Annual Progress Report (APR)

2016 Air Quality Annual Progress Report (APR) for
West Lothian Council
In fulfilment of Part IV of the
Environment Act 1995

Local Air Quality Management

June 2016

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Executive Summary: Air Quality in Our Area

Air Quality in West Lothian

West Lothian Council regularly reviews and assesses air quality throughout the district to determine whether or not the air quality objectives are likely to be achieved. Air pollutants such as Nitrogen Dioxide (NO_2) and fine particulates (PM_{10}), which are mainly associated with vehicle emissions, are measured using a network of 3 continuous air quality monitoring stations located in Linlithgow, Broxburn, and Newton. There are also 20 NO_2 passive diffusion tubes located throughout West Lothian.

Linlithgow pollutant levels for PM_{10} in 2015 were lower than 2014 and below the PM_{10} Air Quality Objective. Measured NO_2 levels in Linlithgow were slightly higher in 2015 than in 2014 but still below the Air Quality Objective.

An Air Quality Management Area (AQMA) in Linlithgow was subsequently declared in April 2016 due to modelled exceedances of both NO_2 and PM_{10} at relevant receptors. The boundaries mirror those in the West Lothian Local Development Plan Proposed Plan. This includes Linlithgow, Linlithgowbridge and land allocated for development.

The 2015 Newton PM_{10} pollutant levels were lower than 2014 bringing the pollutant levels below the air quality objective. Measured NO_2 levels are still below the air quality objective level in Newton as in previous years. The main source of PM_{10} is domestic fuel combustion. An AQMA in Newton will be declared in due course due to modelled exceedances of PM_{10} at relevant receptors. This is based on 2014 monitoring data of PM_{10}.

Monitoring data from the station located in Broxburn, within the declared Broxburn AQMA, did not exceed the annual Air Quality Objective for NO_2 or PM_{10}. Furthermore, measured 2015 pollutant levels were lower than 2014 pollutant levels. However, the AQMA will remain due to the planned extensive residential development which is part of the Core Development Area (CDA) in Broxburn and Winchburgh.

Local Priorities and Challenges

- Finalise and publish the Broxburn Air Quality Action Plan (AQAP)
- Create a draft AQAP for Linlithgow and carry out further assessments of air quality
- Declare an AQMA in Newton and create a draft Newton AQAP
- Carry out $PM_{2.5}$ monitoring at one of the automatic monitoring sites

How to Get Involved

If you would like to find out more about air quality in West Lothian please visit our Air Quality website http://www.westlothian.gov.uk/article/2216/Air-Pollution

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1. Local Air Quality Management

This report provides an overview of air quality in West Lothian during 2015. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) 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 an exceedance is considered likely the local authority must 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. This Annual Progress Report (APR) summarises the work being undertaken by West Lothian Council to improve air quality and any progress that has been made.

Table 1.1 – Summary of Air Quality Objectives in Scotland

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Nitrogen dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 µg/m^3	Annual mean	31.12.2010
Particulate Matter ($PM_{2.5}$)	10 µg/m^3	Annual mean	31.12.2020
Sulphur dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	3.25 µg/m^3	Running annual mean	31.12.2010
1,3 Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mg/m^3	Running 8-Hour mean	31.12.2003

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Lead	0.25 µg/m^3	Annual Mean	31.12.2008

2. Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12 months, setting out measures it intends to put in place in pursuit of the objectives.

A summary of AQMAs declared by West Lothian Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at http://www.westlothian.gov.uk/article/2216/Air-Pollution

A consultation on the declaration of an AQMA in Newton ended on 20 June 2016. An AQMA will be declared in July 2016.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
AQMA CM1	NO_2 and PM_{10} annual mean	Linlithgow	Encompasses the whole of Linlithgow and Linlithgow Bridge including potential new development sites.	AQAP planned for 2016/17
AQMA CM2	NO_2 and PM_{10} annual mean	Broxburn	An area encompassing a number of properties adjacent to Greendykes Junction and along the East/West of the Main Street.	Draft Air Quality Action Plan http://www.westlothian.gov.uk/media/11766/Broxburn-Draft-Air-Quality-Action-Plan/pdf/Air_Quality_Action_Plan_Broxburn1.pdf

2.2 Progress and Impact of Measures to address Air Quality in West Lothian

West Lothian Council has taken forward one measure during the current reporting year of 2016 in pursuit of improving local air quality. Details of all measures completed and in progress are set out in Table 2.2. More detail on these measures can be found in the AQAP relating to the Broxburn AQMA.

Progress on the following measures was slower than expected due to staff leaving the service which delayed the process of completing the AQAP for Broxburn.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Electric Vehicle charging points	Promoting low emission transport	Building a network for low emission vehicles	Environmental Health	June 2016	March 2017	Electric Vehicle charging points ordered	Reduction in Air Pollution	Funding received from Scottish Government	March 2017	Fulfills action measure 15 of draft Broxburn AQAP
2	Improving links with Local Planning and Development framework	Policy guidance and development control	Air Quality Planning Guidance	Environmental Health	January 2016	November 2016	Copy of Draft Air Quality PG developed and received	Reduction in Air Pollution	Funding received and agreement in place with external consultant	December 2016	Fulfills action plan measure 2 of draft Broxburn AQAP

3. Air Quality Monitoring Data and Comparison with Air Quality Objectives

3.1 Summary of Monitoring Undertaken

Measured pollutant levels from all 3 automatic monitoring sites in West Lothian has generally been lower in 2015 than 2014. However, due to anticipated developments and pollutant levels still relatively close to the air quality objective levels there will be no amendments to the AQMAs or proposed AQMA.

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how local concentrations of the main air pollutants compare with the objectives.

West Lothian Council undertook automatic (continuous) monitoring at three sites during 2015. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at Air Quality in Scotland - latest data, forecasts and air quality information

Maps showing the location of the monitoring sites are provided in Appendix C. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

West Lothian Council undertook non- automatic (passive) monitoring of NO_2 with 20 at 20 NO_2 diffusion tubes at various sites during 2015. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix C. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

3.2 Individual pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for annualisation and bias. Further details on adjustments are provided in Appendix C. Trend data from previous years can be found in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

The Air Quality monitoring data for 2015 has shown that there have been no exceedances of the annual or 1 hour air quality objectives at any monitoring sites for

NO_2. However, dispersion modelling carried out in 2015/16 as part of a detailed assessment for Linlithgow has indicated that NO_2 concentrations in excess of the 40 µg/m-3 annual mean objective occurred at one receptor in Linlithgow where the predicted NO_2 annual mean concentration is 40.6 µg/m-3. This triggered the declaration of an AQMA in Linlithgow for NO_2.

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m-3.

With regard to diffusion tubes, the full 2015 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. There were no exceedences of this air quality objective.

3.2.2 Particulate Matter (PM_{10})

The Air Quality monitoring data for 2015 has shown that there have been no exceedances of the PM_{10} annual air quality objective at any of the monitoring sites. However, monitoring has shown that there have been two exceedances of the 24 hour air quality objective at each of the Linlithgow and Broxburn monitoring stations.

Dispersion modelling for PM_{10} carried out in Linlithgow in 2015/16 has shown Annual mean PM_{10} concentrations in excess of the 18 µg/m-3 air quality objective occurred at 10 residential receptors in Linlithgow.

Dispersion modelling for PM_{10} carried out in Newton in 2016 (based on 2014 data) has shown there are exceedances of the PM_{10} annual mean air quality objective in most of Newton.

Table A.5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 18µg/m^3.

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the 24 hour mean air quality objective of 50µg/m^3, not to be exceeded more than 7 times per year.

3.2.3 Particulate Matter ($PM_{2.5}$)

West Lothian Council currently do not monitor $PM_{2.5}$, however, funding has been granted for one new $PM_{2.5}$ monitoring instrument which will be purchased in due course.

3.2.4 Sulphur Dioxide (SO_2)

West Lothian Council does not monitor SO2.

3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene

West Lothian Council does not monitor Carbon Monoxide, Lead, and 1,3-Butadiene

4. New Local Developments

4.1 Road Traffic Sources

There are no new road traffic sources at present.

4.2 Other Transport Sources

There are no new other traffic sources at present.

4.3 Industrial Sources

A planning application has been received requesting comments on an Environmental Impact Assessment (EIA) for the enlargement of a large poultry farm in Broxburn

4.4 Commercial and Domestic Sources

Planning Applications were submitted and granted for commercial biomass boilers at the properties below;

- West Lothian Civic Centre", Howden South Road, Howden, Livingston, West Lothian
- Strathbrock Partnership, 189a West Main Street, Broxburn, West Lothian
- St Kentigern's RC Academy, 60 West Main Street, Blackburn, Bathgate, West Lothian
- Westfield Primary School, Lomond View, Westfield, Bathgate, West Lothian
- James Young High School, "(A)", Quentin Rise, Dedridge, Livingston, West Lothian
- Inveralmond Community High School,50 Willowbank, Ladywell, Livingston

Screening assessments took place for each planning application and after agreement on flue height and type of biomass boiler to be installed, consent was given with conditions attached. A number of domestic stove planning applications have been submitted in 2015 and are generally approved subject to conditions on flue height.

4.5 New Developments with Fugitive or Uncontrolled Sources

There are no new developments with fugitive or uncontrolled sources at present.

5. Planning Applications

West Lothian has been subject to a number of planning applications which may affect air quality. These are listed below;

- 0489/FUL/15 - 220 East Main Street, Broxburn, West Lothian – 190 Houses – Granted subject to conditions.
- 0558/P/09 - Greendykes Road, Broxburn, West Lothian – 350 Houses – Still to be determined
- 0080/P/16 - East Main Street, Broxburn, West Lothian - Retail Units & Public House/Restaurant etc – Still to be Determined
- 0020/P/16 - Standhill North/South, West Main Street, Armadale, West Lothian - 19 ha residential development – Still to be determined

6. Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

Linlithgow

The measured annual mean NO_2 concentration within the Linlithgow AQMA in 2015 is below the annual mean objective level. Measured concentrations at NO_2 diffusion tube locations within the AQMA were below the NO_2 annual mean objective level after bias adjustment and distance correction. The measured annual mean PM_{10} concentration within the Linlithgow AQMA in 2015 is below the annual mean objective level.

Broxburn

The measured annual mean NO_2 concentration within the Broxburn AQMA in 2015 is below the annual mean objective level. Measured concentrations at NO_2 diffusion tube locations within the AQMA were below the NO_2 annual mean objective level after bias adjustment and distance correction. The measured annual mean PM_{10} concentration within the Broxburn AQMA in 2015 is below the annual mean objective level.

