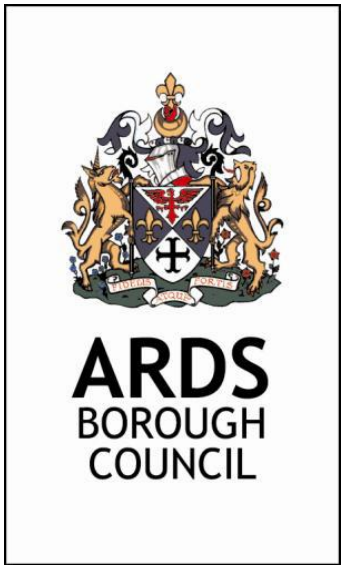



# 2012 Air Quality Updating and Screening Assessment for Ards Borough Council

In fulfillment of Environment (Northern Ireland) Order 2002
Local Air Quality Management

June 2012

| | |
|---|---|
| **Local Authority Officer** | Gareth Kinnear<br>Senior Environmental Health Officer<br>Cheryl Harkness |
| | |
| **Department** | Environmental Health |
| **Address** | 2 Church Street, Newtownards<br>Co Down BT23 4AP |
| **Telephone** | 02891824051 |
| **e-mail** | gareth.kinnear@ards-council.gov.uk<br>cheryl.harkness@egehc.co.uk |
| | |
| **Report Reference number** | USA 2012 |
| **Date** | June 2012 |

# Executive Summary

Increasing priority has been given at both European and National Levels to the assessment and the management of air quality. The Air Quality Strategy has established the frame work for air quality management in the UK. Local Authorities have a duty under the Environment Act 1995 to assess air quality and produce an annual report, action is required in areas where the objectives are or are likely to be exceeded.

Air Quality in Northern Ireland has shown substantial improvement in recent years. In particular levels of pollutants associated with coal and oil combustion have declined significantly over the past decade. Locally the NIHE has completed a fuel conversation scheme over the past few years which has dramatically reduced the number of coal burning properties in Newtownards, this had been a concern in previous review and assessments..

This 2012 USA report has been undertaken in accordance with the Local Air Quality Technical Guidance TG>09. It forms part of a continual process of review and assessment of local air quality and provides an opportunity to update information on the pollution climate and to reassess conclusions from previous assessments.

Within this report sources of pollution in the Borough have been re-examined and any aspects that have changed since the previous round of review and assessment have been identified. New monitoring data has been used to assess compliance with the relevant national air quality objectives. The conclusions from the previous round of review and assessment continue to be valid and there is no need to proceed to a detailed assessment for any of the monitored pollutants.

# Table of contents

## List of Tables



## List of Figures



## Appendices

# 1 Introduction

## 1.1 Description of Local Authority Area

Ards Borough Council is situated east of Belfast on the shores of Strangford Lough, which is designated as an area of outstanding natural beauty and special scientific interest. The Borough comprises of 140 square miles, bounded by 90 miles of coastline. Ards remains one of the fastest growing boroughs with the Northern Ireland Statistics and Research Agency Mid 2006 population estimates standing at 76,179 representing 4.4% of the total population of Northern Ireland.

The Borough is of mixed urban and rural character. The main town of Newtownards is located at the northern end of Strangford Lough and is a natural basin surrounded by hills. The prevailing wind direction is south-westerly. The other main centres of population include Comber, Donaghadee and Portaferry. Neighbouring Councils include North Down Borough Council, Castlereagh Borough Council and Down District Council.

## 1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in the Environment (Northern Ireland) Order 2002, the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an update of any outstanding information requested previously in Review and Assessment reports.

## 1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in Northern Ireland** are set out in the Air Quality Regulations (Northern Ireland) 2003, Statutory Rules of Northern Ireland 2003, no. 342, and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre $\mu g/m^3$ (milligrammes per cubic metre, $mg/m^3$ for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

**Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in Northern Ireland**

| Pollutant | Air Quality Objective | | Date to be achieved by |
|---|---|---|---|
| | Concentration | Measured as | |
| **Benzene** | 16.25 $\mu g/m^3$ | Running annual mean | 31.12.2003 |
| | 3.25 $\mu g/m^3$ | Running annual mean | 31.12.2010 |
| **1,3-Butadiene** | 2.25 $\mu g/m^3$ | Running annual mean | 31.12.2003 |
| **Carbon monoxide** | 10.0 $mg/m^3$ | Running 8-hour mean | 31.12.2003 |
| **Lead** | 0.5 $\mu g/m^3$ | Annual mean | 31.12.2004 |
| | 0.25 $\mu g/m^3$ | Annual mean | 31.12.2008 |
| **Nitrogen dioxide** | 200 $\mu g/m^3$ not to be exceeded more than 18 times a year | 1-hour mean | 31.12.2005 |
| | 40 $\mu g/m^3$ | Annual mean | 31.12.2005 |
| **Particles ($PM_{10}$) (gravimetric)** | 50 $\mu g/m^3$, not to be exceeded more than 35 times a year | 24-hour mean | 31.12.2004 |
| | 40 $\mu g/m^3$ | Annual mean | 31.12.2004 |
| **Sulphur dioxide** | 350 $\mu g/m^3$, not to be exceeded more than 24 times a year | 1-hour mean | 31.12.2004 |
| | 125 $\mu g/m^3$, not to be exceeded more than 3 times a year | 24-hour mean | 31.12.2004 |
| | 266 $\mu g/m^3$, not to be exceeded more than 35 times a year | 15-minute mean | 31.12.2005 |

## 1.4 Summary of Previous Review and Assessments

**The stage one review and assessment completed in 2000 concluded that:**

1. The air quality objectives for the following pollutants were not likely to be exceeded:

*Benzene, 1,2- Butadiene and Lead*

2. A detailed assessment was required for the following pollutants:

*Carbon Monoxide, Sulphur Dioxide, Nitrogen dioxide and $PM_{10}$*

**The stage two & three assessment completed in 2004 concluded that:**

1. The air quality objectives for the following pollutants were not likely to be exceeded:

*Carbon Monoxide, Nitrogen Dioxide, and Sulphur Dioxide*

2. Based on the predictions of the dispersion modelling exercise it was identified that the objective for the following pollutant would be marginally exceeded:

*$PM_{10}$*

The area of predicted $PM_{10}$ exceedence was identified to be within the area of Bradshaw's Brae, based on the findings of the dispersion modelling exercise. The modelling was undertaken by BMT Cordah on behalf of the Council during 2003/2004. The findings were in part based on the real time monitoring for $PM_{10}$ at the Glen Community Centre in Newtownards, and on a fuel usage survey carried out in April 2003. BMT Cordah concluded that the NAQS 24 hour mean would be marginally exceeded, as a result of the high level of domestic coal burning in the town.

