ARDS BOROUGH COUNCIL

2013 Air Quality Progress Report for Ards Borough Council

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

May 2013

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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 2013 Progress 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.

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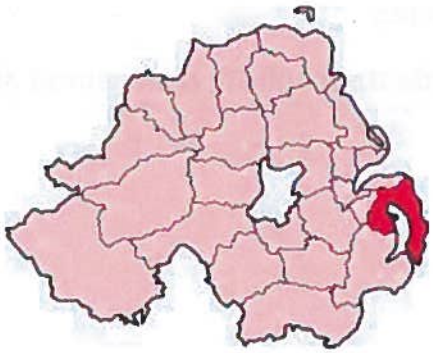
1 Introduction

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 Progress Report

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

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 $\mu g/m^3$ (milligrams 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 Local Air Quality Management in Northern Ireland.

Pollutant	Concentration	Measured as	Date to be achieved by
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 (PM10) (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 and an Updating and Screening Assessment in 2012 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

In 2012 Ards Borough Council did not carry out any automatic monitoring

2.1.2 Non-Automatic Monitoring

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 **0.75**..
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

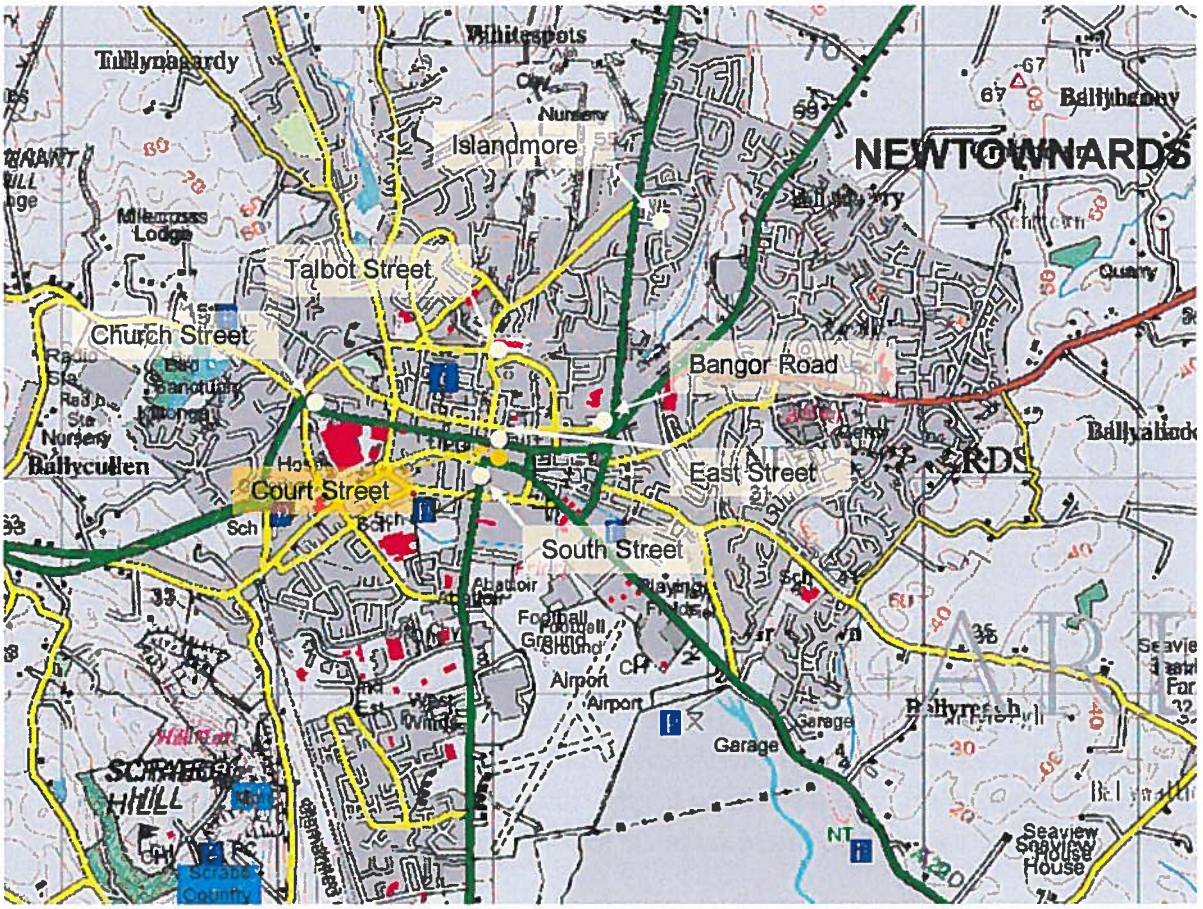