Although Broxburn NO_2 and PM_{10} concentrations are below the objective levels the AQMA will remain for NO_2 and PM_{10} due to the planned residential and commercial developments in and around the AQMA.

Newton

The measured annual mean NO_2 concentration within Newton in 2015 is below the annual mean objective level. Measured concentrations at NO_2 diffusion tube locations within Newton were below the NO_2 annual mean objective level after bias adjustment and distance correction. The measured annual mean PM_{10} concentration within Newton in 2015 is below the annual mean objective level.

Other Monitoring Data

NO_2

There were no measured exceedances of the annual mean NO_2 objective at any diffusion tube monitoring sites in West Lothian. Measured NO_2 annual mean 2015 levels generally stayed at the same level as in 2014 with a slight drop in levels at the Broxburn air monitoring station. There were no measured exceedances of the 1-hour objective for NO2 at any automatic site.

PM_{10}

Measured PM_{10} annual mean 2015 levels were generally lower across all monitoring sites than in 2014. There were two exceedances of the 24 hour objective for PM10 at the Linlithgow automatic site. There were two exceedances of the 24 hour objective for PM_{10} at the Broxburn automatic site.

6.2 Conclusions relating to New Local Developments

Two significant new residential local developments adjacent to the Broxburn AQMA were assessed in terms of air quality. The first development was 190 residential units at 220 East Main Street, Broxburn, West Lothian. An AQIA was provided and reviewed. The dispersion modelling was re-modelled and the final conclusions were;

1. For NO_2 the maximum impact of the development traffic predicted at the receptors modelled (West Main Street receptors) is classified as ‘Slight’ and the

maximum predicted annual mean concentration is 36.6 µg/m-3 which is 91% of the 40 µg/m-3 objective.

2. For PM_{10} the impact of the proposed development traffic predicted at all of the receptors modelled is less than 0.5% of the 18 µg/m-3 Scottish PM_{10} annual mean objective – the impact is therefore classified as 'Negligible' at all receptors. The maximum predicted PM_{10} annual mean concentration with the development in 2018 is 17.9 µg/m-3, 99.6% of the 18 µg/m-3 objective.

3. Although the impact of the proposed development is classified as either 'slight' or 'negligible' on NO2 and PM10 concentrations respectively, it will increase road traffic emissions and may contribute to the cumulative impact of developments on air quality in Broxburn.

Funding towards measures in the draft Broxburn AQAP was provided by the developer for the 'slight' impact of the development on NO_2 concentrations in the Broxburn AQMA.

The second development is still currently being processed through the planning system. The application is for 350 residential units at Greendykes Road, Broxburn, West Lothian. An AQIA has been provided. The model inputs have been reviewed and remodelling has been undertaken taking into account the cumulative effect of this development and the 190 residential unit development on East Main Street, Broxburn. The conclusions are as follows;

1. For NO_2 the maximum impact of the development traffic in the assumed year of completion of the development 2017; the predicated impact at the receptors (Greendykes Road receptors) modelled is classified as 'slight' and the maximum predicted annual mean concentration is 36ug/m-3 which is 90%of the 40ug/m-3 objective.
2. For PM_{10} the maximum impact of the proposed development traffic predicted at the receptors modelled for a future year of 2017 is an increase of 2% of the 18 µg/m-3 Scottish PM_{10} annual mean objective. The impact is classified as 'Moderate' at the worst case receptors both of which are within the Broxburn

AQMA. The maximum predicted PM10 annual mean concentration with the development in 2017 is 18.9 µg/m-3 which is 105% of the 18 µg/m-3 objective.

3. For $PM_{2.5}$ the maximum impact of the proposed development traffic predicted at the receptors modelled for a future year of 2017 is an increase of 2% of the 12 µg/m-3 Scottish PM_{10} annual mean objective (this was the correct PM2.5 objective at the time of submission of the air quality impact assessment but has recently changed to 10µg/m-3). Based on comparison with the 12 µg/m-3 objective, the impact is classified as 'Slight' at the worst case receptors. The maximum predicted $PM_{2.5}$ annual mean concentration with the development in 2018 is 10 µg/m-3, which is 83% of the 12 µg/m-3 objective, and 100% of the new 10 µg/m-3 objective.
4. Hence, the air quality impact of the proposed development is classified as 'Moderate' for PM_{10} and 'Slight' for NO_2 and $PM_{2.5}$. The additional traffic will increase road traffic emissions and contribute to the cumulative impact of ongoing development on air quality in Broxburn. The modelling also indicates that there is a risk that the Scottish PM_{10} annual mean objective will be exceeded at residential properties within the existing Broxburn AQMA, the locations where 'moderate' impacts are forecast to occur.

6.3 Proposed Actions

The monitoring data captured during 2015 has not identified any new exceedances of the objectives for any pollutants measured or identified the need for additional monitoring.

The Broxburn AQMA has been in place for 5 years and over that time the measured levels of PM_{10} and NO_2 have dropped below the objectives levels. However, new developments in this area, modelled through the planning system, may raise the current levels above the annual mean objective level for PM_{10}. The modelling has also indicated that the NO_2 annual mean would increase to a predicted 36ug.m-3. Therefore the AQMA will remain in place. An AQAP for Broxburn has been drafted and was subject to public consultation. This consultation has now ended and finalised version will be available in 2016.

The Linlithgow AQMA came into effect in April 2016. This was based on a detailed assessment of air quality undertaken in 2015 taking into account monitoring data in 2014. The next stage will be to carry out an assessment to provide the technical

justification for any proposed measures to include in an Air Quality Action Plan (AQAP). This further assessment will run in parallel with the development of the action plan for Linlithgow. The action plan will focus on effective, feasible, and proportionate measures to reduce air pollution in Linlithgow.

An AQMA for Newton will be declared for PM_{10} in 2016 following a public consultation ending in June 2016. This is based on a detailed assessment of air quality undertaken in 2015 taking into account monitoring data from 2014. After the AQMA is declared the next stage will be to carry out an assessment to provide the technical justification for any proposed measures to include in an AQAP. This further assessment will run in parallel with the development of an action plan for Newton. The action plan will focus on effective, feasible, and proportionate measures to reduce air pollution in Newton.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	Linlithgow High St 2	Roadside	300426	677172	NO_2; PM_{10}	Y	NOX analyser FDMS	4	1.3	2.4
CM2	Broxburn CMC	Roadside	308314	672231	NO_2; PM_{10}	Y	NOX analyser FDMS	3.5	2	2.3
CM3	Newton CMC	Roadside	309258	677728	NO2; PM_{10}	N	NOX analyser FDMS	2	2.4	2.4

(1) 0 if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
DT1	Newton	Roadside	309223	677711	NO_2	N	3	2	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
DT2	Broxburn WMS	Roadside	308165	672222	NO_2	Y	Facade	3	N
DT3	Broxburn EMS	Roadside	308426	672233	NO_2	Y	1.5	4	N
DT4	Broxburn CNC	Roadside	308314	672231	NO_2	Y	3	2	Y
DT5	Broxburn EMS	Roadside	308426	672233	NO_2	Y	1.5	4	N
DT6	Dedridge Cedric Rise	Urban Background	306403	666341	NO2	N	4	3	N
DT7	West Calder	Roadside	301758	663158	NO2	N	2	2	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
DT8	Whitburn Cross	Roadside	294687	665030	NO2	N	Facade	3	N
DT9	Armadale Cross	Roadside	293842	668588	NO2	N	2	2	N
DT10	Bathgate S Bridge	Roadside	297401	668772	NO2	N	Facade	3	N
DT11	Bathgate Steelyard	Roadside	297467	668734	NO2	N	12	4	N
DT12	Bathgate King St	Roadside	297570	668586	NO2	N	5	4	N
DT13	Bathgate High St	Urban Background	297656	669298	NO2	N	3	10	N
DT14	Linlithgow High St	Roadside	300426	677172	NO2	N	4	1.3	Y

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?
DT15	Linlithgow H St NW	Roadside	299930	677070	NO2	N	Facade	1.4	N
DT16	Linlithgow H St SW	Roadside	299911	677052	NO2	N	2	2.9	N
DT17	Linlithgow H St NE	Roadside	300479	677148	NO2	N	3.4	2	N
DT18	Linlithgow High St SE	Roadside	300485	677125	NO2	N	7.5	2.2	N
DT19	Linlithgow High St N	Roadside	300398	677132	NO2	N	Facade	2.4	N
DT20	Linlithgow H St S	Roadside	300405	677118	NO2	N	Facade	3	N

(1) 0 if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2011	2012	2013	2014	2015
CM1	Roadside	Automatic	n/a	93	n/a	n/a	44.5(36) (3)	32.4	33
CM2	Roadside	Automatic	n/a	99	43	45	39	28	27
CM3	Roadside	Automatic	n/a	98	n/a	32	24	21	21

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedence of the NO_2 1-hour mean objective are shown in **bold and underlined.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG(16) if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2011	2012	2013	2014	2015
CM1	Roadside	Automatic	n/a	93	0	0	0	0	0
CM2	Roadside	Automatic	n/a	99	0	0	0	0	0
CM3	Roadside	Automatic	n/a	98	n/a	0	0	0	0

Notes: Exceedences of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 90%, the 99.8th percentile of 1-hour means is provided in brackets.

Table A.5 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
				2011	2012	2013	2014	2015
CM1	Roadside	n/a	91	13	12	13.9	18	15
CM2	Roadside	n/a	87	18	16	16	17	15
CM3	Roadside	n/a	88	n/a	14.7	19	22	16

Notes: Exceedences of the PM_{10} annual mean objective of 18µg/m^3 are shown in **bold.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) All means have been "annualised" as per LAQM.TG(16), valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2011	2012	2013	2014	2015
CM1	Roadside	n/a	91	n/a	n/a	0	1	2
CM2	Roadside	n/a	87	3	2	0	2	2
CM3	Roadside	n/a	88	n/a	0	4	1	0

Notes: Exceedences of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 7 times/year) are shown in **bold.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 90%, the 90.4th percentile of 24-hour means is provided in brackets.