The Council therefore declared an AQMA, and produced an action plan as a means to improve air quality in Newtownards. The AQMA encapsulated the areas within Newtownards that had the highest density of dwellings using solid fuel burning as the primary source of heating. The automatic monitoring station was relocated to a site within the AQMA, to confirm the findings of the dispersion modelling exercise. Initially there were some difficulties in finding a suitable location; however, the monitoring station was moved to a site within the grounds of Ards Leisure Centre during the

spring of 2006. Information relating to the site, including monitoring data, can be accessed at http://www.airqualityni.co.uk. The monitoring from this location indicated that it was unlikely that the objective for $PM_{10}$ will be exceeded. As a result Ards Borough Council revoked the AQMA on 1st December 2007.

In addition it was felt it would be beneficial to identify any major changes in fuel consumption within the AQMA. A consultation exercise was undertaken with the Northern Ireland Housing Executive (NIHE), to assess the amount of fuel conversion carried out within their properties since 2003. An estimated 859 properties were converted between 2003 and 2009, which has significantly reduced the emissions from domestic coal burning properties within the town.

A progress report was completed in 2008 and an Updating and Screening Assessment 2009 , both reports re-examined the possible pollution sources within the borough and any aspects that had changed since the previous round of review and assessment were identified. Monitoring data for the relevant years was used to assess compliance with the relevant national air quality objectives. The conclusions from the previous rounds of review and assessment were found to be valid and a detailed assessment was therefore not required. No exceedences of the objectives were identified in 2008 or 2009.

A progress report in April 2010 and May 2011 once again concluded there were no exceedences of the objectives.

# 2 New Monitoring Data

## 2.1 Summary of Monitoring Undertaken

### 2.1.1 Automatic Monitoring Sites

From mid 2002 until April 2006, an automatic monitoring station was located at an urban background Estate, Newtownards, to monitor pollutants from the high density of domestic coal burning properties in the area. $PM_{10}$ was monitored using an automatic TEOM sampler and sulphur dioxide was monitored using a UV fluorescence analyser. Modelling carried out for the combined $2^{nd}/3^{rd}$ review indicated the possibility of exceedence of the $PM_{10}$ objective. As a result an AQMA was declared in 2005 and the automatic monitoring station was moved to a location within the area of predicted exceedence in April 2006. The station was re-located at the rear of Ards Leisure Centre, William Street, Newtownards. The monitoring results from this location indicate that it is unlikely that the objectives for $PM_{10}$ or Sulphur Dioxide would be exceeded. Therefore the Sulphur Dioxide analyser was decommissioned at the beginning of 2010 as levels continued to be extremely low. Automatic monitoring of $PM_{10}$ continued in 2010 but as these results also remained continually below the objective Ards Borough Council ceased monitoring at this site at the beginning of 2011.
In 2011 Ards Borough Council carried out no automatic monitoring.

### 2.1.2 Non-Automatic Monitoring Sites

**Nitrogen Dioxide:**

Ards Borough Council has monitored Nitrogen Dioxide by passive diffusion tubes regularly since 1994. Diffusion tube data cannot be compared directly with air quality limit values based on short-term averages; however, they can be used to help identify areas with high concentrations of $NO_2$, which require more detailed investigation. The aim of the $NO_2$ monitoring undertaken has been to measure pollutant concentrations at busy roads and junctions especially near residential areas.

The tubes are sited in accordance with the technical guidance and all within Newtownards town with has the highest traffic flow within the Borough. The tubes are supplied and analysed by ESG (Environmental Scientifics Group).

A decision was made to use a local average bias adjustment factor of **0.71**..

Further information on the decision to use this bias adjustment factor and details of the QA/QC of the diffusion tubes can be found in appendix A