Table 2.1 Details of Non- Automatic Monitoring Sites

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 Air Quality Objectives

2.2.1 Nitrogen Dioxide

Automatic Monitoring results
Ards Borough Council did not carry out any automatic monitoring of nitrogen dioxide in 2012

Diffusion Tube Monitoring Data

There are currently 6 diffusion tubes located throughout the town of Newtownards, all results from 2008-2012 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. Ards Borough Council does not carry out a co-location study but the four neighbouring councils all carried out NO2 co-location studies in 2012, the average of these was 0.75 which has been applied to the diffusion tube results.
The reason for using this factor can also be found in appendix A

Table 2.2 Results of Nitrogen Dioxide Diffusion Tubes

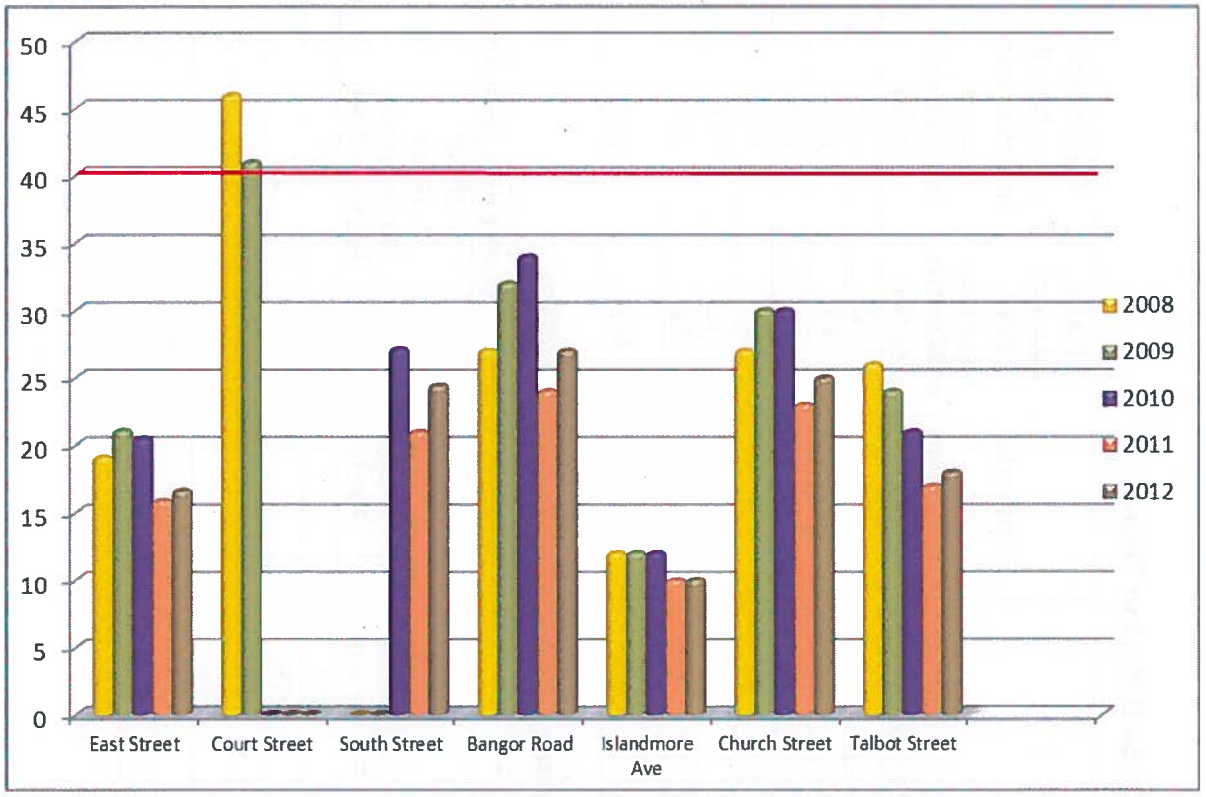
Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2012 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.75) 2012 (μg/m^3)
1	East Street	Roadside	N	N	12	N/A	N	17
2	South Street	Roadside	N	N	12	N/A	N	24
3	Bangor Road	Roadside	N	N	12	N/A	N	27
4	Islandmore Avenue	Background	N	N	11	N/A	N	10
5	Church Street	Roadside	N	N	12	N/A	N	25
6	Talbot Street	Roadside	N	N	12	N/A	N	18
7	Court Street (removed 2010)	Roadside	N/A	N/A	N/A	N/A	N/A	N/A