Table A.7 – Annual Mean $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2011	2012	2013	2014	2015
CM1	Roadside			n/a	n/a	n/a	n/a	n/a
CM2	Roadside			n/a	n/a	n/a	n/a	n/a
CM3	Roadside			n/a	n/a	n/a	n/a	n/a

Notes: Exceedences of the PM_{10} annual mean objective of 10µg/m^3 are shown in **bold.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) All means have been "annualised" as per LAQM.TG(16), valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO_2 Monthly Diffusion Tube Results for 2015

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
DT1	33.8	32.8	30.7	23	18.3	25.8	23	22.9	32.9	39.8	2.0	53.1	**28.5**	23.1
DT2	32.5	26.4	32.8	34	27.4	26.8	22.5	27.0	31.5	40.6	32.6	31	**30.5**	24.7
DT3	39.5	24.5	33.5	27.5	25.9	25.3	21.7	No result	32.3	37.8	34.7	22.5	**29.3**	23.7
DT4	40.6	36.8	40.5	38.9	33.1	29.8	27.9	34.4	35.2	48.4	41.0	34.1	**36.7**	29.7
DT5	27.8	25.5	32.2	28.4	28.3	20.7	23.7	23.7	27.9	40.5	31.4	24.8	**28.0**	22.7
DT6	20.4	15.1	16.0	14.2	10.6	9.2	9.6	10.8	15.5	24	19.4	15	**15.2**	12.3
DT7	28	24.7	28.5	25.9	24	21.9	21.6	23.3	28.4	37.2	29.4	22.2	**26.4**	21.4
DT8	36.4	32	30.2	30.1	23.9	26.6	22	25.4	31.7	35.2	30.5	25.4	**29.1**	23.6
DT9	35.1	37.6	31	27.8	27.1	28.8	23.2	No result	31.5	37	34	31.5	**31.1**	25.2
DT10	29.5	21.3	23	21.6	14.8	15.2	13.2	17.5	20.5	30	23.5	19.8	**21**	17
DT11	35.5	38.3	33.5	34.2	30	26.9	22	26.1	32.2	43.5	37.8	33.6	**32.8**	26.6
DT12	37.3	31.7	31.5	31.9	25.2	24.8	24.7	30.4	33	44.2	33.9	32.7	**31.2**	25.3
DT13	15.7	14.9	12.9	11.2	8.2	7.8	5.6	9.0	10.8	17.4	15.8	14.9	**12.1**	9.8

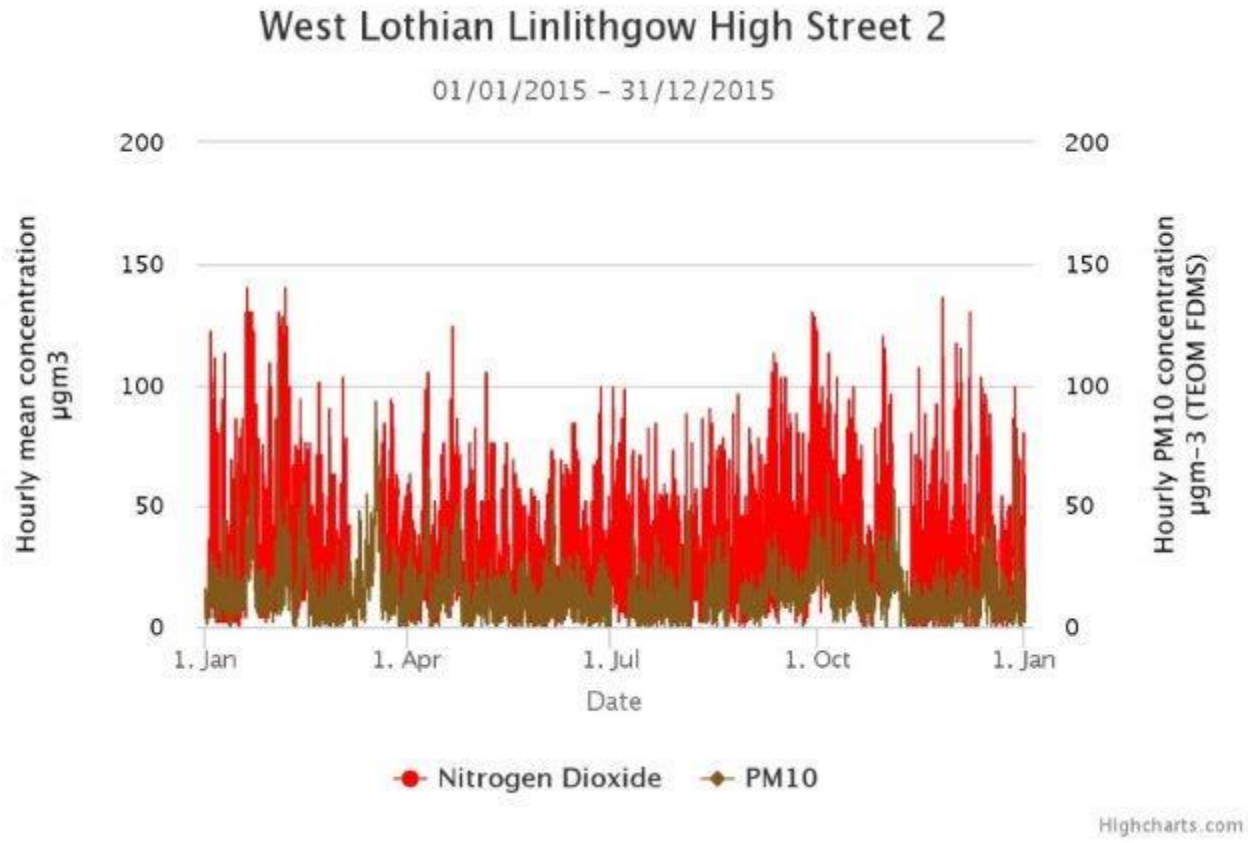
Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
DT14	47.1	38.6	39.8	36.3	32.8	35.6	31.2	33.8	39.0	48.2	44.9	37.9	**38.8**	31.4
DT15	33.5	31.3	34.8	33.7	19.3	26.8	28.1	No result	32.2	42.6	36.7	25.9	**32.6**	26.4
DT16	43.9	47.2	43.6	38.5	36.5	34	31.7	35.4	37.9	47.9	48	38.9	**40.3**	32.6
DT17	36.7	36.2	34.7	31.9	27.1	27.4	21.4	No result	30.5	33.5	35.5	25.9	**31**	25.1
DT18	43.3	42	38.3	31.3	30.3	33.7	31.8	No result	38	45.7	46.1	39	**38.1**	30.9
DT19	38.4	35.2	36.6	35.9	31.1	28.9	27.4	29.5	35	42.5	38.6	29.2	**34.2**	27.7
DT20	44.7	44.5	36.8	37.9	34.4	35.5	31	35.6	38.1	48.4	46.6	37.5	**39.4**	31.9

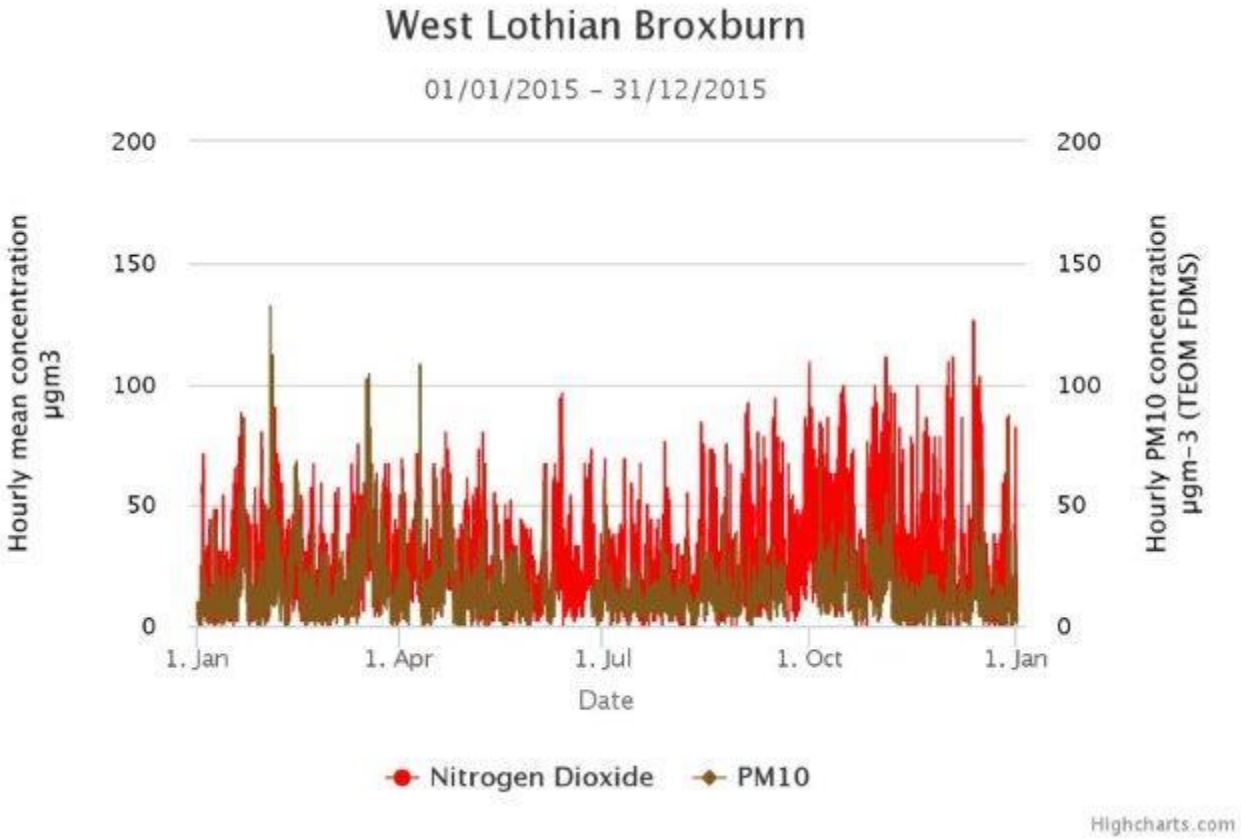
(1) See Appendix C for details on bias adjustment