**Figure 2.1 Map (s) of Non-Automatic Monitoring Sites (if applicable)**

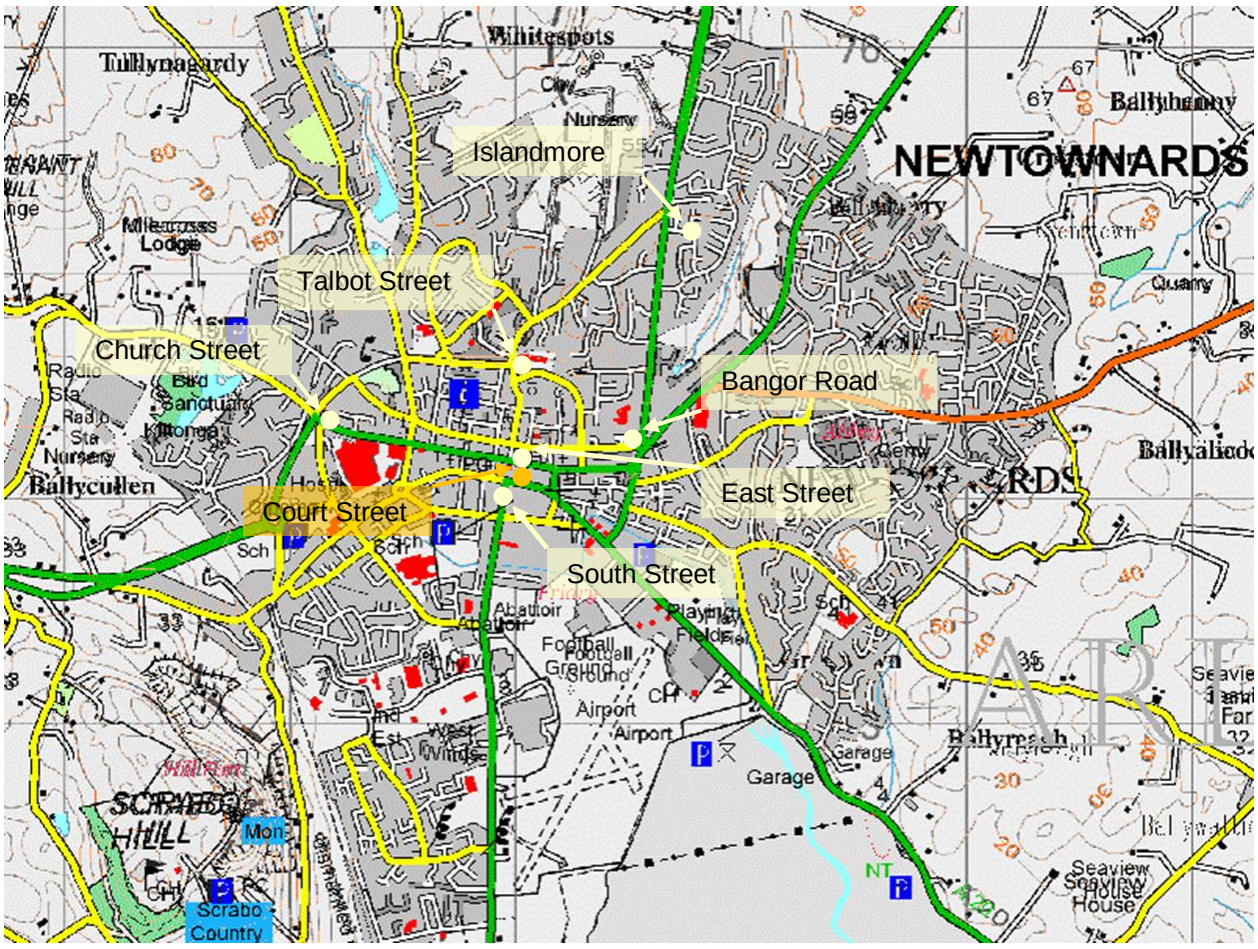


**Table 2.1 Details of Non-Automatic Monitoring Sites**

| Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Is monitoring collocated with a Continuous Analyser (Y/N) | Relevant Exposure? *(Y/N with distance (m) to relevant exposure)* | Distance to kerb of nearest road *(N/A if not applicable)* | Does this location represent worst-case exposure? |
|---|---|---|---|---|---|---|---|---|---|
| **1**-2a East Street | Urban Background | 349001 | 374242 | $NO_2$ | N | N | Y (2m) | >50m from busy road | Y |
| **2-**South Street (b) | Roadside | 348238 | 373590 | $NO_2$ | N | N | Y (0.5m) | 1.5m | Y |
| **3**-Bangor Road | Roadside | 349607 | 374267 | $NO_2$ | N | N | Y (1.5m) | 1.5m | Y |
| **4-** Islandmore | Urban Background | 349847 | 375132 | $NO_2$ | N | N | N | >50m from busy road | N |
| **5-**Church Street | Roadside | 348123 | 374364 | $NO_2$ | N | N | Y (2.5m) | 1.5m | Y |
| **6-**Talbot Street | Roadside | 348994 | 374553 | $NO_2$ | N | N | Y (13.5m) | 1.5m | Y |
| **7-**Court Street (a) | Roadside | 348945 | 373928 | $NO_2$ | N | N | Y (42m) | 1.5m | N |

(a) Court Street site in 2009 remained close to the objective but as there was no relevant exposure at this site, the diffusion tube was relocated to the façade of the nearest relevant exposure ie. South Street.
(b) New monitoring site 67 South Street, Newtownards (commenced 1st April 2010)

## 2.2 Comparison of Monitoring Results with AQ Objectives

### 2.2.1 Nitrogen Dioxide

**Automatic Monitoring Data**

Ards Borough Council did not carry out any automatic monitoring of nitrogen dioxide in 2011

**Diffusion Tube Monitoring Data**

There are currently 6 diffusion tubes located throughout the town of Newtownards, all results from 2007-2011 are contained within appendix A. The Court Street site (a historical kerbside site and 42M from relevant exposure) and which was slightly above the objective in 2009 was relocate to the nearest relevant exposure at 67 South Street, Newtownards at the beginning of 2010
This new South Street site was also considered to be the best possible location to allow for monitoring of the change in traffic flow with the construction of the new A20 Newtownards Southern Relief Road which was completed in 2009, this involved the construction of a 2.0km new link road, from the A20 Blaire Main Road South to the A21 Comber to the Portaferry Road Newtownards

**Table 2.2 Results of Nitrogen Dioxide Diffusion Tubes in 2011**

| Site ID | Location | Site Type | Within AQMA? | Triplicate or Collocated Tube | Data Capture 2011 (Number of Months or %) | Data with less than 9 months has been annualised (Y/N) | Confirm if data has been distance corrected (Y/N) | Annual mean concentration (Bias Adjustment factor = 0.71) 2011 (μg/m$^3$) |
|---|---|---|---|---|---|---|---|---|
| 1 | East Street | Roadside | N | N | 11 | N/A | N | 16 |
| 2 | South Street | Roadside | N | N | 11 | N/A | N | 21 |
| 3 | Bangor Road | Roadside | N | N | 12 | N/A | N | 24 |
| 4 | Islandmore Avenue | Background | N | N | 12 | N/A | N | 10 |
| 5 | Church Street | Roadside | N | N | 10 | N/A | N | 23 |
| 6 | Talbot Street | Roadside | N | N | 12 | N/A | N | 17 |
| 7 | Court Street (removed 2010) | Roadside | N/A | N/A | N/A | N/A | N/A | N/A |

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%.)
[c] Means should be "annualised" as in Box 3.2 of TG(09), if monitoring was not carried out for the full year.
*Annual mean concentrations for previous years are optional.

