private Solid Fuel Users	Total Solid Fuel Users
Carnany Drive	1-95	80	24	31		
Carnany Gardens	1-25	25	0	0		
Carnany Court	1-14	14	0	0		
Carnany Avenue	1-38	40	2	1		
TOTAL	**208**	**159**	**49**	***38***	***2***	***40***
Cloughmills						
Cypress Park	1-64	22	42	14		
Rosemount	1-36	8	28	0		
Main Street	1-8	0	8	0		
Strand Park	1-48	17	31	3		
Fenten Crescent	1-16	6	11	3		
Fenten Park	1-15	9	6	0		
Princess Gardens	1-36	5	31	0		
TOTAL	**224**	**67**	**157**	***20***	***8***	***28***
Ballybogey						
Wheatfield Park	1-20	7	13	0		
Millview Park	1-34	9	25	0		
TOTAL	**54**	**16**	**38**	***0***	***2***	***2***
Stranocum						
Hawbank Park	1-26	8	18	1		
Ford Avenue	1-12	5	7	0		
Willowbank Terrace	1-10	5	5	0		
TOTAL	**48**	**18**	**30**	***1***	***2***	***3***

Street/Estate	House Numbers	No. NIHE Dwellings	No. private Dwellings	NIHE solid fuel Users	Private Solid Fuel Users	Total Solid Fuel Users
Dervock						
Millar Avenue	1-20	8	12	3		
Greystone Crescent	1-41	30	11	3		
Church Street	1-15	3	12	0		
Travers Place	1-26	12	14	7		
TOTAL	**92**	**53**	**39**	***13***	***2***	***15***

Dunloy						
McCelland Park	1-22	10	12	1		
Lilac Terrace	1-10	0	10	0		
Hillview Park	1-14	3	11	0		
Hawthorne Terrace	1-24	15	9	0		
McCamphill Park	1-14	8	6	1		
Fassagh Park	1-6, 13-14	2	6	0		
Carness Drive	1-34	13	21	2		
TOTAL	**126**	**51**	**75**	***4***	***4***	***8***