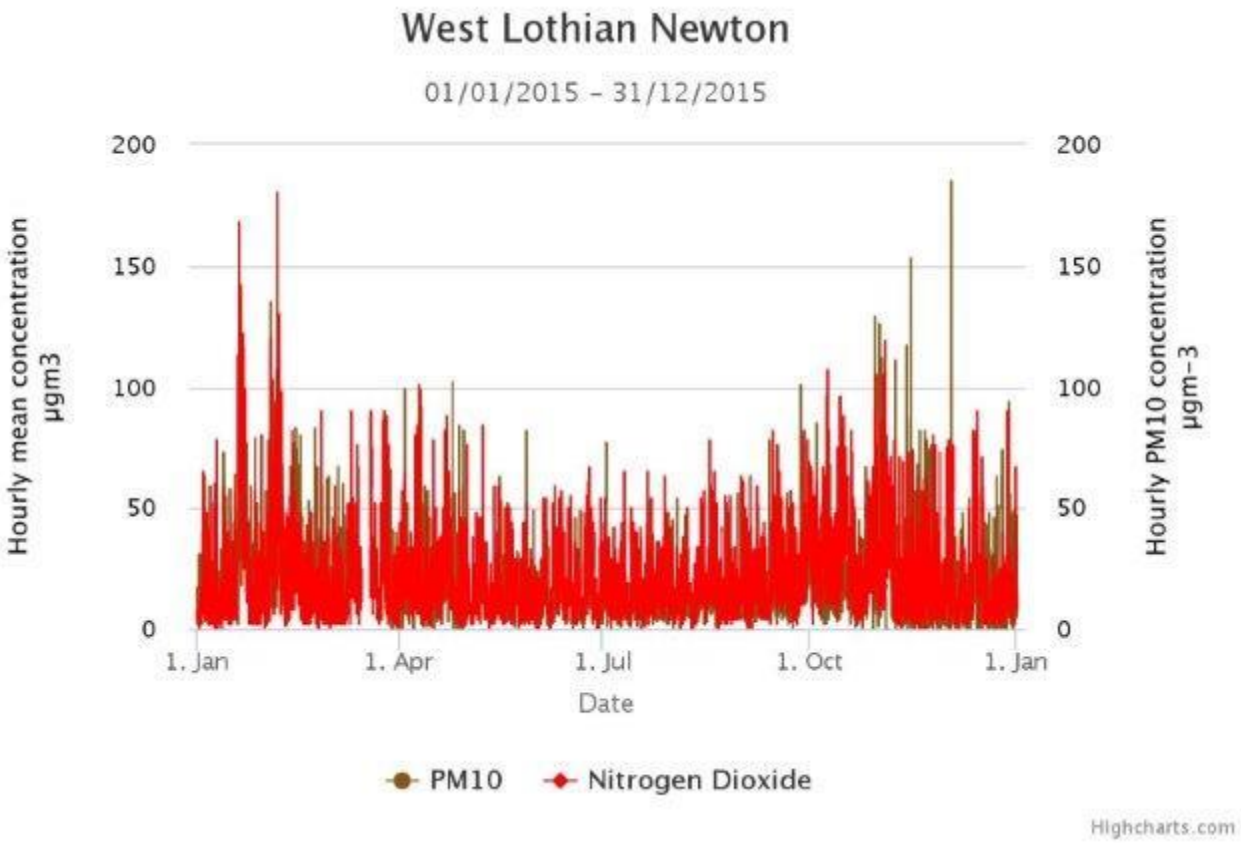
Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC / Maps / Trend Graphs

Detailed dispersion modelling for Linlithgow can be found in the following link http://www.westlothian.gov.uk/media/10903/2016-Linlithgow-Air-Quality-Detailed-Assessment-for-PM10-and-NO2/pdf/Linlithgow_Detailed_Assessment_Final_to_client_090316.pdf

Detailed dispersion modelling for Newton can be found in the following link http://www.westlothian.gov.uk/media/12008/2016-Newton-Detailed-Assessment-of-Air-Quality/pdf/2016_02_26_Newton_Detailed_Assessment_of_Air_Quality.pdf




West Lothian Broxburn
01/01/2015 - 31/12/2015
Hourly mean concentration µgm3
Hourly PM10 concentration µgm-3 (TEOM FDMS)
200
150
100
50
0
1. Jan
1. Apr
1. Jul
1. Oct
1. Jan
Date
Nitrogen Dioxide
PM10
Highcharts.com


West Lothian Newton
01/01/2015 - 31/12/2015
Hourly mean concentration µgm3
Hourly PM10 concentration µgm-3
200
150
100
50
0
1. Jan
1. Apr
1. Jul
1. Oct
1. Jan
Date
PM10
Nitrogen Dioxide
Highcharts.com

Annual AQ Results produced by Ricardo AEA

Produced by Ricardo Energy and Environment on behalf of the Scottish Government

WEST LOTHIAN LINLITHGOW HIGH ST 2
01 January to 31 December 2015

These data have been fully ratified by Ricardo Energy and Environment

POLLUTANT	PM_{10}*+	NO_2	NO_X
Maximum hourly mean	116 µg m^{-3}	140 µg m^{-3}	819 µg m^{-3}
Maximum daily mean	66 µg m^{-3}	83 µg m^{-3}	404 µg m^{-3}
Average	15 µg m^{-3}	33 µg m^{-3}	86 µg m^{-3}
Data capture	90.6 %	92.9 %	92.9 %

+ PM_{10} instruments:
FDMS using a gravimetric factor of 1 from 1 January 2015
All gaseous pollutant mass units are at 20'C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure.
NO_X mass units are NO_X as NO_2 µg m^{-3}

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	2	2
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 18 µg m^{-3}	0	-
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	0	0

Produced by Ricardo Energy and Environment on behalf of the Scottish Government

WEST LOTHIAN BROXBURN
01 January to 31 December 2015

These data have been fully ratified by Ricardo Energy and Environment

POLLUTANT	PM_{10}*+	NO_2	NO_X
Maximum hourly mean	132 µg m^{-3}	126 µg m^{-3}	629 µg m^{-3}
Maximum daily mean	70 µg m^{-3}	67 µg m^{-3}	338 µg m^{-3}
Average	15 µg m^{-3}	27 µg m^{-3}	79 µg m^{-3}
Data capture	86.8 %	99.4 %	99.4 %

+ PM_{10} instruments:
FDMS using a gravimetric factor of 1 from 1 January 2015
All gaseous pollutant mass units are at 20'C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure.
NO_X mass units are NO_X as NO_2 µg m^{-3}

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	2	2
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 18 µg m^{-3}	0	-
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	0	0

Produced by Ricardo Energy and Environment on behalf of the Scottish Government

WEST LOTHIAN NEWTON
01 January to 31 December 2015

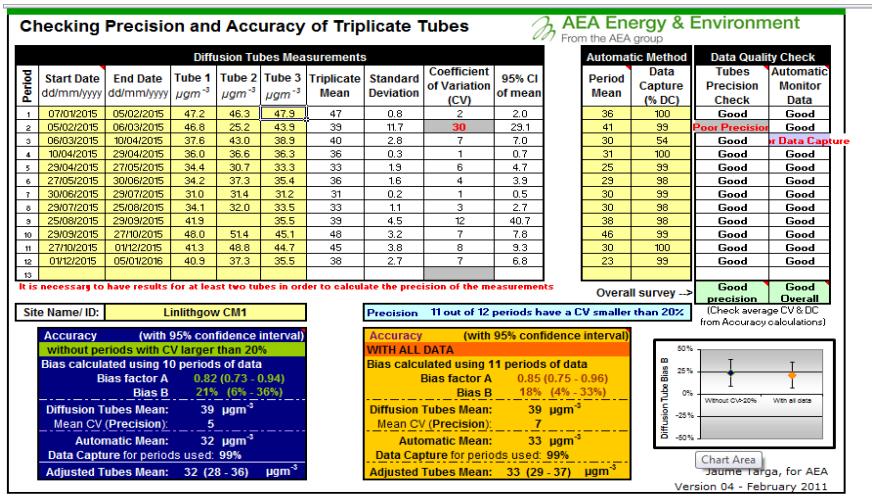
These data have been fully ratified by Ricardo Energy and Environment

POLLUTANT	PM_{10}*+	NO_2	NO_X
Maximum hourly mean	185 µg m^{-3}	180 µg m^{-3}	469 µg m^{-3}
Maximum daily mean	48 µg m^{-3}	72 µg m^{-3}	179 µg m^{-3}
98.08th Percentile of daily mean	41 µg m^{-3}	-	-
Average	16 µg m^{-3}	21 µg m^{-3}	42 µg m^{-3}
Data capture	87.7 %	98.0 %	98.0 %

+ PM_{10} instruments:
FDMS using a gravimetric factor of 1 from 1 January 2015
All gaseous pollutant mass units are at 20'C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure.
NO_X mass units are NO_X as NO_2 µg m^{-3}

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	0	0
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 18 µg m^{-3}	0	-
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	0	0

Bias adjustment factors – Linlithgow & Broxburn



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

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
1	07/01/2015	05/02/2015	47.2	46.3	47.9	47	0.8	2	2.0
2	05/02/2015	06/03/2015	46.8	25.2	43.9	39	11.7	30	29.1
3	06/03/2015	10/04/2015	37.6	43.0	38.9	40	2.8	7	7.0
4	10/04/2015	29/04/2015	36.0	36.6	36.3	36	0.3	1	0.7
5	29/04/2015	27/05/2015	34.4	30.7	33.3	33	1.9	6	4.7
6	27/05/2015	30/06/2015	34.2	37.3	35.4	36	1.6	4	3.9
7	30/06/2015	29/07/2015	31.0	31.4	31.2	31	0.2	1	0.5
8	29/07/2015	25/08/2015	34.1	32.0	33.5	33	1.1	3	2.7
9	25/08/2015	29/09/2015	41.9		35.5	39	4.5	12	40.7
10	29/09/2015	27/10/2015	48.0	51.4	45.1	48	3.2	7	7.8
11	27/10/2015	01/12/2015	41.3	48.8	44.7	45	3.8	8	9.3
12	01/12/2015	05/01/2016	40.9	37.3	35.5	38	2.7	7	6.8
13									

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

Automatic Method	
Period Mean	Data Capture (% DC)
36	100
41	99
30	54
31	100
25	99
29	98
30	99
30	98
38	98
46	99
30	100
23	99

Overall survey -->

Data Quality Check	
Tubes Precision Check	Automatic Monitor Data
Good	Good
Poor Precision	Good
Good	Poor Data Capture
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good precision	Good Overall