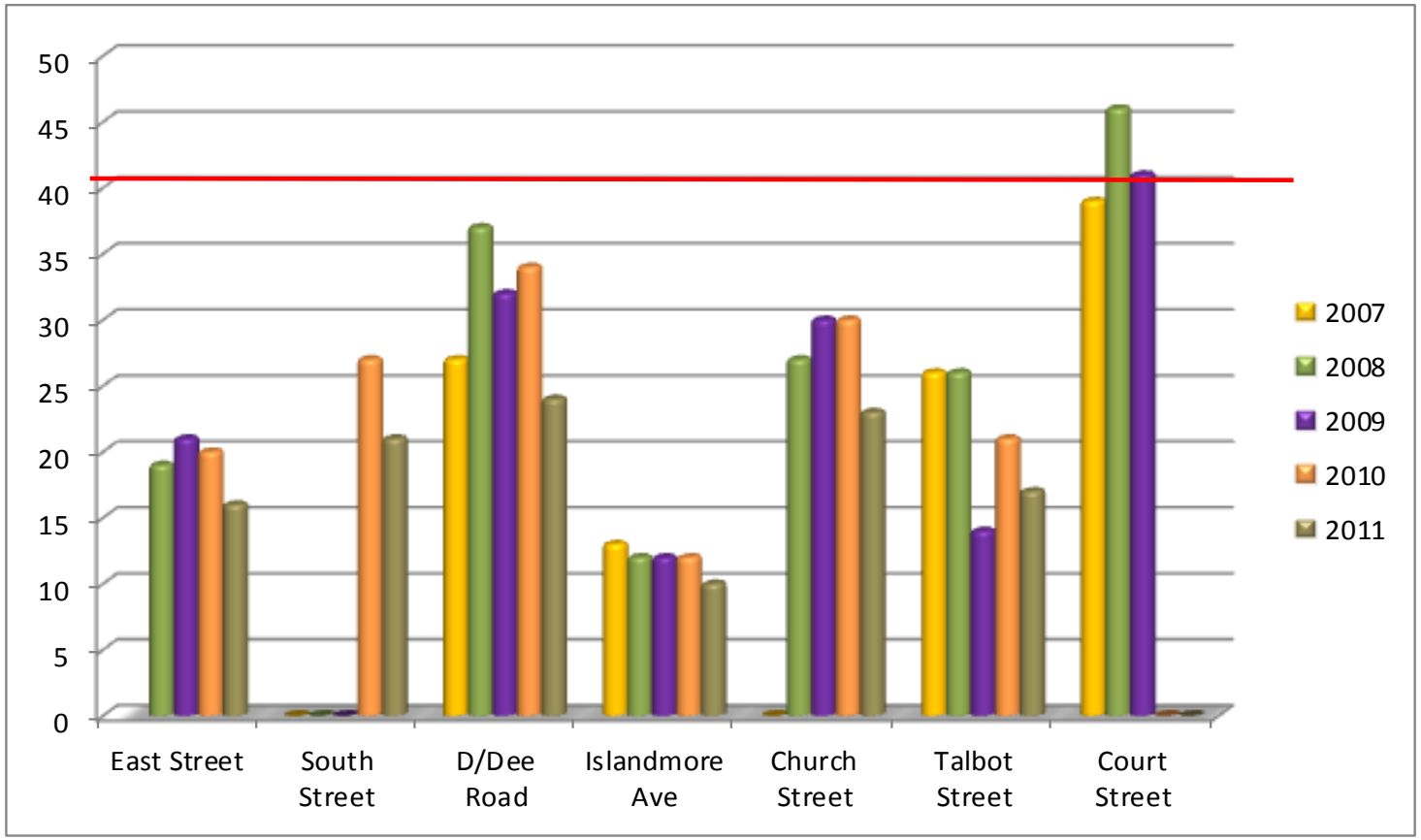
**Table 2.3 Results of Nitrogen Dioxide Diffusion Tubes (2007 to 2011)**

| Site ID | Site Type | Within AQMA? | Annual mean concentration (adjusted for bias) μg/m$^3$ | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2007* (Bias Adjustment Factor =0.917) | 2008* (Bias Adjustment Factor = 0.85) | 2009* (Bias Adjustment Factor = 0.81) | 2010* (Bias Adjustment Factor = 0.84) | 2011 (Bias Adjustment Factor = 0.71) |
| 1 | Roadside | N | N/A | 19 | 21 | 20 | 16 |
| 2 | Roadside | N | N/A | N/A | N/A | 27 | 21 |
| 3 | Roadside | N | 27 | 37 | 32 | 34 | 24 |
| 4 | Background | N | 13 | 12 | 12 | 12 | 10 |
| 5 | Roadside | N | N/A | 27 | 30 | 30 | 23 |
| 6 | Roadside | N | 26 | 26 | 14 | 21 | 17 |
| 7 | Roadside | N | 39 | 46 | 41 | N/A | N/A |

*Optional

**Figure 2.2 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring Sites**

The results for the past 5 years do not show any particular trends. Annual variation is more likely to be as a result of climatic conditions, rather than changes in emissions.



### 2.2.2 $PM_{10}$

There was no $PM_{10}$ monitoring carried out in 2011
Automatic monitoring of $PM_{10}$ ceased at the end of 2010. There had been no monitored exceedences since 2003 and therefore the automatic site was decommissioned at the end of 2010.
No new sites have been identified

### 2.2.3 Sulphur Dioxide

There was no $SO_2$ monitoring carried out in 2011
Automatic monitoring of $SO_2$ ceased at the end of 2009. There had been no monitored exceedences since 2003 and therefore the automatic site was decommissioned at the end of 2009.

No new sites have been identified

### 2.2.4 Benzene

There were no measurements of Benzene carried out in 2011 and no new sites identified

### 2.2.5 Other pollutants monitored

In 2011 Nitrogen Dioxide was the only pollutant monitored

### 2.2.6 Summary of Compliance with AQS Objectives

Ards Borough Council has examined the results from monitoring in the borough Concentrations are all below the objectives, therefore there is no need to proceed to a Detailed Assessment.

# 3 Road Traffic Sources

The following road has been constructed since the last review and assessment:

A20 Newtownards Southern Relief Road was completed early 2009, this involved the construction of a 2.0KM new link road, from the A20 Blaire Main Road South to the A21 Comber to the Portaferry Road in connection with the Castlebawn development.

An environmental impact assessment was carried out at the planning stage which adequately considered the effect on local air quality and showed no potential impact on the air quality objectives.

## 3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Ards Borough Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

## 3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

Ards Borough Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

## 3.3 Roads with a High Flow of Buses and/or HGVs.

Ards Borough Council confirms that there are no new/newly identified roads with high flows of buses/HDVs.

## 3.4 Junctions

Ards Borough Council confirms that there are no new/newly identified busy junctions/busy roads.

## 3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

Ards Borough Council confirms that there are no new/proposed roads.

## 3.6 Roads with Significantly Changed Traffic Flows

Ards Borough Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

## 3.7 Bus and Coach Stations

Ards Borough Council confirms that there are no relevant bus stations in the Local Authority area.

# 4 Other Transport Sources

## 4.1 Airports

Ards Borough Council confirms that there are no airports in the Local Authority area.

## 4.2 Railways (Diesel and Steam Trains)

### 4.2.1 Stationary Trains

Ards Borough Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

### 4.2.2 Moving Trains

Ards Borough Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

## 4.3 Ports (Shipping)

Ards Borough Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

# 5 Industrial Sources

## 5.1 Industrial Installations

### 5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

Ards Borough Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

### 5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

Ards Borough Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

### 5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

Ards Borough Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

## 5.2 Major Fuel (Petrol) Storage Depots

There are no major fuel (petrol) storage depots within the Local Authority area.

## 5.3 Petrol Stations

Ards Borough Council confirms that there are no petrol stations meeting the specified criteria**.**

## 5.4 Poultry Farms

Ards Borough Council confirms that there are no poultry farms meeting the specified criteria.