Table 2.3 Results of Nitrogen Dioxide Diffusion Tubes (2008 to 2012)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2008* (Bias Adjustment Factor = 0.85)	2009* (Bias Adjustment Factor = 0.81)	2010* (Bias Adjustment Factor = 0.84)	2011 (Bias Adjustment Factor = 0.71)	2012 (Bias Adjustment Factor = 0.75)
1	Roadside	N	19	21	20	16	17
2	Roadside	N	N/A	N/A	27	21	24
3	Roadside	N	37	32	34	24	27
4	Background	N	12	12	12	10	10
5	Roadside	N	27	30	30	23	25
6	Roadside	N	26	14	21	17	18
7	Roadside	N	46	41	N/A	N/A	N/A

Figure 2.2 Trends in Annual Mean Nitrogen Dioxide Concentration 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 PM10 monitoring carried out in 2011
Automatic monitoring of PM10 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 2012 and no new sites identified.

2.2.5 Other pollutants monitored

In 2012 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 Council area. Concentrations are all below the objectives; therefore there is no need to proceed to a Detailed Assessment.

3 New Local Developments

Ards Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

Ards Borough Council confirms that all the following have been considered:

- Road traffic sources
- Other transport sources
- Industrial sources
- Commercial and domestic sources
- New developments with fugitive or uncontrolled sources.

4 Planning Applications

Ards Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

5 Conclusions and Proposed Actions

5.1 Conclusions from New Monitoring Data

No monitoring sites within the Council Area have showed exceedences of the air quality objectives.

5.2 Conclusions relating to New Local Developments

N/A

5.3 Proposed Actions

This 2013 progress report 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 2013 and submit a progress report in 2014.

6 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: QA/QC Data

QA/QC of Diffusion Tube Monitoring
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

Diffusion Tube Bias Adjustment Factors

Ards Borough Council lies within the Eastern Group area. There are five neighbouring councils within the group. Ards Borough Council does not carry out automatic monitoring of NO_2 but the remaining four have carried out co-location studies.
The bias adjustment factor calculation of these is shown below.
The average of these four studies is **0.75.**
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 have been submitted for inclusion in the national bias adjustment factor database.

Lisburn City Council 2012

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	28/12/2011	01/02/2012	32.0	33.0	34.0	33	1.0	3	2.5	27	100	Good	Good
2	01/02/2012	29/02/2012	40.0	38.0	35.0	38	2.5	7	6.3	30	100	Good	Good
3	29/02/2012	28/03/2012	34.0	35.0	27.0	32	4.4	14	10.8	28	100	Good	Good
4	28/03/2012	25/04/2012	22.0	26.0	23.0	24	2.1	9	5.2	28	100	Good	Good
5	25/04/2012	28/05/2012	20.0	20.0	19.0	20	0.6	3	1.4	22	100	Good	Good
6	28/05/2012	27/06/2012	23.0	25.0	28.0	25	2.5	10	6.3	20	100	Good	Good
7	27/06/2012	01/08/2012	10.0	24.0	21.0	18	7.4	40	18.3	18	100	Poor Precision	Good
8	01/08/2012	29/08/2012	21.0	23.0	20.0	21	1.5	7	3.8	17	100	Good	Good
9	28/11/2012	02/01/2013	42.0	40.0	40.0	41	1.2	3	2.9	32	100	Good	Good
10													
11													
12													
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