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Linlithgow CM1

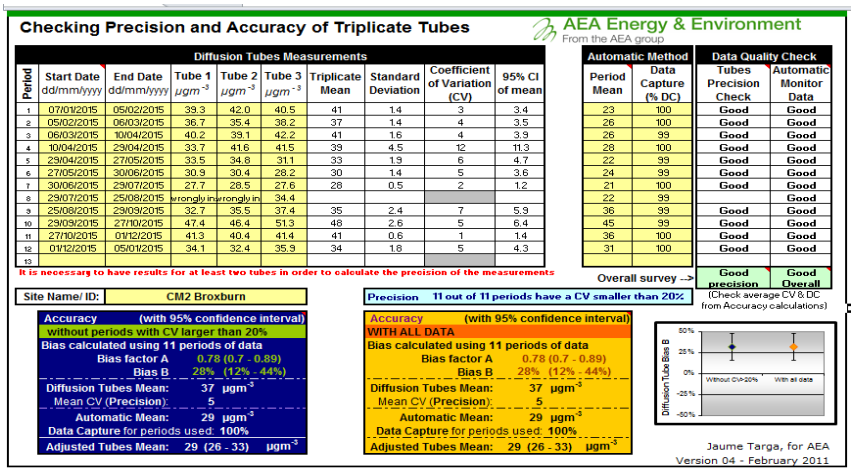
Precision: 11 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 10 periods of data
Bias factor A 0.82 (0.73 - 0.94)
Bias B 21% (6% - 36%)
Diffusion Tubes Mean: 39 µgm^{-3}
Mean CV (Precision): 5
Automatic Mean: 32 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 32 (28 - 36) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 11 periods of data
Bias factor A 0.85 (0.75 - 0.96)
Bias B 18% (4% - 33%)
Diffusion Tubes Mean: 39 µgm^{-3}
Mean CV (Precision): 7
Automatic Mean: 33 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 33 (29 - 37) µgm^{-3}

Chart Area

Jaume Targa, for AEA
Version 04 - February 2011



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

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
1	07/01/2015	05/02/2015	39.3	42.0	40.5	41	1.4	3	3.4
2	05/02/2015	06/03/2015	36.7	35.4	38.2	37	1.4	4	3.5
3	06/03/2015	10/04/2015	40.2	39.1	42.2	41	1.6	4	3.9
4	10/04/2015	29/04/2015	33.7	41.6	41.5	39	4.5	12	11.3
5	29/04/2015	27/05/2015	33.5	34.8	31.1	33	1.9	6	4.7
6	27/05/2015	30/06/2015	30.9	30.4	28.2	30	1.4	5	3.6
7	30/06/2015	29/07/2015	27.7	28.5	27.6	28	0.5	2	1.2
8	29/07/2015	25/08/2015	Wrongly in	Wrongly in	34.4				
9	25/08/2015	29/09/2015	32.7	35.5	37.4	35	2.4	7	5.9
10	29/09/2015	27/10/2015	47.4	46.4	51.3	48	2.6	5	6.4
11	27/10/2015	01/12/2015	41.3	40.4	41.4	41	0.6	1	1.4
12	01/12/2015	05/01/2015	34.1	32.4	35.9	34	1.8	5	4.3
13									

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

Automatic Method	
Period Mean	Data Capture (% DC)
23	100
26	100
26	99
28	100
22	99
24	99
21	100
22	99
36	99
45	99
36	100
31	100

Overall survey -->

Data Quality Check	
Tubes Precision Check	Automatic Monitor Data
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good precision	Good Overall

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: CM2 Broxburn

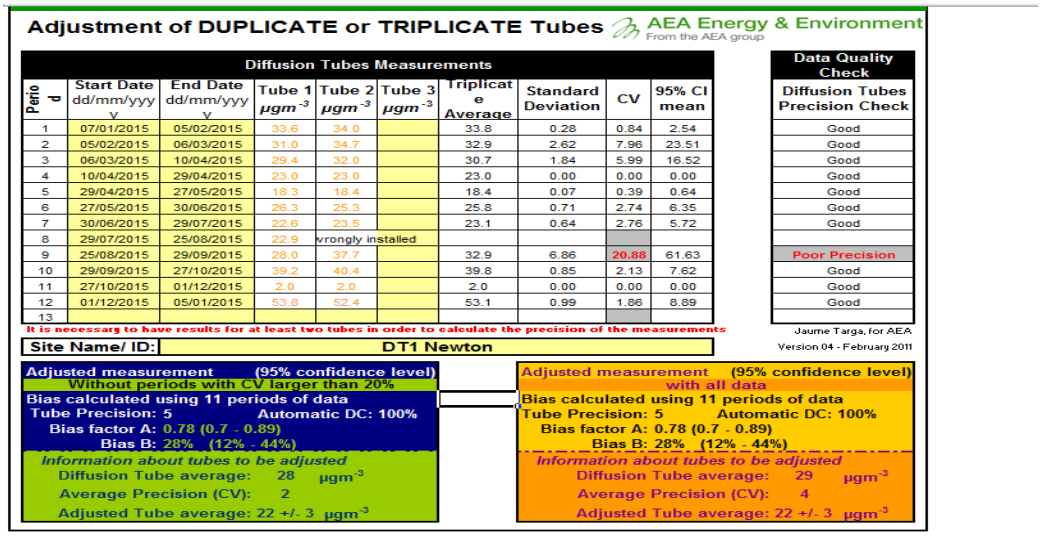
Precision: 11 out of 11 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 11 periods of data
Bias factor A 0.78 (0.7 - 0.89)
Bias B 28% (12% - 44%)
Diffusion Tubes Mean: 37 µgm^{-3}
Mean CV (Precision): 5
Automatic Mean: 29 µgm^{-3}
Data Capture for periods used: 100%
Adjusted Tubes Mean: 29 (26 - 33) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 11 periods of data
Bias factor A 0.78 (0.7 - 0.89)
Bias B 28% (12% - 44%)
Diffusion Tubes Mean: 37 µgm^{-3}
Mean CV (Precision): 5
Automatic Mean: 29 µgm^{-3}
Data Capture for periods used: 100%
Adjusted Tubes Mean: 29 (26 - 33) µgm^{-3}

Jaume Targa, for AEA
Version 04 - February 2011

As described in the Technical Guidance LAQM-TG-16 if there is more than one collocation study then the A factors should not be averaged but an approximation should be derived by averaging the B values. For example if there are two studies of 22% and 28% the average would be 25%. This is expressed as a factor, e.g 0.25, then 1 is added to this, 0.25+1.00 = 1.25. Finally take the inverse to give the bias adjustment factor 1/1.25=0.80.
We had 2 B values of 28% and 18%. Average = 23% = 0.23+1=1.23. Inverse of this is 1/1.23 = 0.81. Therefore we have a Bias adjustment factor of **0.81.**



Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment, From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Data Quality Check: Diffusion Tubes Precision Check
1	07/01/2015	05/02/2015	33.6	34.0		33.8	0.28	0.84	2.54	Good
2	05/02/2015	06/03/2015	31.0	34.7		32.9	2.62	7.96	23.51	Good
3	06/03/2015	10/04/2015	29.4	32.0		30.7	1.84	5.99	16.52	Good
4	10/04/2015	29/04/2015	23.0	23.0		23.0	0.00	0.00	0.00	Good
5	29/04/2015	27/05/2015	18.3	18.4		18.4	0.07	0.39	0.64	Good
6	27/05/2015	30/06/2015	26.3	25.3		25.8	0.71	2.74	6.35	Good
7	30/06/2015	29/07/2015	22.6	23.5		23.1	0.64	2.76	5.72	Good
8	29/07/2015	25/08/2015	22.9	wrongly installed						
9	25/08/2015	29/09/2015	28.0	37.7		32.9	6.86	20.88	61.63	Poor Precision
10	29/09/2015	27/10/2015	39.2	40.4		39.8	0.85	2.13	7.62	Good
11	27/10/2015	01/12/2015	2.0	2.0		2.0	0.00	0.00	0.00	Good
12	01/12/2015	05/01/2015	53.8	52.4		53.1	0.99	1.86	8.89	Good
13										

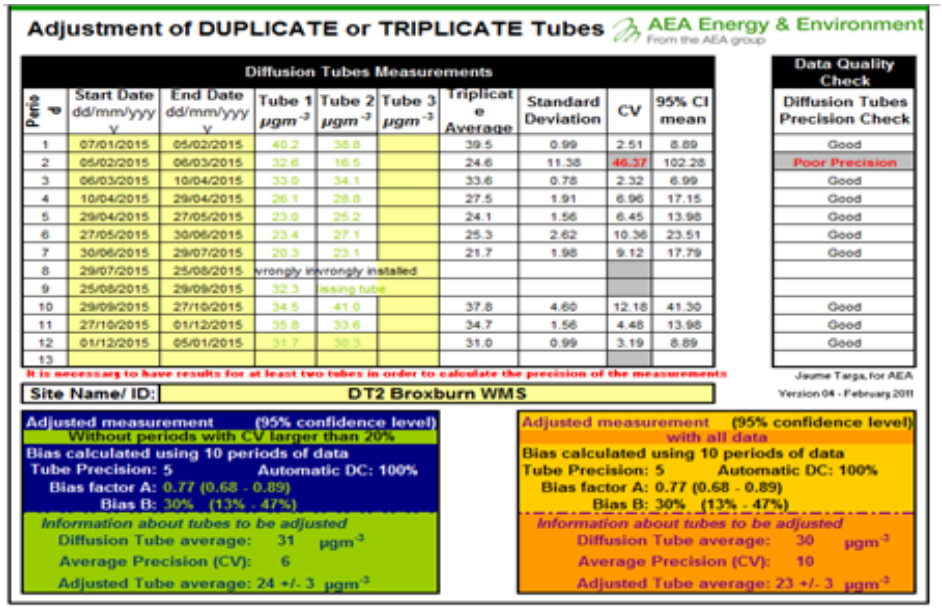
It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT1 Newton

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 28 µgm^{-3}
Average Precision (CV): 2
Adjusted Tube average: 22 +/- 3 µgm^{-3}

Adjusted measurement (95% confidence level) with all data
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 29 µgm^{-3}
Average Precision (CV): 4
Adjusted Tube average: 22 +/- 3 µgm^{-3}



Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment, From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Data Quality Check: Diffusion Tubes Precision Check
1	07/01/2015	05/02/2015	40.2	38.8		39.5	0.99	2.51	8.89	Good
2	05/02/2015	06/03/2015	32.6	16.5		24.6	11.38	46.37	102.28	Poor Precision
3	06/03/2015	10/04/2015	33.0	34.1		33.6	0.78	2.32	6.99	Good
4	10/04/2015	29/04/2015	26.1	28.8		27.5	1.91	6.96	17.15	Good
5	29/04/2015	27/05/2015	23.0	25.2		24.1	1.56	6.45	13.98	Good
6	27/05/2015	30/06/2015	23.4	27.1		25.3	2.62	10.36	23.51	Good
7	30/06/2015	29/07/2015	20.3	23.1		21.7	1.98	9.12	17.79	Good
8	29/07/2015	25/08/2015	wrongly in	wrongly installed						
9	25/08/2015	29/09/2015	32.3	missing tube						
10	29/09/2015	27/10/2015	34.5	41.0		37.8	4.60	12.18	41.30	Good
11	27/10/2015	01/12/2015	35.8	33.6		34.7	1.56	4.48	13.98	Good
12	01/12/2015	05/01/2015	31.7	30.3		31.0	0.99	3.19	8.89	Good
13										