# 6 Commercial and Domestic Sources

## 6.1 Biomass Combustion – Individual Installations

Ards Borough Council confirms that there are no biomass combustion plant in the Local Authority area.

## 6.2 Biomass Combustion – Combined Impacts

Ards Borough Council confirms that there are no biomass combustion plant in the Local Authority area.

## 6.3 Domestic Solid-Fuel Burning

Newtownards is a densely populated area with a high concentration of domestic coal burning properties. During the previous rounds of review and assessment two domestic fuel use surveys were undertaken, this information was then used by BMT Cordah for advanced dispersion modelling. The modelling results showed a possibility of exceedences of the national air quality objective for $PM_{10}$. The NIHE has carried out a large fuel conversion programme within Newtownards, which has significantly reduced the number of coal burning properties in the town. The results from the automatic monitoring station located within identified areas of high domestic fuel use indicated from 2003 - 2010 that the national air quality objectives for both $PM_{10}$ and $SO_2$ had not been exceeded.
No new areas have been identified within the Borough.

Ards Borough Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

# 7 Fugitive or Uncontrolled Sources

Ards Borough Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

# 8 Conclusions and Proposed Actions

## 8.1 Conclusions from New Monitoring Data

The 2011 monitored data for $NO_2$ has been assessed and has indicated no exceedences of the national air quality objectives. It is therefore not necessary to proceed to a detailed assessment, however monitoring will continue at key locations to allow for comparison in future rounds of review and assessment.

## 8.2 Conclusions from Assessment of Sources

Ards Borough Council has found no new or significantly changed sources to have likely impacts on air quality.

## 8.3 Proposed Actions

This 2012 updating and screening Assessment for Ards Borough Council has identified there is no need to proceed to a detailed assessment for any of the pollutants.
Monitoring sites are sited in accordance with the guidance and at relevant exposure, no new sites have been identified.
Ards Borough Council intends to continue monitoring $NO_2$ in 2012 and submit a progress report in 2013.

# 9 References


- Part IV of the Environment Act 1995 Local Air Quality Management Technical Guidance LAQM.TG (09)
- The Northern Ireland Air Quality Website-www.airquality.ni.gov.uk
- Air Pollution NI- AEA/DOE pollution report
- Ards Borough Council Updating and Screening Assessment 2009

# Appendices

## Appendix A

$NO_2$ diffusion tube results, bias applied 0.71

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| East Street | | 19 | 21 | 20 | 16 |
| South Street | 0 | 0 | 0 | 27 | 21 |
| D/Dee Road | 27 | 37 | 32 | 34 | 24 |
| Islandmore Ave | 13 | 12 | 12 | 12 | 10 |
| Church Street | 0 | 27 | 30 | 30 | 23 |
| Talbot Street | 26 | 26 | 14 | 21 | 17 |
| Court Street | 39 | 46 | 41 | 0 | 0 |

## Appendix A: QA:QC Data

**Factor from Local Co-location Studies (if available)**

Ards Borough Council lies within the Eastern Group area. Ards Borough Council does not carry out automatic monitoring of $NO_2$ and therefore has no local bias adjustment factor.
However the other 4 councils within the Eastern Group all have carried out co-location studies.
The bias adjustment factor calculation of these is shown below.
The average of these four studies is **0.71.**
They were all calculated using the R&A support precision and accuracy spreadsheet.

http://laqm.defra.gov.uk/bias-adjustment-factors/co-location-data.html

and in accordance to current guidance summarized in the

Technical Guidance LAQM.TG(09).

These results has been included in the national bias adjustment factor database.

## Down District Council co-location study

### Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

| Diffusion Tubes Measurements | | | | | | | | | | Automatic Method | | Data Quality Check | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 µgm$^{-3}$ | Tube 2 µgm$^{-3}$ | Tube 3 µgm$^{-3}$ | Triplicate Mean | Standard Deviation | Coefficient of Variation (CV) | 95% CI of mean | Period Mean | Data Capture (% DC) | Tubes Precision Check | Automatic Monitor Data |
| 1 | 06/01/2011 | 03/02/2011 | 69 | 67 | 68 | 68 | 1.0 | 1 | 2.5 | 43 | 97 | Good | Good |
| 2 | 03/02/2011 | 28/02/2011 | 56 | 61 | 61 | 59 | 2.9 | 5 | 7.2 | 38 | 100 | Good | Good |
| 3 | 28/02/2011 | 28/03/2011 | 65 | 63 | 59 | 62 | 3.1 | 5 | 7.6 | 44 | 100 | Good | Good |
| 4 | 28/03/2011 | 06/05/2011 | 57 | 44 | 55 | 52 | 7.0 | 13 | 17.4 | 36 | 100 | Good | Good |
| 5 | 06/05/2011 | 01/06/2011 | 35 | 34 | 54 | 41 | 11.3 | 27 | 28.0 | 23 | 100 | Poor Precision | Good |
| 6 | 01/06/2011 | 30/06/2011 | 49 | 49 | 44 | 47 | 2.9 | 6 | 7.2 | 37 | 100 | Good | Good |
| 7 | 30/06/2011 | 04/08/2011 | 44 | 45 | | 45 | 0.7 | 2 | 6.4 | 35 | 96 | Good | Good |
| 8 | 04/08/2011 | 31/08/2011 | 45 | 43 | 43 | 44 | 1.2 | 3 | 2.9 | 34 | 93 | Good | Good |
| 9 | 31/08/2011 | 29/09/2011 | 45 | 44 | 45 | 45 | 0.6 | 1 | 1.4 | 33 | 93 | Good | Good |
| 10 | 29/09/2011 | 27/10/2011 | 47 | 47 | 48 | 47 | 0.6 | 1 | 1.4 | 37 | 98 | Good | Good |
| 11 | 27/10/2011 | 02/12/2011 | 54 | 52 | 56 | 54 | 2.0 | 4 | 5.0 | 40 | 99 | Good | Good |
| 12 | 02/12/2011 | 30/12/2011 | 44 | 39 | 43 | 42 | 2.6 | 6 | 6.6 | 36 | 99 | Good | Good |
| 13 | | | | | | | | | | | | | |
| | | | | | | | | | | | Overall survey --> | Good precision | Good Overall DC |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