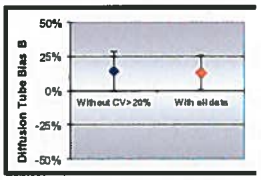
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision: 8 out of 9 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 8 periods of data	
Bias factor A	0.87 (0.78 - 1)
Bias B	14% (0% - 29%)
Diffusion Tubes Mean:	29 µgm^{-3}
Mean CV (Precision)	7
Automatic Mean:	26 µgm^{-3}
Data Capture for periods used	100%
Adjusted Tubes Mean:	25 (23 - 29) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 9 periods of data	
Bias factor A	0.88 (0.79 - 0.99)
Bias B	13% (1% - 26%)
Diffusion Tubes Mean:	28 µgm^{-3}
Mean CV (Precision)	11 caution
Automatic Mean:	25 µgm^{-3}
Data Capture for periods used	100%
Adjusted Tubes Mean:	25 (22 - 28) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Down District Council 2012

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	30/12/2011	02/02/2012	45.0	44.0	58.0	49	7.8	16	19.4	37	100	Good	Good
2	01/03/2012	01/03/2012	52.0	51.0	44.0	49	4.4	9	10.8	35	100	Good	Good
3	29/03/2012	29/03/2012	60.0	60.0	59.0	60	0.6	1	1.4	41	100	Good	Good
4	29/03/2012	26/04/2012	49.0	48.0	49.0	49	0.6	1	1.4	41	100	Good	Good
5	26/04/2012	29/05/2012	55.0	54.0	55.0	55	0.6	1	1.4	49	70	Good	or Data Capture
6	29/05/2012	26/06/2012	54.0	47.0	49.0	50	3.6	7	9.0	42	100	Good	Good
7	02/08/2012	02/08/2012	35.0	54.0	43.0	44	9.5	22	23.7	28	100	Poor Precision	Good
8	02/08/2012	31/08/2012	46.0	47.0	45.0	46	1.0	2	2.5	33	100	Good	Good
9	31/08/2012	27/09/2012	40.0	40.0	41.0	40	0.6	1	1.4	31	100	Good	Good
10	27/09/2012	01/11/2012	51.0	50.0	47.0	49	2.1	4	5.2	43	100	Good	Good
11	01/11/2012	30/11/2012	57.0	59.0	59.0	58	1.2	2	2.9	43	100	Good	Good
12	30/11/2012	04/01/2013	58.0	47.0	57.0	54	6.1	11	15.1	41	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

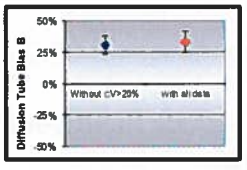
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision: 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 10 periods of data	
Bias factor A	0.77 (0.73 - 0.81)
Bias B	30% (23% - 38%)
Diffusion Tubes Mean:	50 µgm^{-3}
Mean CV (Precision)	6
Automatic Mean:	39 µgm^{-3}
Data Capture for periods used	100%
Adjusted Tubes Mean:	39 (37 - 41) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 11 periods of data	
Bias factor A	0.76 (0.71 - 0.81)
Bias B	32% (24% - 41%)
Diffusion Tubes Mean:	50 µgm^{-3}
Mean CV (Precision)	7
Automatic Mean:	38 µgm^{-3}
Data Capture for periods used	100%
Adjusted Tubes Mean:	38 (35 - 40) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Castlereagh Borough Council 2012