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

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT2 Broxburn WMS

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%
Bias calculated using 10 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.77 (0.68 - 0.89)
Bias B: 30% (13% - 47%)
Information about tubes to be adjusted
Diffusion Tube average: 31 µgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: 24 +/- 3 µgm^{-3}

Adjusted measurement (95% confidence level) with all data
Bias calculated using 10 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.77 (0.68 - 0.89)
Bias B: 30% (13% - 47%)
Information about tubes to be adjusted
Diffusion Tube average: 30 µgm^{-3}
Average Precision (CV): 10
Adjusted Tube average: 23 +/- 3 µgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Data Quality Check: Diffusion Tubes Precision Check
1	07/01/2015	05/02/2015	36.5	28.5		32.5	5.66	17.41	50.82	Good
2	05/02/2015	06/03/2015	25.0	27.7		26.4	1.91	7.25	17.15	Good
3	06/03/2015	10/04/2015	33.5	32.0		32.8	1.06	3.24	9.53	Good
4	10/04/2015	29/04/2015	33.9	34.0		34.0	0.07	0.21	0.64	Good
5	29/04/2015	27/05/2015	25.7	29.1		27.4	2.40	8.77	21.60	Good
6	27/05/2015	30/06/2015	27.5	26.1		26.8	0.99	3.69	8.89	Good
7	30/06/2015	29/07/2015	21.8	23.2		22.5	0.99	4.40	8.89	Good
8	29/07/2015	25/08/2015	27.0	wrongly installed						
9	25/08/2015	29/09/2015	33.0	29.9		31.5	2.19	6.97	19.69	Good
10	29/09/2015	27/10/2015	42.8	38.5		40.7	3.04	7.48	27.32	Good
11	27/10/2015	01/12/2015	35.2	30.0		32.6	3.68	11.28	33.04	Good
12	01/12/2015	05/01/2015	22.1	22.9		22.5	0.57	2.51	5.08	Good
13										

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

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT3 Broxburn EMS

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 10 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.77 (0.68 - 0.89)
Bias B: 30% (13% - 47%)

Information about tubes to be adjusted
Diffusion Tube average: 30 µgm^{-3}
Average Precision (CV): 7
Adjusted Tube average: 23 +/- 3 µgm^{-3}

Adjusted measurement (95% confidence level) with all data
Bias calculated using 10 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.77 (0.68 - 0.89)
Bias B: 30% (13% - 47%)

Information about tubes to be adjusted
Diffusion Tube average: 30 µgm^{-3}
Average Precision (CV): 7
Adjusted Tube average: 23 +/- 3 µgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Data Quality Check: Diffusion Tubes Precision Check
1	07/01/2015	05/02/2015	21.3	34.3		27.8	9.19	33.07	82.59	Poor Precision
2	05/02/2015	06/03/2015	24.1	26.9		25.5	1.98	7.76	17.79	Good
3	06/03/2015	10/04/2015	33.0	31.4		32.2	1.13	3.51	10.16	Good
4	10/04/2015	29/04/2015	25.0	31.7		28.4	4.74	16.71	42.57	Good
5	29/04/2015	27/05/2015	29.8	26.7		28.3	2.19	7.76	19.69	Good
6	27/05/2015	30/06/2015	22.0	19.3		20.7	1.91	9.25	17.15	Good
7	30/06/2015	29/07/2015	23.1	24.3		23.7	0.85	3.58	7.62	Good
8	29/07/2015	25/08/2015	wrongly in	23.7						
9	25/08/2015	29/09/2015	33.4	22.3		27.9	7.85	28.18	70.52	Poor Precision
10	29/09/2015	27/10/2015	38.9	42.1		40.5	2.26	5.59	20.33	Good
11	27/10/2015	01/12/2015	28.9	33.9		31.4	3.54	11.26	31.77	Good
12	01/12/2015	05/01/2015	20.7	28.9		24.8	5.80	23.38	52.10	Poor Precision
13										

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

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT5 Broxburn East Mains Industrial Estate

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)

Information about tubes to be adjusted
Diffusion Tube average: 29 µgm^{-3}
Average Precision (CV): 8
Adjusted Tube average: 22 +/- 3 µgm^{-3}

Adjusted measurement (95% confidence level) with all data
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)

Information about tubes to be adjusted
Diffusion Tube average: 28 µgm^{-3}
Average Precision (CV): 14
Adjusted Tube average: 22 +/- 3 µgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	07/01/2015	05/02/2015	19.6	21.1		20.4	1.06	5.21	9.53
2	05/02/2015	06/03/2015	17.4	12.7		15.1	3.32	22.08	29.86
3	06/03/2015	10/04/2015	16.7	15.3		16.0	0.99	6.19	8.89
4	10/04/2015	29/04/2015	14.1	14.3		14.2	0.14	1.00	1.27
5	29/04/2015	27/05/2015	10.0	11.2		10.6	0.85	8.00	7.62
6	27/05/2015	30/06/2015	9.2	9.1		9.2	0.07	0.77	0.64
7	30/06/2015	29/07/2015	9.4	9.7		9.6	0.21	2.22	1.91
8	29/07/2015	25/08/2015	wrongly in	10.8					
9	25/08/2015	29/09/2015	14.8	16.2		15.5	0.99	6.39	8.89
10	29/09/2015	27/10/2015	24.8	23.2		24.0	1.13	4.71	10.16
11	27/10/2015	01/12/2015	19.2	19.6		19.4	0.28	1.46	2.54
12	01/12/2015	05/01/2015	15.9	14.1		15.0	1.27	8.49	11.44
13									

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

Data Quality Check

Diffusion Tubes Precision Check
Good
Poor Precision
Good
Good
Good
Good
Good
Good
Good
Good
Good

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT6 Dedridge

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)

Information about tubes to be adjusted
Diffusion Tube average: 15 µgm^{-3}
Average Precision (CV): 4
Adjusted Tube average: 12 +/- 2 µgm^{-3}

Adjusted measurement (95% confidence level) with all data
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)

Information about tubes to be adjusted
Diffusion Tube average: 15 µgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: 12 +/- 2 µgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	07/01/2015	05/02/2015	28.9	27.0		28.0	1.34	4.81	12.07
2	05/02/2015	06/03/2015	22.8	26.6		24.7	2.69	10.88	24.14
3	06/03/2015	10/04/2015	29.7	27.2		28.5	1.77	6.21	15.88
4	10/04/2015	29/04/2015	24.9	26.8		25.9	1.34	5.20	12.07
5	29/04/2015	27/05/2015	24.2	23.7		24.0	0.35	1.48	3.18
6	27/05/2015	30/06/2015	19.6	24.2		21.9	3.25	14.85	29.22
7	30/06/2015	29/07/2015	20.5	22.7		21.6	1.56	7.20	13.98
8	29/07/2015	25/08/2015	23.3	wrongly installed					
9	25/08/2015	29/09/2015	28.6	28.2		28.4	0.28	1.00	2.54
10	29/09/2015	27/10/2015	37.9	36.5		37.2	0.99	2.66	8.89
11	27/10/2015	01/12/2015	29.5	29.2		29.4	0.21	0.72	1.91
12	01/12/2015	05/01/2015	23.1	21.2		22.2	1.34	6.07	12.07
13									

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

Data Quality Check

Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT 7 West Calder

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)

Information about tubes to be adjusted
Diffusion Tube average: 27 µgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: 21 +/- 3 µgm^{-3}

Adjusted measurement (95% confidence level) with all data
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)

Information about tubes to be adjusted
Diffusion Tube average: 27 µgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: 21 +/- 3 µgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	07/01/2015	05/02/2015	34.2	38.5		36.4	3.04	8.36	27.32
2	05/02/2015	06/03/2015	33.0	31.1		32.1	1.34	4.19	12.07
3	06/03/2015	10/04/2015	29.6	30.7		30.2	0.78	2.58	6.99
4	10/04/2015	29/04/2015	31.5	28.7		30.1	1.98	6.58	17.79
5	29/04/2015	27/05/2015	22.6	25.2		23.9	1.84	7.69	16.52
6	27/05/2015	30/06/2015	27.6	25.6		26.6	1.41	5.32	12.71
7	30/06/2015	29/07/2015	22.2	21.9		22.1	0.21	0.96	1.91
8	29/07/2015	25/08/2015	26.0	24.8		25.4	0.85	3.34	7.62
9	25/08/2015	29/09/2015	31.6	31.8		31.7	0.14	0.45	1.27
10	29/09/2015	27/10/2015	31.6	38.8		35.2	5.09	14.46	45.74
11	27/10/2015	01/12/2015	29.0	32.1		30.6	2.19	7.18	19.69
12	01/12/2015	05/01/2015	27.4	23.4		25.4	2.83	11.14	25.41
13									

Data Quality Check

Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

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

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT8 Whitburn Cross

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 29 µgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: 23 +/- 3 µgm^{-3}

Adjusted measurement (95% confidence level) with all data
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 29 µgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: 23 +/- 3 µgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	07/01/2015	05/02/2015	29.2	29.7		29.5	0.35	1.20	3.18
2	05/02/2015	06/03/2015	21.5	21.0		21.3	0.35	1.66	3.18
3	06/03/2015	10/04/2015	23.8	22.2		23.0	1.13	4.92	10.16
4	10/04/2015	29/04/2015	21.1	22.1		21.6	0.71	3.27	6.35
5	29/04/2015	27/05/2015	14.0	15.5		14.8	1.06	7.19	9.53
6	27/05/2015	30/06/2015	15.6	14.8		15.2	0.57	3.72	5.08
7	30/06/2015	29/07/2015	13.6	12.7		13.2	0.64	4.84	5.72
8	29/07/2015	25/08/2015	17.5	wrongly installed					
9	25/08/2015	29/09/2015	18.9	22.1		20.5	2.26	11.04	20.33
10	29/09/2015	27/10/2015	28.8	30.9		29.9	1.48	4.97	13.34
11	27/10/2015	01/12/2015	23.4	23.6		23.5	0.14	0.60	1.27
12	01/12/2015	05/01/2015	18.3	21.3		19.8	2.12	10.71	19.06
13									

Data Quality Check

Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

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

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT10 Bathgate S Bridge Street

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 21 µgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 16 +/- 2 µgm^{-3}