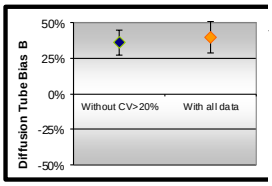
(Check average CV & DC from Accuracy calculations)

| Site Name/ ID: | |
|---|---|

Precision: 11 out of 12 periods have a CV smaller than 20%

| Accuracy (with 95% confidence interval) without periods with CV larger than 20% | |
|---|---|
| Bias calculated using 11 periods of data | |
| Bias factor A | 0.73 (0.69 - 0.78) |
| Bias B | 37% (28% - 45%) |
| Diffusion Tubes Mean: | 51 µgm$^{-3}$ |
| Mean CV (Precision): | 4 |
| Automatic Mean: | 38 µgm$^{-3}$ |
| Data Capture for periods used: | 98% |
| Adjusted Tubes Mean: | 38 (35 - 40) µgm$^{-3}$ |

| Accuracy (with 95% confidence interval) WITH ALL DATA | |
|---|---|
| Bias calculated using 12 periods of data | |
| Bias factor A | 0.72 (0.67 - 0.78) |
| Bias B | 39% (28% - 50%) |
| Diffusion Tubes Mean: | 51 µgm$^{-3}$ |
| Mean CV (Precision): | 6 |
| Automatic Mean: | 36 µgm$^{-3}$ |
| Data Capture for periods used: | 98% |
| Adjusted Tubes Mean: | 36 (34 - 39) µgm$^{-3}$ |




Jaume Targa, for AEA
Version 04 - February 2011

## Lisburn City Council co-location study

### Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

| Diffusion Tubes Measurements | | | | | | | | | | Automatic Method | | Data Quality Check | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 µgm$^{-3}$ | Tube 2 µgm$^{-3}$ | Tube 3 µgm$^{-3}$ | Triplicate Mean | Standard Deviation | Coefficient of Variation (CV) | 95% CI of mean | Period Mean | Data Capture (% DC) | Tubes Precision Check | Automatic Monitor Data |
| 1 | 07/01/2011 | 02/02/2011 | 55 | 52 | 52 | 53 | 1.7 | 3 | 4.3 | 52 | 100 | Good | Good |
| 2 | 02/02/2011 | 02/03/2011 | 31 | 33 | 38 | 34 | 3.6 | 11 | 9.0 | 23 | 100 | Good | Good |
| 3 | 02/03/2011 | 30/03/2011 | 37 | 27 | 37 | 34 | 5.8 | 17 | 14.3 | 24 | 100 | Good | Good |
| 4 | 30/03/2011 | 05/05/2011 | 23 | 25 | 22 | 23 | 1.5 | 7 | 3.8 | 10 | 100 | Good | Good |
| 5 | 05/05/2011 | 01/06/2011 | 25 | 23 | 25 | 24 | 1.2 | 5 | 2.9 | 13 | 99 | Good | Good |
| 6 | 01/06/2011 | 29/06/2011 | 24 | 27 | 27 | 26 | 1.7 | 7 | 4.3 | 15 | 100 | Good | Good |
| 7 | 29/06/2011 | 03/08/2011 | 22 | 19 | 21 | 21 | 1.5 | 7 | 3.8 | 13 | 99 | Good | Good |
| 8 | 03/08/2011 | 31/08/2011 | 26 | 25 | 24 | 25 | 1.0 | 4 | 2.5 | 16 | 97 | Good | Good |
| 9 | 31/08/2011 | 28/09/2011 | 26 | 22 | 26 | 25 | 2.3 | 9 | 5.7 | 14 | 100 | Good | Good |
| 10 | 28/09/2011 | 26/10/2011 | 33 | 32 | 29 | 31 | 2.1 | 7 | 5.2 | 19 | 100 | Good | Good |
| 11 | 26/10/2011 | 30/11/2011 | 29 | 35 | 30 | 31 | 3.2 | 10 | 8.0 | 24 | 100 | Good | Good |
| 12 | 30/11/2011 | 28/12/2011 | 34 | 33 | 37 | 35 | 2.1 | 6 | 5.2 | 19 | 100 | Good | Good |
| 13 | | | | | | | | | | | | | |
| | | | | | | | | | | | Overall survey --> | Good precision | Good Overall DC |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

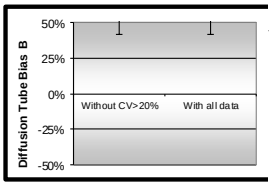
(Check average CV & DC from Accuracy calculations)

| Site Name/ ID: | |
|---|---|

Precision: 12 out of 12 periods have a CV smaller than 20%

| Accuracy (with 95% confidence interval) without periods with CV larger than 20% | |
|---|---|
| Bias calculated using 12 periods of data | |
| Bias factor A | 0.67 (0.59 - 0.78) |
| Bias B | 50% (29% - 70%) |
| Diffusion Tubes Mean: | 30 µgm$^{-3}$ |
| Mean CV (Precision): | 8 |
| Automatic Mean: | 20 µgm$^{-3}$ |
| Data Capture for periods used: | 100% |
| Adjusted Tubes Mean: | 20 (18 - 24) µgm$^{-3}$ |

| Accuracy (with 95% confidence interval) WITH ALL DATA | |
|---|---|
| Bias calculated using 12 periods of data | |
| Bias factor A | 0.67 (0.59 - 0.78) |
| Bias B | 50% (29% - 70%) |
| Diffusion Tubes Mean: | 30 µgm$^{-3}$ |
| Mean CV (Precision): | 8 |
| Automatic Mean: | 20 µgm$^{-3}$ |
| Data Capture for periods used: | 100% |
| Adjusted Tubes Mean: | 20 (18 - 24) µgm$^{-3}$ |