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	29/12/2011	02/02/2012	55.0	49.0	61.0	55	6.0	11	14.9	35	99	Good	Good
2	02/02/2012	01/03/2012	63.0	60.0	64.0	62	2.1	3	5.2	34	99	Good	Good
3	01/03/2012	29/03/2012	56.0	60.0	56.0	57	2.3	4	5.7	39	99	Good	Good
4	29/03/2012	23/04/2012	45.0	48.0	46.0	46	1.5	3	3.8	28	99	Good	Good
5	23/04/2012	28/05/2012	43.0	50.0	42.0	45	4.4	10	10.8	30	99	Good	Good
6	28/05/2012	02/07/2012	41.0	39.0	43.0	41	2.0	5	5.0	23	99	Good	Good
7	02/07/2012	30/07/2012	30.0	32.0	34.0	32	2.0	6	5.0	15	99	Good	Good
8	30/07/2012	31/08/2012	32.0	30.0	31.0	31	1.0	3	2.5	18	99	Good	Good
9	31/08/2012	24/09/2013	39.0	38.0	43.0	40	2.6	7	6.6	23	99	Good	Good
10	24/09/202	29/10/2012	47.0	48.0	43.0	46	2.6	6	6.6	30	99	Good	Good
11	29/10/2012	26/11/2012	59.0	59.0	59.0	59	0.0	0	0.0	36	99	Good	Good
12	26/11/2012	03/01/2013	57.0	61.0	61.0	60	2.3	4	5.7	44	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

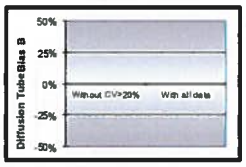
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision: 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	0.62 (0.57 - 0.67)
Bias B	62% (49% - 75%)
Diffusion Tubes Mean:	48 µgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	30 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	30 (27 - 32) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.62 (0.57 - 0.67)
Bias B	62% (49% - 75%)
Diffusion Tubes Mean:	48 µgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	30 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	30 (27 - 32) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

North Down Borough Council 2012

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	28/12/2011	31/01/2012	54.0	52.0	55.0	54	1.5	3	3.8	33	99	Good	Good
2	31/01/2012	28/02/2012	59.0	58.0	43.0	53	9.0	17	22.3	35	99	Good	Good
3	28/02/2012	27/03/2012	56.0	44.0	59.0	53	7.9	15	19.7	36	99	Good	Good
4	27/03/2012	25/04/2012	35.0	37.0	32.0	35	2.5	7	6.3	25	99	Good	Good
5	25/04/2012	28/05/2012	37.0	39.0	36.0	37	1.5	4	3.8	30	99	Good	Good
6	28/05/2012	26/06/2012	38.0	35.0	36.0	36	1.5	4	3.8	29	99	Good	Good
7	26/06/2012	31/07/2012	38.0	35.0	36.0	36	1.5	4	3.8	25	99	Good	Good
8	31/07/2012	28/08/2012	31.0	33.0	33.0	32	1.2	4	2.9	22	99	Good	Good
9	28/08/2012	25/09/2012	35.0	34.0	31.0	33	2.1	6	5.2	24	99	Good	Good
10	25/09/2012	30/10/2012	48.0	47.0	49.0	48	1.0	2	2.5	42	99	Good	Good
11	30/10/2012	27/11/2012	59.0	63.0	64.0	62	2.6	4	6.6	45	99	Good	Good
12	27/11/2012	03/01/2013	56.0	61.0	61.0	59	2.9	5	7.2	49	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

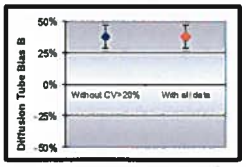
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision: 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	0.73 (0.69 - 0.78)
Bias B	37% (27% - 46%)
Diffusion Tubes Mean:	45 µgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	33 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	33 (31 - 35) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.73 (0.69 - 0.78)
Bias B	37% (27% - 46%)
Diffusion Tubes Mean:	45 µgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	33 µgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	33 (31 - 35) µgm^{-3}



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Discussion of Choice of Factor to Use

The national bias adjustment factor for Environmental Scientific Group.is **0.79**

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 **0.75**.

As Ards Borough Council has confidence in the QA/QC of all the four local studies (all using ratified data),also all the sites are situated in similar location 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 which has only 5 results included one of which was poor.
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 0.75	bias applied 0.84
	2012	2012
East Street	17	17
South Street	24	26
Bangor Road	27	28
Islandmore Ave	10	11
Church Street	25	27
Talbot Street	18	19
Court Street	0	0