Adjusted measurement (95% confidence level) with all data
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 21 µgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 16 +/- 2 µgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	07/01/2015	05/02/2015	38.6	36.0		37.3	1.84	4.93	16.52
2	05/02/2015	06/03/2015	32.1	31.3		31.7	0.57	1.78	5.08
3	06/03/2015	10/04/2015	31.6	31.3		31.5	0.21	0.67	1.91
4	10/04/2015	29/04/2015	31.3	32.4		31.9	0.78	2.44	6.99
5	29/04/2015	27/05/2015	24.1	26.3		25.2	1.56	6.17	13.98
6	27/05/2015	30/06/2015	25.1	24.5		24.8	0.42	1.71	3.81
7	30/06/2015	29/07/2015	24.7	24.7		24.7	0.00	0.00	0.00
8	29/07/2015	25/08/2015	wrongly in	30.4					
9	25/08/2015	29/09/2015	30.1	36.0		33.1	4.17	12.62	37.48
10	29/09/2015	27/10/2015	missing tub	44.2					
11	27/10/2015	01/12/2015	28.6	39.2		33.9	7.50	22.11	67.34
12	01/12/2015	05/01/2015	33.0	32.0		32.5	0.71	2.18	6.35
13									

Data Quality Check

Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Poor Precision
Good

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

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT12 Bathgate King Street

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 30 µgm^{-3}
Average Precision (CV): 4
Adjusted Tube average: 24 +/- 3 µgm^{-3}

Adjusted measurement (95% confidence level) with all data
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 31 µgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 24 +/- 3 µgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Data Quality Check: Diffusion Tubes Precision Check
1	07/01/2015	05/02/2015	13.4	17.9		15.7	3.18	20.33	28.59	Poor Precision
2	05/02/2015	06/03/2015	12.8	16.9		14.9	2.90	19.52	26.05	Good
3	06/03/2015	10/04/2015	13.1	12.7		12.9	0.28	2.19	2.54	Good
4	10/04/2015	29/04/2015	10.6	11.7		11.2	0.78	6.98	6.99	Good
5	29/04/2015	27/05/2015	8.6	7.8		8.2	0.57	6.90	5.08	Good
6	27/05/2015	30/06/2015	7.6	7.9		7.8	0.21	2.74	1.91	Good
7	30/06/2015	29/07/2015	6.2	5.0		5.6	0.85	15.15	7.62	Good
8	29/07/2015	25/08/2015	9.0	wrongly installed						
9	25/08/2015	29/09/2015	11.0	10.6		10.8	0.28	2.62	2.54	Good
10	29/09/2015	27/10/2015	18.0	16.8		17.4	0.85	4.88	7.62	Good
11	27/10/2015	01/12/2015	15.9	15.6		15.8	0.21	1.35	1.91	Good
12	01/12/2015	05/01/2015	14.3	15.5		14.9	0.85	5.69	7.62	Good
13										

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

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT13 Bathgate High Street

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 12 µgm^{-3}
Average Precision (CV): 7
Adjusted Tube average: 9 +/- 1 µgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 12 µgm^{-3}
Average Precision (CV): 8
Adjusted Tube average: 10 +/- 1 µgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Data Quality Check: Diffusion Tubes Precision Check
1	07/01/2015	05/02/2015	36.4	30.6		33.5	4.10	12.24	36.85	Good
2	05/02/2015	06/03/2015	30.2	32.4		31.3	1.56	4.97	13.98	Good
3	06/03/2015	10/04/2015	38.1	31.5		34.8	4.67	13.41	41.93	Good
4	10/04/2015	29/04/2015	36.0	31.4		33.7	3.25	9.65	29.22	Good
5	29/04/2015	27/05/2015	31.7	26.2		29.0	3.89	13.43	34.94	Good
6	27/05/2015	30/06/2015	29.2	24.3		26.8	3.46	12.95	31.13	Good
7	30/06/2015	29/07/2015	26.1	30.0		28.1	2.76	9.83	24.78	Good
8	29/07/2015	25/08/2015	wrongly in	wrongly installed						
9	25/08/2015	29/09/2015	31.3	33.0		32.2	1.20	3.74	10.80	Good
10	29/09/2015	27/10/2015	46.9	38.2		42.6	6.15	14.46	55.27	Good
11	27/10/2015	01/12/2015	38.1	35.3		36.7	1.98	5.39	17.79	Good
12	01/12/2015	05/01/2015	ube missir	25.9						
13										

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

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT15 Linlithgow High Street NW

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 33 µgm^{-3}
Average Precision (CV): 10
Adjusted Tube average: 26 +/- 3 µgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 33 µgm^{-3}
Average Precision (CV): 10
Adjusted Tube average: 26 +/- 3 µgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Data Quality Check: Diffusion Tubes Precision Check
1	07/01/2015	05/02/2015	45.4	42.4		43.9	2.12	4.83	19.06	Good
2	05/02/2015	06/03/2015	46.2	48.1		47.2	1.34	2.85	12.07	Good
3	06/03/2015	10/04/2015	45.2	41.9		43.6	2.33	5.36	20.97	Good
4	10/04/2015	29/04/2015	35.2	41.7		38.5	4.60	11.95	41.30	Good
5	29/04/2015	27/05/2015	32.4	40.5		36.5	5.73	15.71	51.46	Good
6	27/05/2015	30/06/2015	39.0	29.0		34.0	7.07	20.80	63.53	Poor Precision
7	30/06/2015	29/07/2015	30.6	32.7		31.7	1.48	4.69	13.34	Good
8	29/07/2015	25/08/2015	34.1	36.6		35.4	1.77	5.00	15.88	Good
9	25/08/2015	29/09/2015	40.5	35.2		37.9	3.75	9.90	33.67	Good
10	29/09/2015	27/10/2015	45.7	50.1		47.9	3.11	6.50	27.95	Good
11	27/10/2015	01/12/2015	49.9	46.0		48.0	2.76	5.75	24.78	Good
12	01/12/2015	05/01/2015	40.0	37.7		38.9	1.63	4.19	14.61	Good
13										

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

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT16 Linlithgow High Street SW

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 41 µgm^{-3}
Average Precision (CV): 7
Adjusted Tube average: 32 +/- 4 µgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 40 µgm^{-3}
Average Precision (CV): 8
Adjusted Tube average: 31 +/- 4 µgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	07/01/2015	05/02/2015	41.7	31.6		36.7	7.14	19.49	64.17
2	05/02/2015	06/03/2015	38.0	34.3		36.2	2.62	7.24	23.51
3	06/03/2015	10/04/2015	35.0	34.3		34.7	0.49	1.43	4.45
4	10/04/2015	29/04/2015	31.0	32.9		32.0	1.34	4.21	12.07
5	29/04/2015	27/05/2015	24.2	30.0		27.1	4.10	15.13	36.85
6	27/05/2015	30/06/2015	27.5	27.3		27.4	0.14	0.52	1.27
7	30/06/2015	29/07/2015	21.4	21.3		21.4	0.07	0.33	0.64
8	29/07/2015	25/08/2015	wrongly in	wrongly installed					
9	25/08/2015	29/09/2015	31.1	29.8		30.5	0.92	3.02	8.26
10	29/09/2015	27/10/2015	32.7	34.3		33.5	1.13	3.38	10.16
11	27/10/2015	01/12/2015	33.7	37.3		35.5	2.55	7.17	22.87
12	01/12/2015	05/01/2015	26.4	25.4		25.9	0.71	2.73	6.35
13									

Data Quality Check

Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

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

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT17 Linlithgow High Street NE

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 31 µgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: 24 +/- 3 µgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 31 µgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: 24 +/- 3 µgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	07/01/2015	05/02/2015	41.6	44.9		43.3	2.33	5.40	20.97
2	05/02/2015	06/03/2015	41.5	42.4		42.0	0.64	1.52	5.72
3	06/03/2015	10/04/2015	37.3	39.2		38.3	1.34	3.51	12.07
4	10/04/2015	29/04/2015	29.6	33.0		31.3	2.40	7.68	21.60
5	29/04/2015	27/05/2015	28.2	32.3		30.3	2.90	9.58	26.05
6	27/05/2015	30/06/2015	35.0	32.3		33.7	1.91	5.67	17.15
7	30/06/2015	29/07/2015	31.5	32.0		31.8	0.35	1.11	3.18
8	29/07/2015	25/08/2015	wrongly in	wrongly installed					
9	25/08/2015	29/09/2015	39.2	36.8		38.0	1.70	4.47	15.25
10	29/09/2015	27/10/2015	48.9	42.5		45.7	4.53	9.90	40.66
11	27/10/2015	01/12/2015	47.4	44.8		46.1	1.84	3.99	16.52
12	01/12/2015	05/01/2015	40.3	37.7		39.0	1.84	4.71	16.52
13									

Data Quality Check

Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

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

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT18 Linlithgow High Street SE

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 38 µgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 30 +/- 4 µgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 38 µgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 30 +/- 4 µgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	07/01/2015	05/02/2015	38.8	37.9		38.4	0.64	1.66	5.72
2	05/02/2015	06/03/2015	36.5	33.8		35.2	1.91	5.43	17.15
3	06/03/2015	10/04/2015	35.9	37.2		36.6	0.92	2.52	8.26
4	10/04/2015	29/04/2015	35.7	36.0		35.9	0.21	0.59	1.91
5	29/04/2015	27/05/2015	30.0	32.1		31.1	1.48	4.78	13.34
6	27/05/2015	30/06/2015	28.4	29.3		28.9	0.64	2.21	5.72
7	30/06/2015	29/07/2015	29.0	25.7		27.4	2.33	8.53	20.97
8	29/07/2015	25/08/2015	29.5	wrongly installed					
9	25/08/2015	29/09/2015	35.3	34.6		35.0	0.49	1.42	4.45
10	29/09/2015	27/10/2015	37.7	47.2		42.5	6.72	15.82	60.35
11	27/10/2015	01/12/2015	38.3	38.9		38.6	0.42	1.10	3.81
12	01/12/2015	05/01/2015	30.7	27.7		29.2	2.12	7.26	19.06
13									

Data Quality Check

Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

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

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT19 Linlithgow High Street N