Jaume Targa, for AEA
Version 04 - February 2011

## North Down Borough Council co-location study

### Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

| Diffusion Tubes Measurements | | | | | | | | | | Automatic Method | | Data Quality Check | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 µgm$^{-3}$ | Tube 2 µgm$^{-3}$ | Tube 3 µgm$^{-3}$ | Triplicate Mean | Standard Deviation | Coefficient of Variation (CV) | 95% CI of mean | Period Mean | Data Capture (% DC) | Tubes Precision Check | Automatic Monitor Data |
| 1 | 07/01/2011 | 01/02/2011 | 81 | 58 | 73 | 71 | 11.7 | 17 | 29.0 | 52 | 78 | Good | Good |
| 2 | 01/02/2011 | 01/03/2011 | 56 | 55 | 51 | 54 | 2.6 | 5 | 6.6 | 31 | 91 | Good | Good |
| 3 | 01/03/2011 | 29/03/2011 | 60 | 58 | 55 | 58 | 2.5 | 4 | 6.3 | 32 | 97 | Good | Good |
| 4 | 29/03/2011 | 05/05/2011 | 32 | 35 | 41 | 36 | 4.6 | 13 | 11.4 | 19 | 65 | Good | or Data Captu |
| 5 | 05/05/2011 | 31/05/2011 | 29 | 28 | 30 | 29 | 1.0 | 3 | 2.5 | 13 | 98 | Good | Good |
| 6 | 31/05/2011 | 01/07/2011 | | 36 | 32 | 34 | 2.8 | 8 | 25.4 | 20 | 98 | Good | Good |
| 7 | 01/07/2011 | 02/08/2011 | 27 | 30 | 28 | 28 | 1.5 | 5 | 3.8 | 17 | 100 | Good | Good |
| 8 | 02/08/2011 | 30/08/2011 | 38 | 36 | 36 | 37 | 1.2 | 3 | 2.9 | 23 | 89 | Good | Good |
| 9 | 30/08/2011 | 27/09/2011 | 38 | 38 | 38 | 38 | 0.0 | 0 | 0.0 | 22 | 100 | Good | Good |
| 10 | 27/09/2011 | 25/10/2011 | 38 | 37 | 53 | 43 | 9.0 | 21 | 22.3 | 26 | 100 | Poor Precision | Good |
| 11 | 25/10/2011 | 01/12/2011 | 53 | 51 | 58 | 54 | 3.6 | 7 | 9.0 | 37 | 75 | Good | Good |
| 12 | 01/12/2011 | 28/12/2011 | 43 | 51 | 56 | 50 | 6.6 | 13 | 16.3 | 24 | 100 | Good | Good |
| 13 | | | | | | | | | | | | | |
| | | | | | | | | | | | Overall survey --> | Good precision | Good Overall DC |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

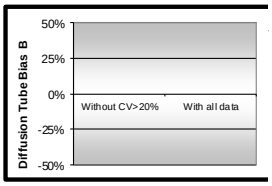
| Site Name/ ID: | |
|---|---|

| Precision | 11 out of 12 periods have a CV smaller than 20% |
|---|---|

(Check average CV & DC from Accuracy calculations)

| Accuracy (with 95% confidence interval) without periods with CV larger than 20% | |
|---|---|
| Bias calculated using 10 periods of data | |
| Bias factor A | 0.6 (0.54 - 0.67) |
| Bias B | 67% (48% - 86%) |
| Diffusion Tubes Mean: | 45 µgm$^{-3}$ |
| Mean CV (Precision): | 7 |
| Automatic Mean: | 27 µgm$^{-3}$ |
| Data Capture for periods used: | 93% |
| Adjusted Tubes Mean: | 27 (24 - 30) µgm$^{-3}$ |

| Accuracy (with 95% confidence interval) WITH ALL DATA | |
|---|---|
| Bias calculated using 11 periods of data | |
| Bias factor A | 0.6 (0.55 - 0.67) |
| Bias B | 67% (50% - 83%) |
| Diffusion Tubes Mean: | 45 µgm$^{-3}$ |
| Mean CV (Precision): | 8 |
| Automatic Mean: | 27 µgm$^{-3}$ |
| Data Capture for periods used: | 93% |
| Adjusted Tubes Mean: | 27 (25 - 30) µgm$^{-3}$ |




Jaume Targa, for AEA
Version 04 - February 2011

## Castlereagh Borough Council co-location study

### Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

| Diffusion Tubes Measurements | | | | | | | | | | Automatic Method | | Data Quality Check | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 µgm$^{-3}$ | Tube 2 µgm$^{-3}$ | Tube 3 µgm$^{-3}$ | Triplicate Mean | Standard Deviation | Coefficient of Variation (CV) | 95% CI of mean | Period Mean | Data Capture (% DC) | Tubes Precision Check | Automatic Monitor Data |
| 1 | 07/01/2011 | 02/02/2011 | 77 | 72 | 81 | 77 | 4.5 | 6 | 11.2 | 61 | 99 | Good | Good |
| 2 | 02/02/2011 | 03/03/2011 | 60 | 65 | 66 | 64 | 3.2 | 5 | 8.0 | 49 | 100 | Good | Good |
| 3 | 02/03/2011 | 31/03/2011 | 63 | 67 | 60 | 63 | 3.5 | 6 | 8.7 | 55 | 100 | Good | Good |
| 4 | 30/03/2011 | 05/05/2011 | 44 | 40 | 44 | 43 | 2.3 | 5 | 5.7 | 47 | 100 | Good | Good |
| 5 | 05/05/2011 | 02/06/2011 | 36 | 30 | 33 | 33 | 3.0 | 9 | 7.5 | 27 | 100 | Good | Good |
| 6 | 01/06/2011 | 01/07/2011 | 42 | 39 | 43 | 41 | 2.1 | 5 | 5.2 | 29 | 99 | Good | Good |
| 7 | 29/06/2011 | 05/08/2011 | 24 | 29 | 26 | 26 | 2.5 | 10 | 6.3 | 23 | 100 | Good | Good |
| 8 | 03/08/2011 | 31/08/2011 | 36 | 35 | 35 | 35 | 0.6 | 2 | 1.4 | 25 | 100 | Good | Good |
| 9 | 31/08/2011 | 26/09/2011 | 48 | 42 | 47 | 46 | 3.2 | 7 | 8.0 | 26 | 72 | Good | or Data Captu |
| 10 | 28/09/2011 | 24/10/2011 | 43 | 46 | 43 | 44 | 1.7 | 4 | 4.3 | 30 | 92 | Good | Good |
| 11 | 26/10/2011 | 02/12/2011 | 55 | 53 | 46 | 51 | 4.7 | 9 | 11.7 | 49 | 80 | Good | Good |
| 12 | 30/11/2011 | 29/12/2011 | 47 | 56 | 52 | 52 | 4.5 | 9 | 11.2 | 43 | 100 | Good | Good |
| 13 | | | | | | | | | | | | | |
| | | | | | | | | | | | Overall survey --> | Good precision | Good Overall DC |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