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 34 µgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 27 +/- 3 µgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)
Information about tubes to be adjusted
Diffusion Tube average: 34 µgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 27 +/- 3 µgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	07/01/2015	05/02/2015	49.0	40.3		44.7	6.15	13.78	55.27
2	05/02/2015	06/03/2015	43.2	45.7		44.5	1.77	3.98	15.88
3	06/03/2015	10/04/2015	36.8	36.8		36.8	0.00	0.00	0.00
4	10/04/2015	29/04/2015	35.7	40.1		37.9	3.11	8.21	27.95
5	29/04/2015	27/05/2015	34.6	34.1		34.4	0.35	1.03	3.18
6	27/05/2015	30/06/2015	37.0	34.0		35.5	2.12	5.98	19.06
7	30/06/2015	29/07/2015	31.5	30.4		31.0	0.78	2.51	6.99
8	29/07/2015	25/08/2015	wrongly in	35.6					
9	25/08/2015	29/09/2015	36.9	39.3		38.1	1.70	4.45	15.25
10	29/09/2015	27/10/2015	50.8	45.9		48.4	3.46	7.17	31.13
11	27/10/2015	01/12/2015	47.2	45.9		46.6	0.92	1.97	8.26
12	01/12/2015	05/01/2015	37.5	37.4		37.5	0.07	0.19	0.64
13									

Data Quality Check
Diffusion Tubes Precision Check
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

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

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT20 Linlithgow High Street South

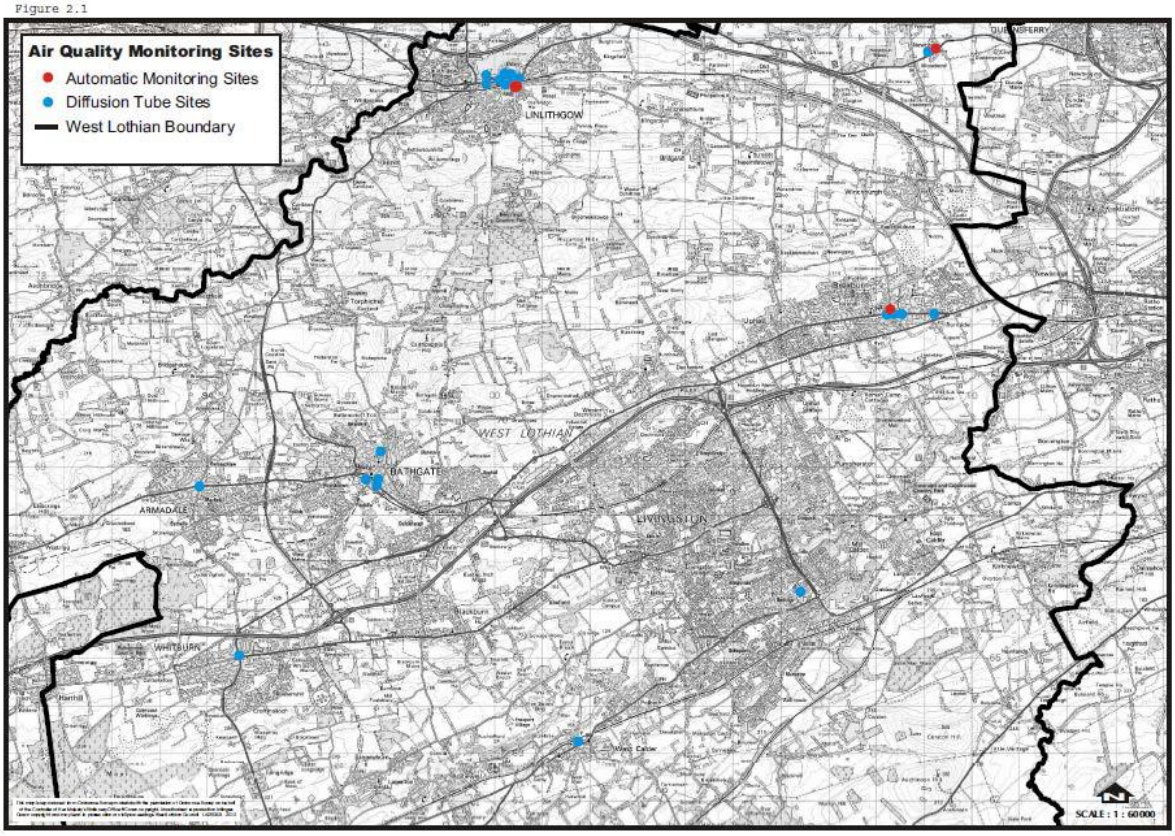
Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)

Information about tubes to be adjusted
Diffusion Tube average: 40 μgm^{-3}
Average Precision (CV): 4
Adjusted Tube average: 31 +/- 4 μgm^{-3}

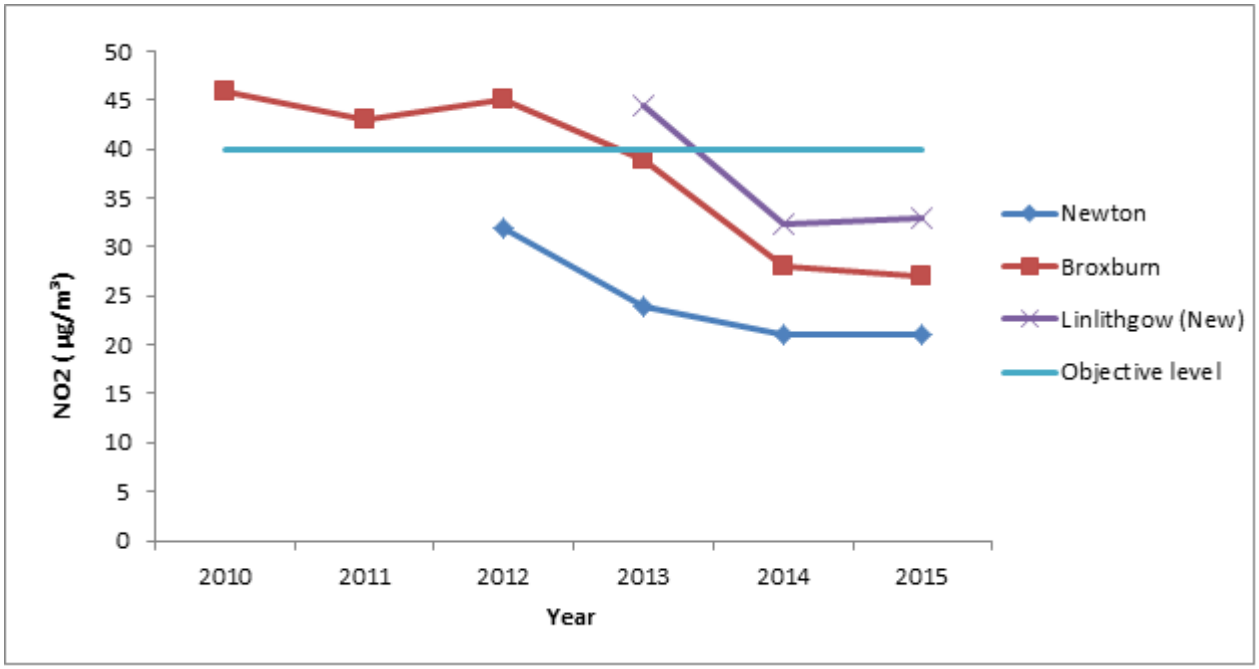
Adjusted measurement (95% confidence level)
with all data
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 0.78 (0.7 - 0.89)
Bias B: 28% (12% - 44%)

Information about tubes to be adjusted
Diffusion Tube average: 40 μgm^{-3}
Average Precision (CV): 4
Adjusted Tube average: 31 +/- 4 μgm^{-3}

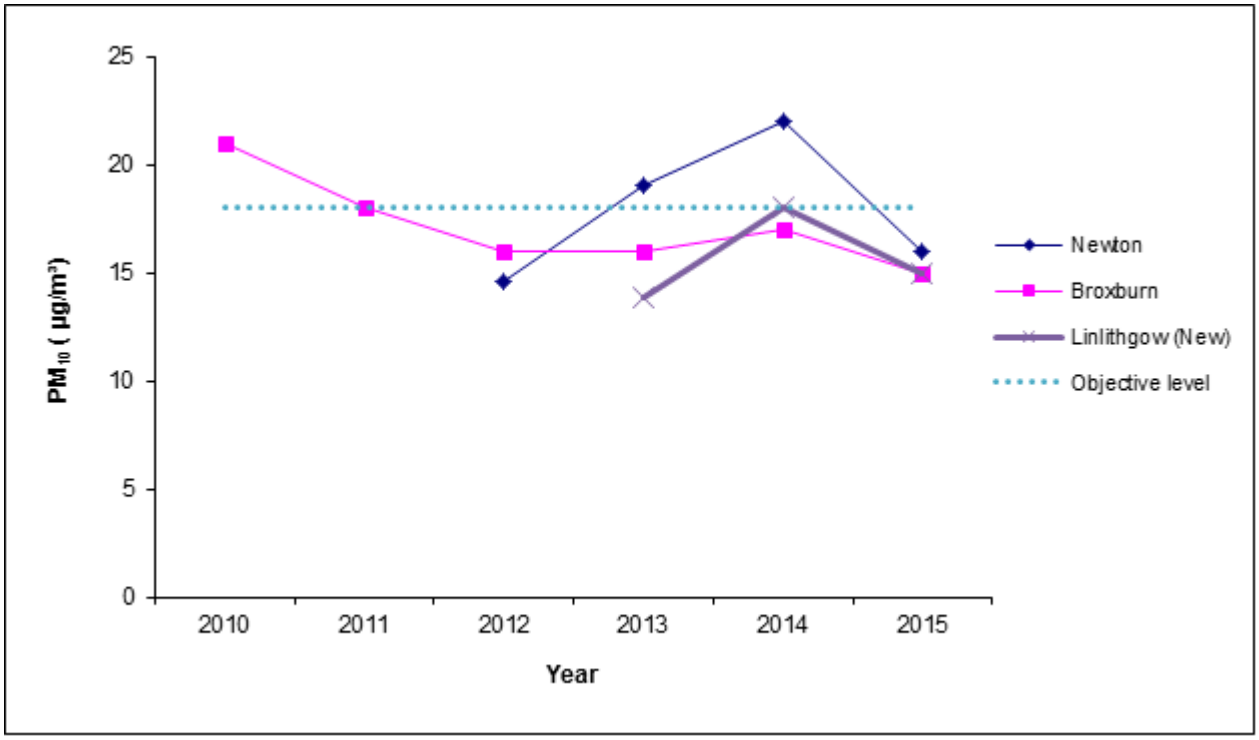
Figure 2.1



NO2 Trend Data graph



PM10 Trend Data Graph



Glossary of Terms.

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
APR	Air quality Annual Progress Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

Broxburn Air Quality Action Plan (AQAP)

LAQM Policy Guidance PG(S) (16)

LAQM Technical Guidance (TG16)