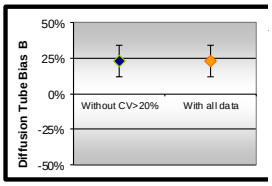
| Site Name/ ID: | |
|---|---|

| Precision | 12 out of 12 periods have a CV smaller than 20% |
|---|---|

(Check average CV & DC from Accuracy calculations)

| Accuracy (with 95% confidence interval) without periods with CV larger than 20% | |
|---|---|
| Bias calculated using 11 periods of data | |
| Bias factor A | 0.83 (0.76 - 0.91) |
| Bias B | 21% (9% - 32%) |
| Diffusion Tubes Mean: | 48 µgm$^{-3}$ |
| Mean CV (Precision): | 6 |
| Automatic Mean: | 40 µgm$^{-3}$ |
| Data Capture for periods used: | 97% |
| Adjusted Tubes Mean: | 40 (37 - 44) µgm$^{-3}$ |

| Accuracy (with 95% confidence interval) WITH ALL DATA | |
|---|---|
| Bias calculated using 11 periods of data | |
| Bias factor A | 0.83 (0.76 - 0.91) |
| Bias B | 21% (9% - 32%) |
| Diffusion Tubes Mean: | 48 µgm$^{-3}$ |
| Mean CV (Precision): | 6 |
| Automatic Mean: | 40 µgm$^{-3}$ |
| Data Capture for periods used: | 97% |
| Adjusted Tubes Mean: | 40 (37 - 44) µgm$^{-3}$ |




Jaume Targa, for AEA
Version 04 - February 2011

## Diffusion Tube Bias Adjustment Factors

The $NO_2$ tubes are supplied by ESG (Environmental Scientific Group) in Didcot Oxfordshire. Their preparation method is listed below.

### Nitrogen Dioxide Diffusion Tube Analysis Report

The samples have been analysed in accordance with ESG's standard operating procedure HS/WI/1015 issue 15. This method meets the guidelines set out in DEFRA's 'Diffusion Tubes for Ambient $NO_2$ Monitoring: Practical Guidance.'

The tubes were prepared by spiking acetone:triethanolamine (50:50) onto the grids prior to the tubes being assembled. The tubes were desorbed with distilled water and the extract analysed using a segmented flow autoanalyser with ultraviolet detection. In the WASP intercomparison scheme for comparing spiked Nitrogen Dioxide diffusion tubes, Scientifics is currently ranked as a Category Good laboratory.
This result can be found on the LAQM Support Web site
http://laqm.defra.gov.uk/diffusion-tubes/precision.html

The National Bias adjustment factor for ESG is **0.84** found on the LAQM Support Website

http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

**Spreadsheet Version Number: 03/12**

**National Diffusion Tube Bias Adjustment Factor Spreadsheet** — Spreadsheet Version Number: 03/12

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of September 2012

LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

**Step 1:** Select the Laboratory that Analyses Your Tubes from the Drop-Down List. If a laboratory is not shown, we have no data for this laboratory.

**Step 2:** Select a Preparation Method from the Drop-Down List. If a preparation method is not shown, we have no data for this method at this laboratory.

**Step 3:** Select a Year from the Drop-Down List. If a year is not shown, we have no data[2]

**Step 4:** Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

| Analysed By[1] | Method (To undo your selection, choose (All) from the pop-up list) | Year[2] (To undo your selection, choose (All)) | Site Type | Local Authority | Length of Study (months) | Diffusion Tube Mean Conc. (Dm) (µg/m³) | Automatic Monitor Mean Conc. (Cm) (µg/m³) | Bias (B) | Tube Precision[5] | Bias Adjustment Factor (A) (Cm/Dm) |
|---|---|---|---|---|---|---|---|---|---|---|
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | Dover District Council | 12 | 42 | 37 | 14.0% | G | **0.88** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | UB | Medway Council | 12 | 22 | 26 | -15.6% | G | **1.19** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | North East Lincolnshire Council | 10 | 52 | 48 | 8.9% | G | **0.92** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | North East Lincolnshire Council | 9 | 38 | 35 | 7.5% | G | **0.93** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | North East Lincolnshire Council | 12 | 41 | 31 | 32.8% | G | **0.75** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | UB | North East Lincolnshire Council | 12 | 22 | 21 | 7.5% | P | **0.93** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | B | Medway Council | 9 | 32 | 20 | 55.3% | G | **0.64** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | Wrexham County Borough Council | 12 | 22 | 19 | 11.8% | G | **0.89** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | Medway Council | 9 | 36 | 30 | 19.0% | G | **0.84** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | K | Marylebone Road Intercomparison | 11 | 121 | 99 | 21.5% | G | **0.82** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | Castlereagh Borough Council | 11 | 48 | 40 | 20.9% | G | **0.83** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | Down District Council | 12 | 51 | 36 | 39.0% | G | **0.72** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | Lisburn City Council | 12 | 30 | 20 | 49.6% | G | **0.67** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | North Down Borough Council | 11 | 45 | 27 | 66.7% | G | **0.60** |
| Environmental Scientific Groups | 50% TEA in Acetone | 2011 | K | Suffolk Coastal District Council | 12 | 51 | 43 | 18.7% | G | **0.84** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | Dumfries and Galloway Council | 12 | 38 | 32 | 20.0% | G | **0.83** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | Rugby Borough Council | 10 | 34 | 34 | -0.3% | G | **1.00** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | Wycombe District Council | 10 | 43 | 39 | 11.5% | G | **0.90** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | Tunbridge Wells Borough Council | 12 | 59 | 43 | 38.5% | P | **0.72** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | LB Newham | 12 | 40 | 47 | -14.3% | G | **1.17** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | UB | Canterbury City Council | 11 | 17 | 15 | 17.8% | G | **0.85** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | R | Canterbury City Council | 12 | 39 | 34 | 15.5% | G | **0.87** |
| Environmental Scientific Groups | 50% TEA in acetone | 2011 | | **Overall Factor[3] (22 studies)** | | | | | **Use** | **0.84** |

## Discussion of Choice of Factor to Use

There is no Automatic $NO_2$ site within the Ards area, so therefore no local bias adjustment factor for the diffusion tubes available

The national bias adjustment factor for Environmental Scientific Group.is **0.84**

However there are 4 co-location studies carried out within the local Eastern Group area all analysed by Environmental Scientific Group, the average of these is **0.71**. As Ards Borough Council has confidence in the QA/QC of the four local studies (all using ratified data),also all the sites are situated in similar locations in major provincial towns and climatic conditions, a decision was made to use the average of these 4 local studies rather than the national study.
The local factor is lower than the national, below shows the results from both studies. Using the national higher figure would not have changed the results dramatically.

| | bias applied 0.71 | bias applied 0.84 |
|---|---|---|
| | 2011 | 2011 |
| East Street | 16 | 19 |
| South Street | 21 | 25 |
| D/Dee Road | 24 | 29 |
| Islandmore Ave | 10 | 11 |
| Church Street | 23 | 28 |
| Talbot Street | 17 | 20 |
| Court Street | 0 | 0 |